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資料 1. 調査団員・氏名

1. 協力準備調査

1) 第一回目現地調査

担当業務	氏名	所属
総括	永瀬 朝則	国際協力機構 ルワンダ事務所
技術アドバイザー	大櫃 宣弘	国際協力機構 地球環境部
協力企画	加治 貴	国際協力機構 地球環境部
業務主任/水道計画①	篠田 健司	国際航業（株）
副業務主任/水道計画②	吉川 健	国際航業（株）
送水管	桃園 時矢	横浜ウォーター（株）
施設計画・設計/地質	樋口 宏之	（株）協和コンサルタンツ
運営維持管理/ソフトコンポーネント計画	和田 善晴	横浜ウォーター（株）
設備/機材計画	佐藤 正章	国際航業（株）
施工・調達計画①/積算	杉原 千鶴	国際航業（株）
環境社会配慮	可児 圭子	国際航業（株）
免税情報収集/再委託管理	川本 真寛	国際航業（株）

2) 第二回目現地調査

担当業務	氏名	所属
免税情報収集/再委託管理	川本 真寛	国際航業（株）

3) 第三回目現地調査

担当業務	氏名	所属
業務主任/水道計画①	篠田 健司	国際航業（株）
免税情報収集/再委託管理	川本 真寛	国際航業（株）

2. 概要説明

担当業務	氏名	所属
総括	益田 信一	国際協力機構 資金協力業務部
協力企画	庄司 いずみ	国際協力機構 地球環境部
業務主任/水道計画①	篠田 健司	国際航業（株）
副業務主任/水道計画②	吉川 健	国際航業（株）

資料 2. 調査行程

1. 協力準備調査

1) 第一回目現地調査

日程	曜日	コンサルタント団員								
		業務主任 /水道計画① 篠田 健司	副業務主任 /水道計画② 吉川 健	送水管	施設計画・設計/地質	運営維持管理/ソフト コンポーネント計画	設備/機材計画	施工・調達計画① /経算	環境社会配慮	免税情報収集 /再委託管理
		篠田 健司	吉川 健	桃園 時夫	樋口 宏之	和田 善晴	佐藤 正章	杉原 千鶴	可見 圭子	川本 真寛
1	11/4	土	HND(羽田)→DOH(ドーハ)		NRT(成田)→DOH(ドーハ)	HND(羽田)→DOH(ドーハ)	HND(羽田)→DOH(ドーハ)			
2	11/5	日	DOH(ドーハ)→KGL(キガリ)		DOH(ドーハ)→KGL(キガリ)	DOH(ドーハ)→KGL(キガリ)	DOH(ドーハ)→KGL(キガリ)			同日まで他案件に従事
3	11/6	月	JICA事務所/WASAC協議 インフラ省表敬		JICA事務所/ WASACと協議	JICA事務所/ WASACと協議	JICA事務所/ WASACと協議			JICA事務所/WASAC協議 インフラ省表敬
4	11/7	火	現地調査		現地調査/資料収集	送水幹線確認、Nzove浄水 場、Ntora配水池状況確認	現地調査			既存送水管ルートの踏査
5	11/8	水	ミニッツ案協議		現地調査/資料収集	Nzove浄水場、Ntora配水池 状況確認	Nzove浄水場、機器・設備仕 様調査			既存送水管ルートの踏査
6	11/9	木	WASACとミニッツ締結		現地調査/資料収集	Nzove浄水場運転状況確認	Nzove浄水場、機器・設備仕 様調査			現地再委託業務準備
7	11/10	金	大使館表敬		現地調査/資料収集	資料整理	Nzove浄水場、機器・設備仕様 調査/Ntora配水池 調査			現地再委託業務準備
8	11/11	土	資料整理		流量・水圧測定準備	資料整理	資料整理			資料整理
9	11/12	日	資料整理		資料整理	資料整理	資料整理			資料整理
10	11/13	月	現地再委託業務準備		流量・水圧測定準備	Ntora配水池水圧調査	Nzove-1浄水場 既設送水 ポンプ更新計画の検討			現地再委託業務準備
11	11/14	火	既存送水管ルートの踏査		既存送水管ルートの踏査	送水管ルート確認	既存送水管ルートの踏査			既存送水管ルートの踏査
12	11/15	水	既存送水管ルートの踏査		流量・水圧測定準備	送水管ルート確認	Nzove-1浄水場、送水ポンプ 更新工事に関する調査			既存送水管ルートの踏査
13	11/16	木	新規送水管ルートの踏査		現地調査	Ntora配水池配水ルート、水 圧・機器調査	Nzove浄水場、送水ポンプ増 設工事にかかる調査			現地再委託業務準備
14	11/17	金	新規送水管ルートの踏査		資料整理	Nzove浄水場SCADA調査、 水質試験所訪問	Nzove浄水場、送水ポンプ増設 工事にかかる調査/Ntora配水 場 測量調査	NRT(成田)→DOH(ドーハ)	NRT(成田)→DOH(ドーハ)	現地再委託契約の圖書配布
15	11/18	土	資料整理	HND(羽田)→DOH(ドーハ)	資料整理	資料整理	資料整理	DOH(ドーハ)→KGL(キガリ)	DOH(ドーハ)→KGL(キガリ)	資料整理
16	11/19	日	資料整理	DOH(ドーハ)→KGL(キガリ)	資料整理	資料整理	資料整理	書類整理		資料整理
17	11/20	月	国内協議、WASACとの協議		現場踏査、国内協議	Nzove浄水場 メンテナンスに 係るインタビュー	Nzove-1浄水場内、送水配管 切り替え工事計画の検討	慣例法規取得	送水管設置予定ルート視察	情報収集調査に係るC/P機 関との協議
18	11/21	火	RTDA訪問(未舗装国道につ いて協議)		流量測定	資料整理	Nzove浄水場運転状況調査 取水施設調査	Nzove浄水場、機器メーカ調 査	現地調査	RTDA訪問(未舗装国道につ いて協議)
19	11/22	水	新規送水管ルート(国道沿 いの踏査)		既設管現場踏査	流量・水圧測定	Nzove浄水場運転状況調査 送水管AV確認	調査結果の整理	現地調査	Rwanda Standard board 資料調査
20	11/23	木	新規送水管ルート(国道沿 いの踏査)		試掘	流量・水圧測定、現地調査	Nzove浄水場 プロセッサート固 作成、メンテナンス業務調査	KGL(キガリ)→DOH(ドーハ)	見様り収集	EIA制度及びEIAコンサル タント候補調査
21	11/24	金	送水管ルート案の検討		試掘	送水管路線調査	Nzove浄水場運転状況調査 送水管位置確認	DOH(ドーハ)→NRT(成田)	見様り収集	EIA制度及びEIAコンサル タント候補調査
22	11/25	土	資料整理		資料整理	資料整理	資料整理		現地調査	資料調査
23	11/26	日	資料整理		資料整理	資料整理	資料整理		書類整理	資料調査
24	11/27	月	送水管ルート案の検討		試掘	資料整理	浄水場メンテナンスに係る資 料作成		現地調査	EIA調査及びRAP担当C/Pと 協議
25	11/28	火	新規送水管ルート(河川沿 いの踏査)		試掘	送水管路線調査	浄水場運転、メンテナンスに 係る資料作成	見様り収集	現地調査(プロジェクトによる 影響範囲把握)	現地再委託業者との契約交 渉、調査対象エリアの踏査
26	11/29	水	テクニカルノートの作成		試掘、水圧測定	流量・水圧測定	Nzove浄水場、Ntora配水池 機器調査	見様り収集	現地調査(プロジェクトによる 影響範囲把握)	現地再委託業者との契約 向)
27	11/30	木	テクニカルノートの作成		試掘	流量・水圧測定、現地調査	報告書作成	見様り収集	現地調査(プロジェクトによる 影響範囲把握)	情報収集調査(他ドナーの動 向)
28	12/1	金	テクニカルノートの作成		試掘	現地調査	Ntora配水池以降配水池運 用調査	見様り収集	EIAコンサルタント選定準備	情報収集調査(他ドナーの動 向)
29	12/2	土	資料整理		資料整理	KGL(キガリ)→DOH(ドーハ)	KGL(キガリ)→DOH(ドーハ)		現地調査	資料調査
30	12/3	日	資料整理		資料整理	DOH(ドーハ)→NRT(成田)	DOH(ドーハ)→NRT(成田)		書類整理	資料調査
31	12/4	月	ルート案に関するWASACと の協議		試掘				試掘調査	EIA調査及びRAP担当C/P と協議
32	12/5	火	ルート案に関するWASACと の協議	同日まで他案件に従事	試掘				試掘調査	保健省、公共サービス労働 省インタビュー
33	12/6	水	ルート案に関する現地踏査と 及び現場協議(インフラ省、 RTDA、WASAC)	ルート案に関する現地踏査と 及び現場協議(インフラ省、 RTDA、WASAC)	新設路線踏査				試掘調査	Cell事務所(2箇所)訪問 (PAH散把握のため)
34	12/7	木	資料収集(RTDA)と整理	資料収集(RTDA)と整理	試掘				試掘調査	District Council Offices (NyarugengeとGasabo)訪 問
35	12/8	金	ルート案に関するWASACと の協議	ルート案に関するWASACと の協議	流量測定				試掘調査	EIAコンサルタント選定
36	12/9	土	KGL(キガリ)→DOH(ドーハ)	資料整理	資料整理				現地調査	資料調査
37	12/10	日	DOH(ドーハ)→NRT(成田)	資料整理	資料整理				書類整理	資料調査
38	12/11	月		ルート案に関するJICAとの 協議/現地踏査(ルート案)	新設路線踏査				見様り収集	EIAコンサルタントとEIA調査 /RAP作成について協議
39	12/12	火		資料収集と打合せ (Culligan)/資料整理	試掘				見様り収集	EIAコンサルタントとEIA調査 /RAP作成について協議
40	12/13	水		資料収集(RTDA)/河川の 水文データの整理	試掘				見様り収集	EIAコンサルタントとEIA調査 /RAP作成について協議
41	12/14	木		河川横断に関する資料収 集、協議(RWFA)	新設路線踏査				見様り収集	キガリ市Health & Environment Unit(廃棄物管理担当)訪問
42	12/15	金		WASACとテクニカルノートの 協議	新設路線踏査				KGL(キガリ)→DOH(ドーハ)	KGL(キガリ)→DOH(ドーハ)
43	12/16	土		資料整理	KGL(キガリ)→DOH(ドーハ)				DOH(ドーハ)→NRT(成田)	DOH(ドーハ)→NRT(成田)
44	12/17	日		資料整理	DOH(ドーハ)→NRT(成田)					
45	12/18	月		WASACとテクニカルノートの 最終化/資料収集(RTDA)						
46	12/19	火		JICA事務所帰国報告/資料収 集(キガリ市)						
47	12/20	水		KGL(キガリ)→DOH(ドーハ)						
				DOH(ドーハ)→NRT(成田)						

2) 第二回目現地調査

日程	曜日	コンサルタント団員	
		免税情報収集 /再委託管理	
		川本 真寛	
1	2/21	水	同日まで他案件に従事
2	2/22	木	現地再委託業務(測量調査) の進捗管理
3	2/23	金	現地再委託業務(地盤調査) の進捗管理
4	2/24	土	資料整理
5	2/25	日	資料整理
6	2/26	月	現地再委託業務(地盤調査) の進捗管理
7	2/27	火	現地再委託業務(環境社会配 慮)の進捗管理
8	2/28	水	免税情報収集、先方負担事項 (ボックスカルバート)進捗確認
9	3/1	木	同日から他案件に従事

3) 第三回目現地調査

日程	曜日	コンサルタント団員	
		業務主任 /水道計画①	免税情報収集 /再委託管理
		篠田 健司	川本 真寛
1	4/16	月	HND(羽田)→DOH(ドーハ) DOH(ドーハ)→KGL(キガリ)
2	4/17	火	WASACとの協議
3	4/18	水	現場踏査
4	4/19	木	WASACとの協議
5	4/20	金	WASACとの協議
6	4/21	土	現場踏査(測量)
7	4/22	日	現場踏査(測量)
8	4/23	月	WASACとの協議
9	4/24	火	KGL(キガリ)→DOH(ドーハ)
10	4/25	水	DOH(ドーハ)→NRT(成田)

2. 概要説明

日程		曜日	コンサルタント団員	
			業務主任 /水道計画①	副業務主任 /水道計画②
			篠田 健司	吉川 健
1	8/26	日	NRT(成田)→DOH(ドーハ)	
2	8/27	月	DOH(ドーハ)→KGL(キガリ)	同日まで他案件に従事
3	8/28	火	WASACとの協議	
4	8/29	水	DODミッション	
5	8/30	木	DODミッション	
6	8/31	金	DODミッション	
7	9/1	土	地方給水技プロサイト訪問	
8	9/2	日	灌漑プロジェクトサイト訪問	
9	9/3	月	JICA事務所との協議	
10	9/4	火	KGL(キガリ)→DOH(ドーハ)	同日から他案件に従事
11	9/5	水	DOH(ドーハ)→NRT(成田)	

資料 3. 関係者（面会者）リスト

氏名	所属・役職
WASAC	
Mr.Aime MUZOLA	Chief Executive Officer of WASAC
Mr.Methode RUTAGUNGIRA	Director of Urban Water and Sewerage Services
Mr.Joseph MURENZI	Director of Water and Sanitation Development Services
Mr.Cyrille Shumbusho	Urban Water and Sewerage Services
Mr.Celestin Mwambutsa	Head of Water Distribution Services
Mr.KAMANA Jean Claude	Water Distribution Officer of Kachiru Branch
Mr.RWABUNEZA Claudien	Water Distribution Officer
Mr.Désiré Ntamuturano	Head of leak detection and pressure management
Mr.GASHUGI Innocent	Manager of Water Operations Services
Mr.Jean Berchmas Bahige	Manager of Non Revenue Water
Mr.Jean Pierre Nkeramihigo	Head of Water Production Service
Mr.KAYITARE Jean Paul	Head of Zoning and Mapping Services
Mr.Claudien MAZIMPAKA	GIS Officer
Mr.Desire UWITONZE	GIS Officer
Mr.DUSHIMIMANA Alfred	ICT Manager
Mr.Lambert TUYISHIME	Manager of Cooperative Planning and Strategy
Mr.MUREKEZI Dominique	Manager of Utility Planning Unit
Mr.Olivier Kanangire	Head of Sanitation Project Implementation Unit (Acting director of Development department)
Mr.Denise	Head of Kimisagara Treatment Plant
Mr.BUSHAYIJA Yasin	Head of Nzove WTP
Mr.Charles Majabo	Maintenance officer of Nzove WTP
Mr.Gynaud Habimana	Production and water quality of Nzove WTP
Mr.Niwrnzizn Emmy	Operator of Nzove WTP
Mr.DUSABE Aimable	Tax officer
Mr.Telesphore Habumuremyi	Officer for REG
Ms.UMUHOZA MBATEYE Francine Aimée	Planning, Research & Development Officer
インフラ省 (MININFRA : Ministry of Infrastructure)	
Mr.BYIRINGIRO Alfred	Division Manager, Transport Division
Ms.Marcelline Kayitesi	Division Manager, WATSAN
Mr.Venuste Mpimbazimana	Urban Water Supply Senior Engineer
Mr.Hategekimana Emmanuel	Senior Engineer/ Rural Water Supply, Water and Sanitation Division
Ms.MUKAMWIZA Leoncia	Policy Research / WATSAN SWAP Secretariat, Water and Sanitation Division
Ms.Monique Kagaga	M&E Expert, Water and Sanitation Division
Ms.HATEGEKIMANA UWITONZE Bova	Water and Sanitation Economist, Water and Sanitation Division
キガリ市 (City of Kigali)	
Mr.RWUNGUKO Jean d'Amour	Acting Director of Infrastructure Unit
Mr.Mugabo John	Solid and Waste Management Officer

氏名	所属・役職
Mr.Regis MUNYENTWALI	Traffic engineer, Project Manager for Kigali Urban Road Upgrading Project (54.56km)
Mr.KAREMERA Patrick	Road Development Engineer
Mr.TUYISENGE Fidele	
Mr.Gatabazi Jean Damascene	Construction supervision, Hycogec
Mr.RUSINE Alphonse	Land Surveyor and GIS, Gasabo District
Mr.DUSABEYEZU Cesar	Land Management Team Leader, Nyarugenge District
Mr.NIYOTWIZERA Vincent	Social Economic Department Officer, Ruhango Cell
Mr.NTABARESHYA Florian	Nurse, Rutonde Health Center

財務・経済計画省 (MINECOFIN: Ministry of Finance and Economic Planning)

Mr.Gerald MUGABE	External Finance Specialist, External Finance Division
Mr.Isaac Rugamba	External Resources Mobilization Officer, External Finance Division
Ms.KANTENGWA Lilian	External Finance Intern, External Finance Division
Mr.Jackson Rugambwa	Tax Policy Economist

官公庁

Mr.Utwali Jean dieu	HIV Prevention Unit, Ministry of Health
Ms.Ellen URAYENEZA	Occupational Safety and Health Officer, Ministry of Public Service and Labour
Mr.Mucyo	Rwanda Meteorological Agency
Mr.Jackson	Traffic Road Safety Department/ Secretary of Commissions, Rwanda National Police
Mr.Johnny Uwimana	Rwanda Standard Board
Mr.MUHOZA Albert	Road Rehabilitation Specialist, Rwanda Transport Development Agency (RTDA)
Mr.MURENGERANTWARI Gustave Adolphe	District Support, M&E and Training Senior Engineer, Rwanda Transport Development Agency (RTDA)
Mr.Pacifique MPORANANAYO	Urban Transport Planning Specialist, Rwanda Transport Development Agency (RTDA)
Mr.Davis Bugingo	Director of Water Resources Allocation and Regulation, Water Resources Department, Rwanda Water and Forestry Authority(RWFA)
Mr.Tetero	Head of Water Resources Department, Rwanda Water and Forestry Authority(RWFA)
Mr. Alsaad NDAYIZEYE	Hydrology Officer, Water Resources Department, Rwanda Water and Forestry Authority(RWFA)
Mr.Alsaad Ndayizeye	Water Portal

再委託先業者（環境社会配慮）

Mr.Theogene HABAKUBAHO	Managing Director, Bureau for Environmental and Social Studies (BESST)
Mr.Etienne NZAMURANBAHO	GIS Officer, Bureau for Environmental and Social Studies (BESST)

再委託先業者（測量）

Mr.Francois Ngirimandwa	Director, DICO
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氏名	所属・役職
Mr.Francois NTAWUNEZARUBANDA	Survey leader, DICO
再委託先業者（地盤）	
Mr.Carpentier Patrick	Director, Foraky Africa Rwanda
Mr.Bizimana Emmanuel	Survey leader, Foraky Africa Rwanda
民間業者	
Mr.Cao Faming	Design, China Road and Bridge Cooperation(CRBC)
Mr.TAHIR Guzel	COO, Culligan International EACA, Rwanda Ltd, Culligan
Mr.Kaspar Kundert	Managing Director, ESRI Rwanda
Mr.Jean BIGAGAZA	ESIA Expert and Managing Director, Green Growth Solution Ltd
Mr.Ian Black	Area Manager, East & Central Africa, KSB
Mr.John Damascene	Team Leader, HYCOGEC(Consultant for NR3 Road Construction)
Mr.David Nkurunziza	Road Senior Engineer, HYCOGEC(Consultant for NR3 Road Construction)
Mr.Huang CriaH	Project Manager, CRBC(Contractor for NR3 Road Construction)
在ルワンダ日本国大使館	
Ms.藤本 瞳	経済協力調整員
JICA ルワンダ事務所	
Mr.高田 浩幸	所長
Mr.永瀬 朝則	次長
Ms.籠田 綾	所員
Mr. 中島 弘司	所員
Mr.Jean d'Amour Rebero	Water and Sanitation Program Coordinator
Ms.Urujeni Kelly	Administrative Assistant

資料 4. 討議議事録（M/D）

討議議事録（2017 年 11 月 9 日付）

テクニカルノート（2017 年 12 月 18 日付）

テクニカルノート（2018 年 4 月 27 日付）

討議議事録（2018 年 8 月 31 日付）

討議議事録（2017 年 11 月 9 日付）

**Minutes of Discussions
on the Preparatory Survey for
the Project for Strengthening of
Nzove - Ntora Principal Transmission Pipeline
in Kigali City**

In response to the request from the Government of the Republic of Rwanda (hereinafter referred to as "Rwanda"), Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for Strengthening of Nzove - Ntora Principal Transmission Pipeline in Kigali City (hereinafter referred to as "the Project") to Rwanda, headed by Mr. Tomonori NAGASE, Senior Representative of JICA Rwanda Office, from 6th to 10th November, 2017. The Team held a series of discussions with the officials of the Government of Rwanda and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Kigali, 9th November, 2017



Tomonori NAGASE

Leader

Preparatory Survey Team

Japan International Cooperation
Agency
Japan



Eng. Aimé MUZOLA

Chief Executive Officer

Water and Sanitation Corporation

The Republic of Rwanda

ATTACHMENT

1. Objective of the Project
The objective of the Project is to develop backbone infrastructure for water supply by/through enhancement and improvement of Nzove - Ntora principle transmission pipeline, etc. in Kigali City, thereby contributing to efficient and stable water transmission.
2. Title of the Preparatory Survey
Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Strengthening of Nzove - Ntora Principal Transmission Pipeline in Kigali City".
3. Project site
Both sides confirmed that the site of the Project is in Kigali City which is shown in Annex 1.
4. Responsible authority for the Project
Both sides confirmed the authorities responsible for the Project are as follows:
 - 4-1. The Water and Sanitation Corporation (hereinafter referred to as "WASAC") will be the executing agency for the Project (hereinafter referred to as "the Executing Agency"). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization chart and implementation structure of the Project are shown in Annex 2.
 - 4-2. The line ministry of the Executing Agency is the Ministry of Infrastructure (hereinafter referred to as "MININFRA"). MININFRA shall be responsible for supervising the Executing Agency on behalf of the Government of Rwanda.
5. Items requested by the Government of Rwanda
 - 5-1. As a result of discussions, both sides confirmed that the items requested by the Government of Rwanda are as follows (refer to Annex 3 'Outline of Items Requested by Government of Rwanda'):
 - a. To install new Nzove - Ntora principal transmission pipeline
 - b. To upgrade facilities related to Nzove - Ntora principal transmission pipeline such as
 - To replace direct connection between distribution pipes for areas around Ntora Reservoir and existing Nzove - Ntora principal transmission pipeline;
 - To improve transmission pump facility in Nzove Water Treatment Plant (mainly about measures for water hammer pressure); and
 - To expand capacity of Ntora Reservoir (its necessity is scrutinized in the Project).

5-2. JICA will assess the feasibility of the above requested items through the survey and will report the findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

5-3. Other relevant issues are as follows:

- a. Any works other than disconnecting of the existing Nzove - Ntora principal transmission pipeline are not planned in the Project. However, WASAC and the Team will discuss and confirm a plan about future usage of the existing Nzove - Ntora principal transmission pipeline by WASAC.
- b. In selection of a route of new Nzove - Ntora principal transmission pipeline, one proposed in the Basic Survey conducted from October to December 2016 and other alternative routes will be evaluated in light of efficiency, cost, environmental and social (especially land acquisition and resettlement) impacts, safety, disaster prevention, etc. The route of new Nzove - Ntora principal transmission pipeline will be decided within the first month of the Preparatory Survey, and confirmed as Technical Note.
- c. The production capacity of Nzove Water Treatment Plant will be enhanced to 130,000 m³/d in 2023. It is planned that 90,000 m³/d out of it will be transmitted to Ntora Reservoir.
- d. In terms of the improvement transmission pump facility in Nzove Water Treatment Plant, the Project will mainly consider to improve measures for water hammer pressure. Currently, enhancement of pump capacity is not included in the Project. However, the Project might consider enhancement of the pump capacity for the sake of efficient operation of new Nzove - Ntora principal transmission pipeline. It is supposed that the Project does not include any other repairs for Nzove Water Treatment Plant.
- e. The Project plans to replace the connection between distribution pipes for the areas around Ntora Reservoir and existing Nzove - Ntora principal transmission pipeline. The Project plans to construct an elevated water tank for water distribution to those areas. Facilities after the elevated water tank such as distribution pipes, house connection, etc. are out of the Project's scopes.
- f. The Project does not include replacement of direct connection between transmission pipe for Runda and Kigali Sector and the existing Nzove - Ntora principal transmission pipeline. WASAC is responsible for its replacement at its own expense. WASAC needs a plan for the replacement corresponding to the Project's construction schedule so as to avoid stoppage of water supply to the two sectors.
- g. Although WASAC requests the expansion of Ntora Reservoir, its urgency and necessity will be scrutinized in the Project. WASAC plans to start a study for preparing the water supply master plan for Kigali City around early 2018. The master plan will include a comprehensive plan about future development of water supply facilities in Kigali City. It seems reasonable that, to keep efficiency and effectiveness of the comprehensive plan, the expansion of Ntora

Reservoir will be considered as one of the components of master plan. In case that the Ntora Reservoir is not physically expanded in the Project, the Project will consider minimum measures to improve the operation of Ntora Reservoir.

- h. The main project scope is to install new Nzove - Ntora principal transmission pipeline. On the other hand, the Preparatory Survey will decide whether the enhancement of the pumping station in Nzove Water Treatment Plant and the expansion of Ntora Reservoir will be included as components of the Project or not, taking consideration of the project's impact as well as cost. This will be agreed as Technical Note until middle of December 2017.

6. Procedures and Basic Principles of Japanese Grant

- 6-1. The Rwanda side agreed that the procedures and basic principles and basic principles of Japanese Grant as described in Annex 4 shall be applied to the Project.

As for the monitoring of the implementation of the Project, JICA requires Rwanda side to submit the Project Monitoring Report, the form of which is attached as Annex 5.

- 6-2. The Rwanda side agreed to take the necessary measures, as described in Annex 6, for smooth implementation of the Project. The contents of the Annex 6 will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report. It will be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

- 7-1. The Team will proceed with further survey in Rwanda until the end of February, 2018 as the first field survey.
- 7-2. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to Rwanda in order to explain its contents around August 2018.
- 7-3. After the contents of the draft Preparatory Survey Report are accepted and the undertakings for the Project are fully agreed by the Rwanda side, JICA will finalize the Preparatory Survey Report and send it to Rwanda around November 2018.
- 7-4. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

- 8-1. The Rwanda side confirmed to give due environmental and social considerations before and during the implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations (April, 2010) (hereinafter referred to as "the Environmental Guidelines").
- 8-2. The Project is categorized as "B" under the Environmental Guidelines from the following considerations: The project is not considered to be a large-scale water supply project, is not located in a sensitive area, and has

none of the sensitive characteristics under the Environmental Guidelines, it is not likely to have a significant adverse impact on the environment.

The Rwanda side confirmed to conduct the necessary procedures concerning the environmental assessment (including stakeholder meetings, Environmental Impact Assessment (EIA) and information disclosure, etc.) and make an EIA report of the Project supported by the Team. The EIA approval will be obtained from the responsible authorities and submitted to JICA by August 2018.

- 8-3. For the Project that will result in involuntary resettlement, the Rwanda side confirmed to prepare a Resettlement Action Plan (RAP) or Abbreviated Resettlement Action Plan (ARAP) and make it available to the public. In addition, the Rwanda side confirmed to provide the affected people with sufficient compensation and/or support in accordance with RAP or ARAP, which is consistent with the Environmental Guidelines, in a timely manner.

9. Other Relevant Issues

9-1. Tax Issue

In the scheme of Japanese Grant, the government of the recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient with respect to the purchase of the products and/or the services be exempted or be borne by its designated authority without using the grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

Thus, the details of taxes, e.g. names, tax rates, calculation methods, relevant laws/regulations, etc., and the processes for the exemption and/or for a designated authority to bear them will be confirmed during the Project. WASAC will provide the Team with necessary supports such as provision and access to relevant information, arrangement of meeting with relevant organizations.

9-2. Undertakings of the Rwanda side for the Preparatory Survey

Both sides agreed that the following undertakings shall be done by the Rwanda side.

- a. To provide the Team with available relevant data, information and materials necessary for the execution of the Preparatory Survey
- b. To prepare answers of the questionnaires presented by the Team
- c. To assign full-time counterpart to the Team during their stay in Rwanda, to play the following roles as the coordinator to the Team:
 - To make the appointments and to set up the meetings with authorities, departments and all other facilities and firms whatever the Team intends to visit.
 - To attend the site survey and any other visiting place with the Team and to make any convenience on accommodation, working office, adequate transportation, getting the permissions if required, etc., and
 - To assist and advise the Team for the collection of data and information as much as possible
- d. To secure the permission to photograph and to enter into private

properties and restricted areas for the Team for proper execution of the Preparatory Survey, if necessary

- e. To take any measures deemed necessary to secure the safety of the members of the Team

Annex 1 Project Site

Annex 2 Organization Chart and Implementation Structure

Annex 3 Outline of Items Requested by Government of Rwanda

Annex 4 Japanese Grant

Annex 5 Project Monitoring Report (template)

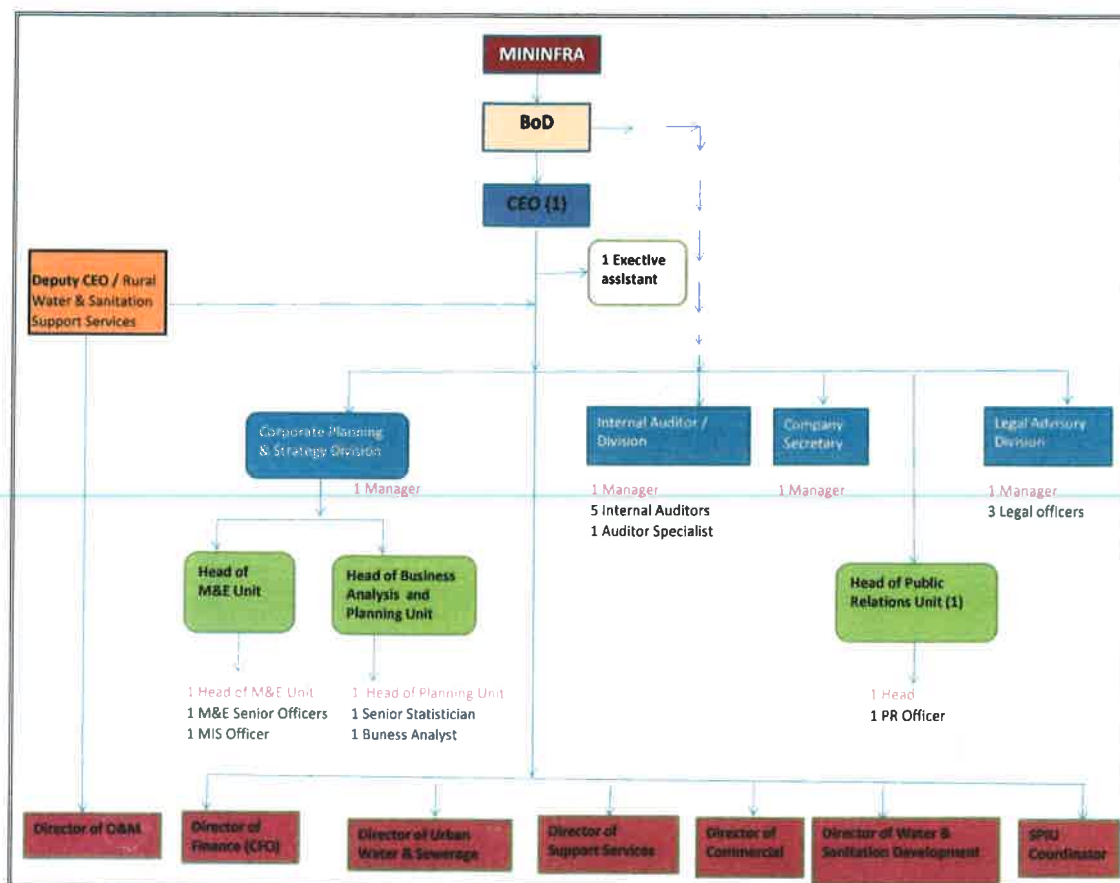
Annex 6 Major Undertakings to be taken by the Government of Rwanda

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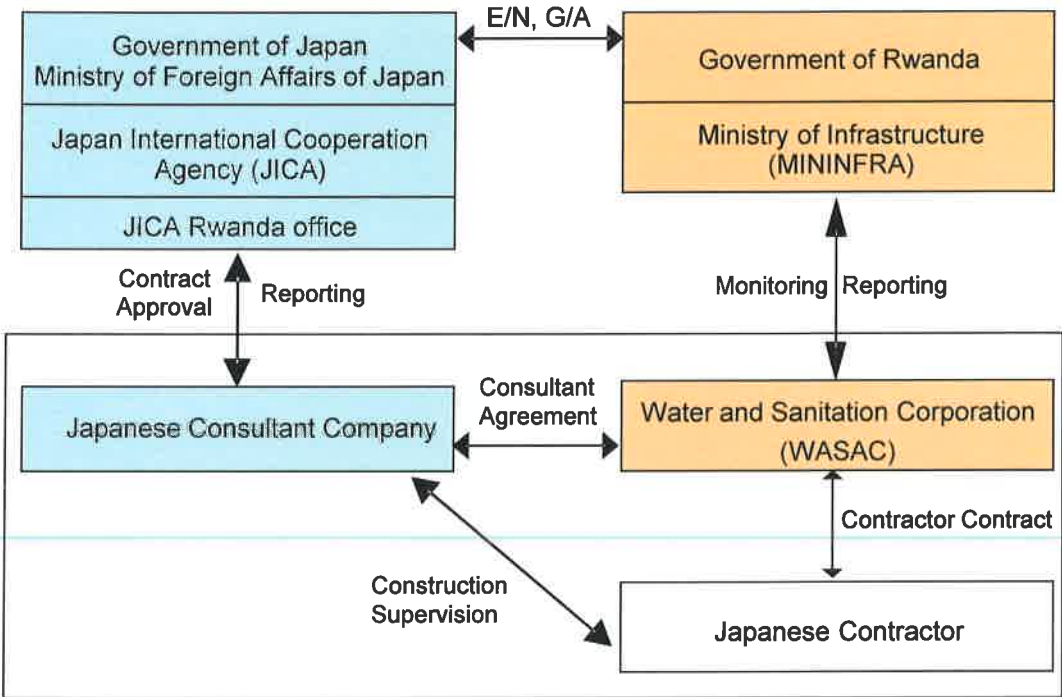


Annex 2 Organization Chart and Implementation Structure

Organization Chart of WASAC

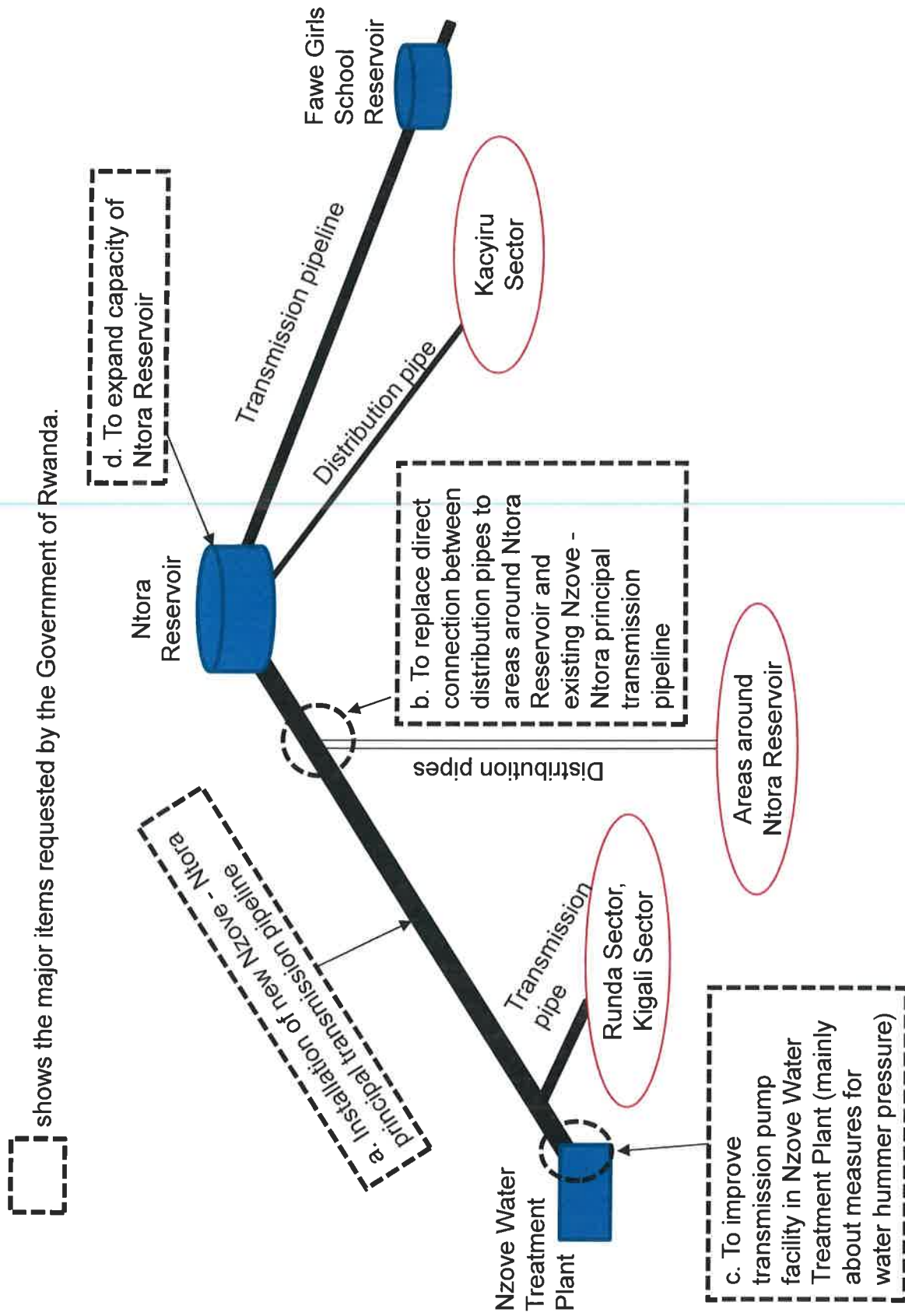


Implementation Structure of the Project



Annex 3

Outline of Items Requested by Government of Rwanda



JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as “the Bank”) to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

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

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as “the E/N”) will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the “General Terms and Conditions for Japanese Grant (January 2016).”

2) Banking Arrangements (B/A) (See “Financial Flow of Japanese Grant (A/P Type)” for details)

- a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.
- b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the “Meeting”) will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the

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Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

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4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
4. Ex-post monitoring & evaluation	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts	x			x	x	
	(14) Completion certificate		x			x	x	
	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

1 Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A

2 Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A

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Project Monitoring Report
on
the Project for Strengthening of
Nzove - Ntora Principal Transmission Pipeline
in Kigali City

Grant Agreement No. XXXXXXXX
20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge (Designation)	_____
	Contacts	_____
	Address:	_____
	Phone/FAX:	_____
	Email:	_____
Executing Agency	Person in Charge (Designation)	_____
	Contacts	_____
	Address:	_____
	Phone/FAX:	_____
	Email:	_____
Line Ministry	Person in Charge (Designation)	_____
	Contacts	_____
	Address:	_____
	Phone/FAX:	_____
	Email:	_____

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (): _____

1: Project Description

1-1 Project Objective

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1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

--

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original (proposed in the outline design)	Actual
1.		

2-2 Scope of the work

Components	Original* (proposed in the outline design)	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

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2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	(at the time of signing the Grant Agreement)	

Reasons for any changes of the schedule, and their effects on the project (if any)

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2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original (proposed in the outline design)	Actual (in case of any modification)	Original ^{1),2)} (proposed in the outline design)	Actual
	1.			
Total				

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original (proposed in the outline design)	Actual (in case of any modification)	Original ^{1),2)} (proposed in the outline design)	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original (at the time of outline design)

name:

role:

financial situation:

institutional and organizational arrangement (organogram):

human resources (number and ability of staff):

Actual (PMR)

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original (at the time of outline design)

Actual (PMR)

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original (at the time of outline design)

Actual (PMR)

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (at the time of outline design)

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

--

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

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5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

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Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
 - Consultant Member List
 - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
8. Pictures (by JPEG style by CD-R) (PMR (final) only)
9. Equipment List (PMR (final) only)
10. Drawing (PMR (final) only)
11. Report on RD (After project)

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

Items of Specified Materials		Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C-D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

Items of Specified Materials		1st month, 2015	2nd month, 2015	3rd month, 2015	4th	5th	6th
1	Item 1	●	●	●			
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

2

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

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Annex 6

Major Undertakings to be Taken by the Government of Rwanda (draft)

1. Specific obligations of the Government of Rwanda which will not be funded with the Grant

(1) Before the Tender

No.	Item	Deadline	In charge	Cost	Ref.
1	To open bank account (Banking Arrangement (B/A))	Within 1 month after the signing of the G/A	WASAC		
	To issue Authorization to Pay (A/P) to a bank in Japan (the Agent Bank) for the payment to the consultant	Within 1 month after the signing of the contract	WASAC		
	To bear the following commissions to a bank in Japan for the banking services based upon the B/A 1) Advising commission of A/P 2) Payment commission for A/P	1) Within 1 month after the signing of the contract 2) Every payment	WASAC		
2	To obtain approval of EIA	Before the early of August 2018	WASAC		
3	To secure lands	Before notice of the bidding document	WASAC		
	To secure the necessary budget and implement land acquisition, and compensation with full replacement cost in accordance with Abbreviated RAP	Before notice of the bidding document	WASAC		
	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, monthly	Till land acquisition completes	WASAC		
4	To obtain the necessary permit for the implementation of the Project from the concerned organization	Before notice of the bidding document	WASAC		
5	To assign counterparts for the Survey Team during detail design survey	Soon after starting detail design survey	WASAC		
6	To submit Project Monitoring Report (with the result of Detail Design)	Before preparation of bidding documents	WASAC		

(2) During the Project Implementation

No.	Item	Deadline	In charge	Cost	Ref
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the contractors	Within 1 month after contract(s) signing	WASAC		
	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 for A/P	1) Within 1 month after the signing of the contract(s) 2) Every payment	WASAC		
2	To ensure prompt customs clearance and assist the Contractor(s) with internal transportation in recipient country	During the project	WASAC		
3	To accord Japanese nationals and/or physical persons of third countries whose services may be required in connection with the supply of the products and services under the verified contract such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.	During the project	WASAC		
4	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services be borne by its designated authority without using the Grant.	During the project	WASAC		
5	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	During the project	WASAC		
6	1) To submit the Project Monitoring Report 2) To submit Project Monitoring Report (final)	1) Every month 2) Within one month after signing of Certificate of Completion for the works under the contract(s)	WASAC		
	To submit a report concerning completion of the Project	Within six months after completion of the Project	WASAC		
7	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)	3 months before completion of the construction	WASAC		
8	To implement Environmental Management Plan and Environmental Monitoring Plan	During the project	WASAC		
9	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	During the Project	WASAC		
	To implement Abbreviated RAP (income restoration program, if needed)	For a period for income restoration program	WASAC		
	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report - Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between BoWIED and JICA.	Until the end of income restoration program (In case that income restoration program is provided)	WASAC		
10	To assign supervisor during the construction period	During the project	WASAC		
11	To assign counterparts for the soft-component activities	During the project	WASAC		

テクニカルノート（2017 年 12 月 18 日付）

**Technical Notes
on the Preparatory Survey for
the Project for Strengthening of
Nzove - Ntora Principal Transmission Pipeline
in Kigali City**

In response to the request from the Government of the Republic of Rwanda (hereinafter referred to as "Rwanda") and Minutes of Discussions signed 9th November 2017, the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for Strengthening of Nzove - Ntora Principal Transmission Pipeline in Kigali City (hereinafter referred to as "the Project") held a series of discussions with the officials of the Government of Rwanda and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Kigali, 18th December, 2017

吉川 健

Takeshi YOSHIKAWA
Sub Chief Consultant
Preparatory Survey Team
for the Preparatory Survey for
the Project for Strengthening of
Nzove - Ntora Principal Transmission
Pipeline in Kigali City



Eng. Aimé MUZOLA
Chief Executive Officer
Water and Sanitation Corporation
The Republic of Rwanda





ATTACHMENT

Proposed route for the new transmission pipeline from Nzove WTP to Ntora reservoir of the Project

The Team has raised seven routes for the new transmission pipeline of the Project as shown in Annex 1 and compared them one another. As a result, the Team proposed the route 1-4 for the Project based on the selection criteria as shown in Annex 2.

1. The reasons to select route 1-4

The Team and the Water and Sanitation Corporation (hereinafter referred to as "WASAC") confirmed that the route 1-4 to be judged as the most appropriate route of the Project due to following main reasons.

- 1-1. Route 1-4 is able to shorten the length of new transmission pipeline of the Project.
- 1-2. Route 1-4 does not affect the traffic and other projects such as the expansion of road and preparation of sewerage as the project of "Kigali Centralized Sewerage".
- 1-3. Route 1-4 does not affect the existing transmission pipeline.
- 1-4. The proposed route should follow the existing transmission pipeline from Nzove WTP. But existing one is laid under the road in front of Nzove WTP and the width of this road will be expanded by June 2018. In addition, National Road 1 will be also expanded from two lanes to four lanes by September 2018. The Team and WASAC had a discussion with Rwanda Transport Development Agency (hereinafter referred to as "RTDA") on 6th December for the possibilities to lay the new transmission pipeline under this road. RTDA explained the difficulties and the necessities of further discussions with high level authorities for the implementing transmission pipeline under this road. Therefore, the Team and WASAC rejected this route.

Hereafter, the Team commences the Topographic Survey and Geotechnical Investigation Survey for the design of the transmission pipeline for the Project. Depending on the result of surveys, there are possibilities of changing some parts of the route.

2. Major Concerns in the Proposed Route 1-4

2-1. The route from Nzove WTP to the National Road 1

WASAC has a plan to prepare the maturation pond, which will be constructed under the project of "Kigali Centralized Sewerage". Thus, the Team and WASAC selected the route to avoid the maturation pond. After passing the maturation pond, new transmission pipeline shall be installed along the Nyabugogo River.

Although there are some narrow areas for installation of new transmission pipeline between National Road 1 and Nyabugogo River (distance from the edge of National Road 1 and Nyabugogo River is approximately 12 meters), the Team confirmed National Road 1 shall be expanded at the mountain side according to the drawings supplied by RTDA.

The Team and WASAC confirmed to install the new transmission pipeline within the width of 12 meters under the consideration of the new sewerage pipeline. Within the width of 12 meters, sewerage pipe shall also be planned to be laid in the future. Although the implementation position of this sewerage pipe for the project of "Kigali Centralized Sewerage" has not been fixed yet, the Team and WASAC confirmed the sewerage pipe shall be laid in the place that does not affect new transmission pipeline.

2-2. The National Road crossing at the construction site of new bridge
(Project name: Kigali Urban Road Upgrading Project (54.56km))

The Team and WASAC had a discussion with RTDA, HYCOGEC Consultant Ltd (Road consultant), CRBC (Road contractor), and Kigali City at site on 23th November regarding road crossing.

As a result of the discussion, the box culvert, which cross the National Road 3 should be designed and constructed within the Kigali Urban Road Upgrading Project by its own cost and the transmission pipeline of the Project will be laid inside of the box culvert. The Team, WASAC, RTDA and Kigali City confirmed the location of box culvert is 8.0 meters away from the edge of the new bridge. Construction period of box culvert shall be the same with the completion of the new bridge, on September 2018. The planned inside dimension of the box culvert is 2.5 meters x 2.5 meters.

With regard to the expansion of National Road 3, construction of the road expansion, between the new bridge and the entrance point of marshlands, shall be completed by September 2018. The Team, WASAC, RTDA and Kigali City confirmed the transmission pipeline shall be installed beside the National Road 3.

2-3. The Section from the Kigali Independent University to Ntora Reservoir

The Team, WASAC and Kigali City confirmed that the transmission pipeline from Kigali Independent University to Ntora Reservoir shall be designed to be installed within 3 meters from the edge of the sidewalk. The Team, WASAC and Kigali City confirmed further discussion is required to seek the possibilities to install the transmission pipeline under the sidewalk including under the road at some points.

There is a point on which the pipeline should cross the paved road near Ntora Reservoir. The Team and WASAC confirmed to continue the discussion with Kigali City with regard to the cross point of the road.

2-4. Crossing the Nyabugogo River

The Team, WASAC and Rwanda Water and Forest Authority confirmed that Route 1-4 needs to cross the Nyabugogo River at six places by either constructing water pipe bridges or underpass of the River. The Team, WASAC and Rwanda Water and Forest Authority confirmed that it is allowed to construct water pipe bridges or underpass of the Nyabugogo River unless these facilities shall not permanently affect the Nyabugogo River. Adopted methods for each river crossing shall be discussed with Rwanda Water and Forest Authority.

2-5. Resettlement and land acquisition

At present, it is expected that a few households would need to be resettled and a dozen of premises are the targets of partial land acquisition. In addition, about a half of the route passes through the marshlands and there are a certain number of farmland plots along the planned route. The Team shall identify households and person, who would be affected by the Project. The Team and WASAC shall consider appropriate compensation through consultation and agreement with the affected people based on the regulations in Rwanda and the JICA guidelines.

Annex 1 Proposed seven routes for the Project

Annex 2 Comparison table of seven proposed routes

Proposed transmission pipeline - 1-1 (9.3km)

- Existing transmission pipeline
- Proposed transmission pipeline 1-1 (9.3km)
- Proposed sewage facility
- Drain pipe
- Assumed residential household



1/3

2/3

Proposed transmission pipeline - 1-2 (9.1km)



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Abstract

Abstract

Proposed transmission pipeline - 1-3 (9.4km)



Proposed transmission pipeline - 1-4 (9.4km)

- Existing transmission pipeline
- Proposed transmission pipeline - 1-4 (9.4km)
- Proposed sewerage facility
- Drain pipe
- Assumed installation footprint
- Electric cable



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Handwritten signature or mark.

Proposed transmission pipeline - 2-1 (11.4km)

- Existing transmission pipeline - 2-1 (11.4km)
- Proposed transmission pipeline - 2-1 (11.4km)
- Proposed average facility
- Drainage
- Assumed household



2/1

2/1

Proposed transmission pipeline - 2-2 (10.5km)

- Existing transmission pipeline
- Proposed transmission pipeline - 2-2 (10.5km)
- Proposed sewage facility
- Prater site
- Assigned residential household



2/2

2/2

Proposed transmission pipeline - 2-3 (10.0km)

- Existing transmission pipelines
- Proposed transmission pipeline - 2-3 (10.0km)
- Proposed access road
- Drainage
- Estimated environmental impact



Annex2

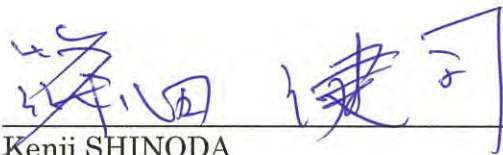
AnnexZ	1. Route parallel with the existing pipeline				2. Route along paved road			
	1-1. Installation the pipe under the road which has the plan of road expansion (install the pipe toward the university)	1-2. Installation the pipe under the road which has the plan of road expansion (install the pipe toward the university)	1-3. Avoid the narrow space along the National road	1-4. Avoid the narrow space along the existing pipe.	2-1. Avoid existing route and lay along the paved road	2-2. Based on 2-1, shorten the length of pipes by crossing wetland	2-3. install the pipe in parallel with the existing pipeline up to the second water bridge, then install the pipe on the paved road	
Proposed route								
Total length of pipe	Approximately 9.3 km	Approximately 9.1 km	Approximately 9.4 km	Approximately 9.4 km	Approximately 11.4 km	Approximately 10.5 km	Approximately 10.0 km	
Route composition	Paved : 0.75km Unpaved : 8.55km	Paved: 1.15km Unpaved: 7.95km	Paved: 1.15km Unpaved: 8.25km	Paved: 1.15km Unpaved: 8.25km	Paved : 9.35km Unpaved : 2.05km	Paved : 7.8km Unpaved : 2.7km	Paved : 2.2km Unpaved : 7.8km	
Presence of narrow road	There is a narrow road, it is necessary to partially secure the road width.	There is a narrow road, it is necessary to partially secure the road width.	There is a point to close river and existing pipe which has a 45° bending, the consideration of the impact to existing pipe is necessary.	The construction of expansion for National Road starts. However, National Road will expand to the mountainside at the river close area, no problem to install the pipe.	None	None	There is a narrow road, it is necessary to partially secure the road width.	
Measures against river protection	The river is partially close to the unpaved road, and river protection measures are required.	The river is partially close to the unpaved road, and river protection measures are required.	There is a point close to the river and existing pipe, and river protection measures will be required.	There is a point close to the river and existing pipe, and river protection measures will be required depend on the design of sewerage pipe.	None	None	The river is partially close to the unpaved road, and river protection measures are required.	
Measures against the construction in wetland	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporary road for the construction.	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporary road for the construction.	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporary road for the construction.	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporary road for the construction.	None	Currently, it is impossible that people pass the wetland, but there is no particular problem for constructing the temporary road for the construction.	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporary road for the construction.	
Measures against river crossing	There are two river crossings. First river crossing is planned as water pipe bridge and second river crossing is planned as underpass the river. It is necessary to plan the temporary bridge etc.	There are two river crossings. First river crossing is planned as water pipe bridge and second river crossing is planned as underpass the river. It is necessary to plan the temporary bridge etc.	There are six river crossings. Last river crossing is planned as underpass the river, others are considered to cross by water pipe bridge. It is necessary to plan the temporary bridge etc.	There are six river crossings. Last river crossing is planned as underpass the river, others are considered to cross by water pipe bridge. It is necessary to plan the temporary bridge etc.	There are one river crossing. River crossing is planned as water pipe bridge. It is necessary to plan the temporary bridge etc.	There are one river crossing. River crossing is planned as water pipe bridge. It is necessary to plan the temporary bridge etc.	There are two river crossings. First river crossing is planned as water pipe bridge and second river crossing is planned as underpass the river. It is necessary to plan the temporary bridge etc.	
Measures against construction at slope	Considering the route along the existing drainage, it is not suitable because there is concern about the stability of the pipeline in the transverse direction and the construction is difficult because the side of the drainage is a valley.	Although it is a steep slope in the longitudinal direction, the transverse direction is almost horizontal and there is no problem in construction if measures such as a cableway etc. are taken.	Although it is a steep slope in the longitudinal direction, the transverse direction is almost horizontal and there is no problem in construction if measures such as a cableway etc. are taken.	Although it is a steep slope in the longitudinal direction, the transverse direction is almost horizontal and there is no problem in construction if measures such as a cableway etc. are taken.	None	None	None	
Impact on traffic	Road expansion from Nzove WTP to road bridge starts, and the difficulties to install the pipe under the road are remained by	Road expansion from Nzove WTP to road bridge starts, and the difficulties to install the pipe under the road are remained by	Impact on traffic is limited, only from the paved road after the steep slope.	Impact on traffic is limited, only from the paved road after the steep slope.	Since the site of pipe installation is near the bus terminal and the traffic is high even in Kigali city, the influence on traffic is enormous.	Since the site of pipe installation is near the bus terminal and the traffic is high even in Kigali city, the influence on traffic is enormous.	Traffic to the Kigali Independent University is somewhat high	
Resettlement	Housing along paved roads, public facilities etc., not so many	Housing and public facilities etc., the paved road after the steep slope. Not so many.	Housing and public facilities etc., the paved road after the steep slope. Not so many.	Housing and public facilities etc., the paved road after the steep slope. Not so many.	Housing along paved roads, public facilities etc., too many	Housing along paved roads, public facilities etc., too many	Housing along paved roads, public facilities etc., many	
Land acquisition	Land acquisition accompanying expansion of road for installation pipe in narrow road	Land acquisition accompanying expansion of road for installation pipe in narrow road.	Compensation for cultivating during the construction is necessary.	Compensation for cultivating during the construction is necessary.	Acquisition of land outside the public road	Acquisition of land outside the public road	Acquisition of land outside the public road	
Construction period	There are few influence to the residents' living, the construction period is not affected.	There are few influence to the residents' living, the construction period is not affected.	There are few influence to the residents' living, the construction period is not affected.	There are few influence to the residents' living, the construction period is not affected.	It is necessary to consider the resettlements of residents procedure, nighttime construction and lining board to avoid the influence on traffic, affecting the construction period too much.	It is necessary to consider the resettlements of residents procedure, nighttime construction and lining board to avoid the influence on traffic, affecting the construction period too much.	Due to the necessity of resettlement of residents, it will affect the construction period. Moreover, it takes a period of time to install the pipe in densely populated area.	
Project cost	It is economical because this route is the second shortest and has large proportion of unpaved road.	River crossing is only two, the cost will be minimized.	River crossing is six, the Project cost will become bigger than 1-2.	River crossing is six, the Project cost will become bigger than 1-2.	Most of the route is paved road, the project cost become higher due to reconstruction of paved road, resettlement of residents, etc.	Most of the route is paved road, the project cost become higher due to reconstruction of paved road, resettlement of residents, etc.	The project cost is higher than 1-1, 1-2 because of the ratio of paved road, but the cost is less than 2-1, 2-2.	
Remarks	The construction of road expansion from Nzove WTP to road bridge starts (width: 10m), and the difficulties to install the pipe under the road are remained; therefore the Project reject this route.	The consideration of impact to the existing pipe in narrow point is necessary.	The detail design of sewerage pipe will be started, the exact location of sewerage and drainage. Together with the large amount of traffic, construction requires a lot of time and labor.	The detail design of sewerage pipe will be started, the exact location of sewerage and drainage. Together with the large amount of traffic, construction requires a lot of time and labor.	At the paved road, many houses are close to the road across the entire road. It is necessary to break down and reconstruction the existing structures such as sidewalks and drainage. Together with the large amount of traffic, construction requires a lot of time and labor.	Pipes are installed mountainside at the area of expansion of road width from Nzove WTP. Box culvert is necessary under the new bridge construction at NR3 before the Project.	Pipes are installed mountainside at the area of expansion of road width from Nzove WTP. Box culvert is necessary under the new bridge construction at NR3 before the Project.	

テクニカルノート（2018 年 4 月 27 日付）

**Technical Notes
on the Preparatory Survey for
the Project for Strengthening of
Nzove - Ntora Principal Transmission Pipeline
in Kigali City**

In response to the request from the Government of the Republic of Rwanda (hereinafter referred to as "Rwanda") and Minutes of Discussions signed 9th November 2017, the Preparatory Survey Team for the Outline Design of the Project for Strengthening of Nzove - Ntora Principal Transmission Pipeline in Kigali City (hereinafter referred to as "the Project") to Rwanda, held a series of discussions with the officials of the Government of Rwanda and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Kigali, 27th April, 2018

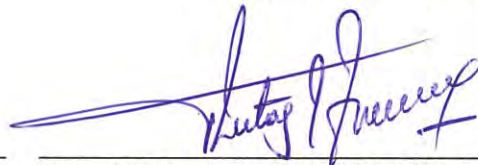


Kenji SHINODA

Chief Consultant

Preparatory Survey Team

Consortium of
Kokusai Kogyo Co., Ltd.,
Kyowa Engineering Consultants Co., Ltd.
and
Yokohama Water Co., Ltd.
Japan



Eng. Méthode RUTAGUNGIRA

Director of
Urban Water and Sanitation Services
Water and Sanitation Corporation

The Republic of Rwanda

ATTACHMENT

1. Scope of the Project

The scope of the Project is shown following table.

Items		Specification
Common items	Design flow volume	87,000 m ³ /day
	Diameter	900 mm
	Length of pipeline	9,700 m
	Type of pipe	Steel pipe: 8,000 m (From Nzove WTP to steep slope)
		Ductile iron cast pipe: 1,700 m (From steep slope to Ntora reservoir)
	River crossing	6 points (refer attached drawing)
Nzove WTP	Existing pump	Capacity: 40,000 m ³ /day It is used for New Transmission Pipeline.
	New pump	Capacity: 22,000 m ³ /day Three (3) pumps - Two (2) pumps for operation - One (1) pump for stand by Pump head: 240m Water flow: 7.6 m ³ /min (11,000m ³ /day) x 2
	Pump station for new pumps	New construction for new pumps at Nzove WTP
	Equipment for operation and maintenance	Two (2) Ultrasonic flow meter - One (1) for intake of Nzove 1 WTP - One (1) for outlet of new pump station
Ntora reservoir	Outlet pipe of reservoir	Replacement of outlet pipe of Ntora reservoir to Kacyiru and Fawe for improvement of
	Elevated tank for water supply around Ntora reservoir	Capacity of tank: 200 m ³ (10m x 10m x 2.5m) Height: 10 m Material: Steel Stand material : RC
	Pumps for elevated tank (include small pump house)	Two (2) pumps - One (1) pump for operation - One (1) for stand by
	Equipment for operation and maintenance	Three (3) Ultrasonic flow meters - One (1) for inlet of Ntora reservoir - Two (2) for outlet of Ntora reservoir Two (2) pressure type water level gauge for each tank



2. Target Year and design flow volume of the Project

In this Project, the target year is determined as 2023 according to the standard of the Japan Grant Aid.

