Education Guideline (1)

d-1	2. Science (1) Experiment: Plant and treat corns, sorghums, and cassavas with and without urine and compost >> Observation and record keeping of growth of the plants, >>compare the plants treated differently (2) Compare native soil and composted materials: size, color, smell, small organisms, remaining things in compost (what is not composted?) (3) Compare composted material at the beginning and at the end of composting process (4) Measure 125ml. How can you make 125ml container with a empty water bottle? Let's make a urine feeder of their own
	3. Math (1) Check the log book and calculate how many pupils use a latrine a day (2) How many days it took to fill up to 3/4 of a vault by how many number of student? (3) How many of what could be grown by feeding urine for how many days? (4) How much is 125ml? What container would you use? (5) How many plants of maize (that requires 125ml urine per day) do you have to plant if one student produces 500ml per day? (need to know number of students who use the latrine per day, actual amount of urine collected per day, use the log book to get the numbers)
	4. Culture, social science (1) Keep journal about latrine use and composting until harvesting time (2) Share daily activity and results of activities with family member (3) Write down their reactions everyday (4) How do they react about the idea of composting fed gardening at first? (5) How do they react with the composting after seeing the crops/fruits? (6) Visit local farmers and interview them about their experiences, observe how they cultivate crops (7) Observe classes that have not received hygiene education in your school. Identify and record "bad behaviors", "good behaviors" and some behavior that you are not sure "good or bad". After discussion about what your have observed and agreed to one conclusion, go back to the class and share your findings about the class.
	5. Music, Art (1) Write a poet about composting, compost-fed agricultural products (2) Make a song about how to use a composting latrine (3) Draw a poster to encourage making composting latrine (4) Draw posters that show how to use a urine diversion composting latrine (5) Draw posters that show how to clean the latrien
	6. Play, literature (1) Make a skit / play that promotes constructing a composting latrine (2) Make a skit / play that address problems and concerns that have been identified through an experience using a composting latrine (3)
	7. Literature (1)Read the articles /reference materials that are given as follows. (2)Under line below

<<Reading material 1>>

Fertilizing with urine

Urine is a high quality, low-cost alternative to commercial fertilizers. It is especially rich in nitrogen and also contains substantial amounts of phosphorus and potassium. The fertilizing effect is rapid and the nutrients are best utilized if the urine is applied prior to sowing and up until two-thirds of the period between sowing and harvest. It can be applied pure or diluted. To avoid odor, foliar burns and the loss of ammonia, the urine should be applied close to the soil and incorporated into the soil as soon as possible.

Application rates for urine

Urine is a by-product from the body's function of balancing liquid and salts, and the amount of urine therefore varies with time, person and circum-stances. The average person produces about 500 litres of urine per year. However, urine volume is not a good indication of nutrient content. It is better to calculate the application rates based on the amount of urine produced per person per day.

If available, local recommendations for commercial mineral fertilizers, urea or ammonium, can be translated to the use of urine. The nitrogen (N) concentration of urine should be analyzed. Otherwise it can be estimated at 3-7 g N per litre. If no local recommendations can be obtained, a general rule of thumb is to apply the urine produced by one person during one day (24 hours) to one square metre of land per growing season (crop). The urine from one person will thus be enough to fertilize 300-400 m2 of crop per year and even up to 600 m2, if dosed to replace the phosphorus removed by the crop.

For most crops, the maximum application rate before risking toxic effects is at least four times the dose above.

Fertilizing with faeces

The total amount of nutrients excreted with faeces is lower than with urine, and the nutrients are not as easily accessible for plants. However, faeces are concentrated and rich in phosphorus, potassium and organic matter.

Sanitized faeces should be applied prior to planting or sowing as the high phosphorus content is beneficial for root formation of young plants. The faecal matter should be within reach of the plant roots but it should not be the only growing medium. The faeces should be thoroughly mixed in and covered by soil before cultivation starts. If there is a limited amount of faeces fertilizer, it can be applied in holes or furrows close to the planned plants to capitalize on this valuable asset.

Application rates for faeces

The application rate of faeces can be based on local recommendations for the use of phosphorus-based fertilizers and analysis of the phosphorus content of the faecal product. This gives a rather low application rate, and the improvement of the crop due to the added organic matter is hard to distinguish. However, faeces are often applied at much higher rates, at which the structure and water-holding capacity of the soil are also visibly improved. Organic matter and ash are often added to the faeces during collection and processing. These additions will improve the buffering capacity and the pH of the soil, which is especially important on soils with low pH.

The average person produces around 50 litres of faeces each year. This amount of faeces will fertilize 1.5 – 3.0 m2 of crop if the application is made according to organic content. If application is instead based on phosphorus content, it will be enough to fertilize 200-300 m2.

- What are the benefits of using urine?
- How much urine should use and when?
- What are the benefits of using compost?
- How much composted material should use ad when?

<<Reading material 2>> Primary treatment of faeces

The purpose of primary processing is to reduce the volume and weight of faecal material to facilitate storage, transport and secondary treatment, and to make further handling safer. This process takes place where the faeces are being deposited, either in or under the toilet. Usually the containment period is 6-12 months, depending on the size of the collection chamber. During this phase, pathogen levels will be reduced as a result of storage time, decomposition, de-hydration, increased pH, and the presence of other organisms and competition for nutrients.

- What happen if you do not apply a recommended amount of urine and composted materials?
- What condition kills bad germs? Why?
- How long your feaces must be contained in latrine vaults?

(2) Form groups of 5 and compare each group's answer
(3) Make an matrix to present their findings
(4) Present the results

8. Gender

(1) All grade

	□ What do you do everyday? Write down in a chronological order ● Make a group of 5 and work together to make a time line ● When do you eat? ● When do you want to go toilet? ● How often do you want to go pee in a day? □ What are the differences between boys and girls? List the differences ● Discuss how the difference affect to daily life ● What are traditional roles for boys and girls? ● What is your mother do? ● What is your father do? ● Are the difference affect in use of a urine diversion composting latrine? ● What can boys do? ● What can girls do? ● How these differences make what job suitable for boys? For girls? ● How they urinate? ● How does the practice affect the condition of latrine? Spray all over the slab? ● How can it be improved? Prevented? ● (5) P4-P6: have two separated class times for girls and boys □ Girls ● Menstruation and girls' life: discuss difficulties in her life ● Current toilet practice ● What do they need in urine diversion latrine? ● How do they maintain the latrine? ● Girls' need ● □ Boys ● Boys life style ● Current practice ● Boys' need

Education Guideline (2)

Students' Club Activity

3.0	Formulation of WASH club	Goal: Pupils become active WASH Club members
3.1	Appointment of supervising teacher	
1. Select candidates for supervisory work as many as necessary 2. Explain about their roles and responsibilities regarding WASH Club supervisors 3. Invite PTA, parents of pupils, other adults in the community who are interested in school activities and all the teachers to elect supervisors by confidential voting		
3.2	Selection of officer candidates	
1. Candidates of WASH Club officers are chosen; 5 boys and 5 girls from each class 2. Explain about their roles and responsibilities regarding WASH Club member 3. Each candidate tells the class mates what they think they are going to do		
3.3	Practice of democratic election	
1. The teacher of a class teach pupils what democratic election is: ● Registration ● 1 person 1vote ● All votes are equal ● Use of paper and ballot box ● Ballot box's gradient and his/her work ● Casting a ballot ● Closing and opening of ballot boxes ● Counting the votes ● Announcement of the winners 2. Practice a voting process 3. Select those who watch over the ballot box, voting process, and count the ballots		
3.4	Election of WASH officers	
1. Two days election; one day for girls, and another day for the boys candidates 2. Set up the ballot box 3. Review and ensure the election process 4. Distribute ballot cards; one for girl and one for boy officer 5. Make a list of 6. Let candidates stand front of the room with numbers that are assigned to them 7. One by one, let each student to cast a ballot according to the number representing a candidate 8. After all the students finish casting ballots move the ballot boxes to teacher's room for count 9. The supervisor teacher and election monitors open the ballot boxes and count 10. Record the numbers of votes earn for all the candidates 11. Chose the one who received the most ballot cards as the winner		
3.5	Selection of WASH Club member	
1. Repeat the above process at <<3.4>> among the WASH officers 2. Select a girl and a boy from each grade that makes 12 members as WASH Club member		
3.6	Selection of WASH from PTA	
1. Have a PTA meeting to chose enough candidates to be WASH Club member 2. Repeat the above process at <<3.4>> among the PTA member		
3.7	Selection of WASH Committee	
1. Have a community meeting including PTA to chose enough candidates to be WASH Committee member 2. Repeat the above process at <<3.4>> among the all the stakeholder		

Manual of
Students' governing body for waster, sanitation and hygiene
(WASH Club manual)

The WASH Club members Constitution
Three points of activities: (1) composting management, (2) clean latrine use and maintenance, (3) hygiene, however, there is no limit and can extend to anything that promotes wellness of pupils and the community
□ To learn and understand causes and effects of "bad practice", science and mechanism of composting, proper use of composting latrine, compost used school gardening, □ To promote healthy life style and community hygiene through school works and club activities □ To improve personal hygiene behavior, cleanness of school environment, and health by providing information and training and preventing waterborne and other communicable disease □ To improve the competences of the teachers regarding school health □ To assure proper and diligent WASH activities in a class room □ To organize and coordinate class room activities □ To prepare and lead meetings about WASH □ To assure messages embedded in posters and other IEC materials be understood □ To assure the elaboration of recording sheet of monitoring in a classroom □ To ensure proper record of the monitoring sheet □ To establish monthly report about activities to submit to the secretary of a WASH Committee □ To assure participation of school-wide cleanings □ To supervise and direct effective participation of all the students to the Plan of Action/activities □ To help the students initiate meetings and carry out subsequent tasks, for example leading, reporting, establishment of monitoring records, according to their level of responsibility by using simulations or picture show
Components: a president, a vice president, a secretary, an assistant secretary, three organizers, an information officer, two liaison officers (one boy and one girl), 2 observers (teachers), and the rest of the Club members
□ 1 President ➢ Leads a meeting ➢ Makes sure the Club function □ 1-2 Vice president(s) ➢ Supports the president ➢ Takes the president's role if necessary □ 1 Secretary ➢ Notifies and informs meeting date and time ➢ Records the minuets of meetings ➢ Keeps all the records ➢ Prepares and distributes letters □ 1 Assistant secretary ➢ Supports the secretary ➢ Takes a role of the secretary in necessary □ 3-4 Organizers ➢ Prepares a meeting room/place ➢ Greets meeting attendances and guests ➢ Prepares and set up a meeting for sensitization

- Prepares and set up a meeting for school cleaning
- Prepares and set up a meeting for other purposes

□ 1 Information officer
- Informs the target /the partners on programmed activities such as meeting, community wide cleaning, sensitization, and door-to-door house visit

□ 2 Liaison officers
- Communicates with stakeholders outside of the school
- Makes arrangements of out-of-school activities

□ 2 Observers
- Two teachers present at a meeting to give appropriate inputs and advise
- Makes sure of relevance of the meeting
- Acts as mediators if there is conflict or severe disagreement

6 steps to determine a program activity
1. Present the problems addressed by all the classes.
2. Classify the problems.
3. Choose a problem for1 academic period or a month.
4. Identify the causes of the problem
5. Come up with feasible solutions to the identified problem
6. Specify the solution methods (how?), the actors (who?), the period (when?).

Components:	Names
a president	William Longa
2 vice presidents,	Diana Juru George, Ruhan Jackson
a secretary	Grace Scovia
an assistant secretary	Peter Ramba
4 organizers (one in each class)	Yohana Enock, Cosmas Ware Joseph, Nyarsin Umaza, Emmanuel Lasuba
an information officer	Monika Jackson
2 liaison officers (one boy and one girl)	Susan Wani, Emmanuel Zeki
2 observers (teachers)	

Class room WASH officers (3 boys& 3 girls / class)						
P-I I	Peter Ramba	Cosmas Ware	William Longa	Ruhan Jackson	Monika Jackson	Grace Scopas
P-I(A)	Emmanuel Zeki	Isaac Bida	Yohana Enok	Diana Juru	Roda Kapuki	Agness Amami
P-I(B)	Victor Abraham	Noah Sebit	Samson Obale	Susan Wani	Omiza Nyarser	Lona Kwaje
Nursery (Top)	James Yak Hassen	Justine Robert Kawal	Emmanuel Loguba Paustine	Magrate Pita Moses	Hellen Justine Kawal	Flora Alex Lomoro

Training Schedule
For
FFEDA Basic School

Summary of details of each activities for FFEDA School Training						
Activities		Outputs: Expected results	Timeline(due date)			
			6/1~6/6	- 6/13	- 6/20	- 6/27
1.0	Facility construction					
	Construction of composting latrines	6 composting latrines Latrine walls painting (Educational messages)				
		Hand washing facility& rain water harvesting system				
2.0	Formulating manuals by workshops and training	Teachers are trained to be WATSAN trainee through the workshop & OJT				
(a)	Composting latrine manual	Latrine O&M manual	5~	~8		
a-1	*Make an outline of the manual*		*5/27~29*			
a-2	*Make a draft of the manual*		*6/1~4*			
a-3	*Workshop to verify and improve the manual*		*5*			
a-4	*Simulation of instructions written in the manual*			*7,8*		
(b)	Hygiene class manual	Curriculum, lesson plans, action plan		9,10		
b-1	*Make an outline of curriculum*		*~6/4*			
	□ *Hygiene and sanitation; Basics, Importance, Prevention of diseases*					
	□ *Composting latrine; Mechanism, Pros and Cons, Process, Products*					
	□ *Urine and compost fed school gardening*					
	□ *Hygiene promotion activities; songs, pictures, skits, presentation*				*~20*	*~27*
b-2	*Make a schedule to formulate a lesson plan for each curriculum*		*6*			
b-3	*Make lesson plans and lists of materials for both teaching and learning*			*7~*	*~20*	*~27~*
b-4	*Give a lesson to the pupils next day and revise the lesson contents*			*8~*	*~20*	*~27~*
b-5	*Create teaching and learning materials or alter those provided by JICA*			*8~*	*~20*	*~27~*
(c)	WASH Club manual	WASH Club activity guideline	5~	~11		
c-1	*Study and revise the revised-COGES manual to meet local need*		*5~*	*~8*		
c-2	*Make an activity plan for the student body at teachers' level for one academic year cycle*			*12~*	*~15*	
(d)	Urine& compost-fed gardening manual	Curriculum, lesson plans, action plan				
d-1	*Make an outline of curriculum*				16~	24
	□ *Nutrition, guideline, safety of handling composted material and urine*					
	□ *School gardening and agriculture; production and economy*					
	□ *Composting and science, math, culture, music, play etc*					
d-2	*Action plan for one composting & growing cycle*					*23,24*
3.0	Formulation of WASH club					
		Appointment of supervising teacher	5			24
		Selection of officer candidates			16	
		Practice of democratic election			17	
		Election of WASH officers			18	
		Selection of WASH Club member			19	
		Selection of WASH from PTA				26~
		Selection of WASH Committee				26~
4.0	Implementation of Action Plan					
		PTA education	4			
		WASH Club activities				

Summary of details of each activities for FFEDA School Training						
Activities		Outputs: Expected results	Timeline(due date)			
			6/1~6/6	- 6/13	- 6/20	- 6/27
		WASH Club Committee activity				26~
		School activity				
		Community activity				26~
6.0	Commissioning the latrines					
		Commissioning ceremony,				26
7.0	Evaluation					
		Focus group discussion		8		26
		Observation		8		26
8.0	Closing workshop					
		Discuss about lessons learnt				26
		Evaluation				26

J.3.6 Students' Hygiene Club Manual

A Manual for
School WATSAN management body

School WASH Club

For JCIA's pilot project in FFEDA Pre and Basic School in Munuki

South Sudan

Ver.1

June 2009

2

Table of Contents

Preface

This manual was originally prepared for a community based school management committee, COGES, in Niger. The manual is translated into English and modified to fit to need of a pilot project for FFEDA elementary school in Munuki, South Sudan.

