

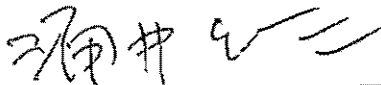
Minutes of Discussions
on
the Preparatory Survey for the Project for the Establishment of
Rural Water Supply System in Kambia Town
in the Republic of Sierra Leone
(Explanation on Draft Report)

In April 2010, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Preparatory Survey Team on the Project for the Establishment of Rural Water Supply System in Kambia Town (hereinafter referred to as "the Project") to the Republic of Sierra Leone (hereinafter referred to as "Sierra Leone") and through discussion, field survey, and technical examination of the results in Japan, JICA prepared a draft report of the study.


In order to explain and to consult the Sierra Leonean authorities concerned on the components of the draft report, JICA dispatched to Sierra Leone the Draft Report Explanation Team (hereinafter referred to as "the Team"), which was headed by Mr. Junji Wakui, Director of Water Resources Management Division 2, Global Environment Department, JICA, from October 18th, 2010.

As a result of discussions, both parties confirmed the main items described on the attached sheets.

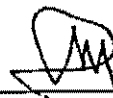
Freetown, 21st October 2010



Mr. Junji Wakui
Team Leader
Preparatory Survey Team
Japan International Cooperation Agency



Hon. Prof. Ogunlade R. Davidson
Minister
Ministry of Energy and Water Resources
Government of Sierra Leone



Mr. S. S. A. Sankoh
Chairman
Kambia District Council

ATTACHMENT

1. Components of the Draft Report

The Sierra Leonean side agreed and accepted in principle the components of the draft outline design explained by the Team.

2. Japan's Grant Aid scheme

The Sierra Leonean side understood the scheme of Japan's Grant Aid and would take the necessary measures and allocate necessary budget properly for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented. The Grant Aid Scheme and necessary measures were described in the Annex 4, 5 and 6 of the Minutes of Discussions signed by both sides on 29th April, 2010 (hereinafter referred to as "the previous minute").

3. Responsible and Implementing Agency

Both sides reconfirmed the responsible and implementing agencies as follows:

- The responsible agency: the Ministry of Energy and Water Resources (hereinafter referred to as "ME&WR")
- The implementing agency: Water Supply Division of ME&WR (hereinafter referred to as "WSD")

4. Schedule of the Study

JICA will complete the final report in accordance with the confirmed item and send it to the Government of Sierra Leone by the end of January, 2011.

5. Other Relevant Issues

(1) Project Cost Estimate and Budgetary Arrangement

The Team explained to the Sierra Leonean side the estimated project cost as attached in Annex 1. Both sides confirmed that this estimated cost was provisional and would be examined further by the Government of Japan for its final approval. Furthermore, both sides confirmed that this project cost estimate is confidential, and should never be duplicated in any forms or released to any other parties until the relevant contracts are awarded by ME&WR, in order to secure fairness of tender procedure.

(2) Budget arrangement for operation and maintenance of the water supply facilities

The Team explained the estimated cost for management, operation, and maintenance of water supply facilities as described in Annex 2, and the Sierra Leonean side promised to allocate necessary budget.

(3) Service Area of the Project

Both sides reconfirmed the service areas, the locations of principal facilities, and the route of distribution network as shown in Annex-3.

(4) Preparation for establishment of KWSSB

Both sides have agreed the detailed necessary procedures to follow for the establishment

of the Kambia Water Supply and Sanitation Board (KWSSB), which is responsible for water supply in Kambia Town, in the Annex-8 of the previous minutes (the Roadmap). Regarding the preparation for the establishment of KWSSB, both sides confirmed the progress as followings;

- The Working Group for the establishment of KWSSB has been officially established with the official appointment of thirteen (13) members. The member list is attached in Annex-4.
- The Working Group completed to prepare a draft bye-law for the establishment of KWSSB as shown in Annex-5, through member meetings.
- Kambia District Council will review the draft and officially approve it, by May 15th, 2011.
- The Team proposed a tentative organization chart, indicating number of staff necessary to be assigned for appropriate operation of KWSSB, in Annex-6. The Kambia District Council understood and expressed its will to recruit staffs by following the chart.
- It is the Kambia District Council that has responsibility for the establishment of KWSSB, and it will make the best effort. However, WSD will monitor the progress and provide technical and financial assistance to the District when necessary. Especially, WSD shall dispatch its technical staff who are familiar with operation of water supply facilities to KWSSB for technical transfer and consultation.
- The Team explained estimated monthly cost for the operation of KWSSB, including operation and maintenance of the facilities to be constructed by the Project, administrative cost, etc, as shown in Annex-2. The Sierra Leonean side understood it and confirmed that WSD is responsible for securing budget necessary for first three (3) months for operation at least as initial capital before KWSSB is able to collect sufficient water charge for proper operation and maintenance from its customers.

(5) Other undertakings of the Sierra Leonean side

The Team explained to the Sierra Leonean side its undertakings as listed in Annex-7, and the Sierra Leonean side understood and promised to execute them. The following items are to be emphasized:

1) Exemption of financial duties

Both sides reconfirmed ME&WR shall take necessary measures to facilitate project implementation, such as exemption of Value Added Tax, Goods and Service Tax (GST), custom duties, and any other taxes and fiscal levy charges in Sierra Leone arisen from the Project activities, collaborating with the Ministry of Finance and Ministry of Foreign Affairs.

2) Site clearance at the proposed construction site

The Team requested the Sierra Leonean side to remove existing buildings on the proposed construction sites for the water treatment plant and elevated tank by September 30th, 2011, at own cost. The Sierra Leonean side understood and promised to carry it out by the above mentioned deadline.

3) Provision of stock yard

The Team explained that the huge amount of construction materials for the Project such as

pipng materials might be delivered to Kambia Town and they must be properly stored during the construction, and therefore requested the Sierra Leonean side to provide land for stock yard in Kambia Town before the Project commences. The Sierra Leonean side understood and promised that Kambia District Council will propose location of the stock yard to JICA Sierra Leone Field Office by November 30th, 2010 in writing, through consultation with WSD. The Team requested that the yard should be flat for easy access of construction vehicles, and the Sierra Leonean side took note.

(6) Environmental and social consideration

The Sierra Leonean side explained that, in response to the application to environmental impact assessment submitted by WSD, the Sierra Leone Environment Protection Agency (SLEPA) would categorized the Project as "class C", which is not expected to generate negative impact on environment. Japanese side requested WSD to submit a copy of the environmental certificate to JICA Sierra Leone Field Office by November 30th, 2010, to verify the official decision of the SLEPA.

(7) Land use permission

Both sides confirmed that the Sierra Leonean side already made agreement with the Paramount Chief on the land use for the Project, but the agreement has not included the exact location of the facilities to be constructed yet. The Team showed the proposed location of the public taps and pipeline route as a result of the survey as shown in Annex-8, and requested the Sierra Leonean side to make complementary agreement with the Paramount Chief on land use on the proposed locations. The Sierra Leonean side agreed and promised to submit a copy of the agreement to JICA Sierra Leone Field Office by November 30th, 2010.

(8) Tentative Schedule

Japanese side explained the tentative schedule as shown in the following table;

| | |
|---|----------------|
| The Government of Japan has cabinet meeting for final approval. | December, 2010 |
| (In the case the Project is formally approved by the Government of Japan) | |
| - Both Governments sign Exchange of Note. - The Sierra Leonean authorities and JICA sign Grant Agreement. | January, 2011 |
| The Government of Sierra Leone makes contract with Japanese consulting firm for the project implementation, referring to the recommendation from the Government of Japan. | February, 2011 |
| Tender for the construction is carried out. | June, 2011 |
| Actual construction work commences. | August, 2011 |
| Construction work is completed. | November, 2012 |

End

Confidential

Annex 1

Components of the Project

This Page is closed due to the confidentiality.

D

4

47

887

Table 1-B: Cost borne by the Government of Sierra Leone

| Items | Cost (Million SLL) | Cost (Million JPY) |
|--|-----------------------|-----------------------|
| Clearing Construction Sites | | |
| - Site clearance at the existing waterworks | 504.52 | 12.61 |
| - Site clearance at the existing elevated tank | 131.64 | 3.29 |
| Initial O&M Cost for KWSSB | 39.51 | 0.99 |
| Total | 675.67 | 16.89 |

Note:

- The costs in Table 1-B are estimated based on prices and exchange rate (1.0 US dollar = 92.13 Japanese Yen, 1.0 Leone = 0.0250 Japanese Yen) as of June, 2010.
- Management cost including payment of banking commission for the Authorization to Pay (A/P) and payment to a Japanese bank based upon the Banking Arrangement (B/A), as mentioned in 10) of Annex-7 in this Minute of Discussions, is also to be borne by the Sierra Leonean side. The total amount will be depend on the total project cost, and it might be approximately 0.1% of the project cost (0.8million JPY =32 million SLL).

B

5
4

GA

Monthly operation and maintenance cost in 2013

| Items | Cost (Thousand SLL) | Cost (Thousand JPY) | Remarks |
|--|------------------------|------------------------|----------|
| 1. Fuel cost | 7,910 | 198 | |
| 2. Maintenance Cost | 396 | 10 | 5% of 1 |
| 3. Personnel Cost - Technical Staff - Administrative Staff - Water rate collector - Part-time labourer | 4,150 | 104 | |
| 4. Office cost | 415 | 10 | 10% of 3 |
| 5. Sitting Fee (Board Member)) | 300 | 8 | |
| Total | 13,171 | 330 | |