The Preparatory Survey Team of Consultant (hereinafter referred to as “the Team”) has studied the current production volume of Nzove WTP (Nzove1, Nzove2, New Nzove1), and confirmed 38,750 m³/day of water was producing in Nzove WTP in 2017. WASAC explained although the production ability of Nzove1 is 25,000m³/day, unit cost of Nzove1 is more expensive than Nzove2, and the capacity of existing transmission pipeline is 40,000m³/day, that is why, Nzove2 is preferentially used. The Team confirmed Nzove1 purified 25,000m³/day of water in 2015, therefore, even if there is a problem with purification system of Nzove1, the Team considers that it would be possible to product the water of 25,000m³/day by taking appropriate measures to recover the ability by WASAC. Therefore, the Team confirmed that maximum production volume of Nzove WTP for Ntora reservoir in 2023 is estimated as 90,000m³/day, and 87,000m³/day of 90,000m³/day can be used for Ntora reservoir. Therefore, the design flow volume of the Project shall be determined as 87,000m³/day.

Nzove WTP (m ³ /day)		Design Volume (m ³ /day)	Maximum Production Ability (m ³ /day)	Current Production Volume (Average) (2017: m ³ /day)	Maximum Production Volume (2018)	Maximum Production Volume (after 2023)
Ntora	Nzove1 WTP	40,000	25,000	17,000	25,000	25,000
	Nzove2-1 WTP	25,000	25,000	21,750	25,000	25,000
	Nzove2-2 WTP	15,000	15,000	Not operated	15,000	15,000
	New Nzove 1-2WTP	25,000	25,000	Under Construction (Phase I)	-	25,000 (Phase II is essential)
	Sub Total -Breakdown-	105,000	90,000	38,750	65,000	90,000
	•Ntora Reservoir •Kimisagara WTP	102,000 3,000	87,000 3,000	35,750 3,000	62,000 3,000	87,000 3,000
Mount Kigali	New Nzove 1-1WTP	40,000	40,000	Under Construction (Phase I)	40,000	40,000
Total		145,000	130,000	38,750	105,000	130,000

The Team starts the outline design for cost estimation based on the 87,000m³/day, however, because of the budget of Japanese Grant, it has a possibility the specification and numbers of some items except for the new transmission pipeline shall be changed.

3. Policy on the handling of the existing transmission pipeline

The Team confirmed the status of the existing transmission pipeline, and the existing transmission pipeline is not recommended to use without appropriate

measures such as repair and renovation due to following points.

- Water leakage had occurred at least six times
- Safety of facilities is not secured due to no proof documents such as as-built drawings, calculation method of structures and etc.

Furthermore, appropriate measures such as repair and renovation of existing transmission pipeline require long term water outage in Kigali City. In response to this situation, the Project plans and designs the new water transmission pipeline from Nzove WTP to Ntora Reservoir without existing transmission pipeline. The design volume of new water transmission pipeline is 87,000m³/day.

4. Specification of the new transmission pipeline

4-1. Diameter

The necessary diameter of the new transmission pipeline to flow 87,000m³/day is 900mm. Therefore, this Project designs the diameter of the new transmission pipeline as 900mm.

4-2. Type of the new transmission pipeline

The Team confirmed that most of the route for new transmission pipeline is soft ground and it is not recommended to select the ductile iron pipe for the Project in these soft ground area because of high water pressure and difficulty to correspond to thrust load. Therefore, this Project plans to use the steel pipe with welding in the soft ground area (include the high water pressure area), plans to use ductile iron pipe in low water pressure area.

5. The system of water transmission from Nzove WTP to Ntora Reservoir

5-1. Necessity of the relay pump station

This Project plans and designs the water transmission system to send the design flow volume of water directly from Nzove WTP to Ntora Reservoir. Once the Team considered to set the relay pumping station between Nzove WTP and Ntora Reservoir to reduce the high water pressure of new transmission pipeline. However, since selected steel pipe with welding for new transmission pipeline can withstand high water pressure, relay pumping station shall not be considered in this Project.

5-2. Expansion of pump system in Nzove WTP

The Team confirmed the capacity of existing pump of Nzove WTP (Nzove1 and Nzove2) is 40,000m³/day. On the other hand, the Team confirmed that the total capacity that can reliably send the water from Nzove WTP (Nzove1 and Nzove2) to Ntora Reservoir is 62,000m³/day. Therefore, this Project expand the capacity of pump system, namely additional 22,000m³/day of pump system (new pump station) shall be planed and designed in this Project.

Because of the budget of Japanese Grant or technical issues, it has a possibility to change the specification of new pump.

New pump station will be designed separately with existing pump system in the Nzove WTP.

6. Rehabilitation of Ntora Reservoir

6-1. Design of elevated tank

The Team confirmed that about 140 customers (Connections) are utilizing the water not from the Ntora Reservoir but directly from existing transmission pipeline. And also, the Team confirmed the area around the Ntora Reservoir where the water pressure is low because of no big difference in altitude with Ntora Reservoir. To solve this situation, this Project shall plan and design the 200m³ of elevated tank (with pump for pumping from Ntora Reservoir to elevated tank) in the same compound of Ntora Reservoir.

6-2. Rehabilitation of outlet pipe

Currently, outlet pipe for Kacyiru is installed separately from outlet pipe for main distribution pipeline of Ntora Reservoir, so this layout of outlet pipes complicates the operation of Ntora Reservoir. To improve this condition, the Project rehabilitates the outlet pipes of Ntora Reservoir.

7. Obligations of the Recipient country

7-1. Secure the production volume of Nzove1

The Team gained a certain understanding of WASAC's explanation for the current production volume of Nzove1 (17,000m³/day). However, it is also the fact that Nzove1 does not purify the 25,000m³/day of water at this moment, and the Team considers that there are problems with the facilities like lack of filtration sand. Therefore, WASAC has to recover the function of Nzove1 so that it can produce the 25,000m³/day of water if necessary.

7-2. Replacement of Water supply pipes from new elevated tank at Ntora Reservoir to customers

The Project plans to construct new elevated tank at Ntora Reservoir for customers who live around Ntora reservoir. The customers are approximately 140 customers (Connections), and they currently utilize the water not from the Ntora Reservoir but directly from existing transmission pipeline. When the elevated tank is constructed by the Project, it is required to replace water supply pipes for the customers. The replacement of water supply pipes is required to complete before completion of construction work of the Project.

7-3. Construction of box culvert

The Team had requested the construction of box culvert (2.5m x 2.5m) at the new bridge construction site of Kigali city. This box culvert is one of the most important structure to install the new transmission pipeline to cross the National Road 3. The Team requested again the securing of budget and reliable construction before Bid Notice.

During the Study, the Team could not meet and discuss with the contact person of City of Kigali to get the drawings and the detail of the schedule for construction of the box culvert. However, WASAC explained to the Team that WASAC send the drawings and the detail of the schedule for construction of the box culvert by the end of May, 2018.

7-4. Construction of New Nzove I water treatment plant

The Project plans to install new water transmission pipeline of 900mm with flow capacity of 87,000m³/day. However, the Project designs pump capacity with 62,000m³ (existing pump capacity: 40,000m³, new pump station: 22,000m³). It is required to develop additionally pump capacity of 25,000m³ to use full capacity of pipeline (87,000m³/day). The Team confirmed that Rwandan side has a plan to develop pumping capacity and water treatment facility of 25,000m³ at New Nzove I WTP. Rwandan side shall complete installation of the pump capacity of 25,000m³/day to utilize all capacity of new water transmission pipeline before target year 2023.

7-5. Water outage due to construction of New Transmission Pipeline

It is necessary to stop the water supply to connect the new transmission pipeline to existing transmission pipeline and it will take a few days. Therefore, WASAC needs to announce to customers who is supposed to be affected by water outage. Water outage due to construction of New Transmission Pipeline is estimated for 3 - 4 days.

7-6. Securing of power supply

The Project considers to expand the pump capacity at Nzove WTP. Pump capacity shall be strengthen with new pump installation (new pump station). Therefore, Rwandan side shall secure the power supply to operate those pumps before Bid Notice.

Attached Drawings

1. Drawing for the Scope of the Project
2. Drawing for Improvement of Nzove Water Treatment Plant
3. Drawing for the Plumbing Work on the Slope

Drawing for the Scope of the Project



16/11/2025

Drawing for Improvement of Nzove Water Treatment Plant

Nzove1

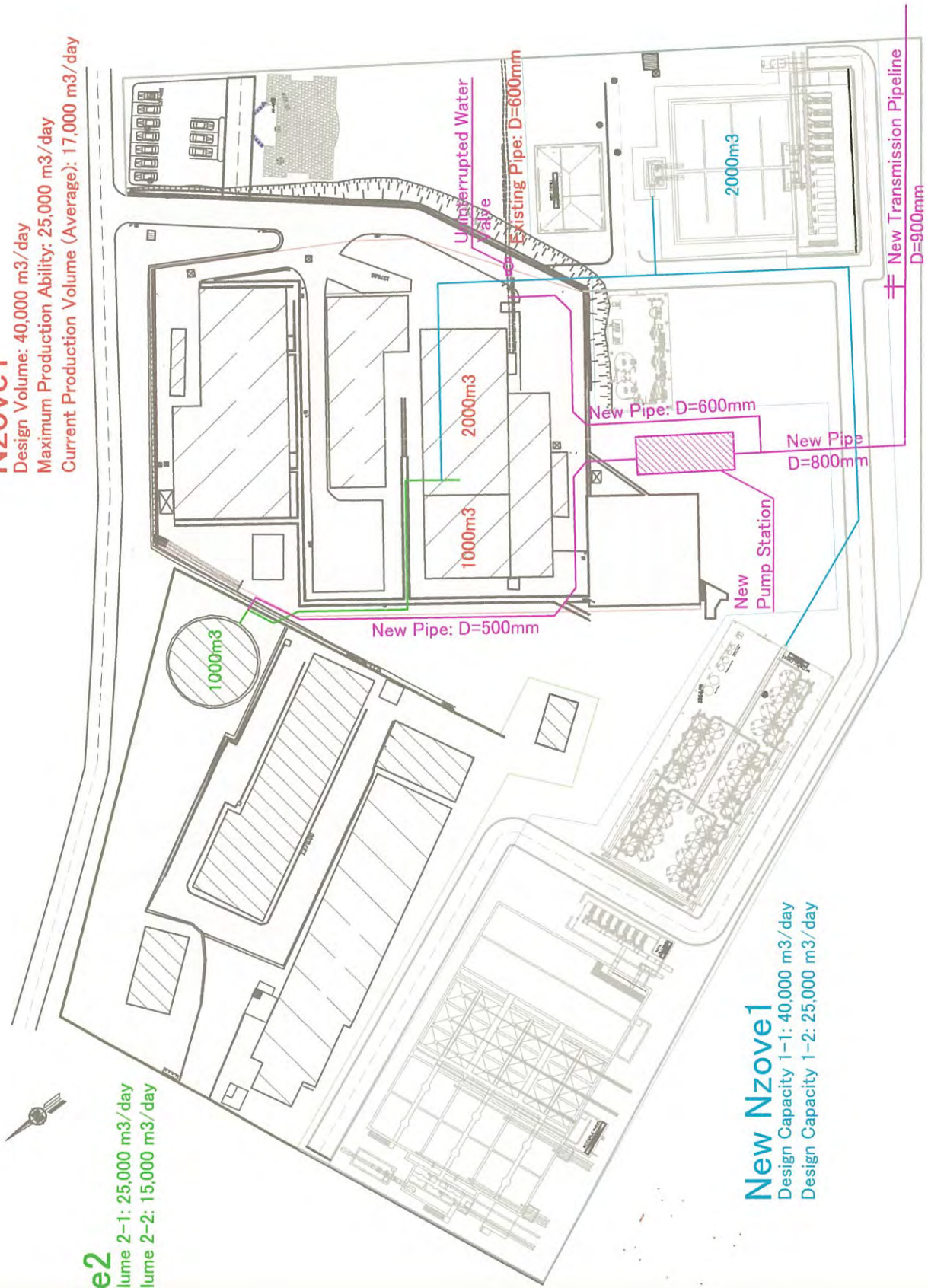
Design Volume: 40,000 m³/day
Maximum Production Ability: 25,000 m³/day
Current Production Volume (Average): 17,000 m³/day

Nzove2

Design Volume 2-1: 25,000 m³/day
Design Volume 2-2: 15,000 m³/day

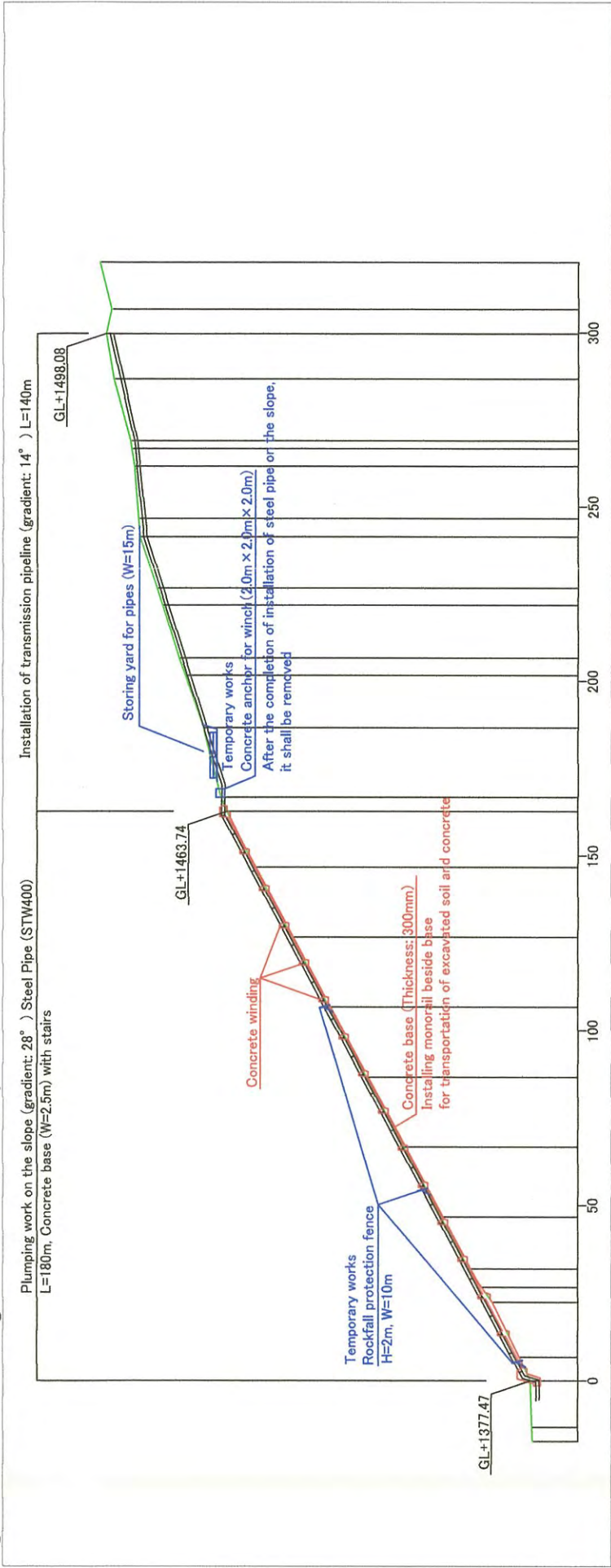
New Nzove1

Design Capacity 1-1: 40,000 m³/day
Design Capacity 1-2: 25,000 m³/day



Kari Rfr

Drawing for the Plumbing Work on the Slope



Kari RHP


討議議事録（2018 年 8 月 31 日付）

Minutes of Discussions
on the Preparatory Survey for the Project for
Strengthening of Nzove - Ntora Principal Transmission Pipeline in Kigali City
(Explanation on Draft Preparatory Survey Report)

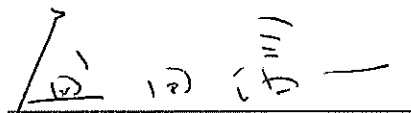
With reference to the minutes of discussions signed between Water and Sanitation Corporation (hereinafter referred to as "WASAC") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 9th November, 2017 and in response to the request from the Government of the Republic of Rwanda (hereinafter referred to as "Rwanda") dated 12th July 2017, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Strengthening of Nzove - Ntora Principal Transmission Pipeline in Kigali City (hereinafter referred to as "the Project").

As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Kigali, 31 August, 2018



Eng. Aimé MUZOLA
Chief Executive Officer
Water and Sanitation Corporation
The Republic of Rwanda



Mr. Shinichi MASUDA
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan



Mr. Ronald NKUSI
Division Manager
Ministry of Finance and Economic Planning
The Republic of Rwanda

ATTACHEMENT

1. Objective of the Project

This project aims to increase the volume of water and to stabilize the supply of water by improving water supply facilities such as Nzove - Ntora transmission pipeline, pump equipment of Nzove WTP and Ntora reservoir station, those are the main water facilities in Kigali City. This project contributes to improvement of social services through improvement of water supply situation.

2. Project site

Both sides confirmed that the site of the Project is in Kigali City, which is shown in Annex 1.

3. Responsible authority for the Project

Both sides confirmed the authorities responsible for the Project are as follows:

3-1 WASAC will be the executing agency for the Project (hereinafter referred to as “the Executing Agency”). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be taken care by relevant authorities properly and on time. The organization chart is shown in Annex 2.

3-2 The Ministry of Infrastructure (hereinafter referred to as “MININFRA”) is responsible for supervising the Executing Agency on behalf of the Government of Rwanda.

4. Contents of the Draft Report

After the explanation of the contents of the Draft Report by the Team, the Rwandan side agreed to its contents including the outline design.

5. Cost estimate

Both sides confirmed that the cost estimate including the contingency explained by the Team is provisional and will be examined further by the Government of Japan for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

6. Confidentiality of the cost estimate and technical specifications

Both sides confirmed that the cost estimate and technical specifications of the Project should never be disclosed to any third parties until all the contracts under the Project are concluded.

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7. Procedures and Basic Principles of Japanese Grant

The Rwandan side agreed that the procedures and basic principles of Japanese Grant as described in Annex 3 shall be applied to the Project. In addition, the Rwandan side agreed to take necessary measures according to the procedures.

8. Timeline for the Project implementation

The Team explained to the Rwandan side that the expected timeline for the Project implementation is as attached in Annex 4.

9. Expected outcomes and indicators

Both sides agreed that key indicators for expected outcomes are as follows. The Rwandan side will be responsible for the achievement of agreed key indicators targeted in year 2024 and shall monitor the progress based on those indicators.

As for the average daily supply in Ntora pipe system, WASAC shall acquire data, record and monitor it every day by flow meters which will be installed by the Project.

As for the number of accidents in the transmission pipeline of Ntora pipe-system, WASAC shall record the situation and correspondence when an accident occurs.

As for the number of days of water supply restrictions in the area surrounding the Ntora reservoir, WASAC shall acquire data, record and monitor it every day.

[Quantitative indicators]

Output indicator	Present value (Actual values in 2017)	Target value (2024) [After three years of project completion]
Average daily supply in Ntora pipe system (m ³ /day)	35,750	52,800 ¹⁾
Number of accidents in the transmission pipeline of Ntora pipe-system ²⁾ (Number of accidents/100km/year)	6.8	0.7
Number of days of water supply restrictions in the area surrounding the Ntora reservoir	3~4	0
(Reference value) Number of recipients of the average water supply volume of the Ntora pipe- system ³⁾	298,000	440,000

1) $62,000 \times (35,750/42,000) \approx 52,800$

2) Reference value: According to the calculation method of average accidents number of ductile iron pipes in Japan, the accident record of existing transmission pipes was converted.
Existing transmission pipe's extension 8.85 km, 6 accidents in the past 10 years.
 $6 / (8.85/100) \times 10 \approx 6.8$

Target value: adopts the average number of accidents on ductile iron pipes in Japan
(Source: Ministry of Health, Labor and Welfare: 2012)

3) The value obtained by dividing the average water supply amount by the unit water supply rate
(120 ℓ / person / day, from Kigali City Master Plan 2013)

[Qualitative indicators]

- ① The water level of the two tanks of Ntora reservoir becomes the even, and the shut down time of water supply from No.1 tank will decrease.
- ② Water distribution situation after Ntora reservoir will improve.

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10. Technical assistance ("Soft Component" of the Project)

Considering the sustainable operation and maintenance of the facilities constructed by the Project, following technical assistance is planned under the Project. The Rwandan side confirmed to deploy necessary number of engineers and staff who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

- ① Improving operation of Ntora reservoir
- ② Introduction of operation of pumps at Nzove WTP

11. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 5. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in No. 5 of During the Project Implementation of Annex 5, both sides confirmed that such customs duties, internal taxes and other fiscal levies shall be clarified in the bid documents by WASAC during the implementation stage of the Project.

The Rwandan side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.

Both sides also confirmed that the Annex 5 will be used as an attachment of Grant Agreement.

The Rwandan side assured to take the necessary measures of land acquisition in the implementation of this Project at the appropriated time in accordance with the Resettlement Action Plan ("RAP") submitted to WASAC.

12. Monitoring during the implementation

The Project will be monitored by WASAC and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 6. The timing of submission of the PMR is described in Annex 5.

13. Project completion

Both sides confirmed that the Project completes when all the facilities constructed and equipment procured by the grant are in operation. The completion of the Project will be reported to JICA promptly, but in any event not later than six months after completion of the Project.

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14. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the Project completion, in principle, with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability). The result of the evaluation will be publicized. The Rwandan side is required to provide necessary support for the data collection.

15. Items and measures to be considered for the smooth implementation of the Project

Both sides confirmed the items and measures to be considered for the smooth implementation of the Project as follows.

① Construction of box culvert

In order to lay the transmission pipeline at the bridge construction area (Nyabugogo area along National Road 3), Kigali City shall construct the box culvert by May 2019 before the notice of the bidding.

② Improvement of the water distribution area from the elevated water tank constructed in Ntora reservoir

Improvement of distribution pipeline and its related facilities (valves, instrumentation equipment etc.) at the water distribution area from the new elevated water tank shall be completed until the completion of the Project (October 2021).

③ Ensuring the electric power for the installation of new pumps

The Project installs three pumps at Nzove WTP and two pumps at Ntora reservoir. WASAC secures necessary electric power by May 2019 before the notice of the bidding.

④ Implementation of recovery work on Nzove I WTP production volume

In order to achieve the effect of the Project certainly, WASAC shall complete the recovery work on Nzove I WTP from current 17,000 m³/day to 25,000 m³/day by 2023.

⑤ Construction permission

Before the construction of the Project, necessary licenses and approvals (especially permission of roads and river administrators) in Rwanda shall be acquired appropriately, and prior consultation with detail design drawings shall be conducted so as not to affect the implementation of the Project.

a) Road: Rwanda Transport Development Agency (RTDA)

b) River crossing etc.: Rwanda Water and Forestry Authority (Water Resources Department)

⑥ Operation and maintenance system and securement of maintenance cost

The transmission pipeline installed by the Project is an important lifeline supporting the civil life and urban activities of Kigali City, so that the function of the water supply system must be maintained over a long period of time. For this reason, WASAC secures the personnel according to the amount of water to be increased in the future and secures necessary costs for operation and maintenance.

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- ⑦ Announcement to customers at the time of construction changeover of transmission pipeline
Switching from the existing transmission pipe to the new transmission pipe is planned to use hot tapping so as not to stop water supply. However, if the amount of water in Ntora reservoir becomes empty due to the unexpected troubles during the work, there is a possibility of water outage. WASAC needs to notify the customers in advance that water supply has a possibility to be affected by before and during switching construction work.

16. Schedule of the Study

JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Rwandan side around December, 2018.

17. Environmental and Social Considerations

17-1 General Issues

17-1-1 Environmental Guidelines and Environmental Category

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as B because the Project is not located in a sensitive area, nor has sensitive characteristics, nor falls into sensitive sectors under the Guidelines, and its potential adverse impacts on the environment are not likely to be significant.

17-1-2 Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex 7. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, the Rwandan side shall submit the modified version to JICA in a timely manner.

17-2 Environmental Issues

17-2-1 Environmental Impact Assessment (EIA)

Both sides confirmed the EIA report will be approved by Rwanda Development Board by September 2018.

The Rwandan side agreed that after the approval of the report, JICA will disclose provided EIA report on its website.

17-2-2 Environmental Management and Monitoring Plan

Both sides confirmed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) of the Project is as Annex 8, respectively. Both sides agreed that environmental mitigation measures and monitoring shall be conducted based on the EMP and EMoP, which may be updated during the detailed design stage.

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17-3 Social Issues

17-3-1 Land Acquisition and Resettlement

Both sides confirmed the 0.5 ha of land would be acquired and 2 households (10 Persons) would be relocated/affected due to the implementation of the Project, and detailed impacts are summarized as follows.

District	Sector	Cell	Number of Affected land		Number of Affected assets			
			size (m2)	Households	Houses	Fence/ Wall	Floor	House-holds
Gasabo	Gatsata	Nyamabuye	157	5	0	0	0	0
		Nyamugari	445	5	0	0	0	0
	Gisozi	Ruhango	2,392	40	1	10	9	19
Nyarugenge	Kanyinya	Nyamweru	718	7	0	0	0	0
		Nzove	723	9	0	1	0	1
	Kigali	Nyabugogo	1,510	14	1	3	1	4
Grand Total			5,945	80	2	14	10	24

Such land acquisition and resettlement shall be implemented based on the Resettlement Action Plan (RAP) as Annex 9 which was prepared by the Rwandan side in line with the JICA and Rwandan Guidelines. RAP shall be finalized after the calculation of compensation amount and be authorized by the Rwandan side by December 2018. Compensation amount should be determined based on the RAP.

17-4 Environmental and Social Monitoring

17-4-1 Environmental Monitoring

Both sides confirmed environmental monitoring will be conducted by the Rwandan side in accordance with the Environmental Monitoring Plan described in the EMoP.

Both sides agreed that the Rwandan side will submit results of environmental monitoring to JICA by using the Monitoring Form attached as Annex 10. The timing of submission of the monitoring form is described in Annex 5.

17-4-2 Social Monitoring

Both sides confirmed that the Rwandan side will implement monitoring of land acquisition and resettlement plan proposed in the RAP. The Rwandan side and the Team agreed that WASAC will submit results of social monitoring to JICA by using the Monitoring Form attached as Annex 10. The timing of submission of the monitoring form is described in Annex 5.

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17-4-3 Information Disclosure of Monitoring Results

Both sides confirmed that the Rwandan side will disclose results of environmental and social monitoring to local stakeholders through their website.

The Rwandan side agreed JICA will disclose the results of environmental and social monitoring submitted by the Rwandan side as the monitoring forms attached as Annex 10 on its website.

When the third parties request further information, JICA will disclose it, subject to approval by the Rwandan side.

18. Other Relevant Issues

18-1 Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which the Project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the Project cost will be disclosed to the public after all the contracts under the Project are concluded.

18-2 Safety measures

Safety measures for implementation of the Project are important issues. Regarding safety measures, both sides agreed that the system for information gathering and communication between WASAC and the Japanese side shall be established during the implementing stage of the Project.

a) Public security

Currently, security situation of Rwanda is stable. However, the contractor shall avoid construction work after sunset.

b) Construction

The contractor shall deploy security guards at the time of laying pipeline along the national road and at the point of entering the temporary road for construction. Also, during the installation of the pipeline on the slope, measures against falling rock (rock fence), measures to prevent dropping of piping materials (duplication of wires), etc. are carried out. During the construction of elevated tank, the Project set up the safety net.

18-3 Road expansion of National Road 1

Based on the latest information, both sides confirmed that the construction site of the Project does not overlap with the road expansion area of National Road 1.

18-4 The capacity of the new transmission pipe for New Nzove I WTP

Considering the high water demand of the distribution networks from Ntora reservoir, the new transmission pipe is designed to be large enough to accept the water supply from New Nzove I WTP even when it expands the capacity from the current 40,000 m³/day to 65,000 m³/day.

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Annex 1 Project Site

Annex 2 Organization Chart

Annex 3 Japanese Grant

Annex 4 Project Implementation Schedule

Annex 5 Major Undertakings to be taken by the Government of Rwanda

Annex 6 Project Monitoring Report (template)

Annex 7 Environmental Check List

Annex 8 Environmental Management Plan/Environmental Monitoring Plan

Annex 9 Resettlement Action Plan

Annex 10 Environmental and Social Monitoring Form

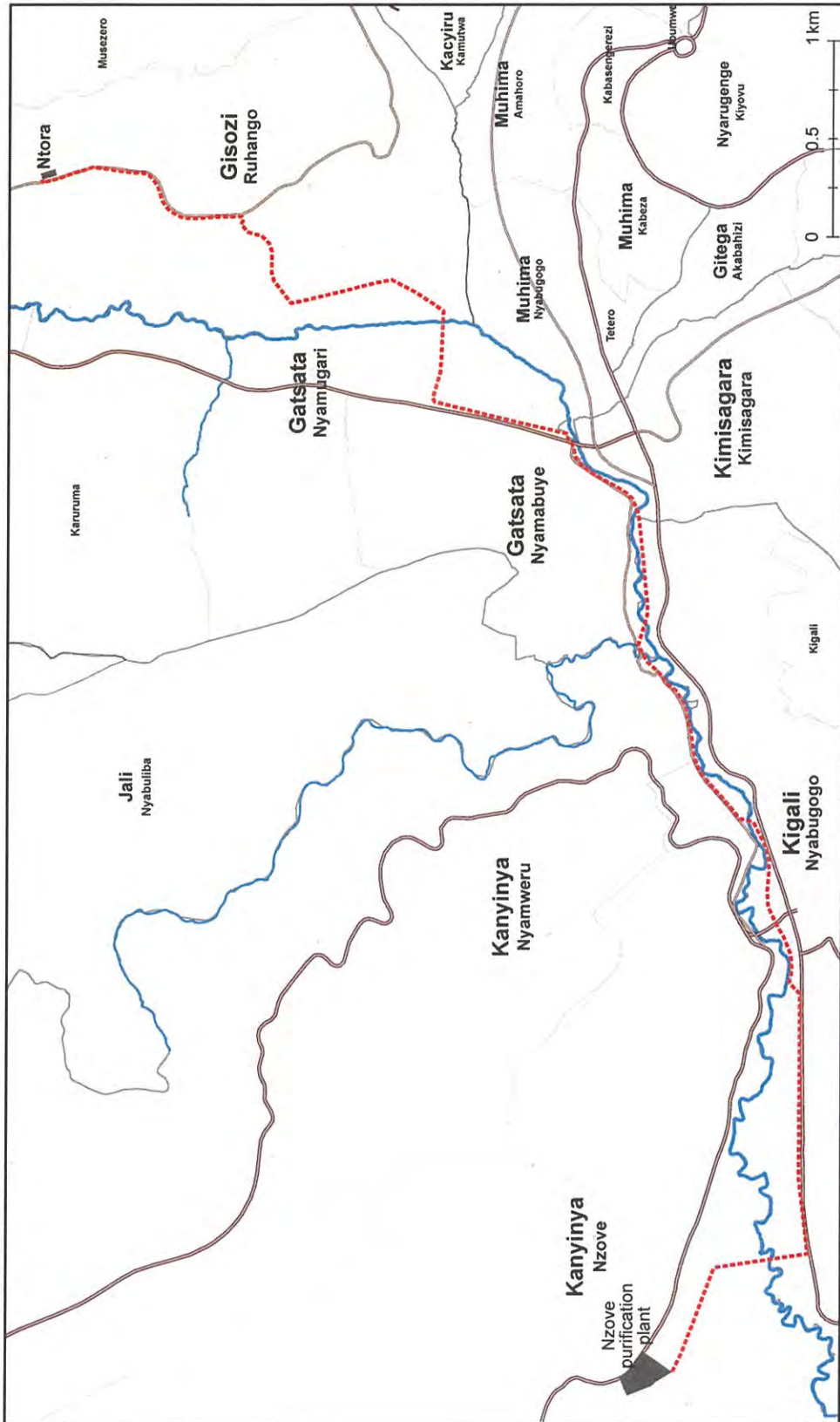
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Project Site Map by Sector/Cell

- Sector Cell Nyarugenge District
- Sector Cell Gasabo District
- Planned water pipe installation route
- Road
- Nyabugogo River

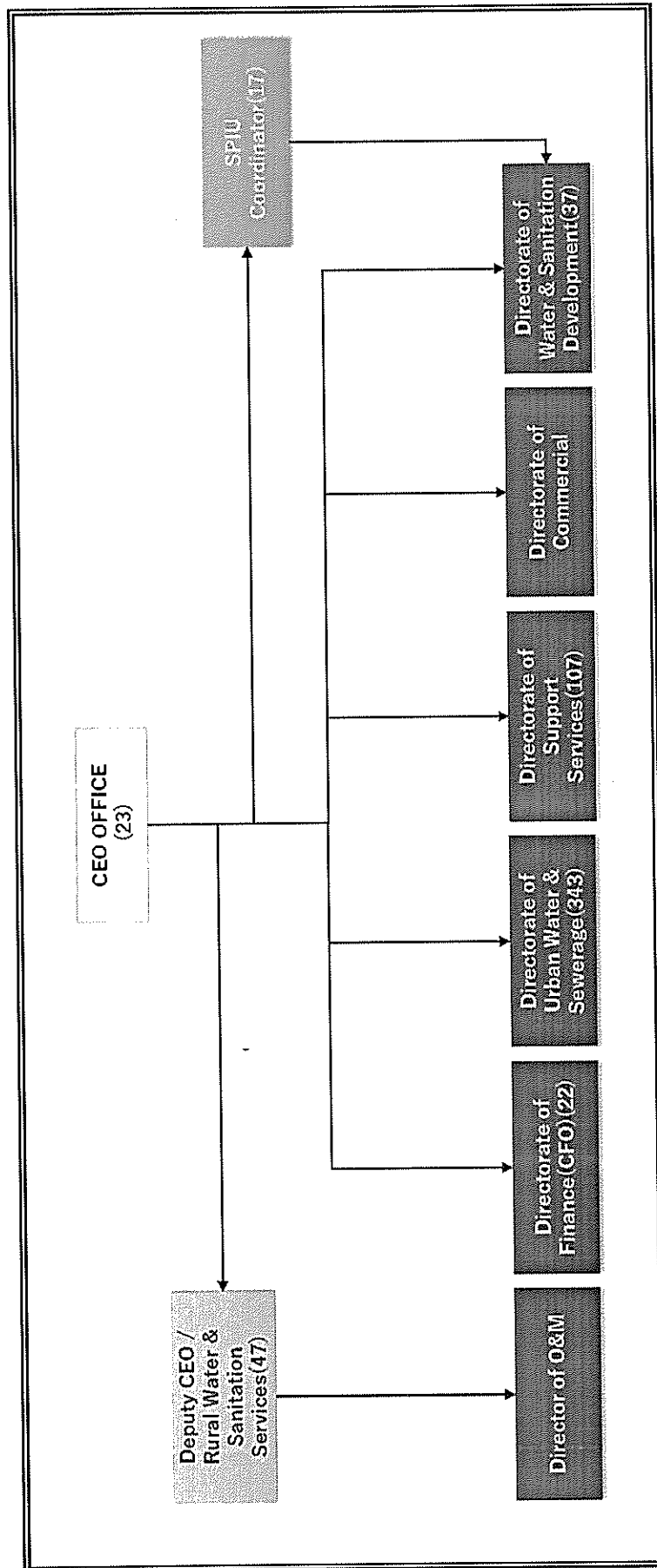


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Annex 2 Organization Chart

SUMMARY OF STRUCTURE



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JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as “the Recipient”) to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as “Project Grants”).

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See “PROCEDURES OF JAPANESE GRANT” for details):

(1) Preparation

- The Preparatory Survey (hereinafter referred to as “the Survey”) conducted by JICA

(2) Appraisal

- Appraisal by the government of Japan (hereinafter referred to as “GOJ”) and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes

- The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as “the G/A”)

- Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as “the B/A”)

- Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as “the Bank”) to receive the grant

Construction works/procurement

- Implementation of the project (hereinafter referred to as “the Project”) on the basis of the G/A

(4) Ex-post Monitoring and Evaluation

- Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

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

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

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relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as “the E/N”) will be signed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the “General Terms and Conditions for Japanese Grant (January 2016).”

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2) Banking Arrangements (B/A)

- a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.
- b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the

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Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

- a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.
- b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

- 1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.
- 2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

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4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

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Procedures of Japanese Grant

Stage	Flow & Works	Recipient Government	Japanese Government	JICA	Consultant	Contract or	Others
Application	<p>(T/R : Terms of Reference)</p> <p>Request</p> <p>Screening of Project</p> <p>Evaluation of T/R</p> <p>Project Identification Survey*</p>						
Project Formulation & Preparation	<p>Preparatory Survey</p> <p>Preliminary Survey*</p> <p>Field Survey Home Office Work Reporting</p> <p>Outline Design Study</p> <p>Selection & Contracting of Consultant by Proposal</p> <p>Field Survey Home Office Work Reporting</p> <p>Explanation of Draft Final Report</p> <p>Final Report Final Report</p> <p>*if necessary</p>						
Appraisal & Approval	<p>Appraisal of Project</p> <p>Inter Ministerial Consultation</p> <p>Presentation of Draft Notes</p> <p>Approval by the Cabinet</p>						
Implementation	<p>(E/N: Exchange of Notes)</p> <p>(G/A: Grant Agreement)</p> <p>(A/P : Authorization to Pay)</p> <p>E/N and G/A</p> <p>Banking Arrangement</p> <p>Consultant Contract</p> <p>Verification</p> <p>Issuance of A/P</p> <p>Detailed Design & Tender Documents</p> <p>Approval by Recipient Government</p> <p>Preparation for Tendering</p> <p>Tendering & Evaluation</p> <p>Procurement /Construction Contract</p> <p>Verification</p> <p>A/P</p> <p>Construction</p> <p>Completion Certificate Recipient Government</p> <p>A/P</p> <p>Operation</p> <p>Post Evaluation Study</p>						
Evaluation & Follow up	<p>Ex-post Evaluation</p> <p>Follow up</p>						

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Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
	(14) Completion certificate		x			x	x	
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.

2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.

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Annex 4 Project Implementation Schedule (Tentative)

Year		2019												2020												2021											
Month		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
Detailed design study	Field survey	1	2																																		
	Detail design																																				
	Preparation for tender documents																																				
	Approval of tender documents																																				
	Notice of the tender																																				
	Distribution of tender documents																																				
	Tender opening																																				
	Evaluation of tender																																				
	Contract																																				
	Construction	Preparation																																			
Transmission pipeline																																					
Nzove WTP																																					
Ntota reservoir																																					
Completion inspection / cleaning up																																					

Work in Japan

Work in Rwanda

□ : Work in Japan ■ : Work in Rwanda

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Annex 5

Major Undertakings to be Taken by the Government of Rwanda

1. Specific obligations of the Government of Rwanda which will not be funded with the Grant

(1) Before the Tender

No.	Item	Deadline	In charge	Approximate Cost (RWF)
1	To open bank account (Banking Arrangement (B/A))	Within 1 month after the signing of the G/A	MINECOFIN/ BNR	24,000,000
	To issue Authorization to Pay (A/P) to a bank in Japan (the Agent Bank) for the payment to the consultant	Within 1 month after the signing of the contract	MINECOFIN	44,000
2	To obtain approval of EIA	Before the early of September 2018	WASAC	N/A
3	To secure lands	Before the tender	WASAC	165,500,000
	To secure the necessary budget and implement land acquisition procedure, and make compensation plan with full replacement cost in accordance with RAP	Before the tender	WASAC	
	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, monthly	Till land acquisition completes	WASAC	
4	To obtain the necessary permission for the implementation of the Project from the concerned organization 1) City Development permission from City of Kigali 2) River crossing permission from RWFA 3) Other permission, if necessary	Before notice of the bidding	WASAC	N/A
5	To submit Project Monitoring Report (with the result of Detail Design)	Before preparation of bidding	WASAC	N/A
6	To construct the box culvert at Nyabugogo area along National Road 3 1) Budget Allocation 2) Construction	Before notice of the bidding	1) WASAC 2) Kigali City	55,000,000
7	To ensure the electric power for the installation of new pumps	Before notice of the bidding	WASAC	N/A

MINECOFIN: Ministry of Finance and Economic Planning

BNR: National Bank of Rwanda

RWFA : Rwanda Water and Forestry Authority

N/A: Not Applicable

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(2) During the Project Implementation

No.	Item	Deadline	In charge	Approximate Cost (RWF)
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the contractor(s)	Within 1 month after contract(s) signing	MINECOFIN	44,000
	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 for A/P	1) Within 1 month after the signing of the contract(s) 2) Every payment	MINECOFIN	174,000
2	To obtain the necessary permission for construction from the concerned organizations 1) City Development permission from City of Kigali 2) River crossing permission from Rwanda Water and Forestry Authority 3) Other permission, if necessary	During the project	WASAC	N/A
3	To ensure prompt customs clearance and assist the contractor(s) with internal transportation in recipient country	During the project	WASAC	N/A
4	To accord Japanese nationals and/or physical persons of third countries whose services may be required in connection with the supply of the products and services under the verified contract such as facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work	During the project	WASAC	N/A
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the Products and/or the Services be borne by its designated authority without using the Grant	During the project	MINECOFIN, WASAC	1,958,000,000
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	During the project	WASAC	N/A
7	1) To submit the Project Monitoring Report 2) To submit Project Monitoring Report (final)	1) Every month 2) Within one month after signing of Certificate of Completion for the works under the contract(s)	WASAC	N/A
	To submit a report concerning completion of the Project	Within six months after completion of the Project	WASAC	N/A
8	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)	During the project	WASAC	N/A
9	To implement Environmental Management Plan, Environmental Monitoring Plan and RAP	During the project	WASAC	Included in the budget for item Before the tender No 3 above

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10	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	During the Project	WASAC	Included in the budget for item Before the tender No 3 above
	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between WASAC and JICA.	Until the end of livelihood restoration program (In case that income restoration program is provided)	WASAC	Included in the budget for item Before the tender No 3 above
11	To assign supervisor during the construction period and counterparts for the soft-component activities	During the project	WASAC	N/A
12	To install distribution pipe from the elevated tank	During the project	WASAC	39,000,000
13	Announcement in advance to customers at the time of construction changeover of transmission pipelines	During the Project	WASAC	N/A

(2) After the Project

No.	Item	Deadline	In charge	Approximate Cost (RWF)
1	To implement environmental management plan and environmental monitoring plan	For a period based on environmental management plan and environmental monitoring plan	WASAC	4,200,000
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between WASAC and JICA.	For three years after the Project	WASAC	
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction	WASAC	7,800,000/day
4	To recover the production volume of Nzove I WTP to 25,000m3/day	By 2023	WASAC	If necessary

2. Other obligations of the Government of Rwanda funded with the Grant

No.	Items	Deadline	Amount (Million Japanese Yen)*
1	To procure works for construction of facilities planned by the outline design. To hire Japanese consultant for detailed design, tendering and technical assistance, etc.		

* The Amount is provisional including contingency. This is subject to the approval of the Government of Japan.

END

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<p><u>Project Monitoring Report</u> on <u>the Project for Strengthening of Nzove - Ntora Principal</u> <u>Transmission Pipeline in Kigali City</u> <u>Grant Agreement No. XXXXXXXX</u> 20XX, Month</p>
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Organizational Information

Signer of the G/A (Recipient)	Person in Charge (Designation) _____ _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Executing Agency	Person in Charge (Designation) _____ _____ Contacts Address: _____ Phone/FAX: _____ Email: _____
Line Ministry	Person in Charge (Designation) _____ _____ Contacts Address: _____ Phone/FAX: _____ Email: _____

General Information:

Project Title	
E/N	Signed date: _____ Duration: _____
G/A	Signed date: _____ Duration: _____
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

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1: Project Description

1-1 Project Objective

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1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

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1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives

Indicators	Original (Yr)	Target (Yr)

Qualitative indicators to measure the attainment of project objectives

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2: Details of the Project

2-1 Location

Components	Original (proposed in the outline design)	Actual
1.		

2-2 Scope of the work

Components	Original* (proposed in the outline design)	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

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2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	(at the time of signing the Grant Agreement)	

Reasons for any changes of the schedule, and their effects on the project (if any)

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2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original (proposed in the outline design)	Actual (in case of any modification)	Original ^{1),2)} (proposed in the outline design)	Actual
	1.			
Total				

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original (proposed in the outline design)	Actual (in case of any modification)	Original ^{1),2)} (proposed in the outline design)	Actual
	1.			

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Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original (at the time of outline design)

name:

role:

financial situation:

institutional and organizational arrangement (organogram):

human resources (number and ability of staff):

Actual (PMR)

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original (at the time of outline design)

Actual (PMR)

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original (at the time of outline design)

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Actual (PMR)

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (at the time of outline design)

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

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	Contingency Plan (if applicable):
Actual Situation and Countermeasures (PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

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5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

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5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

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Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant
- Appendix - Photocopy of Contractor's Progress Report (if any)
 - Consultant Member List
 - Contractor's Main Staff List
4. Check list for the Contract (including Record of Amendment of the Contract/ Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final) only)
8. Pictures (by JPEG style by CD-R) (PMR (final) only)
9. Equipment List (PMR (final) only)
10. Drawing (PMR (final) only)
11. Report on RD (After project)

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Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

Items of Specified Materials		Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C-D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

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2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

Items of Specified Materials		1st month, 2015	2nd month, 2015	3rd month, 2015	4th	5th	6th
1	Item 1	●	●	●			
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

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Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

ANNEX 7 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? (b) Have EIA reports been approved by authorities of the host country's government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied? (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?	(a) Y (b) N (c) N (d) N	(a) EIA report was prepared and submitted to RDB in July 2018 (b) Not yet, but EIA report will be approved in September (c) (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? (b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(a) Y (b) Y	(a) At the stakeholder meetings, the project contents and its impact were adequately explained and stakeholders basically agreed with the project. (b) Participants of consultation meetings made comments and questions, but none of them was critical.
	(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Alternative routes and river crossing methods were examined with social and environmental considerations.
	(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? (b) Do chlorine concentrations within the working environments comply with the country's occupational health and safety standards?	(a) N (b) -	(a) Construction/modification of water purification plant is not included in the project components. (b) ditto
2 Pollution Control	(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) -	(a) Construction/modification of water purification plant is not included in the project components.
	(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) -	(a) Construction/modification of water purification plant is not included in the project components.
	(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) The transmission pumps, which are to be installed at the Nzove WTP, will be covered with RC walls and nearest houses are far away from the pump station, so the noise will not reach the boundary of the site and neighboring houses.



Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
3 Natural Environment	(5) Subsidence	(a) In the case of extraction of a large volume of groundwater, is there a possibility that the extraction of groundwater will cause subsidence?	(a) N	(a) No groundwater will be used.
	(1) Protected Areas	(a) Is the project site or discharge area 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) The project site is not located in protected areas and there is no expected impact of the project on the protected areas.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (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? (c) If significant ecological impacts are anticipated, are adequate protection measures taken to reduce the impacts on the ecosystem? (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?	(a) N (b) N (c) Y (d) N	(a) The result of the EIA survey shows no important habitats inside and around the project site. (b) ditto (c) No serious impact is expected but necessary measures, such as conserving top soil and protecting animals/birds during the site-clearance, will be taken. (d) Construction of new water intake is not included in the project components.
	(3) Hydrology	(a) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect surface water and groundwater flows?	(a) N	(a) There is no new water intake, but there are 6 river-crossing points, which could have impact on the river bank. Pipe jacking method will be applied and this could minimize its impact. At the pipe installation work near springs, back-filling work will be done carefully.

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Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	<p>(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?</p> <p>(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?</p> <p>(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?</p> <p>(d) Is the compensations going to be paid prior to the resettlement?</p> <p>(e) Is the compensation policies prepared in document?</p> <p>(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?</p> <p>(g) Are agreements with the affected people obtained prior to resettlement?</p> <p>(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?</p> <p>(i) Are any plans developed to monitor the impacts of resettlement?</p> <p>(j) Is the grievance redress mechanism established?</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p> <p>(d) Y</p> <p>(e) Y</p> <p>(f) Y</p> <p>(g) Y</p> <p>(h) Y</p> <p>(i) Y</p> <p>(j) Y</p>	<p>(a) Two households are needed to be resettled. 22 other households/corporations have to demolish or move structures such as fences and paved floors. 147 plots of land with the total area of 40,493 m2 will be affected by the project, and among them 5,451 m2 of private land will be permanently expropriated. RAP is being prepared to minimize the impact of the project.</p> <p>(b) Community consultation meetings were organized to explain about compensation and measures of livelihood restoration before the project.</p> <p>(c) RAP is being developed based on socio-economic studies and inventory survey as well as a number of meetings with various stakeholders.</p> <p>(d) Compensation at full replacement cost will be paid prior to the resettlement according to the both Rwandan laws and JICA guidelines.</p> <p>(e) Compensation policies will be prepared as a part of Entitlement Matrix in RAP</p> <p>(f) A support will be provided for vulnerable persons and/or his/her family and priority of job opportunity during the construction period will be also given.</p> <p>(g) Agreements with the affected people will be obtained and compensation will be paid prior to resettlement.</p> <p>(h) The RAP, which is being prepared according to the Rwandan laws and JICA guideline/WB OP 4.12, specifies the resettlement schedule, proposes the resettlement implementation system and necessary budget.</p> <p>(i) The RAP shows the monitoring plan.</p> <p>(j) According to the Rwandan law, the grievance redress mechanism is proposed and will be established. Necessary cost for grievance redress mechanism will be also calculated and presented in the RAP.</p>

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Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(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? (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?	(a) Y (b) Y	(a) Some farmers will face the reduction in their farm land, and a support (priority in employment) will be provided for farmers who depend on income from farming activities (b) The water pipe installation work could have negative impact on some springs, and a countermeasure will be taken if necessary.
	(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) No such facilities are identified in the project area.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) There will be no serious problems, but site clearance work at the marshland and cutting trees and bamboos will change the landscape locally. After the construction work, rehabilitation work will be conducted.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N (b) N	(a) Ethnic minorities and indigenous people are not confirmed in the Project area. (b) ditto
	(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? (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? (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.? (d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(a) Y (b) Y (c) Y (d) Y	(a) Contractors/sub-contractors are requested to take a training provided by Ministry of Public Service and Labour in order to make sure that they would abide by related Rwandan laws and international rules such as OHSAS (b) Measures are taken to oblige workers to wear safety boots and helmets and to manage waste properly, in order to prevent accidents during the construction work (c) The safety and sanitation plan will be planned and regular safety education will be implemented, in consultation with a district work safety inspector (d) Security guards, who are provided with training of health and safety, are assigned and measures are taken such as installation of fence and signboards in order to prevent accidents and troubles involving local residents near the construction site

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5 Others	(1) Impacts during Construction	<p>(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?</p> <p>(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce impacts?</p> <p>(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce impacts?</p> <p>(d) If the construction activities might cause traffic congestion, are adequate measures considered to reduce such impacts?</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p> <p>(d) Y</p>	<p>(a) Based on the baseline survey, the impact of the project was evaluated and mitigation measures were planned.</p> <p>(b) ditto</p> <p>(c) ditto</p> <p>(d) A part of the transmission pipe line runs along the main roads. The installation work there could cause traffic congestion and mitigations measures will be taken.</p>
5 Others	(2) Monitoring	<p>(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?</p> <p>(b) What are the items, methods and frequencies of the monitoring program?</p> <p>(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?</p> <p>(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?</p>	<p>(a) Y</p> <p>(b) Y</p> <p>(c) Y</p> <p>(d) Y</p>	<p>(a) The environmental monitoring plan was prepared for target items of mitigation measures, and will be implemented</p> <p>(b) The feasible monitoring methods and frequency were decided in consultation with the environmental authorities</p> <p>(c) The monitoring system will be established through the EIA survey</p> <p>(d) The reporting system will be established through the EIA survey.</p>
6 Note	Reference to Checklist of Other Sectors Note on Using Environmental Checklist	<p>(a) Where necessary, pertinent items described in the Dam and River Projects checklist should also be checked.</p> <p>(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).</p>	<p>(a) Y</p> <p>(a) N</p>	<p>(a) Since there are 6 river crossing points, river water quality is included in the check items during the construction period.</p> <p>(a) The project does not have possibility of significant adverse impacts on environment, including global warming</p>

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ANNEX8 Environmental Management and Monitoring Plan (implementation system, Methods, and Cost)

The following Environmental Management Plan and Environmental Monitoring Plan will be implemented in order to monitor mitigation measures before/during construction and during operation.

Environmental Management Plan (EMP)

Environmental concerns	Suggested mitigation measures	Responsible	Monitoring	Estimated Cost (US\$)
CONSTRUCTION, OPERATION PHASES AND DECOMMISSIONING PHASES				
Overall environmental management	<ul style="list-style-type: none"> - Designated an Environmental Supervisor to oversee environmental management, environmental training, and the implementation of environmental policies; - Appoint ESHS Manager in EPC contractor team to assist with sampling, monitoring and daily environmental compliance; - Provide environmental training to all employees. 	WASAC Contractor	REMA/WASAC	Construction cost
Occupational health and Safety (OHS)	<ul style="list-style-type: none"> - The safety and sanitation plan is formulated and safety trainings are provided for workers - Ensure all employees have health insurance; - Provide workers and visitors with the necessary personal protective equipment (PPE); - First aid Kits 	Contractor	REMA/WASAC/Districts	Construction cost
Child labour, forced labour and discrimination	<ul style="list-style-type: none"> - Protect workers' rights; - Establish, maintain, and improve the employee-employer relationship; - Promote compliance with national legal requirements and provide supplemental due diligence requirements where national laws are silent; - Comply with international Labour Organization, and the UNICEF Convention on the Rights of the Child, where national laws do not provide equivalent protection; - Protect the workforce from inequality, social exclusion, child labour, and forced labour; 	Contractor	REMA/WASAC/Districts	NA
High expectation of the local communities in relation to job posts	<ul style="list-style-type: none"> - Disclosure the exact number of jobs available, the applicable period and the remuneration to be allocated for each type of work; - Involvement of local leaders; - In the event there are local expectations for employment that cannot be met by the project, the limited availability of places should be made known to the interested parties through local authorities 	Contractor	Local authorities WASAC	NA
High expectations of getting great compensation in cases of resettlement	<ul style="list-style-type: none"> - Expropriation and compensation mechanisms should be implemented in all justifiable cases 	WASAC Ltd	WASAC MININFRA, Local authorities	RAP budget
Conflicts among workers and the local population in the project area	<ul style="list-style-type: none"> - Keeping a good relationship with local communities - Establishment and implementation of set of rules for the workplace 	Contractor and WASAC	Local authorities	Operational Cost

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Environmental concerns	Suggested mitigation measures	Responsible	Monitoring	Estimated Cost (US\$)
Impacts on public utilities such as spring water/wells or water supply pipe and electrical cables	<ul style="list-style-type: none"> - Rehabilitation of affected structures and infrastructures; - Identification of new water source and construct alternative water spring. 	Contractor and WASAC		Construction cost
Risk of destruction or disruption of infrastructure and social and economic loss infrastructure	<ul style="list-style-type: none"> - Minimize the affected population by occasional changes in the route of pipelines; - Providing a due compensation in coordination with local authorities and project proponent; 	WASAC Ltd	Local authorities	Budget provided in RAP
Health related issues due to dust emissions	<ul style="list-style-type: none"> - Use of wet processes; - Use of Personal Protective Equipment 	Contractor	WASAC/ Local authority	-
Risk of increase of HIV/AIDS and other Sexually Transmitted Diseases	<ul style="list-style-type: none"> - Providing surveillance and active screening and treatment of workers - Providing health and hygiene training - Preventing illness among workers in local communities - Providing health services 	Contractor	Ministry of Health/ Local Authority	Constriction cost
Gender based violence and sexual Exploitation and Abuse (GBV/SEA)	<ul style="list-style-type: none"> - Preparation and implementation workers Code of conduct - Conduct GBV/SEA awareness 	Contractor	WASAC/ Local authority	Constriction cost
Safety and security	<ul style="list-style-type: none"> - Install safety and warning signage as appropriate - Provide safety training to all workers 	Contractor	WASAC, / Local Authority	Constriction cost
Soils erosion and compaction	<ul style="list-style-type: none"> - Restrict the activities to the minimum possible; - Use appropriate machinery and/or protective boarding during soil stripping; - Remove and stockpile topsoil, sub-soils and any parent material separately; 	Contractor	REMA/WAS AC	Construction cost
Changes of landscape - Visual impact	<ul style="list-style-type: none"> - Rehabilitate working area with trees and grasses 	Contractor	REMA/WAS AC	Constriction cost
Noise and vibration emissions management	<ul style="list-style-type: none"> - Restrict construction and operation of heavy machines to daylight; - Ensure noise emissions are kept within the Rwanda standards; - Reduce needed truck movements by careful planning of needs of construction material; - Regular and effective equipment maintenance in order to ensure all machinery is in good working order and use does not generate excess noise/vibration. 	Contractor	REMA; WASAC, Local authority	Operational cost
Risk of Alteration of hydrology and wetland	<ul style="list-style-type: none"> - Watercourse crossing must be designed to avoid affecting the stability and long-term performance of riverbanks and flood defences; - Consider the seasonal sensitivity of ecological resources when planning river crossings; etc. 	Contractor	<ul style="list-style-type: none"> - REMA, - RWFA, - Local authority 	Construction cost
Disturbance of wildlife by noise	<ul style="list-style-type: none"> - Restrict construction activities and operation of heavy machines to daylight, when most wildlife is active and can react to noise. 	Contractor	<ul style="list-style-type: none"> - REMA, - district 	-

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Environmental concerns	Suggested mitigation measures	Responsible	Monitoring	Estimated Cost (US\$)
Loss of vegetation cover and plant diversity	<ul style="list-style-type: none"> - Align the excavations to follow existing parallel water pipeline in order to minimize the loss of vegetation cover; - In areas of dense vegetation cover, the removal of vegetation must be restricted to the minimum necessary width; etc. 	Contractor	REMA, WASAC	-
Disturbance and mortality of terrestrial fauna	<ul style="list-style-type: none"> - Restrict construction activities do the daylight; - Inspect the area to be cleared for any terrestrial fauna before bush clearing and digging; - Protect any trench left overnight with a net fence to block fauna from being trapped inside; - Capture and release fauna away from the direct influence zone (including species trapped in the trenches); 	Contractor	REMA, Self-monitoring by WASAC	-
Disturbance of ground Water Quality	<ul style="list-style-type: none"> - Consider measures to prevent pollution of ground water while designing the sludge storage site; - Storage site shall follow the appropriate regulation of Waste Management 	Contractor	REMA, WASAC	-
Air Quality Management	<ul style="list-style-type: none"> - Minimizing dust from open area sources, including storage piles; - Managing emissions from mobile sources, 	Contractor	REMA, WASAC	-
	<ul style="list-style-type: none"> - Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements, 	Contractor	REMA, WASAC	Constriction cost
	<ul style="list-style-type: none"> - Avoiding open burning of solid. 	Contractor	REMA, WASAC	-
Solid wastes management	<ul style="list-style-type: none"> - All the solid waste should be collected; the biodegradable organic material composted properly on site for manure production and the non-biodegradable disposed of in a public landfill; etc 	Contractor	REMA, WASAC	Constriction cost
Management of Hazardous Materials and Oils	<ul style="list-style-type: none"> - Waste separation must be conducted on site; - Maintenance of trucks and machines should be done far from water sources 	Contractor and WASAC	REMA, WASAC	-

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Environmental Monitoring Plan (EMoP)

Environmental items	Monitoring item	Parameter /Indicator	Location	Frequency	Responsible	Budget
Pre-construction and site mobilization phase						
Land expropriation, compensation payment and other support	Compensation for land and houses lost	Number of houses expropriated Area of land expropriated	Project area	Once before construction	WASAC	RAP monitoring
	Priority employment in	Number of PAPs who receive support such as priority in employment	Project area		WASAC/ local government	RAP monitoring
	Complaints resolutions	GRM log book	Project area		Districts/GRM Committees	RAP monitoring
Air pollution	Equipment and automobiles in good shape	Number of Automobiles with certification on site		As appropriate	Contractor	No cost applicable to monitor.
Water pollution	Surface water quality	(temperature, pH, TSS, Turbidity)	Upper site/ lower site of the river	Once	Contractor	Constriction cost
Noise and vibrations	Noise and vibrations		WPT and 8 construction sites	Once	Contractor	Constriction cost
Construction phase						
Accident and incident	Complaint (in general such as noise, traffic jam, and accidents)	Records of complaints	Project area		Contractor WASAC	Operational Cost
Air Pollution	Equipment and automobiles in good shape	Regular inspection and maintenance	WPT and 8 construction sites	Daily	Contractor	No cost applicable to monitor.
	Spraying of water to reduce dust.	Records on water spray Level of dust (observation)	WPT and 8 construction sites	Daily	Contractor	Operational cost
	Regular inspection of electrical installations, Fire extinguishers, water tanks	Number of fire extinguishers and water tanks Records of inspection	WPT and 8 construction sites	Quarterly through the construction phase	EPC contractor	Constriction cost
Water pollution	Surface water quality	temperature, pH, TSS, Turbidity	Upper site/ lower site of the river	Quarterly	Contractor	Constriction cost
Noise and vibrations	Restriction of noise/vibration emitting activities to working hours.	Noise level Vibration level	WPT and 8 construction sites	At the time of earth works or concrete vibrations.	Contractor	Constriction cost
Soil pollution	Check prevention measures of oil contamination	Keep records or not	WPT and 8 construction sites	Monthly	Contractor	Operational Cost
Soil erosion	Check the conditions of river bank and steep slope along the pipeline route	Keep records of conditions	Steep slopes 6 river crossing places	Monthly	Contractor	Operational Cost
Waste	Management of excavated soil Management of concrete debris and others	Reuse or not Proper management or not	WPT and 8 construction sites	Monthly	Contractor	Operational Cost

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Environmental items	Monitoring item	Parameter /Indicator	Location	Frequency	Responsible	Budget
Ecosystem	Reforestation to offset lost grasses and trees Management of top soil	Number of planted hectares (ha) Number of trees planted	WPT and 8 construction sites	Every quarter of a year	Communities/Districts/Contractor	Operational Cost
Work conditions	Occupational Safety and Health plan	Availability of OHS Plan		Quarterly through the construction phase.	Contractor	Operational Cost
	Meetings and trainings	Number of meetings and trainings				
	Safety gear for workers	Number of workers with safety gear	WPT and 8 construction sites			
	Noise and vibrations	(from noise and vibrations)	WPT and 8 construction sites	(from noise and vibrations)		
	Occurrence of accidents and injuries	Records of accidents and injuries	Project area	Monthly		
Accident/Traffic congestions	Traffic management Plan and traffic signage	Availability of TMP Number of traffic signage	Project area	Monthly	Contractor	Operational Cost
HIV and other diseases	Health and sanitation for labor workers	Number of trainings		Quarterly through the construction phase.	Contractor	Operational Cost
Water use	Check springs and well along the construction route	Conditions of springs and wells	Targets springs and wells	Quarterly through the construction phase.	Contractor Community/Local government	Operational Cost
Gender	Preparation and implementation workers Code of conduct	Availability of code of conduct	Project area	Quarterly through the construction phase.	Contractor	Operational Cost
	Conduct GBV/SEA awareness	Number of events		Quarterly through the construction phase.	Contractor	Operational Cost
Child and forced labour	Minimum working age and working condition	Employment record by age	Construction areas	Monthly	Contractor/Local government	Operational Cost
Operation phase						
Noise and vibrations	Noise/vibrations	Noise and Vibration records	WPT	Once/year	WASAC	Operational cost

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Annex 9 Resettlement Action Plan



FINAL REPORT

RESETTLEMENT ACTION PLAN FOR PROJECT OF STRENGTHENING NZOVE -
NTORA PRINCIPAL WATER PIPELINE IN KIGALI CITY, REPUBLIC OF RWANDA

August, 2018

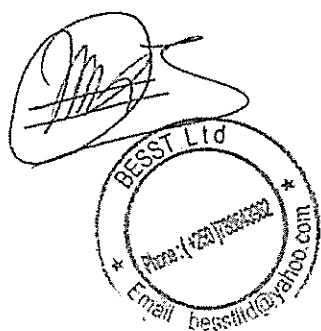
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CONSULTANT CERTIFICATION

Name of the Project:	
STRENGTHENING NZOVE-NTORA PRINCIPAL TRANSMISSION PIPELINE IN KIGALI CITY, REPUBLIC OF RWANDA.	
Project Owner	Government of Rwanda/Water and Sanitation Corporation Limited
Source of funds	Government of Japan/Japan International Cooperation Agency
Nature of Report	Resettlement Action Plan (RAP)
Name of Consultant	Bureau for Environmental and Social Studies/BESST LTD
Team Leader	Mr. Théogène HABAKUBAHO
Sociologist	BENEMARIYA Emma
Chief Surveyor and assets inventory	NZAMURAMBAHO Etienne
GIS Expert	AYINKAMIYE Marie Ange Gisele
Chef data collection and Analysis	NSEKANABANGA Jovine

I hereby undertake that all requirements included in terms of reference provided by the client, I also undertake that the facts given in this Resettlement Action Plan report are factually correct to the best of our knowledge.