Since the pilot project period is very short (less than 1 month) this is focused on issues directly related to use and maintenance of composting latrine.

June 2009

JICA Study Team for Water System in Juba

(original text)

Ce manuel du Comité de Santé Scolaire/COGES est spécialement conçu pour accompagner le guide du maître de l'Éducation Sanitaire version 2. C'est le cadre idéal de la pratique, qui organise et responsabilise les maîtres, les élèves et les parents d'élèves face à notre grand défi qui est l'amélioration de la santé scolaire à travers le COGES.

Il est aussi pour nous un champ de pérennisation des contenus de l'enseignement thématique.

Chers Enseignants, tout en espérant un impact positif et un bon usage de ce document que nous vous proposons, nous sommes disposés à recevoir vos observations et suggestions pour son amélioration future.

Chef service Hygiène et Santé Scolaire
DREB/A Dosso

KIMBA ALI

I. Background

1. About the Pilot Project

This pilot project is complement to an old pilot project that provided 8 communal tap water systems. This additional pilot project is to provide a sanitary facility and information that helps be sustain by;

- Constructing a composting latrine,
- Ensuring of sustainability and responsibility,
- Promoting user and supporter based operation and management, and
- Creating School water, sanitation and health(WASH) Club for and by the pupils

2. School activity and the Community

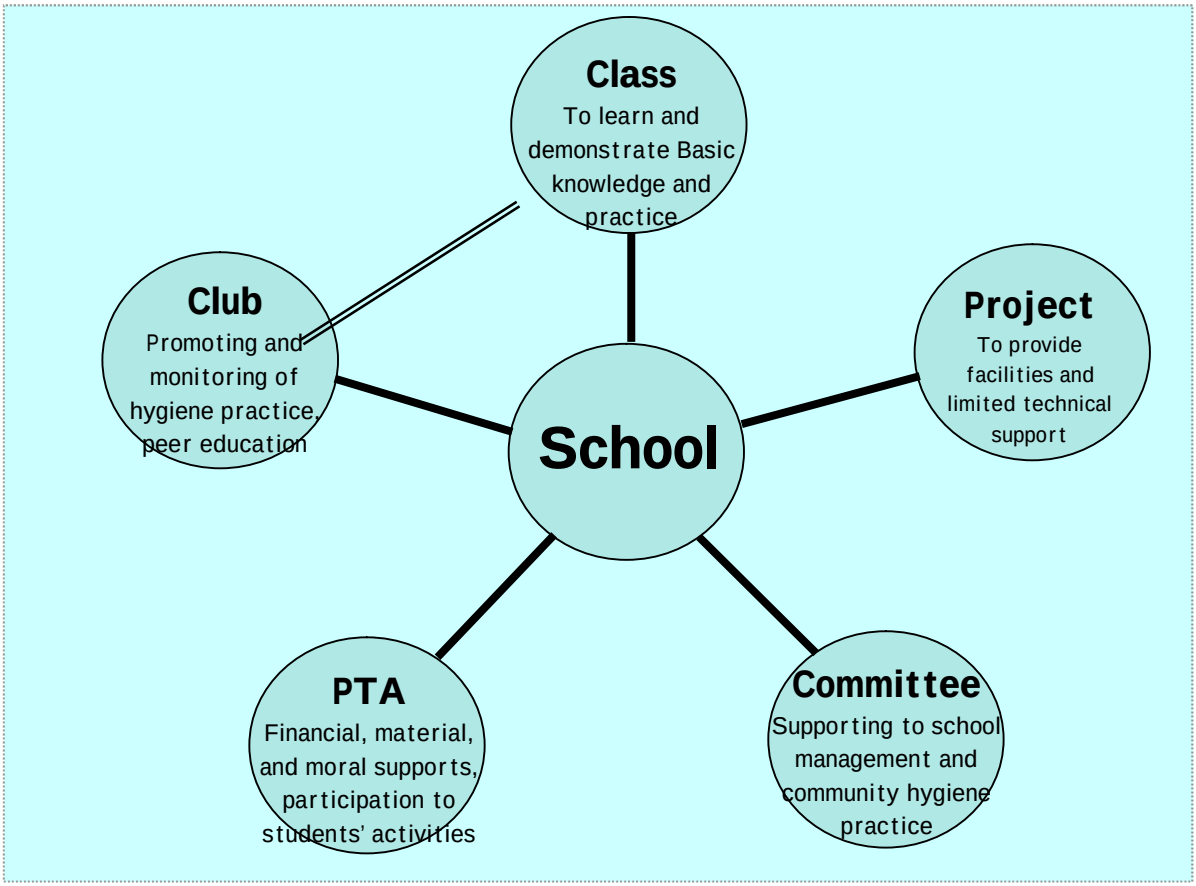


Figure 1. Cooperative structure and actors

1. The WASH Club members: WASH Club members shall be elected for each class. Each club member attends and participates a weekly meeting. Probably the club members will have to meet every so often in its early stage of club formulation, then

reduced to monthly after activities become a routine. Club activity immediately after formulation of the club will be focused on (1) composting management, (2) clean latrine use and maintenance, (3) hygiene, however, there is no limit and can extend to anything that promotes wellness of pupils and the community.

2. School WASH Committee: A group of community members and other stake holders who are interested in school activity must be elected democratically. Such members of the community meet periodically to support the WASH Club and school management and to act to improve collective wellness of Munuki. In this meeting fund raising and allocation for WASH Club activity is discussed and decided. Finance report is also examined and confirmed.

3. PTA: Selected members of PTA designated for WASH Club activity attend and participate a meeting every so often. They can also attend pupils meeting as observers. PTA serves as a power house of fund raising and a link to the rest of the community.

4. Class: Subjects related to hygiene, sanitation, and composting are taught. These classes should be pupils-centered and involved hands-on activities as well as classroom lectures. School must allocate appropriate class times for the club and other activities related to composting latrine use, hygiene, sanitation, and health.

5. School: FFEDA school and teachers support the club activity and any other activities that promote and maintain the composting latrine. The school can help how to achieve the project goal through:

* health teaching,
* reinforcing the ideas in other subjects,
* action to make the school a good example, and
* community activities organized by the school.

After the project is closed and JICA withdraw Munuki FFEDA school becomes a sole responsible party for managing and operating the latrine and club activity as well as for keep involving PTA and community member to the hygiene behavior change activities.

6. Project: A pilot project by JICA provides initial supports for one month period which include constructing composting latrine, training teachers, providing information and composting gardening tools, helping sensitization and promotion activities. However, after handing over the facility, JICA will withdraw from the school permanently.

3. Why WASH Club in school?

School hygiene club such as this project is “Child-to-child” approach. “Child-to-Child is a way of teaching about health which encourages children to participate actively in the process of learning and to put into practice what they learn. It is an approach that can make health education more exciting. The Child-to-Child approach recognises that children in many countries may be responsible for looking after younger brothers and sisters, and that in their role as caretakers they are in a position to educate and support their siblings to ensure better health. Children may

also influence other members of their families and encourage them to take action to promote health in the home and village. Schools can also set an example of better health to the rest of the community and in this way there is a continual interaction 'zigzagging' between school and community (UNICEF)".

The good health of the students enhances learning and growth of children. Anything learnt at school in their early age last longer and stronger and impact their future behavior and wellness. What the children learn at school also can be disseminated to the rests of their family members and neighbors. Soon the children grow up to be parents who influence their children in all aspects of life. A **School WASH Club** will be established to achieve the following objectives.

- Proper use and maintenance of hygiene/sanitation facilities in a school.
- A healthy and safe school environment
- Regular teaching of life skills-based hygiene education in all classes.
- Well-trained and committed teachers and personnel.
- The adoption of hygienic practices/behaviours by all, pupils, teachers and preferably parents and community members as well.
- Active involvement of the parents and other community representatives in continued School WASH Club activities.
- Regular outreach to the families and communities with a special focus on school aged children not going to a school.

4. Strategy

Changes in attitudes and components !

Practical meetings

Thematic lessons

Method
"Thematic approach"

Actions

Searching for solutions

Problems identification

Adaptation of correct knowledge and information

Implementation of activities together

Club meetings at school

Observe the current state of the school and town

Practical structure
"School WASH Club" & Committee

N.B. : **Setting up of a democratic management body is essential for successful improvement of hygiene behavior via proper management of composting latrines!! Look at the above diagram from the bottom up. While passing the steps above, we can change behavior to prevent water related and communicable diseases.**

II. School WASH Club

1. Definition

School WASH ("Water And Sanitation, Health") Club is a students-oriented club that heavily involves community and PTA members. Its prime purpose is to promote, manage, maintain, and operate a composting latrine that is provided by a project.

The Club members (children) work with PTA and community members (adults) to practice hygienic behavior, to initiate and maintain clean latrine and school environment, and to sensitize and inspire the community.

2. General Objectives

- To manage and maintain proper usage of a composting latrine
- To contribute to the improvement of the sanitary conditions and hygienic behavior of the students and of their families

3. Specific Objectives

- To learn and understand causes and effects of "bad practice", science and mechanism of composting, proper use of composting latrine, compost used school gardening,
- To promote healthy life style and community hygiene through school works and club activities
- To improve personal hygiene behavior, cleanness of school environment, and health by providing information and training and preventing waterborne and other communicable disease
- To improve the competences of the teachers regarding school health

4. Strategy

These objectives will be achieved by mobilizing and involving the whole community around the school for identification and resolution of the problems regarding hygiene and cleanliness of the school, community or around the neighborhood.

5. Components

- School WASH Club consists of Classroom WASH Club officers from each class of a school.
- School WASH Club consists of a president, a vice president, a secretary, an assistant secretary, three organizers, an information officer, two liaison officers (one boy and one girl), 2 observers (teachers), and the rest of the Club members. All of the School WASH Club members are elected democratically by all the Club members.
- Two girls and two boys are elected as Classroom WASH Club officers by and for each class. The Classroom WASH officers act as interfaces between individual student and the WASH Club.

6. TOR

- □ 1 President
  - ➢ Leads a meeting
  - ➢ Makes sure the Club function
- □ 1 Vice president
  - ➢ Supports the president
  - ➢ Takes the president's role if necessary
- □ 1 Secretary
  - ➢ Notifies and informs meeting date and time
  - ➢ Records the minuets of meetings
  - ➢ Keeps all the records
  - ➢ Prepares and distributes letters
- □ 1 Assistant secretary
  - ➢ Supports the secretary
  - ➢ Takes a role of the secretary in necessary
- □ 3 Organizers
  - ➢ Prepares a meeting room/place
  - ➢ Greets meeting attendances and guests
  - ➢ Prepares and set up a meeting for sensitization
  - ➢ Prepares and set up a meeting for school cleaning
  - ➢ Prepares and set up a meeting for other purposes
- □ 1 Information officer
  - ➢ Informs the target /the partners on programmed activities such as meeting, community wide cleaning, sensitization, and door-to-door house visit
- □ 2 Liaison officers
  - ➢ Communicates with stakeholders outside of the school
  - ➢ Makes arrangements of out-of-school activities
- □ 2 Observers
  - ➢ Two teachers present at a meeting to give appropriate inputs and advise
  - ➢ Makes sure of relevance of the meeting
  - ➢ Acts as mediators if there is conflict or severe disagreement

6 steps to determine a program activity

1. Present the problems addressed by all the classes.
2. Classify the problems.
3. Choose a problem for1 academic period or a month.
4. Identify the causes of the problem
5. Come up with feasible solutions to the identified problem
6. Specify the solution methods (how?), the actors (who?), the period (when?).

III. School WASH Committee

1. Composition

The School WASH Committee is composed of:

- 2 members from school management body (e.g. school master),
- 1 teacher chosen by its colleagues,
- 1 agent of health of the town (e.g. health officer of Payam or medical personnel of a clinic),
- 2 members of the PTA (1 man and 1 woman), and
- A general assembly of School WASH Club (pupils).

2. Organization

2.1- School WASH Club

Each class has its own WASH Club member called "WASH officers", 2 boys and 2 girls (the number is tentative and can be changed as necessary). These officers are elected from the class and in charge of carrying out of the Club activities and ensuring of all aspects of hygiene and sanitation, especially of a proper use of the composting latrine. Class WASH offices are the interface between all the rest of students and School WASH committee, to stimulate the club activity.

2.2- School WASH committee

School WASH committee is at the level of an execution entity of the school health program. School WASH committee is composed of a chairman (member of the PTA), a secretary, technical advisors, (the school head mater and a health agent), 2 communication officers (the 2 members of the PTA or community), a accountant/finance/treasure.