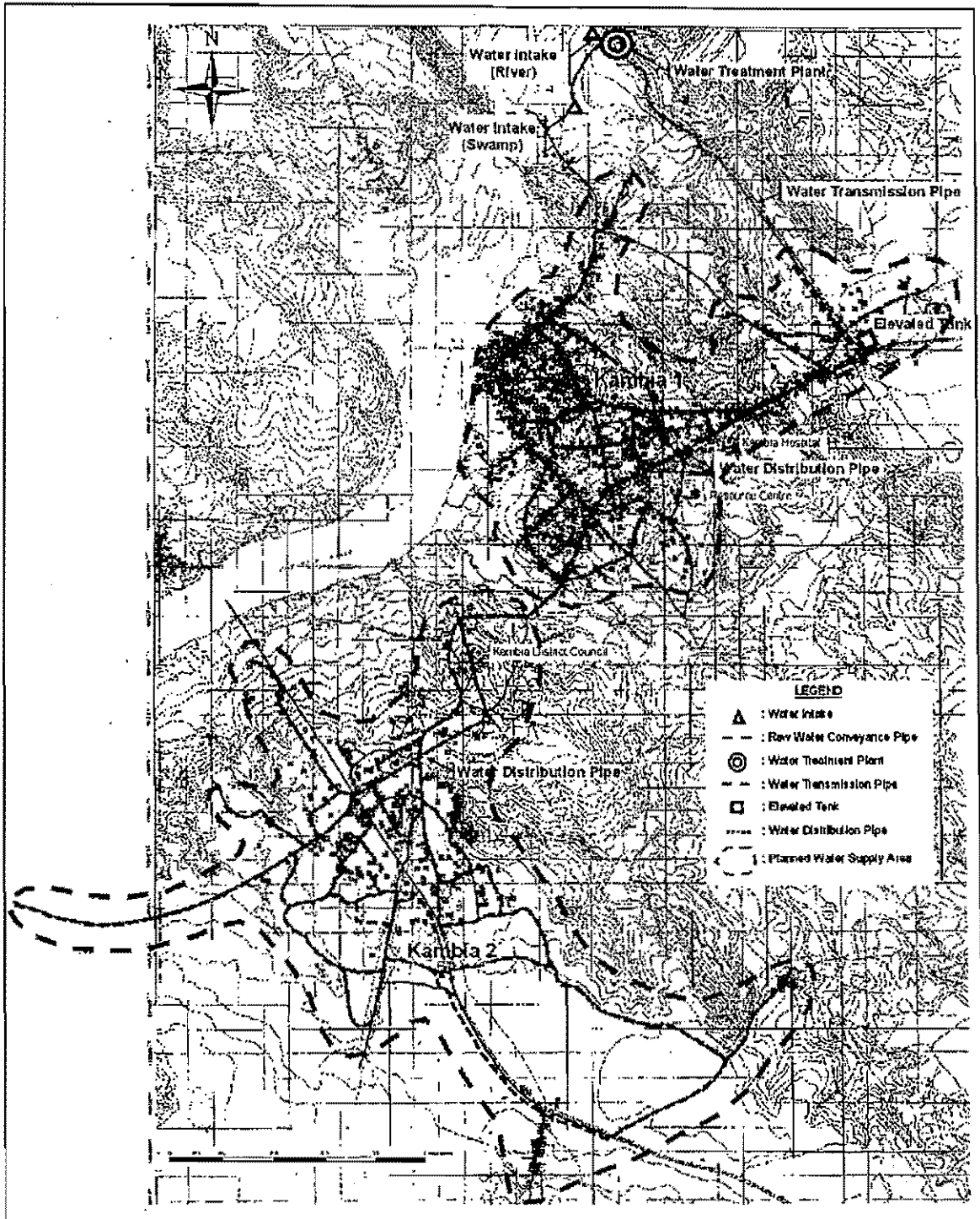
Monthly operation and maintenance cost in the Target Year (2016)

| Items | Cost (Thousand SLL) | Cost (Thousand JPY) | Remarks |
|--|------------------------|------------------------|----------|
| 1. Fuel cost | 20,196 | 505 | |
| 2. Maintenance Cost | 1,010 | 25 | 5% of 1 |
| 3. Personnel Cost - Technical Staff - Administrative Staff - Water rate collector - Part-time labourer | 7,800 | 195 | |
| 4. Office cost | 780 | 19 | 10% of 3 |
| 5. Sitting Fee (Board Member)) | 300 | 8 | |
| Total | 30,086 | 752 | |

Note:

The costs are estimated based on prices and exchange rate (1.0 US dollar = 92.13 Japanese Yen, 1.0 Leone = 0.0250 Japanese Yen) as of June, 2010.

Service area and layout map



10

7

4

881

**Member list of the working group for establishment of KWSSB
(as of October, 2010)**

- | | |
|--|--|
| 1. Kambia 1 | Madam Hawa Kamura |
| 2. Kambia 2 | Madam Umu Turay |
| 3. Kambia 3 | Madam Ya Alimamy Sally Smith |
| 4. Paramount Chief | P.C. Bai Farama Tass Bubu Angbak III |
| 5. District Medical Officer | Dr. Chernor Jalloh (Kambia Govt. Hospital) |
| 6. NGO Representative | Mr. Alimamy Kamara (ABC Development) |
| 7. Youth Group | Mr. Anito Kamara |
| 8. Women's Group | Madam Isatu Serengbeh |
| 9. Teachers' Union | Mr. Osman S. Conteh |
| 10. MDA's Representative | Mr. Abdul Nassar Fofanah (SLRA Engineer) |
| 11. Kambia District Council Representative | Mr. Francis Kamara (MEWR WSD) |
| 12. Ward -122 Representative- | Coouncilor Aminata Conteh (Mrs.) |
| 13. Works Committee Representative | Councilor N'Sorie Yansaneh, Chairman Councils' Work Committee |

The above is as approved by Kambia District Council on August 15th, 2010

Draft Bye-Laws for establishment of KWSSB



**KAMBIA DISTRICT COUNCIL
KAMBIA**


Sierra Leone District Council 2010/11

1st October, 2010

Representative of JICA
Sierra Leone

APPROVAL OF DRAFT BYE-LAWS

Having gone through the Draft Bye-laws prepared by the Working Group, for the operation of the Kambia Water Supply, I hereby approve these Bye-laws for the effective running of the water Supply, when completed.


.....
Samuel S. A. Sankoh
Chairman
Kambia District Council

Copy:

The Chief Administrator – Kambia District Council

47

BYE LAWS FOR KAMBIA WATER SUPPLY AND SANITATION BOARD

By virtue of the powers vested in the Kambia District Council these Bye-laws are hereby made this 1st day of October 2010.

1.0 NAME

This is hereby established for each area or community listed in the Kambia Water Supply Schedule to a body which shall be called the Kambia Water and Sanitation Development Board hereinafter referred to as "The Board" whose functions shall be applicable in the Kambia community and such others as may from times be added by amendment of these bye-laws.

2.0 COMPOSITION

The Board shall comprise not less than 5 and not more than 13 members. This number may be exceeded if the system serves several areas or communities.

2.1 BOARD MEMBERSHIP

Members of the Board shall be appointed or elected as follows:-

- (a) **Representative from various sections of the Kambia Community**
- (b) In the event (a) result in gender imbalance, or does not make up the required number the following shall be considered:-
 - (1) At least two representatives, who shall be women, representing women's organization and water user groups
 - (2) Recognized community organizations that carry out activities directly related to water, sanitation and community development. The Board shall keep a list of eligible community organizations to be revised each year adding new and active groups, and removing those, which have become inactive from which members may be drawn, the list of community organization eligible to elect members onto the Board must include women's organizations as well.
- (c) Additionally, the following may be considered as Ex-officio members:
 - (1) Representatives of leaders of the community that have the authority to represent their areas in community affairs inclusive of women and or religious authorities.
 - (2) The Councillor representing Kambia Community in the Kambia District Council. In the event these are more than one, at least one member of the Kambia District Council representing the community.

2.2 DURATION OF MEMBERSHIP

Each person elected or appointed to the Board shall serve a two-year term. Members of the Board shall be eligible for re-election or re-appointment.

Members of the first elected Board shall have an initial term commensurate with the duration of the project cycle till commissioning of the water supply system, and thereafter, another term of two years. During this period, the Board cannot be changed.

3.0 DELEGATION OF RESPONSIBILITIES

The Board shall delegate responsibility for its various management functions among its members by appointing 1- 2 members:

- a. administrations
- b. financial management and
- c. technical management
- d. water utilisation, education, community mobilization and training

4.0 MANDATE OF THE BOARD

The Board shall be responsible for the management of the operation and maintenance of all water supply systems in the service area KAMBIA within the jurisdiction of the Kambia District Council.

This mandate shall include the following specific aspects:

- a. The preparation of plans for the establishment, rehabilitation, expansion and replacement of existing well as new water systems in any community specified in the schedule to these bye-laws.
- b. Proposing an appropriate tariff to cover the cost of operation and maintaining the community water system, including capital depreciation; such tariff to be approved by the Kambia District Council.
- c. Recruiting and supervision of qualified persons within the community to work as operators and managers of the community water system.
- d. Contracting an outside agency where appropriate to carry out operations and maintenance or maintenance alone.
- e. Recommending necessary byelaws (to be enacted by the Kambia District Council) that would regulate water use enforce tariff and other financial obligations and promote appropriate sanitation practices within the community.
- f. Undertaking public education and community training to promote tariff obligations and sound sanitation and hygienic behaviors within the community.
- g. Setting procedures and charges for services connection, disconnection, penalties for default and damages to the water supply system, subject to the approval of the Kambia District Council,

5.0 OBLIGATIONS OF THE BOARD

The Board has an obligation to establish a mechanism for consultation with the community in arriving at decisions on all matters including:

- a) Preparation of plans for water system rehabilitation and expansion; and
- b) Major expenditure on the water system
- c) Mobilization of the community for education on its objectives and necessary steps for implementing same
- d) Fixing of sanctions by way of monetary fines not exceeding.....Leones Le.....for a first breach of its rules, the provisions of this sub-section to be applicable to only able-bodied persons of rate-paying age.

4

- e) The WSSB will ensure that Water is kept running for the period of time each day planned for.
- f) The WSSB will ensure that the quantity of water to be provided each day allows for a minimum of 15 l/c/d.
- g) Water losses will be kept to a maximum of 10% (New Systems) and 15% (Rehabilitated Systems). These will be determined by meters of which records of readings shall be kept and aggregated monthly to be made available for inspection by the designated representative of the district should an inspection be carried out.
- h) The WSSDB shall ensure that the quality of the Water is regularly monitored in accordance with guidelines to be issued by the Sierra Leone National Water Quality lab.
- i) While the WSSB may not itself carry out the monitoring, it will have the responsibility to ensure that the monitoring is carried out with the specified regularity.
- j) Breakdowns shall be kept to a minimum

In the case of breakdowns lasting for 1 – 3 days, the WSSB shall ensure that communities always store at least one day Water Supply for emergency use and that this Water is changed every 48 hours

In the case of major breakdown lasting more than 3 days appropriate measures shall be put in place to ensure an emergency supply of potable Water

Arrangement of the provision of such Water in emergency shall be in place by the time of commissioning of the work

The WSSB will have the obligation to inform the community of planned shut downs before these shut downs are made

In the case of planned shut downs, the obligations governing emergency supply of Water can still be applied

6.0 JURISDICTION AND AUTHORITY

- 6.1 The Board derives its legal authority in accordance with the byelaws of the Kambia District Council. The Council shall approve and adopt all resolutions and sanction all byelaws proposed by the Board, after the necessary deliberations on the appropriateness and legality for such resolutions and byelaws.
- 6.2 In turn, the Council shall vest the Board with all authority and jurisdiction over the development, operation and maintenance of all Water Systems specified in the schedule and such others as may from time to time be added thereto.
- 6.3 The Kambia District Water and Sanitation Team and from the National level, the MDA responsible for backstopping the Local Councils in Water Supply and Sanitation service delivery shall facilitate the work of the WSSB and shall, from time to time provide technical advice to guide the work of the WSSB and assist the Kambia District Council to exercise its jurisdiction and authority.

7.0 FINANCE AND OPERATING BUDGET

7.1 FINANCE

- (1) The Board shall raise its own finance directly from Water supply tariff to the operation and maintenance of the water system, in a manner determined by the Board and approved by the Assembly. The Kambia District Council may allocate funds through its regular budgetary allocation to

support major rehabilitation and expansion of the community water supply system, where necessary.

7.2 Financial Management

For the purpose of managing these finances, the Board shall establish its own bank accounts. At least two of these accounts shall be operational designated as "Operational Account" and "Reserve Account" Other accounts may be designated for particular activities including the running of the Board. The Board shall establish a book-keeping system appropriate for the management of funds relating to the nature of its business, and provide quarterly financial reports to the Kambia District Council and the Kambia Community.