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REEXECUTIVE SUMMARY

Project background

The Government of Rwanda with its partners is implementing project that consist at rehabilitation and extension of Nzove Water Treatment Plant. Phase one commissioned March 2016 increased the production from 65,000m³ to 90.000m³/day and Phase 2 which is under implementation will add 55,000m³/day to have the total capacity of 145,000m³/day. At present, Water & Sanitation Corporation(WASAC), has already maintain the principal transmission pipeline between Nzove and Ntora, but the demand for water supply is expected to be increased in the near future, and the Japanese and Rwandan Governments agreed to install another water pipe line between the two locations. In accordance with JICA guidelines on environmental and social considerations as well as national expropriation regulations, such project requires the preparation of Resettlement Action Plan

Objectives of the RAP

The objective of the RAP is to ensure immediate compensation or other supports to Project Affected Persons (PAPs) for their affected properties at the project sites prior construction. The present report principally describes the proposed Project components/activities and associated resettlement impacts. The RAP also provides the legal and regulatory framework for assets valuation, eligibility, and compensation. Estimated affected Person and assets and project affected Person, entitlement, compensation and resettlement measures, public consultation, Grievance Redress Mechanism (GRM), estimated budget, implementation, monitoring and reporting arrangement.

Approach and methodology of the study

To achieve the study objectives, the consultant followed procedures stipulated in JICA guidelines for environmental and social consideration and national expropriation and evaluations laws. The study adopted the following approach: (i) preliminary assessment and review of preliminary design of the projects, (ii) review of secondary data on baseline information (iii) review of policies and regulations, (iv) review of previous meetings and consultations with stakeholders, (v) interviews with key stakeholders, and (vi) field surveys at the project sites including socio-economic baseline data and assets inventory. Spatial data ,site locations, land cover, proposed infrastructure were described fully with clear maps using Global Position System (GPS) and Geographic Information System (GIS) tools for a comprehensive understanding of the area and project activities and to make the task of planning and monitoring easier during the implementation.

Project location and description

The proposed project is located in Kigali City in both Nyarugenge and Gasabo district. The principal pipeline will mainly follow the existing pipeline from Nzove Water Treatment Plant, located in Nzove cell, Kanyinya sector of Nyarugenge District, to Ntora water reservoir located in Ruhango Cell, Gisozi sector of Gasabo District.

Content of RAP

The present report principally describes the proposed Project components/activities and associated resettlement impacts. The report also provides the socio-economic baseline data, identified PAPs and inventory of properties/assets highlights to be affected, biography of the PAPs and the magnitude of the properties to be lost. The RAP also provides the legal and regulatory framework for assets valuation, eligibility, and compensation.

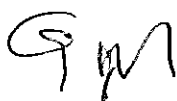
Consultation

The persons to be compensated were meaningfully consulted and participated in planning and implementing the compensation process. Before and during the preparation of this RAP, consultative meetings were held on site to inform the PAPs that their properties or their income might at some point be destroyed or cleared to make way for the rehabilitation of irrigation facilities. In the meetings, PAPs got to know how the compensations will be done, their rights and their major role in the Project activities. Other meetings and interview were also conducted with implementing and regulatory institutions as well as different experts working on similar projects.

WASAC together with Nyarugenge and Gasabo districts will be responsible for implementation, monitoring and reporting the implementation of the RAP. Any aggrieved party may ask for justification of the decisions from the resettlement and compensation committee to be established, but should the answer still be unsatisfactory, they may appeal to the local authorities starting with the cell, sector and district authorities. If the grievances are not resolved in this way, the complainant should bring his case to local mediators known as «Abunzi» or court of law depending on the nature of complaint. WASAC Ltd and both districts will ensure that all PAPs appreciate the complaints procedure and will make sure each party involved fulfils its duties.

RAP budget

The proposed Nzove Ntora Principal water pipeline was designed in a way that avoid or minimize physical and economic resettlement impacts. However, the identification of project affected households revealed that 80 HHs and 8 corporation will be affected including two households who will lose their houses. Other households will be affected by losing either land, crops, trees or structures. According to the current market value and similar projects in Kigali City, the cost for RAP implementation and monitoring is estimated at **one hundred and fifty four million Rwandan francs (154,000,000) equivalent to 180,000USD**. This amount is provided for planning purposes and the real cost will be determined by an independent valuer. The budget for RAP implementation and monitoring will be born from government of Rwanda funds.



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ACRONYMS

BESST	: Bureau for Environmental and Social Studies
DDP	: District Development Plan
DLB	: District Land Bureau
EIA	: Environmental Impact Assessment
EICV	: Enquête Intégrale sur les conditions de vie
ESMF	: Environmental and Social Management Framework
FRW	: Franc Rwandais/Rwandan Franc
GDP	: Gross Domestic Product
GIS	: Geographic Information System
GoJ	: Government of Japan
GoR	: Government of Rwanda
HH	: Household
JICA	: Japan International Cooperation Agency
M&E	: Monitoring and Evaluation
MoE	: Ministry of Environment
NGO	: Non-Governmental Organization
OP	: Operational Policy
PAPs	: Project Affected Parties/People
RAP	: Resettlement Action Plan
REMA	: Rwanda Environment Management Authority
RLMUA	: Rwanda Land management and Use Authority
RPF	: Resettlement Policy Framework
ToRs	: Terms of Reference
UPI	: Unique Personnel Identification
USD	: United States Dollars
WB	: World Bank
WASAC	: Water and Sanitation Corporation

DEFINITIONS OF TERMS

Unless the context dictates otherwise, the following terms shall have the following meanings:

- **Census** is a data collection technique of completing enumeration of all Project Affected Households and their assets through household questionnaire.
- **Compensation**: means payment in cash or in kind to replace losses of land, housing, income, and other assets caused by a project.
- **Cut-off date**: This refers to the date prior to which the project affected family was in possession of the immovable or movable property within the affected zone.
- **Entitlement**: is defined as the right of project affected persons (PAPs) to receive various types of compensation, relocation assistance, and support for income restoration in accordance with the policy provisions.
- **House hold** includes a. person, his' or her spouse, minor sons, unmarried daughters, minor brothers, unmarried sisters, father, mother and other relatives residing with him or her and dependent on him or her for their livelihood; and includes "nuclear family" consisting of a person, his or her spouse and minor children.
- **"Involuntary Displacement"** means the involuntary taking of land resulting in direct or indirect economic and social impacts caused by:
 - loss of benefits from use of such land;
 - relocation or loss of shelter;
 - loss of assets or access to assets; or
 - loss of income sources or means of livelihood, whether or not the project affected person has moved to another location.
- **Land acquisition"** means the taking of or alienation of land, buildings or other assets thereon the land. ,
- **Loss of income**: In this A-RAP, loss of income is defined as the future benefit that was going to be gained if the project was not implemented.
- **Non-titleholder**: Affected persons/families with no legal title to the land, structures and other assets adversely affected by the project. Non-titleholders include encroachers, squatters, etc.
- **"Project affected persons" (PAPs)** means persons who, for reasons of the involuntary taking or voluntary contribution of their land and other assets under the project, result in direct economic and or social adverse impacts, regardless of whether or not Project affected persons physically relocate. These people may have their:
 - Standard of living adversely affected, whether or not the Project Affected Person must move to another location;
 - Right, title, interest in any house, land (including premises, agricultural and grazing land) or any other fixed or movable asset acquired or possessed, temporarily or permanently, adversely affected;
 - Access to productive assets adversely affected, temporarily or permanently;
 - Business, occupation, work or place of residence or habitat adversely affected.
- **"Resettlement and Compensation Plan"**, also known as a "Resettlement Action Plan (RAP)" or "Resettlement Plan" - is a resettlement instrument (document) to be prepared when subproject locations are identified. In such cases, land acquisition leads to physical displacement of persons, and/or loss of shelter, and /or loss of livelihoods and/or loss, denial or restriction of access to economic resources. When the projects affects lees than 200 households or the has low impacts, an Abbreviated Resettlement Action(A-RAP) may be appropriate;
- **"Resettlement Assistance"** means the measures to ensure that project affected persons who may require to be physically relocated are provided with assistance such as moving allowances, residential

housing or rentals whichever is feasible and as required, for ease of resettlement during relocation,

- **Replacement cost/value**: Replacement cost is the cost of purchasing comparable assets elsewhere by the affected person in lieu of the acquired land, buildings, structures, and other immovable assets, etc.
- **Socio-economic survey**: is carried out in order to prepare profile of PAPs and to prepare for Resettlement Action Plan. The survey result is used (i) to assess incomes, identify productive activities, and plan for income restoration, (ii) to develop relocation options where applicable, and (iii) to develop social preparation phase for vulnerable groups.
- **Titleholder**: A PAP who has legal title to land, structures and other assets in the affected zone and the land has a unique personnel Identification;
- **“Vulnerable Groups”** refers to: a. Widows, the disabled, marginalized groups, low income households and informal sector operators; b. Incapacitated households – those no one fit to work and; c. Child-headed households and street children d. Including among other things, persons characterized by low nutrition levels, low or no education, lack of employment or revenues, old age, ethnic minority and/or gender bias.

Measurement unit and rates used

- 1 ha= 100 are
- 1 Are=100 sqm
- 1 USD=855 Frw (BNR exchange rate on May 15th , 2018

CHAPTER I: INTRODUCTION

1.1. Project background

The overall objective of water supply and sanitation policy is to ensure safe, reliable and affordable water supply services for all 100% by 2020. This will be achieved while strengthening the financial viability of the utility and ensure sustainable functionality of water supply infrastructure by developing effective management structures and well-regulated public private partnership (PPP) arrangements. To achieve this objective, the Government of Rwanda with its partners is embarked in different water supply projects including construction of new Water Treatment Plants and associated forwarding infrastructure, the rehabilitation and extension of existing Water Treatment Plants and strengthening the existing water supply network.

One of the major ongoing project is the rehabilitation and extension of Nzove Water Treatment Plant. Phase one commissioned March 2016 increased the production from 65,000m³ to 90,000m³/day in Kigali against the demand which is 120,000m³/day. Phase 2 which is under implementation add 55,000m³/day to have the total capacity of 145,000m³/day. Phase 2 involves upgrading production capacity of the existing 25,000m³/day to 40,000m³/day and construction of a new treatment plant with initial capacity of 40,000m³/day with upgradable capacity of 65,000m³/day. At present, Water & Sanitation Corporation, WASAC, has already maintain the principal transmission pipeline between Nzove and Ntora, but the demand for water supply is expected to be increased in the near future, and the Japanese and Rwandan Governments agreed to install another water pipe line between the two locations.

1.1. Presentation project developer

Water and Sanitation Corporation (WASAC) Ltd is the entity setup to manage the water and sanitation services in Rwanda and was created by the law N° 87/03 of 16/08/2014. The Company was created in the on-going government reform intended to deliver water and sanitation utility sufficiently focused to deliver new infrastructure; efficient and effective service delivery; build a strong people capability; and meet key national milestones. It is expected to reverse the status quo that includes inadequate planning and investments; inefficient and wasteful operations; inadequate institutional management focus; improve viability and autonomy; and establish a sustainable and customer-centric utility to deliver an important mandate that touches people of all walks of life. The mission of the company is providing quality, reliable and affordable water and sewerage services through continuous innovations and detailed care to customers' needs.

1.2. Presentation of the consultant

Bureau for Environmental and Social Studies(BESST) is a Rwanda company registered with Rwanda Development Board (RDB).The company is licensed by Rwanda Association professional Environmental Practitioners(RAPEP) with license number RAPEP/EA/O72(list Certified experts available at www.repep.org). The company has its headquarters in Kigali City, Gasabo district, KG 182st, Martin Plaza, second Floor. The company is specialized in EIA, RAP, climate change risk assessment, socio-economic assessment, baseline surveys, waste management, water and sanitation, advisory services in sectors ranging from Agriculture, energy development, Infrastructure and housing development, transport and water supply. For this specific assignment of preparation of EIA, the company used the following consultants:

- **Théogène HABAKUBAHO, Team leader** – He is an authorized EIA Lead expert(RAPEP/EA/024) . He holds a master of science in environmental science management and development and BSc in physical geography. He has over 12 years professional experience in the

field of environmental assessment and management. He has worked on various projects as team leader of environmental studies. Key projects worked on include irrigation projects, green house agriculture, Water supply mining projects, road and bridge construction projects, building and house constructions, schools and hospitals, among others.

- **Mrs. Emma BENEMARIYA, Sociologist-** holds a Master of Development Studies and a bachelor's degree in Social Sciences. She is tasked with evaluation of social impacts associated with project and has led the socio-economist survey.
- **NSEKANABANGA Jovine, Statistician :** He is an experience data collection and analysis and he has a bachelor's degree in applied statistics with over five years in data collection and analysis. He supervised data collection, data entry and conducted data analysis.
- **NZAMURAMBAHO Etienne, Chief surveyor:** He is an experience land surveyor with bachelors degree in land survey and diploma in topography. He coordinated assets inventory and identification of project affected people.
- **AYINKAMIYE Marie Ange Gisele, GIS Expert:** She is an authorizer EIA Junior Expert (RAPEP/EA/063). She holds a bachelors degree in Environmental Management with solid knowledge in GIS and remote sensing. She assisted the team in data collection and mapping. She also participated in assets inventory. The above team was supported by field enumerators and data entry officers

1.2. Scope of the RAP

The aim of the RAP report is to develop an action plan that ensures that the PAPs livelihoods and standards of living are improved or at least restored, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. The scope of work undertaken during the RAP preparation included public consultation, PAPs identification, and assets inventory, establishment of legal and regulatory framework for assets valuation and compensation, monitoring and grievance redress mechanism. The provisional assets inventory and estimated cost was included in the RAP but shall be updated upon the completion of final design studies and compensation made prior construction.

1.3. Methodology

The preparation of this RAP results of the combination of desk study, field surveys and census as well as public consultation with PAPs and stakeholders. The desk study involved review of previous study documents and analysis of the proposed project maps; and field surveys to establish the location of the proposed dam, irrigation canals and related infrastructure. The field survey consisted on conducting household census of identified PAPs; conducting baseline socio-economic survey on the project area as well as census and measurement of lands and crops which are likely to be affected. Discussions with PAPs and key stakeholders including district administration was also another tools used along the preparation of this RAP.

1.3.1. Literature review

Review on the existing baseline information and literature material was undertaken to gain a further and deeper understanding of the project. Among the documents reviewed included the project inception report, JICA guidelines on environmental and social consideration, World bank OP4.12 on Involuntary Resettlement Expropriation and valuation law, Land law and land Policy, Resettlement Action Plan of Similar project or other project in Kigali City such as Abbreviated Resettlements Action Plan for Kigali

1.3.2. Field work

The consultant deployed surveyors/enumerator's team lead by a GIS expert and used a detailed questionnaire to collect socio-economic baseline data. Furthermore, the GIS expert and his team used a designed form to record all properties including land, crops and trees in submerged, borrow pits, disposal, access roads and camps site areas. The identification of all projects affected person was also done through field survey by GIS expert and surveyors. The provisional assets valuation was made based on similar project and prevailing market price in the area but it shall be updated upon the completion of final design studies and payment should be made prior construction work.

1.3.3. Public consultation

In compliance with national regulations and JICA guidelines on environmental and social consideration stakeholder engagement and public consultation was the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts. Stakeholder engagement involved, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation with stakeholders and participation, grievance redress mechanism (GRM), and on-going reporting to beneficiaries or PAPs.

From the scoping exercise, stakeholders were identified in two categories. First category made of implementing and regulatory agencies including government institutions, local administration and key experts in the area of irrigation and involuntary resettlement. Second category is made by potential project beneficiaries and/or project affected persons. During the Public consultation, the RAP expert applied different participatory methods, namely; interviews, one-to-one discussions, focused group discussions (FGD) and official meetings with stakeholders. Stakeholders were informed on the proposed project and anticipated resettlement implications, existing legal framework and provisions in relation to involuntary resettlement. Though the consultant guided discussions, most of the time was given to participants to provide views, and comments and ask questions. For each meeting, key issues discussed were recorded and included in the RAP report together participants lists.

1.3.4. Social impact assessment

The proposed Project has positive social and economic benefit to the user's communities and individuals but it may also have negative impacts including loss of land, crops, trees and means of livelihood. Therefore, the consultant assessed both social benefits and negative effects of the proposed project on local population and users. The social impact assessment considered permanent changes in land use and loss of property and other assets caused by occupation of land for the irrigation structure, temporary changes in land uses caused by short term occupation of land for construction, and changes in accessibility to existing land uses resulting from the temporary or permanent presence of the Project.

1.3.5. Assets valuation methodology

As provided by the valuation law, the company certified valuer used the methodology whereby the proposed price for the real property is close or equal to replacement value. The valuar compared prices by referring to the prices recently assigned to a real property that is similar or comparable to the real property subject to valuation. Income loss were estimated based on investment cost, average production on one hectare, unit cost per 1kg for the last season times number of missed season. It is worth to note that the valuation done is just provisional and will be updated upon the completion of final design studies.

1.3.6. Content of the RAP report

The RAP report is structured into different chapters as follow:

- Executive summary
- Chapter I: Introduction and methodology
- Chapter II: Project description and location
- Chapter III: Legal and regulatory frame work
- Chapter IV: Socio-economic survey
- Chapter V: Public consultation
- Chapter VI: Impact assessment and compensation measures
- Chapter VII: RAP implementation and monitoring
- Chapter VIII : RAP budget
- Chapter IX: RAP disclosure

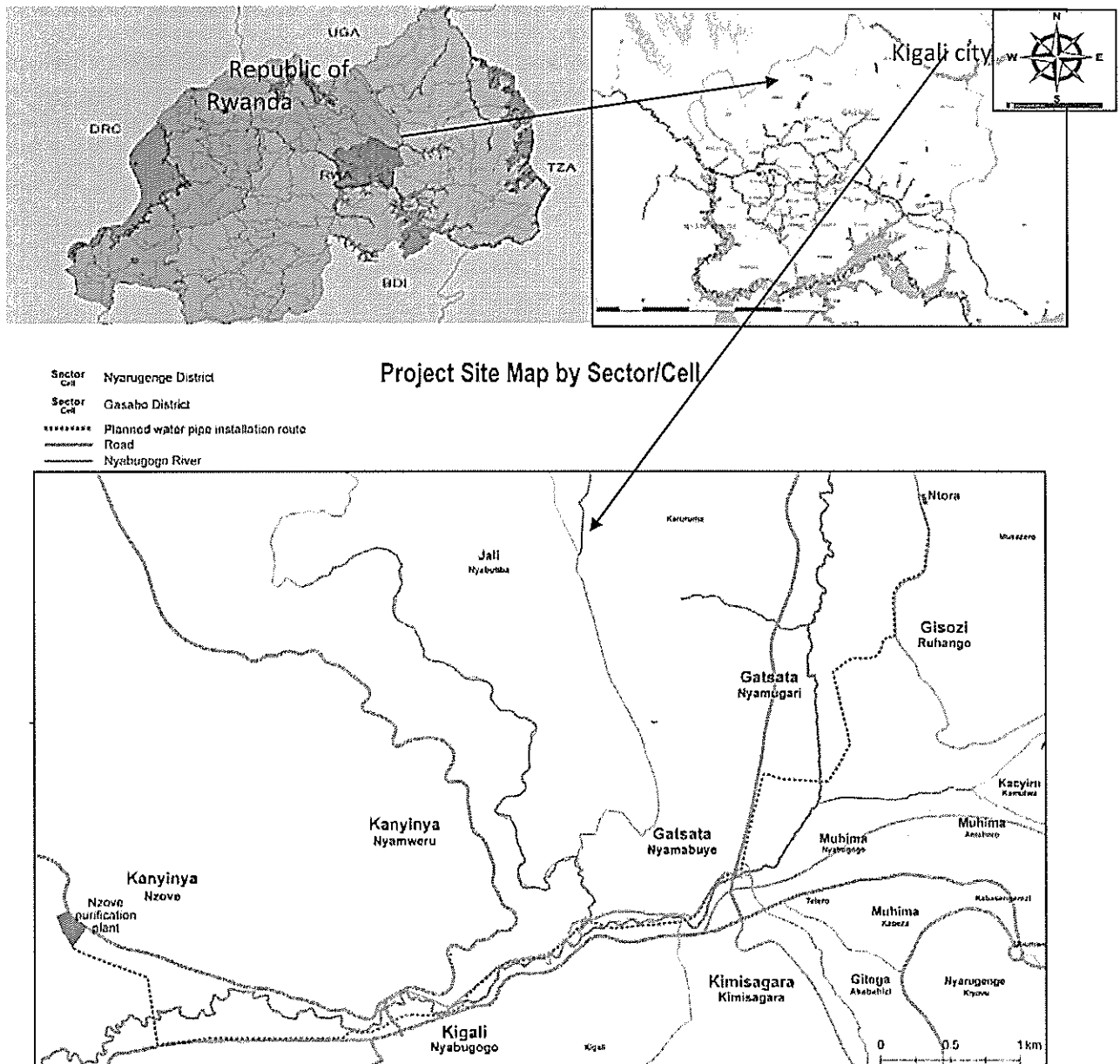
CHAPTER II: PROJECT DESCRIPTION AND LAND REQUIREMENT

Per as terms of reference but also best practices the EIA consultant is requested to describe the proposed project and its activities. The description of project activities shall be based on phases of project life cycle i.e. pre-construction, construction, operation, maintenance, and decommissioning phases. Therefore, this chapter provide the location of the project, projects component/activities in different phases and projects requirements in terms of material or associated facilities.

2.1. Project Location

Administratively, the proposed project is located in Kigali City in both Nyarugenge and Gasabo district. The principal pipeline will mainly follow the existing pipeline from Nzove Water Treatment Plant, located in Nzove cell, Kanyinya sector of Nyarugenge District, to Ntora water reservoir Located in Ruhango Cell, Gisozi sector of Gasabo District.

Figure 1: Administrative location of project area



Source: Project preliminary design rreport, JST, 2018

2.2. Description of the project

The proposed project of strengthening of Nzove-Ntora principal water pipeline will consist at installation of pipeline with 900mm diameter on a distance of 9.7 km from the Nzove water treatment plant located in Kanyinya sector of Nyarugenge district to Ntora Reservoir located in Gisozi sector of Gasabo district. The installation such pipe requires associated infrastructures such access roads, construction of 3 temporary cross river bridges, construction yard for material, construction material and equipment. Three new water pumps and new pump building is also part of the proposed projects. Initially, it was proposed to use the new pipeline with the exiting one but it was decided to use the new pipeline and increase its capacity to 900mm diameter.

2.2.1. Construction phase activities

The construction works will consist at installation of water pipe and river cross bridge as well as access road in some sections where the pipe passes far front existing road. As a result, of preliminary design, it is possible to install new pipeline in parallel with existing one, but it is difficult to physically arrange the following two areas side by side, and it is necessary to install a water supply pipeline with a new route. The proposed pipeline will cover a distance of 9.7 km and the pipe will have $\Phi 900$. Therefore, the area that would be cleared and excavated is about 9.8 m width if we consider access road. Figure 2 presents the proposed cross-section view of water pipe installation and Figure 3 present cross section view of excavation works.

- Pipe installation activities:

A still pipe of 900mm of diameter will be installed on a distance of 9.4 km from Nzove WTP to Ntora water reservoir. The installation of principal water pipeline will involve different activities including:

- Manufacturing and importation of pipe;
- Site clearance and excavation;
- Construction of temporary access road;
- Construction of temporary cross river bridge(3)
- Pipe installation with 6 tunnels;
- Concrete placement to protect water pipe ;
- Construction of a corridor for maintenance (steps made of concrete);
- Protecting pipes by covering with concrete

Figure 2: Proposed principal pipeline route

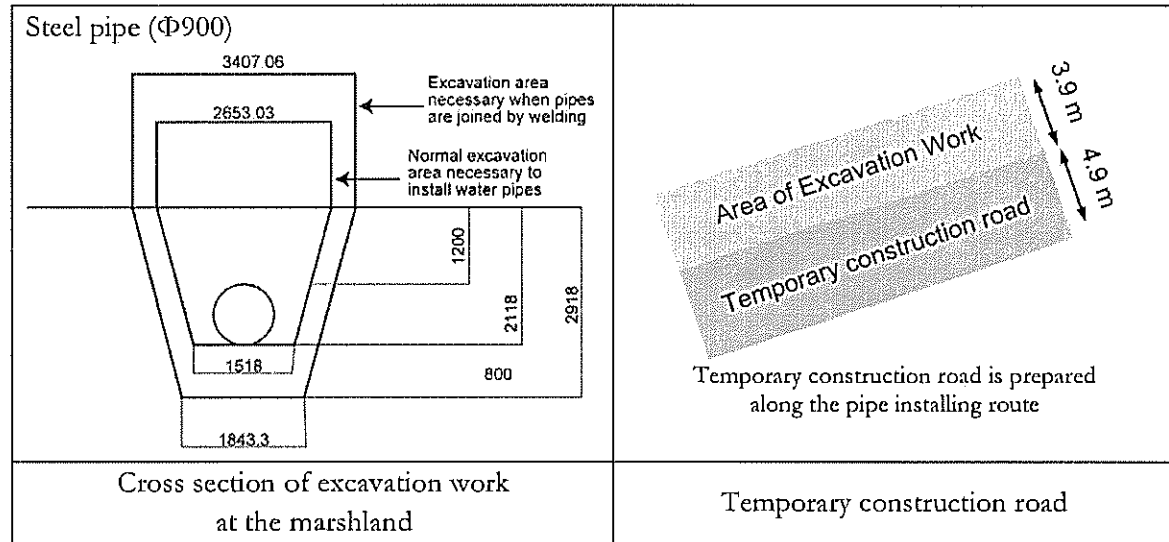


Source: Preliminary design study, 2018

- **Installation work of water pipe at the marshland**

The proposed construction method is open cut method that will be taken by backhoe excavating by the backhoe. However, the contraction should consider careful the cutting angle not to collapse the soil because the soil is very soft.

Figure 3: Cross section view of water pipe installation in marshland

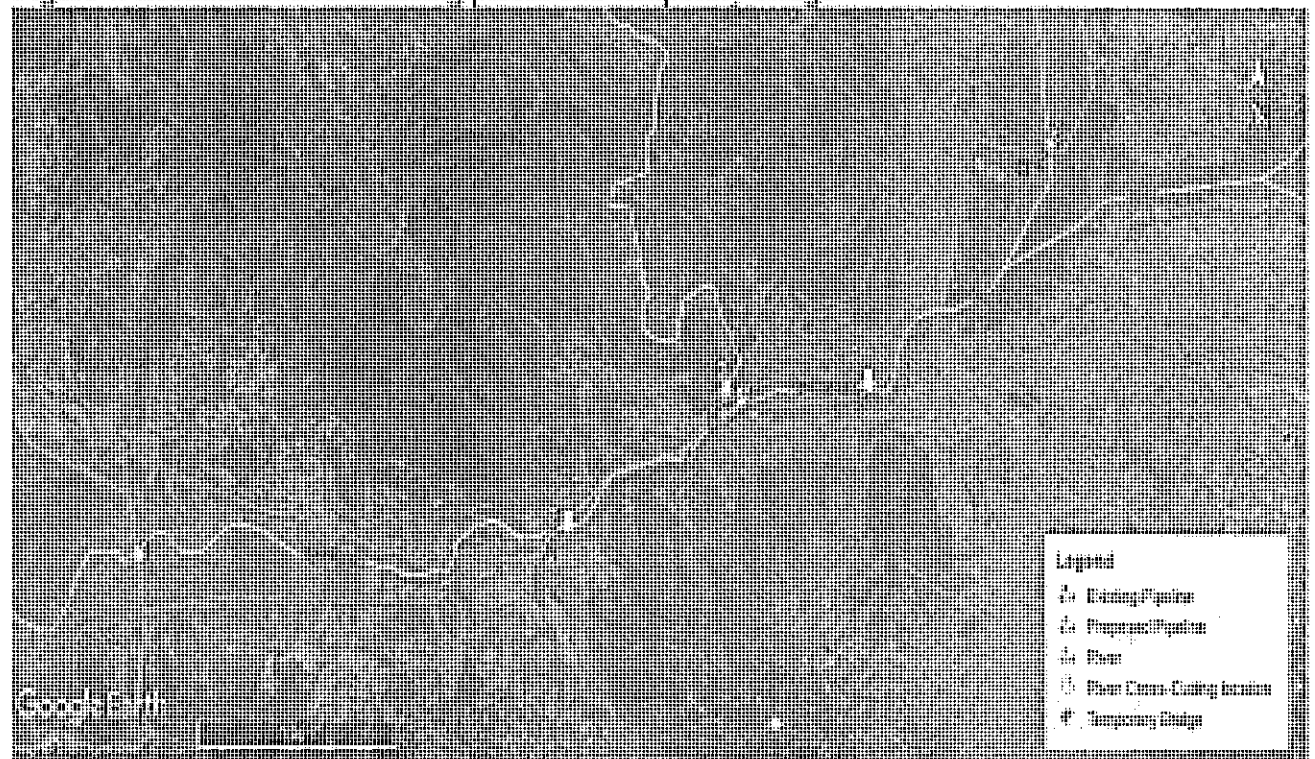


Source Preliminary design study, 2018

- **Cross river tunnels**

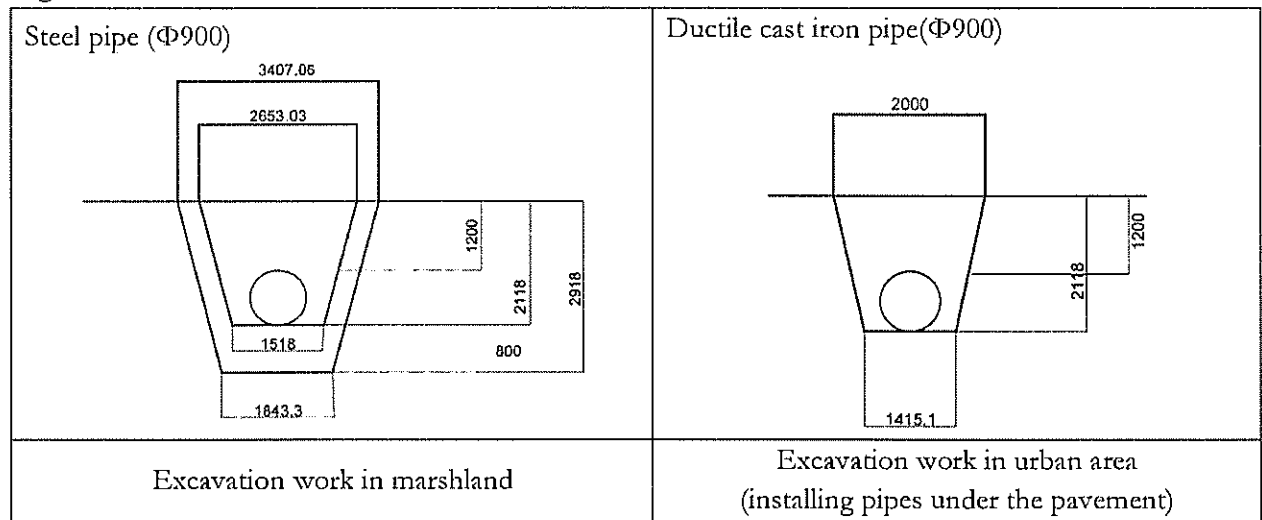
Three alternatives water pipeline routes were explored and the proposed one presented above has six river crossings. The water pipelines is planned to be installed under the river bottom by pipe jacking method at all the six river crossing places.

Figure 4: Location of river crossing places and temporary bridge



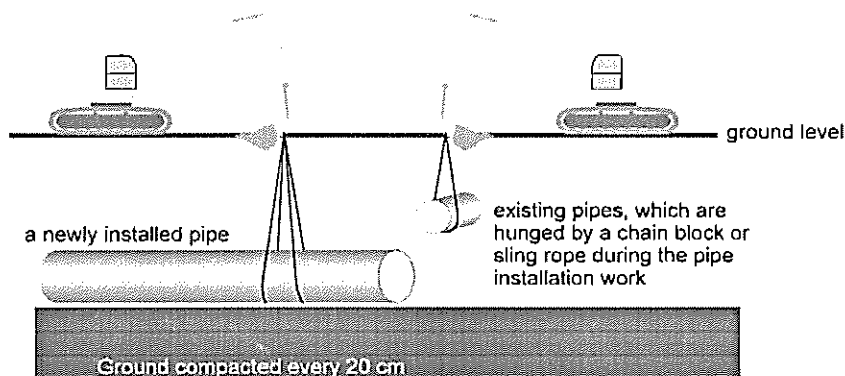
Source: Preliminary design Study, JST, 2018

Figure 5: Cross section of excavation work



Source: Preliminary design, 2018

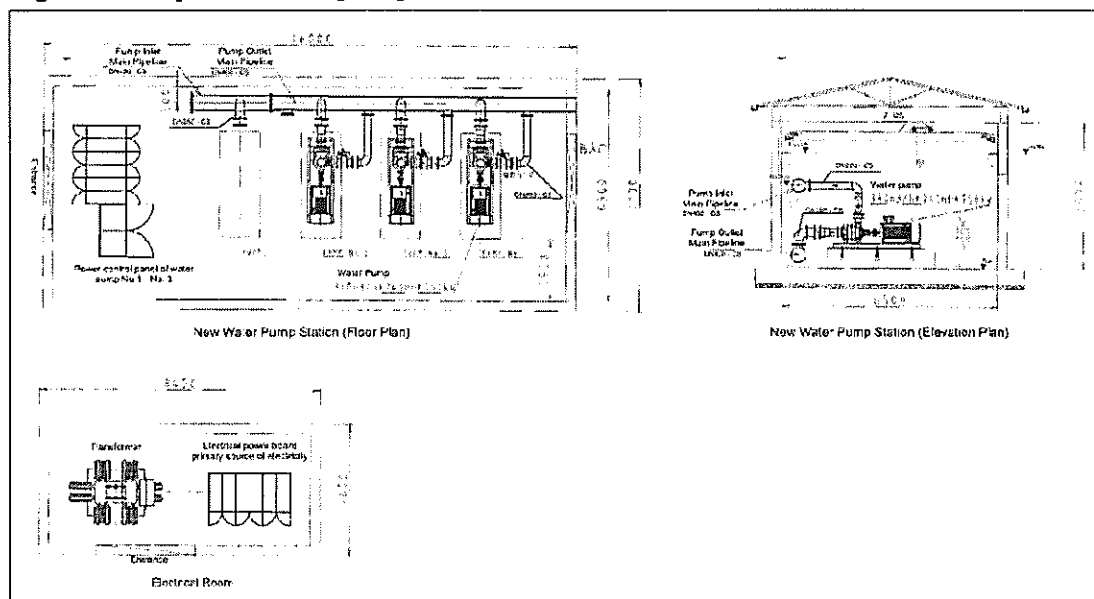
Figure 6: Representation of water pipe after installation



- Construction of new water pump station

A new water pipe is proposed and its components are presented in figure 8.

Figure 7: Proposed water pump station



Source: Preliminary design, JST, 2018

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2.2.2. Project land requirement

The installation of principal water pipeline does not require much lands but it requires land clearance in construction area that may go up to 9.8 m. In some sections, such as Ntora, the excavation area have been reduced to 2.0 m to avoid private structures such as wall and fences. The permanent land take is expected only where pipe will be installed plus maintenance area, around 3.0 m but this land can be used under conditions. The remaining land will be used only during construction and after that owners will use it again. The lands to be affected include both private and government lands especially in the marshlands and along paved roads. The following table summarises the land that will be affected by the proposed projects temporary or permanently.

Table 1: Total land to be affected by the proposed project

DISTRICT	SECTOR	CELL	Number of HHs	Number of plots affected		Size of affected land (m2)
Gasabo	Gatsata	Nyamabuye	6	Cultivate land	7	1,841
				Business/commercial	2	1,323
		Nyamugari	8	Cultivate land	22	6,174
	Gisozi	Ruhango	46	Cultivate land	26	7,585
				Housing plot	21	373
				Business/commercial	6	144
Nyarugenge	Kanyinya	Nyamweru	7	Cultivate land	6	1,621
				Housing plot	3	116
				Business/commercial	1	378
		Nzove	9	Cultivate land	14	6,397
				Housing plot	0	0
	Kigali	Nyabugogo	19	Cultivate land	28	10,936
				Housing plot	5	3,061
				Business/commercial	6	437
	Kimisagara	Kimisagara	*0	Cultivate land	1	280
Grand Total			95		148	40,665

*: PAH who use the plot in Kimisagara is already counted in Nyamweru

Source: Field survey, BESST Ltd, 2018

2.2.3. Project Schedule

The project schedule include preliminary works and construction works that will be undertaken both in Rwanda and in Japan. Due to the limited length of the construction period (2 years and 3 months), it is proposed to divide the pipe-work area into two sections, one is the wetland and steep slope and the other is the residential area in Ruhango cell. And then the project area in the wetland is divided into 4 sections and to conduct construction work at each section simultaneously.

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Construction Schedule (Series B Bonds)

Source: Preliminary design, JST, 2018

CHAPTER III: LEGAL AND INSTITUTIONAL FRAMEWORK

3.1. Introduction

This chapter describes relevant policies, strategies, legal instruments, institutional arrangement and framework applicable to the proposed projects of strengthening Nzove- Ntora Principal pipeline in Kigali City. The legal and institutional framework analyses the available laws, regulations, policies and institutions that guide the land acquisition, assets valuation and compensation. The legal framework also provides applicable laws and regulations and administrative procedures including remedies available to displaced persons in the judicial process and the normal time frame for such procedures and available alternative dispute resolution mechanisms that may be relevant to the project. Both national and international regulations related to land ownership; land acquisition and involuntary resettlement were reviewed and gap analysis made.

3.2. National regulations

This part describes national institutional, legal and policy framework for resettlement requirements in Rwanda, applicable to the project as well as the international provisions that bear relevance to the implementation of this project.

3.2.1. Land tenure system and provisions in Rwanda

The organic land law no 08/2005 of 14/7/2005 amended in 2013 categorizes land via two criteria: (1) land use and (2) land ownership. Land use (article 9) is split into two categories: urban lands and rural lands. Urban lands are defined as lands confined within the legal boundaries of towns and municipalities as well as lands in suburbs and collective settlements of towns and municipalities. Any other land is rural land.

Land ownership is divided into the following categories: individual owned lands and State lands (whether urban or rural). Article 11 provides that individual land is comprised of land acquired through custom, written law, acquisition from competent authorities, purchase, gift, exchange and sharing. State lands are further categorized into two sub-categories: public domains and private State owned lands (articles 12 and 13). State land for public domain comprises land reserved for public use, for use by organs of state services or for environmental protection. Private state owned land consists of all other state owned land not considered to be part of public domain.

- Land tenure legal provisions in Rwanda

The Organic Land Law also provides two types of formal land tenure: full ownership/ freehold and long term leasehold. So far, all land in the country has been registered and land titles issued to citizens. According to article 10 of new land law of June 2013, private individual land shall comprise land acquired through custom or written law. That land has been granted definitely by competent authorities or acquired by purchase, donation, inheritance, succession, ascending sharing, and exchange or through sharing. This law offers equal protection to rights over land resulting from all channels stipulated in the preceding paragraph. All types of land tenure must be in compliance with the designated land use and environmental protection measures as outlined in the Land Use Master Plan.

In addition, the present organic land law sets a legal framework for property law under articles 5 and 6 which provides for full ownership of land and permits any person that owns land (either through custom or otherwise), to be in conformity with the provisions of this law. It is important to observe however that full ownership of land is only granted upon acquisition of a land title issued by the general land registrar authority. Once the efforts to provide proper land tenure documentation are completed, ownership of land without proper documents such as land title will not be deemed lawful land ownership



and thus in event of circumstances like expropriation, one will not be able to benefit from a fair and just compensation package.

3.2.2. Important resettlement legislations

The expropriation law no 18/2007 of 19/4/2007 revised in 2015 outlines rights and compensation procedures for land expropriated for public interest. The valuation law (2010) stipulates valuation methods to be applied to the expropriated assets. The following laws are important for rehabilitation and resettlement, land acquisition and compensation:

- The Rwandan constitution, promulgated in 2003 and amended in 2015;
- Organic land law n° 43/2013 of 16/06/2013 governing land in Rwanda gazette in the official gazette no special of 16/06/2013 was promulgated to determine the procedure for use and management of land in Rwanda property valuation law no 17/2010; establishing and organizing the real property valuation in Rwanda;
- Organic law n° 32/2015 of 11/06/2015 law related to expropriation in the public interest ;
- Presidential order no 54/01 of 12/10/2006 determining the structures, the responsibility, the functioning and the composition of land commission;
- Ministry order no 001/2006 of 26/09/2006 determining the structures of land registration, the responsibilities and the functioning of the District Land Bureau (DLB) and;
- Ministerial order no 002/16.01 of 2010 on determining the reference land price outside Kigali city.

The above legal orders are briefly describe as follows:

- **The Rwanda constitution**

The constitution is the supreme law of the land. Under article 29 of the Rwanda constitution every citizen has a right to private property, whether personal or owned in association with others. Further it states private property, whether individually or collectively owned, is inviolable. However this right can be interfered with in case of public interest, in circumstances and procedures determined by law and subject to fair and prior compensation. Article 30 stipulates that private ownership of land and other rights related to land are granted by the State. The constitution provides that a law should be in place to specify modalities of acquisition, transfer and use of land (expropriation law). The constitution also provides for a healthy and satisfying environment. In the same breath every person has the duty to protect, safeguard and promote the environment.

- **Organic law N° 43/2013 of 16/06/2013 governing land in Rwanda**

The land law was initially adopted in 2005 and then revised in 2013 and was gazetted in the official gazette no special of 16/06/2013. It determines the use and management of land in Rwanda: This is the law that determines the use and management of land in Rwanda. It also institutes the principles that are to be respected on land legal rights accepted on any land in the country as well as all other appendages whether natural or artificial. According to the law, land in Rwanda is categorized into two: individual land and public land. The latter is subdivided into two categories: the state land in public domain and the state land in private domain. State land in public domain includes national land reserves for environment conservation; land over which administration building are erected, state roads, land containing lakes, rivers, stream and springs. State land in private domain include swamps that may be productive in terms of agriculture, vacant land with no owner, land purchased by the State, donation, land acquired through expropriation and land occupied by state owned forests.

Land in Rwanda is predominantly individual land and the law gives the owner of land full rights to exploit his or her land in accordance with the existing laws and regulations. The law also provides for expropriation which stipulates that land expropriation can be undertaken if it's for public interest. The law states that swamp land (marshland) belongs to the state and no person can use the reason that he or she has spent a long time with it to justify the definitive takeover of the land.

- **Organic law n° 32/2015 of 11/06/2015 law relating to expropriation in the public interest**

This law determines the procedures relating to expropriation of land in the interest of the public. The law stipulates that the government has the authority to carry out expropriation. However the project, at any level, which intends to carry out acts of expropriation in public interest, shall provide funds for inventory of assets of the person to be expropriated. According to the organic law, no person shall hinder the implementation of the program of expropriation on pretext of self-centered justifications and no land owner shall oppose any underground or surface activity carried out on his or her land with an aim of public interest. In case it causes any loss to him or her, he or she shall receive just compensation for it.

Eligibility for compensation is enshrined under the Rwandan constitution (article 29) and the expropriation law. The two laws regulate and give entitlement to those affected, whether or not they have written customary or formal tenure rights. The person to be expropriated is defined under article 2(7) of the expropriation law to mean any person or legal entity who is to have his or her private property transferred due to public interest, in which case they shall be legally entitled to payment of compensation.

Compensation entitlement: In case an individual suffers any loss, Article 3 of the expropriation law stipulates that he or she should receive just compensation for it, although it is not clear what comprises fair and just compensation, this being left to the judgment of independent valuers. Article 4 of this law also stipulates that any project which results in the need for expropriation for public interest shall provide for all just compensation in its budget. Through mutual arrangement, both parties can determine the mode of payment. Article 22 (2) of the expropriation law provides that through an agreement between the person to expropriate and the one to be expropriated, just compensation may either be monetary, alternative land or a building equivalent as long as either option equates to fair and just monetary compensation. In case the determination of 'just' compensation exceeds in value the alternative land given to the expropriated person, the difference will be paid to the expropriated person.

Furthermore, the law deals with valuation of land earmarked for expropriation. The law identifies properties to be valued for just compensation to be land and activities that were carried out on the land including different crops, forests, buildings or any other activity aimed at efficient use of land or its productivity. Here the law is silent on access to economic activities on the land. The new law has added 5% of total compensation fees for disturbance allowances.

- **Law n°17/2010 of 2010 establishing and organizing the real property valuation profession in Rwanda**

This law provides for the registration of land in Rwanda and conditions for registration. The law also allows the government to conduct valuation when mandated by their government institutions. Articles 27, 29, 30 and 31 of the law deal with valuation methods. These articles stipulate that price for the real property shall be close or equal to the market value. The valuation could also compare land values country wide. Where sufficient comparable prices are not available to determine the value of improved land, the replacement cost approach shall be used to determine the value of improvements to land by taking real property as a reference. The law also allows the use of international methods not covered in the law after approval from the institute of valuers council.

- **Ministerial order no. 001/2006 of 2006 determining the structure of land registers**

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The ministerial order determines the structure of lands registers, the responsibilities and functioning of the District Land Bureau (DLB). This ministerial order determines the structure of land registers, the responsibilities and the functioning of DLB. The responsibilities of the land bureau include among others to implement land registration and manage land and update, safely keep records of land registers and monitor and approve activities pertaining to valuation of land, other immovable property and demarcate and approve land cadastral. This order does not apply to land specified in articles 12, 14, 15 and 72 of the organic law n° 8/2005 of 14/07/2005 determining the use and management of land in Rwanda.

- **Ministerial order n° 002/16.01 of 2010 on determining the reference land price outside Kigali city.**

Purpose of this order is to provide reference land prices to be used in areas outside Kigali city. This order was aimed at protecting land owners from exploitation and to prevent land speculation when the market is not developed. However with the propagation of land valuation law, the order seems to have been overtaken by events and practicability. This is due to the fact that valuation law provides for independent market rates to apply in land valuation.

3.2.3. Institutional arrangement for RAP preparation and implementation

In Rwanda, there is no single institution governing resettlement activities and social impact are assessed and managed through EIA. The institutional framework for environmental and social management is currently enshrined in the organic law determining the modalities of protection, conservation and promotion of the environment in Rwanda, published in the Official gazette n° 9 of the 1st May 2005, particularly in its chapter III relating to the establishment of the institutions, the 2013 land law and 2015 expropriation law. The responsibility of preparation and implementation is shared by different institution based on the nature of the project and the project proponent.

For the Project of strengthening Nzove-Ntora Principal pipeline in Kigali city, the main actors responsible for development of policy, framing regulations, developing projects, monitoring and approval of issues related to resettlement and compensation are:

- Ministry of Forest and Lands(MINILAF);
- Ministry of Infrastructure(MININFRA);
- Water and Sanitation Corporation Limited(WASAC Ltd);
- Rwanda Land Management and Use Authority (RLMUA);
- Rwanda Environment Management Authority (REMA);
- Local administration including Kigali City, Nyarugenge and Gasabo District;
- Sectors and Cells in the project areas.

- **Ministry of Infrastructure(MININFRA) and Water and Sanitation corporation Ltd**

The mission of Ministry of Infrastructure includes to initiate programs, to develop, rehabilitate and maintain an efficient and integrated national transport infrastructure network, including roads, bridges, airports, railways, and water supply which will contribute towards economic development and regional integration. the ministry also supervise activities meant to elaborate, monitor and assess the implementation of national policies and programs on matters relating to habitat and urbanism, transport, energy, water and sanitation. Through water and sanitation Corporation Ltd, MININFRA is the main implementing agency on government side and will work closely with WASAC Ltd, Ministry of land and Forestry, District land Bureau and ensure that land is acquired in compliance with both national and international regulations.

The Water and Sanitation Corporation (WASAC) Ltd is the entity setup to manage the water and sanitation services in Rwanda and was created by the law N° 87/03 of 16/08/2014. The Company was created in the on-going government reform intended to deliver water and sanitation utility sufficiently focused to deliver new infrastructure; efficient and effective service delivery; build a strong people capability; and meet key national milestones. It is expected to reverse the status quo that includes inadequate planning and investments; inefficient and wasteful operations; inadequate institutional management focus; improve viability and autonomy; and establish a sustainable and customer-centric utility to deliver an important mandate that touches people of all walks of life. The mission of the company is providing quality, reliable and affordable water and sewerage services through continuous innovations and detailed care to customers' needs. WASAC Ltd is the implementing entity for the construction of pipelines but also is responsible for land acquisition for water treatment plant and reservoirs. For this reason, WASAC Ltd is responsible for the preparation and implementation of this RAP including the final valuation and compensation of project affected person/households.

- **Ministry of Land and Forestry (MINILAF)**

MINILAF governs the implementation and application of the organic land law and the Land Use Master Plan. While the MINILAF deals with overall land policy and the alignment with these Laws at the national level, responsibilities for their implementation locally has been devolved, following decentralization, to land commissions and committees at district, sector and cell levels. MINILAF is also the key ministry governing resettlement arrangements in Rwanda through the Land Bureaus. They do this by working directly with the ministry/institution developing the land on which resettlement is required. MINILAF A will therefore play a critical role in ensuring that appropriate and consistent compensation is provided to all affected persons resulting from the implementation of the project.

- **Rwanda Land Management and Use Authority (RLMUA)**

RLMUA through its department of land administration and mapping is the organ responsible for overall management and coordination of all activities related to land administration, land use planning and management in Rwanda. The role of RLMUA in RAP process is to advise on matters related to land ownership and expropriation. District land bureau in close collaboration with project staff will check and approve surveys, various maps and approve land surveys carried out during valuation exercise.

- **Nyarugenge and Gasabo districts and local administration**

The article 66 of the environmental organic law specifies to establish, at the provincial, district, town, sector and the cell levels; committees responsible for conservation and protection of the environment. The organization, functioning and their responsibilities are determined by prime minister's order. The executive committee of the district is responsible to initiate the expropriation and district council implements the expropriation after considering the decision of the land commission (expropriation law, 2015).

Both districts manage lands through the district land bureau. Thus, the district land bureau will be responsible for ensuring activities undertaken comply with the national and district level land use master plans and will assess the validity of land tenure rights of affected persons. In addition the officer, will be responsible for ensuring effective grievance redress mechanism is in order to reduce disputed or complaints.

- **The Institute of Real Property Valuers (IRPV)**

The responsibilities of IRPV are to:

- to analyze and find solutions to all problems related to the real property valuation profession;

- to analyze and find solutions to all problems related to the conduct of real property valuers;
- to exchange information relating to the real property valuation profession;
- to promote the real property valuation profession in Rwanda;
- to prepare regulations and guidelines governing the real property valuation profession,
- to prepare real property valuation standards; and
- to represent the interests of, and advocate for real property valuers in Rwanda and abroad.

In relation to the proposed project, upon the completion of detailed design studies, WASAC Ltd should hire an independent valuar certified by IRPV to conduct final valuation.

3.2.4. RAP preparation and approval process in Rwanda

In Rwanda involuntary resettlement is governed by expropriation law and valuation law. Both laws do not have provisions on RAP preparation and approval. Instead, the expropriation defines the process of expropriation and valuation while the resettlement impacts are assessed together with the EIA report. The chapter III of the law n° 32/2015 of 11/06/2015 relating to expropriation in the public interest expropriation law defines steps to be undertaken for expropriation as follows:

- **Organs determining projects of expropriation in the public interest**

- Organs which determine projects of expropriation in the public interest are the following:
- the executive committee at the district level, in case such activities concern one district;
- the executive committee at the level of the City of Kigali, in case such activities concern more than one district in the boundaries of the City ;
- the relevant ministry, in case planned activities concern more than one district or if it is an activity at the national level, subject to provisions of item 2° of this Article.

- **Organs supervising projects of expropriation in the public interest**

Organs in charge of supervising projects of expropriation in the public interest are hereby established as follows:

- the committee in charge of supervision of projects of expropriation in the public interest at the district level where the project concerns one district;
- the committee in charge of supervision of projects of expropriation in the public interest at the City of Kigali level where the project concerns more than one district within the boundaries of the City ;
- the committee in charge of supervision of projects of expropriation due to public interest at the national level where the project concerns more than one district or it is a project at the national level, subject to the provisions of item 2° of this article.

- **Organs approving expropriation in the public interest**

The organs approving expropriation in the public interest are the following:

- at the district level, it is the district council after considering the recommendation of the committee in charge of supervision of projects of expropriation in the public;
- at the level of the City of Kigali, where the project concerns more than one district within the boundaries of the City of Kigali, it is the council of the City of Kigali after considering the recommendation of the committee in charge of supervision of projects of expropriation in the public interest at the level of the City of Kigali;
- at the level of more than one district, the ministry in charge of land, upon proposal by the committee in charge of supervision of projects of expropriation in the public interest at national level subject to provisions of item 2 of this Article. A ministerial order shall be used;

- at the national level and in case of activities related to security and national sovereignty, the Prime Minister's Office upon proposal by the committee in charge of supervision of projects of expropriation in the public interest at the national level by way of a Prime Minister's order.

- **Procedure for expropriation in the public interest**

Procedures for expropriation are as follows:

- Request for expropriation in the public interest by project proponent/ developer;
- Consideration of the relevance of the project proposal for expropriation in the public interest by relevant committee.
- Decision on the relevance of a project of expropriation in the public interest;
- Approval of expropriation in the public interest;
- Publication of the decision on a project for expropriation in the public interest;
- Valuation of assets and agreement on compensation measures;
- Compensation.

- **RAP process for donor funded projects**

For donor funded projects, where the RAP preparation and approval is a requirement, the donor policies applies and the RAP is prepared in compliance with both international and national laws. The normal practice is as follows:

- Preparation and approval of terms of reference by both donor and implementing agency;
- Recruitment of independent consultant to prepare the RAP;
- RAP preparation by independent consultant;
- Approval of the RAP report by both donor and implementing agency;
- Implementation and monitoring of RAP by implementing agency.

3.3. International regulations

3.3.1. JICA Guidelines for Environmental and Social Considerations

The project of strengthening Nzove-Ntora principal pipeline will be funded by Japan Government through Japan International Cooperation Agency (JICA) and it is very important to consider the JICA guidelines for environmental and social consideration in preparation and implementation of the RAP. The key principle of JICA's policy on involuntary resettlement is summarized below:

- Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
- When population displacement is unavoidable, effective measures to minimize the impact and to compensate for losses should be taken.
- People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.
- Compensation must be based on the full replacement cost as much as possible.
- Compensation and other kinds of assistance must be provided prior to displacement.
- For projects that entail large-scale involuntary resettlement, RAPs must be prepared and made available to the public. It is desirable that the RAP include elements laid out in the WB, OP 4.12 Annex A.

During the preparation of RAP, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner and language that are understandable to the affected people. Appropriate participation of affected people must be promoted in planning,

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implementation and monitoring of RAPs. Furthermore, appropriate and accessible grievance mechanisms must be established for the affected people and their communities.

Above principle is complemented by the WB OP 4.12 (Annex Q), since it is stated in JICA Guidelines that "JICA confirms that projects do not deviate significantly from the WB's Safeguard Policies".

3.3.2. World Bank O.P. 4.12 on involuntary resettlement policy

The WB involuntary resettlement related policies are also critical in preparation and implementation of this RAP. The main objectives of the WB O.P. 4.12 include: avoiding or minimizing involuntary resettlement where feasible, exploring all viable alternative project design; where it is not feasible to avoid resettlement. Resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to give the persons displaced by the project the opportunity to share in project benefits.

Displaced persons should be meaningfully consulted and have opportunities to participate in planning and implementing resettlement programs. Those displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to beginning of project implementation, whichever is higher. Specifically, the production systems of a community are safeguarded to the extent that guarantees their livelihoods and that their skills base remain relevant regardless of the resettlement site. The policy objectives are also designed to minimize kinship group dislocation that might subject the affected persons to unfair competition when mutual help is diminished or lost.

The project consultant met the objective of the WB OP 4.12, by conducting public participation in the project area; evaluating project alternatives to enable minimize involuntary resettlement and developed an entitlement matrix to guide in calculation of resettlement and replacement costs.