3. Function

A periodical meeting (weekly or monthly) is held to discuss about composting latrine use and maintenance and other Club activity in each class. Issues raised in a class meeting are then brought to a School WASH Club meeting under the school master's supervision. School WASH Club meeting is also a place to formulate and revise annual plan of activities as well as to connect to School WASH Committee.

The Club meeting results are reported to the secretary of School WASH Committee that connects the Club activities to community level. A Committee meeting is held to examine the report and to discuss issues raised at the Club meeting immediately after School WASH Club meeting, usually once a month. In a Committee meeting concerns of the community other than school activities progress about improving hygiene and sanitation situation shall be discussed.

An extraordinary meeting / special cession can be help upon request approved by 2/3 of the member. All community members who are interested in the WASH activity can attend the meeting through the chairman of the Committee.

The Secretary prepares and reports the minuets of meeting for each meeting and provides the community to review, after approved by the chairman. The results of meeting shall be shared by and discussed with the community.

IV. TORs OF COMPONENTS

1. Classroom WASH officers

- To check and enforce cleaning and maintenance of latrines, class room, and their surroundings
- To check and ensure of personal hygiene of classmates
- To monitor and make sure of good usage of the cleaning supplies in the classroom
- To maintain and enforce rules and agreements that were made for a proper latrine use and hygienic life style which the class agreed
- To propose the activities to resolve problems regarding hygiene and sanitation in the community to the WASH Committee
- To participate efficiently to the activities of the School WASH Club
- To initiate occasional activities that contribute to the improvement of hygiene and sanitation to benefit the school and/or community
- To identify and sensitize the parents about proper clothing, personal hygiene, clean living quarter, latrine, etc

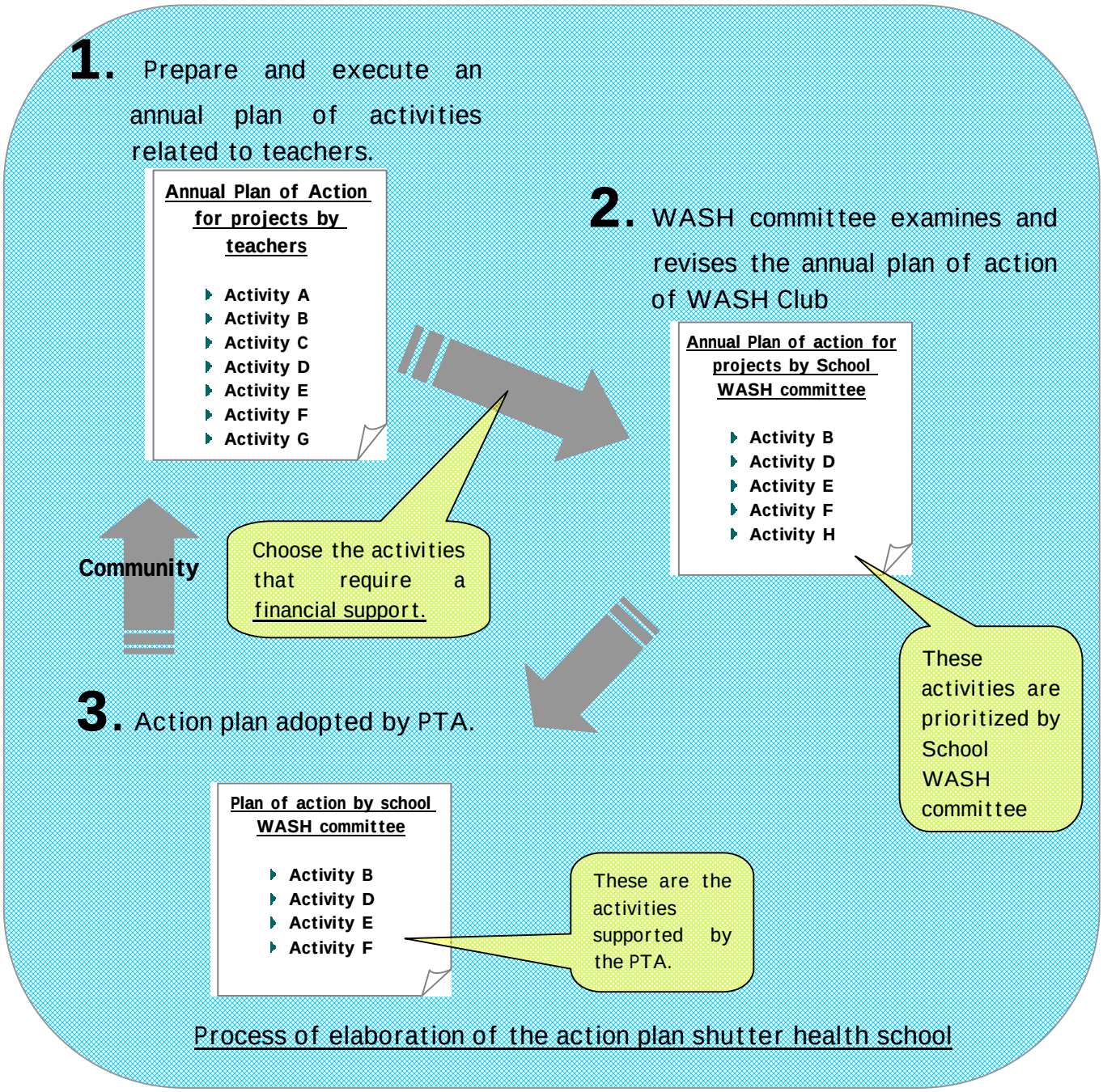
N.B: These tasks must be done according to the level of decision making, capability, and responsibility in classes and the school,

N.B: The school master and Club supervisor must pay special attention to the pupils in order not to make the pupils and/or parents stressed and confused.

2. School WASH committee

- To clean up the compost bin of the latrines after the excreta/waste matured
- To teach, participate and guide the pupils to use compost for school gardening
- To help marketing the gardening products to generate income for Club activities
- To promote construction and use of composting latrine and educate the community of benefits of composting latrine
- To assure a healthy environment to the school and to the town or in the neighborhood (dwellings and public places)
- To participate in identification of health problems in their community
- To participate as observer to the management of epidemics
- To assure the elaboration of an annual activities as soon as a new school year starts
- To sensitize, inspire, and lead the school and the students' parents
- To oversee and advise the WASH officers to carry out the club activities effectively
- To elaborate and to subject to the Community's action plans of improving community hygiene and sanitation

- ☐ To propose to the Community to take prompt and appropriate actions to improve hygiene and sanitation according to the reports from the School WASH Club
- ☐ To sensitize merchants at markets and those who sell food items to the school
- ☐ To sensitize the community and the parents by individual house visits
- ☐ To help funds raising to execute program activities
- ☐ To oversee proper usage of the funds and equipments that are used for the periodic cleanings of the school and/or town or neighborhood, large scale cleaning of the school, with parent participation
- ☐ To clean the town or neighborhood by involving entire community
- ☐ To do follow up and evaluate progress of activities according to annual plan of action
- ☐ To produce and submit periodical reports on activities to the Community



Process of elaboration of the action plan shutter health school

V. ROLES and RESPONSABILITES of the ACTORS

1. School WASH Committee:

1-1.President/Chairman

- Calls for and leads Committee meetings
- Assures conditions and mental status of the committee members to be able to function properly and effectively
- Oversee proper usage of the means (financial and material) provided to the committee

1-2. Secretary

- Keeps up at activity schedule
- Makes sure of the meetings date, hour, place
- Establishes the reports of meetings
- Receives and consolidates monthly reports from the School WASH Club and present them to the meeting of the Committee and the community
- Establishes the reports of activities of the Committee to present to the Community
- Prepares and dispatches letters

1-3.Technical counselors:

1-3-1.School head master:

- Supervises the management of WASH Club
- Supervises the activities of WASH Club and class room activities
- Calls for and leads meetings
- Informs frequency of the communicable disease to the health agent

1-3-2.Health agent:

- Give an advise of good practices regarding hygiene, sanitation, health and the techniques of health sensitization
- Disseminate information of disease in an event of outbreak of communicable disease to the community

1-4.Information officers: (one female, one male of PTA)

- Inform the target group about all activities of the WASH Club committee by a most effective manner
- Prepare the room/the place of meetings
- Organize the meetings about sensitization and community- cleaning

- Dispatch/distribute the letters of invitation to the meetings and other activities.

1-5.Accountant/ finance/ treasure:

- To manage funding
- To oversee finance activity

2. School WASH Club:

2-1. Advisory:(with a school head master)

- To assure proper and diligent WASH activities in a class room
- To organize and coordinate class room activities
- To prepare and lead meetings about WASH
- To assure messages embedded in posters and other IEC materials be understood
- To assure the elaboration of recording sheet of monitoring in a classroom
- To ensure proper record of the monitoring sheet
- To establish monthly report about activities to submit to the secretary of a WASH Committee
- To assure participation of school-wide cleanings
- To supervise and direct effective participation of all the students to the Plan of Action/activities
- To help the students initiate meetings and carry out subsequent tasks, for example leading, reporting, establishment of monitoring records, according to their level of responsibility by using simulations or picture show

2-2. Monitoring: (2) students (one boy and one girl) in each class

2-2-1. Cleanliness of a classroom and approaches:

- to check the cleanliness of the floor of the class,
- to check the spider combs, termites nests, bats nests, and other vectors
- to check the garbage can,
- to check the black board, chalk tray, bucket, bloom, cleaning rag and other cleaning supply,
- to check the cleanliness of the surroundings of the class,

N.B: The cleaning of the class and class room items, discarding trash must be done everyday before class starts by a student who is assigned for that day.

Overseeing them present their check report all the evenings in class before the exit.

2-2-2. Clean and safe drinking water:

- ☐ to check the cleanliness of the receptacles of water and its lid,
- ☐ to check the cleanliness and proper storage of the cup to drink water,
- ☐ to check the cleanliness of the drinking water,
- ☐ to check the cleanliness of the source of water, pounding wastewater around the water source,
- ☐ To check container to keep ash
- ☐ To check toilet paper
- ☐ To check a sign-up log book for latrine users/students

N.B: Students in charge of keeping ensuring quality and quantity of drinking water must clean each item used to serve drinking water such as a water jug/container/vase, cup, water source (tap or hand pump), wastewater around the water source/tap stand, and fill the drinking water container every morning.

All the points of concern described above must be checked and reported. The monitoring report must be presented to the class every day before classes are dismissed.

2-2-3. Appropriateness of use and maintenance of the latrines:

- ☐ To check the keys to access latrine chambers
- ☐ To check intactness of the doors to access latrine chambers
- ☐ To check cleanness of latrine receptacles/urine separation toilet
- ☐ To check urine collection receptacle/tank for contamination and over flow
- ☐ To check the cleanliness of the floor and the walls of the latrines,
- ☐ to check the spider combs, the termites nests, and any other vectors' habitats
- ☐ to check the existence and the cleanliness of lids of the latrines,
- ☐ to check the cleanliness of the surroundings of the latrines,
- ☐ to check the hand washing facility and availability of soap
- ☐ to check the rain harvesting system, cleanliness of its gutter,

N.B: The cleaning of the floor, lids, walls, hand washing facility, and surroundings of the latrine shall be done on Wednesdays and Friday by students on duty. Their work must be confirmed, examined, reported, and discussed in the class every day before the class is dismissed.

2-2-4. On health, personal hygiene and students' clothing:

Classroom WASH officers ask following questions, under supervision of the teacher, to the classmates before the classes start everyday.
Exemples :

- ☐ Are your clothes clean?
- ☐ Did you bath and wash hands before coming to the school?
- ☐ Are your nails cut?
- ☐ Are your hair clean?
- ☐ Are you waring shoes?
- ☐ Are there sick students?
- ☐ Are there students who are injured?
- ☐ Are there students who did not eat before coming to the school?
- ☐ Are you carrying ash and paper for the toilet use?
- ☐ etc.

The check should be done 10-15 minutes before eight o'clock, or the first lesson hour in a class. 4-5 questions should be chosen to ask each day.

2-2-5. Hands washing :

- ☐ to check the hand washing facility,
- ☐ to check the existence and the cleanliness of the soap and a soap holder,
- ☐ check if students are washing hands each key time for hand washing
- ☐ check procedure of hands washing

A water point/hand washing facility should be done each Wednesdays and Friday by students. Hand washing means and facility should be checked and reported/monitored. Monitoring report is presented and reviewed by the teacher/supervisor and peer students before the class is dismissed at the end of a day.

2-3. The other students:

- ☐ to participate efficiently to the activities in a class room
- ☐ to participate cleanings according to instructions/posters
- ☐ to ensure proper use of the latrines and tools for class cleaning
- ☐ to identify and suggest activities that improve hygiene conditions, cleaning, and health to class room WASH officers
- ☐ to respect and support a class room WASH officers in executing daily tasks

VI. PROCEDURE

A. Preparation

A-1. Democratic Elections for the choice of the members of office of the PTA and School WASH committee.
A-2. Selection of managerial members of the School WASH Committee.
A-3. Selection of the members of School WASH Committee.
A-4. Selection of the president and secretary of the School WASH Committee and the rest of the committee.

B. Development

B-1. Review and formulation of the members of School WASH Committee and School WASH Club.
B-2. Review and formulation of the guideline and instruction to School WASH Committee and School WASH Club.

C. Implementations

C-1.School WASH Club

C-1-1. To explain a chief, director of Payam, and other key persons about School WASH Club and Committee
C-1-2. To hold an election for selecting a leader of WASH Club
C-1-3. To formulate monitoring sheet for activities
C-1-4. To create a posters and illustrated instruction of activities regarding hygiene and sanitation
C-1-5. To carry out the activities according to the plan of action
C-1-6. To hold monthly meetings and to issue activity reports
C-1-7. To report to the secretary of the WASH Committee
C-1-8. To repeat C-1-5 to C-1-8 for the rest of the year
C-1-9. To issue an annual report at the last meeting of a year

C-2.School WASH committee

C-2-1. To identify and list materials necessary to class room and school activities.
To create the program/frame work and action plan (Ref. Annex 2).
C-2-2. To discuss precondition of hygiene and sanitation situation in school and community with community for validation.
C-2-3. To execute the action plan
C-2-4. To collect and combine monthly reports of each class
C-2-5. To hold monthly meetings and to issue activity reports
C-2-6. To submit the report transmission to the leader of the Community
C-2-7. To submit a quarterly report to the leader of PTA
To hold monthly meeting with school master
C-2-8. To repeat C-2-5 to C-2-8
C-2-10. To issue an annual report at the last meeting of a year

VII. ANNEXES

Annex 1 Example of the Action Plan matrix
Annex 2 Example of annual activities for each program
Annex 3 Example of Monitoring Sheet
Annex 4 Example of Monthly Monitoring Report
Annex 5 Examples of Activities
Annex 6 A time schedule of the activities of the School WASH Committee of 2006-2007

Annex 1: Example of the Action Plan Matrix

A list of problems identified by each class

1.
2.
3.