8.0 MEETING AND REPORTING

8.1 Regular Meeting

The Board shall meet as many times as required but at any rate no less than once a month to effectively develop, operate and maintain the community water supply system

8.2 Quorum and Voting

At least half of the Board members shall form a quorum for Board meetings. Voting at the Board shall be based on a simple majority.

8.3 Records of Decisions

The Secretary of the Board shall keep a correct record of decision made at each meeting. This record of decisions shall be posted at the community Notice Board for public view

8.4 Community Notice Board

The Board shall establish a Community Board, accessible to all Community members at all times. The notice Board shall be used to publicise all records of decision of Board meetings, monthly financial reports, information and announcement about the water system.

8.5 Sitting Allowance

The Board members shall be paid sitting allowances to be agreed with the Community. Allowances payable shall be subject to periodic review by the Community.

8.6 Presentation to the Kambia District Council

Each time the Kambia District Council is in session the Chairperson of the Board (or his/her representative) shall make a presentation to the Kambia District Council on the status of the community water system, upon request. At least, one presentation shall be made in a year.

8.7 Annual Community Forum

Once every year, the entire community shall be given the opportunity to participate in the review of the Board's work through a community forum. The forum would also be used to educate the community on their obligations to support the water system, and to promote appropriate sanitation and hygienic behavior.

9.0 Financial Statement and Regular Audit

- i. The Board shall produce month, quarterly and annual financial statement/reports. These shall be posted on Community Notice Board for public review. A copy of each of the quarterly and annual financial reports shall also be given to the Kambia District Council.
- ii. The finances of the Board shall be audited once a year, via the regular District Administration audit mechanism. The Board shall arrange for quarterly internal audit on retainer basis. The audit reports shall be approved by the Kambia District Council and posted on the Kambia Water Supply System community Notice Board.

10.0 Amendment of Bye-Laws

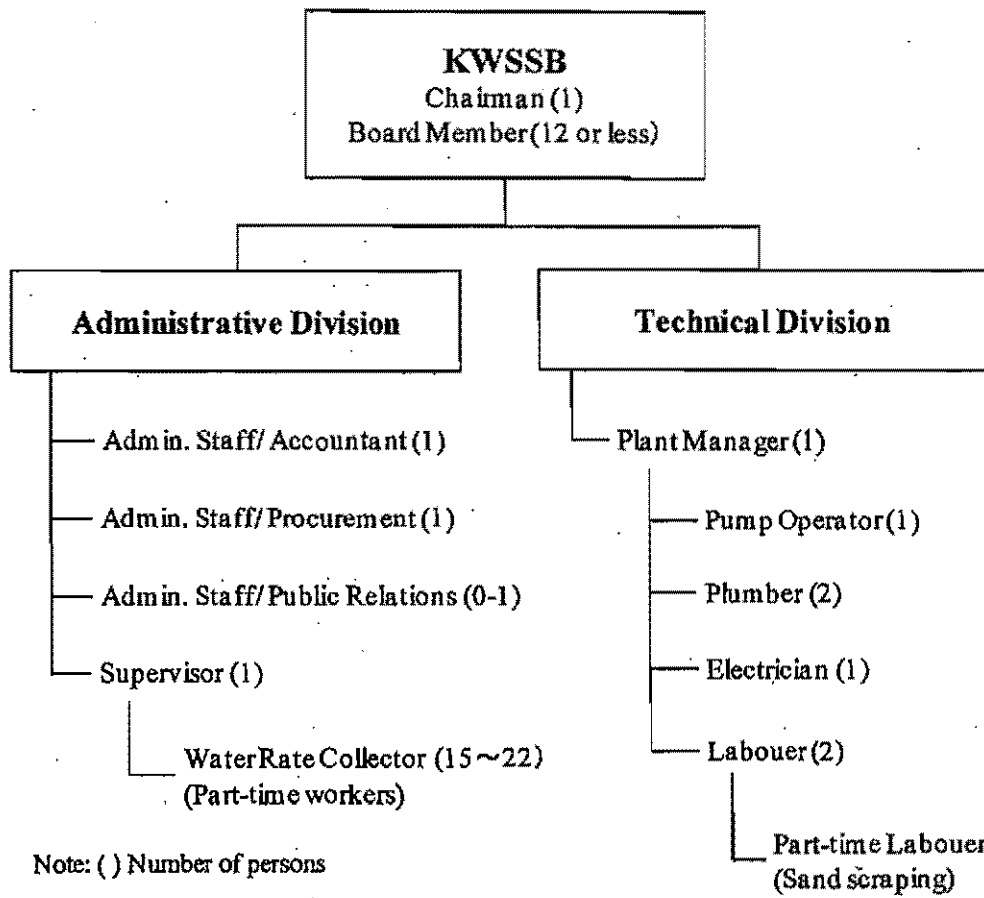
- i. These byelaws may be amended at any time deemed necessary for the achievement of the objectives of the Board.
- ii. Such amendment can only be effected upon agreement by no less than two thirds of all members of the Board that have been established by this instrument, and in the presence and active participation and consent of the Assembly members designated for said communities.
- iii. The Schedule hereto may be amended by addition of such other communities or areas as is deemed appropriate for the application of these byelaws by a Resolution of the Kambia District Council.

11.0 Schedule

| <u>Community Name</u> | <u>Date</u> | <u>Signature of Board Chairman</u> |
|-----------------------|--------------|------------------------------------|
| Kambla One | 1st OCT 2010 | Gibril Conteh |
| Kambla Two | | |
| Kambla Three | | |



Tentative organization chart of KWSSB



4

Undertakings of the Sierra Leonean side

In the implementation of the Project, the Sierra Leonean side will be responsible for the following:

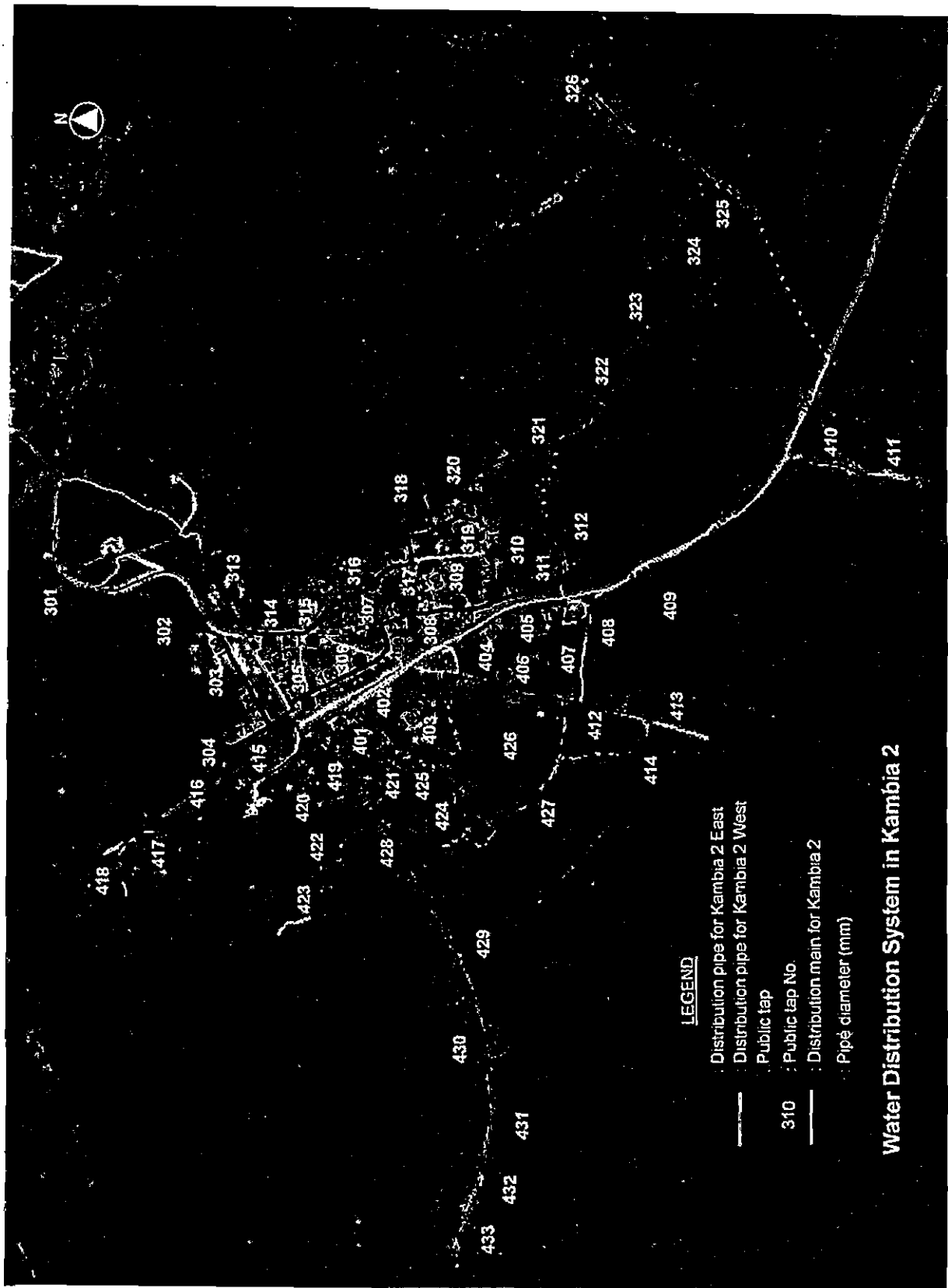
- 1) Provision of stock yard (approx. 5,000m²) of the construction materials and equipment
- 2) Acquisition of land at the sites for the construction of the following facilities:
 - (a) Water Intake

| | | |
|-------------------|-------------------|--------------|
| - Kolentten River | 100m ² | Public lands |
| - Swamp | 100m ² | Public lands |
 - (b) Water Treatment Plant 10,000m² Public lands
 - (c) Elevated Tank 500m² Public lands
 - (d) Public Taps 5m²×100 places Public and private lands
- 3) Site clearance at the construction site of the water treatment plant (removal of the existing water treatment facilities and buildings).
- 4) Site clearance at the construction site of the elevated tank (removal of steel shaft and tank of the existing elevated tank).
- 5) Prompt customs clearance and tax exemption of the equipment and materials required in the implementation of the Project at the port of landing and support for smooth delivery of the equipment and materials.
- 6) Payment of all the expenses not including in Japan's Grant Aid scheme but necessary for the implementation of the project:
 - (a) Management cost of the Ministry of Energy and Water Resources related to the Project
 - (b) Management cost of the Kambia District Council related to the Project
 - (c) Initial working capital for the operation and maintenance of KWSSB
- 7) Exemption of the equipment and materials brought into Sierra Leone and services provided by the Japanese nationals in accordance with the contracts, from customs duty, internal taxes and other levies, including GST.
- 8) Granting of relevant visas and permits of stay in Sierra Leone towards the Japanese nationals involved in the Project in accordance with the contracts.
- 9) Proper maintenance and use of the facilities and equipment provided with in the Japan's Grant Aid scheme.
- 10) Payment of banking commission for the Authorization to Pay (A/P) and payment to a Japanese bank based upon the Banking Arrangement (B/A).