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Table 3: Gap between Rwandan laws and JICA guidelines for environmental and social considerations

JICA Guidelines	Rwandan regulation	Gaps	Measures to be taken
<ul style="list-style-type: none"> After the disclosure of the scoping drafts, project proponents etc. conduct consultations with local stakeholders*. JICA incorporates the results of such consultations into its TOR. The consultations cover the needs of projects and the analysis of alternatives. (JICA GL) 	<ul style="list-style-type: none"> Nothing mentioned 	<ul style="list-style-type: none"> There is description about consultation with stakeholders including project alternatives; however, the agenda does not cover scoping. 	<ul style="list-style-type: none"> JICA guidelines shall apply
<ul style="list-style-type: none"> Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. (JICA GL) 	<ul style="list-style-type: none"> Resettlement is acceptable for public interest. Affected persons are fully informed of expropriation issues. The law prohibit any opposition to the expropriation. 	<ul style="list-style-type: none"> Loss of means of livelihoods is not captured in the expropriation law 	<ul style="list-style-type: none"> JICA guidelines shall apply
<ul style="list-style-type: none"> When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. (JICA GL) 	<ul style="list-style-type: none"> Affected person receive fair and just compensation. However a ministerial order gives the value of land and crops. 	<ul style="list-style-type: none"> In Rwanda loss of income and compensation of illegal occupants in not provided 	<ul style="list-style-type: none"> JICA guidelines shall apply
<ul style="list-style-type: none"> Compensation and other kinds of assistance must be provided prior to displacement. (JICA GL) 	<ul style="list-style-type: none"> Rwanda expropriation law stipulates a timeframe upon when the property to be expropriated must be handed over which is 90 days after compensation has been paid. 	<ul style="list-style-type: none"> JICA GL does not specify the period of payment and assistance while the Rwandan law specify payment must be done 90 days prior displacement. 	<ul style="list-style-type: none"> Payment should be done prior construction work
<ul style="list-style-type: none"> The socio-economic studies should be implemented in the early stages of project preparation and with the involvement of potentially displaced people (WB OP4.12, Para 6) 	<ul style="list-style-type: none"> Census survey and asset survey shall be implemented; however, they are done after official approval of any projects. The procedures to be respected in expropriation shall not exceed a period of four (4) months from the day organs mentioned in article 10 of this law approve it. (Law N°32/2015 of 11/06/2015 Expropriation in the public interest, Art.16) 	<ul style="list-style-type: none"> JICA request the census survey for project approval while it's done after project approval in case of Rwandan, 	<ul style="list-style-type: none"> Provisional survey shall be done at this stage, and to be updated at final valuation stage.
<ul style="list-style-type: none"> For projects that entail large-scale involuntary resettlement, RAP must be prepared and made available to the public. (JICA GL) 	<ul style="list-style-type: none"> An application for expropriation should be prepared and submitted to the competent authority for approval the law gives the content of an application. Art 11 	<ul style="list-style-type: none"> Donor like WB supports preparation of RAP for its project. 	<ul style="list-style-type: none"> JICA has funded the preparation of RAP
<ul style="list-style-type: none"> Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey). 	<ul style="list-style-type: none"> A person to be expropriated shall be informed of the beginning of the process of the land survey and the inventory of the properties thereon. The owner of the land is not allowed to carry out any activities after the land survey and the inventory of the properties thereon and coming to terms with the beneficiaries. 	<ul style="list-style-type: none"> In other projects in Rwanda supported by WB, they set cut-off date on the census survey implementation after official approval of project implementation, not during 	<ul style="list-style-type: none"> The provisional cut-off date was established as the date of baseline survey. This may be reviewed upon the completion

JICA Guidelines	Rwandan regulation	Gaps	Measures to be taken of detailed design study.
preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (WVB OP4.12 Para.6)	In case he or she carries out any activities, they shall not be valued in the process of expropriation. Art 17, expropriation law.	F/S or basic design stage.	
<ul style="list-style-type: none"> Those who do not have formal legal rights to land at the time the census begins but have a claim to such land or assets—provided that such claims are recognized under the laws of the country or become recognized through a process identified in the resettlement plan are eligible for benefit (WVB OP4.12, Para 15) 	<ul style="list-style-type: none"> Article 18 of the law requires the person who owns land intended for expropriation to provide evidence of ownership or rights on that land and presents a certificate to case. The person who owns land intended for public interest shall provide evidence to confirm that he or she possesses rights on that land and among the evidence to confirm ownership of the land, there shall be included: <ul style="list-style-type: none"> written evidence indicating that he or she purchased the land, received it as a donation or as a legacy or a successor; a document or a statement of local administrative entities indicating rights of the expropriated person on the land; a document or testimony of the neighbours; confirming the ownership of the land; a Court certificate (art 18 expropriation law).. 	<ul style="list-style-type: none"> There are some cases whereby Government provided in kinds supports, but, they were not full compensation. The WB OP 4.12 also provide eligibility of benefits including the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law) the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal rights to the land they are occupying. 	<ul style="list-style-type: none"> JICA guidelines were applied and income for illegal occupants will be considered Compensation for structures at the land without land titles will be considered
<ul style="list-style-type: none"> Compensation based on the full replacement cost must be provided as much as possible (JICA Guideline). 	<ul style="list-style-type: none"> The land prices stipulated by “N°002/16.01 of 26/04/2010 Ministerial Order determining the reference land price outside the Kigali City” when the government expropriates land. This land unit prices are set considering market prices. The compensation for disruption caused by expropriation to be paid to the expropriated person shall be equivalent to five percent (5%) of the total value of his/her property expropriated. (Law N°32/2015 of 11/06/2015 Expropriation in the public interest, Art.28) 	<ul style="list-style-type: none"> Market value vs replacements cost 	<ul style="list-style-type: none"> Market value plus 5% of disturbance allowances were used. The proposed price for the real property will be made close or equal to full replacement cost, including tax and registration fee
JG requires displaced persons to be consulted on, offered choices among, and provided with technically and economically feasible resettlement alternatives	Through agreement between the person to expropriate and the one to be expropriated, the just compensation may be monetary or an alternative land and a building equivalent to the determination of just		JG were used for consultations

JICA Guidelines	Rwandan regulation	Gaps	Measures to be taken
<ul style="list-style-type: none"> Provide support for the transition period (between displacement and livelihood restoration). 	<ul style="list-style-type: none"> monetary compensation (art.23 expropriation law). No mention 		Four seasons were considered for income loss.
<ul style="list-style-type: none"> Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities, etc. 	<ul style="list-style-type: none"> No mention 	<ul style="list-style-type: none"> The Rwandan expropriation law is silent on vulnerable people. 	<ul style="list-style-type: none"> Vulnerable people should be given special attention such priority in recruitment of labour.
<ul style="list-style-type: none"> In preparing a RAP, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. (JICA Guidelines) Appropriate participation by affected people and their communities must be promoted in the planning, implementation, and monitoring of RAPs and measures to prevent the loss of their means of livelihood (JICA Guidelines) 	<ul style="list-style-type: none"> Public consultation is needed to be organized and the result must be included in EIA report. The Rwandan organic law on expropriation simply stipulates that affected peoples be fully informed of expropriation issues. The law prohibits any opposition to the expropriation 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Public consultation was held with all project affected Person and the final assets valuation results will be displayed to People and approved by both valuer, affected person and Local Authorities

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CHAPTER IV: SOCIO-ECONOMIC BASELINE DATA

4.1. Introduction

This Chapter describes the current situation of the population in the project area and provide the baseline socio-economic status of project affected people that will be used to measure the project impact on them. The information presented in this chapter has been collected through socio-economic survey conducted on people owning or using land in the project targeted area. In Total, 80 households and 6 corporations out of 87 HHs and 8 corporations identified as project affected households.

4.2. Data collection and analysis methodology

Data collection and analysis followed predefined steps including preparation of questionnaires, training of field enumerator, pre-test, and filed survey. This study is descriptive as it is describing in detail, the socio-economic characteristics of households and corporate owning or using plots in the targeted area

- **Area covered by the study**

The survey covered households who own or used the land located in project targeted area and it conducted two districts, Nyarugenge and Gasabo, 4 sector and six cells. The table below summarizes the area covered by the survey.

- **Determination of survey population**

A research population is also known as a well-defined collection of individuals or objects known to have similar characteristics. All individuals or objects within a certain population usually have a common, binding characteristic or trait. In this survey, targeted population were households or corporation who own or use plots in targeted area.

- **Reliability and validity**

Reliability is a measure of the degree to which instrument yields consistent results of data after repeated traits. While, validity is the degree to which results obtained from the analysis of the data represent the phenomenon under study. To enhance reliability, methods such as pre-test; internal consistency and alternative form were used. In test retest method, the researcher gives the same test to a group of subjects at two different times. Internal consistency measures whether several items that propose to measure the same general construct produce similar scores. Validity was censured by conducting the pre-test and finalizing the questionnaire based on pre-test results. The pre-test was conducted on 8 households and one corporation and results confirmed the validity of questionnaire after minor correction. To ensure the quality of data collection and data entry, 8 enumerator participated in one day training and in pre-test.

- **Data processing and analysis**

After data collection and data entry, the next step is data processing and data analysis. Response obtained from field survey were interpreted and put into different specific and relevant categories. Then, data were analysed using descriptive statistics in tables and charts. Data processing and analysis was done in excel statistical analysis tool and different tables and diagrams was used to display survey findings.

4.3. Findings of socio-economic baseline data

In total 95 units were identified including 87households and 8 corporate but the field covered 80 households and 6 corporate. 7 households were already resettled under a road construction project and removed from the targets of the socio-economic survey and two corporation did not want to disclose information. Here is the outline of Projects Affected Households(PAHs):

Table 4: Outline of PAHs

PAHs

District	Sector	Cell	Identified before Socio-economic survey		Identified later in the survey (no Socio economic survey)		total
			Own a part or whole land plots	Cultivate government owned land	Own a part or whole land plots	Cultivate government owned land	
Nyarugenge	Kanyinya	Nzove	6		1		7
		Nyamweru	5		1		6
	Kigali	Nyabugogo	10	1	3	3	17
Gasabo	Gatsata	Nyamabuye	2		4		6
		Nyamugali	0	5	8		13
	Gisozi	Ruhango	29		5	1	35
total			52	6	22	4	84

PAP

District	Sector	Cell	Identified before Socio-economic survey		total
			Own a part or whole land plots	Cultivate government owned land	
Nyarugenge	Kanyinya	Nzove	20		20
		Nyamweru	23		23
	Kigali	Nyabugogo	37	9	46
Gasabo	Gatsata	Nyamabuye	14		14
		Nyamugali		23	23
	Gisozi	Ruhango	164		164
total			258	32	290

Corporations

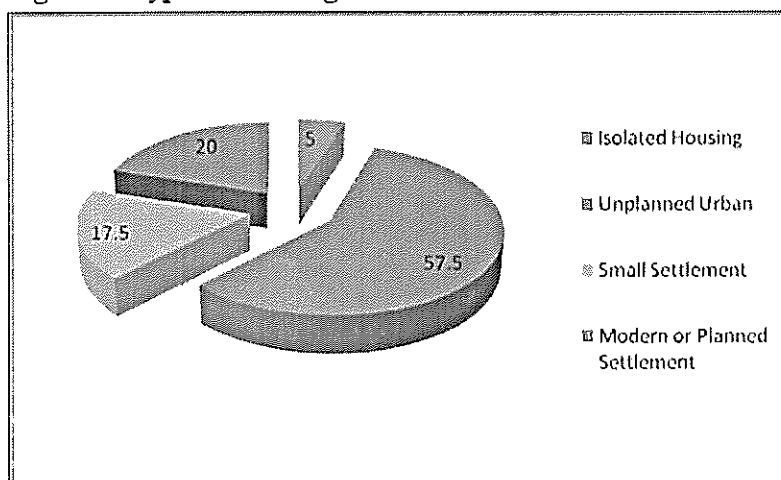
District	Sector	Cell	Identified before Socio-economic survey		Identified later in the survey	total
			Target of socio-economic survey	Rejected the survey		
Nyarugenge	Kanyinya	Nzove	1	1		2
		Nyamweru		1		1
	Kigali	Nyabugogo	1		1	2
Gasabo	Gatsata	Nyamabuye				
		Nyamugali				
	Gisozi	Ruhango	4		2	6
total			6	2	3	11

4.3.1. Characteristics of households

- Type of housing

Background describe type of household habitation and its members as well as nature of their land (main purpose of land or plot). This assessment at each level present a mixture of both household's characteristics and corporate characteristics where is possible.

Figure 8: Type of housing

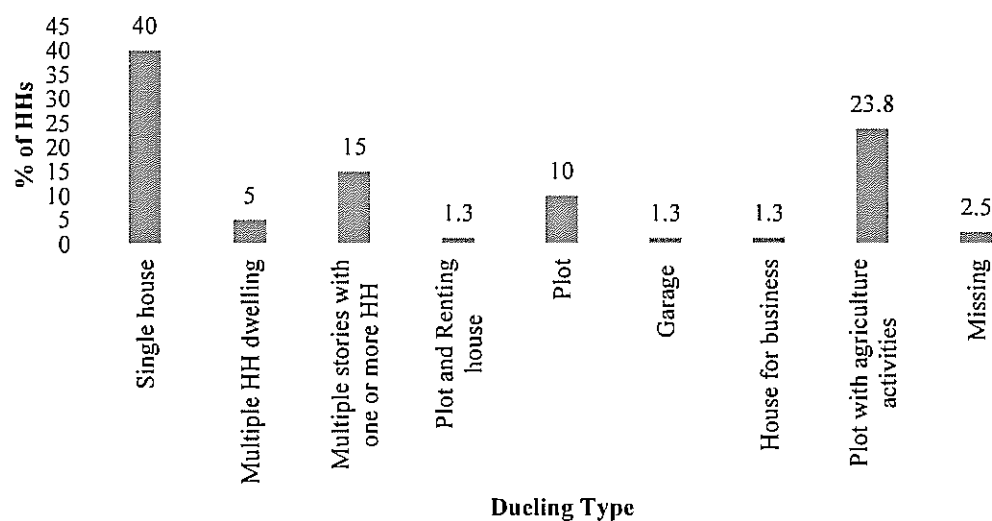


Source : Socio-economic survey, BESST Ltd 2018

From the above, diagram unplanned urban settlement dominate the type of habitat with 57.5% and this is due to the fact that most of the households are in Gisozi sector which is in urban area but its

development was done before Urban master plan. On the second place we have planned settlement with 20%, small settlement with 17.5 and isolated housing with 5%. This type of habitat reflect the current situation of Kigali City where unplanned urban planning dominate other type of habitat. Modern or planned settlement seems to be high and this may due to the fact that all modern house located in area demarcated as residential are considered modern or planned even though there were constructed before the master plan. Isolated settlement are only found in Rural areas that was annexes to Kigali City such as Kanyinya.

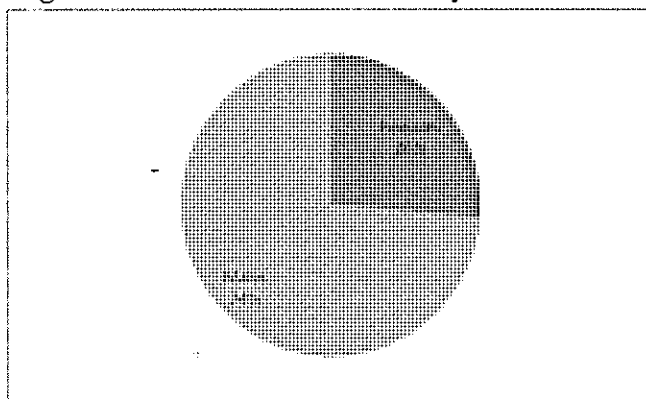
Figure 9: Type of duelling in project area



Source: Field survey, BESST Ltd 2018

From above chart 40% of households assessed, held single house type, 5% multiple household dwelling, 15% multiple stories with one or more household, 1% plot and renting house, 10% are plots only, 1% is a garage, 1% house of business, 24% are plots containing agriculture activities and around 3% (2.5%) are consisted by these who failure to identify the form of their dwelling. Thus, the most of them are living in single house type of dwelling and other plots are still being used for agriculture development.

Figure 10: Heads of households by sex



Source: Field Survey, BESST Ltd, 2018

From the above diagram, 26% of heads of household are females and 74% males. And they are all aged between 24 to 87 years old. 33% of them are aged between 24 and 65 years old (in between working age in Rwanda) which is equivalent to 85% of the whole assessed households.

4.3.2. Characteristics of households members

This section provides baseline on household members including sex, age, education, source of income (primary and secondary), working conditions as well as the average amount or income earning per year

by specific activities. In 52 assessed households, 290 family members were identified assessed which makes average of 5 members/households.

Table 5: Members of households by age and by sex

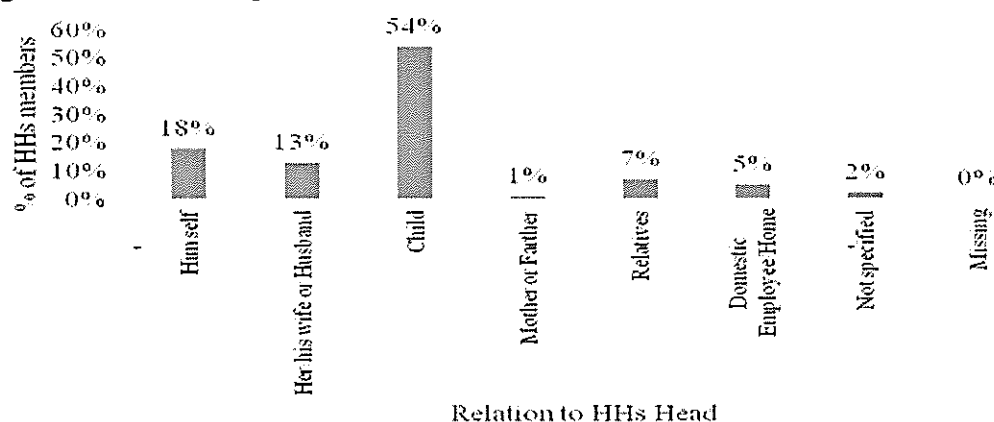
Age intervals	Female		Male		Total	
	Number HHs of members	Percentage	Number of members	Percentage	Number members	Percentage
Less than 10 years	23	17%	24	16%	47	16%
Between 10 and 20 years	30	22%	32	21%	62	21%
Between 20 and 30 years	28	20%	36	24%	64	22%
Between 30 and 40 years	19	14%	18	12%	37	13%
Between 40 and 50 years	15	11%	14	9%	29	10%
Between 50 and 60 years	11	8%	15	10%	26	9%
Between 60 and 70 years	8	6%	4	3%	12	4%
Between 70 and 80 years	2	1%	4	3%	6	2%
Between 80 and 90 years	0	0%	1	1%	1	0%
Don't their age			1	1%	1	0%
Not specified	2	1%	4	3%	6	2%
Total	138	48%	152	52%	290	100%
Median Age	24		24		24	

Source: Field survey, BESST Ltd 2018

The above table shows that 48% of them are males and 52% are females. In regards to the age, the big portion for both males and females are below 50 years. The table also shows that 15% of households members are below 10 years for both sex, 26% of the total males and 19% of total females are aged between 10 and 20 years old. 21% of total males and 23% of females are aged between 30 and 40 years old. 11% of total males and 14% of total females are aged between 40 and 50 years and 8% of males to 8% of total females are aged between 50 and 60 years old. The remaining shares for both males and females are aged 60 years plus.

- Relation of households members with heads of households

Figure 11: Relationship in the household



Source: Field survey, BESST Ltd 2018

Reference made to the above chart, 18% are heads of household, 13% are husband or wife of the head of households, 54% represent children of the head of household, 1% represented by the mother or father of the head of household, 7% are relatives while 5% are domestic employee.

- Vulnerability

In total 15 vulnerable people were identified including 5 with physical disability, 3 with chronic diseases, twelve orphans, 1 people with mental disability and 4 old people.

Table 6: Vulnerability in the project area

Vulnerability	Number of family members	Percentage
Physical Disability	5	1.7%

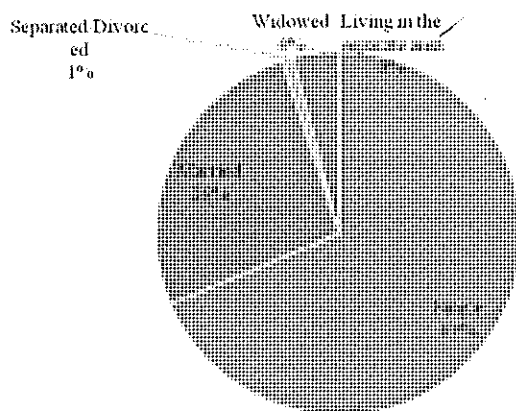
Chronic diseases	3	1.0%
Mental Disability	1	0.3%
Orphan	2	0.7%
Old people	4	1.4%
Total people suffering any type of Disability	15	5.2 %

Source: Field survey, BESST Ltd 2018

- **Marital status**

The survey revealed that 69% of households members are still single, 26% are married, 1% separated and 4% are widows. The share of single is high since more than 50% of total household member are children of the household head.

Figure 12: Marital status of household members in the project area

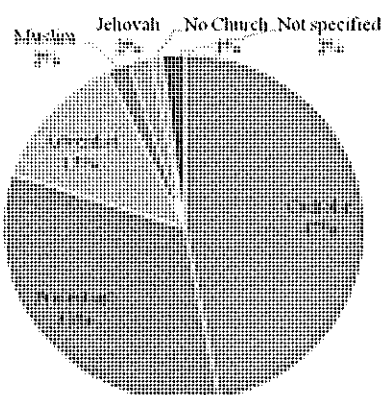


Source: Field survey, BESST Ltd 2018

- **Members of households by religion**

In reference to the following diagram, Roman Catholic is a dominant religion with 47%, the second is protestant at 33%, 13% Adventist, 2% Muslim, 2% Jehovah and 1% do not belong to any church. This reflect the situation in the country where catholic church members are majority.

Figure 13: Religion characteristics of household members in the project area



Source: Field survey, BESST Ltd 2018

- **Education**

The survey revealed that 10.3% of 290 household members living in the project area do not have any formal education, 4% have only attended pre-primary education, 29.7% did primary education, 30% did high schools , 4% VTC, 22% university and 1% did high schools. Thus, only 56% of 290 who have at least secondary education background.

- **Literacy among household members**

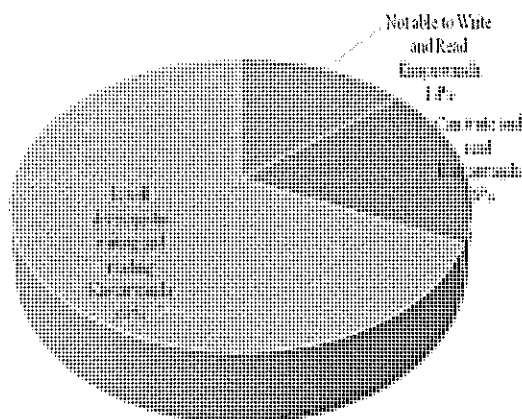
A person is qualified as literate if he/she is able to read, write and understand at least one language. According to the fourth The fourth Population and Housing Census in Rwanda conducted in August

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2012 (2012 RPHC) shows that 68% of Rwandan population aged 15 years and above were literate. The field survey shows that 14% of the household members are not able to write and read Kinyarwanda correctly, 18% can write and read Kinyarwanda while 68% can writing and reading Kinyarwanda. This concur with the national status.

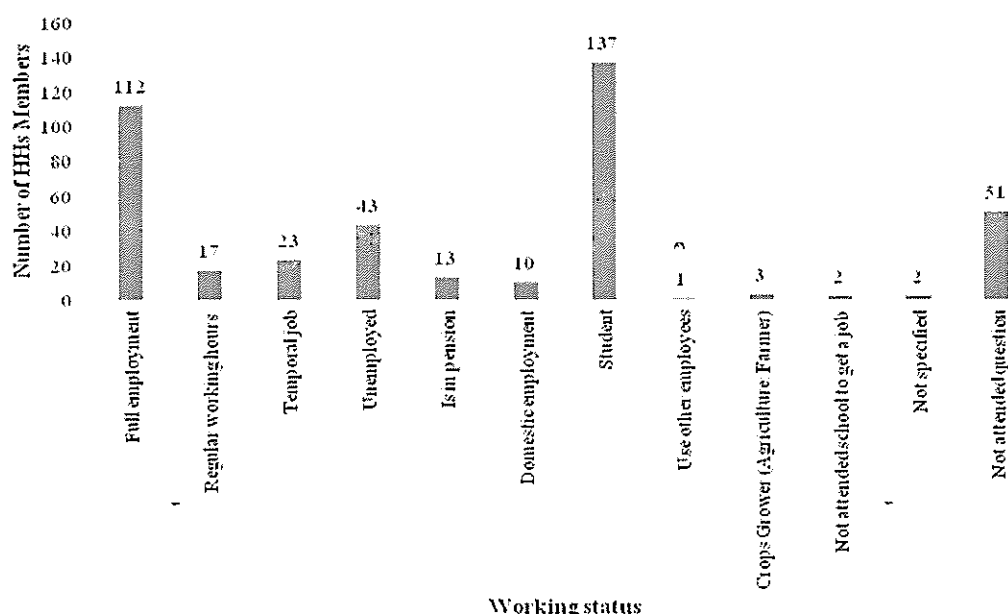
Figure 14: Households members Literacy



Source: Field survey, BESST Ltd 2018

- Status of employment in project area

Figure 15: Working status for the household members in the project area



Source: Field survey, BESST Ltd 2018

From the above chart, 27% of the total household members are full employed, 4% have regular working hours, 6% has part time(temporary) jobs, 10% are unemployed, 3% are in pension 2% domestic or home employees, 33% are students.

- Means of transport

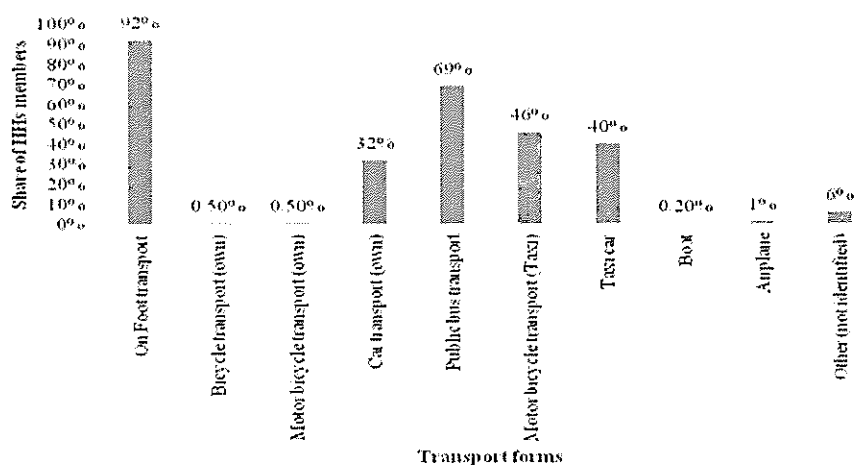
People use various transport means in different period or mixed of all possible transport means. In many cases households members use different means of transport. The field survey shows that 92% has walking/foot transport as main transport means, 0.5% of the total household members use bicycle, 0.5% are own motor bicycle use it as transport means, 32% use car transport (own), 69% use public transport (bus), 46% use motor bicycle transport (taxi), 40% use tax car, 0.2% use boat, 1% use airplane and 6%

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other transport means not identified. It shows that many people used to use on foot and public transportation means.

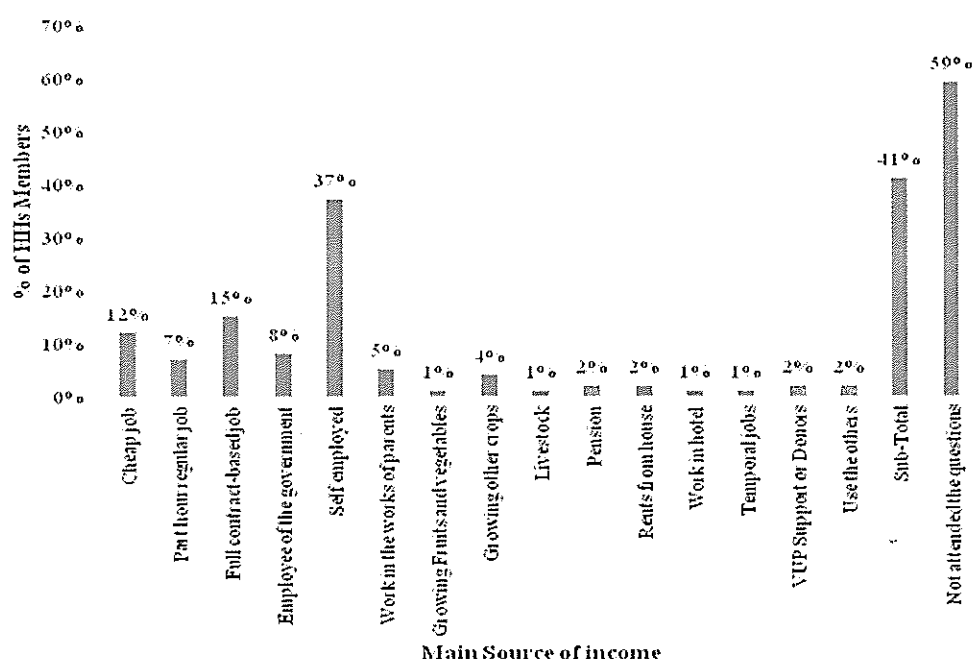
Figure 16: Means of transport used by household members in the project area



Source: Field survey, BESST Ltd 2018

- Source of income for households members

Figure 17: Share of main Source of income for household members in the project area



Source: Field survey, BESST Ltd 2018

In reference to the above chart, the main source of income per each household member in the project area (52 households assessed). The assessment was attempted from 114 household members (39% of total household members) since some people keep confidentially the information related to their income. From all 114 household's members who clarified their main income source, 12% their main source of income is cheap job, 7%-part hour regular job, 15% full contract job, 8% work for the government, 37% are self-employed, 5% work for their parents, 4% are growing crops, others for livestock, pension, temporal jobs, VUP supports or other donors, work in hotel, etc. The main source of income for the people in the project area is self-employment.

- Main income generation activities in the project area

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Key activities that generate income for members of households include agriculture, 18% , livestock 7%, construction 1%, Formal and informal commercial 29%, and remaining in different levels of activity like: industry, finance and accounting as well as management, education, arts, plays, NGOs, work the wife or husband, lawyer, consultant, pension, rents from house and ICT. Thus, in the area commerce and trade are the important activity levels to signify people's main source of income.

Table 7: Main income generation activities in the project area

Level of the activities	Number of family members	Percentage
Agriculture	20	18%
Livestock	8	7%
Construction	1	1%
Manufacturing	1	1%
Commercial	33	29%
Trading	1	1%
Financial	5	4%
Transportation	3	3%
Government	11	10%
Education	1	1%
Professional	9	8%
Others	21	18%
Total	114	100%

Source: Field survey, BESST Ltd 2018

- **Yearly income by main income source**

It is not an easy task to calculate early income for households members because some of them cannot estimate their income on do not want to disclose this information. However, surveyors managed to get this information from 79 out of 290 household members. According to this survey, 29.1% of members households has an yearly income below 0.5 million per year and the average is 253,348 Rwfs. 15.2% earn income between 0.5-1 million Rwfs per year, 41.8% earn income between 1-10 million Rwfs per year. 10.1% earn an income ranged between 10-50 million, 2.5 % earn income ranged between 50-100 million and 1.3 % earn 100 million and above.

Table 8: Household member yearly income

Size of yearly income (Rwfs)	Number of family members	Percentage	Average
Less than 0.5 Million Rwfs	23	29.1%	253,348
Between 0.5 Million Rwfs to 1 Million Rwfs	12	15.2%	670,417
Between 1 Million Rwfs and 10 Million Rwfs	33	41.8%	3,478,398
Between 10 Million Rwfs and 50 Million Rwfs	8	10.1%	22,631,638
Between 50 Million Rwfs and 100 Million Rwfs	2	2.5%	57,615,000
100 Million Rwfs and More	1	1.3%	428,140,000
Median	79		10,798,509 1,500,000

Source: Field survey, BESST Ltd 2018

- **Income by second activities of household members**

Only 11% of household members in the project reported a second main source of income activity, from them 9% are gaining as second income from small jobs, 4% part time jobs, 9% full time contract based jobs, 2% are employees of government, 28% are working in their own businesses (self-employed), 2% work for their parents (work in family businesses), 11% are agriculture farmers, 22% gain rents of the house, 2% gain pension, 2% enjoy supports from friends and donors, 2% are gain rents fees from their land or plots, 2% enjoy benefits from cooperatives, 2% gain from domestic worker wages and 2% are employing other employees.

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Table 9: Annual income from second income generating activities

Size of income from secondary main source of income (Rwfs)	Number of family members	Percentage
0-100,000	4	10.2
100,001-500,000	4	10.2
500,001-1,000,000	4	10.2
1,000,001-2,000,000	11	28.
2,000,001-4,000,000	6	15.1
4,000,000-10,000,000	6	15.3
10,000,000-20,000,000	2	5
Above 20,000,000	2	5
Total	39	100
Average (Rwfs)	8,587,959	

Source: Field survey, BESST Ltd 2018

4.3.3. Land ownership in the project area.

In Rwanda all plots have been registered and given a Unique Personnel Identification(UPI) that shows the land owner. In some instance the land owner may lease his land to someone else for a given period. There also people who are using the government land especially in marshlands. The field survey team identified the land ownership and these data are very important especially during compensation exercise.

- **Time spent in current residential house**

The survey revealed that only 5 household has spent less than one year in the project area. 37.5% spent more than 20 years in the current residential houses. This is due to the fact that most of the household in the project area own their houses. All people who recently moved to the project area are from Gasabo district and one is from Kicukiro district. No one from outside Kigali City.

Table 10: Time spent in current house

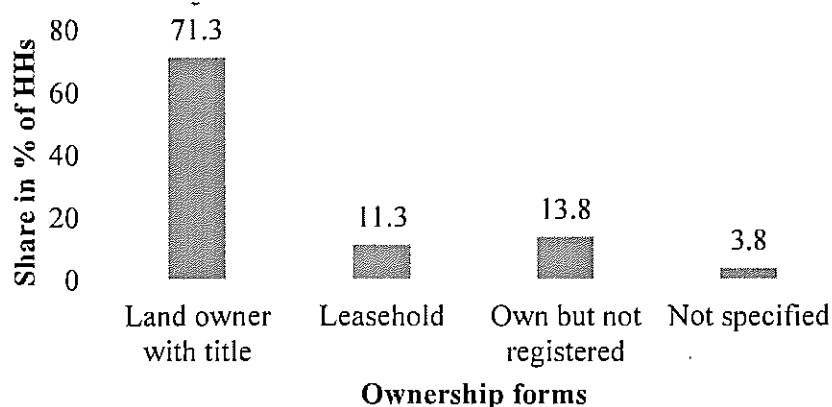
Number of years spent in the house	<1year	1-5	6-10	11-16	16-20	>20
Number of households	5	14	14	9	8	30
%	6.2	17.5	17.5	11.3	10	37.5

Source: Field survey, BESST Ltd 2018

- **Residential land ownership**

Results of filed survey shows that 71.3% of interviewed households are owner of the residential houses, 11.3% live in rental houses and 13.8 occupy their own house but the land is not registered. 3.8% of interviewed households failed to provide information on land ownership.

Figure 18: Residential land ownership.



Source: Field survey, BESST Ltd, 2018

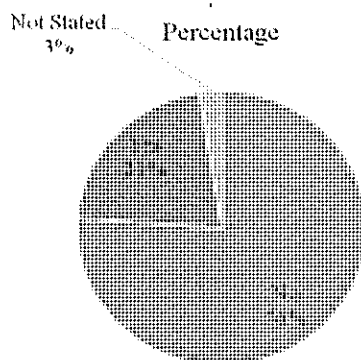
- **Other land than residential area**

Only 21%household reported that they have other plots in the project area while 76 have only residential land.

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Figure 19: Households with additional lands.



Source: Field Survey, BESST Ltd 2018

4.3.4. Source of income and households expenditures

In addition to the source of income by household members, it was paramount to analyse the source of income in the household and how household spend resources.

- **Household Source of income**

Households were requested to provide information on their main source of income and the second source of income. Source of income includes salaries and wages, retirement income, near cash government transfers like food stamps, and investment gains. Results from the study are presented in the following table. In total, 40 households are growing vegetables/crops inside the project area, but the number of households whose main income is from farming is 9.

Table 11: Main and second source of income in the project area.

Household Source of income	Main source of income		Second source of income	
	No. of HHs	%	No. of HHs	%
Agriculture	9	15.5%	13	22.4%
Livestock	5	8.6%	7	12.1%
Construction	1	1.7%	1	1.7%
Manufacturing	1	1.7%	0	0.0%
Commercial	16	27.6%	3	5.2%
Trading	1	1.7%	0	0.0%
Financial	2	3.4%	1	1.7%
Transportation	0	0.0%	1	1.7%
Government	5	8.6%	3	5.2%
Education	1	1.7%	0	0.0%
Professional	8	13.8%	6	10.3%
others	4	6.9%	7	12.1%
No reply	5	8.6%	16	27.6%
Total	58		58	

Source: Field survey, BESST Ltd 2018

- **Loans**

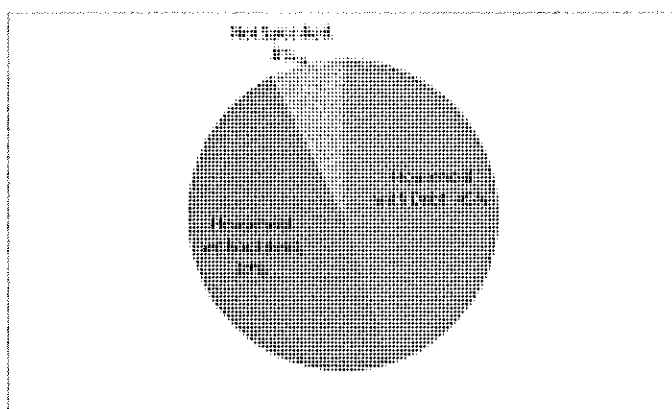
Household debt is defined as the combined debt of all people in a household. It includes consumer debt and mortgage loans. Household debt can be defined in several ways, based on what types of debt are included. Common debt types include home mortgages, home equity loans, auto loans, student loans, and credit cards.

In Rwanda people use debt for improving household consumption, develop or improve their small or larger income generating activities, paying school fees, etc. The survey assessed the main purpose the loan, source, size, pay, payment period (agreed) of debt held by household in the project area.

Figure 20: Loan status in the project area.

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Source: Field survey, BESST Ltd 2018

From the above chart, 45% of households have borrowed money, 47% did not report any loan while 8% did not want to provide information on the question.

- **Purpose of the loan**

Households reported different reasons of borrowing money and 37% borrowed for buying house or constructing houses, 18.5% for starting or increasing business (commercial activities), 7.4% to add value to existing house and expanding it, 3.7% also for commercial activities expansion 3.7% equally for both buy and renew the house. The following table summarizes different reasons of taking the loan.

Table 12: Purpose of taking loan

Purpose of debt	Number of Households	Percentage
Buy a house	10	37.0%
Add a value to existing house and expansion	2	7.4%
Buy domestic household materials	1	3.7%
Buy Motorcycle	1	3.7%
Buy parcel of land	1	3.7%
Expanding garage	1	3.7%
Expanding house for animal rearing purposes	1	3.7%
Commercial activities expansion	1	3.7%
Develop Bar business	1	3.7%
Business (Commercial)	5	18.5%
Animal Rearing	1	3.7%
Rearing caws	2	7.4%
Sub-Total	27	

Source: Field survey, BESST Ltd, 2018

- **Source of loan**

The survey revealed that have loan from commercial banks with 97,2 while only one person took the loan from his employer. 63.9 % of interviewed household acknowledge to have the loan but did not disclose the name of the Bank.. the following table summarizes the source of loan among 27 HHs who have loans.

Table 13: Source of debt for household living in the project area

Source of Debt	Number of Households	Percentage
BANK	16	59.3%
Bk	2	7.4%
BPR	4	14.8%
COGEBANQUE	1	3.7%
CSS BANK	2	7.4%
Letshego	1	3.7%
Advance salary payment	1	3.7%
Sub-Total	27	100

Source: Field survey, BESST Ltd 2018

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- **Size of the loan**

Only 24 household accepted to disclose the size of the loan and following table provides an indication on the size of the loan. 37.5% of households borrowed more than 20 million and this is due to the fact that most of the loans are for house construction and to construct a house in project area goes beyond 20million.

Table 14: Size of debt for households in the area covered by the project

Size of the Loan	Number of HHs	%
<1000,000	1	4.2%
1m-5m	7	29.2%
5m-10m	6	25.0%
10-15	1	4.2%
>20	9	37.5%
	24	100

Source: Field survey, BESST Ltd 2018

- **Loan repayment period**

Debt period range from one year to 15 years and this reflect the terms of the loan given by most of the bank in Rwanda. Only one household has short term loan that equal to six months and this is the loan from employer. The table below provide information on debt period

Table 15: Debt period of payment for household living the area covered by the project

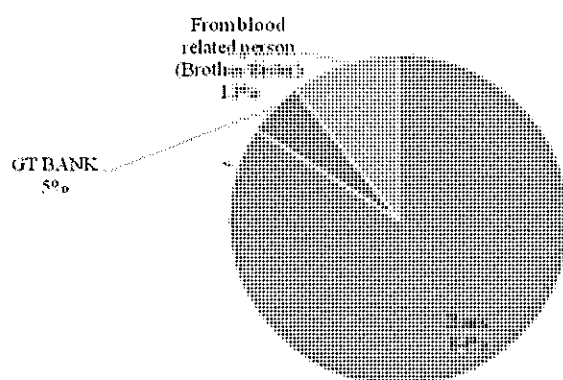
Debt payment period	Number of Households	Percentage
6 Months< 1year	2	8.3%
1 -3	11	45.8%
4-10	10	41.7%
Above 10	1	4.2%
General Total	27	100

Source: Field survey, BESST Ltd, 2018

- **Additional debt**

Among the interviewed households, 19 confirmed to have additional debt the source is almost the same as the first loan but the second loan is taken in different banks.

Figure 21: Source of additional debt

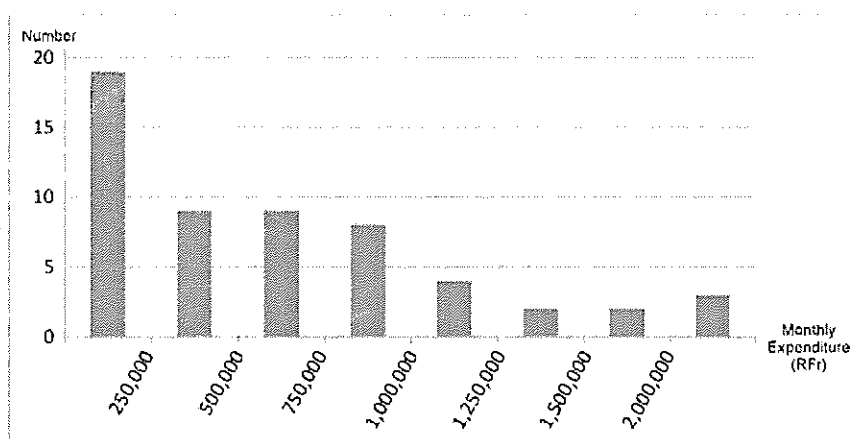


Source: Field survey, BESST Ltd 2018

- **Household monthly expenditures**

The distribution of the monthly household expenditure of 52 households is shown below. The median household expenditure is RF 505,175 and much of the money is spent on food with 29%, Fuel comes at the second place with 14 % while water is the last with 1 %. The table 15 summarizes household monthly expenditures.

Figure 22: Distribution of Monthly Household Expenditure



Source: Field survey, BESST Ltd 2018

Table 16: Household monthly expenditures

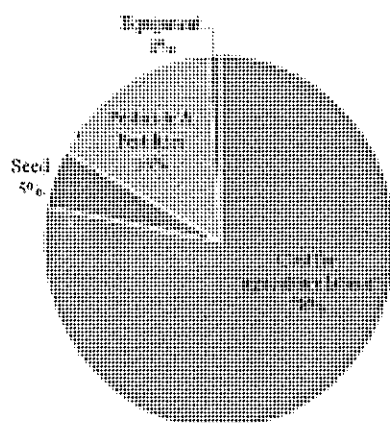
Services spending for/ Monthly Expenditure on	Total households expenditure	Average expenditure per household	Share in %
Food	20,465,500	255,819	29%
Fuel	10,055,000	279,306	14%
Water	852,435	11,677	1%
Electricity	1,408,250	18,777	2%
Daily Transportation	3,561,067	54,786	5.2%
Transportation to school	3,432,952	68,659	5.7%
Health	3,662,355	51,582	5.1%
Other education related	18,415,699	270,819	27%
Others	7,634,534	127,242	11%
General total	69,487,792	120,221	100%

Source: Field survey, BESST Ltd 2018

- Yearly expenses for Rice farming**

For households where rice farming is the main source of income, the total expenditure is about 1,925,000Rwfs annually where 78% are spent on agriculture labour, 5% for seed, 16% for pesticide and fertilizers and 1% for equipments.

Figure 23: Yearly expenses of household for Rice farming.



Source: Field survey, BESST Ltd, 2018

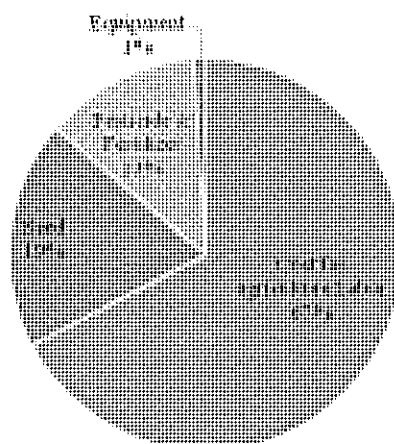
- Yearly expenditure for vegetable farming.**

For households with vegetable farming is the main source of income, households spent in average 592,500 FRW per year. The same as on the rice farming, most of money are sent on agriculture labor (68%). Other money are spent on seed costs (19%), pesticide and Fertilizer (13%), and equipment's for vegetables and fruits growing (1%).

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Figure 24: Yearly expenses for vegetable and fruits farming.

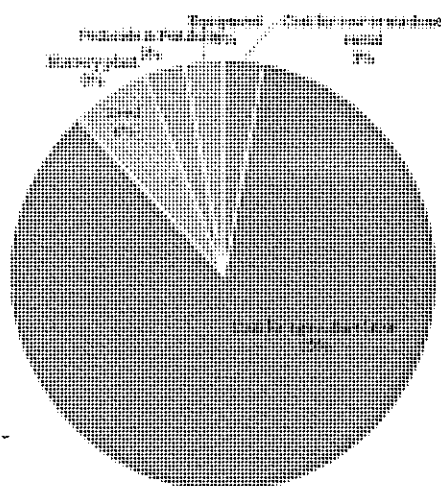


Source: Field survey, BESST Ltd 2018

- **Expenses for farming other crops**

Though Kigali is an urban area, some households reported farming of subsistence and commercial crops as the main income source. In average a households can spent about 1,138,389RWF for farming other crops in three season. Most of expenses are on labour with 85% of total costs. second are costs for cow or machine rental (3%), seed (6%), pesticide and fertilizer (3%) and equipments with (3%).

Figure 25: Yearly expenses for household for farming other crops.



Source: Field survey, BESST Ltd 2018

- **Expenses for livestock keeping**

For livestock keeping in the project area, expenses are a little bit high because farmers who are relying on livestock are big farmers who secured farms in the project area. In average total expenses is 3,870,375 rwf where animal feeding takes 76%. The rest of money spent on animal vaccination (6%) and other expenses like guards takes 18%. It worth to note that these expenses for agriculture and livestock are estimation because most of farmers do not do record their expenses on regular basis.

Table 17: Yearly expenses for household livestock keeping

Item which cause expenses/ need costs	Number of Household	Total Expenses/ per year (in Rwfs)	Average costs per year (in Rwfs)	Share in %
Animal feed	16	61,926,000	3,870,375	76%
Vaccination	16	5,150,000	1,287,500	6%
Others	16	14,652,265	610,511	18%

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Total	16	81,728,265	5,108,017	100%
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Source: Field survey, BESST Ltd 2018

- Yearly expenses for trading and other small business

Expenses for running shop and other small were reported by 22 households. In this category, households spent 44,957,500 and most of the money are spent on purchasing commodities with 95%. Other expenses are spent on labor and staff in business (3%), rental fees for working place (0.28%), electricity 0.20%.

Table 18: Yearly expenses for running shop and other small business

Item which cause expenses/ need costs	Number of Household	Total Expenses/ Costs per year (in Rwf)	Average costs per year (in Rwf)	Share in %
Purchasing commodity	22	989,065,000	44,957,500	95.65%
Cost for labor & staff	18	34,193,000	1,899,611	3.31%
Water	15	2,946,200	196,413	0.28%
Electricity	9	2,049,500	227,722	0.20%
Others	19	5,787,900	304,626	0.56%
Total	22	1,034,041,600	47,001,891	100.00%

Source: Field survey, BESST Ltd, 2018

4.3.5. Household domestic appliances or materials

Households were asked to list appliance or material their own. Materials and appliances are in many categories and they are used either for food preparation purposes, washing clothes or any other domestic activity and they constitute one of the measurement indicator for socio-economic development. The next table provides detailed information on appliance owned by households in project area.

Table 19: Household properties/appliances or materials in the project area

Household Items	Number of household owning item	Total assessed household	Total number of Items
Fridge	28	48.3%	37
Cooking stove/equipment	34	58.6%	42
Micro oven	17	29.3%	17
Washing machine	6	10.3%	6
TV	45	77.6%	61
Radio	39	67.2%	54
Computer (desktop)	6	10.3%	8
Computer (notebook)	31	53.4%	66
Bicycle	11	19.0%	15
Motorbike	3	5.2%	4
Car	22	37.9%	38
Mobile Phone	46	79.3%	135
Smart Phone	46	79.3%	117
Landline Phone	2	3.4%	4
Electric fan	6	10.3%	16
Inverter	20	34.5%	28
Battery for inverter	4	6.9%	4
Solar panel	6	10.3%	6
Generator	5	8.6%	5
Tractor	1	1.7%	1
Agricultural machine	0	0.0%	0
water pump	7	12.1%	7
Others (iron)	16	27.6%	24
Total			

Source: Field survey, BESST Ltd 2018

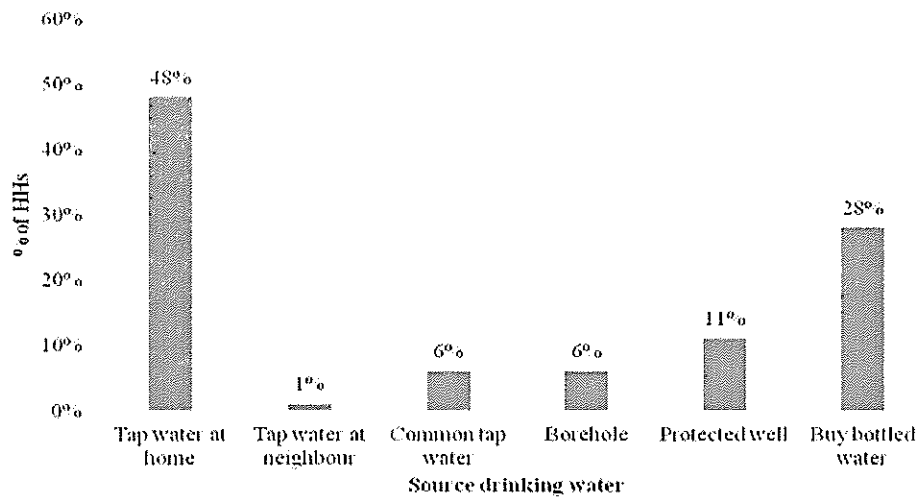
4.3.6. Household accessibility to water and electricity

Water and electricity are major component of household daily activities. This section provides information on how households access those services in project area.

- Source of drinking water

The survey results show that all households in the project target area have access to safe drinking water. The survey show that 48% have tap water at home, 28% buy bottled water, 11% use protected well, 6% common tap water, 6% also borehole and only 1% to tap water at neighbour.

Figure 26: Share of main source of drinking water for household in the project area

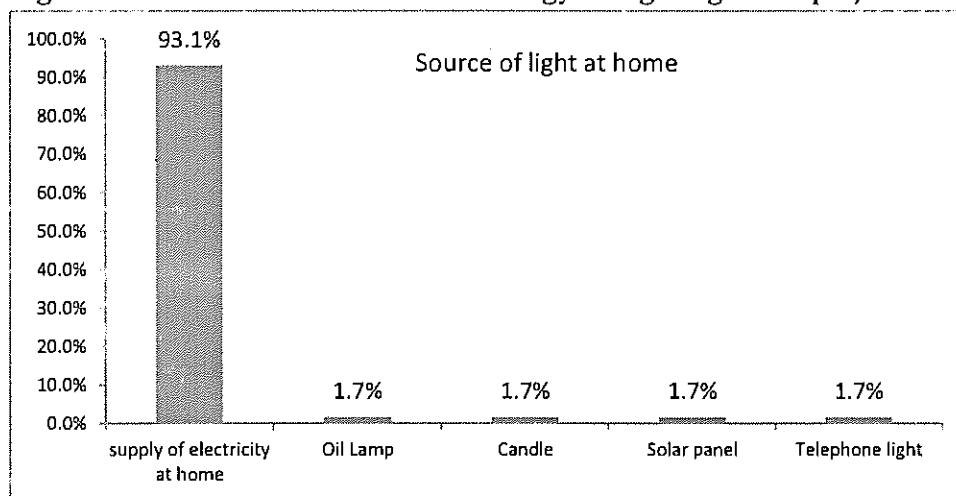


Source: Field survey, BESST Ltd 2018

- Source of energy for lighting

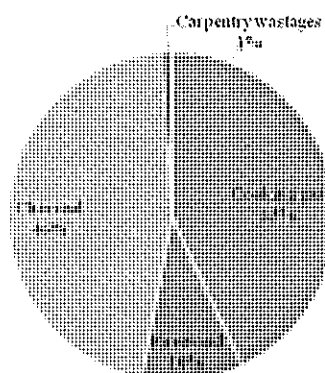
On 58 households interviewed, 93% are connected to the national grid and use electricity for lighting, 1.7% candle, 1.7% oil lamp, 1.7% solar panel and 1.7% telephone light.

Figure 27: Main source of household energy for lighting in the project area



Source: Field survey, BESST Ltd 2018

Figure 28: Main source of energy for cooking for household in the project area



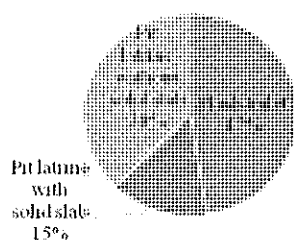
Source: Field survey, BESST Ltd, 2018

- Sanitation facilities in project area

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Figure 29: Main type of toilet used by households



Source: Field survey, BESST Ltd 2018

4.3.7. Access to health services and frequent diseases

Access to health facilities is an important indicator in socio-economic survey and is assessed by considering the time citizens use to get health services. This survey also assessed the frequent diseases in the project area. From 58 households assessed in the project area, the longest time to get health service is 60 minutes with 4% of households, 20% use 10 minutes from home to nearest health centre, 25% use 40 minutes, 18% takes 30 minutes. The average time of household (any) to nearest health centre is 25 minutes for all households owning plots in the area of the project.

Table 20: Time it takes from home to the nearest health facility

Size	Number of Household	Percentage
<5minutes	3	5.2%
5-10	15	25.9%
10-20	10	17.2%
21-30	12	20.7%
31-40	15	25.9%
>40	3	5.2%
	58	100%

Source: Field survey, BESST Ltd 2018

Table 21: Frequent diseases that required medical treatment from last year (2017)

Disease affected household member in last year	Number of Respondents	Percentage
Malaria	27	34%
Diarrhea	4	5%
Stomach problems	10	13%
Respiratory problems	18	23%
Eye infection	15	19%
STIs/HIV/AIDs	2	3%
Blood Infection	1	1%
Diabetes	1	1%
Disability	2	3%
Skin diseases	2	3%
Child disease	1	1%
Sex disease	1	1%
Paralyse	1	1%
Hypertension	3	4%
Accident	1	1%
Typhoid	1	1%
Teeth disease	1	1%
Skin Allergy	1	1%
X-Ray services	1	1%
Humanization	1	1%
Muscles diseases	4	5%
Grippe	1	1%
Infection	3	4%
Hemolagy in the head	1	1%
Snake	1	1%

Disease affected household member in last year	Number Respondents	Percentage
Back	1	1%
Joints	1	1%
Polio	1	1%
Don't remember	3	4%

Source: Field survey, BESST Ltd 2018

Table 22: Medical treatment

Households attended Hospital for disease treatment in last year	49	86%
Households not went to the hospital for disease treatment in last year	8	14%
Total	57	100%

Source: Field survey, BESST Ltd, 2018

Above tables shows that 86% of interviewed households has at least one member who went to the hospital last year for medical treatment while 14% did not. The most common disease is Malaria (34%), respiratory problems (23%), Eye infection (19%), Stomach problems (13%), Diarrhea (5%), Muscles diseases (5%), Hypertension (4%), Infection (4%), Don't remember (4%), STIs/HIV/AIDs (3%), Disability (3%), Skin diseases (3%) and all other illness or diseases are fluent less than 1%.

- **Access to other socio-economic infrastructure**

In average, households use 19 minutes to access primary education facilities, 24 minutes to access high school, 21 minutes to access administrative office and 24 to access market/shop.

Table 23: Time consumed by households members from their home to selected infrastructures

Time range	Service							
	Access to Primary Education		Access to secondary education		Access to administrative office (cell)		Access to Food market or shop	
	Number of Household	Percentage	Number of Household	%	Number of Household	%	Number of Household	%
<10	8	14.0%	16	28.1%	6	10.5%	13	22.8%
10--20	13	22.8%	7	12.3%	25	43.9%	7	12.3%
20--30	21	36.8%	8	14.0%	6	10.5%	8	14.0%
30--60	13	22.8%	19	33.3%	17	29.8%	23	40.4%
>60	2	3.5%	7	12.3%	3	5.3%	6	10.5%
Average	19.9		24.2		21.6		24.4	

Source: Field survey, BESST Ltd 2018

4.3.8. Livestock farming in the project area

Though the project target area is an urban area, people are still keeping livestock. In the project area, households are rearing both small and larger animals.

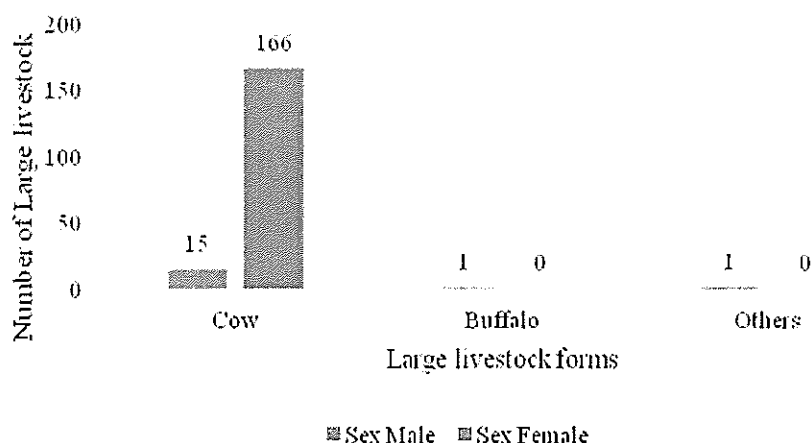
- **Large size livestock development in the project area**

The main large livestock kept in the project area cows. Only one household reported buffalo. The purpose of cattle keep include selling, milk, meat, etc.

Figure 30: Number and sex of larger livestock in the project area

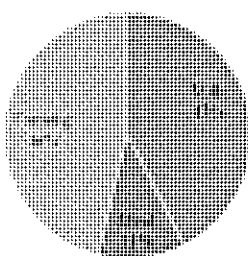
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Source: Field survey, BESST Ltd. 2018

Figure 31: Purpose of rearing large animals in %



Source: Field survey, BESST Ltd 2018

- **Livestock keeping after expropriation.**

When asked whether households considers to keep large livestock after expropriation 61% are willing to continue since the proposed project will not affect the entire farms. 31% prefer to change the activity and start new business. the rest of households were not sure and they prefer to decide when they know the project impact on their farms.

- **Small livestock in the project area**

Small livestock rearing is also one of the income generating activities in Rwanda and its one of source income for some household.. In the project area only 13 households out of 80 have at least one small livestock and Chicken are the most visible in the project area with 2,046 chicken reported. Pigs, duck, rabbit and goat are also present in the project area. The following table summarizes small livestock identified in the project area and the use of them.

Table 24: Small livestock characteristics in the household living in the project area

Small Livestock	Total number	Selling		Domestic use		Both: Selling and Domestic use		others	
		Number	Share	Number	Share	Number	Share	Number	Share
Pig	16	16	100%	-	-	-	-	-	-
Chicken	2,046	2,002	97.8%	17	0.8%	27	1.3%	-	-
Duck	11	-	-	-	-	-	-	11	100%
Goat	46	-	-	20	43.5%	21	45.7%	5	10.9%
Rabbit	13	-	-	8	61.5%	5	38.5%	-	-
Total	2132	2018	94.7%	45	2.1%	53	2.5%	16	0.8%

Source: Field survey, BESST Ltd 2018

4.3.9. Socio-economic status of corporation in project area

- **Type of Corporate**

In Rwanda major types of corporate include Government institutions, Non- Governmental Organisation(NGOs), commercial companies, Cooperatives and Community Based Organization(CBOs). in the project area 8 corporations were identified but only six provided information. Among the six corporation identified, 3 are commercial limited companies, 2 non profit organization and 1 local public institution.