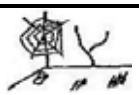
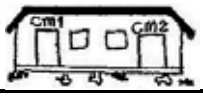
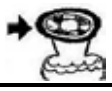
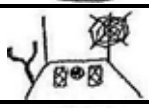
What is not going well? « problems»	Why it does not go well? « Causes»	How can it be solved? « Locally feasible solutions»	What methods and means does it requires? « Methods »	Who will do it ? « Responsible person »	When? « Time »	How much? «Cost »
1.						
2.						
3.						

Annex 2 : Example of Annual Action Plan

Objectives	Activities	Duration	Who	Cost	Remarks
1. Sensitization on hygiene and sanitation	**1.1**-To Plan the activity (counsel of the masters) **1.2**- To Prepare songs, poems and posters for sensitization **1.3**-To involve community members	6/1-10 6/1-15 6/1-30	-Teachers, PTA, WASH committee -Students, local musician -	50 SDG	-To resume the activity at the end of every quarter -To See other details in the action plan.
2. Installation of garbage cans to the school	**2.1**- To plan the activity (counsel of the masters) **2.2**-To empty12 boxes or 5 bags everyday **2.3**-To place 2 rubbish bins in each class and 4 in school yard**.** **2.4**-To ensure safe disposal / incineration of the garbage (school master) **2.5**-To empty the rubbish bins of the classes in the evenings before going back home.	6/1-10 6/10-12 6/10-12 6/1- 6/10-	-The teachers -Observer -Secretary	130 SDG	-Has to leave January 07, instruct every student to install at least 2 garbage cans in their concession. -To follow the usage of the family garbage cans (overseeing CSC and secretary CSS) -To See other details in the action plan.
3. Making of soap holders	**3.1**- To plan the activity (counsel of the masters) **3.2**- To gather; 6 handful of straw, 12 stems of wood, 10M of wire nylon, 5M of net nylon or rags. **3.3**-To make brooms	6/1-10 6/10-20 6/10-20	-Teachers -Committee members -PTA -Community -Director	60 SCG	-Activity to do in vocational class time -To See other details in the action plan.

Annex 3 Example of Monitoring Sheet

The monitoring must be done every day.

	Date	Monday		Tuesday		Wednesday		Thursday		Friday	
		dd/mm/yy		dd/mm/yy		dd/mm/yy		dd/mm/yy		dd/mm/yy	
	Condition	Good	Bad	Good	Bad	Good	Bad	Good	Bad	Good	Bad
Classe	Clean floor and walls, No insects nests, Clean chairs and tables 	√		√			√	√		√	
	Emptying rubbish bins Clean rubbish bin itself 	√		√		√		√		√	
	Cleanness of blackboard and chalk box, cleaning supplies 	√		√		√			√	√	
	Cleanness of environment around the class room 		√		√	√		√		√	
Hygiène de l'eau	Cleanness of water containers 	√		√			√		√	√	
	A clean lid/cover on a drinking water containers 	√									
	Cleanness and hygienic a cup to drink water 	√									
	Safe and clean drinking water 										
	Clean water point; Hand washing basin, water harvesting facility 										
Latrine	Cleanness of floor and walls: No missing spots, No smell 										
	Clean and emptied urine collection containers 										
	No insects nests 										
	Existence and cleanness of latrine cover 										
	Cleanness of environment around the latrines 										
	Existence of Ash and bulking materials										
Hand washing facility	Existence and cleanness of Soap and its container 										
	Cleanness and readiness of Hand washing facility 		√	√		√			√		√
	Signature of monitor										

Prepare a monitoring sheet/ notebook like this picture!

4 Example of Monthly Monitoring Report

School *TFEDA* Month : *June*

Grade/Class *P4* Date *20/06/2009*

Recorded by *Salamatou Issa et Mamoudou Ibrahim*

1. This month's goal (Month of)

To formulate School WASH committee and Class room WASH officers

2. General observation

Parameter	Very good	Good	Bad
Cleanness of class room		✓	
Cleanness around class room			✓
Cleanness of latrine		✓	
Cleanness of drinking water		✓	
Hands washing practice	✓		

3. Observation:

-Washed our hands everyday before and after the using latrine with soap.
The friends helped overseeing them in their work.
-The class has not any rakes to clean the garbage that are located behind the class

4. Goal of next month (Month of)

Allocation of rubbish bins

5. Other achievements:

3 meetings of sensitization of the students of TFEDA on the usage of the latrines and hand washing by pictures and simulations.

6. Suggestions /Recommendations

- We would like to have 3 rakes to clean the surroundings of our class.
- The girls had difficulties in useing their latrine because the door is broken. We request repair this door.

7. Monitors for next month's (Month of)

Moussa Abdou, Mariama Kadri

8.General Observation (By School master or other responsible person for the monitoring activity)

-Disease frequency: the Cold. But it did not cause absences of students.
-The hand washings were well executed, but let us know if not sufficient.
-The students contributed themselves to pay 3 pieces of soap and a kettle.
-For the cleaning of the surroundings of the class, it is necessary for us 3 rakes to reinforce the brooms existing.

Supervised on the month of Supervised by

Secretary

Annex 5 Examples of Activities

Followings are some examples of activities about hygiene and to achieve healthinesses in schools.

Ex 1 :

Installation de poubelles dans la classe

What to do

Place 1 or 2 rubbish bins or cardboard boxes in each class, then empty them and burn the garbage periodically.

What to expect

The installation of the garbage cans is effective to create with the child the habit to use the garbage can.

Example of Plan of Action

	Activity	Objective	e date	Cost				Finance source	onsible arty
				Item	ty	t cost	al cost		
Ex1	lation of garbage in the classes	cardboard box rubbish bins in each oom	31, 2009	dboard box	12	5	60	PTA	H Club P3
						Total	**60SDG**		

Ex 2 :

Installation of rubbish bins

What to do

Place rubbish bins or empty bags/containers in which cleaning should to be done frequently and by the streets where they can be seen by the community member. The school master must help obtaining in-kind rubbish bin before purchase.

What to expect

The pupils, their families and the rest of the community will follow an example of the rubbish collection activities at school. Eventually amounts of trash on the streets will be reduced and environmental hygiene is improved.

Example of a Plan of Action

	Activity	Objective	Due date	Cost				Finance source	Responsible party
				Item	Qty	Unit cost	Total cost		
Ex2	Installation of garbage can in the classes	Purchase 5 large bags	January 30, 2010	Large bags	5	1	25	PTA, WASH Committee	WASH Club P4
		Install 5 bags as rubbish bins in school yard							
						Total SDG	**25**		

Ex 3 :
Making cleaning equipments

What to do

Cleaning equipments such as blooms and dusting rags shall be made by students and the parents

What to expect

Hand made blooms and other cleaning items

Example of Plan of Action for WASH Club Committee

	Activities	Objects	Due date	Cost				Financed by	Monitor
				Items	Qty	Unit cost	Total cost		
Ex3	Making of cleaning equipments	Students mobilization	June 15-20 2009					PTA, WASH Committee	School master, teachers
		Obtain materials to make blooms		A bundle of plant stems	1				
		Obtain nylon tapes		Nylon tape	3 m	10	30		
		Making of the blooms	June 21-26 2009	Tools to make blooms		Donated by farmer	0		
						Total	**30**		

Ex 4 :
Solid wastes control

What to Do

Dig a pit and burn trash and other odorous items by the students and/or the students' parents.

What to expect

The pit installation to garbage is effective to create with the child and the parents the habit to use this technique to treat the garbage in the concession the town or the neighborhood.

Example of a program /activities

	Activity	Objective	Due date	Cost				Financed by	Monitor
				Item	Qty	Unit cost	Total cost		
Ex4	Solid wastes control on school compound	Mobilization of students and WASH Committee	January 13 -17 2010					Committee	Committee, parents
		Lesson for environmental health							
		Obtain 5 rubbish bins							
		Dig a pit for wastes disposal in school yard		shovels	5	Borrow	0		
						Total	**0**		

Ex 5 :

Creating Posters and Messages

What to do

In a class designated for hygiene and physical wellness, pupils create informative and educational poster and messages as well as other related IEC (Information, education, and communication).

What to expect

Pupils and community share the same view of hygiene and sanitation and are willing to cooperate to each other by agreeing the messages.

Example of Plan of Action of WASH Committee

	Activity	Objective	Due date	Cost				Financed by	Monitor
				Item	Qty	Unit cost	Total cost		
Ex5	Creation of messages	Come up with 1 message	July 30 2009					PTA, WASH Committee	School master, supervise
		Obtain materials	July 1 2009						
		A-4 notebook		notebook	1	2	2		
		Thick pen (black)		Black pen	1	10	10		
		Post the poster							
						Total	**12**		

Ex 6 :

Create an IEC poster for sensitization

What to do

WASH Club leader shows an example of IEC /poster for prevention of solid wastes damping. The rest of pupils make their own messages and pictures following the example. These messages and pictures are posted for community to view.

What to expect

Pupils and community are aware of environmental hygiene and an appropriate action is taken to realize the message.

Example of Plan of Action

	Activity	Objective	Due date	Cost				Funded by	Monitor
				Item	Qty	Unit cost	Total cost		
Ex6	Creating a IEC poster for sensitization	Obtain materials	Aug 10, 2009	A4 notebook	1	10	10	Committee, PTA	School master + supervising the classes
				ball pointed pen(black)	10	10	1 00		
				(red)	12	10	120		
				(blue)	12	10	120		
				Thick pen	1	1 5	1 5		
		Making posters	Aug 30, 2009				0		
		Post the posters					0		
						Total	**365**		

Ex 7 :

Assigning the new latrines (by the teachers)

What to do

6 newly constructed latrines are assigned to specific classes and genders.

What to expect

Pupils use the latrine that is assigned to a specific class and log on a recording book as they use it. The classes assigned to the latrine are also responsible in cleaning, maintenance and composting gardening.

Example of Plan of Action by the WASH Club and Committee

	Activities	Objectives	Due date	Cost				Funded by	Monitoring
				Item	Qty	Unit cost	Total cost		
Ex7	Assignment of latrine	Allocate latrines	Sept 5 2009					WASH Committee, PTA	School master, teachers
		Write grade/class number on the doors		Chalks	1	5	5		
						Total	**5**		

Ex 8 :

Taking care of water environment

Problem

Pounding water, garbage, and animals are around water points and creating a filthy unhygienic condition. Water is dripping from faucets.

Solution

1. Cleaning all the water points by WASH Club member
2. All the water points are checked/monitored
3. Check water harvest system for leak
4. Water for cleaning latrine is secured
5. Faucets are repaired

Example of a Plan of Action

	Action	Objective	Due	Cost				Funded by	Monitoring
				Item	Qty	Unit cost	Total cost		
Ex8	Taking care of water wnvironment	Cleaning all the water points by Students	Year round	blooms	Borrow from communtiy			PTA, WASH Committee	WASH Club rep, Supervior,
		Check the water points		notebook	1				
		Check water harvest system for leak	Nov 31, 2009	Call for repair	1	5 000	5 000		
		Repair faucets		faucet	3	3 500	10 500		
				labor	3	1 000	3 000		
						Total	**18 500**		

Ex 9 :

Washing Hands with Soap

What to do

To make sure all the students wash hands after recess, use of latrine, cleaning, and touching unclean objects, in an appropriate manner

What to expect

Students practice hand washing to prevent getting a disease

Record results of hand washing monitoring

Example

	Activity	Object	Due Date	Cost				Financed by	Monitor
				Item	Qty	Unit cost	Total cost		
Ex9	Washing hands with Soap	Obtain hand soaps	July 1, 2009	Soaps	30	2	60	PTA, Committee	WASH officers
						Total	**60**		

Ex 10 :

Making of Soap holders/bags

What to do

Creates soap bags for each class

What to expect

Each class has its own soap on a holding bag that will be carried to hand washing facility as needed

Example

	Activity	Object	Due date	Cost				Financed by	Monitor
				Item	Qty	Unit cost	Total cost		
EX10	Making of soap holders	Obtain materials	June30, 2009	Nylon rope Nylon meshed tube	3 m 2 m	20/m 40/m	60 80	PTA, committee, by selling compost-fed ag products	WASH Officers
		Students mobilization	July 7, 2009						
		Making soap holders for the classes					0		
						Total	**140**		

Ex 11 :

Check the food venders around and at the school

What to do

PTA, WASH Committee and teachers with selected students check foods sold around and at school for their conditions for temperature, cleanness of container, flies and other vectors, and other attributes that cause food poison

What to expect

Food venders are also educated for food safety
Students and community people are protected from unhygienic food, food poisoning

Ex 12 :

Community Health Improvement

Case Study

A community has a slogan “Clean Our Environment to the time of Our Forefathers” to recover clean and natural healing power of environment including safe and clean water and vegetation.

Objective

To improve hygienic living conditions and habits of a community

Preparation

(One week before the activity takes place)

- Sensitization about importance of proper hygiene practice to the community
- Use posters and messages that School WASH Club has developed to the community to provide key messages to improve knowledge, attitude and behavior regarding water and sanitation
- Payam health officer and health clinic workers explain the community importance of hygiene and environmental safety
- The chief of a community and leaders of various community groups encourage people to attend the meeting

Ex 13 :

Purchase of Cleaning Supplies

What to do

To purchase appropriate cleaning supplies such as buckets, detergents, soap, blooms, rakes, dust pans, trash collecting baskets, wheel barrow, shovels, water storage containers, and dipping cups. Examples are shown below.