Proposed location of public taps to be constructed in the Project
(Kambia 1)



Proposed location of public taps to be constructed in the Project
(Kambia 2)



[Handwritten mark]

[Handwritten signature]

資料 5

本プロジェクトの環境許可証



SIERRA LEONE GOVERNMENT

**Sierra Leone Environment Protection Agency
3rd Floor, Youyi Building, Freetown**

Ref: SLEPA/EIA/25

1st November, 2010

Mr. Wosum A. Koroma
Chief Engineer
Water Supply Division
Ministry of Energy & Water Resources
Tower Hill
Freetown.

Dear Sir,

**ISSUANCE OF ENVIRONMENTAL PERMIT FOR THE ESTABLISHMENT OF
RURAL WATER SUPPLY SYSTEM IN KAMBIA TOWN**

I wish to refer to the above subject matter and to inform you that the Sierra Leone Environment Protection Agency (SLEPA) has carefully reviewed the project proposal for the establishment of rural water supply system in Kambia Town and the environmental assessment report submitted by the Ministry of Energy and Water Resources. According to the review and inspection report on the project site, the proposed project would not have any adverse impact to the environment and categorized under "C". The project therefore does not require any environmental impact assessment.

In the light of the foregoing, the Agency is issuing this letter as environmental permit for a "No Objection" to the proposed project to enable the Ministry of Energy and Water Resources to replace the existing and dilapidated facilities in order to provide treated water through distribution pipes and public taps for inhabitants in Kambia Town.


Haddijatou Jallow (Mrs.)

Executive Chairperson, SLEPA

Cc: The Secretary to the President

資料 6

自然条件調査結果

資料6 自然条件調査結果

現地調査では表-1に示す自然条件に係る調査を現地再委託業務で実施した。また、本プロジェクトの水源（コレンテン川、スワンプ）及びカンビア・タウン内の井戸から採水して水質状況を確認した。さらに、コレンテン川の流量観測を行い、乾期の流量を調査した。各調査の実施地点を図-1に示す。

表-1 自然条件調査（現地再委託業務）

| 調査項目 | 調査内容 | 調査方法及び仕様 |
|------------|---------------------|--|
| 1. 地形測量 | (1) 平面測量 | <ul style="list-style-type: none"> ・ 取水施設予定地 コレンテン川 (30m×30m=900㎡) スワンプ (30m×30m=900㎡) ・ 浄水施設予定地 既存施設 (100m×100m=10,000㎡) ・ 高架水槽予定地 既存施設 (50m×50m=2,500㎡) 新設予定地 (50m×50m=2,500㎡) 合計16,800㎡ |
| | (2) 路線測量 | <ul style="list-style-type: none"> ・ コレンテン川～浄水場間 (0.2km) ・ スワンプ～浄水場間 (0.5km) ・ 浄水場～既存高架水槽(2.0km) ・ カンビア市街地 (35km) 合計37.7km |
| 2. 地盤・土質調査 | (1) ボーリング調査及び標準貫入試験 | <ul style="list-style-type: none"> ・ 浄水場予定地 (1個所×20m) ・ 既存高架水槽 (1個所×20m) ・ 新設高架水槽 (1個所×20m) 合計3個所60m |
| | (2) 平板載荷試験 | <ul style="list-style-type: none"> ・ 浄水施設予定地 (1個所) |
| | (3) 埋設構造物確認調査 | 試掘調査 <ul style="list-style-type: none"> ・ カンビア市街地 (30個所×1m×1m×1m) ・ 浄水施設 (10個所×1m×1m×2m) 合計40個所 |

(1) 地形測量

地形測量では、計画施設の建設予定地の平面測量と配管ルート of 路線測量（平面及び縦断）を実施し、計画地点の平面・縦断形及び標高を調査した。なお、路線測量ではカンビア・タウン内の公共水栓の建設予定地（100ヶ所）の地点及び標高についても合わせて調査した。

(2) 地盤・土質調査

地盤・土質調査では、浄水場及び高架水槽建設予定地点でのボーリング調査（標準貫入試験含む）、浄水場建設予定地（既存浄水場内）での平板載荷試験を実施した。ボーリング調査の結果を表-2、平板載荷試験の結果を表-3に示す。

また、地盤・土質調査では、施工計画や工事費の積算に反映させるため、カンビア・タウン内の配管ルート及び浄水場建設予定地で試掘を実施し、土質や転石等の有無を確認した。試掘調査の結果を図-2に示す。

配管ルートの内、浄水場～高架水槽間の送水管ルートの一部（Test Pit No.2及び No.3地点）、カンビア・タウンの新市街地の西地区の一部（Test Pit No.26～No.28、No.22地点）には地表から30～60cmの深さに岩が確認され、同地点を含む約1kmの区間は配管工事で岩掘削が必要となる。一方、浄水場内の試掘調査では浄水施設の建設予定地点10箇所まで深さ2mまで掘削を行い、転石等による掘削工事への障害はないことを確認した。

(3) 水質調査

現地調査では、本プロジェクトの水源となるコレンテン川及びスワンプから採水して水質分析を行い、原水の水質の性状について確認を行った。また、カンビア・タウン内の伝統井戸及びハンドポンプ付井戸から採水して、住民が利用している給水源の水質についても調査を行った。これら水質分析の結果を表-4に示す。なお、水質分析はWSDの水質分析室に依頼した。

(4) 河川流量観測

本プロジェクトの水源となるコレンテン川の河川流量（特に、乾期の終わりの最も流量の少ない時期の流量）に対する取水の影響を把握する目的で同河川の流量観測を行った。河川流量は、河川の流速を流速計により測定し、河川の流積（流下断面積）との積によって算定した。この結果、コレンテン川の流量は $2.40\text{m}^3/\text{秒}$ （2010年5月15日観測）であった。

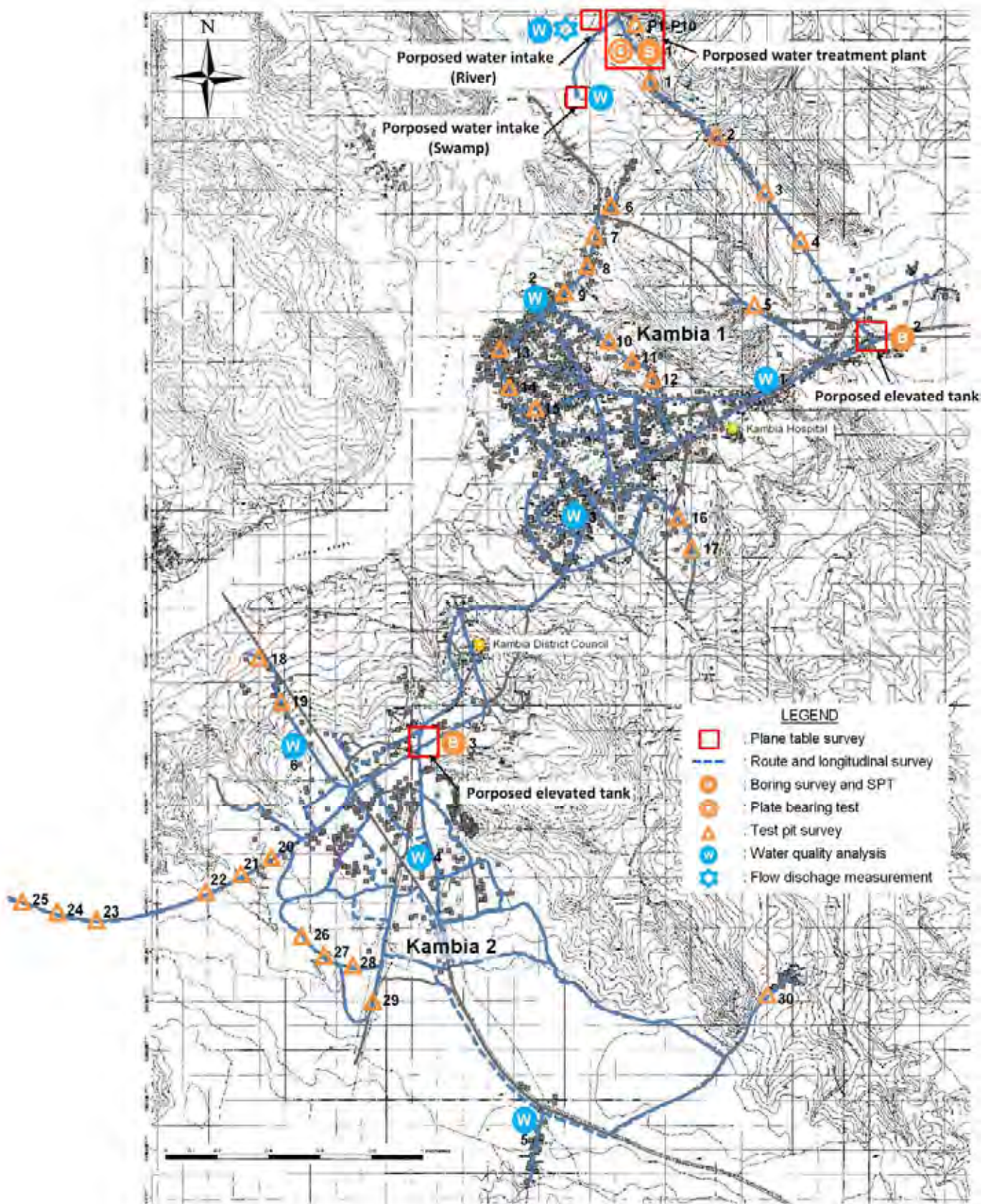


图-1 自然条件调查位置图

表-2 ボーリング調査結果

| SPT LITHOLOGIC DRILL LOG | | | | | | | | | | | |
|--------------------------|--------|--------------------|--|-------------------------|--------------------|------------------|------------|------------------|---------------------------------|----------|--|
| DATE: 02/06/2010 | | | | | | | | | FOREMAN: J. Ailie | | |
| AREA: Kambia Town I | | | LINE: Existing Elevated Tank | | | SITE: 1 | | | GEOLOGIST: M. Bawoh | | |
| COLLAR ELEV.: 67.762m | | | BEDROCK ELEV.: 59.242m | | | WATER ELEV.: Nil | | | DRILL TYPE: B53 auger drill rig | | |
| From (m) | To (m) | Drive Interval (m) | Recovery (%) | Test Drive Hammer Blows | Colour | Over Size (%) | Slimes (%) | Characteristic | Modifier | Rock | Other Observations |
| 0.00 | 0.46 | 0.46 | 75 | 9 | Dark Brown | 70 | 20 | Coarse Sized | Laterite | Gravel | Roots and root hairs, pebble-cobble sized laterite nodules |
| 1.46 | 1.92 | 0.46 | 90 | 147 | Dark Reddish Brown | 70 | 10 | Coarse Sized | Iron Stained | Laterite | Iron stained, compacted indurated magnetite nodules with lateritic matrix in the interstices. |
| 2.92 | 3.38 | 0.46 | 100 | 78 | Reddish Brown | 70 | 25 | Coarse Sized | Iron Stained | Laterite | Highly weathered micaceous lateritic matrix with many magnetite nodules embedded |
| 4.38 | 4.84 | 0.46 | 100 | 12 | Reddish Brown | 50 | 30 | Highly Weathered | Iron Stained | Laterite | Highly weathered micaceous lateritic matrix with fewer magnetite nodules embedded |
| 5.84 | 6.30 | 0.46 | 70 | 13 | Reddish Brown | 10 | 70 | Highly Weathered | Lateritic | Clay | Very few compacted magnetite nodules embedded in lateritic clay/matrix |
| 7.30 | 7.76 | 0.46 | 85 | 42 | Orange Brown | 40 | 30 | Partly Weathered | Indurated | Saprotic | Partly weathered and fresh rock material embedded in weathered matrix showing honey-comb texture, and relics of gresic texture |
| 7.76 | 8.57 | 0.81 | Fresh Country Rock - No Penetration by motorised auger drive | | | | | | | | |