Table 25: Type of Corporation

Type of Corporation	Number	Percentage
Limited Liability Company	3	50.0
Non-Profit Corporation	2	33.3
Local public hody	1	16.7
Total	6	100

Source: Field survey, BESST Ltd 2018

- **Type corporation business**

The following table presents the type of organization identified in the projects area including churches, schools and commercial enterprises.

Table 26: Category of business for plots owned by the corporate

Business category	Number	Percentage
Education	1	16.7
Lodging, catering, restaurant	2	33.3
Other service	1	16.7
Professional service	1	16.7
Church	1	16.7
Total	6	100

Source: Field survey, BESST Ltd, 2018

- **General information of corporation.**

Though two corporate did not disclose the information on their financial and administrate situation, the surveying team managed to get some information on corporation in the study area and these information are presented in the following table.

Table 27: Description of corporate business in the project area

Type	Starting year	Starting Capital in Rwfs	Number of Employees		No of Board Members	NO of Employees	NO of Factories	Sales in 2017	Last Year Profits (in Rwfs)
School	2015	326,567,235	Full Time	Part Time	6	2	1	85,077,000	
			24	0					
Bar, Resto, Apartment	2012	6,000,000	5	2	2			18,000,000	
	2016	700,000,000	70	0	7			400,000,000	
Church	1995	5,000,000	2	3	53				
Zamura Cooperative	2000	10,000,000	2	5	5	1		Secrete	
Kobil	2013	20,000,000		11	2	1		700,000,000	5,000,000
Average where applicable			21	4	13	1	1	300,769,250	5,000,000

Source: Field survey, BESST Ltd 2018

- **Ownership of the land used by corporate**

The following table provide information on land ownership , access to service like water and electricity and sanitation infrastructures.

Table 28: General information on land ownership, access to social infrastructure

Type of corporate	Kobil Petrol station	Bar, Resto, Apartment		School	Church	Zamura Cooperative
Years/months in Using Plot House	Not Specified (16.66%)	5 Years and 7 Months (16.6%)	1 Year and 6 Months (16.6%)	3Years and 1 Month (16.6%)	23 Years (16.6%)	18 Years (16.6%)

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Land Ownership	Tenant/Rent (33.3%)	Plot of ADEPR (16.6%)	50%
Building Structure	Tenant/Rent (33.3%)	Own (66.6%)	
Source of Drinking Water	Tap water at home (100%)		
Source of energy for lighting	Supply of electricity at home (100%)		
Toilet Type used by the corporate	Flash toilet (66.6%)	Pit latrine with solid slab (16.6%)	Pit latrine without solid slab (16.6%)

Source: Field survey, BESST Ltd 2018

4.3.10. Assets inventory

The project of strengthening of Nzove-Ntora Principal requires the clearance and excavation work where the pipeline will be installed. For this reason, the field survey included inventory of assets that are likely to be affected. Among other assets to be affected, include structures such as fences, wall and concrete floor, perennial crops and trees. The assets inventory considered maximum 9.8 m width where access road is required, 2 to 3.9 m where access road exist width which will be required during construction. After construction all this land will not be required but it should be used under certain conditions.

Table 29: Number of plots identified in the construction area by land use

DISTRICT	SECTOR	CELL	Number of HHs	Number of plots affected		Size of affected land (m2)
Gasabo	Gatsata	Nyamabuye	6	Cultivate land	7	1,841
				Business/commercial	2	1,323
		Nyamugari	8	Cultivate land	22	6,174
	Gisozi	Ruhango	46	Cultivate land	26	7,585
				Housing plot	21	373
				Business/commercial	6	144
Nyarugenge	Kanyinya	Nyamweru	7	Cultivate land	6	1,621
				Housing plot	3	116
				Business/commercial	1	378
		Nzove	9	Cultivate land	14	6,397
				Housing plot	0	0
	Kigali	Nyabugogo	19	Cultivate land	28	10,936
				Housing plot	5	3,061
				Business/commercial	6	437
	Kimisagara	Kimisagara	*0	Cultivate land	1	280
Grand Total			95		148	40,665

*: User of the land is counted at Nyamweru Cell, because they do business there

Source: Field survey, BESST Ltd, 2018

The targeted land plots are summarized according to the ownerships. The left end column shows the total area of the permanently lost land.

Table 30: Targeted Land Plots by Ownership

District	Sector	Cell	Size of affected land (m2)			Permanently affected land (only private land) m2
			Government land (m2)	Private land (m2)	Total	
Gasabo	Gatsata	Nyamabuye	2,680	484	3,164	157
		Nyamugali	3,933	2,242	6,174	445
	Gisozi	Ruhango	2,563	5,539	8,102	2,392
Nyarugenge	Kanyinya	Nzove	864	5,533	6,397	718
		Nyamweru	98	2,016	2,114	723
	Kigali	Nyabugogo	11,769	2,664	14,433	1,510
	Kimisagara	Kimisagara	280		280	-
total			22,187	18,478	40,665	5,946

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CHAPTER V: PUBLIC CONSULTATION AND PARTICIPATION

5.1. Overview

Public consultation and stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts. Stakeholder engagement is an on-going process that involves the following elements, stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism and on-going reporting to affected communities. During this survey consultation meetings were conducted with regulatory authorities, local leaders and local communities. Due to the difficulties of having people many times especially communities who have to work every day, it was advised to have meetings in the afternoon preferably on Tuesday where local people have community meetings. It was also advised to combine meetings for environment and social assessments rather than having separate meeting.

5.2. Purpose

- To prepare communities on potential emergency scenarios that could be caused by the project and can affect the community.
- To build a trusting relationship with the affected communities and other interested stakeholders based on a transparent and timely supply of information and open dialogue.
- To ensure effective engagement with local communities and other key stakeholders throughout all phases of the project.
- To actively build and maintain productive working relationships, based on principles of transparency, accountability, accuracy, trust, respect and mutual interests with affected communities and other stakeholders.

5.3. Public consultations and participation

Public participation and community consultation has been taken up as an integral part of social and environmental assessment process of the project. Consultation was used as a tool to inform project affected people, beneficiaries and stakeholders about the proposed activities both before and after the development decisions are made. It assisted in identification of the problems associated with the project as well as the needs of the population likely to be impacted. This participatory process helped in reducing the public resistance to change and enabled the participation of the local people in the decision making process. Initial Public consultation has been carried out in the project areas with the objectives of minimizing probable adverse impacts of the project and to achieve speedy implementation of the project through bringing in awareness among the community on the benefits of the project.

As part of the project consultations, efforts were made to consult with the decision making official at central level as well as a number of local authorities, to determine their thoughts, opinions and feedback on the impact of Nzove-Ntora project.. Information and comments collected from the public early in the study process were of use. Local communities especially farmers who are the land along the proposed pipeline were also consulted to give them the opportunity to express their views and concerns. As part of the process, they were also provided with relevant and sufficient information on the project prior to its start - up.

5.3.1. Stakeholders

Discussions with decision making bodies, key stakeholders, sector institutions and specialist experts were made on the very concepts and nature of the proposed project, giving emphasis on levels of public participation, role of key stakeholders and joint contributions of these actors to the success of the project. In addition, the scope of the proposed project and possible means of maximizing local communities'

social, economic and environmental benefits from the project implementation were underlined. Key stakeholders and authorities with whom consultations made at the project study areas were:

At national level:

- Ministry of Environment
- Rwanda Water and Sanitation Corporation Limited(WASAC Ltd)
- Rwanda Environment Management Authority (REMA)
- Rwanda Development Board (RDB).
- Kigali City

At local level:

- Gasabo district
- Nyarugenge district
- Kigali , Kanyinya, Gisozi and Gatsata sector
- Potential Project Affected People(PAPs).

List of consulted people are attached in appendices

5.3.2. Public participation – methods and process

During the Public consultation, the study team applied different participatory methods, namely; interviews, one-to-one discussions, focused group discussions (FGD) and official meetings with stakeholders. Stakeholders consulted were informed on the proposed project and by using the key guiding questionnaires, the study was able to guide discussions and obtain relevant information on the likely impacts of the project activities. For the socio-economic survey and assets inventory, consultation focused on potential projects households. During these consultations, stakeholders and the communities were explained about the project, its benefits, social and environmental impacts. The participants were encouraged to (i) be open and make known their concerns and claims. The presentation highlighted the project background, objectives, expected upcoming activities, social economic information, environmental concerns and land acquisition process.

5.4. Consultative meeting held with stakeholders and communities

Different meeting was organized by the study team from the earliest stage of project planning so as to present to all stakeholders the proposed project. In addition to public consultation meeting with project beneficiaries or project affected persons, the study team held technical meeting and one to one meeting with stakeholders as well. The first meeting was done at scoping phase to explain the projects to stakeholders and get feedback on key areas of concern that need to be covered. The second round of consultation meeting was held before the socio-economic survey and the third round of consultation meeting was done after socio-economic survey and assets inventory to display census results and agree on compensation measures. To avoid more unnecessary meeting and on advice from local authorities all those consultations covered both environmental assessment, socio-economic survey and resettlements implication.

5.4.1. Scoping meeting

- **Consultation at central and district level**

Consultation at central and district level consisted at explaining the proposed project, legal and regulatory requirements relevant to the project as well as roles and responsibilities of different stakeholders. It was also an opportunity to collect data and information related to the projects like existing laws, standards and policies. These consultation was done one to one interviews with guiding question institutions consulted include:

- Ministry of Environment,
- Ministry of Land and Forestry

- Rwanda Land Management and Use Authority
- Rwanda Environment Management Authority(REMA)
- Rwanda Development Board(RDB)
- Water and Sanitation Authority(WASAC)
- Kigali City Council(KCC)
- Gasabo District and Nyarugenge District

In relation to involuntary resettlement, key issues identified during one to one consultations include:

- Possibility of loss of property , crops and trees, disturbance of water table, loss of biodiversity.
- Likelihood of delays in compensation of PAPs, which could escalate into disputes, Execution period, employment for their citizen, cost and accessibility of potable water waste management and disposal, Source of construction material, health insurance; connectivity to the existing network, cost of land acquisition and eligibility criteria.;
- Possibility of low wages to local workers during construction works;
- Payment of water fees;
- Roles and responsibilities in implementation and monitoring of RAP;
- Land ownership and eligibility criteria and;
- Entitlement matrix/Compensation measures.

The list of stakeholders consulted at central level is presented in annexes.

• Consultation with sector and cells authorities

Before meeting potential project affected people the consulting team met with local authorities from local authorities from sector and cells. Apart from Gisozi sector where local authorities gathered at sector conference hall, other authorities were consulted at their offices. the purpose of those meetings was to introduce the consulting team. introduction of projects and likely impacts, schedule for public consultation meeting with potential affected persons. The list of people consulted at Sector an cell level is presented in annexes.

5.4.2. Scoping meetings with local communities

One meeting was held in each sector to introduce project to local authorities and local population who has land or use the land in project. These meetings were invited by WASAC Ltd and the Specialist in charge of Environment and Social attended the meeting. It was agreed that those meeting should take place in the afternoon preferably on Tuesday where local citizens have community meeting. All these meeting were chaired my sector and cells authorities and the WASAC Ltd representative presented the project while the consultant team discusses the project environmental and social impact using the scoping matrix(see annex 4). Table 32 summarizes meeting held with communities at scoping stage and table 33 summarizes key issues raised in each meeting. Attendance list are presented in annexes.

Table 31: schedule of scoping meeting with local communities

Dates	Sector	Venue	Category of Participants
Tuesday January 9 th , 2018	GATSATA	NYAMABUYE cell	<ul style="list-style-type: none"> - WASAC Representative - BESST LTD Team - Nyamabuye Cell local Leaders - Nyamabuye local community
	KIGALI	Nyabugogo Cell	<ul style="list-style-type: none"> - WASAC Representative - BESST LTD Team - Nyabugogo Cell local Leaders - Nyabugogo local community
Tuesday January 16 th , 2018	KANYINYA	Nyamweru Cell	<ul style="list-style-type: none"> - WASAC Representative - BESST LTD Team - Nyamweru Cell Leaders and local community

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Saturday January 27 th , 2018	GISOZI	Ntoral Cell	<ul style="list-style-type: none"> - BESST LTD Team - Representative of Ruhango cell and four villages - Community of four villages
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Table 32: Questions and Suggestions and responses provided in public consultation meet at scoping stage.

No.	Names	Questions/Suggestions	Responses
Nyamabuye cell in Gatsata sector, Tuesday January 9th, 2018			
1		- How many sectors will the pipeline cross?	-The proposed pipeline will be installed in four sectors Kanyinya and Kigali in Nyarugenge, Gatsata and Gisozi in Gasabo District.
		-Will the pipeline cross through people properties? If so, is there compensation planned for?	- The project is designed to avoid people houses but where structures will be affected, adequate compensation will be provided
		- It seems that there are many partners involved in the project, who is responsible for compensation issues? To which institution shall we send our complaints?	-WASAC Ltd is the implementing agency and will be responsible institution to provide compensation but will work with district, sector, cells and resettlement committees.
		- When assets valuation will start	- There will be a cut-off date that will be agreed on and announced to the population which means that every assets putted after the cut-off date will not be considered.
3		During the previous projects that occur, we noticed that there are lands valued and it was marked zero (0) on the certificate, and we couldn't be compensated, what does this project expect to do about it?	The consultant explained that the 0frw marked to land titles is related to Taxes but in Compensation the value of land is calculated based on full replacement cost of market value. Anyone who own a land which does not have up to one ha (1ha) and is for agriculture does not pay taxes but when the land is affected the person receives compensation.
		-There is a pipeline from Yanze river that have exploded and the water destroyed the bridge	- WASAC Ltd Representative promised to check the issue and work with the maintenance department to address the problem.
Nyabugogo cell in Kigali sector, Tuesday January 9th, 2018			
1		-We are currently working on government land, what will happen during the valuation?	-During Valuation people will have to provide evidences of assets ownership, better search for documents before.
		Have you already planned where people will relocate after the expropriation?	The first assessment involved avoiding expropriation thus not many people will be expropriated
2		After the construction works will people continue to use their land?	- The consultant replied that during construction works, they will need buffer zone but after the construction other works will continue as usual.
		Some have assets on the land which they lease, and they don't have ownership certificate what laws says about it?	Land law says that in case of project implementation, assets on land are compensated to its owner.
			The consultant mentioned also that there is a cut-off date that will be announced, thus any assets that will be added after the cut-off date will not be evaluated. He mentioned also that everyone who has land must provide the proof of ownership
Nyamweru Cell, Kanyinya sector, Tuesday January 16th, 2018			
1.		We have a local market here, what about the pollution during the construction work?	Construction works could probably have impacts like pollution which will be analysed during the studies that will be conducted.
		We are being asked taxes by the owner of the plot and we wonder who will be compensated if the market is affected?	The compensation will be provided to land owners but if there is an agreement with users then the compensation of assets will be provided to the person who owns these assets
2		What about people who are renting the land as business ground?	Disturbance allowances are provided in expropriation laws and should be added to the compensation package.
Meeting with communities in Ruhango, Gisozi Sector, January 18, 2018			
1.		Are other meeting planned with affected people?	The consultant agreed with that and he also mentioned that this was an introduction meeting and further meeting are planned.

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2.		When do you think the project should start?	The project is planned to start in 2019. However the final assets valuation and compensation should be done prior construction
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Source: BESST Ltd, 2018

5.4.3. Meetings at Socio-economic survey and assets inventory stage

Before starting socio economic survey and assets inventory, the consultant conducted the second round of consultation meetings in each cell. The meeting was attended by cells authorities and People who have been identified as project affected people. The purpose of the meeting was to announce the cut-off date but also to explain the purpose of the survey and assets inventory. It was an opportunity to introduce field surveyors and to request people who will participate in survey, to avail themselves or delegate someone in the household who can provide information on households and lands owned or used. The table 39 below presents the schedules of meeting conducted and table 40 presents key issues raised in these meeting. Attendance list are presented in annexes.

Table 33: Schedule of meeting conducted at Social Economic survey stage

Dates	Sector	Venue	Category of Participants
Tuesday February 6 th , 2018	GATSATA	NYAMABUYE cell	- BESST LTD Team - Nyamabuye Cell Leaders - Nyamabuye local community
	KIGALI	Nyabugogo Cell	- BESST LTD Team - Nyabugogo Cell local Leaders - Nyabugogo local community
Wednesday 7 th , 2018	KANYINYA	Nzove & Nyamweru Cell	- BESST LTD Team - Nyamweru Cell local Leaders - Nyamweru local community
Thursday 8 th , 2018	GISOZI	Ntoral Cell	- Representative of Ruhango cell-Leaders of four villages - Community of four villages

Table 34: Key issues raised in Consultation meeting at socio economic meeting

No	Question/comments	Answers provided by consultant
Consultative meeting in Nyamabuye Cell, Gatsata cell		
1	How are we going to know the value of our properties?	WASAC will hire an independent valuer who will agree with assets owner the compensation value.
2	When the project implementation will start so that we can plan for our agriculture activities?	It is anticipated that construction will start in 2019, but upon the completion of final design studies, farmers will be informed on construction schedule.
3	Will the project gives us the jobs or it will use machines?	Though some activities will require the use of machines, other works will be performed by people and affected people will be given priority.
4	What are the mechanisms that are you putting in place to ensure that local are provided with jobs?	First of all, locals will be provided with information on time but also during the preparation of construction contract WASAC shall emphasize the use of local resident in construction work where possible.
Consultative meeting in Nyabugogo Cell, Kigali Sector		
1	Sometimes the fees paid as compensation is not enough to buy another land. What are you planning to address this issue?	There will be compensation for land owners and Special attention will be taken on these who are going to lose government land. For the person who disagrees with the value assignment to his/her property appealing measures are provided.
2	When are we going to get results of your data collection?	This exercise is the initial identification of assets and PAPs and results will be included in RAP report which will be made public. However a final asset valuation will be conducted and every PAP will sign on the valuation form after verification of his attest and its value
3	Where beacons have been installed is the last limit of the land to be acquired?	Beacons were used for land survey and will be used for assets inventory.
5	Will farmers allowed to continue to use the land after pipe installation.	Yes, but the land will be used under conditions and no permanent structure may be allowed. Again above the pipe it's not allowed to conduct activities but all land in 9 m will not be required
7	What about the water point that may be affected?	The installation of water pipe will not affect the water r source because even the first pipe did not affected. However, the final design will consider the location of water source.

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9	One PAPs wanted to know the size of his land that will be taken.	All affected will be measures and communicated to land owners but in general 9m will be required during contraction for excavation but also access roads.
Consultative Nzove and Nyamweru Kanyinya sector		
1	Will our land be taken without compensation?	Private land will be compensated and care will be taken to the ones who will lose government land.
2.	What kind of compensation will you give us?	Compensation measures will be provided based on eligibility criteria and the nature of impact and the compensation may include land for land compensation or monetary compensation. Especially for crops and trees.
3	When shall the construction start?	The final date for construction is not yet fixed but construction works are expected to start in 2019. Farmers will be informed about construction schedule in due time.
4	I f one people has two plots in targeted area marshland will be counted two times?	If the land is for the same use and fall in the same category these areas are to be summed up in order to avoid double counting.
5	We cannot be against public interest, but what are the support are we going to receive from the government?	Compensation will be provided to the affected people and job opportunities will be provided during construction.
Consultative meeting at Ntora, Gisozi Sector		
1	We were living for our land. What do you think for us when the project starts?	Owners of private land will be compensated and their assets. These who live by government land in affected area will be considered for different supports and follow of their living conditions
2	If 9m will be required it's likely that some structures will be affected. If that is the case what are provisions?	The assets inventory will identify both land, crops, trees but also other structure that will be affected and adequate compensation will be provided in accordance with laws.
3	The land in Road reserve have been marked as government land but we have not received any compensation. What will happen to this portion of land when the project start.	The land law is clear any land to be transferred from private to public land should be compensated. What is required is to present ownership documents.

5.4.4. Meetings at draft stage

Upon the completion of socio-economic survey and assets inventory and the preparation of the first draft, another round of meetings were held. Meetings were held at sector level and at cells levels. The meeting at sector levels discussed both EIA and RAP while the meeting at cell levels focused on RAP. These meeting were attended by local authorities, projects affected Person and local communities. Meetings at sector level are presented in the EIA report while meeting at cell levels are presented in this RAP. These meeting focused essentially on results of assets inventory, type of impacts including loss of land, structures crops and trees, compensation measures and grievance redress mechanism (GRM). In each meeting and after the presentation of the consultant, participant were provided with time for questions and response were provided by both consultant, WASAC representative or local authorities. Key issues raised and responses are provided in the following table while list of attendance are presented in annex 18,19,20 and 21.

Table 35: Issues and responses provided in consultation meeting at drafting stage

Names	Issues	Response
Meeting in Gisozi, Ruhango cell, April 21, 2018		
	What will happen if someone is not happy with the compensation cost?	Grievance redress mechanism will be established and communicated to PAPs and the expropriation law provides mechanism by which the affected people can express his complaints including the recruitment of his own valuer.
	What will happen if crops that were identified in assets inventory are harvested before the final valuation?	The final valuation will be done on assets found on the land during valuation period. If crops are harvested before valuation, then there will be no impacts on these crops
	What will happen to people who have not received land title?	People are encouraged to request land titles because all land in Kigali and elsewhere in the country have been registered and the compensation

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		law requires land title or any other written documents issued by authority
Meeting at Kanyinya Sector, Nzove and Nyamweru Cell, April 24th, 2018		
	Some people have the trees and crops in government land. How they will be compensated?	Trees and crops on government will be compensated but the land is not compensated because in the government properties.
	Is there any special attention to vulnerable people?	Vulnerable people identified by project will be given priority in employment and special follow up during compensation process.
	What kind of compensation is provided for land?	The expropriation law provide both monetary and in kind compensation. However, due to the lack of free land in Kigali, the cash compensation is likely to be the only alternative.
Meeting In Kigali sector, Nyabugogo Cell, April 17, 2018		
	In the past we have seen some problems of compensation that comes after valuation and are either related to construction activities or consequence of poor water drainage. Is there any mechanism to address these issues?	If there is a new compensation issue that were not identified before or any issue that is caused by projects after construction, the resettlement committee will work with local Authority and WASAC to address the issue.
	When the construction works will start?	Construction works are expected to start in 2019 but people will be informed in due time
	-After assets inventory what are the next steps?	A final valuation will be done and compensation shall follow before and physical works
Meeting in Gatsata sector Nyamugali cell, April 20, 2018		
	What happen if people are not around during valuation?	If the land owner is not around during land valuation, the valuer carries out the valuation in the presence of local authorities.
	What will happen to people who have not received land title?	People are encouraged to request land titles because all land in Kigali and elsewhere in the country have been registered and the compensation law requires land title or any other written documents issued by authority
	What will happen to people who have not received land title?	People are encouraged to request land titles because all land in Kigali and elsewhere in the country have been registered and the compensation law requires land title or any other written documents issued by authority

Figure 32: Illustrative photos taken during public consultation meetings



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CHAPTER VI: IMPACT ASSESSMENT AND COMPENSATION MEASURES

The project of strengthening Nzove- Ntora Pipeline in Kigali City were designed in a way that avoid or minimize resettlement impacts. However some component of the project such as the installation of pipes and associated construction roads requires land whether temporally or permanently. The initial assessment has been completed and assets inventory results are available. This section assess the likely involuntary resettlement, projects affected households and proposes compensation measures.

6.1. Expected resettlement impacts

The field survey and public consultation revealed that Nzove-Ntora project will affected 84 households and 11 Corporation who have or use land in the project construction area. The expected resettlement impacts range from loss of shelter (two households), loss of structures such as fence, wall and concrete ground floor, loss of electrical poles, loss of land permanently or temporary, loss of perennial crops and trees. During the impact assessment and assets inventory, all Households to be affected were identified and in this identification, a surveying team identified each and every one and collected data on assets to be affected, size of the land owned or leased and the main usage of the land. This information helped the consultant to calculate the compensation package. Detailed results of this identification are presented in annexes.

6.1.1. Loss of private land

The installation of pipeline will involve land clearance in an area that can go up to 9m width where there is no construction roads. In some section such as Ntora, the excavation area have been reduced to 2m to avoid private structures such as wall and fences. The land will be lost presently or use under conditions where water pipe will be installed and maintenance area, 13m width maximum. The remaining land will be taken only during construction. The following table summarises the land that will be affected by the proposed projects.

Table 36: Permanent loss of land

District	Sector	Cell	Affected HHs	Number of plots affected	Size of land affected (m2)
Gasabo	Gatsata	Nyamabuye	6	5	157
		Nyamugari	8	7	445
	Gisozi	Ruhango	40	47	2,392
Nyarugenge	Kanyinya	Nyamweru	7	8	718
		Nzove	9	12	723
	Kigali	Nyabugogo	14	21	1,510
Grand Total			80	100	5,946

Table 37: Temporary loss of land

District	Sector	Cell	Affected HHs	Number of plots affected	Total size of land affected(m2)
Gasabo	Gatsata	Nyamabuye	6	6	327
		Nyamugari	8	10	1,797
	Gisozi	Ruhango	40	47	3,147
Nyarugenge	Kanyinya	Nyamweru	7	8	4,815
		Nzove	9	12	1,293
	Kigali	Nyabugogo	14	21	1,477
Grand Total			84	104	12,855

6.1.2. Loss of government lands

Article 19 of organic law on land use and land management states that swamp/marsh land belongs to the State. It shall not definitively be allocated to individuals and no person can use the ground of holding it for a long time to justify the definitive takeover of the land. However, it may be lent to a person based on agreement concluded between both parties. During the identification of project affected people, the field team identified farmers who are using government land in the project area and will be affected by

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the project in submerged area, borrow pits, disposal, buffer zone and at camp sites. These farmers are mostly growing rain fed crops including maize, sweet potatoes and some vegetables. Only crops and trees will be compensated.

6.1.3. Loss of crops and trees

The installation of water pipe Construction works entail clearing of the vegetation inherent in the project site which includes fruit trees, trees, grass and crops that have been planted and or cultivated by the farmers. According to both national regulations and international policies on environmental and social considerations requires the compensation of affected assets including trees and perennial crops. All trees and perennial crops were counted and valued. Below is the summary of trees and perennial crops likely to be affected. Provisional detailed list of project affected Households and their assets are presented at the end of the report as appendix 2.

Table 38: Affected trees and crops on private land

District	Sector	Cell	Affected HHs	Number/Area of trees/Crops	
				Pces	Area/ m2/ha
Gasabo	Gatsata	Nyamabuye	5	18	80.5
		Nyamugari	5	46	5.5
	Gisozi	Ruhango	22	278	1078.3
Nyarugenge	Kanyinya	Nyamweru	5	81	127.5
		Nzove	6	90	520
	Kigali	Nyabugogo	14	55	2596.5
Grand Total			57	569	4,408.3

Table 39: Affected trees on government land

District	Sector	Cell	Trees/Perennial Crops		Number/Area of trees/Crops	
					Pces	Area/ m²
Gasabo	Gatsata	Nyamabuye	Trees	Private owned	31	0
				Government	15	0
			Perennial crops		0	266
		Nyamugari	Trees	Government	10	0
	Gisozi	Ruhango	Trees	Government	109	0
Nyarugenge	Kanyinya	Nyamweru	Trees	Private owned	0	0
				Government	4	0
		Nzove		0	0	
	Kigali	Nyabugogo	Trees	Private owned	49	0
				Government	10	0
			Perennial crops		0	0
Grand Total					228	266

6.1.4. Loss of houses and structures

The design team has tried to avoid or minimize the physical relocation. However, the assets inventory show that two households will be relocated and other structures such as fences and concrete floor will be partially affected. The identified houses and structures are summarized in the next table.

Table 40: Houses and structures to be affected by projects

DISTRICT	SECTOR	CELL	Affected HHs	Number of Affected assets		
				Houses	Fence/Wall	Floor
Gasabo	Gatsata	Nyamabuye	0	0	0	0
		Nyamugari	0	0	0	0
	Gisozi	Ruhango	19	1	10	9
Nyarugenge	Kanyinya	Nyamweru	0	0	0	0
		Nzove	1	0	1	0
	Kigali	Nyabugogo	4	1	3	1
Grand Total			24	2	14	10

Source: BESST Ltd, 2018

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6.2. Eligibility criteria and entitlement matrix

6.2.1. Eligibility criteria

Defining eligibility criteria is essential in involuntary resettlement and compensation process. The census and assets inventory provide the basis for identification of PAPs and assets. According the national expropriation regulations, the person who owns land intended for public interest shall provide evidence to confirm that he or she possesses rights on that land and among the evidence to confirm ownership of the land, there shall be included:

- written evidence indicating that he or she purchased the land, received it as a donation or as a legacy or a successor;
- a document or a statement of local administrative entities indicating rights of the expropriated person on the land;
- a document or testimony of the neighbours; confirming the ownership of the land;
- a Court certificate (art 18 expropriation law);

Furthermore, Article 27: Properties valued during expropriation in the public interest defines the properties subject to valuation for the payment of fair compensation due to expropriation in the public interest are:

- land;
- activities carried out on land for its efficient management or rational use;
- Compensation for disruption caused by expropriation which is equal to 5% of total amount of compensation;

However, JICA guidelines for environmental and social considerations request the recipient country to consider international eligibility criteria including those provided by World Bank Policy OP 4.12 on involuntarily resettlement. The WB OP 4.12 also provides eligibility of benefits including the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets, and the PAPs who have no recognizable legal rights to the land they are occupying. The eligibility criteria used in this assessment are based on the three criteria given in clause 15 of the World Bank's Operational Policy 4.12: involuntary resettlement

- Those who have formal legal rights to land (including customary and traditional rights recognized under the laws of the country);
- Those who do not have formal legal rights to land at the time the census begins but have a claim to such land or assets – provided that such claims are recognized under the laws of the country or become recognized through a process identified in the resettlement plan;
- Those who have no recognizable legal rights or claim to the land they are occupying;

JICA requires recipient country to comply with JICA guidelines on environmental and social consideration and World Bank OP 4.12. Therefore the eligibility was determined in compliance with those guidelines together with national expropriation regulations and the PAPs that were considered as eligible for compensation include the following:

- Tenants leasing privately owned land;
- PAHs losing trees and crops located on private land,
- PAHs that are currently using government land that will be affected;
- PAHs that have structures in construction area,

6.2.2. Entitlement matrix

PAPs entitlement matrix is provided in table 41 below and it provides an indication of resettlement and measures for compensation and other supports to restore livelihoods impacted by the loss of land, crops

and other structures. It is important to pay special consideration to vulnerable people, for instance, giving them high priority in recruitment of labourers.

Table 41: Proposed entitlement matrix

Type of Loss	No HH	Quantity	Unit	Eligibility Criteria	Entitlement
1. Loss of Private Land					
1.1. Permanent loss of private Land	80	5,946	m2	Land owners where the proposed pipeline will be installed	Compensation in cash because the land to be affected is small and no free land available. Compensation for loss of land will be arranged based on the full replacement cost
1.2. Temporary Loss of Private Land (1) in construction road	84	12,855	m2	Land owners where the proposed pipeline and construction roads facilities will be constructed temporarily	People will be notified on time and the construction period should have shortened. Temporary loss of land results in the loss of income, and this is covered by compensation for loss of income.
2. Loss of Government Land					
2.1. Loss of government land	9 + 23	4,917	m2	Current users of affected land	No compensation required because it's government land and only small portion will be affected. Affected households should be allowed to use the land outside the pipeline area
3. Loss of assets in the private/government land					
3-1 Perennial crops and trees	57	241 4,158.7	Pies Are	Various rights and interest holders	Cash compensation based on the market value and 5% disturbance allowances per as expropriation law
3-2 Loss of houses	2	2	Unit	Land owner	Compensation of the house at replacement cost, based on the market value such as materials and labor cost
3-3 Loss of other structures	22	22	Unit	Various rights and interest holders	Compensation of the house at replacement cost based on the market value such as materials and labor cost
4. Loss of income					
4-1 Temporary loss of income for business	1	2	Weeks	Business owner in the projects construction area such as driving school	Disturbance allowances to be included in compensation of assets
4-2 Temporary loss of income for farmers	57			Current users of affected land	Cash compensation for one-year crop for one season and 5% disturbance allowances
4-3 Permanent loss of income (farmers)	2	2	HHs	HHs who will lose Farming income	Priority in employment during construction
5. Support for vulnerable people					
5-1 Vulnerable people	7	7	HHs	Households where the head of household is vulnerable	Priority in employment during construction

6.3. Assets valuation and compensation

6.3.1. Cut-off date

The cut-off date is the date on which assets inventory starts and for the Project the provisional date was fixed on February 1st, 2018 the date on which field survey started. This date was communicated to all potential PAPs in the project affected area with sufficient time for these people to ensure their availability for the census. To ensure all the stakeholders and PAPs are informed, WASCAC Ltd wrote officially to all sectors and the communication was handed to all village leaders and communicated to local communities during monthly community work..

However, this date is provisional and may be revised depending on the progress of the project and a new date will be required if the projects delayed too much. According to the expropriation law, the valuation of assets expires in 120 if the payment is done before this time. The establishment of a cut-off date is required to prevent opportunistic invasions/rush migration into the chosen land areas. Persons who encroach on the area after the cut-off date are not entitled to compensation. It should be noted that the

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cut-off date should be determined before the census is conducted and agreed by all the stakeholders especially the PAPs.

6.3.2. Assets valuation

The consultant has conducted initial assets inventory and has estimated the value of different assets and properties likely to be affected. However, upon the completion of final detailed design, WASAC should hire an independent valuer to carry out the final assets valuation. Reference made to the law n°17/2010 of 12/05/2010 establishing and organising the real property valuation profession in Rwanda, the valuation of land and property incorporated thereon shall be conducted by valuers certified by the Institute of Real Property Valuers in Rwanda (IRPVR).

The district and local authorities must inform the persons to be expropriated in the public interest of the expected start date of measurement of land and inventory of property incorporated thereon. The valuation of land and property incorporated thereon shall be conducted in the presence of land owner and that of the owner of property incorporated on land or their lawful representatives and in the presence of representatives of local administrative entities. The owner of land designated for expropriation in the public interest shall provide land titles and documentary evidence that he/she is the owner of property incorporated on land. He/she shall also provide a civil status certificate and a document evidencing his/her chosen matrimonial regime in case of a married person. However, a person dispossessed of land or unlawfully occupying land or having developed activities on land on which such activities are prohibited after the enactment of relevant laws shall receive no compensation. The properties subject to valuation for the payment of fair compensation due to expropriation in the public interest are:

- land;
- activities carried out on land for its efficient management or rational use;
- Compensation for disruption caused by expropriation. The new law has added 5% of total compensation fees for disturbance allowances.

Article 27 of valuation law allows the independent valuer to apply one or more valuation methods provided by this law or any other method accepted by the IRPVR Council. Valuation methods proposed by the law include:

- **Comparable prices methods** where by the proposed price for the affected property shall be close or equal to the market value. The valuer shall compare prices by referring to the prices recently assigned to a real property that is similar or comparable to the real property subject to valuation.
- **Comparison of land values countrywide as an alternative land valuation method:** Where comparable prices are not available for land in a particular area, the valuer may use comparable prices of similarly classified land from other areas of the country. Prices shall vary depending on the quality and location of the land. The valuer shall fulfil his/her valuation duties in compliance with principles and regulations governing the valuation profession and the Council.
- **Replacement cost approach as an alternative valuation method for improvements:** Where sufficient comparable prices are not available to determine the value of improved land, the replacement cost approach shall be used to determine the value of improvements to land by taking real property as a reference;
- **Use of multiple valuation methods** where real property valuation requires special skills, the valuer shall use whatever combination of the methods he/she considers best suited to determine the current market value. The methods used shall be clearly explained in the valuation report.

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- Upon approval by the council, a valuer may use any other relevant worldwide methods not provided in this Law in order to carry out the assigned work.

To comply with both national and international policies such as World Bank OP. 4.12 on involuntary resettlement and JICA guidelines on environmental and social considerations, the consultant recommend to use the replacement cost approach as an alternative valuation method. This method does not consider only the assets value but also administrative cost and other costs required to have a new assets or property.

6.3.3. Compensation

When the land owner or the owner of property incorporated on land is satisfied with the valuation, he/she shall sign or fingerprint the approved fair compensation reports. The deadline for signing or fingerprinting approved fair compensation reports may not be less than seven (7) days or more than twenty- one (21) days from the publication of the valuation report. Within seven (7) days after the approval of the valuation report by the expropriator, any person to be expropriated who is not satisfied with the assessed value of his/her land and property incorporated thereon shall indicate in writing grounds for his/her dissatisfaction with the valuation report. Any person contesting the assessed value shall, at his/her own expense, engage the services of a valuer or a valuation firm recognized by IRPVR to carry out a counter-assessment of the value. The counter-assessment report must be available within ten (10) days from the application for counter valuation by the person to be expropriated. Compensation can be paid in monetary form in the Rwandan currency or in any other form mutually agreed upon by the expropriator and the person to be expropriated. In reference to national laws, WB OP 4.12 and JICA guidelines for environmental and social consideration the consultant recommend the following compensation measures.

a) Compensation for land

Land for land compensation is desirable where feasible, however, it can be challenge for WASAC to find alternative lands for the persons to be expropriated, because district does not have enough free lands. Therefore, cash compensation based on the replacement cost may be provided if there is no free land available. The value should be based on the prevailing market value in the locality and in reference to other compensation done recently in the project area. In addition, any associated costs of purchasing the land including land rates, registration fees will need to be included in the compensation calculation. Where land lost is only a small proportion of total land owned by the PAP, but renders the remaining land as unusable, the compensation provided should be calculated based on the total land affected (the actual land lost plus the remaining unusable land). Disturbance allowances equivalent to 5% will be provided.

b) Compensation for crops and trees

PAPs will be encouraged to harvest their produce before the construction start for short term crops In order to ensure that this is possible, there needs to be sufficient consultation beforehand so that harvesting can be properly planned. In the event that crops cannot be harvested, compensation for loss of crops and trees including value of fruit trees will be provided as follows.

- Provision of cash compensation for value of crops lost, at current market value;
- Provision of seed or seedlings appropriate for the resettled areas;

The cash compensation will be equivalent to the value of crop production lost, until the replacements are yielding to the same level (i.e., the period until the replacement seed/seedlings are producing whether the same year for annual crops, or longer in the case of shrub or tree crops).

- For fruit trees that take longer to mature and yield and are seasonal, the cost of the yields for the period that the tree will take to mature should be calculated including future price.

c) Compensation for houses and other structures.

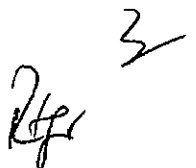
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One household will lose its house. during consultation the owner expressed the need to be compensated in cash. Therefore, a replacement cost should be calculated by the independent valuar and compensation provided prior any construction. the households should be also provided with the time to leave the house and take movable materials. This should be the case for other structures except the time for leaving the area.

Based on cost recently used in other projects under implementation in Kigali Such as Kigali-Gatuna Road, Rwanda Urban Development projects, the consultant has estimated the compensation cost for planning purposes but the assets valuation should be done in due time and paid prior in construction works.



CHAPTER VII: RAP IMPLEMENTATION ARRANGEMENTS

The overall coordination of the RAP implementation will be provided by the Ministry of Infrastructure through Water and Sanitation Corporation(WASAC Ltd). Other stakeholders that will be involved in the implementation of the RAP are described in detail below. The implementation arrangement builds on responsibilities already in place to ensure that the requirements of this RAP are met. At local level, Gasabo and Nyarugenge districts are responsible institution of RAP implementation while Kigali City ensures the proposed projects comply with Urban land use Master plan.

7.1. National level implementing institutions

7.1.1. Ministry of Infrastructures

Government of Rwanda represented by Ministry of Infrastructure and WASAC Ltd is responsible for land acquisition and hence responsible for RAP implementation. The RAP implementation will be done through Water and Sanitation Corporation(WASAC Ltd which is the main agency involved in implementation of the project of strengthening Nzove- Ntora Principal Pipeline. Ministry of Infrastructure will work together with Ministry of Finance to ensure that compensations funds are secured on time and compensation is made in due time.

7.1.2. Ministry of Land and Forestry/MINILAF

MINILAF governs the implementation and application of the organic land law and the Land Use Master Plan. While the Ministry deals with overall land policy and the alignment with these laws at the national level, responsibilities for their implementation locally has been devolved, following decentralization, to Rwanda Land Management and Use Authority (RLMUA) and district land bureau. MINILAF is the institution that has the authority to lease all land and resolve any dispute over land ownership. The ministry is also responsible for issuing authorization to use government and land titles. For this reason, MINILAF will play a critical role in ensuring that appropriate and consistent compensation is provided to all affected persons resulting from this project and provides data where there is grievance on land ownership and local authority fail to solve it.

7.1.3. Water and Sanitation Corporation Limited

WASAC Ltd is the technical institution responsible for the project on government side. Therefore, WASAC Ltd will be the leading institution in the implementation of the RAP. The role of WASAC Ltd will be to implement the RAP provisions including the recruitment of independent assets valuer, coordination of monitoring activities, building the capacity of other stakeholders in collection and analysis of monitoring data. WASAC Ltd has an environmental and social safeguard specialist and she will be the focal point for RAPs implementation and will liaise with other stakeholders. WASAC Ltd will also act as the central agency responsible for holding all information relevant to the RAP.

The designated staff will ensure that procedures and requirements of the Rwandan laws and JICA consideration on environment and social consideration are complied with. A key role will be to implement the RAP and other resettlement-related activities and to ensure that all procedures have been adhered to and that there is consistency in approach between sub-projects activities. She will also undertake the main monitoring and evaluation role of resettlement activities during and post implementation.

7.1.4. Rwanda Land Management and Use Authority/ RLMUA

RLMUA through its department of land management and use is the organ responsible for overall management and coordination of all activities related to land administration, land use planning and management in Rwanda. The role of RLMUA in RAP process will be to advise on matters related to land

ownership and expropriation. District land bureau in close collaboration with project staff will check and approve valuation forms, various maps and approve land surveys carried out during valuation exercise. After compensation RLMUA will also participate in the process of transferring land titles as appropriate.

7.2. Implementation arrangement at district level

The direct implementation of RAP is done at district level and different key player are presented below.

7.2.1. Nyarugenge and Gasabo district

Reference made to the section 3.6 of land law, the District Land Bureau (DLB) is a district based institution authorized by law to manage land. The DLB will be responsible for ensuring activities undertaken comply with the national and district level Land Use Master Plans. They will assess the validity of land tenure rights of affected persons and eventually provide the land use permit for the new activity proposed by the sub-project. In addition to that, they will be responsible for ensuring effective grievance mechanisms are in place. They will also be used in the implementation of RAP as much as possible in order to ensure that community buy in is present at an early stage hence reducing disputed or grievances. Their activities will be monitored by the district Executive Committee.

The DLB will play a major role in RAP implementation by:

- Monitor and approve activities pertaining to valuation of land and other immovable property;
- Demarcate and approve land cadastral;
- Establishing project level resettlement and compensation committees at Site and district levels;
- Clarifying the policies and operational guidelines of these resettlement and compensation;
- Establishing standards for unit rates of affected assets and compensation estimates, according to the standard units appended to the RAP, adjusted for local conditions where necessary; and
- Coordinating and supervising implementation of A-RAP provisions;

The land Bureau will be supported with land office at sector level and community development officer at cell level.

7.2.2. District Resettlement and Compensation Committee

WASAC will work closely with Gasabo and Nyarugenge district in the implementation of this RAP. A team that includes District Community Development Officer, a Civil Engineer, District Land Bureau officer, and Environmental specialist WASAC, Executive secretaries of affected sectors and PAPs representatives will be responsible for resettlement and ensure that the RAP is properly applied.

7.2.3. Resettlement and compensation committees

Due to linear nature of this projects, each sector will put in place a resettlement committee for the sole purpose of RAP implementation arrangements, and will operate at sector level. It is proposed to be supported technically by in charge of land and settlement at sector level and community development officer at cell level. The committee would comprise the following:

- Representative from sectors
- Representative of cells that are affected
- Representative from any other key sector office involved in the project;
- Two representatives of PAP by cells (equal gender representation).

The Resettlement and Compensation Committee would have responsibility for:

- Verifying PAPs documentation;
- Validate inventories of PAPs and valuation of affected assets;
- Allocate land, where required, to permanently PAPs;
- Monitor the disbursement of funds;

- Facilitate conflict resolution and addressing grievances; and
- To ensure the support and assistance to vulnerable groups including disable, orphans, and the old persons among others.

This committee should meet on a regular basis (as determined by the needs of the project) to ensure that compensation activities are appropriately designed and executed.

7.2.4. Project Affected Persons

This group of people will also help identify community affected by the projects, be present during final valuation and participate in complaints resolutions.

Table 42: Summary of institutional responsibilities for RAP implementation

Institutions	Responsibilities
WASAC Ltd	<ul style="list-style-type: none"> - Designate a social safeguard specialist(s) who will be the focal point for RAPs implementation and will liaise with other stakeholders. - Initiate the expropriation process and compensation requirements; - Preparation and signature of compensation grant agreement with the district; - To establish Resettlement and Compensation Committee in consultation with District Land Bureau; - Have a representation in District Resettlement and Compensation Committee - Provision of capacity building and technical support relating to expropriation and compensation activities; - Ensure funds allocated appropriately, according to RAP; - Prepare the RAP closure report and file all documentation related to RAP implementation; - Hire independent assets valuar upon the completion of final detailed design study.
MINILAF	<ul style="list-style-type: none"> - To ensure that the expropriation process is done in compliance with land policies, land law and expropriation law; - Ensure the RAP is within the context of national land use plan.
RLMUA	<ul style="list-style-type: none"> - To advise on matters related to land ownership and expropriation activities; - To participate in verification of land ownership and land titles.
Districts	<ul style="list-style-type: none"> - Verify land owners from records of land register; - Monitor and approve activities pertaining to valuation of land and other immovable property; - Approve land expropriated land surveys; - Coordinate the establishment of Resettlement Committees; - Work in collaboration with the Resettlement and Compensation Committees to ensure that the valuation and compensation is done in accordance with the law and the requirements of this RAP. - To facilitate the PAPs to purchase new land; - Facilitate the transfer of land titles after;
District Resettlement Committee	<ul style="list-style-type: none"> - Verifying PAPs - Validate inventories of PAPs and valuation affected assets; - Allocate land, where required, to permanently affected households; - Facilitate conflict resolution and addressing grievances.
Site resettlement Committee	<ul style="list-style-type: none"> - Help in creating awareness on expropriation process; - Monitor the implementation of expropriation closely with environment protection committees to monitor the use of marshlands and reserved areas; - Conflicts resolution; - Help in land demarcation confirm holders of land rights during land resettlement process, participate in the identification of community settlement sites, identify and list escheat land, and serve as witnesses in compensation and resettlement

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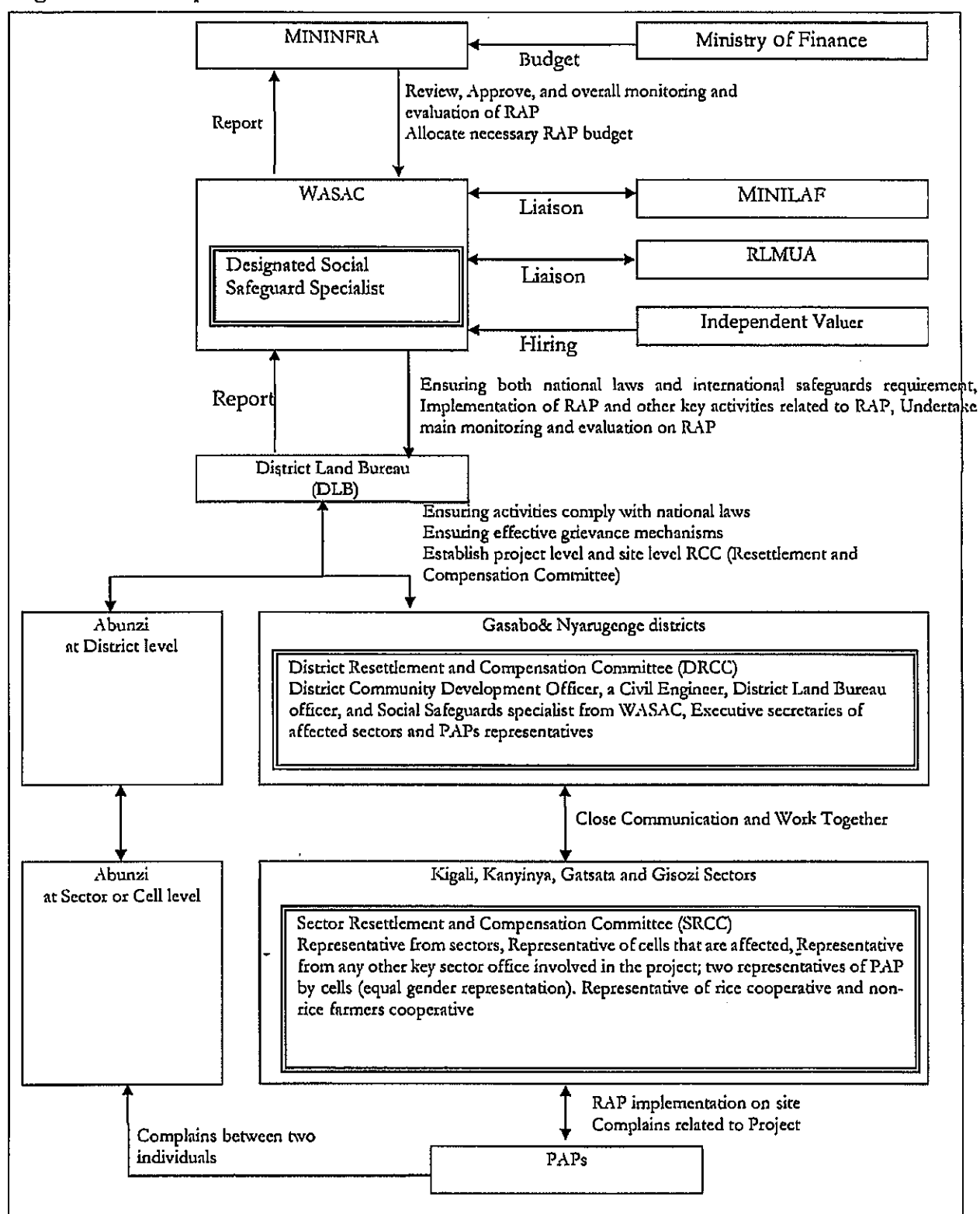
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Institutions	Responsibilities
Mediators/ Abunzi	<ul style="list-style-type: none"> - Resolving disputes - Provide grievances mechanism following land acquisition. - Help in designing RAP at the community level to ensure community buy in.
Project Affected Persons	<ul style="list-style-type: none"> - Be present when the land survey and inventory is being carried out - Provides all required information in regards to resettlement activities - Participate in expropriation activities

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Figure 33: RAP implementation flow



7.3. Grievance Redress Mechanism (GRM)

The district is an acknowledged institution for which the PAPs have been made aware of as avenues for expressing discontent and disapproval to the resettlement and compensation process. Article 26 of the expropriation law N0 18/2015 of 19/04/2015 provides complaints procedures for individuals dissatisfied with the value of their compensation. The law stipulates that dissatisfied persons have a period of 30 days

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after project approval decision has been taken to appeal (Article 19). Grievance procedures are required to ensure that PAPs are able to lodge complaints or concerns, without cost, and with the assurance of a timely and satisfactory resolution of the issue. The procedures also ensure that the entitlements are effectively transferred to the intended beneficiaries. Stakeholders will be informed of the intention to implement the grievance mechanism, and the procedure will be communicated at the time that the RAPs are finalized. Grievances may arise from members of communities who are dissatisfied with eligibility criteria use, community planning and actual implementation or compensation.

7.3.1. Process of grievance

The overall process of grievance is as follows:

1. During the initial stages of the valuation process, the affected persons will be given copies of grievance procedures as a guide on how to handle the grievances.
2. The process of grievance redress will start with registration of the grievances to be address for reference, and to enable progress updates of the cases.
3. The project will use a local mechanism, which includes resettlement committees, peers and local leaders of the affected people. These will ensure equity across cases, eliminate nuisance claims and satisfy legitimate claimants at low cost.
4. The response time will depend on the issue to be addressed but it should be addressed with efficiency.
5. Compensation will be paid to individual PAPs only after a written consent of the PAPs, including both husband and wife.

7.3.2. Procedure of grievance

The aggrieved person should file his/ her grievance, relating to any issue associated with the resettlement process or compensation, in writing to the sub-project Resettlement and Compensation Committee. The grievance note should be signed and dated by the aggrieved person. The designated WASAC officer and the Resettlement and Compensation Committee will consult to determine the validity of claims. If valid, the Committee will notify the complainant and s/he will be assisted. The Resettlement and Compensation Committee will respond within 7 days during which time any meetings and discussions to be held with the aggrieved person will be conducted. If the grievance relates to valuation of assets, a second or even a third valuation will be undertaken, until it is accepted by both parties. These should be undertaken by separate independent valuers than the person who carried out the initial valuation.

If the aggrieved person does not receive a response or is not satisfied with the outcome within the agreed time, she/he may lodge his/her grievance to the relevant local administration such as the District Land Bureau, also mandated to help resolve such matters. If requested, or deemed necessary by the subproject Committee, the District Project Coordination officer will assist the aggrieved person in this matter. The relevant Local Administration will then attempt to resolve the problem (through dialogue and negotiation) within 30 days of the complaint being lodged. If no agreement is reached at this stage, then the complaint is dealt with through the local courts (Abunzi) where possible. Where matters cannot be resolved through local routes, the grievance will be referred to higher authorities at the national level. The Resettlement and Compensation Committee will provide assistance at all stages to the aggrieved person to facilitate resolution of their complaint and ensure that the matter is addressed in the optimal way possible. If administrative ways of grievance redress is not enough to address the complaint, then the unsatisfied person may refer to judicial system. Based on the nature of complaints, the process will start from mediators for assets below 3 million Rwandan francs and if the value is more than three million, the process will start from intermediate courts, high court and to Supreme Court. The proposed grievance redress system is as illustrated follows:

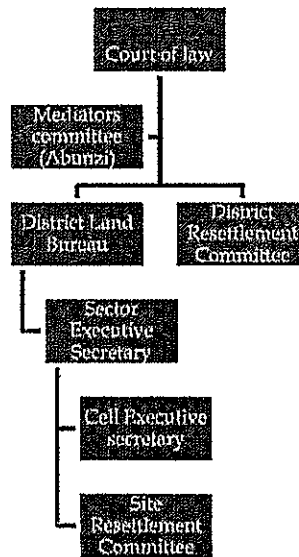


Figure 34: Proposed GRM flow chart

7.3.3. Grievance log

The District Land Bureau will ensure that each complaint has an individual reference number, and is appropriately tracked and recorded actions are completed. The log will contain record of the person responsible for an individual complaint, and records dates for the following events:

- Date the complaint was reported;
- Date the Grievance Log was added onto the project database;
- Date information on proposed corrective action sent to complainant (if appropriate);
- The date the complaint was closed out; and
- Date response was sent to complainant.
- Providing the resettlement and compensation committee with a weekly report detailing the number and status of complaints;
- Any outstanding issues to be addressed; and
- Monthly reports, including analysis of the type of complaints, levels of complaints, actions to reduce complaints and initiator of such action.

Table 43: RAP implementation schedule

Items \ Year	2018					2019												2020												2021									
Month accumulated	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
RAP preparation																																							
RAP Confirmation																																							
Final detailed design and tendering																																							
Confirmation of eligibility																																							
Final cut-off date																																							
Establishment of resettlement committee																																							
Final assets valuation and compensation agreement																																							
Compensation																																							
Construction																																							
Monitoring and grievance redress																																							
RAP closure report																																							

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7.5. Monitoring

The objective of the monitoring and evaluation process will be to determine whether PAPs have been paid in full and before implementation of the subproject, and people who were affected by the subproject have been affected in such a way that they are now living a higher standard than before, living at the same standard as before, or they are actually poorer than before. The arrangements for monitoring the compensation activities will fit into the overall monitoring program of the entire Nzove- Ntora Project, which will fall under the overall responsibility of the JICA and WASAC.

7.5.1. Monitoring indicators

A number of indicators would be used in order to determine the status of affected people (land being used compared to before, standard of house compared to before, level of participation in project activities compared to before, how many kids in school compared to before, health standards and so on). Therefore, the resettlement and compensation plans will set two major socio-economic goals by which to evaluate its success: Affected individuals, households, and communities are able to maintain their pre-project standard of living, and even improve on it; and the local communities remain supportive of the project. In terms of the resettlement process, the following indicators could be used to understand the success of the measures identified and the working of the relevant parties in implementation the RAP:

- Percentage of individuals selecting cash or a combination of cash and in-kind compensation;
- The number of contentious cases as a percentage of the total cases;
- The number of grievances and time and quality of resolution;
- Number of impacted locals employed by the civil works contractors; and
- General relations between the project and the local communities.

These will be determined through the following activities:

- Questionnaire data will be entered into a database for comparative analysis at all levels of local government;
- Each individual will have a compensation dossier recording his or her initial situation, all subsequent project use of assets/improvements, and compensation agreed upon and received.

The District authorities will maintain a complete database on every individual impacted by the sub-project land use requirements and compensation, land impacts or damages; and WASAC should prepare Resettlement Completion Reports for RAP, in addition to other regular monitoring reports.

The project Resettlement and Compensation Committee will facilitate coordination of information collation activities (such as surveys, supervising documentation) in accordance with procedures put in place. WASAC will provide training, technical support and funds to ensure that this happens. In order to assess whether these goals are met, the RAP will indicate parameters to be monitored, institute monitoring milestones and provide resources necessary to carry out the monitoring activities.

7.5.2. Monitoring of livelihood restoration

The purpose of socio-economic monitoring is to ensure that PAPs are compensated and recovering on time. A number of indicators will be used to determine the status of affected people and appropriate parameters and verifiable indicators will be used to measure the resettlement and compensation plans performance. As part of the preparation of RAP a baseline study was conducted this will provide baseline data against which to monitor the performance of the RAP.

7.5.3. Monitoring of RAP implementation

Local government authorities from district level will assist in compiling basic information from the project, and convey this information to RAB, on a quarterly basis.

They will compile the following statistics:

- Number of households and individuals physically or economically affected;
- Length of time from project identification to payment of compensation to PAPs;

- Timing of compensation in relation to commencement of physical works;
- Amount of compensation paid to each PAP household (if in cash), or the nature of compensation (if in kind);
- Number of people raising grievances in relation to project; and
- Number of resolved grievances.
- Number of unresolved grievances.

Table 44: Sample format for monitoring

Work	Planned in room	Progress in quantity	Progress in percentage
Identification of final PAPs			
Preparation of RAP			
Announcement to the affected people			
Cost estimation for expropriation			
Consultation meeting			
Revise of the RAP and signing based on the feedback at the consultation meeting			
Compensation in cash			
Compensation by land			
Social supports such as job training			
Number of unresolved grievances.			

WASAC will scrutinize these statistics in order to determine whether the compensation arrangement is done as planned in the RAP. The project team will alert WASAC, if there appears to be any discrepancies. Financial records will be maintained by the district land bureau to permit calculation of the final cost of resettlement and compensation per individual or household. The indicators that will be used to monitor implementation of the RAP include.

- Outstanding compensation cases;
- Grievances recognized as legitimate out of all complaints lodged;
- Grievance resolved and unresolved by levels

Financial records will be maintained by Project District officers and WASAC, to permit calculation of the final cost of resettlement and compensation per individual or household.

7.5.3. Record keeping

Each PAP household will be provided with a signed report recording his or her assets and compensation agreed upon and received. At the same time, before compensation all household heads representing the PAPs will be required to provide passport size photographs. The Local Authority and project management team will maintain a complete database on every individual impacted by the project land use requirements including compensation, land impacts or damages. Each recipient of compensation will have a record containing individual bio-data, number of household dependents and amount of land available to the individual or household when the report is opened. Additional information to be acquired for individuals eligible for resettlement and/or compensation include the level of income and of production, inventory of material assets and improvements in land and debts.

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CHAPTER VII: COST ESTIMATION FOR RAP IMPLEMENTATION

Based on the impacts described earlier, this section present the budget estimates according to the aforementioned valuation methodologies and unit value rates. The estimated budget for RAP is implementation summarized in the following table.