Example of detailed Activity Plan and Budget

	Activity	Object	Due date	Cost				Financed by	Monitor
				Items	Qty	Unit cost	Total cost		
Ex13	**Promotion of hygiene and sanitation**								
	1-Installation of rubbish bins in school	Purchase items	Du 1ier au 15 nov.2006	Rubbish bin	12	20	240	WASH Committee, PTA	Parents, WASH Club
				Paper bags	5	10	50		
		Execution of plan							
				Sub total 1			**290**		
	2-Making blooms and soap holders	Purchase items	Du 17 au 30 nov.2006	Straws	6	10	60		
				wire (m)	20	10	200		
				net(m)	5	2	10		
				stem	20	2	40		
				rags					
		Execution of plan							
				Sub total 2			**340**		
	3-Creating messages and posters	Purchase items	Du 1ier au 10 déc.2006	notebooks	25	10	250		
				pencils	50	3	150		
				Ball point pens					
				blue	50	5	250		
				red	50	5	250		
				Fat pen	12	5	60		
		Execution of plan		erasers	25	3	75		
				Sub total 3			**1035**		
	4-Sanitary solid wastes management	Purchase items	Du 20 déc.06 au 5 janv.07et jrs suivants	groves	6	5	30		
				rake	12	10	120		
				bag	10	1	10		
				Fuel(L)	10	10	100		
				Match(box)	1	5	5		
		Execution of plan							
				Sub total 4			**265**		
	5-Discussion about water points	Purchase items	Du 10 au 15 janv 07 et jrs suivants	Pipe(m)	2	20	40		
				faucets	3	100	300		
				Valve wheel	3	100	300		
		Execution of plan							
				Sub total 5			**640**		

	Activity	Object	Due date	Cost				Financed by	Monitor
				Items	Qty	Unit cost	Total cost		
EX13 (Cont)	6- Ensure all pupils wash their hands	Purchase of items	Du 10 au 15 janv 07 et jrs suivants	kettles	25	8	200	WASH Committee, PTA	Parents, WASH Club
				box	3	3	9		
				can	12	3	36		
		Execution of plan							
				Sub total 6			**245**		
	7-Class discussion about latrines and environment	Purchase of items	Du 15 au 31 Jan 2007et jrs suivants	blooms	60	5	300		
				Latrine lids	6	10	60		
				Buckets	6	10	60		
				Rubbish bin	6	10	60		
				Ash can	6	10	60		
				scooper	6	5	30		
		Execution of plan							
				Sub total 7			**570**		
	8- Set a drinking water facility in a class room	Purchase of items	Du 2 au 10 mars 07	Water vase/jar	6	20	120		
				buckets	6	10	60		
				cup	12	5	60		
		Execution of plan							
				Subtotal 8			**240**		
	Grand total								

Case

Ex 15 :

Periodical Sensitization to a community

(Use a latrine at home, promoting family health, good school attendance, schooling the girl and studying at night)

History of activity

Lack of latrines in the village, poor school attendance, fewer girls in school, lower level students.

Purpose

Bring the people to construct family latrines and improving the school by raising awareness repeated

Frequency

1 time per month (the 15th of each month)

Preparation

– Preparations-The General Assembly of C

- Choice of themes, actors, dates and times.
- Information facilitators. Information facilitators.
- Elaboration of the message by the Health Club

Excecution

-programme-

	Thème	Acteurs
1	L'utilisation des latrines à la maison	Vice-président du COGES
2	La bonne fréquentation scolaire	Le directeur de l'école
3	La scolarisation de la jeune fille	Une enseignante
4	L'étude de nuit	Président de l'APE
5	Présentation des messages par le Club de Santé de l'école	Les élèves délégués

Monitoring

Awareness is also a follow-up session.

Strategy to better organize

How to choose the time, place, actors and the content according to the audience (youth, adults, old, etc ...)

Ex 16 :

INFORMATION

Session Awareness (of malaria)

Case of school Kossom

History of activity

It included a meeting of awareness in the action plan of the Executive Directorate of School Health (DCSS) because there are many absences are due to malaria.

Purpose

Malaria prevention through knowledge of the disease and awareness of the population.

Preparations

- Meeting for the choice of activities and allocation of tasks by class,
- Preparation of songs, riddles and skits by the students,
- Information by the town crier in the village and invitation cards for some services

Excecusion

-programme-

	Activités	Acteurs
1	Ouverture	Président COGES
2	Introduction	Président du Club de santé
3	Présentation du Chant de bienvenue	Les élèves CE1
4	Présentation d'un dialogue	Les élèves CP
5	Présentation d'un sketch	Les élèves CE2
6	Jeu de devinettes avec les parents	Les élèves CM2
7	Clôture	Directeur

Material used

Town crier, invitation cards, nets, mats, syringes, clothes

Impact

- The students have high motivation.
- The villagers are aware.

Example of the Action Plan / COGES

	Activités	Tâches	Période	Coû					
				Désignation	Qté	Coût/U	Coût/T	financement	suivi
Ex17	Organisation d'une séance de Sensibilisation sur le paludisme	Programmer (Choisir les activités et répartir les tâches)	Le 6 Mars 2007					COGES	SG/COGES + S/CSS
		Préparer le chant, le dialogue, le sketch et le jeu de devinettes	En mars						
		Informer le village/quartier	Début Avr 2007	crieurs publics	3	300 F	900 F		
				Carte d'invitation			2 500 F		
		Préparer le matériel	Le 6 Avr 2007	nattes	1	Apport des parents			
				Vêtements	5	Apport des parents			
				Couverture	1	Apport des parents			
		Exécuter l'activité							
							Total	**3 400 F**	

INFORMATION

Ex 17 :
Sensitization on personal hygiene

History of activity

We wanted to raise awareness of a high level. The teachers wanted to show students and the people of that village can use the group to educate the youth community.

Purpose

Know the importance of cleanliness for a healthy and a better attitude of students about personal hygiene.

Preparations

- Repetition of the scene every night (actors: grouping youth assistant: responsible for the youth group, school)
- Information Village

Excesion

The youth group presented skits and songs about personal hygiene.

Advantage

The skits and songs of a high level have been organized and presented by the youth group. Students and villagers are convinced that villagers can carry out activities to raise awareness of the location of the population.

Example of the Action Plan / COGES

	Activités	Tâches	Période	Désignatio					
Ex18	Sensibilisation sur l'hygiène corporelle en collaboration avec le groupement de jeunesse	Informer leu village/quartier	Le 4 Avr 2007	Crieur public	3	500 F	1 500 F	COGES	Vice-Président COGES+ Resp. du GJ
		Préparer le Chant de sensibilisation	Le 5 Avr 2007	Préparation	1	0 F	0 F		
		Exécuter l'activité		Griot d'accompagnement	3	500 F	1 500 F		
						Total	**3 000 F**		

Ex 18 :

Awareness of the community to celebrate school

Case of school Tessa

History of activity

After 9 months of school work, the year should be punished by a balance sheet that will be presented to the public. We must bring the public and organizing the ceremony with kindness.

Purpose

- Encourage students, teachers and parents.
- Inform and educate parents on monitoring children's education.

Preparations

- Informing teachers of teachers in Council
- Purchases of equipment
- Distribution of roles.

Actors: Director → Teachers → Students assistants : COGES

People

Financiing

Cooperative education (contribution of students and teachers) + EPA

Execusion

-Programme-

Horaire	Activités	Thèmes	Acteurs
09 :00-10 :00	Accueil des participants		
10 :00-10 :05	Ouverture	Discours de bienvenue	Maire, Président du COGES
10 :05-10 :10	Chant	Bienvenue	Elèves de l'école Tessa
10 :10-10 :20	Introduction	Présentation du programme	Directeur
10 :20-10 :25	Poème	Ecolier	Elèves de l'école Tessa
10 :25-10 :35	Théâtre	Scolarisation de la jeune fille	Elèves de l'école Tessa
10 :35-10 :45	Chant	Scolarisation de la jeune fille	Elèves de l'école Tessa
10 :45-10 :50	Poème	Scolarisation de la jeune fille	Elèves de l'école Tessa
10 :50-11 :00	Chant	Chant d'animation	Elèves de l'école Tassiba Tangara
11 :00-11 :05	Chant	Latrines	Elèves de l'école Tessa
11 :05-11 :10	Sketch	Diarrhée	Elèves de l'école Tessa
11 :10-11 :20	Dialogue	Gargarisme	Elèves de l'école Tessa
11 :20-11 :25	Poème	Hymne au maître d'école	Elèves de l'école Tessa
11 :25-11 :30	Chant	Chant de l'école Mamandey	Elèves de l'école Mamandey
11 :30-11 :40	Théâtre	Scolarisation de la jeune fille	Elèves de l'école Tessa
11 :40-11 :55	Jeu devinette	Ordures et maladies	Elèves de l'école Tessa
11 :55-12 :00	Chant	Paludisme	Elèves de l'école Tessa
12 :00-12 :10	Sketch	Mariage précoce	Elèves de l'école Tassiba Tangara
12 :10-12 :15	Chant	APP	Elèves de l'école Tessa
12 :15-12 :20	Poème	SIDA	Elèves de l'école Tessa
12 :20-12 :30	Chant	Scolarisation des enfants	Elèves de l'école Tassiba Tangara
12 :30-12 :35	Chant	Remerciement	Elèves de l'école Tessa
12 :35-13 :00	Distribution des prix	Prix de travail, de propreté corporelle et vestimentaire, de propreté de la classe, de latrine etc.	Lauréats, Distributeurs (Participants)
13 :00	Clôture	Remerciement	Directeur

Impact

- Satisfaction of students, teachers and parents.
- Awareness of parents on monitoring children's education.
- Introduce students to creativity and expression.

Strategy to better organize

- Take sufficient time for preparation,
- Educate students, teachers and parents,
- Develop the skills of all children,
- How to choose the moment
- Proper division of labor.

Example of the Action Plan / COGES

	Activities	Tasks	Period	Cost				Funding Source	Res. monitoring
				Description	Qty	Cost/U	Cost/T		
Ex19	Organisation de la fête scolaire de fin d'année	Programmation	Le 9 Mai 2007					APE et Coopérative Scolaire	Président et SG du COGES
		Préparer les activités de sensibilisation							
		Préparer le matériel:	Le 8 Juin 2007	Ustensiles	-	Prêt des parents			
				nattes	3	Prêt des parents			
				Vêtements	-	Prêt des parents			
				Matériel de salubrité	-	Prêt des parents			
				seaux	5	Prêt des parents			
		Acheter les prix		Cahiers	50	125 F	6 250 F		
				Bics	50	75 F	3 750 F		
				Savon	30	150 F	4 500 F		
		Informer le village/quartier		crieurs publics	3	300 F	900 F		
		Exécuter l'activité	Le 9 Juin 2007	Repas et boissons	100	700 F	70 000 F		
						Total	**85 400 F**		

Ex 19 :

Open day (session awareness)

Case of school-Kargui Bangou

History of activity

The community is not sufficiently informed of the school. The community and the school should communicate more

Purpose

- Inform parents about the school by their testimony.
- Educate the community as a whole and in a short time to invest in the education of his children.

Preparation

- Program of activities.
- Choice of activities and allocation of tasks between the classes.
- Preparing the scene for hours of PPA.

Material used

Soap, brushes, toothbrushes, teeth care, etc..

Execusion

-Programme-

Schedules	Activities	Themes	Actors
8h00-9h00	Accueil des participants	-	Directeur et collaborateurs
9h00-9h10	Ouverture	-	Directeur
9h10-9h15	Chant de bienvenue	Remerciement aux partenaires de l'école	Elèves
9h15-9h25	Chant	Latrines	Elèves CI
9h25-9h35	Pratique de lavage des mains	Hygiène corporelle	Elèves CPB
9h35-9h50	Sketchs	Paludisme	CE2A
9h50-10h20	Sensibilisation	Latrines	C.G.L (Comité de la Gestion des Latrines)
10h20-10h30	Jeu de devinettes	Animation	CE2B
10h30-10h45	Pratique de l'hygiène des dents	Hygiène bucco-dentaire	CPA
10h45-11h00	Jeu de devinettes	Les ordures	CM1
11h00-11h10	Poème	Moustique	Directeur
11h10-11h30	Remise des prix après les résultats 1er 2e 3e /classe	1er 2e 3e par classe	Partenaires : JICA, IEB,CP
11h30-12h00	clôture	-	Directeur

Strategy to better organize

- Developing a work plan.
- Research equipment to near COGES and others

Example of the Action Plan / COGES

	Activities	Tasks	Period	Cost				Funding Source	Res. monitoring
				Description	Qty	Res. monitoring	Cost/T		
Ex20	Organisation d'1 Journée Porte Ouverte		Le 9 Mai 2007					COGES	SG/COGES+Pdt et TG/APE +2 parents
		Préparer les activités de sensibilisation							
		Rassembler le matériel:	Le 8 Juin 2007	gobelet	2	Prêt des parents			
				bouches	2	Prêt des parents			
				cuillers	2	Prêt des parents			
				tasses	2	Prêt des parents			
				Sachet SRO	1	Prêt des parents			
				natte	1	Prêt des parents			
				Vêtement	-	Prêt des parents			
				Matériel de salubrité	-	Matériel de l'école			
				bouilloires	2	Matériel de l'école			
				seau	2	Matériel de l'école			
		Acheter les prix		Cahier (96p)	6	150 F	900 F		
				Cahier (75p)	12	75 F	900 F		
				Bic	6	75 F	450 F		
				Omo	12	100 F	1 200 F		
				Savon	30	100 F	3 000 F		
				kosi (cure-dents)	345	10 F	3 450 F		
		Informer le village/quartier		crieur public	3	300 F	900 F		
		Exécuter l'activité	Le 9 Juin 2007				0 F		
						Total	**10 800 F**		

Ex 20 :

Traditional construction of latrines at school

Case of school-Yelo Kaina

History of activity

Understanding the people and students the importance of latrines.

Purpose

- Prevent disease
- Awareness on the use of latrines.

Material utilized

Wood, clay, millet stalks, picks, shovels, water, etc..

Implementation process

1. Awareness on the importance of latrines in schools on the occasion of the General Assembly of the EPA.
2. Collection of equipment and construction
   Teachers, students and the public gathered wood, stems and clay. They prepared the banco. Then they built two latrines completed in millet stalks.

Impact

The latrines have put students at ease for their natural needs and allowed the school to prevent many diseases such as diarrhea.