| SPT LITHOLOGIC DRILL LOG | | | | | | | | | | | |
|--------------------------|--------|--------------------|---|-------------------------|---------------|------------------|------------|------------------|---------------------------------|----------|--|
| DATE: 03/06/2010 | | | | | | | | | SUPERVISOR: J. Ailie | | |
| AREA: Kambia Town I | | | LINE: Proposed Water Treatment Facility | | | SITE: 1 | | | GEOLOGIST: M. Bawoh | | |
| COLLAR ELEV.: 29.561m | | | BEDROCK ELEV.: 16.341m | | | WATER ELEV.: Nil | | | DRILL TYPE: B53 auger drill rig | | |
| From (m) | To (m) | Drive Interval (m) | Recovery (%) | Test Drive Hammer Blows | Colour | Over Size (%) | Slimes (%) | Characteristic | Modifier | Rock | Other Observations |
| 0.00 | 0.46 | 0.46 | 70 | 13 | Dark Brown | 10 | 30 | Coarse Sized | Lateritic | Gravel | Roots and root hairs, clay matrix in interstices of iron-stained compacted lateritic nodules |
| 1.46 | 1.92 | 0.46 | 75 | 112 | Reddish Brown | 70 | 10 | Coarse Sized | Iron Stained | Laterite | Iron stained, compacted indurated magnetite nodules with lateritic matrix in their interstices |
| 2.92 | 3.38 | 0.46 | 90 | 71 | Reddish Brown | 50 | 30 | Coarse Sized | Iron Stained | Laterite | Iron stained, matrix with compacted indurated magnetite nodules embedded |
| 4.38 | 4.84 | 0.46 | 60 | 28 | Reddish Brown | 20 | 50 | Highly Weathered | Lateritic | Clay | Highly weathered lateritic clay with few lateritic pebbles |
| 5.84 | 6.30 | 0.46 | 60 | 20 | Orange Brown | 5 | 80 | Highly Weathered | Lateritic | Clay | Highly weathered lateritic clay with fewer lateritic pebbles |
| 7.30 | 7.76 | 0.46 | 75 | 15 | Dark Brown | 5 | 80 | Highly Weathered | Lateritic | Clay | Highly weathered lateritic clay with fewer lateritic pebbles |
| 8.76 | 9.22 | 0.46 | 100 | 10 | Mottled Brown | 5 | 20 | Partly Weathered | Indurated | Saprotic | Saprotic material mixed with fresh and partly weathered country rock |
| 10.22 | - | - | After more than 25 blows, no penetration for seating drive (fresh country rock encountered) | | | | | | | | |

| SPT LITHOLOGIC DRILL LOG | | | | | | | | | | | |
|--------------------------|--------|--------------------|---|-------------------------|---------------|------------------|------------|------------------|---------------------------------|----------|--|
| DATE: 04/04/2010 | | | | | | | | | SUPERVISOR: J. Ailie | | |
| AREA: Kambia Town II | | | LINE: Proposed Elevated Tank | | | SITE: 1 | | | GEOLOGIST: M. Bawoh | | |
| COLLAR ELEV.: 55.217m | | | BEDROCK ELEV.: 41.617m | | | WATER ELEV.: Nil | | | DRILL TYPE: B53 auger drill rig | | |
| From (m) | To (m) | Drive Interval (m) | Recovery (%) | Test Drive Hammer Blows | Colour | Over Size (%) | Slimes (%) | Characteristic | Modifier | Rock | Other Observations |
| 0.00 | 0.46 | 0.46 | 80 | 10 | Dark Brown | 50 | 20 | Coarse Sized | Lateritic | Gravel | Roots and root hairs, iron stained lateritic pebbles and clay matrix |
| 1.46 | 1.92 | 0.46 | 70 | 20 | Reddish Brown | 40 | 10 | Partly Weathered | Iron Stained | Laterite | Iron stained, densely packed coarse-gravel sized particles |
| 2.92 | 3.38 | 0.46 | 85 | 17 | Reddish Brown | 20 | 30 | Highly Weathered | Iron Stained | Laterite | Fine-medium grain size quartz particles embedded in weathered laterite |
| 4.38 | 4.84 | 0.46 | 80 | 22 | Reddish Brown | 25 | 30 | Highly Weathered | Iron Stained | Laterite | Fine-medium grain size quartz particles with very few magnetite nodules embedded in weathered laterite |
| 5.84 | 6.30 | 0.46 | 70 | 20 | Reddish Brown | 10 | 55 | Highly Weathered | Lateritic | Clay | Fewer magnetite nodules embedded in dominant clay matrix |
| 7.30 | 7.76 | 0.46 | 70 | 7 | Reddish Brown | 5 | 60 | Highly Weathered | Lateritic | Clay | Very very few magnetite nodules embedded in dominant clay matrix |
| 8.76 | 9.22 | 0.46 | 65 | 14 | Orange Brown | - | 50 | Partly Weathered | Indurated | Saprotic | Saprotic material containing partly weathered country rock |
| 10.22 | 10.68 | 0.46 | 90 | 21 | Orange Brown | - | 50 | Partly Weathered | Indurated | Saprotic | Saprotic material containing partly weathered country rock |
| 11.68 | 12.14 | 0.46 | 85 | 10 | Orange Brown | 20 | 40 | Partly Weathered | Indurated | Saprotic | Saprotic material containing partly weathered country rock |
| 13.14 | 13.60 | 0.46 | 100 | 40 | Orange Brown | 10 | 50 | Partly Weathered | Indurated | Saprotic | Saprotic material containing partly weathered country rock |
| 14.60 | - | - | After more than 25 blows, no penetration for seating drive (fresh country rock encountered) | | | | | | | | |

Recovery (%): Total length of core recovered expressed as a percentage of the drive length.
 Blows: The number of times a 63.5kg hammer is dropped from a height of 0.76m for the split sampler tube to penetrate the ground for 0.30m.
 Oversize: Size fraction greater than 75µm
 Slimes: Size fraction smaller than 63µm

表-3 平板載荷試驗結果

| | | | | | | | | | | | |
|--|----------------------|--|-----------|---------|---------------------------------|---------------------------|-------------------------------|---|----------------------|--|--|
| REPUBLIC OF SIERRA LEONE CONSULTANT JICA CONTROL LABORATORY | | ESTABLISHMENT OF RURAL WATER SUPPLY SYSTEM IN KAMBIA TOWN | | | | | | CONTRACTOR MINISTRY OF WATER AND ENERGY | | | |
| DETERMINATION OF THE PLATE-BEARING VALUE | | | | | | | | | | | |
| CHAINAGE: | | | LOCATION: | | | KAMBIA | | DATE: 23/05/2010 | | | |
| LAYER: | | | | | Operator: A KAMARA and I KOROMA | | | | | | |
| DESCRIPTION: CLAYEY SAND | | | | | | | | | | | |
| Manometer reading | | Deflexion reading in 0.01 mm = 10 ⁻³ m | | | | | | Soil Pressure | $\Delta P/\Delta S$ | Bearing Plate D = 60 [cm] | |
| Pm | | Gauge 1 | Gauge 2 | Gauge 3 | Gauge 4 | Sum x 10 ⁻⁵ | Average x 10 ⁻⁵ | P=C · Pm x 10 ⁻² | | | |
| [Kg/cm ²] | [MN/m ²] | 0.01mm | 0.01mm | 0.01mm | 0.01mm | [m] | [m] | [MN/m ²] | [MN/m ³] | | |
| 0,0 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,000 | 0,001 | Bearing Piston d = 6 [cm] | |
| 0,5 | 0,05 | 112,00 | 119,00 | 104,00 | 119,00 | 454,00 | 113,50 | 0,050 | | $C = d^2 / D^2$ | $\Delta P = 0,150 \times 10^{-1} [MN/m^2]$ $\Delta S = 154,75 \times 10^{-1} [m]$ |
| 1,0 | 0,10 | 198,00 | 196,00 | 180,00 | 201,00 | 775,00 | 193,75 | 0,100 | | | |
| 1,5 | 0,15 | 245,00 | 250,00 | 238,00 | 272,00 | 1005,00 | 251,25 | 0,150 | | | |
| 2,0 | 0,20 | 289,00 | 299,00 | 297,00 | 313,00 | 1198,00 | 299,50 | 0,200 | | | |
| 2,5 | 0,25 | 320,00 | 346,00 | 361,00 | 367,00 | 1394,00 | 348,50 | 0,250 | | | |
| 3,0 | 0,30 | 365,00 | 398,00 | 410,00 | 450,00 | 1623,00 | 405,75 | 0,300 | 0,003 | $E_v = 0.75 \cdot D \cdot \Delta P / \Delta S$ | |
| 1,5 | 0,15 | 300,00 | 335,00 | 378,00 | 433,00 | 1446,00 | 361,50 | 0,150 | | | $E_{v1} = 0,2 [MN/m^2]$ |
| 0,0 | 0,00 | 255,00 | 278,00 | 295,00 | 359,00 | 1187,00 | 296,75 | 0,000 | | | $\Delta P = 0,150 \times 10^{-1} [MN/m^2]$ $\Delta S = 44,75 \times 10^{-1} [m]$ |
| 0,5 | 0,05 | 258,00 | 296,00 | 298,00 | 363,00 | 1215,00 | 303,75 | 0,050 | | | $E_{v2} = 0,8 [MN/m^2]$ |
| 1,0 | 0,10 | 272,00 | 309,00 | 300,00 | 358,00 | 1239,00 | 309,75 | 0,100 | | | $E_{v2}/E_{v1} = 3,46 (>2.2)$ |
| 1,5 | 0,15 | 284,00 | 319,00 | 316,00 | 410,00 | 1329,00 | 332,25 | 0,150 | | | |
| 2,0 | 0,20 | 290,00 | 324,00 | 331,00 | 425,00 | 1370,00 | 342,50 | 0,200 | | | |
| 2,5 | 0,25 | 298,00 | 334,00 | 349,00 | 437,00 | 1418,00 | 354,50 | 0,250 | | | |
| 0,0 | 0,00 | 158,00 | 272,00 | 270,00 | 357,00 | 1057,00 | 264,25 | 0,000 | | | |
| 0,5 | 0,05 | 164,00 | 300,00 | 286,00 | 371,00 | 1121,00 | 280,25 | 0,050 | | | |
| 2,5 | 0,25 | 201,00 | 338,00 | 350,00 | 442,00 | 1331,00 | 332,75 | 0,250 | | | |
| Remarks: | | | | | | | | | | | |
| | | | | | | | | | | | |