Table 45: Cost estimation for RAP implementation

No	Item description	HHs/Corporation	Unit	Quantity	Total Cost(frw)
1	Permanent loss of land	80	SQ	5,947	62,257,509
2	Loss of trees and crops	57	Pces Sqm	569 4408	6,914,742
3	Loss of houses & structures	2	House	2	62,834,470
		22	Structure	21	
4	Final valuation	-	Ls	1	20,010,000
		95			152,016,721

Table 46: Estimated monitoring cost

Activity	Indicator	Qty	Unit cost (FRW)	Total Cost (FRW)
Meeting for set up resettlement committees	Established committee	5	100,000	500,000
Follow up valuation and compensation process	Field report	7	360,000	2,520,000
Meetings for grievance redress	Meetings/grievance resolved	12	100,000	1,200,000
PAPs Livelihoods assessment	Assessment report	1	5,000,000	5,000,000
Total				9,220,000

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CHAPTER IX: RAP DISCLOSURE

JICA and other international policies on environmental and social safeguards require the implementing agency to disclose publicly the RAP. Therefore, WASAC will disclose this RAP by making copies available at its head office and at District and sector offices. The RAP will be disclosed to the WASAC Websites and the Government of Rwanda will also authorize JICA to disclose this RAP electronically.

A completion report of the entire resettlement/compensation process for this project will be prepared and will include a hand over certificate which will ostensibly provide a verification of when the compensation and assistance were undertaken and to whom these services were provided as well as to indicate that indeed all the compensation has been delivered. This report will be prepared and submitted to JICA months after the end of compensation payment by WASAC. The RAP implementation report should include (but not be limited to) the following information:

- Background of the RAP preparation including a description of the project activities, scope of impacts, number of affected persons, and estimate budget;
- Update of its implementation with actual numbers of displaced persons by segments; compensation paid, issues/complaints raised and solutions provided;
- Complaints status;
- Early assessment of the impacts of resettlement and compensation on affected categories at the time of the report production;
- Total sum disbursed;
- Lessons learned from the RAP implementation;

Suggested annexes:

- List of people affected as per the RAP report;
- List of people compensated during implementation;

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ANNEXES

Annex 1: List of affected structures

No	NAME/USER	DISTRICT	SECTOR	CELL	UPI	Total land	OWNER SHIP	Affected Land/Qty	Structures Nature	Materials	Unit	Qty	Unit cost	Total cost (RWF)
1		Nyarugenge	Kinyinya	Nzove	1/01/02/02/05/102	121886	Private	3536	Fence	Steel Frame	m2	12.5	10,000	125,000
2		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/1621	288	Private	116.5	House	Tree Trunk with mud and concrete	units	4	3,500,000	14,000,000
3		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3433	5694	Private	437	Fence	Concrete Block	m3	114	55,000	6,270,000
4		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3434	5507	Private	335	Storage 1 behind fence	Concrete Block	m3	7.5	55,000	412,500
5		Gasabo	Gisozi	Ruhango	1/02/04/02/685	571	Private	44	Storage 2 Tap Water	Steel Frame	Pces	1	8,000	8,000
6		Gasabo	Gisozi	Ruhango	1/02/04/02/1260	2307.11	Private	80	Fence	Cement Brick	m3	8.5	55,000	467,500
7		Gasabo	Gisozi	Ruhango	1/02/04/02/131	350	Private	30	Fence	Steel Frame	m2	182	10,000	1,820,000
8		Gasabo	Gisozi	Ruhango	1/02/04/02/4023	916	Private	15.46	Entrance	Steel Frame	m2	26	10,000	260,000
9		Gasabo	Gisozi	Ruhango	1/02/04/02/88	761	Private	24	Paves Floor	concrete	m2	17.4	55,000	957,000
10		Gasabo	Gisozi	Ruhango	1/02/04/02/89	729	Private	30	Paves Floor	concrete	m2	21.75	55,000	1,196,250
11		Gasabo	Gisozi	Ruhango	1/02/04/02/95	1914.65	private	60	Paves gate house foundation walls	Bricks+Grasse s	m3	106.7	45,000	4,801,500
12		Gasabo	Gisozi	Ruhango	1/02/04/02/274	1097.96	Private	18.7	Paves Floor	concrete	m2	43.5	55,000	2,392,500
13		Gasabo	Gisozi	Ruhango	1/02/04/02/90	1000	Private	40	Paves Floor	concrete and stones	m3	12.6	55,000	693,000
14		Gasabo	Gisozi	Ruhango	1/02/04/02/272	313.85	Private	11	concrete base	concrete and stones	m3	12.87	45,000	579,150
15		Gasabo	Gisozi	Ruhango	1/02/04/02/253	1192.48	Private	15.58	Fence wall	metal and glass	Pces	1	90,000	90,000
16		Gasabo	Gisozi	Ruhango	1/02/04/02/252	2173.63	Private	30.38	Paves Floor	metallic sheet	m2	24.75	50,000	1,237,500
17		Gasabo	Gisozi	Ruhango	1/02/04/02/251	563.5	Private	30	Paves Floor	Ciment	m2	5.4	51,000	275,400
18		Gasabo	Gisozi	Ruhango	1/02/04/02/250	1625.4	Private	20	Fence wall	Stones	m2	19.5	55,000	1,072,500
										Bricks	m2	18.7	55,000	1,028,500
										concrete	m2	29	55,000	1,595,000
										concrete and stones	m3	7.7	55,000	423,500
										concrete and stones	m3	7.7	55,000	423,500
										Concrete blocks	m3	8.7	70,000	609,000
										Concrete	m2	30.38	55,000	1,670,900
										Metal	m2	78	10,000	780,000
										concrete	m2	30	55,000	1,650,000
										concrete blocks	m2	103	30,000	3,090,000

No	NAME/User	DISTRICT	SECTOR	CELL	UPI	Total land	OWNER SHIP	Affected Land/Qty	Structures Nature	Materials	Unit	Qty	Unit cost	Total cost(RV/R)
19		Gasabo	Gisozi	Ruhango	1/02/04/02/201	1743.74	Private	19.904	Paves Floor	concrete	m2	19.404	55000	1067220
20		Gasabo	Gisozi	Ruhango	1/02/04/02/662	162	Private	5.585	Stairs	concrete	m2	4.565	55000	251075
21		Gasabo	Gisozi	Ruhango	1/02/04/02/664	368	Private	8.5	Stairs	Concrete	m2	8.5	55000	467500
22		Gasabo	Gisozi	Ruhango	1/02/04/02/2972	410	Private	30	Basement stairs windows + protective screen Door Partial House wall	Cement and stones metallic metallic mud bricks	m3 m2 pces m3	1.5 1.2 1 14.3	55000 45000 90000 55000	82500 54000 90000 785500
23		Nyanugenge	Kigali	Nyabugogo	1/01/03/03/3435		Gov							
24		Gasabo	Gisozi	Ruhango	1/02/04/02/94		Gov							
Total														6283470

Annex 2: List of affected crops and trees

No	NAME/User	ID	District	Sector	CELL	Village	UPI	Total Land	Ownership	Affected Land (Sam)	Affected Trees & Local Name	Unit	Unit cost	Total cost(RV)	
1		101374021	Nyarugenge	Kinyinya	Nzove	Ruyenzi	1/01/02/02/5102	1,218	Private	353.6	Papaya	Pces	4	2000	8000
2		119798000103000	Nyarugenge	Kinyinya	Nzove	Ruyenzi	1/01/02/02/5182	1,2406	Private	420	Banana	Pces	2	3500	7000
3			Nyarugenge	Kigali	Nyabugogo	Kamenge	1/01/03/03/3420	5797	Gov	3,251	Sugar Cane	are	7	50000	350000
4											Urubingo	are	3.2	1000	3150
5											Sugar Cane	are	3.5	50000	175000
6		119627000032713	Nyarugenge	Kigali	Nyabugogo	Kamenge	1/01/03/03/1621	288	Private	116.5	Ipera	Pces	2	24000	48000
7			Nyarugenge	Kigali	Nyabugogo	Kamenge	1/01/03/03/3489	370	Gov	370	Flowers tree	m	4	500	2000
			Nyarugenge	Kigali	Nyabugogo	Kamenge	1/01/03/03/3128	292	Gov	270.5	Urubingo	are	2.5	1000	2500
8		119648000460105	Nyarugenge	Kigali	Nyabugogo	Kamenge	1/01/03/03/3432	6208	Gov	75	Urubingo	are	0.75	1000	750
9		1196680006343260	Nyarugenge	Kigali	Nyabugogo	Kamenge	1/01/03/03/2132	433	Private	66	Cypres	Pces	2	2000	4000
			Nyarugenge	Kigali	Nyabugogo	Kamenge	1/01/03/03/2129	465	Private	75	Urubingo	are	1.3	1000	1250
		Nyarugenge	Kigali	Nyabugogo	Nyabugogo	1/01/03/03/2301	960.26	Gov	52.5	Umunyinya	Pces	2	8000	16000	
10	119678002055110	Nyarugenge	Kigali	Nyabugogo	Nyabugogo	1/01/03/03/3433	5694	Private	437	Umugano	Pces	1	3000	3000	
11			Kigali			1/01/03/03/3434	5507	Private	335	Garden	m2	241	200	48200	

	1196270005079040	Nyarugen ge	Kigali	Nyabugogo	Giticyinyoni	1/01/03/03/3235	5226.76	Gov	224	Umukondo	Pces	2	9'000	18'000
		Nyarugen ge	Kigali	Nyabugogo	Giticyinyoni	1/01/03/03/1693	287	Private	84	Umusave	Pces	3	6'000	24'000
12	1196780004891010	Nyarugen ge	Kigali	Nyabugogo	Giticyinyoni	1/01/03/03/1692	269	Private	84	Umusave	Pces	13	3'000	39'000
13	119838001008060	Nyarugen ge	Kigali	Nyabugogo	Giticyinyoni	1/01/03/03/3422	46025	Gov	3512	Vegetables	Pces	2	6'000	8'000
		Nyarugen ge								Imihari	m	10	2'200	22'000
										Indimu	Pces	1	4'000	4'000
										Papaya	Pces	1	3'000	3'000
										Banana	Pces	30	4'000	120'000
										Bobere	Pces	1	1'100	1'100
										umugano	Pces	5	3'000	15'000
14	1195870000215060	Nyarugen ge	Kigali	Nyabugogo	Giticyinyoni	1/01/03/03/3452	1326	Private	13.5	Sugar Cane	are	0.6	50'000	297'500
15	1195770000206070	Nyarugen ge	Kigali	Nyabugogo	Giticyinyoni	1/01/03/03/2619	1121	Private	140	Mango	Pces	1	5'000	5'000
										Imiyenzi	Pces	1	3'000	3'000
										Banana	Pces	17	4'000	68'000
16	119637000280070	Nyarugen ge	Kanyinya	Nzove	Rutagara I	1/01/02/02/4780	645	Private	184	Avocat	Pces	2	15'000	30'000
17	1195070000072090	Nyarugen ge	Kanyinya	Nzove	Rutagara I	1/01/02/02/4803	1171	Private	122.5	Banana	Pces	1	3'000	3'000
18	1195880002168050	Nyarugen ge	Kanyinya	Nzove	Rutagara I	1/01/02/02/4432	1501	Private	52.5	Banana	Pces	10	10'000	100'000
						1/01/02/02/4815	5225.2	Private	160	Urubungo	are	2.8	1'000	2'800
19	1196080001239010	Nyarugen ge	Kanyinya	Nzove	Rutagara I	1/01/02/02/4415	3331	Private	120	Urubungo	are	2.4	1'000	2'400
20	1197980004613090	Nyarugen ge	Kanyinya	Nyamweru	Bwimo	1/01/02/01/3359	5505	Private	927.5	Banana	Pces	3	4'000	12'000
21	1196270000607120	Nyarugen ge	Kanyinya	Nyamweru	Bwimo	1/01/02/01/3361	2565.28	Private	350	Umusave	Pces	2	3'000	6'000
										Banana	Pces	1	4'000	4'000
		Nyarugen ge	Kanyinya	Nyamweru	Bwimo	1/01/02/01/2603	223.99	Gov	17.5	Banana	Pces	1	4'000	4'000
										Umusave	Pces	2	3'000	6'000
		Nyarugen ge	Kanyinya	Nyamweru	Bwimo	1/01/02/01/2595	447.32		70	Mango	Pces	1	5'000	5'000
										Banana	Pces	3	4'000	12'000
										Umukondo	Pces	2	9'000	18'000
22	1196780001018030	Nyarugen ge	Kanyinya	Nyamweru	Bwimo	1/01/02/01/3296	501.31	Private	29.75	Banana	Pces	3	4'000	12'000
23	1194070001283040	Nyarugen ge	Kanyinya	Nyamweru	Bwimo	1/01/02/01/2593	1001.758	Private	79	umugano	Pces	1	3'000	3'000
										Banana	Pces	1	4'000	4'000

STATE_O2_ID_CARD_NO	Nyarugen ge	Kanyiny a	Nyamweru	Bwimo	1/01/02/01/2586	2648.33	Gov	80.5	Cypres	3	Pces	1	2,000	2,000
1198380007514080	Gasabo	Gatsala	Nyamabuye	Galare	1/01/02/01/3357	7188.83		378	Umusave Banana	2	Pces	1	3,000	3,000
	Gasabo	Gatsala	Nyamabuye	Rubonobo	1/02/02/02/2097	35564.26	Gov	1200	Sugar Cane Urubingo	1	are	0.5	50,000	26,250
									Bamboo	10	Pces	10	3,000	30,000
									Imisave	3	Pces	4	4,000	16,000
									Banana	5	Pces	10	10,000	100,000
1198380007514080	Gasabo	Gatsala	Nyamabuye	Agakomeye	1/02/02/02/2088	666.35	Private	66.5	Grevellia	10	Pces	1	6,000	6,000
	Gasabo	Gatsala	Nyamabuye	Runyonza & Nyakabande	1/02/02/02/2085	11112.27	Gov	1064	Urubingo		are	0.7	1,000	700
									Bamboo	10	Pces	1	3,000	3,000
									Cypres	5	Pces	19	2,000	38,000
									Papaya	5	Pces	3	3,000	9,000
									Umusave	3	Pces	6	4,000	24,000
									Banana	1	Pces	1	4,000	4,000
									Sugar Cane	1	are	1.26	50,000	63,000
1196780001713020	Gasabo	Gatsala	Nyamabuye	Runyonza	1/02/02/02/1893	894.24	Private	259	Bamboo	10	Pces	3	3,000	9,000
									Umusave	5	Pces	3	4,000	12,000
									Cypres	5	Pces	5	2,000	10,000
									Sugar Cane	1	are	0.8	50,000	40,250
									Avocat	10	Pces	2	15,000	30,000
1197470003854050	Gasabo	Gatsala	Nyamabuye	Nyakabande	1/02/02/02/297	650	Private	87.5	Banana	1	Pces	1	4,000	4,000
	Gasabo	Gatsala	Nyamabuye	Nyakabande	1/02/02/02/280	1859.76	Gov	416	Flower Tree		Pces	2	100	200
1195580001977170	Gasabo	Gatsala	Nyamabuye	Kibaya	1/02/02/02/282	316.9	Private	47	Umunyinya	10	Pces	10	6,000	60,000
1196080001495070	Gasabo	Gatsala	Nyamabuye	Kibaya	1/02/02/02/2091	663.52	Private	22	Grevellia	2	Pces	2	800	1,600
	Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/02/03/151	1233.5	Gov	272		10	Pces	1	4,000	4,000
	Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/02/03/150	1350.86	Gov	101.5						0
	Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/02/03/152	3128.5	Gov	560	Grevellia	10	Pces	4	4,000	16,000
	Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/02/03/153	1027.46	Gov	168						0
	Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/02/03/160	1829.3	Gov	224	Grevellia	5	Pces	2	2,000	4,000
	Gasabo	Gatsala	Nyamugari	Akarubimbu	1-2/02/03/161	1770.24	Gov	240	Grevellia	10	Pces	1	4,000	4,000
	Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/02/03/162	1904.24	Gov	312	Grevellia	10	Pces	1	4,000	4,000
	Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/02/03/167	728.54	Gov	144	Grevellia	20	Pces	1	6,000	6,000
11962800018708010	Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/02/03/1532	10800	Private	344	Flowers		m2	5.5	200	1,100
									Avocat	10	Pces	7	15,000	15,000
									Grevellia		Pces	3	3,000	28,000

31	1198570175969060	Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/04/02/1538	2780	Private	304	Imiyenzi Ipera	Pees	1	500	500
32		Gasabo	Gatsala	Nyamugari	Akarubimbu	1/02/04/02/1795	401273.5	Gov	904	Vegetables	are	1.6	81000	129600
33	1197780020811020													
34	1199180003300010													
35	1192170000023050	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1852	87	Private	80	Urubingo	are	0.8	11000	800
36	1195580000997160	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1853	990	Private	184.5	Urubingo	are	1.84	11000	1845
37	1195780001220010	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1854	1178.26	Private	263.7	Banana	are	2.1	11000	2085
38	1198080085880400	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1859	987.4	Private	132.7	Urubingo	are	1.8	11000	1845
39	1198580008542050	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1904	3143.7	Private	398.7	Grevellia	pce	4	24000	16000
40	1193180000187000	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1905	536.88	Private	101.2	Banana	group	43	10000	430000
41	1194270056460400	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1912	396.7	Private	101.5	Papayer	pce	1	3000	3000
42										Eucalyptus	pce	9	27000	27000
43	1196380081990600	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1913	62.39	Private	69.8	Urubingo	are	1.1	3000	3000
44	1197480043485000	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1914	155.08	Private	56.84	Imiyenzi (fence)	m	45	1000	45000
45	1195680005109180	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1924	3033.75	Private	270.7	Imiyenzi (fence)	m	10	1000	10000
46	1198580008734100	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1922	1324.22	Private	352.2	Imiyenzi (fence)	m	12	1000	12000
47	1195970001584050	Gasabo	Gisozi	Ruhango	Kanyinya	1/02/04/02/1962	62164.8	Gov	632	Banana	group	35	10000	350000
										Eucalyptus	pce	6	12000	72000
										Ipera	pce	1	4000	4000
										Banana	Pees	2	4000	8000
										Mango	Pees	1	5000	5000
										Eucalyptus	Pees	91	16000	146000
										Cypres	Pees	7	2000	14000
										Filao	Pees	8	1000	8000
										Eucalyptus	Pees	7	3000	21000
										Eucalyptus	Pees	3	3000	9000
										Grevellia	Pees	1	4000	4000

48	LD164992	Gasabo	Gisozi	Ruhango	Rukeri	Private	2140.46	1/02/04/02/1267	584	Mango	Pces	1	5000	5000
							3661	1/02/04/02/1255	702	Banana	Pces	8	4000	32000
										Eucalyptus	Pces	5	3000	15000
										Avocat	Pces	12	15000	180000
										Grevellia	Pces	11	6000	66000
49	119728000405501	Gasabo	Gisozi	Ruhango	Umurava	Private	965.37	1/02/04/02/1709	184	Avocat	Pces	1	15000	15000
										Grevellia	Pces	3	4000	12000
										Mango	Pces	2	15000	10000
50	193770000256107	Gasabo	Gisozi	Ruhango	Umurava	Private	158.14	1/02/04/02/3026	38.5	Cypres	Pces	4	2000	8000
51	119748001072113	Gasabo	Gisozi	Ruhango	Umurava	Private	571	1/02/04/02/685	44	Flower Tree	Pces	10	200	2000
										Flower Tree	Pces	1	100	100
52	119458000019707	Gasabo	Gisozi	Ruhango	Umurava	Private	839	1/02/04/02/677	24	Mango	Pces	1	5000	5000
53	119538004996060	Gasabo	Gisozi	Ruhango	Umurava	Private	3217	1/02/04/02/2868	120	Mango	Pces	1	5000	5000
54	119818001928204	Gasabo	Gisozi	Ruhango	Ntora	Private	729	1/02/04/02/89	30	Cypres	Pces	2	3000	6000
										Umukindo	Pces	1	9000	9000
55	119618005338206	Gasabo	Gisozi	Ruhango	Ntora	Private	1914.65	1/02/04/02/95	60	Umukindo	Pces	5	9000	45000
56	119708000332710	Gasabo	Gisozi	Ruhango	Ntora	Private	563.5	1/02/04/02/251	40	Cypres	Pces	2	9000	18000
57	119628000250001	Gasabo	Gisozi	Ruhango	Ntora	Private	2173.63	1/02/04/02/252	100	Umukindo	Pces	5	9000	45000
total														3691474

Annex 3: List of affected land including government owned land plots

No	HH	NAME/User	DISTRICT	SECTOR	CELL	UPI	Total land	OWNER SHIP	Affected Land/Qty	Land to be lost permanently	Unit cost	Unit	Total Cost(RWF)
1	C-		Nyarugenge	Kinyinya	Nzove	1/01/02/02/5102	121886	Private	3536	36	m2	2000	72000
2	C4268		Nyarugenge	Kinyinya	Nzove	1/01/02/02/4268	925	Private	164.5	54.8	m2	2000	109667
3	5182		Nyarugenge	Kinyinya	Nzove	1/01/02/02/2638	7153	Private	7	7	m2	2000	14000
4	4806		Nyarugenge	Kinyinya	Nzove	1/01/02/02/5182	12406	Private	420	38	m2	2000	76000
5	-		Nyarugenge	Kigali	Nyabugogo	1/01/02/02/4827	3970	Private	224	74.7	m2	2000	149333
6	-		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3420	42768	Gov	815				
7	-		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3420	5797.2	Gov	3251.5				
8	1621		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3249	84.31	Gov	31				
9	27		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/1621	288	Private	116.5	288	m2	4500	1286000
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3489	370	Private	370	370	m2	4500	1665000
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3128	292.34	Gov	270.5				
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3432	6208.15	Gov	75				
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3248	167.43	Gov	25.5				
10	2133		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2133	288	Private	43.5	43	m2	4500	193500
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3493	332	Private	43.5	43	m2	4500	193500
11	2132		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2132	433	Private	66	30	m2	4500	135000

No	HH	NAME/USER	DISTRICT	SECTOR	CELL	UPI	Total land	OWNER SHIP	Affected Land/Qty	Land to be lost permanently	Unit	Unit cost	Total Cost(RWF)
12	2131	[REDACTED]	Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3423	21512	Private	91.5	55	m2	4500	247,500
13	2130		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2131	279	Private	42	6	m2	4500	27,000
14	2129		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3521	71	Private	42	6	m2	4500	27,000
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3477	517	Private	30	30	m2	4500	135,000
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2130	202	Private	30	30	m2	4500	135,000
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2129	465	Private	75	39	m2	4500	175,500
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3430	7839	Private	75	39	m2	4500	175,500
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2048	330	Gov	55.5				
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3443	2804.1	Gov	54				
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2046	924.46	Gov	177				
15	3428	[REDACTED]	Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3429	7906	Gov	177				
16	C3433		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2045	496.43	Gov	118.5				
17	3434		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3427	10937	Gov	120				
18	-		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2308	620	Private	276.5	92.2	m2	4500	2414,750
19	1692		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3428	10585	Private	20	20	m2	4500	90,000
20	-		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/2301	980.26	Gov	52.5				
21	2619		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3435	5320.9	Gov	315				
22	-		Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3433	5994	Private	437	146	m2	4500	555,500
23	4790		Nyarugenge	Kanyinya	Nzove	1/01/02/02/4790	5507	Private	335	111.7	m2	4500	502,500
24	4803		Nyarugenge	Kanyinya	Nzove	1/01/02/02/4803	5226.76	Gov	224				
25	4816	[REDACTED]	Nyarugenge	Kanyinya	Nzove	1/01/02/02/4790	287	Private	84	28	m2	4500	126,000
26	-		Nyarugenge	Kanyinya	Nzove	1/01/02/02/4803	269	Private	84	48	m2	4500	216,000
27	4801		Nyarugenge	Kanyinya	Nzove	1/01/02/02/4801	46925.74	Gov	2526				
28	-		Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/3359	1326	Private	13.5	13.5	m2	4500	60,750
29	3360		Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/3360	1121	Private	140	47	m2	4500	210,000
30	3361		Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/3361	449	Private	77	25.7	m2	4500	115,500
31	3296		Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/2603	545	Private	184	61	m2	2000	122,667
32	2593		Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/2593	1171	Private	122.5	40.8	m2	2000	81,667
33	2592		Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/2592	1301	Private	52.5	16.5	m2	2000	33,000
			Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/2586	919.7	Gov	49				
		[REDACTED]	Nyarugenge	Kanyinya	Nzove	1/01/02/02/4816	5225.2	Private	160	124	m2	2000	248,000
			Nyarugenge	Kanyinya	Nzove	1/01/02/02/4415	3331	Private	120	84	m2	2000	168,000
			Nyarugenge	Kanyinya	Nzove	1/01/02/02/4927	6972	Private	455	151.7	m2	2000	303,333
			Nyarugenge	Kanyinya	Nzove	1/01/02/02/4801	230	Private	87.5	29.17	m2	2000	58,333
			Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/3359	5505	Private	927.5	309.2	m2	10000	3,091,667
			Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/3360	487.64	Private	175	58.3	m2	10000	583,333
			Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/3361	2565.28	Private	350	116.7	m2	10000	1,167,667
			Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/2603	223.59	Gov	17.5				
			Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/2595	447.32	Private	70	34	m2	10000	340,000
			Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/3296	501.31	Private	29.75	29	m2	10000	290,000
			Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/2593	1001.758	Private	79	43	m2	10000	430,000
		[REDACTED]	Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/2592	361.89	Private	7	7	m2	10000	70,000
			Nyarugenge	Kanyinya	Nyamweru	1/01/02/01/2586	2648.33	Gov	80.5				

No	IHS	NAME/USER	DISTRICT	SECTOR	CELL	UPI	Total land	OWNER SHIP	Affected Land/Qty	Land to be lost permanently	Unit	Unit cost	Total Cost(RWF)
34	C0		Nyarugenge Gasabo	Kanyinya Gatsala	Nyamwetu Nyamabuye	1/01/02/01/3357 1/02/02/02/2097	7188.83 35564.26	Private Gov	378 1200	126	m2	100000	11260000
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3424	18029.42	Gov	2768				
			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3431	7805.83	Gov	1528				
			Nyarugenge	Kimisagara	Kimisagara	1/01/04/03/2349	3153.4	Gov	280				
35	2088		Gasabo	Gatsala	Nyamabuye	1/02/02/02/2088	666.35	Private	66.5	30.5	m2	100000	3050000
			Gasabo	Gatsala	Nyamabuye	1/02/02/02/2095	11112.27	Gov	1064				
36	-		Gasabo	Gatsala	Nyamabuye	1/02/02/02/1883	894.24	Private	259	86.3	m2	100000	863333
37	-		Gasabo	Gatsala	Nyamabuye	1/02/02/02/1875	11.25	Private	2	2	m2	100000	200000
38	297		Gasabo	Gatsala	Nyamabuye	1/02/02/02/297	650	Private	87.5				
			Gasabo	Gatsala	Nyamabuye	1/02/02/02/280	1859.76	Gov	416				
39	-		Gasabo	Gatsala	Nyamabuye	1/02/02/02/282	316.9	Private	47	16	m2	100000	156667
40	-		Gasabo	Gatsala	Nyamabuye	1/02/02/02/2091	663.52	Private	22	22	m2	100000	220000
			Gasabo	Gatsala	Nyamugari	1/02/02/03/151	1233.5	Private	272	90.7	m2	7500	680000
			Gasabo	Gatsala	Nyamugari	1/02/02/03/150	1350.86	Private	101.5	33.8	m2	7500	253750
			Gasabo	Gatsala	Nyamugari	1/02/02/03/152	3128.5	Gov	560				
			Gasabo	Gatsala	Nyamugari	1/02/02/03/153	1027.46	Gov	168				
41	-		Gasabo	Gatsala	Nyamugari	1/02/02/03/156	1900	Private	336				
			Gasabo	Gatsala	Nyamugari	1/02/02/03/158	1122.3	Gov	160				
42	-		Gasabo	Gatsala	Nyamugari	1/02/02/03/159	1404	Private	216				
			Gasabo	Gatsala	Nyamugari	1/02/02/03/160	1829.3	Gov	224				
			Gasabo	Gatsala	Nyamugari	1/2/02/03/161	1770.24	Gov	240				
			Gasabo	Gatsala	Nyamugari	1/02/02/03/162	1904.24	Gov	312				
			Gasabo	Gatsala	Nyamugari	1/02/02/03/163	48.7	Gov	28				
			Gasabo	Gatsala	Nyamugari	1/02/02/03/164	1037.73	Gov	208				
			Gasabo	Gatsala	Nyamugari	1/02/02/03/165	621.11	Gov	80.5				
43	-		Gasabo	Gatsala	Nyamugari	1/02/02/03/166	2404	Private	336				
			Gasabo	Gatsala	Nyamugari	1/02/02/03/167	728.54	Gov	144				
44	-		Gasabo	Gatsala	Nyamugari	1/02/02/03/1762	749	Private	176	58.7	m2	7500	440000
45	-		Gasabo	Gatsala	Nyamugari	1/02/02/03/1761	273	Private	112	37.3	m2	7500	280000
46	-		Gasabo	Gatsala	Nyamugari	1/02/02/03/1760	400	Private	44	8	m2	7500	60000
			Gasabo	Gatsala	Nyamugari	1/02/02/03/170	297	Gov	176	58.7	m2	7500	860000
47	-		Gasabo	Gatsala	Nyamugari	1/02/02/03/1532	10800	Private	344	114.7	m2	7500	860000
48	-		Gasabo	Gatsala	Nyamugari	1/02/02/03/1538	2780	Private	304	101.3	m2	7500	760000

No	HP	NAME/USE	DISTRICT	SECTOR	GENL	UPI	Total land	OWNER SHIP	Affected Land/Qty	Land to be lost permanently	Unit	Unit cost	Total Cost(RWF)
			Gasabo	Gatsala	Nyamugari	1/02/02/03/1794	58911.28	Gov	1632				
49	19		Gasabo	Gisozi	Ruhango	1/02/02/03/1795	401273.5	Gov	800		m2		
50	20		Gasabo	Gisozi	Ruhango			Gov	180		m2		
51	21		Gasabo	Gisozi	Ruhango			Gov	160		m2		
52	22		Gasabo	Gisozi	Ruhango			Gov	112		m2		
53	24		Gasabo	Gisozi	Ruhango			Gov	112		m2		
54	-		Gasabo	Gisozi	Ruhango	1/02/04/02/3477	467461	Private	30	30	m2	17500	525000
55	3185		Gasabo	Gisozi	Ruhango	1/02/04/02/3185	87	Private	80	44	m2	17500	720000
			Gasabo	Gisozi	Ruhango	1/02/04/02/1852	2839	Private	319.5	28	m2	17500	490000
56	3533		Gasabo	Gisozi	Ruhango	1/02/04/02/3533	1740	Private	160	53.3	m2	17500	933333
57	1853		Gasabo	Gisozi	Ruhango	1/02/04/02/1853	990	Private	184.5	61.5	m2	17500	1076250
						1/02/04/02/1918	657	Private	208.49	69.5	m2	17500	1216192
58	1854		Gasabo	Gisozi	Ruhango	1/02/04/02/1854	1178.26	Private	269.7	87.9	m2	17500	1538250
59	1859		Gasabo	Gisozi	Ruhango	1/02/04/02/1859	987.4	Private	132.75	96.75	m2	17500	169325
60	1904		Gasabo	Gisozi	Ruhango	1/02/04/02/1904	3143.7	Private	398.7	132.9	m2	17500	2325750
61	1905		Gasabo	Gisozi	Ruhango	1/02/04/02/1905	536.86	Private	101.25	33.75	m2	17500	590625
62	1912		Gasabo	Gisozi	Ruhango	1/02/04/02/1912	396.7	Private	101.5	33.8	m2	17500	592083
						1/02/04/02/1913	62.39	Private	69.8	23.3	m2	17500	407467
63	1914		Gasabo	Gisozi	Ruhango	1/02/04/02/1914	155.08	Private	56.84	20.84	m2	17500	384700
						1/02/04/02/1920	2899.67	Gov	206.5		m2	17500	1008817
64	1919		Gasabo	Gisozi	Ruhango	1/02/04/02/1919	503.37	Private	172.94	57.6	m2	17500	2054517
65	1922		Gasabo	Gisozi	Ruhango	1/02/04/02/1922	1324.22	Private	352.22	117.41	m2	17500	2054517
66	1923		Gasabo	Gisozi	Ruhango	1/02/04/02/1923	1877.85	Private	40	13.3	m2	17500	233333
						1/02/04/02/1924	3033.75	Private	270.72	90.24	m2	17500	1579200
67	1260		Gasabo	Gisozi	Ruhango	1/02/04/02/1260	2307.11	Private	80	44	m2	17500	770000
68	1261		Gasabo	Gisozi	Ruhango	1/02/04/02/1261	1085.22	Private	264	86	m2	17500	1154000
						1/02/04/02/1265	1228.48	Gov	336.96				
69	-		Gasabo	Gisozi	Ruhango	1/02/04/02/1249	1104	Private	225	150	m2	17500	2625000
70	1266		Gasabo	Gisozi	Ruhango	1/02/04/02/1266	459.83	Private	200	66.7	m2	17500	1166567
71	-		Gasabo	Gisozi	Ruhango	1/02/04/02/1267	2140.46	Private	584	54	m2	17500	945000
						1/02/04/02/1255		Private	706	460	m2	17500	8050000
72	685		Gasabo	Gisozi	Ruhango	1/02/04/02/685	571	Private	22	22	m2	17500	385000
73	677		Gasabo	Gisozi	Ruhango	1/02/04/02/677	839	Private	24	24	m2	17500	420000
74	131		Gasabo	Gisozi	Ruhango	1/02/04/02/131	350	Private	30	30	m2	17500	525000
75	4223		Gasabo	Gisozi	Ruhango	1/02/04/02/4223	916	Private	14	14	m2	17500	245000
76	88		Gasabo	Gisozi	Ruhango	1/02/04/02/88	761	Private	24	24	m2	17500	420000
77	89		Gasabo	Gisozi	Ruhango	1/02/04/02/89	729	Private	30	30	m2	17500	525000
78	90		Gasabo	Gisozi	Ruhango	1/02/04/02/273	342.23	Private	37.4	37.4	m2	17500	654500
						1/02/04/02/90	1000	Private	40	40	m2	17500	700000
			Gasabo	Gisozi	Ruhango	1/02/04/02/94	308.62	Gov	24		m2		

No	HH	NAME (User)	DISTRICT	SECTOR	CELL	UPI	Total land	OWNER SHIP	Affected Land/Qty	Land to be lost permanently	Unit	Unit Cost	Total Cost (RWf)
79	95		Gasabo	Gisozi	Ruhango	1/02/04/02/95	1914.66	Private	24	24	m2	17,500	420,000
80	274		Gasabo	Gisozi	Ruhango	1/02/04/02/274	1097.96	Private	14	14	m2	17,500	245,000
81	272		Gasabo	Gisozi	Ruhango	1/02/04/02/272	313.85	Private	11	11	m2	17,500	192,500
						1/02/04/02/275	5712.58	Private	40	40	m2	17,500	700,000
82	253		Gasabo	Gisozi	Ruhango	1/02/04/02/253	1192.48	Private	15.5	15.5	m2	17,500	272,650
			Gasabo	Gisozi	Ruhango	1/02/04/02/252	2173.63	Private	33.3	33.3	m2	17,500	583,333
83	C252												
84	251		Gasabo	Gisozi	Ruhango	1/02/04/02/251	583.5	Private	19.9	19.9	m2	17,500	348,250
86	250		Gasabo	Gisozi	Ruhango	1/02/04/02/250	1625.4	Private	20	20	m2	17,500	350,000
			Gasabo	Gisozi	Ruhango	1/02/04/02/201	1743.74	Private	19.9	19.9	m2	17,500	348,250
86	C201												
87	C-		Gasabo	Gisozi	Ruhango	1/02/04/02/203	136	Private	11	11	m2	17,500	192,500
88	C200		Gasabo	Gisozi	Ruhango	1/02/04/02/200	23921	Private	36	36	m2	17,500	630,000
			Gasabo	Gisozi	Ruhango	1/02/04/02/202	2459.63	Private	25	25	m2	17,500	437,500
89													
90	3026		Gasabo	Gisozi	Ruhango	1/02/04/02/3026	158.14	Private	2	2	m2	17,500	35,000
91	-		Gasabo	Gisozi	Ruhango	1/02/04/02/662	162	Private	5.5	5.5	m2	17,500	96,250
92	-		Gasabo	Gisozi	Ruhango	1/02/04/02/664	368	Private	8.5	8.5	m2	17,500	148,750
93	-		Gasabo	Gisozi	Ruhango	1/02/04/02/2972	410	Private	30	30	m2	17,500	525,000
94			Nyarugenge	Kigali	Nyabugogo	1/01/03/03/3435		Gov					
95			Gasabo	Gisozi	Ruhango	1/02/04/02/94		Gov					
Total									40.493				62257509

*: Since the project affected area accounts for more than 20% of the premises, whole the areas of the premises become the target of land expropriation.

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Annex 4: Assets inventory form



WASAC
Water & Sanitation Corporation

Umushinga /Project : Strengthening of Nzove Ntora Principal Pipeline In Kigali city

Form title:/izina rya fishe:

mu karere ka (valuation of assets affected in district of).....

Amazina ya nyiri umutungo/Owner :..... Nimero ya telefone/Phone Number..... Nimero y'indangamuntu/Id Number Nimero ya konti/Account Number..... Izina rya banki/name of the bank..... Akarere/DistrictUmurenge/Sector..... Akagali(cell):.....Umudugudu/Village:..... ..					Byemejwe n'Akarere ka/Approved by the District Names:..... Signature & Stamp		Amazina n'umukono ry'umugenagaciro wemewe/Names and signature of certified valuer Names:..... Signature & Stamp:	
No	Affected area	Location	Umutungo wangiye/ Affected assets	Igipimo /Unit	Ingano/ Quantity	Imyaka /Year	Igicro cya kimwe/ unit cost	Igicro cya byose Total cost
1								
2								
.								
.								
IGITERANYO CYA BYOSE/ GENERAL TOTAL								
Amazina n'umukono bya nyiri umutungo/Names and Signature of owner			Amazina n'umukono by'Umuyobozi w'Akagali/Names and signature of executive secretary of cell		Amazina n'umukono by'Umukozi w'umurenge ushinze imitungo/ Names and signature of sector agronomist or in charge of land and resettlement		Izina n'umukono by'Umunyamabanga Nshingwabikorwa w'Umurenge/ Names and signature of Sector Executive Secretary	

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Annex 5: Sample grievance redresses form

Grievance Form		
Grievance Number		Copies to forward to:
Name of the recorder		(Original) Receiver Party
District/ Sector/Cell		(Copy)- Responsible Party
Date		
INFORMATION ABOUT GRIEVANCE		
Define The Grievance		
INFORMATION ABOUT THE COMPLAINANT		Forms of Receive
Name-Surname		Phone line
Address		Community/Information meetings
Village/ Cell		Mail
Sector/ District		Informal
Signature of Complainant		Other

Details of Grievance

6.Incidents Regarding Expropriation and Compensation (Specify)	7.Resettlement Process (specify)	8.Employment and recruitment (Specify)	9.Construction workers and Community Relations - Nuisance from dust - Nuisance from noise - Vibrations due to explosions - Misconduct of the project personal/worker - Complaint follow up Other	10.Other (specify)
--	----------------------------------	--	---	--------------------

Grievances Close Out Form

Grievance Number:.....

Define immediate action required:.....

Define long term action required (if necessary).....

Verification of corrective action and sign off

Corrective action taken	Due date

Responsible party

Notes: This part will be filled in and signed by the complainant when he/she receives the compensation or file is closed out

Complainant:.....
 Name and Signature.....
 Date
 Representative of Responsible Party
 Title, Name and Signature.....
 Date:.....

Annex 6: Consulted people at central and district level

No	Institution	Contact person	Position	Contact
1			Environmental Inspector	
2			In charge of Water Quality	
3			In Charge of Planning	
4			Land Survey & GIS	
5			Environmental Officer	
6			Land Management Team Leader	
7			Environmental Officer	

Annex 7: People consulted at sector and cell level

No	Institution	Contact person	Position	Contact
1			Land & Infrastructure Officer	
2			In charge of development of Umurava village	
3			Ubudehe President	
4			In charge of communication and training in Ntora village	
5			Leader of village in Gisozi Sector	
6			In charge of development in Kanyinya village	
7			SEDO/Masezero	
8			In charge of social affaires	
9			C/O In charge of development	
10			Leader of Rukeli village	
11			Executive Secretary	
12			Executive secretary of Nyabugogo cell	
13			Executive secretary of Nzove cell	
14			Executive secretary of Sector	
15			Executive secretary of Nyamweru cell	
16			Executive secretary/ Nyamabuye cell	
17			SEDO/Nyamugali cell	
18			Executive secretary of Sector	
19			Executive Secretary of Sector	
20			Executive Secretary/ Ruhango cell	

Annex 8: Participants to the scoping meeting Kanyinya sector, January 16th, 2018

No	Names	Institution/cell	Position/profession	Contact
1		Nyamweru	Photograph	
2		Nyamweru	Farmer	
3		Nyamweru	Farmer	
4		Nyamweru	Farmer	
5		Nyamweru	Farmer	
6		Nyamweru	Farmer	
7		Nyamweru	Farmer	
8		Nyamweru	Farmer	
9		Nyamweru	Trader	
10		Nyamweru	Trader	
11		Nyamweru	Motorcycle conductor	
12		Nyamweru	Farmer	
13		Nyamweru	Village representative	
14		Nyamweru	Housewife	
15		Nyamweru	Housewife	
16		Nyamweru	Trader	
17		Nyamweru	Housewife	
18		Nyamweru	Housewife	
19		Nyamweru	Housewife	
20		Nyamweru	Trader	
21		Nyamweru	Socio development	
22		Nyamweru	Security in village	
23		Nyamweru	Security in village	
24		Nyamweru	Housewife	
25		Nyamweru	Trader	
26		Nyamweru	Trader	
27		Nyamweru	-	
28		Nyamweru	Farmer	
29		Nyamweru	Farmer	
30		Nyamweru	Housewife	
31		Nyamweru	Farmer	
32		Nyamweru	Constructor	
33		Nyamweru	Farmer	
34		Nyamweru	Farmer	
35		Nyamweru	Commercial	

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36		Nyamweru	Tailoring	
37		Nyamweru	Farmer	
38		Nyamweru	Commercial	
39		Nyamweru	Farmer	
40		Nyamweru	Farmer	
41		Nyamweru	Agricultural	
41		Nyamweru	Agricultural	
43		Nyamweru	Tailoring	
44		Nyamweru	-	
45		Nyamweru	Broker	
46		Nyamweru	Broker	
47		Nyamweru	Taxi Moto	
48		Nyamweru	Housewife	
49		Nyamweru	Housewife	
50		Nyamweru	Housewife	
51		Nyamweru	Farmer	
52		Nyamweru	Commercial	
53		Nyamweru	Farmer	
54		Nyamweru	Executive Secretary	
55		WASAC	Planning	

Annex 9: Participant to the scoping meeting in Gatsata sector, January 9th, 2018

N0	Names	Institution/cell	Position/Profession	Contact
1		Nyamabuye	Technician	
2		Nyamabuye	House wife	
3		Nyamabuye	Security	
4		Nyamabuye	House wife	
5		Nyamabuye	Commercial	
6		Nyamabuye	House wife	
7		Nyamabuye	Commercial	
8		Nyamabuye	House wife	
9		Nyamabuye	chef of village	
10		Nyamabuye	Commercial	
11		Nyamabuye	Film player	
12		Nyakabande	Security	
13		Nyakabande	-	
14		Nyakabande	Commercial	
15		Nyakabande	-	
16		Nyakabande	Commercial	
17		Nyakabande	Commercial	
18		Nyakabande	House wife	
19		Nyakabande	House wife	
20		Nyakabande	Security	
21		Nyakabande	Commercial	
22		Nyamabuye	Technician	
23		Nyamabuye	Commercial	
24		Nyakabande	Technician	
25		Nyamabuye	House wife	
26		Nyakabande	-	
27		Nyakabande	Cell communication	
28		Nyakabande	-	
29		Nyamabuye	-	
30		Nyamabuye	-	
31		Nyakabande	Commercial	
32		Nyakabande	Commercial	
33		Nyamabuye	Umwunzi	
34		Runyonza	Umujyanama	
35		Nyakabande	-	
36		Kibaya	Social affairs	
37		Nyakabande	House wife	
38		Nyamabuye	-	
39		Nyamabuye	-	
40		Nyamabuye	-	
41		Nyamabuye	-	
42		Nyamabuye	Commercial	

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43		Kanunga	-	
44		Nyamabuye	Commercial	
45		Nyamabuye	Farmer	
46		Nyamabuye	-	
47		Nyamabuye	Commercial	
48		Nyamabuye	Commercial	
49		Nyamabuye	-	

Annex 10: Participants to the scoping meeting with leaders in Gisozi sector , January 18th, 2018

No	Names	Institution/cell	Position/Profession	Contact
1		Gisozi sector	Land and infrastructure officer	
2.		Gisozi sector	In charge of development in Murava village	
3.		Gisozi sector	Executive secretary of Musezero	
4.		Gisozi sector	Communication and training officer at Ntora	
5.		Gisozi sector	Chef of village	
6.		Gisozi sector	Ubudehe President	
7.		Gisozi sector	Development in Kanyinya village	
8.		Gisozi sector	SEDO/MASESERO	
9.		Gisozi sector	Social affairs officer	
10.		Gisozi sector	C/O Development	
11.		Gisozi sector	Chef of Rukeri village	
12.		BESST LTD	Consultant	
13.		BESST LTD	GIS	
14.		BESST LTD	EIA	
15.		WASAC	Planning	

Annex 11: Participants to scoping meeting with local community in Gisozi, February 27, 2018

No	Names	Telephone
1		
2		
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Annex 12: Participants to the scoping meeting Kigali Sector, Nyabugogo cell, January 9th, 2018

No.	Names	Institution/cell	Profession/Position	Contact
1		Nyabugogo	E/S	
2		Nyabugogo	Pension	
3		Nyabugogo	commercial	
4		Gatare	commercial	
5		Nyabugogo	Farmer	
6		Kamenge	Village leader	
7		Nyabugogo	Farmer	
8		Kamenge	Farmer	
9		Kamenge		
10		Kamenge		
11		Kamenge		
12		Nyabugogo		
13		Nyabugogo		
14		Nyabugogo		
15		Kamenge		
16		Kamenge		
17		Kamenge		
18		Kamenge		
19		Kamenge		
20		Kamenge		
21		Nyabugogo	Farmer	
22		Nyabugogo	Farmer	
23		Nyabugogo	V&C	
24		Kamenge	Farmer	
25		Kamenge	Plumber	
26		Kamenge	Farmer	
27		Kamenge	Farmer	
28		Kamenge	Farmer	
29		Kamenge	Farmer	
30		Kamenge	Farmer	
31		Kamenge	Farmer	
32		Kamenge	Farmer	
33		Kamenge	Farmer	
34		Nyabugogo	Farmer	
35		Kamenge	Farmer	
36		Nyabugogo	Trader	
37		Nyabugogo	Farmer	
38		WASAC	Planning	

Annex 13: Participants the meeting before survey in Ruhango cell, Feb.5th 2018

No	Names	Cell	Village	Contact
1		Ruhango	Umurava	
2		Ruhango	Umurava	
3		Ruhango	Umurava	
4		Ruhango	Umurava	

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5		Ruhango	Umurava	
6		Ruhango	Umurava	
7		Ruhango	Umurava	
8		Ruhango	Rukeri	
9		Ruhango	Umurava	
10		Ruhango	Umurava	
11		Ruhango	Umurava	
12		Ruhango	Umurava	
13		Ruhango	Kanyinya	
14		Ruhango	Kanyinya	
15		Ruhango	Kanyinya	
16		Ruhango	Kanyinya	
17		Ruhango	Kanyinya	
18		Ruhango	Kanyinya	
19		Ruhango	Kanyinya	
20		Ruhango	Kanyinya	
21		Ruhango	Kanyinya	
22		Ruhango	Kanyinya	
23		Ruhango	Kanyinya	
24		Ruhango	Rukeri	
24		Ruhango	Rukeri	
26		Ruhango	Umurava	
27		Ruhango	Kanyinya	
30		Ruhango	Ntora	
31		Ruhango	Ntora	
32		Ruhango	Ntora	
33		Ruhango	Ntora	
34		Ruhango	Ntora	
35		Ruhango	Ntora	
36		Ruhango	Ntora	
37		Ruhango	Ntora	
38		Ruhango	Ntora	
39		Ruhango	Trinity Nursery and Primary School	
40		Ruhango	Ntora	
41		Ruhango	Ntora	
42		Ruhango	Umurava	
43		Ruhango	Ntora	
44		Ruhango	Umurava	
45		Ruhango	Ntora	

Annex 14: Participants to the meeting before survey in Nyabugogo Cell, February 6th 2018

No	Names	Cell	Village	Contact
1		Nyabugogo	Kamenge	
2		Nyabugogo	Kamenge	
3		Nyabugogo	K amenge	
4		Nyabugogo	Kamenge	
5		Nyabugogo	Kamenge	
6		Nyabugogo	Kamenge	
7		Nyabugogo	Kamenge	
8		Nyabugogo	Gitikinyoni	
9		Nyabugogo	Gitikinyoni	
10		Nyabugogo	Gitikinyoni	
11		Nyabugogo	Gitikinyoni	
12		Nyabugogo	Gitikinyoni	

Annex 15: Participants the meeting before survey in Nzove cell, February 7th 2018

No	Names	Cell	Village	Phone
1		Nzove	Rutagara I	
2		Nzove	Rutagara I	
3		Nzove	Ruyenzi	
4		Nzove	Rutagara I	
5		Nzove	Rutagara I	
6		Nzove	Rutagara I	
7		Nzove	Rutagara I	

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8		Nzove	Ruyenzi	
9		Nzove	Ruyenzi	

Annex 16: Participants the meeting before survey in Nyamweru& Nyamabuye cell,9th 2018

No	Names	Cell	Village	Contact
1		Nyamweru	Bwimo	
2		Nyamweru	Bwimo	
3		Nyamweru	Bwimo	
4		Nyamweru	Bwimo	
5		Nyamabuye	Agakomeye	
6		Nyamabuye	Nyakabande	
7		Nyamabuye	Agakomeye	
8		Nyamabuye	Nyakabande	
9		Nyamabuye	Agakomeye	
10		Nyamabuye	Nyakabande	
11		Nyamabuye	Agakomeye	
12		Nyamabuye	Nyakabande	
13		Nyamabuye	Agakomeye	
14		Nyamabuye	Nyakabande	
15		Nyamabuye	Agakomeye	
16		Nyamabuye	Nyakabande	
17		Nyamabuye	Agakomeye	
18		Nyamabuye	Nyakabande	

Annex 17: Participants the meeting before survey in Nyamugali cell, February 14th 2018

1		Gatsata	Nyamugari	
2		Gatsata	Nyamugari	
3		Gatsata	Nyamugari	
4		Gatsata	Nyamugari	
5		Gatsata	Nyamugari	
6		Gatsata	Nyamugari	
7		Gatsata	Nyamugari	
8		Gatsata	Nyamugari	
9		Gatsata	Nyamugari	
10		Gatsata	Nyamugari	
11		Gatsata	Nyamugari	
12		Gatsata	Nyamugari	
13		Gatsata	Nyamugari	
14		Gatsata	Nyamugari	
15		Gatsata	Nyamugari	
16		Gatsata	Nyamugari	

Annex 18: List of presence for meeting in Gisozi sector, Ruhango Cell at drafting stage

No	Names	Cell	Contact
1.		Ruhango	
2.		Ruhango	
3.		Ruhango	
4.		Ruhango	
5.		Ruhango	
6.		Ruhango	
7.		Ruhango	
8.		Ruhango	
9.		Ruhango	
10.		Ruhango	
11.		Ruhango	
12.		Ruhango	
13.		Ruhango	
14.		Ruhango	
15.		Ruhango	
16.		Ruhango	
17.		Ruhango	
18.		Ruhango	
19.		Ruhango	
20.		Ruhango	
21.		Ruhango	
22.		Ruhango	

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23.		Ruhango	
24.		Ruhango	
25.		Ruhango	
26.		Ruhango	
27.		Ruhango	

Annex 19: List of presence for meeting in Kanyinya sector, in Nyamweru and Nzove cell.

N	NAMES	Position/Profession	SECTOR	CELL	CONTACT
1		Leader of Village	Kanyinya	Nyamweru	
2		Farmer	Kanyinya	Nyamweru	
3		Farmer	Kanyinya	Nyamweru	
4		commercial	Kanyinya	Nyamweru	
5		Farmer	Kanyinya	Nzove	
6		Farmer	Kanyinya	Nyamweru	
7		Farmer	Kanyinya	Nyamweru	
8		Self-employment	Kanyinya	Nyamweru	
9		Farmer	Kanyinya	Nyamweru	
10		Commercial	Kanyinya	Nyamweru	
11		Commercial	Kanyinya		
12		Farmer	Kanyinya	Nzove	
13		Driver	Kanyinya	Nyamweru	
14		Farmer	Kanyinya	Nyamweru	
15		Commercial	Kanyinya		
16		Farmer	Kanyinya		
17		Farmer	Kanyinya		
18		Commercial	Kanyinya		
19		Farmer	Kanyinya		
20		Farmer	Kanyinya		
21		Commercial	Kanyinya		
22		Farmer	Kanyinya		
23		Farmer	Kanyinya		
24		Farmer	Kanyinya		
25		Farmer	Kanyinya		
26		commercial	Kanyinya		
27		Commercial	Kanyinya		
28		Farmer	Kanyinya		
29		Farmer	Kanyinya		
30		Commercial	Kanyinya		
31		SEDO CELL	Kanyinya		

Annex 20: List of presence for meeting in Kigali sector, Nyabugogo Cell

N	NAMES	Position/Profession	Sector	Cell	Contact
1		Farmer	Kigali	Nyabugogo	
2		Farmer	Kigali	Nyabugogo	
3		Farmer	Kigali	Nyabugogo	
4		commercial	Kigali	Nyabugogo	
5		Farmer	Kigali	Nyabugogo	
6		Farmer	Kigali	Nyabugogo	
7		Farmer	Kigali	Nyabugogo	
8		Self-employment	Kigali	Nyabugogo	
9		Farmer	Kigali	Nyabugogo	
10		Commercial	Kigali	Nyabugogo	
11		Commercial	Kigali	Nyabugogo	
12		Farmer	Kigali	Nyabugogo	
13		Driver	Kigali	Nyabugogo	
14		Farmer	Kigali	Nyabugogo	
15		Farmer	Kigali	Nyabugogo	
16		Farmer	Kigali	Nyabugogo	
17		Commercial	Kigali	Nyabugogo	
18		Farmer	Kigali	Nyabugogo	
19		Commercial	Kigali	Nyabugogo	
20		Farmer	Kigali	Nyabugogo	
21		Farmer	Kigali	Nyabugogo	
22		Farmer	Kigali	Nyabugogo	
23		Leader Nyabugogo village	Kigali	Nyabugogo	

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24		Farmer	Kigali	Nyabugogo	
25		Farmer	Kigali	Nyabugogo	
26		Village Leader	Kigali	Nyabugogo	
27		Executive Secretary	Kigali	Nyabugogo	

Annex 21: List of presence for meeting in Gatsata sector, Nyamweru Cell, 20, 2018

No	Names	Institution/Cell	Profession	Contact
1.		Nyamweru	Wasac	
2.		Nyamweru	Chauffeur	
3.		Nyamweru	Commercial	
4.		Nyamweru	Commercial	
5.		Nyamweru	Commercial	
6.		Nyamweru	Agriculture	
7.		Nyamweru	Agriculture	
8.		Gatsata	Nyamugari	
9.		Gatsata	Nyamugari	
10.		Gatsata	Nyamugari	
11.		Gatsata	Nyamugari	
12.		Gatsata	Nyamugari	
13.		Gatsata	Nyamugari	
14.		Gatsata	Nyamugari	
15.		Gatsata	Nyamugari	

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Annex10 Proposed Monitoring Form

Environmental Management Plan

Proposed monitoring forms, based on Environmental Management and Monitoring Plan (EMMP) are shown below.

1. Response/Actions to Comments and Guidance from Government Authorities and the Public

Date:

Venue:

Organizations or Communities:

Monitoring Item	Monitoring Results during Report Period
Number and contents of formal comments made by the public	
Number and contents of responses from Government agencies	

2. Pollution

1) Surface Water Quality

Item	Unit	Down-stream	Main point	Up-stream	Country Standards	Standards for Contract	Referred National Standards*	Frequency
pH	-				-	6.5-8.5	RS 109 (discharged industrial wastewater)	Quarterly
Temperature	degree				-	<3	RS546 (Drinking water	
Turbidity	NTU				-	5	RS546 (Drinking water	
TSS	mg/l				-	50	RS 109 (discharged industrial wastewater)	
Oil					-	observed		

Sampling point: WQ16: Nyabugogo at Giticyinyoni on Nemba gauging station

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Result of the baseline survey and standards

	Unit	Down-stream	Main point	Up-stream	National permissible limit ¹	Reference national Standards
Temperature	°C	20.5	20.2	20.4	<3	RS 109 (discharged industrial wastewater)
pH	-	6.63	6.86	6.84	6.5-8.5	RS546 (Drinking water
Turbidity	NTU	723	702	688	5	RS546 (Drinking water
TSS	(mg/l)	282	280	276	50	RS 109 (discharged industrial wastewater)

Source: UR/College of Applied Science and Technology, Feb 2018

2) Noise and Vibrations

Item	Unit	Measured Value (mean)	Measured Value (Max)	Country Standards	Standards for Contract	Referred International Standards	Measurement Point	Frequency
Noise LAeq	dB(A)			60 (residential area) 65 (Industrial area)	60/65	85 (Japan)	Nzove WTP, Ntora Reservoir, 4 sections at the wetland, and steep slope	Quarterly
Vibrations	dB(A)			-	-	75 (Japan)	Nzove WTP, Ntora Reservoir, 4 sections at the wetland, and steep slope	Quarterly

Result of the baseline survey

Full name of the feature/area	Noise			Vibrations		
	Maximum dB(A)	Minimum dB(A)	Average dB(A)	Maximum (VdB)	Minimum (VdB)	Average (VdB)
	66.4	48.6	55.4	3.5	0.4	2.3
	64.7	42.5	51.6	2.3	0.2	1.8

Ambient noise standards in Rwanda

No.	Area	Time During Day (hours)	Limits, dB(a)
1.	Industrial Noise	07:00-21:00 21:00-07:00	60.0 55.0
2.	Neighborhood Noise	07:00-18:00 18:00-21:00 21:00-07:00	60.0 55.0 50.0

3) Waste (Construction waste)

Frequency: monthly

Date: Item: Waste Management

Mark: "✓" if management is done as required

Location	Exact location	Kind of waste	Volume of waste (m3)	Final disposal or reuse	Stored at designated place	Waste separation	Remark
WTP site	-						
Ntora reservoir	-						
Section 1							
Section 2							
Section 3							

¹ Rwanda does not have specific standards for surface water or ground water. Water assessment results were compared either with drink water (RS 546) or industrial wastewater discharge (RS 109).