Example of the Action Plan / COGES

	Activities	Tasks	Period	Cost				Funding Source	Res. monitoring
				Description	Qty	Res. monitoring	Cost/T		
Ex21	Construction de latrines traditionnelles à l'école	Sensibiliser la population	Le 2 Fev 2007					COGES	P/COGES + gestionnaire + directeur
		Chercher : Bois	En Fev 2007	Bois	30		0 F		
		Argile		Argile	pm		0 F		
		Tiges de mil		Tiges de mil	pm		0 F		
		Pioches		Pioches	6	Prêt des parents			
		Pelles		pelle	10	Prêt des parents			
		Eau		Eau	pm		0 F		
		Creuser les fosses	Le 3 Mars 2007	Main d'œuvre	Contribution physique de la population				
		Construire les 2 latrines,les clôturer							
						Total	**0 F**		

Ex 21 :
Construction of modern public latrines

Case of the Community of Kargui-Bangou

History of activity

- Enough cases of diarrhea
- Much garbage behind the houses and the market.
- The market place is unhealthy

Purpose

Prevent diseases related to unsafe by the building of public latrines near the market.

Preparations

1. Establishment of a Management Committee Latrines (CGL) consisting of: President of Cosan, president of Youth, nursing CSI, director of the school, members of the EPA, Health and matron of the village.

2. Awareness and consciousness of the population;
   The school director, youth and volunteers from JICA have alerted people in four districts of the village.

3. Collection equipment
   - Youth sought gravel, sand and dug the hole.
   - The Mayor has provided iron and cement.
   - The nurse said the place where to build the latrines.

4. Construction of latrines with a mason specialized population.

Example of the Action Plan / COGES

	Activities	Tasks	Period	Cost				Funding Source	Res. monitoring
				Description	Qty	Res. monitoring	Cost/T		
Ex22	Construction de latrines modernes publiques	Sensibiliser la population sur l'importance et l'utilisation des latrines	Le 1er Fev 2007	-	-	Contribution physique du CSS/COGES		Cotisation de la population+ Mairie	P/CSS + P/APE + P/COGES + Adj/Mairie
		Mettre en place un Comité de Gestion des Latrines	Le 9 Fev 2007	-	-	-	-		
		Sensibiliser la population sur l'importance et l'utilisation des latrines	D'avril à Mai 2007	Séance de sensibilisation par quartier	5	Contribution physique du CSS/COGES			
		Rassembler le matériel/Fabrication des 600 briques	En Mai 2007	Gravier	pm	Contribution physique dela population			
				Sable	pm				
				Eau	pm				
				Pioche	6	Prêt de la population			
				Pelle	10	Prêt de la population			
		Choisir la place idéale	Le 4 Mai 2007	-	-	-			
		Acheter le matériel	De juillet à Sept 2007	Ciments	40	5 000 F	200 000 F		
				Ciments blancs	1	15 000 F	15 000 F		
				Fer de 10	-	40 000 F	40 000 F		
				Portes	2	15 000 F	30 000 F		
				Fil de fer	-	50 000 F	50 000 F		
				Toles	-	20 000 F	20 000 F		
				tuyaux crochet	-	20 000 F	20 000 F		
				Transports	-	20 000 F	20 000 F		
		Construire 2 latrines	De juillet à Oct 2007	Maçon	1	40 000 F	40 000 F		
				Main d'œuvre	12	1 000 F	12 000 F		
							Total	**447 000 F**	

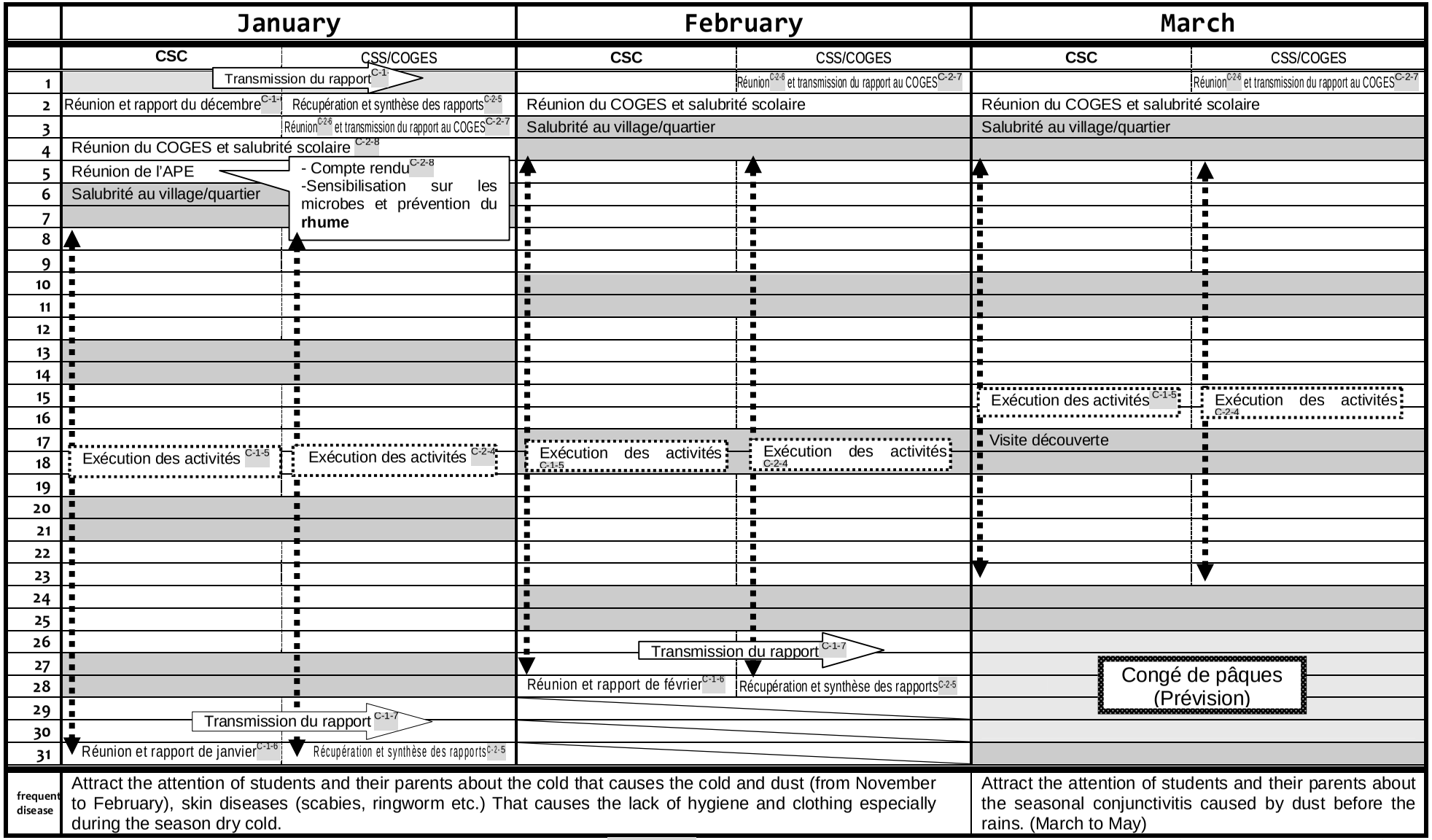
Annex 6: Schedule of activities of School WASH Club 2009-2010

From October to December

	October	November	December	
			CSC	CSS/COGES
1		Formation des directeurs sur la mise en place démocratique du bureau APE/COGES	Restitution de la formation et mise en place du «Comité de Santé Scolaire» B-1, B-2	
2				
3				
4			Réunion	Réunion
5				
6			- Explication du CSS C-1-1 - Election/désignation des surveillants C-1-2 - Elaboration du cahier de contrôle C-1-3 - Elaboration du tableau de services C-1-4	- Identification du matériel C-2-1 - Elaboration du programme d'activités et du plan d'action, volet santé scolaire C-2-2
7				
8				
9		Sensibilisation de la population sur l'élection démocratique du bureau APE/COGES		
10				
11				
12				
13				
14			Exécutions des activités C-1-5	
15				
16				
17				
18				
19				
20		Election démocratique du bureau APE et COGES A-1		
21		Désignation des membres des sous-comités de gestion du COGES A-2		
22				
23				
24				
25				
26			Congé de noël (Prévision)	
27				
28		Formation sur le plan d'actions et la gestion des fonds A-3		
29				
30		Formation sur le Comité de Santé Scolaire A-4		
31				
frequent disease	Attract the attention of students and their parents about malaria and health especially from the back.		Attract the attention of parents on diarrhea due to non-washed raw vegetables. (Eg lettuce, tomato, carrot, etc.). And the cold.	

N.B.1 » Ce calendrier est proposé à titre indicatif N.B.2 » Remarques; A-1, A-2, etc.; ces numéros renvoient aux étapes du processus de mise en place (voir document p.18 et suivant)

From January to March



frequent disease	Attract the attention of students and their parents about the cold that causes the cold and dust (from November to February), skin diseases (scabies, ringworm etc.) That causes the lack of hygiene and clothing especially during the season dry cold.	Attract the attention of students and their parents about the seasonal conjunctivitis caused by dust before the rains. (March to May)

*N.B.1 » Ce calendrier est proposé à titre indicatif N.B.2 » Remarques; C-1-1, C-1-2, etc.; ces numéros renvoient aux étapes du processus de mise en place (voir document **p.18** et suivant)*

From April to June

	April		May		June	
	CSC	CSS/COGES	CSC	CSS/COGES	CSC	CSS/COGES
1			*Fête du travail*	Transmission du rapport C-1-7		
2	Transmission du rapport C-1-7		Réunion et rapport d'avril C-1-6	Récupération et synthèse des rapports C-2-5	Salubrité au village/quartier	
3	Réunion et rapport du mars C-1-6	Récupération et synthèse des rapports C-2-5		Réunion C-2-6 et transmission du rapport au COGES C-2-7	Transmission du rapport C-1-7	
4		Réunion C-2-6 et transmission du rapport au COGES C-2-7	Réunion du COGES et salubrité scolaire C-2-8		Réunion et rapport de Mai C-1-6	Récupération et synthèse des rapports C-2-5
5	Réunion du COGES et salubrité scolaire C-2-8		Salubrité au village/quartier pour la prévention du paludisme		Bilan annuel C-1-11	Réunion C-2-6 et transmission du rapport au COGES C-2-7
6	Réunion de l'APE	- Compte rendu - Sensibilisation sur la prévention du **paludisme**				Bilan annuel C-2--12
7	Salubrité au village/quartier					
8					Salubrité scolaire	
9					Fête scolaire (sensibilisation ; chant, sketch, etc.)	
10						
11						
12						
13						- Compte rendu C-2-12 - Bilan annuel sur CSS C-2-12
14					Réunion du COGES (bilan annuel)	
15					Réunion de l'APE (bilan annuel)	
16						
17						
18	Exécution des activités C-1-5	Exécution des activités C-2-4	Exécution des activités C-1-5	Exécution des activités C-2-4		
19						
20						
21						
22						
23						
24	*Journée de la concorde*					
25						
26						
27						
28						
29						
30						
31						

frequent disease	Attract the attention of 'pupils and their parents about the buttons and mumps heat caused the heat and humidity in hot dry season (from April to May).	
		Prepare students and parents on prevention of malaria.

*N.B.1 » Ce calendrier est proposé à titre indicatif N.B.2 » Remarques; C-1-1, C-1-2, etc.; ces numéros renvoient aux étapes du processus de mise en place (voir document **p.18** et suivant)*

from July to September

	July	August	September
1			Salubrité au village/quartier
2			
3			
4		Salubrité au village/quartier	
5			
6			
7	Salubrité au village/quartier		
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			- Compte rendu - Sensibilisation sur scolarisation - Préparation rentrée scolaire
26			
27			
28			Réunion de l'APE
29			
30			
31			

N.B : During the holiday period (July, August, September), health workers are responsible for community awareness on malaria, diarrhea, skin diseases ... in the villages and sites in foraines outputs.

frequent disease	Attract the attention of students and their parents on malaria transmitted by mosquitoes during the rainy season and conjunctivitis caused by seasonal rains (July to September). Do not let children swim in the puddles, they develop diarrhea and skin diseases (from July to October)

N.B.1 » Ce calendrier est proposé à titre indicatif

N.B.2 » Remarques; C-1-1, C-1-2, etc.; ces numéros renvoient aux étapes du processus de mise en place (voir document p.18 et suivant)

« Manual of School Health Committee of COGES»

For health education programs Dosso

Prepared under the direction of:
Regional Directorate of Basic Education and Literacy Dosso

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By:
Team JOCV / JICA-Dosso

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- Inspection of Basic Education Dosso Department

APPENDIX – K

FACILITY CAPACITY CALCULATION FOR PRIORITY PROJECT

APPENDIX - K FACILITY CAPACITY CALCULATION FOR PRIORITY PROJECT

Table of Contents

K.1 Result of Geo-Technical Survey

(1) Existing Water Treatment Site

3.2 Result of Survey (Existing WTP site)

The existing water purification plant is located on end of a hill extending to the East-West directions, and foundation rock is 3.0~4.5m in depth. Foundation rock is consisted of hard gneiss, but include highly weathered layer of 1m thickness on top. Sandy silt layer is also consisted of highly weathered gneiss, but it was changed to soil completely by weathering. Foundation on drilling point Br-2 is deeper than on Br-1.