Test Pit in Kambia Town



図-2 (1/2) 試掘調査写真



Test pit No.25



Test pit No.26



Test pit No.27



Test pit No.28



Test pit No.29



Test pit No.30

Test Pit in Existing Water Treatment Plant



Test pit No.P1



Test pit No.P2



Test pit No.P3



Test pit No.P4



Test pit No.P5



Test pit No.P6



Test pit No.P7



Test pit No.P8



Test pit No.P9



Test pit No.P10

図-2 (2/2) 試掘調査写真

表-4 水質分析結果

| Parameters | | Measured Values | | | | | | | | | | WHO recommended Permissible Limits |
|------------|---|-----------------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-------|------------------------------------|
| | | Kolnten | Swamp | Well No.1 | Well No.2 | Well No.3 | Well No.4 | Well No.5 | Well No.6 | | | |
| 1 | PH | 5.8 | 6.1 | 5.7 | 6 | 6.1 | 5.7 | 6.2 | 6.2 | 6.2 | 6.2 | 6.5 – 8.5 |
| 2 | Turbidity (NTU) | 1.5 | 2.2 | 2.4 | 1.3 | 0.5 | 4.5 | 0.4 | 11.4 | 11.4 | 11.4 | <5.0 |
| 3 | Conductivity (µS/cm) | 39.9 | 40.1 | 129.8 | 237 | 107 | 37.5 | 93.2 | 51.4 | 51.4 | 51.4 | <450 |
| 4 | TDS (mg/l) | 19.3 | 20 | 64.2 | 118.1 | 53.1 | 18.4 | 46.1 | 25.6 | 25.6 | 25.6 | <248 |
| 5 | Ammonia (mg/l) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | No. Value |
| 6 | Total Hardness CaCO ₃ (mg/l) | 14 | 11 | 0 | 0 | 0 | 8 | 4 | 11 | 11 | 11 | <500 |
| 7 | Copper (mg/l) | 0.04 | 0 | 0.06 | 0 | 0.03 | 0.03 | 0 | 0.12 | 0.12 | 0.12 | <2.0 |
| 8 | Fluoride (mg/l) | 0.44 | 0.04 | 0.2 | 0.9 | 0.7 | 0.65 | 0.4 | 1.46 | 1.46 | 1.46 | <1.5 |
| 9 | Iron (mg/l) | 0 | 0.06 | 0.09 | 0.03 | 0.02 | 0.03 | 0 | 0.04 | 0.04 | 0.04 | <0.3 |
| 10 | Magnesium (mg/l) | 0 | 0 | 8.5 | 14.5 | 11 | 9.5 | 4 | 0 | 0 | 0 | <200 |
| 11 | Manganese (mg/l) | 0.02 | 0.003 | 0.035 | 0.018 | 0.014 | 0.015 | 0 | 0.002 | 0.002 | 0.002 | <0.4 |
| 12 | Nitrite (mg/l) | 0.027 | 0.012 | 0.004 | 0.006 | 0.001 | 0.004 | 0.017 | 0.025 | 0.025 | 0.025 | 3 |
| 13 | Nitrate – Nitrogen (mg/l)/HR | 1.38 | 0.58 | 9.4 | 27.6 | 24 | 10.8 | 0.66 | 2.2 | 2.2 | 2.2 | <10 |
| 14 | Sulphate (mg/l) | 0 | 0 | 8 | 3 | 3 | 5 | 0 | 4 | 4 | 4 | <400 |
| 15 | Sulphide (mg/l) | 0.14 | 0.15 | 0.1 | 0.09 | 0.07 | 0.1 | 0.16 | 0.18 | 0.18 | 0.18 | <0.5 |
| 16 | Chloride (mg/l) | - | - | - | - | - | - | - | - | - | - | <250 |
| 17 | Arsenic – (p) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 |
| 18 | Zinc (mg/l) | 0.02 | 0 | 3.5 | 0.74 | 0.08 | 0.02 | 0.03 | 0.06 | 0.06 | 0.06 | <5.0 |
| 19 | E. Coli | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | Zero |
| 20 | Faecal Coliforms | 80 | 160 | 135 | 175 | 85 | 120 | 55 | 145 | 145 | 145 | Zero |

Note: Date of water sampling: May 19, 2010

資料 7

社会条件調査結果

資料7 社会条件調査結果

現地調査では、カンビア・タウンの一般的な社会経済状況の把握、水利用実態、衛生状況、本プロジェクトが実施後の給水の利用に係る意思、各戸給水栓の接続に係る希望等に係るアンケート調査を実施した、また、給水区域内の戸数と人口を把握するためのカウント（全数調査）を実施した。

上記アンケート調査のサンプル数は旧市街地185、新市街地200の合計385サンプルを対象に行った。アンケート調査の結果の概要は以下のとおりである。

【民族】

| | |
|--------|-----|
| ・ティムニ： | 71% |
| ・リンバ： | 13% |
| ・スス： | 9% |
| ・その他 | 6% |

【識字率/最終学歴】

| | |
|-------|-----|
| ・小学校 | 29% |
| ・中学校 | 14% |
| ・高等学校 | 2% |
| ・識字率 | 47% |

【健康状態】

| | |
|--------------|-----|
| ・過去1年間に病気を経験 | 62% |
| ・内、下痢 | 10% |
| ・内、腸チフス | 18% |

【衛生施設】

| | |
|--------|-----|
| ・個人トイレ | 21% |
| ・共同トイレ | 70% |
| ・水洗トイレ | 1% |

【給水源】

| | |
|------------|-----|
| ・伝統井戸 | 44% |
| ・ハンドポンプ付井戸 | 16% |
| ・河川・小川 | 37% |

【水汲みに要する時間】

| | |
|---------|-----|
| ・10分以内 | 34% |
| ・10～20分 | 33% |
| ・25分以上 | 30% |

【水源までの距離】

| | |
|-----------|-----|
| ・ 50m 以内 | 44% |
| ・ 60～100m | 54% |
| ・ 100m 以上 | 1% |

【主な収入源】

| | |
|----------------|-----|
| ・ 給与所得 | 24% |
| ・ 貿易業 (Trader) | 21% |
| ・ 年金 | 2% |
| ・ 送金 | 3% |
| ・ 自営 | 33% |
| ・ その他 | 13% |

【月収】

| | |
|--------------|-----|
| ・ 10 万レオネ以下 | 43% |
| ・ 10～20 万レオネ | 27% |
| ・ 20～35 万レオネ | 13% |
| ・ 35～50 万レオネ | 7% |
| ・ 50～75 万レオネ | 2% |

【貯蓄】

| | |
|--------|-----|
| ・ 貯金あり | 25% |
| ・ 貯金なし | 65% |

【本プロジェクトへの協力】

| | |
|---------|-----|
| ・ 協力する | 87% |
| ・ 協力しない | 11% |
| ・ 分からない | 2% |

【希望する給水形態】

| | |
|----------------------------|-----|
| ・ 公共水栓 | 16% |
| ・ 各戸給水栓 (Yard connection) | 43% |
| ・ 各戸給水栓 (House connection) | 37% |
| ・ 分からない | 3% |

【水道料金の支払い】

| | |
|---------|-----|
| ・ 意志あり | 80% |
| ・ 意思なし | 10% |
| ・ 分からない | 10% |

【支払い意思額/公共水栓】

| | |
|---------------|-----|
| ・ 5,000 レオネ以下 | 55% |
| ・ 5,000 レオネ | 23% |
| ・ 5,000～7,500 | 3% |

【支払い意思額/Yard Connection】

| | |
|--------------------|-----|
| ・ 5,000 レオネ以下 | 9% |
| ・ 5,000 レオネ | 11% |
| ・ 5,000～7,500 レオネ | 16% |
| ・ 7,500～10,000 レオネ | 46% |

【支払い意思額/House Connection】

| | |
|---------------------|-----|
| ・ 15,000～20,000 レオネ | 35% |
| ・ 20,000～30,000 レオネ | 11% |
| ・ 30,000 レオネ以上 | 1% |

本プロジェクトの計画給水区域内の戸数と人口は以下のとおりである。

| | 戸数 (戸) | 人口 (人) |
|-------------------|--------|--------|
| ・ 旧市街地 (Kambia 1) | 1,231 | 9,892 |
| ・ 新市街地 (Kambia 2) | 1,962 | 10,876 |
| 合 計 | 3,193 | 20,768 |

資料 8

配水管水理計算書

資料 8 配水管水理計算書

Hydraulic Calculation on Water Pressure at Public Taps in Kambia 1

Water Head at Junctions in Kambia 1

| Junction | C | D (mm) | Q (m ³ /min) | L (m) | V (m/sec) | Hf (m) | Σ Hf (m) | El. Tank (EL-m) | Water Head | Discharge (m ³ /day) | Hourly Coefficient |
|----------|-----|--------|-------------------------|-------|-----------|--------|----------|-----------------|------------|---------------------------------|--------------------|
| 1A | 130 | 150 | 1.367 | 20 | 1.290 | 0.25 | 0.25 | 77.90 | 77.65 | 492 | 4.0 |
| | 130 | 150 | 0.767 | 400 | 0.723 | 1.69 | | | | | |
| 1B | 130 | 100 | 0.767 | 790 | 1.628 | 24.09 | 26.03 | 77.90 | 51.87 | 276 | |
| | 130 | 100 | 0.300 | 140 | 0.637 | 0.75 | | | | | |
| 1C | 130 | 100 | 0.300 | 140 | 0.637 | 0.75 | 26.78 | 77.90 | 51.12 | 108 | |

Kambia 1 - Higher Area 1

| Tap No. | C | D (mm) | Q (m ³ /min) | L (m) | V (m/sec) | Hf (m) | Σ Hf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m ³ /day) |
|---------|-----|--------|-------------------------|-------|-----------|--------|----------|------------------|--------------|---------------------------------|
| 103 | 130 | 75 | 0.133 | 100 | 0.503 | 0.49 | 0.71 | 65.99 | 10.95 | 48 |
| | 130 | 75 | 0.067 | 160 | 0.252 | 0.22 | | | | |
| 101 | 130 | 75 | 0.033 | 200 | 0.126 | 0.07 | 0.78 | 66.10 | 10.77 | 12 |
| 102 | 130 | 75 | 0.067 | 80 | 0.252 | 0.11 | 0.60 | 63.54 | 13.51 | 24 |
| 103 | 130 | 75 | 0.033 | 220 | 0.126 | 0.08 | 0.68 | 60.92 | 16.05 | 12 |
| 104 | 130 | 75 | 0.033 | 220 | 0.126 | 0.08 | 0.68 | 60.92 | 16.05 | 12 |