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Location	Exact location	Kind of waste	Volume of waste (m3)	Final disposal or reuse	Stored at designated place	Waste separation	Remark
Section 4							
Steep slope							
Ruhango (residential area)							

4) Mitigation measures

Frequency: monthly

Date:

Mark: "✓" if mitigation measure is done

No	Item	Monitoring Site **	Exact Location of pipe installation work (Cell/Village)	Mitigation measure is done or not	Remarks
1	Check the conditions of vehicles (dust control)				
2	Watering (dust control)				
3	Covering truck load with a sheet (dust control)				
4	Using oil pan (soil pollution prevention)				
5	Installing fence at steep slope (soil erosion prevention)				
6					

** Monitoring site: Nzove WTP, Ntora Reservoir, 4 sections at the wetland, steep slope, Ruhango, and a Storage places

3. Natural Environment

1) Biota and ecosystems

Item	Monitoring Results during Report Period	Measures to be Taken	Frequency
Clearance activities (visual inspection)			Weekly
Management of top soil (visual inspection)			Weekly

2) Hydrological Situation

Item	Monitoring Results during Report Period	Measures to be Taken	Frequency
Impact of construction work on steep slope (visual inspection)	Soil erosion		Weekly

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4. Social Environment

1) Resettlement

Pre-Construction phase

Resettlement, Land expropriation, and compensation for assets and crops (monthly report)

	Planned Total	Unit	2019.2		2019.3		2019.4		2019.5		Expected completion date	Responsible organization
			Qty	%	Qty	%	Qty	%	Qty	%		
1.Preparation												
1-1 Employment of Individual Valuer	5	Times										WASAC
1-2 Designation of Social Safeguard Staff in WASAC	1	M/M										
1-3 Establish SRCC and DRCC Committee	5	Committee										
1-4 Training of officers involved for 1-3	1											WASAC
2.Update PAPs list and Final Asset Valuation												
2-1 Identification of final PAHs	93	HH										
2-2 Announcement to Affected people	3	Time										
2-3 Cost estimation for expropriation												
2-4 Consultation meeting times	10	Time										
2-5 PAHs sign agreement	93	HH										WASAC
3. Progress of resettlement												
3-1 Kanyinya												
3-2 Kigali	1	HH										
3-3 Gatsata												
3-4 Gisozi	1	HH										WASAC
4. Progress of land acquisition												
4-1 Kanyinya	8,511	m2										
4-2 Kigali	14,261	m2										
4-3 Gatsata	9,338	m2										
4-4 Gisozi	8,102	m2										
4-5 Kimisagara	280											WASAC
5.Progress of compensation in cash												

	Planned Total	Unit	2019.2		2019.3		2019.4		2019.5		Expected completion date	Responsible organization
			Qty	%	Qty	%	Qty	%	Qty	%		
5-1 Kanyinya	16	HH										
5-2 Kigali	18	HH										
5-3 Gatsata	19	HH										
5-4 Gisozi	40	HH										
6. Construction work job arrangement for some PAHs												Local authorities, WASAC
6-1 Kanyinya		HH										
6-2 Kigali		HH										
6-3 Gatsata		HH										
6-4 Gisozi		HH										
7. Complain and Grievance Redress Cases	N/A	Case										RCC
7-1 Solved cases		Case										
7-2 Unsolved cases		Case										

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Record of Complain and Grievance Management

No	Date	Complain and Grievance from PAPs	Solution / Result / Any actions to be taken

Consultation meetings

No	Date	Sector	Nos of Participants	Key agenda and result of discussion

RFF 2

During Construction

Social Economic Survey for Resettled Households (once in a half year for the first yea, once in a year for the second year)

1) Livelihood

Before Construction

Item	Monitoring Results during Report Period	Measures to be Taken	Frequency
Support for vulnerable groups			Monthly
Priority in Employment			Monthly
Other employment			Monthly

2) Safety Management (Health and Occupational Safety)

Safety and sanitation management plan

Pre-construction phase

	Safety and health management plan is submitted	Approved by the Consultant
Date		

Training programs

No	Date	Training	Agenda	Participant
1				
2				

During Construction
Safety management

Date:

No	item	Monitoring Site **	Exact Location of pipe installation work (Cell/Village)	Result	Remarks
1	Number of meetings organized since the previous monitoring				
2	Safety gear distribution (%)				
3	Keep records of accidents and injuries properly (Yes/No)				
4	Installation of fences, assignment of guards (Yes/No)				

** Monitoring site: Nzove WTP, Ntora Reservoir, 4 sections at the wetland, steep slope, and a Storage places

Record of Accidents

No	Date	Details of accidents	Solution/Result/Any actions to be taken

1) Other checklist

Date:

Mark: "✓" if mitigation measure is done

No	item	Monitoring Site **	Exact Location of pipe installation work (Cell/Village)	Mitigation measure is done or not	Remarks
1	Communities get the information on the construction schedule				
2	Communities know get the information of traffic management				
3	Installation of signboard				
4					

** Monitoring site: Nzove WTP, Ntora Reservoir, 4 sections at the wetland, steep slope, and a Storage places

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2) Record of Complaints

No	Date	Complains	Solution / Result / Any actions to be taken

24/3

資料 5.ソフトコンポーネント計画書

独立行政法人国際協力機構

ルワンダ共和国
キガリ市ンゾバーノトラ間
送水幹線強化計画

ソフトコンポーネント計画書

平成 30 年 8 月

(2018 年)

国際航業株式会社
株式会社 協和コンサルタンツ
横浜ウォーター 株式会社

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ソフトコンポーネント計画書

1. ソフトコンポーネントを計画する背景

「ルワンダ国キガリ市ンゾベ－ノトラ送水幹線強化計画」は、「ル」国の首都である、キガリ市において、ンゾベ－ノトラ送水幹線等の増強・改善を行うことにより、給水サービスのための基盤施設の整備を図り、送配水の効率化、安定化に寄与することを目的とするものである。協力対象事業は、ンゾベ浄水場の送水ポンプ設備の改善、ンゾベ－ノトラ送水幹線の増強、同送水幹線から分岐している配水管の付け替え、ノトラ配水池の改修である。

本プロジェクトが実施する送水幹線の増強により送水量が増加し、ノトラ配水池の流出管の再整備により、2槽から構成されるノトラ配水池の柔軟な運用が可能となる。ノトラ配水池2槽両方からカチル方面への配水、送水本管（Fawe Girls School 配水池方面）への配水、ノトラ配水池周辺への配水を可能にすることでノトラ配水池の能力を最大化し、ンゾベ浄水場からの送水量増にも対応することができる。また、ノトラ配水池の流出管の整備により配水池1槽のみでも対象配水区域への配水が可能となり、配水池の定期的な清掃が可能となる（年1回程度の清掃を想定）。既存設備ではカチル方面への配水は配水池2槽のうち1槽のみからであったため、ノトラ配水池への注水を停止することができず配水池の清掃は行われてこなかった。また、先方実施機関である WASAC には配水池清掃の知識や経験がない。現状では、ノトラ配水池で流量計や水位計は使用されておらず、流量や水位などのデータを活用した配水池の運用をしていない。したがって、本ソフトコンポーネントにより、配水池の清掃方法や流量計、水位計から得られるデータを活用した配水池の運用方法を指導・支援する。

1-1 給水施設の運営・維持管理状況

1-1-1 ンゾベ浄水場の運営維持管理体制

現在はノトラ配水池への送水は既存送水ポンプ5基（5基運転、1基予備、合計6基）により約40,000m³/日を送水している。本プロジェクトではンゾベ浄水場内に新たにポンプ棟が整備され、ポンプ2基（2基運転、1基予備、合計3基）によって22,000m³/日（11,000m³/日/基）がさらに送水されることとなる。

ンゾベ浄水場からノトラ配水池への送水量は、ノトラ配水池が満水になると5基のうち数台の運転を停止し、送水量を調整している（ポンプ台数による送水量の調整）。

1-1-2 ノトラ配水池の運営維持管理体制

ノトラ配水池は2槽（10,000m³（5,000m³×2槽））から構成され、2槽間の連絡管は存在しない。また、既存の水位計は故障し、流量計も設置されておらず、2槽のうち1槽のみにカチル方面への流出管が接続されている。したがって、現在の運用では2槽の水位を別々に管理（目視による管理）しており、運用が複雑となり配水池の能力を十分に活かしていない状況である。

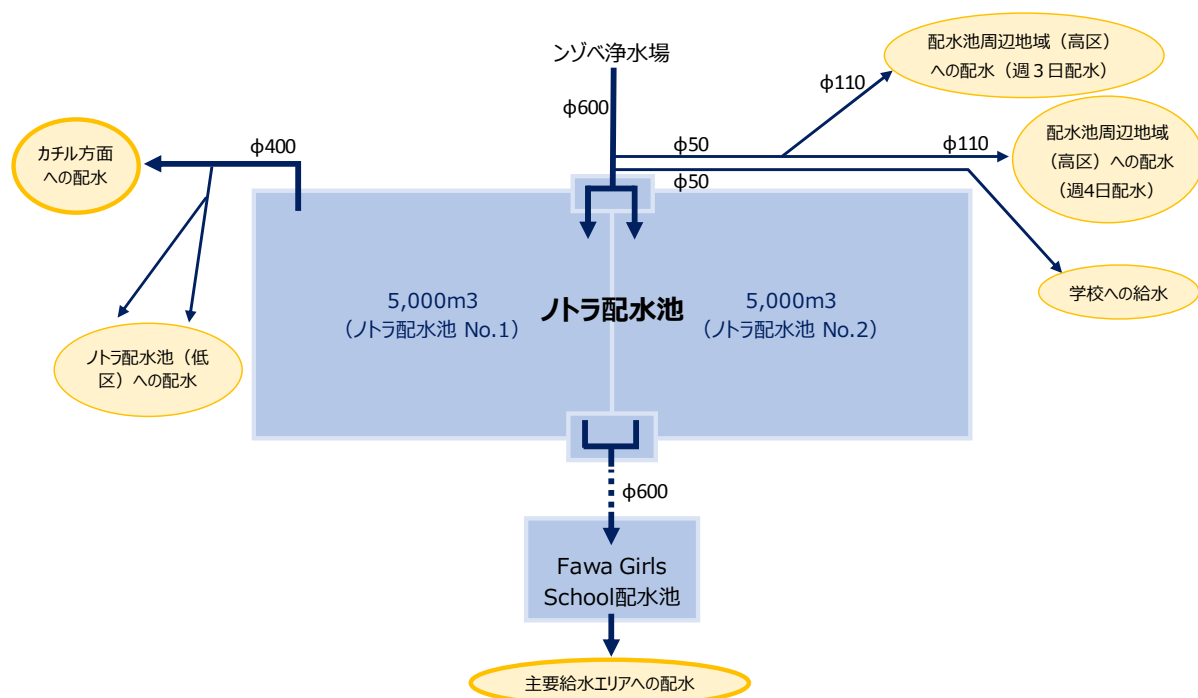


図 1-1 現在のノトラ配水池概要図

ンゾベ浄水場からの流入管 (φ 600mm) からはノトラ配水池周辺への配水のために分岐 (φ 50mm) があり (ノトラ配水池流入前の送水管からの分岐)、この配水管の分岐には機械式のメータが設置されている。この配水管 (φ 50mm) から一部の高区エリアへの配水はンゾベ浄水場からの送水圧の残圧により給水されているが、水圧の不足により給水が困難となっている。また、配水管 (φ 50mm) からの分岐により2つのエリアへの配水管 (φ 110mm) が布設されており、それぞれ4日配水 (日～水曜日) と3日配水地区 (木～土曜日) に配水される。

国際機関や高官庁があるカチル方面への送水用配水池 (ノトラ配水池 No.1) は配水の優先度が高く空になることはほとんどないが、ノトラ配水池 No.2 は水需要量が多い場合に空になることがある。

1-1-3 ノトラ配水池管理者の技術能力

ノトラ配水池は3名の職員が配置されている (1名は日勤、2名は夜勤の交代勤務)。1時間毎の水位監視及び記録、流入弁・流出弁の操作を必要に応じて行っている。水位計は故障しており、目視による水位確認をしている。

1-1-4 ンゾベ浄水場およびノトラ配水池運用における課題

ンゾベ浄水場およびノトラ配水池運用における課題は以下のとおりである。

課題 1：送水能力の異なる既存送水ポンプと本件で整備される送水ポンプによる適切な送水量の調整が出来ない。

課題 2：ノトラ配水池は水位計、流量計がなく、配水池の水位や流量が適切に記録されていない。

課題 3：ノトラ配水池 2 槽間には連絡管がなく、別々の運用をしなければいけないため、施設能力を最大限活用できていない。

課題 1：送水能力の異なる既存送水ポンプと本件で整備される送水ポンプによる適切な送水量の調整が出来ない。

ンゾベ浄水場からノトラ配水池への送水量は、ポンプの運転台数によって調整されている。一般に、送水ポンプは水需要量や配水池の容量から最も効率の良い送水量に調整され、頻繁に送水量の調整は行わない。

本プロジェクト終了後には、既存送水ポンプに加えて新たに整備される送水ポンプを併用して送水量を調整する必要がある。既存送水ポンプと新たに整備される送水ポンプの 1 基あたりの送水量は異なり、運転台数による送水量の調整が重要となる。

課題 2：ノトラ配水池は水位計、流量計がなく、配水池の水位や流量が適切に記録されていない。

ノトラ配水池には水位計が設置されているが、現在は故障している。また、流量計は設置されておらず、ノトラ配水池に常駐している WASAC 職員が目視による水位を 1 時間おきに記録しているのみである。ノトラ配水池からは主に送水本管（Fawe Grils School 配水池方面）とカチル方面の 2 つのエリアに配水をしているが、流量計が設置されていないことで、各配水エリアにどの程度の水を配水しているの把握できていない。キガリ市における水需要量が増加している状況下では計画的な給水計画に基づく効率的な送配水の必要性は高まっており、本無償資金協力で整備する水位計や流量計などの設備を正しく利用し、ノトラ配水池の水位や流量を記録し、そのデータを活用した適切な運用が重要となる。

課題 3：ノトラ配水池 2 槽間には連絡管がなく、別々の運用をしなければいけないため、施設能力を最大限活用できていない。

ノトラ配水池は 2 槽（容量：1 槽 5,000m³、計 10,000m³）から構成されているが、2 槽間の連絡管は整備されていない。また、ノトラ配水池以降の送水本管（Fawe Girls School 配水池方面）については両槽から流出管が整備されているが、カチル方面は 2 槽のうち 1 槽からのみ流出管が設置されている。また、カチル方面への流出管は送水本管（Fawe Girls School 配水池方面）への流出管取り付け位置よりも高い位置に設置されている。このことから、カチル方面への配水を行うためにはカチル方面へ配水している水槽の水位を高く保つことが必要となり、2 槽の運用が複雑となっている。送水本管（Fawe Girls School 配水池方面）のみへの送水に使用されている 1 槽は満水になることが多く、満水時にはンゾベ浄水場の送水ポンプの一部を止めるなどしており、ンゾベ浄水場での生産可能量のすべてを送水できない等、ノトラ配水池が有効に活用されていない。

また、各槽は別々の給水エリアへの給水を担っていることから、各槽とも運用を停止することができず、配水池の清掃はこれまで行われてきていない。本無償資金協力では両槽から送水本管（Fawe Girls School 配水池方面）とカチル方面へ配水できるよう流出管を整備し、1 槽のみでも両配水エリアへ配水できる施設に改修する。この改修により、清掃期間中も断水することなく、配水池の清掃を実施することが可能となる。

2. ソフトコンポーネントの目標

前項の課題を踏まえて、本ソフトコンポーネントは「ンゾベ浄水場およびノトラ配水池の運用能力の強化」を目標とする。

3. ソフトコンポーネントの成果

ソフトコンポーネントの目標を実現するために、達成されるべき成果は以下のとおりである。

表 3-1 課題に対する成果

ンゾベ浄水場およびノトラ配水池運用における課題		成果
1	送水能力の異なる既存送水ポンプと本件で整備される送水ポンプによる適切な送水量の調整が出来ない。	設定する送水量をポンプ運転台数とバルブの調整により確保する。
2	ノトラ配水池の水位計は故障し、流量計は設置されていないため配水池の水位や流量が適切に記録されていない。	ノトラ配水池の状態（水位・流量）が記録される。
3	ノトラ配水池2槽間には連絡管がなく、別々の運用をしなければいけないため、施設能力を最大限活用できていない。	ノトラ配水池2槽が適切に運用される。

4. 成果達成度の確認方法

本ソフトコンポーネントの成果達成度の確認を行うための指標を以下のとおりに設定する。

表 4-1 ソフトコンポーネントの成果ごとの指標（案）

成果	活動	達成度の確認項目	指標	確認方法
1 設定する送水量をポンプ運転台数とバルブの調整により確保する。	ンゾベ浄水場からノトラ配水池への送水量と送水ポンプ運転台数の相関関係を指導する。	ポンプ性能曲線と送水量の関係を理解できるか	設定する送水量に必要なポンプ運転台数を決定することができるか	送配水運用マニュアル
	ポンプ性能曲線から算出される送水量と実際の送水量との乖離を考慮した送水ポンプ運転台数を決定・運用する。	設定する送水量に応じて送水ポンプの運転を調整することができるか	設定する送水量を送水することができるか	ノトラ配水池の水位・流量記録簿
2 ノトラ配水池の状態（水位・流量）が記録される。	ノトラ配水池の水位、流量データの記録・整理方法を指導する。	適切に水位、流量を記録し、データを整理することができるか	配水池の一時間ごとの水位・流量が記録されているか	ノトラ配水池の水位・流量記録簿
3 ノトラ配水池 2 槽が適切に運用される。	水位、流量データに基づきンゾベ浄水場からの適切な送水量を検討し、WASAC に指導する。	配水池の水位を適切に管理することができたか	配水池が満水となる回数が減少したか	ノトラ配水池の水位・流量記録簿
	ノトラ配水池の清掃を WASAC と実施する。	配水池の清掃方法が習得されたか	適切な清掃方法に沿って配水池の清掃がされたか	実地試験

成果	活動	達成度の確認項目	指標	確認方法
	1 槽の清掃中における配水池の流入量、流出量の適切な管理方法を指導する。	流入量、流出量を適切に把握し、配水池の水位を適切に維持できるか	配水池 1 槽運用時における適切な有効水深内で運用することができたか	ノトラ配水池の水位・流量記録簿

5. ソフトコンポーネントの活動（投入計画）

5-1 基本方針

ソフトコンポーネントの基本方針は以下のとおりである。

表 5-1 ソフトコンポーネント基本方針

ソフトコンポーネント実施者	日本人コンサルタント（1 名）（日本における水需要予測、配水池運用経験者）
ソフトコンポーネント対象者	WASAC のンゾベ浄水場メンテナンスオフィサー（1 名）/オペレーター（8 名）、ノトラ配水池の常駐職員（3 名）
ソフトコンポーネント実施方法	講義、現地 OJT
ソフトコンポーネント実施時期	本プロジェクトで新たに建設する施設工事完了後

5-2 活動内容

ソフトコンポーネントの投入計画及び活動内容を以下に示す。

成果 1：設定する送水量をポンプ運転台数とバルブの調整により確保する。

活動 1-1：送水ポンプの運転台数と送水量の相関関係を指導する。

➤ 送水ポンプの運転台数と送水量の関係についての説明（講義）

本活動では既存送水ポンプと新設送水ポンプそれぞれの性能曲線と送水量の相関関係を講義形式で指導する。運転する送水ポンプの台数と流量の関係を理解することで、水需要量に合わせた送水が可能となる。

活動 1-2：ポンプ性能曲線から算出される送水量と実際の送水量との乖離を考慮した送水ポンプ運転台数を決定・運用する。

- 性能曲線から検討された最適な送水ポンプの組み合わせによる試運転（OJT）
- 試運転を元に送水量に応じた運転する最適な送水ポンプの組み合わせの決定
- 決定された送水量と送水ポンプの組み合わせに基づいた送水ポンプの運転

本活動では活動 1-1 から導き出される送水量に応じたポンプ運転台数を実際に運転させて、実際の送水量との乖離を確認する。実際に送水することができる送水量から、送水量に合わせた送水ポンプの運転台数や既存送水ポンプと新規送水ポンプの組み合わせを一覧表として取り纏める。また、

送水ポンプの運転台数による送水量の調整のみでは、送水ポンプ 1 基あたりでの調整しかできないため、さらに細かい送水量の調整はバルブ制御によって行う。また、送水量に基づいた送水ポンプの運転台数や組み合わせが決定した後は実際に設定する送水量に応じた送水ポンプの運転を行う。

成果 2：ノトラ配水池の状態（水位・流量）が記録される。

活動 2-1：ノトラ配水池の水位、流量データの記録・整理方法を指導する。

➤ 配水池運用についての説明（講義）

【テーマ】・本計画の施設概要・施設能力の説明

・配水池水位と流出量の相関関係の説明

➤ 配水池の監視および記録（現場での OJT）

活動 2-1 では配水池の正しい運用方法について基礎知識を講義形式にて指導する。本講義はノトラ配水池だけでなく、配水池運用に必要な一般知識を得る機会となる。特に現在の WASAC では水需要予測を基に給水計画を策定し運用することはしていないため、本ソフトコンポーネントをとおして WASAC 全体の給水施設運用能力の向上に資する講義となる。

また、講義形式による基礎知識を習得した上で、WASAC に対してノトラ配水池の水位監視、記録方法を指導する（現場での OJT）。水位監視、記録方法の指導は活動 1-2 で行う送水ポンプの試運転と同時に行う。

成果 3：ノトラ配水池 2 槽が適切に運用される。

活動 3-1：水位、流量データに基づきンゾベ浄水場からの適切な送水量を検討し、WASAC に指導する。

➤ 適切な配水池流入量に係る指導（講義）

➤ 送配水運用マニュアルの作成

活動 2-1 で得られた流量、水位のデータからンゾベ浄水場からの送水量とノトラ配水池がカバーする給水エリアの水需要量を算出する。

また、ンゾベ浄水場からの送水量を一定としつつもノトラ配水池が満水、もしくは空とならずに運用できることを目標とする運用計画を検討する（季節による水需要量の変動に伴う送水量の変化に応じた送水ポンプ運転台数の調整は必要）。ノトラ配水池の運用計画はマニュアル（本ソフトコンポーネントの成果品）として取り纏める。マニュアルの内容は以下を含めるものとする。

- 送水量に応じた送水ポンプの運転台数と組み合わせ一覧
- 配水池の流入量と水位の関係性
- 配水池への流入量と流出量（水需要量）に応じた運用方法
- 配水池流出管のバルブ操作による流出量の調整方法

活動 3-2：ノトラ配水池の清掃を WASAC と実施する。

➤ 配水池の清掃方法と清掃時のチェックポイントの確認（講義）

➤ 配水池 1 槽の清掃×2 回（現場での OJT）

➤ 配水池水槽内の状態評価（現場での OJT）

ノトラ配水池は建設されて以降、約 10 年間ものあいだ配水池を清掃した記録がなく、WASAC 職員も配水池を清掃する十分な経験がない。したがって、本活動では配水池を清掃し、配水池の

状態を把握・評価する。清掃は合計 2 回実施することとし、1 回目の清掃は本邦で実際に配水池の清掃経験が豊かなソフトコンポーネント実施者の指導の下で実施し、技術移転を行う。配水池の状態によっては補修が必要になることを想定し、2 回目の清掃では清掃後 1～2 日間の期間をノトラ配水池 2 槽のうち、1 槽のみで給水を実施する。ンゾベ浄水場側と連携し、ノトラ配水池の清掃中の運用について本活動で指導を行う。なお、配水池の清掃時には一時的にノトラ配水池がカバーする給水エリアにおいて給水量が減少する。そのため、給水量の制限を地域住民（水利用者）に周知する必要がある。

活動 3-3：1 槽の清掃中における配水池の流入量、流出量の適切な管理方法を指導する。

- 配水池 1 槽の清掃中の水位監視および記録（現場での OJT）
- 配水池 1 槽のみでの給水運用（水槽内の補修等を想定し、1～2 日間運用する）（現場での OJT）
- 適切なバルブ操作およびンゾベ浄水場の送水量の調整（現場での OJT）

活動 3-2 で実施する清掃時の給水に関する記録（水位、流量）を記録し、適切な送水量になるよう調整する。配水池 2 槽のうち 1 槽のみで、カチル方面と送水本管（Fawe Girls School 配水池方面）へ給水する際には 2 槽合計の配水池容量である 10,000m³ に比べて半分の 5,000m³ で給水しなければならないことから、運用には相当の知識と技術が必要となる。配水池の清掃時は本来のノトラ配水池の容量が半分になることから、通常よりも配水池が満水になる可能性が高くなる。そのため、水需要量が少なくなる夜間などではンゾベ浄水場からの送水量を制限する必要性は発生する可能性もある。また、送水本管（Fawe Girls School 配水池方面）とカチル方面のどちらかの給水エリアに優先的に給水を行う場合には配水池流出管のバルブ操作によって調整する必要がある。このような運用方法について OJT 方式で WASAC の職員へ技術移転を行う。

6. ソフトコンポーネントの実施リソースの調達方法

本ソフトコンポーネントにおける活動に必要な実施リソースは、以下のとおりである。

(1) 本邦コンサルタント

将来に亘る配水池水運用計画に対応するには、水需要予測に基づく配水池の運用を適切に行う必要がある。配水池の適切な運用は浄水場の適切な運用にも関係する重要な事項であり、豊富な経験と知識を必要とすることから、ソフトコンポーネントの実施は日本人コンサルタントが行うこととする。

(2) WASAC

本ソフトコンポーネントの実施には給水施設を管理する WASAC の協力が必須となる。WASAC の運営体制は、明確に担当分野が区分されるため、ソフトコンポーネントの対象者を定めて実施する必要がある。特にンゾベ浄水場およびノトラ配水池の維持管理にかかる職員は本ソフトコンポーネントにおける全ての活動に参加することを WASAC に打診する。

(3) その他リソース

本ソフトコンポーネント実施に必要なその他のリソースを以下に示す。

表 6-1 その他必要なリソース

項目	説明
移動車輛	本邦コンサルタントの現場移動用

7. ソフトコンポーネントの実施工程

ノトラ配水池、高架水槽への水位計および流量計設置、ノトラ配水池の流出管再整備後にソフトコンポーネントを実施する。実施工程の概略は以下のとおりである。

表 7-1 ソフトコンポーネント所要日数

成果	活動		日数	
成果 1 設定する送水量を ポンプ運転台数と バルブの調整により 確保する。	活動 1-1	説明資料の作成	1 日	
	送水ポンプの運転台数と送水量 の相関関係を指導する。	運転する送水ポンプの組み合わせと送水量の関係につ いての説明（講義）	2 日	
		活動 1-2	ポンプ性能曲線から導き出される送水ポンプ運転台数 での試運転（OJT）	6 日
		ポンプ性能曲線から導き出される 送水量と実際の送水量との乖離 を考慮した送水ポンプ運転台数 を決定する。	実際の送水量を考慮した送水ポンプ運転台数の決定	1 日
			決定された送水量に基づいた送水ポンプの運転	(5 日) 他 の活動と同 時に行う
成果 2 ノトラ配水池の状 態（水位・流量） が把握される。	活動 2-1 ノトラ配水池の水位、流量データ の記録・整理方法を指導する。	配水池運用についての説明（講義）	活動 1-1 と 同時に行う	
		配水池の監視および記録（現場での OJT）	活動 1-2 と 同時に行う	
成果 3 ノトラ配水池 2 槽 が適切に運用され る。	活動 3-1 水位、流量データに基づきンゾベ 浄水場からの適切な送水量を検 討し、WASAC に指導する。	適切な配水池流入量に係る指導（講義）	活動 1-1 と 同時に行う	
		配水池運用マニュアルの作成	1 日	
	活動 3-2 ノトラ配水池の清掃を WASAC と実施する。	配水池の清掃方法と清掃時のチェックポイントの確認	1 日	
		配水池 1 槽の清掃（第 1 回目）	3 日	
		配水池 1 槽の清掃（第 2 回目）	5 日	
		配水池水槽内の状態評価（現場での OJT）	2 日	
	活動 3-3 1 槽の清掃中における配水池の 流入量、流出量の適切な管理 方法を指導する。	配水池 1 槽の清掃中の水位監視および記録（現場 での OJT）	活動 3-2 と 同時に行う	
		配水池 1 槽のみでの給水運用（現場での OJT）	活動 3-2 と 同時に行う	
適切なバルブ操作およびンゾベ浄水場の送水量の調 整および評価（現場での OJT）		活動 3-2 と 同時に行う		
書類整理（報告書作成）			1 日	
合計（平日のみ）			23 日	
合計（移動日往復＋土日＝12 日を加味）			35 日	

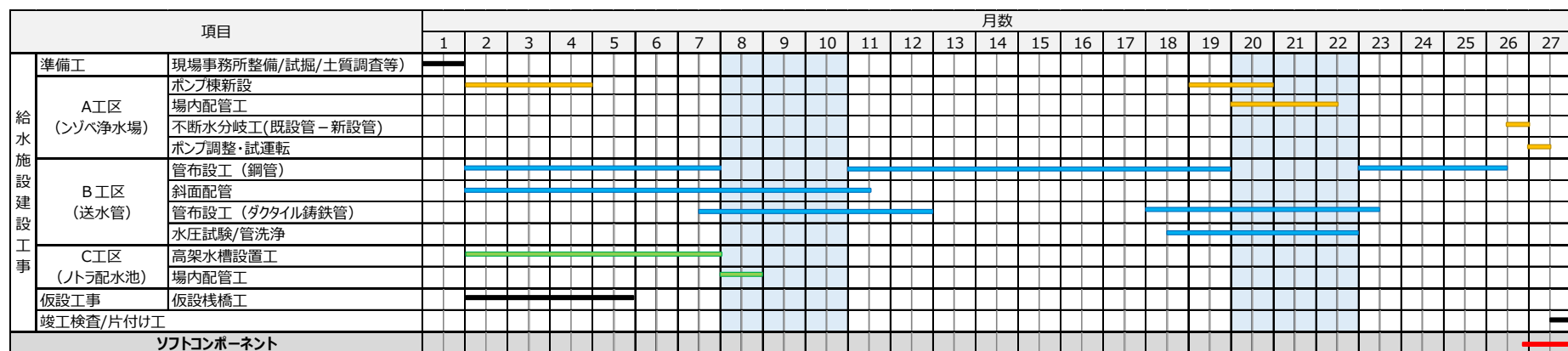


図 7-1 ソフトコンポーネント実施計画概要

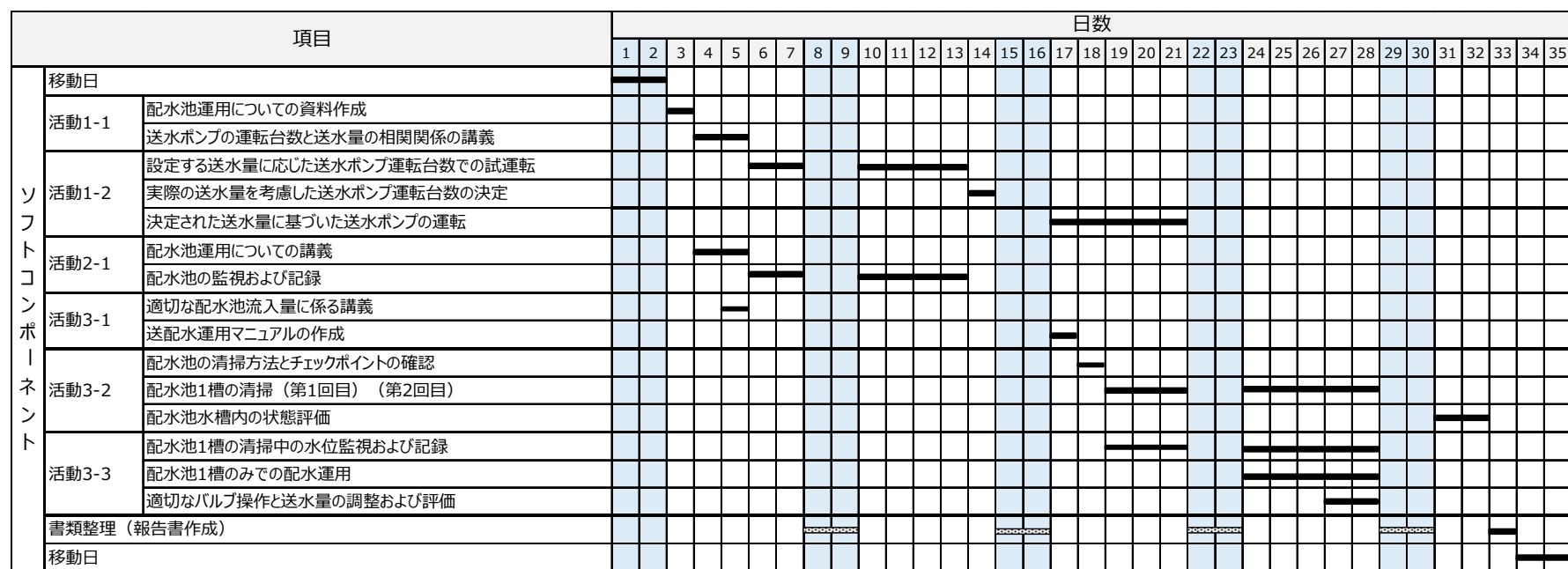


図 7-2 ソフトコンポーネント実施計画概要(詳細)

8. ソフトコンポーネントの成果品

ソフトコンポーネントの成果品は以下のとおりとする。

- 🚧 送配水運用マニュアル
- 🚧 ソフトコンポーネント完了報告書（英語版、日本語版）
- 🚧 ソフトコンポーネント完了報告書添付資料（活動写真、ノトラ配水池の水位・流量記録簿、配水池水槽の清掃チェックリスト、WASAC 職員への説明資料、その他活動に係る資料）

9. ソフトコンポーネントの概略事業費

本ソフトコンポーネントの概略事業費は、以下のとおりである。

表 9-1 ソフトコンポーネントの概略事業費

項目	内訳	数量	単価（円）	金額（円）
直接人件費	配水池水運用計画担当者（3 号級）	1.16 人月	926,000	1,074,160
直接経費	旅費、日当・宿泊費、車輛賃貸料	一式	1,111,881	1,111,881
間接費	諸雑費、技術経費	一式	2,234,253	2,234,253
合計				4,420,294

10. 先方政府の負担事項

先方実施機関である WASAC はソフトコンポーネントの対象となる人員（ンゾベ浄水場メンテナンスオフィサー/オペレーター、ノトラ配水池の常駐職員）を決定し、全てのソフトコンポーネント活動に参加できるように人員配置を行う必要がある。また、配水池の清掃時には必要に応じて WASAC は地域住民に対して情報を周知する。

資料 6. 参考資料

技術資料

- 送水管布設ルートを選定に係る技術資料
- 既存送水管の使用に係る技術資料
- 鋼管管厚計算に係る技術資料
- 水撃圧に係る技術資料

収集資料リスト

技術資料

送水管布設ルートを選定に係る技術資料

Annex2

Proposed route	1. Route parallel with the existing pipeline								2. Route along paved road									
	1-1. Installation the pipe under the road which has the plan of road expansion		1-2. Installation the pipe under the road which has the plan of road expansion (install the pipe toward the university)		1-3. Avoid the narrow space along the National road		1-4. Avoid the narrow space along the existing pipe.		2-1. Avoid existing route and lay along the paved road		2-2. Based on 2-1, shorten the length of pipes by crossing wetland		2-3. install the pipe in parallel with the existing pipeline up to the second water bridge, then install the pipe on the paved road					
Total length of pipe	Approximately 9.3 km		△	Approximately 9.1 km		○	Approximately 9.4 km		△	Approximately 11.4 km		×	Approximately 10.5 km		×	Approximately 10.0 km		×
Route composition	Paved : 0.75km Unpaved : 8.55km		○	Paved: 1.15km Unpaved: 7.95km		○	Paved: 1.15km Unpaved: 8.25km		○	Paved : 9.35km Unpaved : 2.05km		×	Paved : 7.8km Unpaved : 2.7km		×	Paved : 2.2km Unpaved : 7.8km		△
Presence of narrow road	There is a narrow road, it is necessary to partially secure the road width.		×	There is a narrow road, it is necessary to partially secure the road width.		×	There is a point to close river and existing pipe which has a 45° bending, the consideration of the impact to existing pipe is necessary.		△	The construction of expansion for National Road starts. However, National Road will expand to the mountainside at the river close area, no problem to install the pipe.		○	None		○	There is a narrow road, it is necessary to partially secure the road width.		○
Measures against river protection	The river is partially close to the unpaved road, and river protection measures are required.		×	The river is partially close to the unpaved road, and river protection measures are required.		×	There is a point close to the river and existing pipe, and river protection measures will be required.		△	There is a point close to the rive and planed sewerage pipe, and river protection measures will be required depend on the design of sewerage pipe.		△	None		○	The river is partially close to the unpaved road, and river protection measures are required.		×
Measures against the construction in wetland	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporarily road for the construction.		○	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporarily road for the construction.		○	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporarily road for the construction.		○	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporarily road for the construction.		○	Currently, it is impossible that people pass the wetland, but there is no particular problem for constructing the temporarily road for the construction.		×	Currently, the width of path is enough to allow people pass wetland. There is no particular problem for constructing the temporarily road for the construction.		○
Measures against river crossing	There are two river crossings. First river crossing is planned as water pipe bridge and second river crossing is planned as underpass the river. It is necessary to plan the temporary bridge etc.		○	There are two river crossings. First river crossing is planned as water pipe bridge and second river crossing is planned as underpass the river. It is necessary to plan the temporary bridge etc.		○	There are six river crossings. Last river crossing is planned as underpass the river, others are considered to cross by water pipe bridge. It is necessary to plan the temporary bridge etc.		△	There are six river crossings. Last river crossing is planned as underpass the river, others are considered to cross by water pipe bridge. It is necessary to plan the temporary bridge etc.		△	There are one river crossing. River crossing is planned as water pipe bridge. It is necessary to plan the temporary bridge etc.		○	There are two river crossings. First river crossing is planned as water pipe bridge and second river crossing is planned as underpass the river. It is necessary to plan the temporary bridge etc.		△
Measures against construction at slope	Considering the route along the existing drainage, it is not suitable because there is concern about the stability of the pipeline in the transverse direction and the construction is difficult because the side of the drainage is a valley.		×	Although it is a steep slope in the longitudinal direction, the transverse direction is almost horizontal and there is no problem in construction if measures such as a cableway etc. are taken.		△	Although it is a steep slope in the longitudinal direction, the transverse direction is almost horizontal and there is no problem in construction if measures such as a cableway etc. are taken.		△	None		△	None		○	None		○
Impact on traffic	Road expansion from Nzove WTP to road bridge starts, and the difficulties to install the pipe under the road are remained by		×	Road expansion from Nzove WTP to road bridge starts, and the difficulties to install the pipe under the road are remained by		×	Impact on traffic is limited, only from the paved road after the steep slope.		○	Since the site of pipe installation is near the bus terminal and the traffic is high even in Kigali city, the influence on traffic is enormous.		×	Since the site of pipe installation is near the bus terminal and the traffic is high even in Kigali city, the influence on traffic is enormous.		×	Traffic to the Kigali Independent University is somewhat high		×
Resettlement	Housing along paved roads, public facilities etc., not so many		△	Housing and public facilities etc., the paved road after the steep slope. Not so many.		△	Housing and public facilities etc., the paved road after the steep slope. Not so many.		△	Housing along paved roads, public facilities etc., too many		×	Housing along paved roads, public facilities etc., too many		×	Housing along paved roads, public facilities etc., many		×
Land acquisition	Land acquisition accompanying expansion of road for installation pipe in narrow road		△	Land acquisition accompanying expansion of road for installation pipe in narrow road.		△	Compensation for cultivating during the construction is necessary.		△	Acquisition of land outside the public road		×	Acquisition of land outside the public road		×	Acquisition of land outside the public road		×
Construction period	There are few influence to the residents' living, the construction period is not affected.		△	There are few influence to the residents' living, the construction period is not affected.		△	There are few influence to the residents' living, the construction period is not affected.		△	It is necessary to consider the resettlements of residents procedure, nighttime construction and lining board to avoid the influence on traffic, affecting the construction period too much.		×	It is necessary to consider the resettlements of residents procedure, nighttime construction and lining board to avoid the influence on traffic, affecting the construction period too much.		×	Due to the necessity of resettlement of residents, it will affect the construction period. Moreover, it takes a period of time to install the pipe in densely populated area.		×
Project cost	It is economical because this route is the second shortest and has large proportion of unpaved road.		△	River crossing is only two, the cost will be minimized.		○	River crossing is six, the Project cost will become bigger than 1-2.		△	Most of the route is paved road, the project cost become higher due to reconstruction of paved road, resettlement of residents, etc.		×	Most of the route is paved road, the project cost become higher due to reconstruction of paved road, resettlement of residents, etc.		×	The project cost is higher than 1-1, 1-2 because of the ratio of paved road, but the cost is less than 2-1, 2-2.		×
Remarks	The construction of road expansion from Nzove WTP to road bridge starts (width: 10m), and the difficulties to install the pipe under the road are remained, therefore the Project reject this route.						The consideration of impact to the existing pipe in narrow point is necessary.		The detail design of sewerage pipe will be started, the exact location of sewerage pipe must be confirmed in future.		At the paved road, many houses are close to the road across the entire road. It is necessary to break down and reconstruction the existing structures such as sidewalks and drainage. Together with the large amount of traffic, construction requires a lot of time and labor.						Pipes are installed mountainside at the area of expansion of road width from Nzove WTP. Box calvert is necessary under the new bridge construction at NR3 before the Project.	

Proposed transmission pipeline - 1-1 (9.3km)

- Existing transmission pipeline
- Proposed transmission pipeline - 1-1 (9.3km)
- Proposed sewerage facility
- Drain pipe
- Assumed resettlement household



Nzove WTP

Ntora Reservoir

Paved road
L=760m

Kigali
Independent
University

Wet land

New bridge

Close to the river

Close to the river

Road expansion (unpaved, W=10m)

Proposed transmission pipeline - 1-2 (9.1km)

- Existing transmission pipeline
- Proposed transmission pipeline - 1-2 (9.1km)
- Proposed sewerage facility
- Drain pipe
- Assumed resettlement household
- Electric cable



Proposed transmission pipeline - 1-3 (9.4km)

- Existing transmission pipeline
- Proposed transmission pipeline - 1-3 (9.4km)
- Proposed sewerage facility
- Drain pipe
- Assumed resettlement household
- Electric cable



Nzove WTP

Road expansion (unpaved, W510m)

Proposed
Migration Ponds Area

Close to the river

Road expansion (National road, 4 lanes)

New bridge

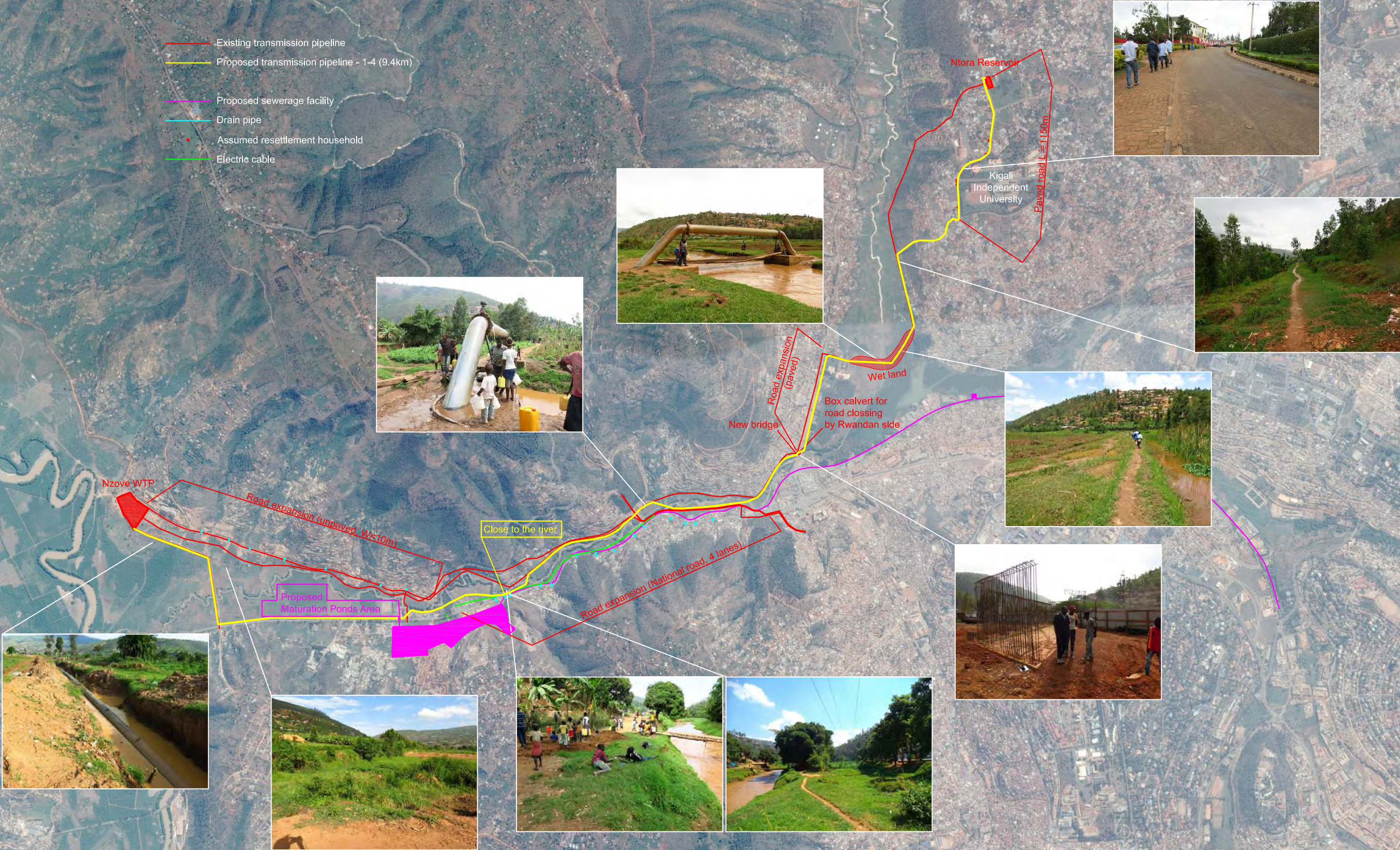
Road expansion
(paved)

Wet land

Box culvert for
road crossing
by Rwandan side

Proposed transmission pipeline - 1-4 (9.4km)

- Existing transmission pipeline
- Proposed transmission pipeline - 1-4 (9.4km)
- Proposed sewerage facility
- Drain pipe
- Assumed resettlement household
- Electric cable



Proposed transmission pipeline - 2-1 (11.4km)

- Existing transmission pipeline
- Proposed transmission pipeline - 2-1 (11.4km)
- Proposed sewerage facility
- Drain pipe
- Assumed resettlement household

Nzove WTP

Non-paved road L = 2050m
Road expansion (unpaved, W=10m)

Close to the river

Close to the river

New bridge

Road expansion
(paved)

Traffic volume is high

Ntora Reservoir

Kigali
Independent
University

Densely residential areas



Proposed transmission pipeline - 2-2 (10.5km)

- Existing transmission pipeline
- Proposed transmission pipeline - 2-2 (10.5km)
- Proposed sewerage facility
- Drain pipe
- Assumed resettlement household

Nzove WTP

Non-paved road L=2050m
Road expansion (unpaved, W=10m)

Close to the river

Close to the river

New bridge

Road expansion (paved)

Traffic volume is high

Ntora Reservoir

Kigali Independent University

Densely residential areas

Wet land



Proposed transmission pipeline - 2-3 (10.0km)

- Existing transmission pipeline
- Proposed transmission pipeline - 2-3 (10.0km)
- Proposed sewerage facility
- Drain pipe
- Assumed resettlement household



Nzove WTP

Ntora Reservoir

Kigali Independent University

Densely residential areas

Narrow width

Road expansion (paved)

New bridge

Close to the river

Close to the river

Road expansion (unpaved, W=10m)

既存送水管の使用に係る技術資料

2018 年 3 月 29 日

準備調査団

既存送水管の使用に関する見解

1. 竣工当時の状況及び既存送水管に対する WASAC の見解

既存送水管の施工時期（2006 年頃）の状況について、当時この案件に関わっていた WASAC 地方局水局のエマヌエル氏との協議から、竣工当時について以下を確認した。

- ① 既存送水管は WASAC が独自にスペインの Espina Obras Hidráulicas 社（以下、Espina 社）と契約して施工されたものの、Espina 社が全てのスコープを完了せずに引き上げてしまったため、裁判となった案件である。
- ② WASAC が裁判所に提出したレポート（仏語）では、既存送水管に必要ないくつかのサポート工事（具体的に何を指しているかは不明）が実施されていない、また水圧テストも実施されていないことが指摘されている。
- ③ 調査団から既存水管橋の建設を担当したという業者（本件の地盤調査の再委託業者）から、水管橋の基礎構造が杭基礎（口径 200mm×20 数メートル、鋼管杭 4 本/箇所）であるとの情報を得たが、WASAC としては水管橋の基礎構造についてははっきりと覚えていない。今回の調査団からの説明により杭基礎であることを改めて確認した。
- ④ 当時の対応として、Espina 社が施設建設の途中で引き上げてしまった結果、残された工事は最終的にルワンダ側で実施し完工させた。
- ⑤ したがって、竣工図書もこのような事情から存在しない。Espina 社はそもそも竣工図書を作成せずに引き上げた。

これら竣工当時の状況と以下に説明する竣工後の漏水事故を踏まえ、本件を担当する WASAC のドミニク氏の既存送水管に対する見解は以下のとおりである。

既存送水管は、竣工から少なくとも 6 件の大きな漏水事故（以下参照）が発生している。漏水事故については、漏水箇所の補修（管を継ぎ輪で接合）をしたものの、補修箇所の前後を含めて、既存送水管の状況については確認していない。ただし、標高差 200m 以上の高水圧の状況下で、漏水事故が複数件発生している事実に対し、竣工当時のいきさつを考慮すると、このまま既存送水管を安全に使用し続けることに強い不安を感じている。

特に水管橋については、1 橋はフランジ部を溶接することで応急的に補修はしたが、護岸が整備されていないことと一帯が湿地帯であることから、雨季の高流量時には河道が浸食され基礎が露出している。このことは今後も事故が発生するリスクを有していることを示しており、現在もうひとつの水管橋についても漏水が発生していることを考慮すると、WASAC としては Espina 社の対応も含め、既存送水管全体に対し、安全・安心に対する強い懸念があり、これら安全・安心が担保されているとは考えていない。このため、当プロジェクトで既存送水管は使用せず、新設管で対応して頂けることを強く望む。

2. 既存送水管の構造.

(1) 管種（材質・継手構造）

既存送水管は、口径 600mm のダクタイル鋳鉄管が本管として使用されており、水管橋部は鋼管である。ダクタイル鋳鉄管については、受口に挿口を差込むだけのタイトン型と呼ばれる管種が使用されており、管は抜け止めの機能を持たず、差込み以上の管の変位により管の継手部が外れる構造となっている。タイトン型のダクタイル鋳鉄管は、一般的に使用されている管種であり、使用には問題はないが、不平均力の発生する箇所においては、コンクリート防護や離脱防止継手など、不平均力に対応した措置が適切に取られていない場合は、管の変位により管が外れる可能性がある。

水管橋部については鋼管の溶接により部材が構成され、部材間の接合はフランジ接合である。水管橋は2か所であるが、いずれもこのフランジ部から漏水が発生し、1橋はフランジ部の溶接により補修をしているが、もう1橋は現在も漏水が発生している状況であり、補修には断水が必要となることから、現時点で補修は行われていない。また、補修の際には管内の排水が必要となるが、既存送水管には止水弁が設置されていないことから、排水も容易ではなく、その点からも補修の実施には時間を要する。なお、これら水管橋の基礎構造は杭基礎形式であり、口径 200mm の鋼管杭が基礎ごとに4本、杭延長 20 数 m の深さまで施工されている。



図 1 既存送水管（左：ダクタイル鋳鉄管、右：鋼管）

(2) 送水管延長

既存送水管は、ンゾベ浄水場からノトラ配水池間に布設されており、総延長は 8,850m である。

(3) 既存送水管の設計水圧

ダクタイル鋳鉄管の設計水圧は不明だが、ダクタイル鋳鉄管メーカーである Saint-Gobain 社より 2007 年のダクタイル鋳鉄管の製造分として、口径 500～600mm、K-9 と呼ばれるダクタイル鋳鉄管規格にて約 20km 分を Espina 社に納入した記録があるとの報告があった。K-9 の水圧に関する性能は、口径 600mm で常用時の水圧 36bar（最大：43bar）までの水圧

に耐えるものである。

(4) 既存送水管で送水するポンプ仕様

現在、約 40,000m³/日の送水量が、ンゾベ浄水場にある以下の送水ポンプにより、ノトラ配水池まで既存送水管で送水されている。送水に使用されるポンプは 5 基であり、1 基は予備の交互運転となっている。

流量：340m³/h、揚程：248m（4 基）

流量：380m³/h、揚程：220m（2 基）

(5) 曲管部の保護方法

曲管部については、コンクリート防護により不平均力に耐える構造となっている。ただし、後述するが、過去の漏水補修の実績から、不平均力に対して十分な対応が施されていない可能性がある。

(6) フランジ継手の規格

既存送水管のフランジ継手に関し、ンゾベ浄水場からの流出管、電磁流量計、水管橋などは PN40 が使用されている。一方、空気弁に関して、空気弁自体は PN40 のフランジ仕様となっているが、空気弁を取り付ける本管からの分岐管となる T 字管は、PN40 と異なり明らかに小さい。



図 2 フランジの状況（左：ンゾベ浄水場、右：空気弁）

WASAC の GIS データにある、既存送水管が PN16 であるとの記録の経緯については、確かな情報の確認は出来ないものの、ダクタイル鋳鉄管の規格は PN 規格とは異なることから、この分岐 T 字管をベースにしている可能性がある。

3. 漏水と漏水事故

(1) 漏水率

以下に、これまでに実施された既存送水管の漏水量の調査結果を示す。

表 1 既存送水管の漏水量

調査時	① ソゾベ浄水場からの流出	② 分岐部	③ ノトラ配水池への流入	漏水量 (①-②-③)	漏水率
2016/12/5 基礎調査時	1,726m ³ /h	133m ³ /h	1,313m ³ /h	280m ³ /h	17.60%
2017/3/16 技プロ（高橋氏）	1,642.96m ³ /h	127.87m ³ /h	1,539.8m ³ /h	-24.71m ³ /h	—
2017/5/12 技プロ（桃園氏）	1584.0m ³ /h	170.8m ³ /h	1,474.6m ³ /h	-25.69m ³ /h	—
2017/11/30 当調査団	16,454m ³ /11h	16,718m ³ /11h		-264m ³ /11h	—

基礎踏査時においては漏水率が 17.6%と記録されたものの、その後の各調査で確認できる漏水は計測上ほとんどない（基礎調査時の値は、ソゾベ浄水場とノトラ配水池で時間軸を合わせての同時測定ではない）。現在確認できるのは漏水が発生している水管橋の漏水量約 2.4m³/h（1 分で 20ℓ ジェリ缶約 2 缶分）である。

(2) 事故・不具合記録

別添の図により、2007 年の竣工からの 10 年間で少なくとも以下の計 6 か所の漏水が発生したことを確認している。

- ① 未舗装の公道内に布設されている。管路の継手での漏水が 2013 年頃に発生した。漏水した水が地表まで噴出したため漏水が発覚した。既存管を切断し、新たにジョイント（継ぎ輪と思われる）2 つにより管を接合して修理した。漏水時の既存管の状況については不明であるが、公道下に埋設されていることから、他の区間に比べて地盤条件が良いにも関わらず漏水が発生したのは、送水管が緩く S の字を描いており、各々の緩いカーブが反対方向に力が加わるなか、コンクリート防護が無いために、200m 以上の高低差（高水圧）による不平均力により管が抜けたと推定される。
- ② 本来であれば、直線に送水管を布設するところであるが、施工当時に直線上に民家があり、民家を避けるために河川側に送水管を迂回して布設されていたとのことである。漏水事故及び補修の時期は確認できない。このため、45°曲管が河川側にあったコンクリート防護で固定されていたが、河川の氾濫によって土壌が浸食され、漏水事故が発生した。補修は、既存送水管が直線状に配置されるよう、WASAC が管の位置を道路側に約 2m 移動させて行った。
- ③ 既存水管橋からの漏水であるが、第一次現地調査が開始された 2017 年 11 月の初めは僅かであった漏水が、約 1 か月後の 2017 年 12 月初旬では約 2.4m³/h の漏水量となっていた。漏水はフランジ部からであり、補修には断水の必要があるものの、断水時のキガリ市への影響もあり修理の目途は立っていない。
- ④ 未舗装道路から舗装道路に出る地点にある曲管直後のジョイントでの漏水。2012～2013 年頃に発生。地表まで水が噴出したことによって漏水が発覚した。コンクリート防護はされているものの（大きさは不明）200m 以上の水圧による不平均力により管が抜けたと推定される。
- ⑤ 湿地帯に架かる水管橋であるが、フランジ部分からの漏水は 2014 年ごろから生じていた。2017

年 3 月に WASAC 側が、フランジ面を被覆充填する形で溶接し止水された。基礎に鋼管杭が使用されてはいるものの、両岸のコンクリート基礎が外側に傾いており、杭が全く機能していない可能性が高い。

- ⑥ 水管橋のすぐ後にある排泥弁付近からの漏水が 2014 年頃に発生した。地表数mまで水が噴出したため漏水が発覚した。排泥弁の後に 45°曲管にて送水管が布設されていることと、付近一帯が湿地帯で地盤が緩いことから、不平均力により管が外れたと推定される。

過去の 6 件の漏水事故を確認すると、200m の高低差のもと、高水圧によると思われる漏水が、特に曲管部を中心に発生していることが確認される。曲管部については不平均力に対抗するため、コンクリート防護による対策が施されているとのことだが、漏水が発生している事実を考慮すると、その大きさも含め適切に施工がされたとは断定することは出来ない。また、漏水記録の①については、送水管が緩く曲線を描いて布設されている区間であり、コンクリート防護は施されておらず、同様に緩く曲線を描いて布設されている区間においては、使用されているダクトイル鋳鉄管が抜け止め機能のついていない構造のため、時間の経過と共に徐々に管が水圧によって変位し、管が外れることによって漏水が発生する可能性がある。特に既存送水管の一部では、既存管が露出している箇所もあり、そのような区間は土圧によって管の変位に抵抗することも期待できないことから、今後管が外れて漏水が発生する可能性がある。

(3) 不平均力に対する管の影響範囲の試算

ここで、45° 曲管部のコンクリート防護の大きさを仮定し、本件での地盤調査結果より N 値が概ね 1～2 と低い値であることから、粘土質地盤の許容支持力度を 20kN/m² として、どの程度範囲まで送水管の離脱に影響を及ぼしているか試算する。コンクリート防護の大きさを、

コンクリート幅：1.5m

管の曲部からの長さ：2.0m

コンクリート高さ：1.2m

として漏水事故が発生した時の安全率を 1 として試算した結果、不平均力に対する結果は以下の通りとなる。

表 2 不平均力により影響を受ける範囲（45° 曲管）

	コンクリート防護単独		コンクリート防護以後の影響を受ける範囲		
	安全率	地耐力 (kN/m ²)	安全率	影響を受ける 管延長 (m)	地耐力 (kN/m ²)
試算結果	0.6	46.7	1.0	15.6	46.7
限界値	1.0	---	1.0	---	---
基準	1.5	20	1.5	---	20.0
判定	不可	不可	不可	---	不可

※90°曲管に関しては、影響を受ける範囲は約37mとなる。

この試算結果の意味するところは、上記大きさのコンクリート防護では、コンクリート防護単独で不平均力に対抗することが出来ず、コンクリート防護以後の最低 15.6m の範囲の送水管にも不平均力に対抗するための力が加わるということである。つまり、既存送水管には抜け止め機能がついていないため、各管が受け口に差し込まれている間は問題ないが、年月を経て徐々に水圧により管が移動し、最終的に受け口から管が外れた場合には、大規模な漏水事故が発生する可能性がある、その可能性のある範囲が少なくとも 15.6m と推定されるということである。

また、地盤の支持力が 20kN/m² に対し 46.7kN/m² と 2 倍以上の開きがあり、実際の地盤の支持力が 20kN/m² であれば、コンクリート防護を地盤が支えることが出来ないことを示している。漏水事故が曲管部のどこで発生したのかを確認することは難しいが、コンクリート防護が杭施工されているとは考えにくいとため、防護が自重で沈下し、送水管との沈下量の差により、コンクリート直近の管が外れたことも推定される。すなわち、水平方向、鉛直方向、いずれにも管が変位し、管が外れることで漏水事故の発生する可能性が、既存送水管には潜在的にあると、試算結果からは推定できるということである。

さらに、漏水事故の発生した箇所についても、漏水箇所の補修をただけで、それ以外の影響を受ける可能性のある範囲の管路の調査も、送水管の布設替えも実施していない。つまり試算に従えば、将来にわたり漏水事故で補修した範囲についても、再び漏水が発生する可能性はあると推定する。

上記の範囲は安全率を 1 とした場合の試算であり、設計上問題のない既存送水管の対策を施すとすれば、安全率 1.5 を確保する必要がある。既存送水管を使用する場合にはまず地盤支持力を満足させるべくコンクリート防護の対策が必要になる。送水管については、仮定したコンクリート防護の大きさとすれば、安全率 1.5 を確保するために、曲部から 45° 曲管では約 30m、90° 曲管では約 46m の範囲を抜け止め機能のついた管路に布設替をする必要がある（添付図参照）。

(4) 漏水事故率

以下は、厚生労働省による日本国内（404 水道事業者）の導送水管の管路事故率である。

表 3 国内の管路事故率（導送水管）

管路事故（導送水管）について	平均	最高	最低
導送配水管事故率（事故件数/100km/年）	7.5	76.1	0
鋼管の導送配水管事故率（事故件数/100km/年）	27.5	750	0
ダクタイル鋳鉄管の導送配水管事故率（事故件数/100km/年）	0.7	33.4	0
鋳鉄管の導送配水管事故率（事故件数/100km/年）	6.3	193.2	0
塩化ビニル管の導送配水管事故率（事故件数/100km/年）	13.8	364.7	0
石綿セメント管の導送配水管事故率（事故件数/100km/年）	28.3	3096	0
その他の管種の導送配水管事故率（事故件数/100km/年）	38	4211.1	0

出典: <http://www.mhlw.go.jp/topics/bukyoku/kenkou/suido/jouhou/shidou/02/choshu01.html>

既存送水管の事故率は、過去 10 年間で漏水事故件数：6 件、管延長：8.85km であることから、6.8 件/100km/年と算出される。これは、日本国内の管路事故率（平均：0.7 件/100km/

年)と比べて約10倍の発生率であり非常に高い。ンゾベ浄水場からの送水量はキガリ市内の給水量の約半分を賄っており、既存送水管はその基幹施設である。1回の漏水事故による断水により、キガリ市内に与える影響は甚大であり、その点からも既存送水管の管路事故の発生率は、既存送水管を高水圧下で今後も使用を続けられると判断するには非常に高い。