Table 3-1 Summary of Geological Result (Existing WTP site)

Formation	Thick -ness	Color	Description	N-values
Surface Soil (Clay)	1.0m	Black Brown	Not sticky clay with medium to coarse sand as quartz particle.	4~5 (Ave.4.5)
Sandy Silt	2.0~ 3.5m	Dark Brown ~ Grayish Brown	Sandy silt with medium to coarse sand of quartz, having water content and a little bit sticky.	3~8 (Ave.5.4)
Sandy Silt with gravel	0.8m	Grayish Brown	Part of highly weathered gneiss, but, it is shown aspect of soil.	17~20 (Ave.18.5)
Highly weathered Gneiss	0.8~ 1.0m	Brown ~ Grayish Brown	Aspect is like clay and sand by weathering.	Over 50
Weathered Gneiss	-	Grayish Brown ~Black and White	It is not hard Gneiss and easy to break by hammer.	Over 50
Gneiss	-	Black and White	Head and substantial gneiss.	Over 50

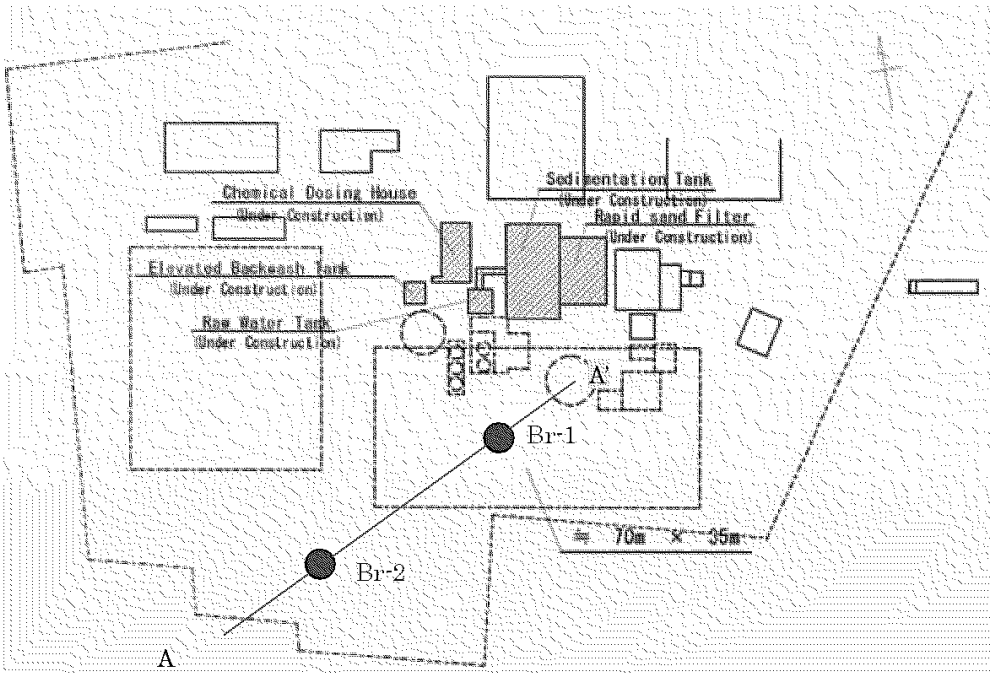

Fig.3-2 Location of Boring Point (Existing WTP site)

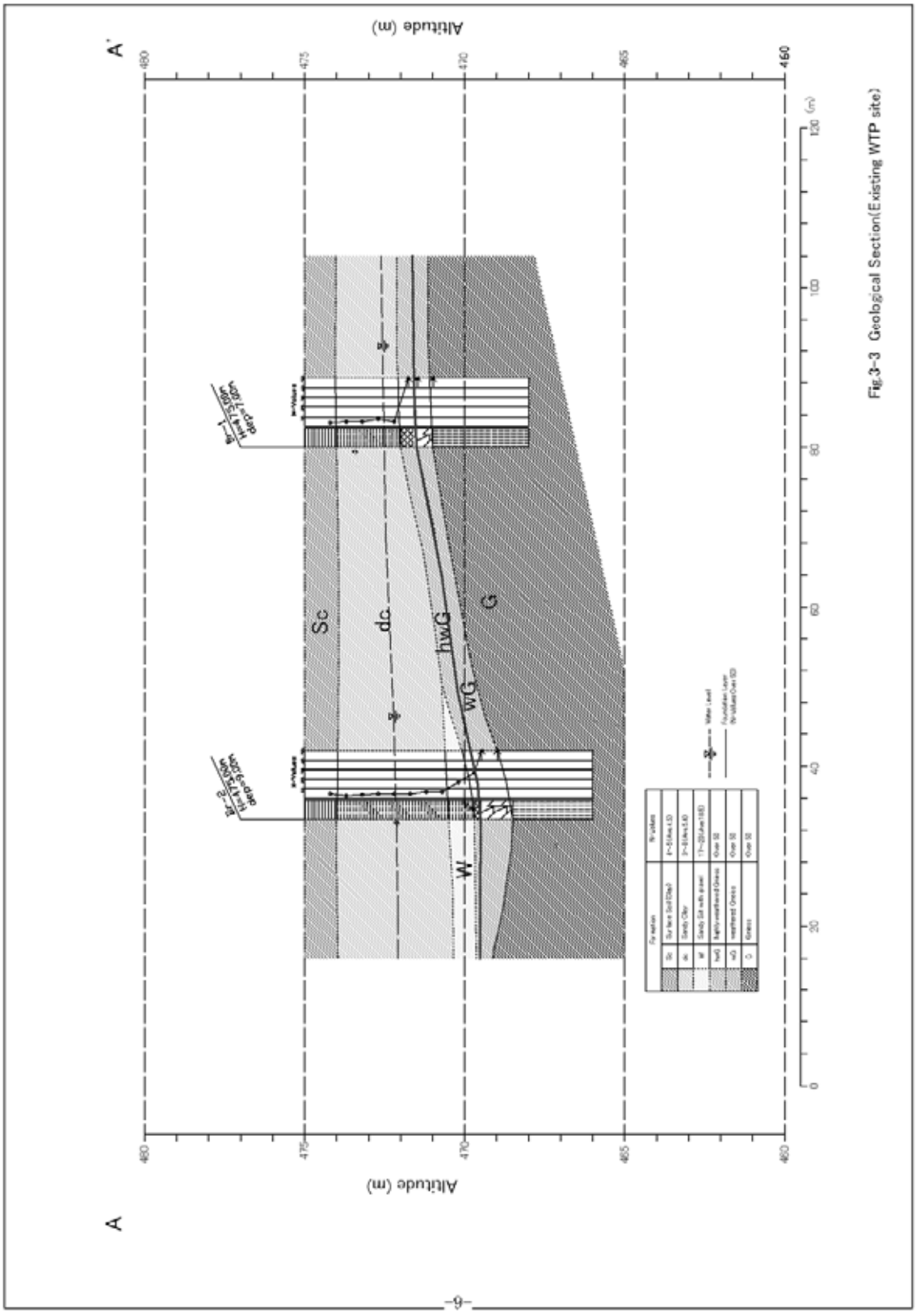

Fig.3-3 Geological Section(Existing WTP site)

(2) New West Water Treatment Plant Site

3.3 Result of Survey (New West WTP site)

New West WTP site is located in Tokkiman Village southern of Juba behind the Sand river (called Koro-Mura), and it is on flat topography plain, but swamp extend around survey site to South- West direction. Sand layer of 4~5m in thickness deposit along the Sand river, and another sand layer of 8m in thickness deposit in former river channel(Fig.3-4).

Sand formation of 1m in thickness on surface is confirmed at Borehole No.Br-6, and it is expected to extend from Tokkiman Village. Then Clay formation with 3~5 in N-values and clay sand formation with 10~12 in N-values, which both of thick is 2.5m, are confirmed at Borehole No.Br-3 and Br-6, and it is expected to distribute soft formation around swamp. Sandy silt with gravel having 15~22 in N-values which is changed aspect from weathered gneiss by weathering, distribute around borehole No.Br-4, west side of survey area.

Depth of foundation layer (highly weathered Gneiss with over 50 in N-values) is 4m at Br-3 and Br-4, but it is 5.5m at Br-6 on swamp. And also thickness of highly weathered Gneiss layer is only 1m at Br-3 and Br-4, but it is 4.5m at Br-6, then it is expected that deeper foundation layer highly weathered on swamp.

The water level at borehole after drilling is GL-2.38 at Br-3, GL-3.88 at Br-4, GL-2.52m at Br-6 and it is declined toward Nile River. Then water level arise up 0.5~1.2m after rain.

Table 3-2 Water Level in Borehole (GL- m)

	After Drilling	After Rain
Br-3	2.38m(11-May)	1.90m(13-May)
Br-6	2.52m(14-May)	-
Br-4	3.88m(10-May)	2.69m(13-May)

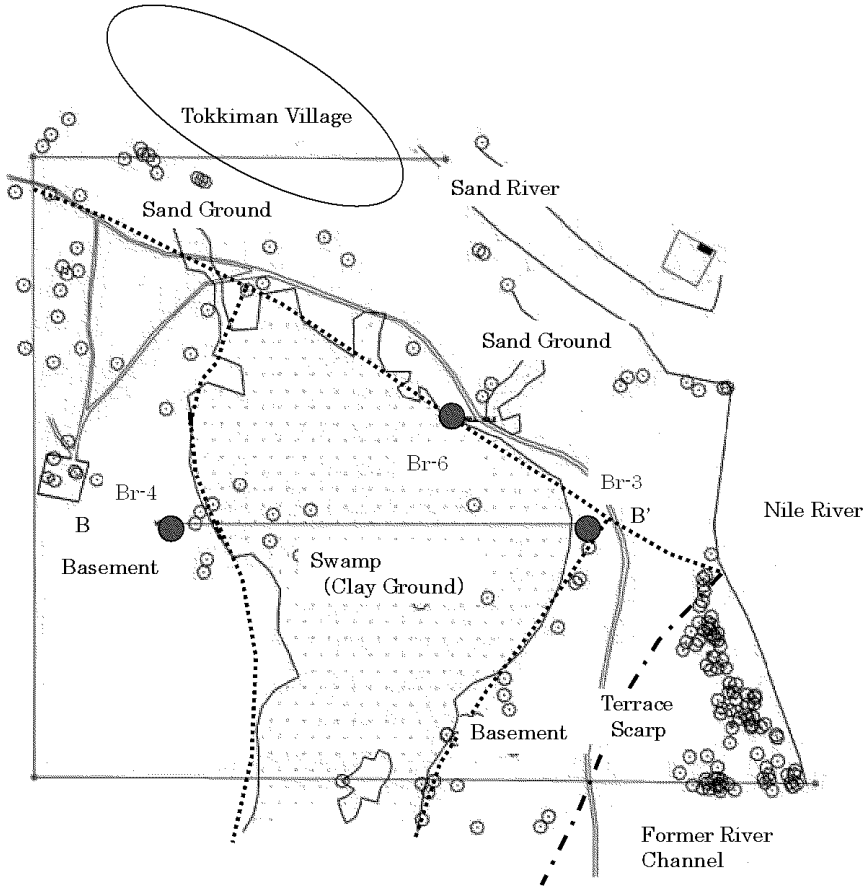

Fig. 3-4 Location map (New West WTP site)

Table 3-3 Summary of Geological Result (New West WTP site)

Formation	Thick -ness	Color	Description	N-values
Surface Soil (Sand)	1.0m	Brown	Fine to medium sand with silt.	18 (Ave.18.0)
Surface Soil (Clay)	0.5~ 1.5m	Dark Brown ~ Black Brown	Hard silty clay with coarse sand and fine gravel	19 (Ave.19.0)
Clay Sand	0.6~ 1.1m	Light Brown ~ Grayish Brown	Clay sand with quartz and feldspar of 5 ~ 10 mm in size, with little sticky.	10 ~ 12 (Ave.11.0)
Sandy Clay	1.4~ 1.8m	Dark Grayish Brown ~ Grayish Brown	Sandy clay with fine to medium sand, with highly water content and sticky.	3 ~ 5 (Ave.4.1)
Sandy Silt / Clay Sand	2.1~ 3.5m	Dark Brown~ Yellowish Brown	Aspect is sandy silt or clay sand with fine to medium size quartz by weathering, but it is part of highly weathered gneiss. No water content and less sticky.	15 ~ 47 (Ave.24.9)
Highly weathered Gneiss	0.5~ 2.0m	Grayish Brown	Aspect is like clay and sand by weathering.	42 ~ Over 50
Weathered Gneiss	-	Grayish Brown	It is not hard Gneiss and easy to break by hammer.	Over 50
Gneiss	-	Black and White ~ Grayish Brown	Head and substantial gneiss.	Over 50

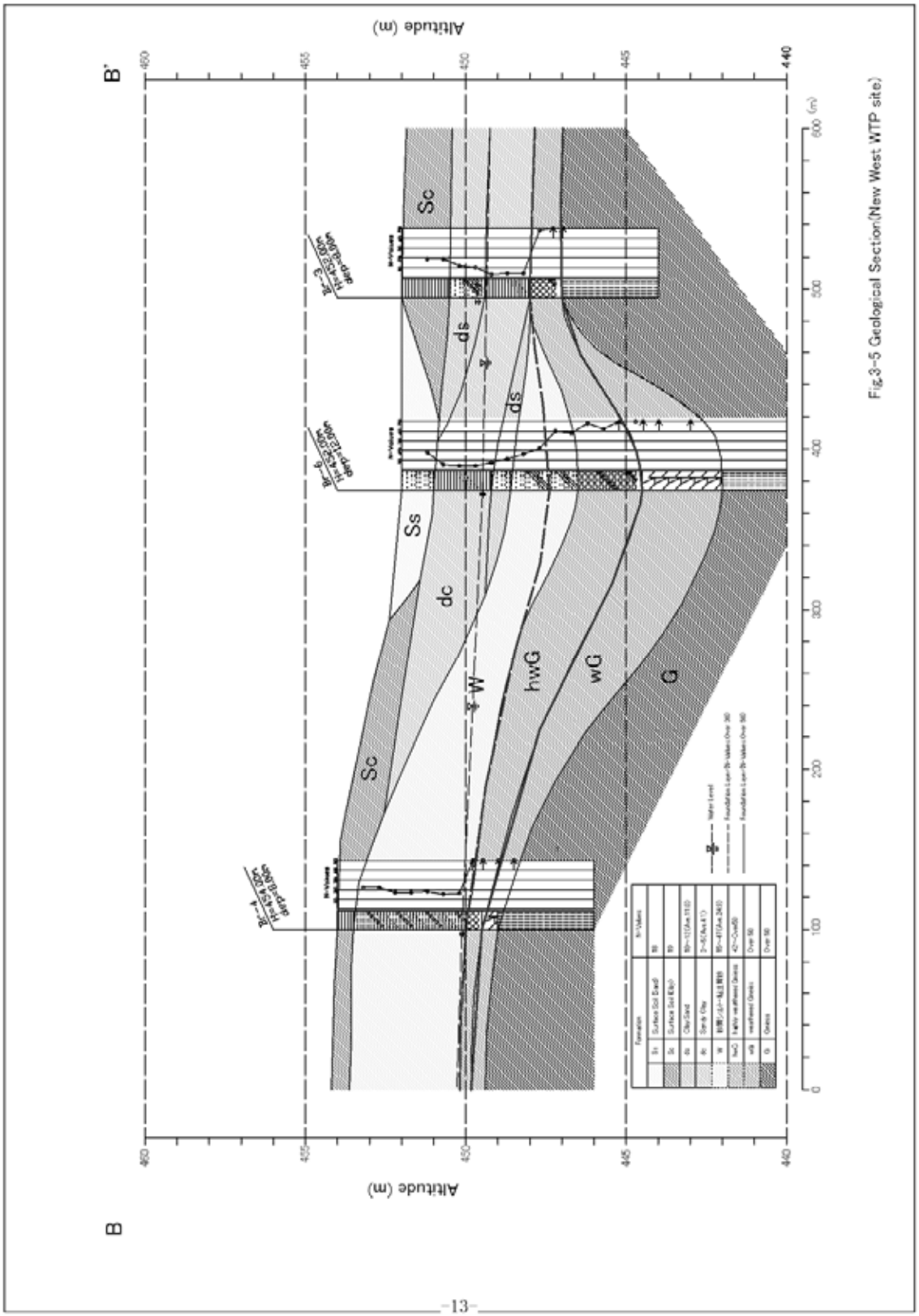

Fig.3-5 Geological Section(New West WTP site)

(3) North Low Service Reservoir Site

3.4 Result of Survey (Parliament GLSR site)

Survey point is located on top of hill, and rock formation is distributed in central Juba city. Surface is sandy clay with gravel (30~50 in N-values) of 2m in thickness cover rock formation. Top of rock formation is highly weathered gneiss with only 0.5m in thickness, and hard rock formation appear in shallow depth.