Kambia 1 - Higher Area 2

| Tap No. | C | D (mm) | Q (m ³ /min) | L (m) | V (m/sec) | Hf (m) | Σ Hf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m ³ /day) |
|---------|-----|--------|-------------------------|-------|-----------|--------|----------|------------------|--------------|---------------------------------|
| 105 | 130 | 150 | 0.467 | 30 | 0.440 | 0.05 | 0.90 | 63.38 | 13.37 | 168 |
| | 130 | 100 | 0.433 | 80 | 0.920 | 0.85 | | | | |
| 106 | 130 | 100 | 0.400 | 120 | 0.849 | 1.10 | 2.46 | 56.43 | 18.76 | 144 |
| | 130 | 100 | 0.333 | 70 | 0.708 | 0.46 | | | | |
| 107 | 130 | 100 | 0.333 | 70 | 0.708 | 0.46 | 2.46 | 56.43 | 18.76 | 120 |
| 109 | 130 | 100 | 0.300 | 250 | 0.637 | 1.34 | 3.95 | 45.87 | 27.83 | 108 |
| | 130 | 100 | 0.100 | 210 | 0.212 | 0.15 | | | | |
| 110 | 130 | 100 | 0.100 | 210 | 0.212 | 0.15 | 3.95 | 45.87 | 27.83 | 36 |
| 116 | 130 | 100 | 0.067 | 130 | 0.142 | 0.04 | 4.00 | 40.77 | 32.88 | 24 |
| | 130 | 100 | 0.033 | 120 | 0.071 | 0.01 | | | | |
| 117 | 130 | 100 | 0.033 | 120 | 0.071 | 0.01 | 4.00 | 40.77 | 32.88 | 12 |
| 118 | 130 | 100 | 0.033 | 120 | 0.071 | 0.01 | 0.06 | 67.51 | 10.08 | 12 |
| 105 | 130 | 100 | 0.033 | 120 | 0.071 | 0.01 | 0.06 | 67.51 | 10.08 | 12 |
| 107 | 130 | 75 | 0.067 | 180 | 0.252 | 0.24 | 2.24 | 58.39 | 17.02 | 24 |
| 108 | 130 | 75 | 0.033 | 280 | 0.126 | 0.10 | 2.34 | 51.08 | 24.23 | 12 |
| 110 | 130 | 100 | 0.200 | 10 | 0.425 | 0.03 | 3.83 | 50.30 | 23.52 | 72 |
| 111 | 130 | 100 | 0.167 | 200 | 0.354 | 0.36 | 4.19 | 47.20 | 26.26 | 60 |
| 112 | 130 | 100 | 0.133 | 160 | 0.283 | 0.19 | 4.40 | 40.51 | 32.74 | 48 |
| | 130 | 100 | 0.067 | 60 | 0.142 | 0.02 | | | | |
| 113 | 130 | 100 | 0.067 | 60 | 0.142 | 0.02 | 4.40 | 40.51 | 32.74 | 24 |
| 114 | 130 | 100 | 0.033 | 140 | 0.071 | 0.01 | 4.41 | 40.98 | 32.26 | 12 |
| 115 | 130 | 100 | 0.033 | 160 | 0.071 | 0.01 | 4.39 | 42.33 | 30.93 | 12 |
| 112 | 130 | 100 | 0.033 | 160 | 0.071 | 0.01 | 4.39 | 42.33 | 30.93 | 12 |
| 113 | 130 | 100 | 0.033 | 90 | 0.071 | 0.01 | 4.39 | 43.83 | 29.43 | 12 |
| 117 | 130 | 75 | 0.033 | 80 | 0.126 | 0.03 | 4.02 | 43.00 | 30.63 | 12 |

Kambia 1 - Lower Area 1

| Tap No. | C | D (mm) | Q (m3/min) | L (m) | V (m/sec) | Hf (m) | ΣHf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m3/day) |
|---------|-----|--------|------------|-------|-----------|--------|---------|------------------|--------------|--------------------|
| 1B | 130 | 100 | 0.167 | 10 | 0.354 | 0.02 | | | | 60 |
| 201 | | | | | | | 0.02 | 37.64 | 14.21 | |
| 202 | 130 | 100 | 0.133 | 220 | 0.283 | 0.26 | | | | 48 |
| | 130 | 75 | 0.067 | 180 | 0.252 | 0.24 | | | | 24 |
| 204 | | | | | | | 0.52 | 34.70 | 16.65 | |
| 205 | 130 | 75 | 0.033 | 200 | 0.126 | 0.07 | | | | 12 |
| | | | | | | | 0.59 | 29.24 | 22.04 | |
| | 130 | 100 | 0.067 | 20 | 0.142 | 0.01 | | | | 24 |
| 202 | | | | | | | 0.29 | 37.06 | 14.52 | |
| | 130 | 100 | 0.033 | 290 | 0.071 | 0.03 | | | | 12 |
| 203 | | | | | | | 0.32 | 29.44 | 22.11 | |

Kambia 1 - Lower Area 2

| Tap No. | C | D (mm) | Q (m3/min) | L (m) | V (m/sec) | Hf (m) | ΣHf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m3/day) |
|---------|-----|--------|------------|-------|-----------|--------|---------|------------------|--------------|--------------------|
| 1B | 130 | 100 | 0.300 | 160 | 0.637 | 0.86 | | | | 108 |
| 206 | | | | | | | 0.86 | 34.37 | 16.64 | |
| 207 | 130 | 100 | 0.267 | 190 | 0.566 | 0.82 | | | | 96 |
| | 130 | 100 | 0.233 | 10 | 0.495 | 0.03 | | | | 84 |
| 208 | | | | | | | 1.71 | 33.00 | 17.16 | |
| 209 | 130 | 100 | 0.200 | 10 | 0.425 | 0.03 | | | | 72 |
| | 130 | 100 | 0.167 | 220 | 0.354 | 0.40 | | | | 60 |
| 210 | | | | | | | 2.14 | 21.12 | 28.61 | |
| 211 | 130 | 100 | 0.133 | 170 | 0.283 | 0.20 | | | | 48 |
| | 130 | 75 | 0.100 | 50 | 0.377 | 0.14 | | | | 36 |
| 212 | | | | | | | 2.48 | 18.08 | 31.31 | |
| | 130 | 75 | 0.067 | 270 | 0.252 | 0.36 | | | | 24 |
| 213 | | | | | | | 2.84 | 18.92 | 30.11 | |
| 214 | 130 | 75 | 0.033 | 220 | 0.126 | 0.08 | | | | 12 |
| | | | | | | | 2.92 | 25.69 | 23.26 | |
| | 130 | 100 | 0.033 | 140 | 0.071 | 0.01 | | | | 12 |
| 207 | | | | | | | 1.69 | 31.31 | 18.87 | |
| | 130 | 100 | 0.033 | 140 | 0.071 | 0.01 | | | | 12 |
| 209 | | | | | | | 1.75 | 28.81 | 21.31 | |
| | 130 | 100 | 0.033 | 180 | 0.071 | 0.02 | | | | 12 |
| 211 | | | | | | | 2.36 | 24.55 | 24.96 | |

Kambia 1 - Lower Area 3

| Tap No. | C | D (mm) | Q (m3/min) | L (m) | V (m/sec) | Hf (m) | ΣHf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m3/day) |
|---------|-----|--------|------------|-------|-----------|--------|---------|------------------|--------------|--------------------|
| 215 | 1C | 130 | 0.233 | 110 | 0.495 | 0.37 | | | | 84 |
| | | 130 | 0.200 | 90 | 0.425 | 0.23 | | | | 72 |
| 216 | | | | | | | 0.60 | 28.54 | 21.98 | |
| 217 | 130 | 100 | 0.167 | 50 | 0.354 | 0.09 | | | | 60 |
| 218 | 130 | 100 | 0.133 | 130 | 0.283 | 0.16 | | | | 48 |
| | 130 | 100 | 0.100 | 110 | 0.212 | 0.08 | | | | 36 |
| 219 | | | | | | | 0.93 | 18.94 | 31.25 | |
| | 130 | 100 | 0.067 | 180 | 0.142 | 0.06 | | | | 24 |
| 220 | | | | | | | 0.99 | 16.41 | 33.72 | |
| | 130 | 100 | 0.033 | 170 | 0.071 | 0.02 | | | | 12 |
| 221 | | | | | | | 1.01 | 16.64 | 33.47 | |
| | 130 | 100 | 0.033 | 120 | 0.071 | 0.01 | | | | 12 |
| 215 | | | | | | | 0.38 | 30.40 | 20.34 | |
| | 130 | 100 | 0.033 | 220 | 0.071 | 0.02 | | | | 12 |
| 217 | | | | | | | 0.71 | 26.63 | 23.78 | |
| | 130 | 75 | 0.033 | 120 | 0.126 | 0.04 | | | | 12 |
| 218 | | | | | | | 0.89 | 17.34 | 32.89 | |

Kambia 1 - Lower Area 4

| Tap No. | C | D (mm) | Q (m ³ /min) | L (m) | V (m/sec) | Hf (m) | ΣHf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m ³ /day) |
|---------|-----|-----------|----------------------------|----------|--------------|-----------|------------|---------------------|-----------------|------------------------------------|
| 1C | 130 | 100 | 0.067 | 80 | 0.142 | 0.03 | | | | 24 |
| 222 | | | | | | | 0.03 | 33.14 | 17.95 | |
| | 130 | 100 | 0.033 | 220 | 0.071 | 0.02 | | | | 12 |
| 223 | | | | | | | 0.05 | 18.03 | 33.04 | |

Hydraulic Calculation on Water Pressure at Public Taps in Kambia 2

Water Head at Junctions in Kambia 2

| Junction | C | D (mm) | Q (m ³ /min) | L (m) | V (m/sec) | Hf (m) | Σ Hf (m) | El. Tank (EL-m) | Water Head | Discharge (m ³ /day) | Hourly Coefficient |
|----------|-----|--------|-------------------------|-------|-----------|--------|----------|-----------------|------------|---------------------------------|--------------------|
| 2A | 130 | 250 | 1.967 | 2150 | 0.668 | 4.32 | 4.32 | 77.90 | 73.58 | 708 | 4.0 |
| | 130 | 200 | 1.100 | 940 | 0.584 | 1.91 | | | | | |
| 2B | | | | | | | 6.23 | 77.90 | 71.67 | 396 | |

Kambia 2 East 1

| Tap No. | C | D (mm) | Q (m ³ /min) | L (m) | V (m/sec) | Hf (m) | Σ Hf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m ³ /day) |
|---------|-----|--------|-------------------------|-------|-----------|--------|----------|------------------|--------------|---------------------------------|
| 2A | 130 | 100 | 0.400 | 20 | 0.849 | 0.18 | 0.18 | 33.60 | 39.80 | 144 |
| 301 | 130 | 100 | 0.367 | 480 | 0.778 | 3.74 | | | | |
| 302 | 130 | 100 | 0.333 | 220 | 0.708 | 1.44 | 3.92 | 49.22 | 20.44 | 132 |
| 303 | 130 | 100 | 0.300 | 120 | 0.637 | 0.64 | 5.36 | 55.47 | 12.75 | 120 |
| 304 | 130 | 100 | 0.267 | 150 | 0.566 | 0.65 | | | | |
| 305 | 130 | 100 | 0.233 | 180 | 0.495 | 0.61 | 6.65 | 55.76 | 11.17 | 84 |
| 306 | 130 | 100 | 0.200 | 120 | 0.425 | 0.30 | 7.26 | 55.57 | 10.75 | 72 |
| 307 | 130 | 100 | 0.167 | 100 | 0.354 | 0.18 | 7.56 | 55.27 | 10.75 | 60 |
| 308 | 130 | 100 | 0.133 | 140 | 0.283 | 0.17 | 7.74 | 55.13 | 10.71 | 48 |
| 309 | 130 | 100 | 0.100 | 110 | 0.212 | 0.08 | 7.91 | 54.85 | 10.82 | 36 |
| 310 | 130 | 100 | 0.067 | 80 | 0.142 | 0.03 | | | | |
| 311 | 130 | 100 | 0.033 | 240 | 0.071 | 0.02 | 8.02 | 54.93 | 10.63 | 24 |
| 312 | 130 | 100 | 0.033 | 240 | 0.071 | 0.02 | 8.04 | 53.36 | 12.18 | 12 |
| 304 | 130 | 75 | 0.033 | 120 | 0.126 | 0.04 | 6.04 | 55.35 | 12.19 | 12 |
| 310 | 130 | 100 | 0.033 | 150 | 0.071 | 0.01 | 8.00 | 53.26 | 12.32 | 12 |