4. 既存送水管の維持管理

(1) 河川護岸の未整備による問題

ンゾベ浄水場から公道下の布設部を過ぎると、既存送水管は河川に沿うように布設されている。この区間において、一部河川に近接するエリアがあり、河川の護岸整備がされていない中、送水管の布設位置が河川端から約2mと近接している。護岸の一部が浸食されていることもあり、将来的に既存送水管に影響を与えることが懸念される。

(2) 斜面部の民家の乱立

また、ノトラ配水池に向かう送水管最後の斜面部においては、送水管の布設後に民家が乱立されたことにより、送水管上に民家が建っている箇所もあり、管の補修が出来ない状況である。

(3) 既存送水管を使用する利点

既存送水管を使用する利点としては、計画送水量の一部を既存送水管で送水することが出来るため、新規送水管の口径を小さくすることが可能となり(新規送水管のみ:900mm、既存管と併用:新規送水管口径700mmまたは600mm)、事業費を抑えられる可能性がある。ただし、既存送水管の調査、必要な範囲の更新(水管橋、曲管部等)には送水を長期にわたって止め、水圧を下げた状態あるいは排水した後での実施が必要である。

(4) 既存送水管を使用する欠点

既存送水管の過去の漏水・補修履歴のあるなか、施工会社が完工を待たずに引き上げ、裁判にもなり、水圧試験も実施されていない状況を考慮すると、既存送水管が高水圧に対し適切に対応され、施工されていると判断することに強い抵抗がある。漏水補修に関しては、漏水した箇所の管路の更新のみであり、コンクリート防護の補強、前後の管路の状態の確認などは行っていないことから、時間の経過とともに同じ場所からの漏水が再度発生する可能性がある。また、現時点で漏水が発生していない箇所においても、曲管の使用箇所、緩く曲線を描いている箇所など、不平均力の発生する場所については漏水事故が発生する可能性は否定できない。したがって、既存送水管を使用する場合、漏水事故の発生のたびに送水が新規送水管のみとなり、必要な送水量が送水出来ない状況となる。

5. 貴機構整理依頼事項に対する見解

以下に、貴機構からの整理依頼事項に対する見解を示す。

表 4 整理依頼事項に対する見解

整理依頼事項記載内容		コンサルタントの見解
基礎調査時	本準備調査での報告	
口径（600mm）が不十分で、ノトラ配水池への計画送水量が送水できない。	実際に技プロチームがンゾベ浄水場出口での送水量を流量計で計測したところ、ンゾベ浄水場からの計画送水量の約40,000トン/日が送水できていた。	基礎調査及び本件では、既存のンゾベ浄水場の処理能力（90,000m ³ /日）を基本に計画を進めており（これまでの協議の結果、本件では79,000m ³ /日）、40,000m ³ /日が送水出来れば良いとの立場には立っていない。
基礎調査時にノトラ配水池への流入量から算出した漏率が17.6%あった。	その後3度の送水量測定調査にて、いずれも漏水はほぼ無いという結果であった。	水管橋からの漏水以外、確認出来る漏水はほぼ無い。
既存管の2か所の水管橋うち、1か所では2014年に大量漏水があり、2017年3月にWASACが応急措置を行って漏水は止まっている。もう1か所では現在も漏水が発生しているが、WASACは修理を行っていない。応急措置を行った水管橋も基礎が地面に対して傾斜しており、漏水が再発する恐れがある。	現在も漏水が発生している水管橋は2日程度補修に要するが、断水できず工事が行えない。漏水量も増加している。	特に齟齬はない。
WASACのGISデータによれば、既存管には呼び水圧PN16の管材が使用されている。一方、送水ポンプの送水圧は23.2barであり、水撃圧（60%増）を考慮すると37bar程度の設計水圧となり、耐圧化を施さなければ配管の破損や漏水のリスクは非常に大きい。管の許容を超えた送水圧が送水管に作用している。	PN16はダクタイル鋳鉄管の規格でなく、フランジの規格であったと思われる。ダクタイル鋳鉄管であれば、通常の送水圧23.2bar及び水撃圧発生時の37barには十分耐えうる。	フランジについては、PN16、PN40の双方が使用されている。PN規格がダクタイル鋳鉄管の規格でないことは正しい。ダクタイル鋳鉄管の水圧に関しては認識は同じであり、管が破裂するとは考えていない。危惧するのは高水圧で地盤が緩い状況で管が外れることによる漏水事故が今後も発生する可能性である。

既存送水管に関しては、正規に引き渡されて使用されているものではなく、必要な水圧試験も実施されておらず、既存送水管の安全性については正規に確認されていない。過去の約10年に亘る使用実績により、水撃圧も含めた水圧に対する安全性は担保されているとの見方もあるが、安全性が担保されているとすれば、水圧試験も問題なく終了するはずであり、水撃圧も考慮した水圧試験を実施したうえで、確実に既存送水管が使用できることを確認することが、既存送水管を併用する場合は必要であると考ええる。

これまでの漏水事故の発生頻度及び既存送水管の引き渡しにかかる経緯を踏まえると、水圧試験を実施した場合の漏水及び管の離脱が発生する可能性を憂慮する。本調査で既存送水管の水圧試験を実施した場合、水圧試験により発生した漏水や管の離脱に対する復旧対策を講じることは困難であり、キガリ市内に長期の断水を強いる可能性を考えると、本調査にて既存送水管の水圧試験を実施することは現実的ではない。

既存送水管を使用するとの前提に立った場合、既存送水管の水圧試験の実施や必要な既存送水管の補強・改修の詳細が確認できるのは新設送水管を布設し、新設送水管による通水が可能になった後である。この場合は、本調査の積算時に水圧試験を含む各種調査費用、想定される既存送水管の補強・改修を想定して事業費を算出することになるが、新設送水管布設後の調査結果により、費用が増額に振れる可能性があり、その際には改めて必要な予算を確保する必要がある。

Nzove浄水場～Ntora配水池：既存管の布設状況

既存送水管(ダクティル鋼管:φ600mm)

新設送水管



Ntota Reservoir

狭小区域

Nzove WWT

漏水発生箇所①

漏水発生箇所②

漏水発生箇所③

漏水発生箇所④

漏水発生箇所⑤

漏水発生箇所⑥

湿地帯



送水方式によるNzove浄水場の改修及び既存管取扱いの検討（条件：Ntora配水池まで直送）

項目	既存管（Φ600）と併用		新設管のみ対応	
	① ポンプ棟建設	② 既存ポンプ棟利用	③ ポンプ棟建設	④ 既存ポンプ棟利用
施設フロー	<p>※ピンク：対象事</p>	<p>※ピンク：対象事</p>	<p>※ピンク：対象事</p>	<p>※ピンク：対象事</p>
送水方式	Nzove2浄水場から22,000m3/日をポンプ棟を含む新たなポンプ設備で送水する	Nzove1、Nzove2の総浄水量62,000m3/日を既存ポンプの更新新により送水する	Nzove2浄水場から22,000m3/日をポンプ棟を含む新たなポンプ設備で送水する	Nzove1、Nzove2の総浄水量62,000m3/日を既存ポンプの更新新により送水する
既存管送水量	40,000m3/日			
新設管送水量	47,000m3/日			
新設管口径	Φ700			
既存ポンプの更新計画	既存ポンプ更新の必要なし (40,000m3/日)	既存ポンプの更新 (40,000m3/日→62,000m3/日)	既存ポンプ更新の必要なし (40,000m3/日)	既存ポンプの更新 (40,000m3/日→62,000m3/日)
新設ポンプ計画	ポンプ棟・新設ポンプ設置 (22,000m3/日)	---	ポンプ棟・新設ポンプ設置 (22,000m3/日)	---
施工に対する課題	<ul style="list-style-type: none"> 既存施設と別系統となり、既存施設を通常運用した状態での施工が可能 施工上の問題は特になし 	<ul style="list-style-type: none"> 既存管（Φ600）からの分岐が発生 ポンプの更新による断水が発生 分岐については断水又は断水となり、ポンプの更新も含め施工難度が高い 	<ul style="list-style-type: none"> 既存管との接続以外は既存施設と別系統となり、既存施設を通常運用した状態で施工が可能 既存管との接続に関しては断水工法、一時的に送水量は少なくなるものの、新設管からの通水により既存施設を停止しての切替施工が可能 	<ul style="list-style-type: none"> 既存管（Φ600）からの分岐が発生 ポンプの更新による断水が発生 分岐については断水又は断水となり、ポンプの更新も含め施工難度が高い
管洗浄・耐圧試験等に対する課題	<ul style="list-style-type: none"> 新設ポンプを利用した充水・洗浄・耐圧試験の実施が可能 洗浄に必要な流速が確保できない場合は仮設排水管を設置して管内に充水後、逆流による洗浄の検討も可能 	<ul style="list-style-type: none"> 既存管との接続後に充水・洗浄・耐圧試験の実施が考えられるが、分岐部の制水弁による流量調整は高圧により検討を要する 	<ul style="list-style-type: none"> 新設ポンプを利用した充水・洗浄・耐圧試験の実施が可能 洗浄に必要な流速が確保できない場合は仮設排水管を設置して管内に充水後、逆流による洗浄も可能 耐圧試験後に既設管と接続することで運用が開始できる 	<ul style="list-style-type: none"> 既存管との接続後に充水・洗浄・耐圧試験の実施が考えられるが、分岐部の制水弁による流量調整は高圧により検討を要する
既存管の改修による課題	<ul style="list-style-type: none"> 漏水が発生している既存水管橋を本件で更新する必要がある 既存水管橋の更新期間中は、既存管を使用できないため新設管による送水となるが、22,000m3/日のみの送水により市内の断水が長期となる 	<ul style="list-style-type: none"> 漏水が発生している既存水管橋を本件で更新する必要がある 既存水管橋の更新期間中は、既存管を使用できないため新設管による送水となるが、47,000m3/日の送水が必要となり、新設管の口径を分岐部から47,000m3/日にて計画する必要がある 	---	---
採用に際しての既存送水管に対する見解	<ul style="list-style-type: none"> 過去10年で漏水事故が6件発生している 水管橋からの漏水や不平均力に対する対応（基礎が傾いている）など、設計に問題がある 竣工図がなく、当時の施工状況や現状の埋設部の状態が確認できない 斜面部は無秩序に建設された住宅により、補修も含めた管路の維持管理ができない 			
開発調査と本件関連性との対応	<ul style="list-style-type: none"> キガリ市の人口の増加に伴い、今後の開発調査で新たな水源の確保が優先事項となるなか、Nzove地域の水源開発のポテンシャル（水量・水質）は他の既存浄水場に比べて高いものの、更なる送水管の布設は難しく、水源開発を含む開発調査での将来の拡張計画の足枷となる。 			

鋼管管厚計算に係る技術資料

1. 鋼管の管厚計算（日本水道鋼管協会：水道用鋼管による）計画送水量：87,000m³/日

(1) 設計条件

管外径： 914.4 mm
 管厚： 8.0 mm
 材質： STW400
 鋼の弾性係数 (E)： 200,000 N/mm²

許容変形率 (%)： 5 % (許容変形率：塗料)
 許容応力度 (σ_a)： 140 N/mm² (静水圧のみ)
 210 N/mm² (静水圧 + 水撃圧)

圧力水頭： 240 m (静水圧のみ) → 内圧 (P)： 2.35 Mpa (静水圧のみ)
 355 m (静水圧 + 水撃圧) → 3.48 Mpa (静水圧 + 水撃圧)

土被り (H)： 2.0 m
 基礎支持角 (°)： 90 °
 土の単位体積重量 (γ_s)： 18 kN/m³
 土の反力係数 (E')： 1.4 N/mm² (土質分類：シルトML、軽度の締固め)

輪荷重： 2 台 (T-25)

形状係数 (f)： 1.5 定数

(2) 内圧による円周方向応力度

$$\begin{aligned}\sigma_t &= P \cdot D_i / 2t \text{ (静水圧のみ)} \\ &= 132.1 \text{ N/mm}^2 \\ &< 140.0 \text{ N/mm}^2 \quad \dots \text{ OK}\end{aligned}$$

内圧による円周方向応力度 (σ_t)： --- N/mm²
 管の内径 (D_i)： 898.4 mm
 管厚 (t)： 8.0 mm

$$\begin{aligned}\sigma_t &= P \cdot D_i / 2t \text{ (静水圧 + 水撃圧)} \\ &= 195.3 \text{ N/mm}^2 \\ &< 210.0 \text{ N/mm}^2 \quad \dots \text{ OK}\end{aligned}$$

(3) 外圧の検討 (変形量)

$$\begin{aligned}\Delta X &= 2 \cdot K_x (W_v + W_t) R^4 / E \cdot I + 0.06146 E' \cdot R^3 \\ &= 25.6 \text{ mm}\end{aligned}$$

水平方向の変形量 (ΔX)： --- mm
 管底の曲げモーメント係数 (K_b)： 0.15699 基礎支持角：90°
 水平方向変形係数 (K_x)： 0.09559 基礎支持角：90°
 鉛直土荷重強度 (W_v)： 0.036 N/mm²
 トラック荷重強度 (W_t)： 0.015 N/mm²
 管の平均半径 (R)： 457.2 mm
 管の単位幅の断面二次モーメント (I)： 42.7 mm³ (I=t³/12)
 衝撃係数 (i)： 0.45 kN/m³

$$\begin{aligned}\text{変形率} &= \Delta X / \text{管外径} \\ &= 2.8 \% \\ &< 5.0 \% \text{ (許容変形率：塗料)} \quad \dots \text{ OK}\end{aligned}$$

ここに、鉛直土荷重強度は

$$\begin{aligned}W_v &= \gamma_s \cdot H \text{ (土被り } H \leq 2\text{m)} \\ &= 36.0 \text{ kN/m}^2 \\ &= 0.036 \text{ N/mm}^2\end{aligned}$$

また、トラック荷重強度は、T-25トラック2台として

$$\begin{aligned}W_t &= 100(1+i) / (2.50+H)(0.1+H) \\ &= 15.3 \text{ kN/m}^2 \\ &= 0.015 \text{ N/mm}^2\end{aligned}$$

(4) 外圧の検討 (曲げ応力度)

$$\sigma_b = \frac{2}{f \cdot z} (W_v + W_t) \frac{K_b \cdot R^2 \cdot E \cdot I + (0.06146 K_b - 0.08303 K_x) E' \cdot R^5}{E \cdot I + 0.06146 E' \cdot R^3}$$

$$\begin{aligned}&= 125.6 \text{ N/mm}^2 \\ &< 140.0 \text{ N/mm}^2 \text{ (許容応力度 } \sigma_a) \quad \dots \text{ OK}\end{aligned}$$

外圧による管底部曲げ応力度 (σ_b)： --- N/mm²
 管の単位幅の断面係数 (Z)： 10.7 mm² (I=t²/6)

2. 鋼管の管厚計算（日本水道鋼管協会：水道用鋼管による）送水量：105,000m³/日（参考）

（1）設計条件

管外径： 914.4 mm
 管厚： 8.0 mm
 材質： STW400
 鋼の弾性係数（E）： 200,000 N/mm²

許容変形率（%）： 5 %（許容変形率：塗料）
 許容応力度（ σ_a ）： 140 N/mm²（静水圧のみ）
 210 N/mm²（静水圧＋水撃圧）

圧力水頭： 250 m（静水圧のみ） → 内圧（P）： 2.45 Mpa（静水圧のみ）
 374 m（静水圧＋水撃圧） → 3.67 Mpa（静水圧＋水撃圧）

土被り（H）： 2.0 m
 基礎支持角（°）： 90 °
 土の単位体積重量（ γ_s ）： 18 kN/m³
 土の反力係数（E'）： 1.4 N/mm²（土質分類：シルトML、軽度の締固め）

輪荷重： 2 台（T-25）

形状係数（f）： 1.5 定数

（2）内圧による円周方向応力度

$$\begin{aligned}\sigma_t &= P \cdot D_i / 2t \text{（静水圧のみ）} \\ &= 137.6 \text{ N/mm}^2 \\ &< 140.0 \text{ N/mm}^2 \quad \dots \text{OK}\end{aligned}$$

内圧による円周方向応力度（ σ_t ）： --- N/mm²
 管の内径（ D_i ）： 898.4 mm
 管厚（t）： 8.0 mm

$$\begin{aligned}\sigma_t &= P \cdot D_i / 2t \text{（静水圧＋水撃圧）} \\ &= 205.8 \text{ N/mm}^2 \\ &< 210.0 \text{ N/mm}^2 \quad \dots \text{OK}\end{aligned}$$

（3）外圧の検討（変形量）

$$\begin{aligned}\Delta X &= 2 \cdot K_x (W_v + W_t) R^4 / E \cdot I + 0.06146 E' \cdot R^3 \\ &= 25.6 \text{ mm}\end{aligned}$$

水平方向の変形量（ ΔX ）： --- mm
 管底の曲げモーメント係数（ K_b ）： 0.15699 基礎支持角：90°
 水平方向変形係数（ K_x ）： 0.09559 基礎支持角：90°
 鉛直土荷重強度（ W_v ）： 0.036 N/mm²
 トラック荷重強度（ W_t ）： 0.015 N/mm²
 管の平均半径（R）： 457.2 mm
 管の単位幅の断面二次モーメント（I）： 42.7 mm³（ $I = t^3/12$ ）
 衝撃係数（i）： 0.45 kN/m³

$$\begin{aligned}\text{変形率} &= \Delta X / \text{管外径} \\ &= 2.8 \% \\ &< 5.0 \% \text{（許容変形率：塗料）} \quad \dots \text{OK}\end{aligned}$$

ここに、鉛直土荷重強度は

$$\begin{aligned}W_v &= \gamma_s \cdot H \text{（土被り } H \leq 2\text{m）} \\ &= 36.0 \text{ kN/m}^2 \\ &= 0.036 \text{ N/mm}^2\end{aligned}$$

また、トラック荷重強度は、T-25トラック2台として

$$\begin{aligned}W_t &= 100(1+i) / (2.50+H)(0.1+H) \\ &= 15.3 \text{ kN/m}^2 \\ &= 0.015 \text{ N/mm}^2\end{aligned}$$

（4）外圧の検討（曲げ応力度）

$$\sigma_b = \frac{2}{f \cdot z} (W_v + W_t) \frac{K_b \cdot R^2 \cdot E \cdot I + (0.06146 K_b - 0.08303 K_x) E' \cdot R^5}{E \cdot I + 0.06146 E' \cdot R^3}$$

$$\begin{aligned}&= 125.6 \text{ N/mm}^2 \\ &< 140.0 \text{ N/mm}^2 \text{（許容応力度 } \sigma_a \text{）} \quad \dots \text{OK}\end{aligned}$$

外圧による管底部曲げ応力度（ σ_b ）： --- N/mm²
 管の単位幅の断面係数（Z）： 10.7 mm²（ $I = t^2/6$ ）

水撃圧に係る技術資料

水撃圧計算（計画流量：87,000m3/日）

1. 設計条件

計画送水量	3,625 m ³ /h
	60.4 m ³ /min
ポンプ台数	9 台
1台当り吐出量	6.7 m ³ /min
ポンプ全揚程	240 m
吸水井LWL	1,364.0 m
配水池HWL	1,572.5 m
最高実揚程	208.5 m
送水管	口径 900 mm
	延長 9,450 m
原動機	出力 360 kW
	回転数 2,980 rpm
	電圧 0.38 kV

2. 計算条件

No. 項目	計算結果	単位	計算式
ポンプ台数	N	9 台	
ポンプ規定吐出量	Q _n	0.112 m ³ /sec	設計条件より
ポンプ規定全揚程	H _n	240 m	設計条件より
ポンプ回転数	N _n	2980 rpm	設計条件より
ポンプ効率	η _p	75 %	条件
水の比重	γ	1	条件
電動機出力	P	360 kW	設計条件より
電動機の慣性効果	(GD ²) ₂	7 kgf・m ²	かご形電動出力 GD ² 線図より
ポンプの慣性効果	(GD ²) ₁	0.7 kgf・m ²	(GD ²) ₂ の10%
回転部分の全慣性効果	(GD ²)	7.7 kgf・m ²	(GD ²) ₁ +(GD ²) ₂
ポンプ軸動力	P _n	351.1 kW	9.807×γ×Q _n ×H _n /η _p
ポンプトルク	M _n	114.8 kg・m	974×P _n /N _n
ポンプの慣性係数	K	1.88	(375×M _n)/(GD ² ×N _n)
管路計画流量	Q	1.007 m ³ /sec	設計条件より
管内径	D	0.9 m	設計条件より
管路延長	L	9,450 m	設計条件より
管路規定流速	v _n	1.58 m/sec	
圧力波伝播速度	a	954 m/sec	1425/√{(1+k/E×D/t)}
管厚	t	0.008 m	条件
水の体積弾性率	k	219,000,000 kg・m ²	2.19×10 ⁸
管材料の縦弾性係数	E	20,000,000,000	鋼管 2.0×10 ¹⁰
管路定数	2ρ	0.64	a/9.8×v _n /H _n
圧力波往復時間	μ	19.81 sec	2L/a
K・μの値	K・μ	37.16	K・μ
管路損失	H _l	31.5 m	条件
動水勾配	I	0.00333	H _l /L
管路損失とポンプ全揚程の比率(%)		13.13 %	H _l /H _n ×100

3. 最低圧力の計算

管路損失（0%、20%）はパーマキアンの図表からの読取値

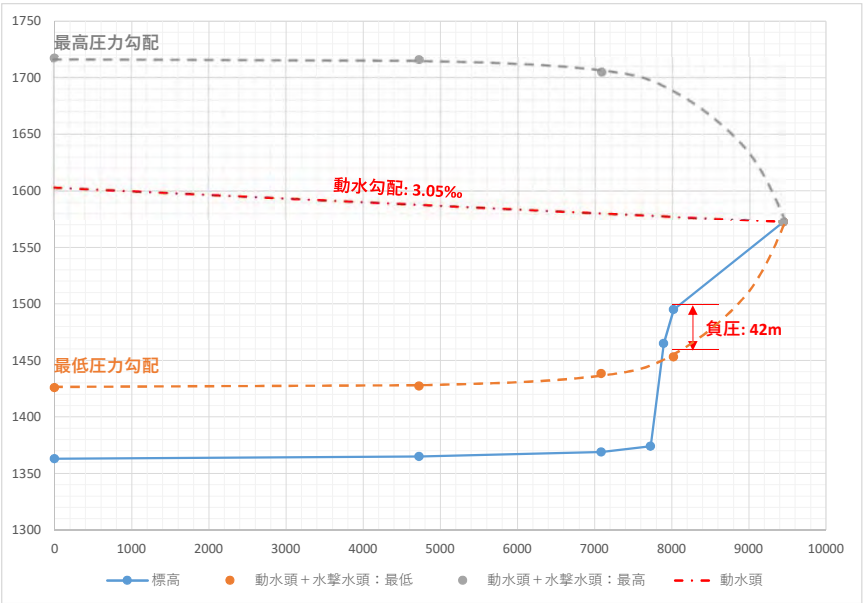
場所	管路損失 0%	管路損失 20%	管路損失 13.13%
ポンプ直後	36%	21%	26.2%
1/2L地点	36%	22%	26.8%
3/4L地点	36%	29%	31.4%

	動水圧+水撃圧 (m)	標高(m)	最低水圧(m)
ポンプ直後	62.775	1,363	62.775
1/2L地点	64.350	1,365	62.350
3/4L地点	75.375	1,369	69.375

4. 最高圧力の計算

	動水圧+水撃圧 (m)	標高(m)	最高水圧(m)
ポンプ直後	354.225	1363	354.225
1/2L地点	352.650	1365	350.650
3/4L地点	341.625	1369	335.625

水撃圧の計算結果（横軸：距離(m)、縦軸：標高(m)）



	ポンプ直後	1/2L地点	3/4L地点				配水池
管延長	0	4725	7087.5	7725	7897	8026	9,450
標高	1,363.00	1,365.00	1,369.00	1,374.00	1,465.00	1,495.00	1,572.50
動水頭+水撃水頭：最低	1,425.78	1,427.35	1,438.38	---	---	1,453.00	1,572.50
動水頭+水撃水頭：最高	1,717.23	1,715.65	1,704.63	---	---	---	1,572.50
動水頭	1,603.00	1,587.75	1,580.13	1,578.07	1,577.51	1,577.10	1,572.50

圧力タンク容量計算（計画流量：87,000m3/日）

1. 設計条件

計画送水量		3,625 m ³ /h	
		60.42 m ³ /min	
ポンプ台数		9 台	
1台当り吐出量		6.7 m ³ /min	
ポンプ全揚程	H _n	240.0 m	
吸水井LWL		1,364.0 m	
配水池HWL		1,572.5 m	
吸込揚程	H _{si}	0.0 m	吸上げの場合、H _{is} は－
実揚程		208.5 m	
送水管	口径	900 mm	
	延長	9,450 m	
原動機	出力	360 kW	
	回転数	2,980 rpm	
	電圧	0.38 kV	

2. 計算条件

圧力タンクの初期絶対圧力水頭	H ₀ *	250.33 m	H _n -H _{si} +10.33
管路損失	H _f	31.5 m	H _n -実揚程
ポンプの初期流量	Q _o	1.007 m ³ /sec	
管路規定流速	V _n	1.583 m/sec	
圧力波伝播速度	a	954 m/sec	1425/√(1+k/E×D/t)
管厚	t	0.008 m	条件
水の体積弾性率	k	219,000,000 kg・m ²	2.19×10 ⁸
管材料の縦弾性係数	E	20,000,000,000	鋼管 2.0×10 ¹⁰
管路定数	2p	0.61	a/9.8×V _n /H _n

3. α、βの設定

ポンプ直後の最高上昇圧力	+ΔH _{xmax}	216 m	条件
	α	0.86	+ΔH _{xmax} /H ₀ *
管路中間点の最大降下圧力	-ΔH _{ymax}	120 m	
	β	0.48	-ΔH _{ymax} /H ₀ *
流量Q _o が圧力タンクに流入する場合の全損失がKH ₀ *で表される水頭損失係数			
	K	0.3	条件
ポンプ直後	α'	0.53	簡易計算図表より、α'≤α
	β'	0.46	簡易計算図表より、β'≤β
管路中間点	α''	0.32	簡易計算図表より
	β''	0.37	簡易計算図表より
	2・C _o ・α/(Q _o ・L)	2.5	

4. 上昇圧力、降下圧力の計算

ポンプ直後（上昇圧力）	+ΔH _{xmax}	132.67 m	α'・H ₀ *
ポンプ直後（降下圧力）	-ΔH _{ymax}	-115.15 m	β'・H ₀ *
管路中間点（上昇圧力）	+ΔH _{xmax}	80.11 m	α''・H ₀ *
管路中間点（降下圧力）	-ΔH _{ymax}	-92.62 m	β''・H ₀ *

5. 圧力タンク内の圧縮空気の初めの体積（C_o）

	12.47 m3	2.5・Q _o ・L/2a
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6. 圧力タンク内最小容量（C'）

	23.09 m3	Co/(1-β')
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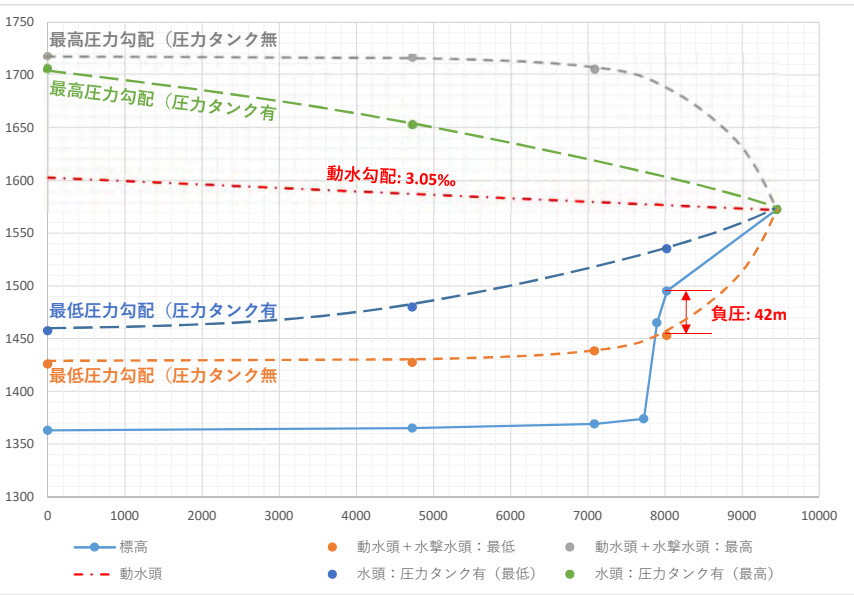
7. 圧力タンク容量

圧力タンク内の最低水位を約30%と設定	32.00 m3	≈C'/(1-0.3)
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8. 圧力タンク基部（オリフィス）の損失水頭

	43.60 m	
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圧力タンク設置時の計算結果（横軸：距離(m)、縦軸：標高(m)）



	ポンプ直後	1/2L地点	3/4L地点				配水池
管延長	0	4725	7087.5	7725	7897	8026	9,450
標高	1,363.00	1,365.00	1,369.00	1,374.00	1,465.00	1,495.00	1,572.50
動水頭+水撃水頭: 最低	1,425.78	1,427.35	1,438.38	---	---	1,453.00	1,572.50
動水頭+水撃水頭: 最高	1,717.23	1,715.65	1,704.63	---	---	---	1,572.50
動水頭	1,603.00	1,587.75	1,580.13	1,578.07	1,577.51	1,577.10	1,572.50
水頭: 圧力タンク有 (最低)	1,457.35	1,479.88	---	---	---	1,535.00	1,572.50
水頭: 圧力タンク有 (最高)	1,705.17	1,652.61	---	---	---	---	1,572.50
管内水圧(常時)	240.00	222.75	211.13	204.07	112.51	82.10	0.00
管内最低水圧(圧力タンク無)	62.78	62.35	69.38	---	---	-42.00	0.00
管内最高水圧(圧力タンク無)	354.23	350.65	335.63	---	---	---	0.00
管内最低水圧(圧力タンク有)	94.35	114.88	---	---	---	40.00	0.00
管内最高水圧(圧力タンク有)	342.17	287.61	---	---	---	---	0.00

水撃圧計算（参考 計画流量：105,000m3/日）

1. 設計条件

計画送水量	4,375 m ³ /h
	72.9 m ³ /min
ポンプ台数	9 台
1台当り吐出量	8.1 m ³ /min
ポンプ全揚程	250 m
吸水井LWL	1,364.0 m
配水池HWL	1,572.5 m
最高実揚程	208.5 m
送水管	口径 900 mm
	延長 9,450 m
原動機	出力 450 kW
	回転数 2,980 rpm
	電圧 0.38 kV

2. 計算条件

No. 項目	計算結果	単位	計算式
ポンプ台数	N	9 台	
ポンプ規定吐出量	Q _n	0.135 m ³ /sec	設計条件より
ポンプ規定全揚程	H _n	250 m	設計条件より
ポンプ回転数	N _n	2980 rpm	設計条件より
ポンプ効率	η _p	75 %	条件
水の比重	γ	1	条件
電動機出力	P	450 kW	設計条件より
電動機の慣性効果	(GD ²) ₂	9 kgf・m ²	かご形電動出力 GD ² 線図より
ポンプの慣性効果	(GD ²) ₁	0.9 kgf・m ²	(GD ²) ₂ の10%
回転部分の全慣性効果	(GD ²)	9.9 kgf・m ²	(GD ²) ₁ +(GD ²) ₂
ポンプ軸動力	P _n	441.4 kW	9.807×γ×Q _n ×H _n /η _p
ポンプトルク	M _n	144.3 kg・m	974×P _n /N _n
ポンプの慣性係数	K	1.83	(375×M _n)/(GD ² ×N _n)
管路計画流量	Q	1.215 m ³ /sec	設計条件より
管内径	D	0.9 m	設計条件より
管路延長	L	9,450 m	設計条件より
管路規定流速	v _n	1.91 m/sec	
圧力波伝播速度	a	954 m/sec	1425/√{(1+k/E×D/t)}
管厚	t	0.008 m	条件
水の体積弾性率	k	219,000,000 kg・m ²	2.19×10 ⁸
管材料の縦弾性係数	E	20,000,000,000	鋼管 2.0×10 ¹⁰
管路定数	2ρ	0.74	a/9.8×v _n /H _n
圧力波往復時間	μ	19.81 sec	2L/a
K・μの値	K・μ	36.34	K・μ
管路損失	H _l	41.5 m	条件
動水勾配	I	0.00439	H _l /L
管路損失とポンプ全揚程の比率(%)		16.60 %	H _l /H _n ×100

3. 最低圧力の計算

管路損失（0%、20%）はパーマキアンの図表からの読取値

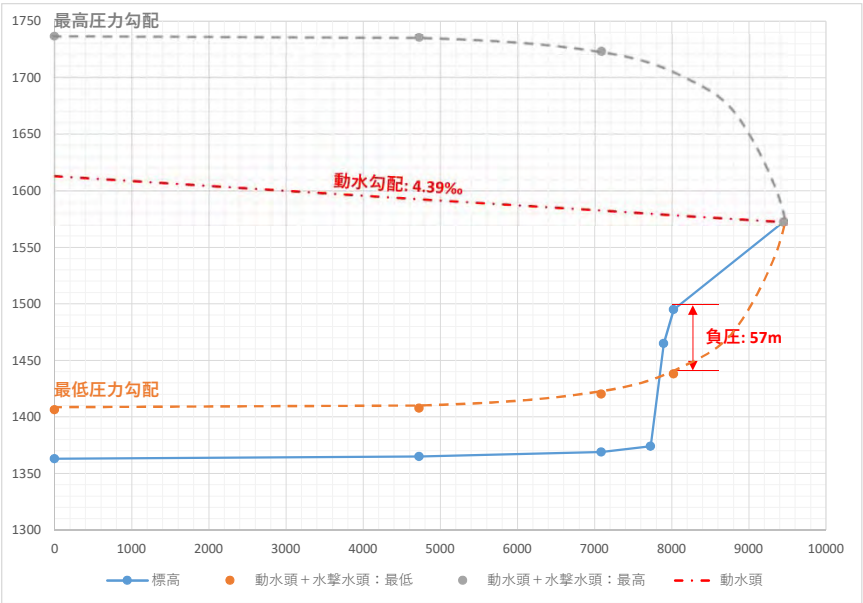
場所	管路損失 0%	管路損失 20%	管路損失
ポンプ直後	26%	16%	17.4%
1/2L地点	26%	16%	17.9%
3/4L地点	26%	22%	22.8%

	動水圧+水撃圧 (m)	標高(m)	最低水圧(m)
ポンプ直後	43.420	1,363	43.420
1/2L地点	44.665	1,365	42.665
3/4L地点	57.115	1,369	51.115

4. 最高圧力の計算

	動水圧+水撃圧 (m)	標高(m)	最高水圧(m)
ポンプ直後	373.580	1363	373.580
1/2L地点	372.335	1365	370.335
3/4L地点	359.885	1369	353.885

水撃圧の計算結果（横軸：距離(m)、縦軸：標高(m)）



	ポンプ直後	1/2L地点	3/4L地点				配水池
管延長	0	4725	7087.5	7725	7897	8026	9,450
標高	1,363.00	1,365.00	1,369.00	1,374.00	1,465.00	1,495.00	1,572.50
動水頭+水撃水頭：最低	1,406.42	1,407.67	1,420.12	---	---	1,438.00	1,572.50
動水頭+水撃水頭：最高	1,736.58	1,735.34	1,722.89	---	---	---	1,572.50
動水頭	1,613.00	1,592.75	1,582.63	1,579.89	1,579.16	1,578.60	1,572.50

圧力タンク容量計算（参考 計画流量：105,000m3/日）

1. 設計条件

計画送水量		4,375 m ³ /h	
		72.9 m ³ /min	
ポンプ台数		9 台	
1台当り吐出量		8.1 m ³ /min	
ポンプ全揚程	H _n	250.0 m	
吸水井LWL		1,364.0 m	
配水池HWL		1,572.5 m	
吸込揚程	H _{si}	0.0 m	吸上げの場合、H _{is} は－
実揚程		208.5 m	
送水管	口径	900 mm	
	延長	9,450 m	
原動機	出力	450 kW	
	回転数	2,980 rpm	
	電圧	0.38 kV	

2. 計算条件

圧力タンクの初期絶対圧力水頭	H ₀ *	260.33 m	H _n -H _{si} +10.33
管路損失	H _f	41.5 m	H _n -実揚程
ポンプの初期流量	Q _o	1.215 m ³ /sec	
管路規定流速	V _n	1.910 m/sec	
圧力波伝播速度	a	954 m/sec	1425/√(1+k/E×D/t)
管厚	t	0.008 m	条件
水の体積弾性率	k	219,000,000 kg・m ²	2.19×10 ⁸
管材料の縦弾性係数	E	20,000,000,000	鋼管 2.0×10 ¹⁰
管路定数	2p	0.71	a/9.8×V _n /H _n

3. α、βの設定

ポンプ直後の最高上昇圧力	+ΔH _{xmax}	216 m	条件
	α	0.83	+ΔH _{xmax} /H ₀ *
管路中間点の最大降下圧力	-ΔH _{ymax}	120 m	
	β	0.46	-ΔH _{ymax} /H ₀ *
流量Q _o が圧力タンクに流入する場合の全損失がKH ₀ *で表される水頭損失係数			
	K	0.3	条件
ポンプ直後	α'	0.59	簡易計算図表より、α'≤α
	β'	0.49	簡易計算図表より、β'≤β
管路中間点	α''	0.38	簡易計算図表より
	β''	0.39	簡易計算図表より
	2・C _o ・a/(Q _o ・L)	2.5	

4. 上昇圧力、降下圧力の計算

ポンプ直後（上昇圧力）	+ΔH _{xmax}	153.59 m	α'・H ₀ *
ポンプ直後（降下圧力）	-ΔH _{ymax}	-127.56 m	β'・H ₀ *
管路中間点（上昇圧力）	+ΔH _{xmax}	98.93 m	α''・H ₀ *
管路中間点（降下圧力）	-ΔH _{ymax}	-101.53 m	β''・H ₀ *

5. 圧力タンク内の圧縮空気の初めの体積（C_o）

	15.05 m3	2.5・Q _o ・L/2a
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6. 圧力タンク内最小容量（C'）

	29.51 m3	Co/(1-β')
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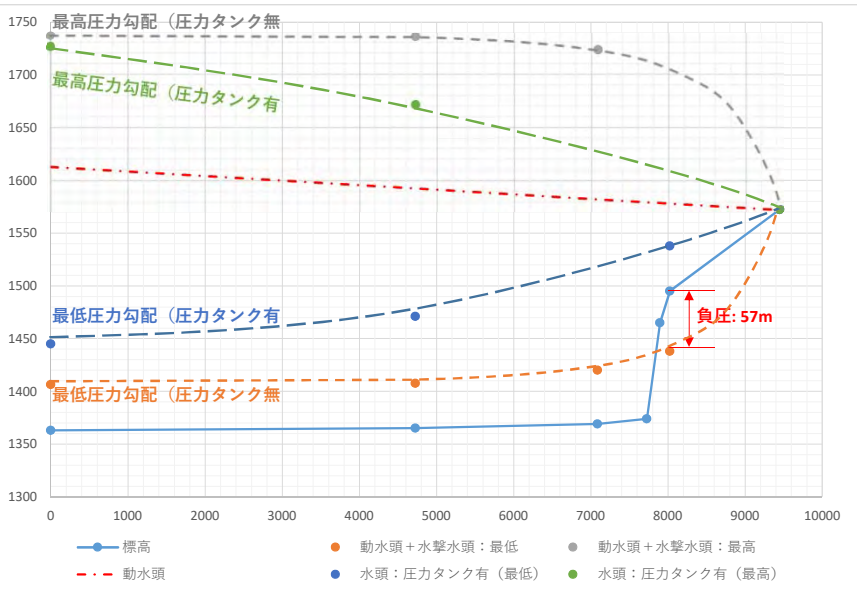
7. 圧力タンク容量

圧力タンク内の最低水位を約30%と設定	42.00 m3	≈C'/(1-0.3)
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8. 圧力タンク基部（オリフィス）の損失水頭

	36.60 m	
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圧力タンク設置時の計算結果（横軸：距離(m)、縦軸：標高(m)）



	ポンプ直後	1/2L地点	3/4L地点				配水池
管延長	0	4725	7087.5	7725	7897	8026	9,450
標高	1,363.00	1,365.00	1,369.00	1,374.00	1,465.00	1,495.00	1,572.50
動水頭 + 水撃水頭：最低	1,406.42	1,407.67	1,420.12			1,438.00	1,572.50
動水頭 + 水撃水頭：最高	1,736.58	1,735.34	1,722.89				1,572.50
動水頭	1,613.00	1,592.75	1,582.63	1,579.89	1,579.16	1,578.60	1,572.50
水頭：圧力タンク有（最低）	1,444.94	1,470.97				1,538.00	1,572.50
水頭：圧力タンク有（最高）	1,726.09	1,671.43					1,572.50
管内水圧(常時)	250.00	227.75	213.63	205.89	114.16	83.60	0.00
管内最低水圧(圧力タンク無)	43.42	42.67	51.12	---	---	-57.00	0.00
管内最高水圧(圧力タンク無)	373.58	370.34	353.89	---	---	---	0.00
管内最低水圧(圧力タンク有)	81.94	105.97	---	---	---	43.00	0.00
管内最高水圧(圧力タンク有)	363.09	306.43	---	---	---	---	0.00

収集資料リスト

番号	資料の名称	形態(図書、ヒ データ、地図、写真 等)	収集方法	発行機関	発行年月	資料言語
A 実施機関に関する情報						
A-1	WASAC Organization Chart	書面 (PDF)	C/P	WASAC	2017年2月	英語
A-2	WASAC Annual Report 2014-2015	図書 (PDF)	C/P	WASAC	2015年	英語
A-3	WASAC Annual Report 2015-2016	図書 (PDF)	C/P	WASAC	2017年5月	英語
A-4	NRW in WASAC(2014-2017)	Excel	C/P	WASAC	2017年11月	英語
A-5	WASAC Budget 2015/2016	図書 (PDF)	C/P	WASAC	2015年	英語
A-6	WASAC Detailed Budget 2015/2016	図書 (PDF)	C/P	WASAC	2015年	英語
A-7	WASAC Budget 2016/2017	図書 (PDF)	C/P	WASAC	2017年2月	英語
A-8	WASAC Budget 2017/2018	図書 (PDF)	C/P	WASAC	2017年8月	英語
A-9	Water Tariff and Charges	ウェブ (PDF)	インターネット	WASAC	2017年11月	英語
A-10	2015 ANNUAL REPORT NZOVE WTP	図書 (Word)	C/P	WASAC	2016年	英語
A-11	2016 ANNUAL REPORT NZOVE WTP	図書 (Word)	C/P	WASAC	2017年	英語
A-12	Nzove Water Treatment Plant Power Cut Off and Supplied Time Evaluation from Nov 2016 to Nov 2017	写真	C/P	WASAC	2017年12月	英語
A-13	Logbook for Operation at Nzove WTP (Power&Water Quality) from Nov 2016 to Dec 2017	写真	C/P	WASAC	2017年12月	仏語
A-14	Logbook for Pump Operation to Ntora at Nzove WTP in Apr 2017, Aug 2017, Oct 2017, Nov 2017	写真	C/P	WASAC	2017年11月	仏語
A-15	DAILY REPORT JULY 2016 TO JUNE 2017	Excel	C/P	WASAC	2017年11月	英語
A-16	DAILY REPORT JULY 2017 TO JUNE 2018	Excel	C/P	WASAC	2017年11月	英語
A-17	Drawings of Detailed Design for Existing Nzove Ntora Pipeline一式	図面 (PDF)	C/P	ESPINA	2007年3月	仏語
A-18	Drawings of Detailed Design for Ntora Reservoir一式	図面 (PDF)	C/P	ESPINA	2007年9月	仏語
A-19	Drawings of Detailed Design for Nzove WTP一式	図面 (PDF)	C/P	ESPINA	2007年11月	仏語
A-20	General Layout Plan for Sewer Network in Kigali City	図書 (PDF)	C/P	WASAC	2017年8月	英語
A-21	Shapefiles for Sewer Network in Kigali City	地図 (GIS)	C/P	WASAC	2017年8月	英語
A-22	14th Monthly Progress Report for Culligan Project	図書 (PDF)	C/P	CAVICON CONSULTANTS	2017年10月	英語
A-23	Environmental Impact Assessment (EIA) Certificate for Culligan Project	図書 (PDF)	C/P	Rwanda Development Board	2017年6月	英語
A-24	Environmental and Social Impact Assessment(ESIA) for the Construction of New Nzove I Water Treatment Plant Expendable to 65,000m3 of Capacity and Expansion of Nzove II Water Treatment Plant	図書 (PDF)	C/P	Dr. Fabien Twagiramungu	2016年9月	英語
A-25	Drawings for New Nzove I WTP 一式	図面 (CAD)	C/P	Culligan International EACA	2015年5月	英語
A-26	Project Brief of Bulk Water Supply Project Rwanda 2015	書面 (PDF)	インターネット	AfDB	2015年12月	英語
A-27	Inception Report for Consultancy Services for Water Network Modelling and Water Customer Mapping	図書 (PDF)	C/P	ESRI Rwanda	2015年9月	英語
A-28	TOOLS AND QUERIES NEEDED FOR WASAC USERS OF WEB GIS(Draft)	書面 (Word)	C/P	WASAC	2017年11月	英語
A-29	既設送水管布設位置GPSデータ	地図 (GIS)	現場調査	WASAC	2017年11月	英語
A-30	ESRIに委託して収集しているGISデータ一式	地図 (GIS)	C/P	ESRI Rwanda	2017年8月	英語
A-31	キガリ市内土地区画データ	地図 (GIS)	C/P	ESRI Rwanda	2015年	英語
A-32	10mメッシュDEMデータ	地図 (TIFF)	C/P	ESRI Rwanda	2015年	英語
A-33	キガリ市内高解像度衛星画像一式 (2013年2月から2015年9月時点)	地図 (TIFF)	C/P	ESRI Rwanda	2015年	英語
A-34	プロジェクトサイト周辺高解像度50cm衛星画像 (2016年5月時点)	地図 (TIFF)	購入	ESRI Rwanda	2017年11月	英語
A-35	Kigali Central Sewerage - Engineering Design and Preparation of Tender	図書 (Word)	C/P	European Investment Bank	2017年3月	英語
A-36	Kigali Sewerage Factual Report (KCSS Ground Investigation)	図書 (PDF)	C/P	WASAC	2017年1月	英語
A-37	Kigali Central Sewerage (General Mechanical Specification)	図書 (PDF)	C/P	European Investment Bank/Mott MacDonald	2017年1月	英語
A-38	Drawing Album (Kigali centralised sewerage, sewer network and wastewater treatment works)	図面 (PDF)	C/P	European Investment Bank/Mott MacDonald	2017年1月	英語
A-39	WASAC Projects Prospectus	図書 (PDF)	C/P	WASAC	17年5月22日	英語
A-40	SUPPLIERS LIST	図書 (Word)	C/P	WASAC	2017年11月	英語
B 監督官庁に関する情報						
B-1	MININFRA ORGANIZATIONAL CHART 2017	画像 (PDF)	インターネット	MININFRA	2017年	英語
B-2	MININFRA Budget for the latest 5 years	書面 (Word)	メール	MININFRA	2017年11月	英語
B-3	MININFRA Action Plan 2015/2016	図書 (PDF)	インターネット	MININFRA	2015年	英語
B-4	MININFRA Action Plan 2016/2017	図書 (PDF)	インターネット	MININFRA	2016年	英語
B-5	MININFRA Annual Report 2014/2015	図書 (PDF)	インターネット	MININFRA	2015年8月	英語
B-6	MININFRA Annual Report 2015/2016	図書 (PDF)	インターネット	MININFRA	2016年8月	英語
B-7	WATSAN SECTOR BACKWARD-LOOKING JOINT SECTOR REVIEW REPORT 2013/2014	図書 (Word)	インターネット	MININFRA	2014年10月	英語
B-8	WATSAN SECTOR BACKWARD-LOOKING JOINT SECTOR REVIEW REPORT 2014/2015	図書 (PDF)	インターネット	MININFRA	2015年11月	英語
B-9	WATSAN SECTOR BACKWARD-LOOKING JOINT SECTOR REVIEW REPORT 2015/2016	図書 (PDF)	インターネット	MININFRA	2016年11月	英語
B-10	FORWARD LOOKING JOINT SECTOR REVIEW REPORT 2016/2017 WATER AND SANITATION SECTOR	図書 (PDF)	インターネット	MININFRA	2016年6月	英語
B-11	FORWARD LOOKING JOINT SECTOR REVIEW REPORT 2017/2018WATER AND SANITATION SECTOR	図書 (PDF)	インターネット	MININFRA	2017年6月	英語
B-12	Rwanda Sustainable Water Supply and Sanitation Program	図書 (Word)	C/P	MINISTRY OF INFRASTRUCTURE	2016年10月	英語

番号	資料の名称	形態(図書、ビデオ、地図、写真 等)	収集方法	発行機関	発行年月	資料言語
C	その他公的機関に関する情報					
C-1	Kigali City Organizational Chart 2014	PDF	現地訪問	City of Kigali	2014年	英語
C-2	City of Kigali Budget for 2017-2018	図書 (PDF)	インターネット	City of Kigali	2017年	英語
C-3	Action Plan for 2017-2018 City of Kigali	図書 (PDF)	インターネット	City of Kigali	2017年	英語
C-4	Kigali City Master Plan 2013	図書 (PDF)	現地訪問	City of Kigali	2013年5月	英語
C-5	Kigali City Master Plan 2013 GISデータ	GISデータ	現地訪問	City of Kigali	2013年5月	英語
C-6	KIGALI MASTER PLAN REPORT	図書 (PDF)	Internet	Surbana International	2013年5月	英語
D	開発計画に関する情報					
D-1	RWANDA VISION 2020	図書 (PDF)	インターネット	MINECOFIN	2000/7	英語
D-2	National Policy & Strategy for Water Supply and Sanitation	図書 (PDF)	インターネット	MININFRA	2010/2	英語
D-3	RWANDA VISION 2020 Revised 2012	図書 (PDF)	インターネット	Republic of Rwanda	2012	英語
D-4	ECONOMIC DEVELOPMENT AND POVERTY REDUCTION STRATEGY II	図書 (PDF)	インターネット	MINECOFIN	2013/5	英語
D-5	WATER AND SANITATION SECTOR STRATEGIC PLAN 2013/14 - 2017/18	図書 (PDF)	インターネット	MININFRA	2013/6	英語
D-6	ETUDE DETAILLEE DES TRAVAUX D'ENTRETIEN PERIODIQUE DE LA ROUTE GITICYINYONI-RULI-RUSHASHI-GANKENKE	図面 (PDF)	現地訪問	RWANDA TRANSPORT DEVELOPMENT	2015年9月	英語
D-7	RWANDA SUSTAINABLE WATER SUPPLY AND SANITATION PROGRAM APPRAISAL REPORT	図書 (PDF)	インターネット	AfDB	2017年11月	英語
D-8	NATIONAL WATER SUPPLY POLICY IMPLEMENTATION STRATEGY	図書 (PDF)	インターネット	MININFRA	2016年12月	英語
D-9	Rwanda Sustainable Water and Sanitation Program PROGRAM CONCEPT NOTE	図書 (Word)	C/P	African Development Bank Group	2016年11月	英語
E	法律・規格に関する情報					
E-1	AVAILABLE STANDARDS IN WASAC	書面 (Word)	C/P	WASAC	2017年11月	英語
E-2	RS EAS12:2014 Potable water specification	図書 (PDF)	C/P	Rwanda Standard Board	2014年11月	英語
E-3	RS EAS15-1:2000 Methods of test for drinking water Part 1: Physical methods of test for the quality of drinking	図書 (PDF)	C/P	Rwanda Standard Board	2000年	英語
E-4	RS 238-1:2015-Water Supply-Part 1:Requirement for system	図書 (PDF)	C/P	Rwanda Standard Board	2015年2月	英語
E-5	RS 238-2:2015-Water Supply-Part 1: Requirement for components	図書 (PDF)	C/P	Rwanda Standard Board	2015年2月	英語
E-6	RS ISO 4422-1:2006 Pipes and fittings made of unplasticized Poly(vinyl chloride) (PVC-U) for water Supply: Specifications Part 1:General	図書 (PDF)	C/P	Rwanda Standard Board	2006年6月	英語
E-7	RS ISO 4422-2:2006 Pipes and fittings made of unplasticized Poly(vinyl chloride) (PVC-U) for water Supply: Specifications Part 2:Pipes (with or without integral sockets)	図書 (PDF)	C/P	Rwanda Standard Board	2006年6月	英語
E-8	RS ISO 4422-3:2006 Pipes and fittings made of unplasticized Poly(vinyl chloride) (PVC-U) for water Supply: Specifications Part 3:Fittings and joints	図書 (PDF)	C/P	Rwanda Standard Board	2006年6月	英語
E-9	RS ISO 4422-4:2006 Pipes and fittings made of unplasticized Poly(vinyl chloride) (PVC-U) for water Supply: Specifications Part 4: Valves and ancillary equipment	図書 (PDF)	C/P	Rwanda Standard Board	2006年6月	英語
E-10	RS ISO 4422-5:2006 Pipes and fittings made of unplasticized Poly(vinyl chloride) (PVC-U) for water Supply: Specifications Part 5: Fitness for purpose of the system	図書 (PDF)	C/P	Rwanda Standard Board	2006年6月	英語
E-11	RS 400:2009 ISO 7-1:1994 Pipe threads where pressure -tight joints are made on the threads-part 1:Dimensions,tolerances and designation	図書 (PDF)	C/P	Rwanda Standard Board	2009年12月	英語
E-12	RS 402:2009 ISO 4427 -1:2007 Plastics piping systems-Polyethylene(PE) pipes and fittings for water supply	図書 (PDF)	C/P	Rwanda Standard Board	2009年12月	英語
E-13	RS 404: 2009 ISO 559:1991 Steel tubes for water and sewage	図書 (PDF)	C/P	Rwanda Standard Board	2009年12月	英語
E-14	RS 107: 2010 /Construction material and building (Building sands)	図書 (PDF)	C/P	Rwanda Standard Board	2010年12月	英語
E-15	RS 108: 2010 /Construction material and building (Mortar for masonry)	図書 (PDF)	C/P	Rwanda Standard Board	2010年3月	英語
E-16	RS 143: 2012/ Civil engineering (Design for concrete structures)	図書 (PDF)	C/P	Rwanda Standard Board	2012年5月	英語
E-17	RS 142: 2012/ Civil engineering (Waste water treatment systems)	図書 (PDF)	C/P	Rwanda Standard Board	2012年1月	英語
E-18	RS 144: 2012/ Civil engineering (Cement blocks and bricks)	図書 (PDF)	C/P	Rwanda Standard Board	2012年1月	英語
E-19	RS ISO 898-1: 2013/ Civil engineering (Mechanical properties of fasteners made of carbon steel and alloy steel)	図書 (PDF)	C/P	Rwanda Standard Board	2014年11月	英語
E-20	RS ISO 15630-1:2010 /Civil engineering (Steel for the reinforcement and restressing of concrete)	図書 (PDF)	C/P	Rwanda Standard Board	2012年5月	英語
E-21	RS ISO 22965-1: 2007/ Civil engineering (Concrete part 1)	図書 (PDF)	C/P	Rwanda Standard Board	2016年4月	英語
E-22	RS ISO 22965-2: 2013/ Civil engineering (Concrete part 2))	図書 (PDF)	C/P	Rwanda Standard Board	2016年4月	英語
E-23	Law No 016/2018 of 13/04/2018 on Direct Taxes on Income	図書 (PDF)	インターネット	Rwanda Revenue Authority	2018年4月	英語/仏語/キニア
E-24	Law No 06/2015 of 28/03/2015 relating to Investment Promotion and Facilitation	図書 (PDF)	インターネット	Rwanda Revenue Authority	2015年5月	英語/仏語/キニア
E-25	RWA 2013 LAW No37-2012 VALUE ADDED TAX-OG.N0 SP OF 05 FEB. -2013	図書 (PDF)	インターネット	Rwanda Revenue Authority	2013年2月	英語/仏語/キニア
E-26	Compilation of fiscal laws and regulations in use in Rwanda	図書 (PDF)	インターネット	Rwanda Revenue Authority	2017年	英語/仏語/キニア

番号	資料の名称	形態(図書、ヒ データ、地図、写真 等)	収集方法	発行機関	発行年月	資料言語
F 社会経済に関する情報						
F-1	GDP National Accounts 2016_17	図書 (PDF)	インターネット	NISR	2017年	英語
F-2	Rwanda Statistical Yearbook 2015	図書 (PDF)	インターネット	NISR	2015年	英語
F-3	Fourth Population and Housing Census, Rwanda, 2012	図書 (PDF)	インターネット	NISR	2012年	英語
F-4	ANNOUNCEMENT ON NEW ELECTRICITY TARIFF	ウェブ (PDF)	インターネット	REG	2017年1月	英語
G 地形・気象等に関する情報						
G-1	KIGALI State of Environment and Outlook Report 2013	図書 (PDF)	インターネット	REMA	2013年	英語
G-2	RWANDA State of Environment and Outlook Report 2015	図書 (PDF)	インターネット	REMA	2015年	英語
G-3	The National Risk Atlas of Rwanda	図書 (PDF)	インターネット	Ministry of Disaster Management and Refugee Affairs	2015年	英語
G-4	ニャバロンゴ川河川水位データ	CSV	インターネット	Rwanda Water Portal	2017年11月	英語
G-5	ニャブゴゴ川河川水位データ	CSV	インターネット	Rwanda Water Portal	2017年11月	英語
G-6	ニャバロンゴ川およびニャブゴゴ川の水位観測点の座標情報	CSV	メール	Rwanda Water Portal	2017年11月	英語
G-7	キガリ空港における気象データ (マニュアル) 一式 (2012年～2015年)	CSV	現地訪問	Rwanda Meteorology Agency	2017年11月	英語
G-8	キガリ空港における気象データ (自動観測) 一式 (2015年～2017年)	CSV	現地訪問	Rwanda Meteorology Agency	2017年11月	英語
G-9	キガリ市内のGikomero観測所における降雨データ (自動観測)	txt	現地訪問	Rwanda Meteorology Agency	2017年11月	英語
G-10	キガリ市内のJari観測所における降雨データ (自動観測)	xml	現地訪問	Rwanda Meteorology Agency	2017年11月	英語
G-11	キガリ市内のRutongo観測所における降雨データ (自動観測)	xml	現地訪問	Rwanda Meteorology Agency	2017年11月	英語
G-12	キガリ市内の気象観測所の位置情報	CSV	現地訪問	Rwanda Meteorology Agency	2017年11月	英語
G-13	キガリ空港における風向・風速データ	画像	現地訪問	Rwanda Meteorology Agency	2017年12月	英語
H 環境に関する情報						
H-1	LAND ADMINISTRATION PROCEDURE MANUAL	図書 (PDF)	インターネット	Rwanda Natural Resources Authority	2016年1月	英語
H-2	Official Gazette n° Special of 03/12/2015 (Rwanda Road Act)	図書 (PDF)	Rwanda Transport Development Agency	Minister of Finance and Economic Planning / Minister of Justice/Attorney General	2015年11月17日	英語/キニアルワ ンダ語/ 仏語
H-3	ESIA and RPF for the Kigali Wastewater Project (Stakeholder Engagement Plan)	図書 (PDF)	C/P	European Investment Bank	2015年12月	英語
H-4	ESIA and RPF for the Kigali Wastewater Project (Resettlement Policy Framework)	図書 (PDF)	C/P	European Investment Bank	2015年12月	英語
H-5	N° 04/2005 of 08/04/2005 Organic Law determining the modalities of protection, conservation and promotion of environment in Rwanda	図書 (PDF)	インターネット	The Minister of Land, Environment, Forestry, Water and Mines/The Minister of Justice/etc	2005年4月	英語/キニアルワ ンダ語/ 仏語
H-6	Ministerial Order N° 003/2008 of 15/08/2008 Relating to The Requirements and Procedure for Environmental Impact Assessment Ministerial Order N° 004/2008 of 15/08/2008 establishing the List of Works, Activities and Projects that have to Undertake an Environment Impact Assessment	図書 (PDF)	インターネット	The Ministry of Natural Resources/The Minister of Justice/etc	2008年11月	英語/キニアルワ ンダ語/ 仏語
H-7	Ministerial Order No 007/2008 of 15/08/2008 Establishing the list of Protected animal and plant species	図書 (PDF)	インターネット	The Ministry of Natural Resources/The Minister of Justice/etc	2008年8月	英語/キニアルワ ンダ語/ 仏語
H-8	General Guidelines and Procedure for Environmental Impact Assessment	図書 (PDF)	インターネット	Rwanda Environment Management Authority	2006年11月	英語
H-9	Guidelines for Environmental Impact Assessment for Water Resources Management In Rwanda	図書 (PDF)	インターネット	Rwanda Environment Management Authority	2009年3月	英語