Kambia 2 East 2

| Tap No. | C | D (mm) | Q (m ³ /min) | L (m) | V (m/sec) | Hf (m) | Σ Hf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m ³ /day) |
|---------|-----|--------|-------------------------|-------|-----------|--------|----------|------------------|--------------|---------------------------------|
| 2A | 130 | 150 | 0.467 | 580 | 0.440 | 0.98 | 0.98 | 55.04 | 17.56 | 168 |
| 313 | 130 | 150 | 0.433 | 190 | 0.409 | 0.28 | | | | |
| 314 | 130 | 150 | 0.400 | 110 | 0.377 | 0.14 | 1.26 | 55.43 | 16.89 | 156 |
| 315 | 130 | 150 | 0.367 | 240 | 0.346 | 0.26 | 1.40 | 55.40 | 16.78 | 144 |
| 316 | 130 | 150 | 0.333 | 110 | 0.315 | 0.10 | 1.66 | 54.32 | 17.60 | 132 |
| 317 | 130 | 150 | 0.300 | 150 | 0.283 | 0.11 | 1.76 | 53.70 | 18.12 | 120 |
| 318 | 130 | 100 | 0.267 | 10 | 0.566 | 0.04 | | | | |
| 319 | 130 | 100 | 0.233 | 260 | 0.495 | 0.88 | 1.91 | 53.42 | 18.25 | 84 |
| 320 | 130 | 100 | 0.200 | 200 | 0.425 | 0.51 | 2.79 | 50.46 | 20.33 | 72 |
| 321 | 130 | 100 | 0.167 | 260 | 0.354 | 0.47 | 3.30 | 52.54 | 17.74 | 60 |
| 322 | 130 | 100 | 0.133 | 220 | 0.283 | 0.26 | 3.77 | 55.07 | 14.74 | 48 |
| 323 | 130 | 100 | 0.100 | 200 | 0.212 | 0.14 | 4.03 | 56.21 | 13.34 | 36 |
| 324 | 130 | 100 | 0.067 | 200 | 0.142 | 0.07 | 4.17 | 57.91 | 11.50 | 24 |
| 325 | 130 | 100 | 0.067 | 200 | 0.142 | 0.07 | 4.24 | 58.68 | 10.66 | |

| | | | | | | | | | | |
|-----|-----|----|-------|-----|-------|------|------|-------|-------|----|
| 326 | 130 | 75 | 0.033 | 400 | 0.126 | 0.15 | | | | 12 |
| | | | | | | | 4.39 | 41.82 | 27.37 | |

| | | | | | | | | | | |
|-----|-----|----|-------|-----|-------|------|------|-------|-------|----|
| 318 | 130 | 75 | 0.033 | 120 | 0.126 | 0.04 | | | | 12 |
| | | | | | | | 1.91 | 50.49 | 21.18 | |

Kambia 2 West 1

| Tap No. | C | D (mm) | Q (m3/min) | L (m) | V (m/sec) | Hf (m) | Σ Hf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m3/day) |
|---------|-----|--------|------------|-------|-----------|--------|----------|------------------|--------------|--------------------|
| 2B | 130 | 150 | 0.467 | 220 | 0.440 | 0.37 | | | | 168 |
| 401 | | | | | | | 0.37 | 54.83 | 16.47 | |
| 402 | 130 | 150 | 0.433 | 120 | 0.409 | 0.18 | | | | 156 |
| 403 | | | | | | | 0.55 | 55.32 | 15.80 | |
| 404 | 130 | 150 | 0.400 | 100 | 0.377 | 0.13 | | | | 144 |
| 404 | 130 | 100 | 0.367 | 140 | 0.778 | 1.09 | | | | 132 |
| 404 | 130 | 100 | 0.300 | 100 | 0.637 | 0.54 | | | | 108 |
| 406 | | | | | | | 2.31 | 54.98 | 14.38 | |
| 413 | 130 | 100 | 0.267 | 130 | 0.566 | 0.56 | | | | 96 |
| 413 | 130 | 100 | 0.167 | 130 | 0.354 | 0.24 | | | | 60 |
| 407 | | | | | | | 3.11 | 55.53 | 13.03 | |
| 408 | 130 | 100 | 0.133 | 170 | 0.283 | 0.20 | | | | 48 |
| 408 | | | | | | | 3.31 | 55.55 | 12.81 | |
| 409 | 130 | 100 | 0.100 | 180 | 0.212 | 0.13 | | | | 36 |
| 409 | | | | | | | 3.44 | 57.09 | 11.14 | |
| 410 | 130 | 100 | 0.067 | 480 | 0.142 | 0.16 | | | | 24 |
| 410 | | | | | | | 3.60 | 57.28 | 10.79 | |
| 411 | 130 | 75 | 0.033 | 170 | 0.126 | 0.06 | | | | 12 |
| 411 | | | | | | | 3.66 | 55.40 | 12.61 | |
| 404 | 130 | 100 | 0.067 | 60 | 0.142 | 0.02 | | | | 24 |
| 404 | | | | | | | 1.79 | 55.24 | 14.64 | |
| 405 | 130 | 100 | 0.033 | 180 | 0.071 | 0.02 | | | | 12 |
| 405 | | | | | | | 1.81 | 55.10 | 14.76 | |
| 412 | 130 | 100 | 0.100 | 60 | 0.212 | 0.04 | | | | 36 |
| 412 | 130 | 100 | 0.067 | 220 | 0.142 | 0.07 | | | | 24 |
| 413 | | | | | | | 2.98 | 53.91 | 14.78 | |
| 414 | 130 | 100 | 0.033 | 130 | 0.071 | 0.01 | | | | 12 |
| 414 | | | | | | | 2.99 | 52.54 | 16.14 | |
| 412 | 130 | 100 | 0.033 | 80 | 0.071 | 0.01 | | | | 12 |
| 412 | | | | | | | 2.92 | 53.15 | 15.60 | |

Kambia 2 West 2

| Tap No. | C | D (mm) | Q (m3/min) | L (m) | V (m/sec) | Hf (m) | Σ Hf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m3/day) |
|---------|-----|--------|------------|-------|-----------|--------|----------|------------------|--------------|--------------------|
| 2B | 130 | 100 | 0.133 | 140 | 0.283 | 0.17 | | | | 48 |
| 415 | | | | | | | 0.17 | 55.66 | 15.84 | |
| 416 | 130 | 75 | 0.100 | 150 | 0.377 | 0.43 | | | | 36 |
| 416 | | | | | | | 0.60 | 53.52 | 17.55 | |
| 417 | 130 | 75 | 0.067 | 180 | 0.252 | 0.24 | | | | 24 |
| 417 | | | | | | | 0.84 | 37.65 | 33.18 | |
| 418 | 130 | 75 | 0.033 | 240 | 0.126 | 0.09 | | | | 12 |
| 418 | | | | | | | 0.93 | 24.33 | 46.41 | |

Kambia 2 West 3

| Tap No. | C | D (mm) | Q (m3/min) | L (m) | V (m/sec) | Hf (m) | Σ Hf (m) | Elevation (EL-m) | Pressure (m) | Discharge (m3/day) |
|---------|-----|--------|------------|-------|-----------|--------|----------|------------------|--------------|--------------------|
| 2B | 130 | 100 | 0.500 | 110 | 1.062 | 1.52 | | | | 180 |
| 419 | | | | | | | 1.52 | 55.41 | 14.74 | |
| 420 | 130 | 100 | 0.467 | 120 | 0.991 | 1.46 | | | | 168 |
| 420 | 130 | 100 | 0.433 | 10 | 0.920 | 0.11 | | | | 156 |
| 421 | | | | | | | 3.09 | 53.22 | 15.36 | |
| 422 | 130 | 100 | 0.400 | 60 | 0.849 | 0.55 | | | | 144 |
| 424 | 130 | 100 | 0.333 | 50 | 0.708 | 0.33 | | | | 120 |
| 424 | 130 | 75 | 0.200 | 30 | 0.755 | 0.31 | | | | 72 |
| 428 | | | | | | | 4.28 | 50.27 | 17.12 | |
| 429 | 130 | 75 | 0.167 | 380 | 0.629 | 2.79 | | | | 60 |
| 429 | | | | | | | 7.07 | 49.22 | 15.38 | |
| 429 | 130 | 75 | 0.133 | 240 | 0.503 | 1.17 | | | | 48 |

| | | | | | | | | | | |
|------------|-----|-----|-------|-----|-------|------|------|-------|-------|----|
| 430 | | | | | | | 8.24 | 50.66 | 12.77 | |
| | 130 | 75 | 0.100 | 220 | 0.377 | 0.63 | | | | 36 |
| 431 | | | | | | | 8.87 | 49.34 | 13.46 | |
| | 130 | 75 | 0.067 | 210 | 0.252 | 0.28 | | | | 24 |
| 432 | | | | | | | 9.15 | 37.17 | 25.35 | |
| | 130 | 75 | 0.033 | 140 | 0.126 | 0.05 | | | | 12 |
| 433 | | | | | | | 9.20 | 30.74 | 31.73 | |
| | 130 | 100 | 0.033 | 100 | 0.071 | 0.01 | | | | 12 |
| 420 | | | | | | | 2.99 | 53.57 | 15.11 | |
| | 130 | 75 | 0.067 | 160 | 0.252 | 0.22 | | | | 24 |
| 422 | | | | | | | 3.86 | 48.35 | 19.46 | |
| | 130 | 75 | 0.033 | 200 | 0.126 | 0.07 | | | | 12 |
| 423 | | | | | | | 3.93 | 44.49 | 23.25 | |
| <u>427</u> | 130 | 100 | 0.133 | 220 | 0.283 | 0.26 | | | | 48 |
| 424 | | | | | | | 4.23 | 48.18 | 19.26 | |
| | 130 | 100 | 0.067 | 220 | 0.142 | 0.07 | | | | 24 |
| 425 | | | | | | | 4.30 | 52.72 | 14.65 | |
| | 130 | 100 | 0.033 | 200 | 0.071 | 0.02 | | | | 12 |
| 426 | | | | | | | 4.32 | 53.20 | 14.15 | |
| | 130 | 100 | 0.033 | 240 | 0.071 | 0.02 | | | | 12 |
| 427 | | | | | | | 4.25 | 50.03 | 17.39 | |