Table 3-4 Summary of Geological Result (Parliament GLSR site)

Formation	Thick -ness	Color	Description	N-values
Sandy Clay with gravel	2.0m	Dark Brown ~ Grayish Brown	Surface soil with gravel of quartz changed aspect of gneiss by weathering.	33~47 (Ave.39.3)
Highly weathered Gneiss	0.5m	Grayish Brown	Aspect is like clay and sand by weathering.	Over 50
Weathered Gneiss	-	Grayish Brown	It is not hard Gneiss and easy to break by hammer.	Over 50
Gneiss	-	Black and white ~ Grayish Brown	Head and substantial gneiss.	Over 50

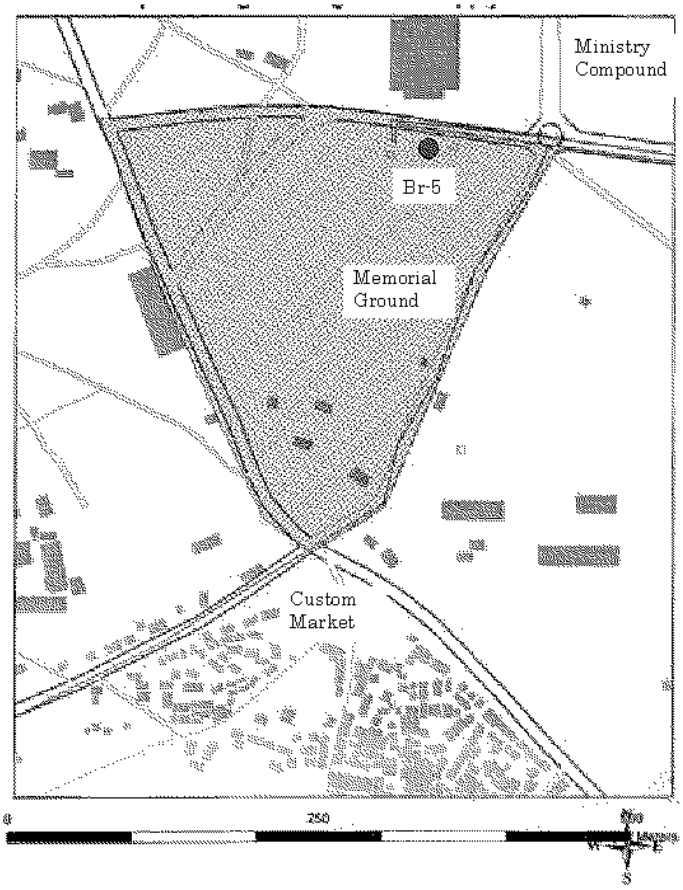

Fig. 3-6 Location Map (Parliament GLSR site)

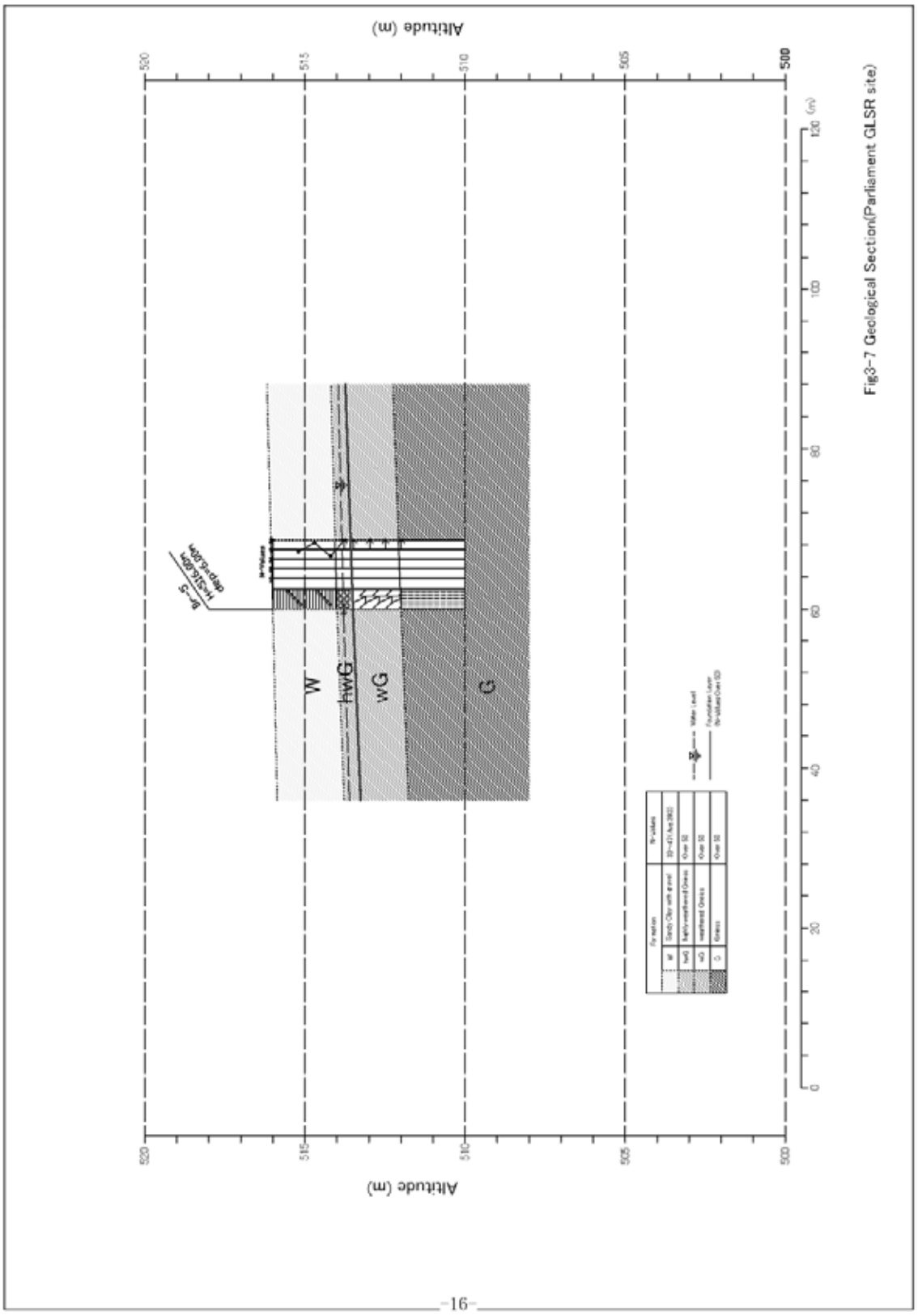

Fig3-7 Geological Section(Parliament GLSR site)

K.2 Facility Design of Expansion of Existing Water Treatment Plant Site for Feasibility Study

1-1. Capacity of Water Treatment Plant

(1) Total Capacity (with Existing)

					=	14,000	m3/day
	14000/24				=	583	m3/hr
	14000/24/60				=	9.72	m3/min
	14000/24/60/60				=	0.162	m3/sec

(2) Extension Capacity

					=	7,000	m3/day
	7000/24				=	292	m3/hr
	7000/24/60				=	4.86	m3/min
	7000/24/60/60				=	0.081	m3/sec

1-2. Raw Water Pump

No. of Pump	2 nos. (1 standby)						
Q=	4.86	/	1.00		=	4.9	m3/mim
H=						16.0	m
∴	Q4.9m3/m * H16.0m * 18.5kw * 2(1)nos.						

1-3. Receiving Well

V=	4.8*4.8*3.0				=	69.12	m3	
Retention Time=	69.12	/	4.86		=	14.22	min	(1.5min -)

1-4. Sedimentation Basin (High rate)

Ah=	10.25*10.25*2					=	210.13	m2	
Surface Load=	4.86	/	210.13	*	1,000	=	23.13	mm/min	(40-60mm/min)
V=						=	630.00	m3	
Retention Time=	630.00	/	292.00			=	2.16	hr	(1.5-2.0hr)

1-5. Rapid Sand Filter

No. of Filter	4 nos. (1 standby)						
A=	4.8*3.4*3				=	48.96	m2
V=	7,000.00	/	48.96		=	142.97	m/day	(120-150m/day)

1-6. Clear Water Reservoir (Total Capacity)

V=	5.0*16.0*4.0*2				=	640.00	m3	
Retention Time=	640.00	/	583.00		=	1.10	hr	(1hr -)

1-7. Clear Water Pump (Total Capacity)

No. of Pump	3 nos. (1 standby)						
Q=	9.72	/	2		=	4.9	m3/min
H=						80.0	m
∴	Q4.9m3/m * H75.0m * 90kw * 3(1)nos.						

K.3 Facility Design of West Water Treatment Plant for Feasibility Study

2-1. Capacity of Water Treament Plant

(1) Total Capacity (3 serias)

						=	189,000	m3/day	
	189000/24					=	7,875	m3/hr	
	189000/24/60					=	131	m3/min	
	189000/24/60/60					=	2.19	m3/sec	

(2) Priority Project Capacity (1 serias)

						=	63,000	m3/day	
	63000/24					=	2,625	m3/hr	
	63000/24/60					=	43.8	m3/min	
	63000/24/60/60					=	0.73	m3/sec	

2-2. Intake (Total Capacity)

Ah=	2.0*1.6*2					=	6.40	m2	
Average Velocity=	2.19	/	6.40			=	0.34	m/sec	(0.4-0.8m/sec)

2-3. Grid Chamber (Total Capacity)

Ah=	10.0*15.0*2					=	300.00	m2	
Surface Load=	131.00	/	300.00	*	1,000	=	436.67	mm/min	(200-500mm/min)
Av=	10.0*3.0*2					=	60.00	m2	
Average Velocity=	2.19	/	60.00	*	100	=	3.65	cm/sec	(2-7cm/sec)

2-4. Raw Water Pump (Total Capacity)

No. of Pump	4 nos. (1 standby)								
Q=	131.00	/	3.00			=	43.7	m3/min	
H=							10.0	m	
∴	Q43.7m3/m * H10.0m * 110kw * 4(1)nos.								

2-5. Receiving Well (Priority Project)

V=	4.0*2.0*5.0+4.0*4.0*2.0					=	72.00	m3	
Retention Time=	72.00	/	43.80			=	1.64	min	(1.5min -)

2-6. Flocculation Basin (Priority Project)

V=	30.0*(1.1*2+1.5*2+2.0*2)*4.0					=	1,104.00	m3	
Retention Time=	1,104.00	/	43.80			=	25.21	min	(20 - 40min)

2-7. Sedimentation Basin (Priority Project)

Ah=	30.0*50.0					=	1,500.00	m2	
Surface Load=	43.80	/	1,500.00	*	1,000	=	29.20	mm/min	(15-30mm/min)
Av=	30.0*4.5					=	135.00	m2	
Average Velocity=	43.80	/	135.00			=	0.32	cm/sec	(- 0.4cm/sec)

2-8. Rapid Sand Filter (Priority Project)

No. of Filter	6 nos. (1 standby)								
A=	(3.6+3.6)*12.0*5					=	432.00	m2	
V=	63,000.00	/	432.00			=	145.83	m/day	(120-150m/day)

2-9. Clear Water Reservoir (Priority Project)

V=	20.0*35.0*4.0					=	2,800.00	m3	
Retention Time=	2,800.00	/	2,625.00			=	1.07	hr	(1hr -)

2-10. Clear Water Pump (Total Capacity)

for North Low Reservior						=	107,000	m3/day	
	107000/24					=	4,458	m3/hr	
	107000/24/60					=	74.3	m3/min	
	107000/24/60/60					=	1.24	m3/sec	
No. of Pump	3 nos. (1 standby)								
Q=	74.30	/	2			=	37.2	m3/min	

H=							90.0	m	
	Q37.2m3/m * H90.0m * 750kw * 3(1)nos.								

2-11. Back Wash

Back Wash Rate=							0.80	m3/mm･m2	(0.6-0.9m3/mm･m2)
Back Wash Time=							5.00	min	(4-6min)
Filter Area=	(3.6+3.6)*12.0					=	86.40	m2	
Quantity of Water=	86.40	*	0.80	*	5.00	=	345.60	m3	

(1) Back Wash Overhead Tank

V=	10.0*10.0*4.0					=	400.00	m3	

(2) Back Wash Pump

Pumping Time=							30.00	min	
Q=	400.00	/	30.00			=	13.33	m3/min	
H=							25.00	m	
	Q13.3m3/m * H25.0m * 75kw * 2(1)nos.								

2-12. Surface Wash

Surface Wash Rate=							0.15	m3/mm･m2	(0.15-2.0m3/mm･m2)
Filter Area=	(3.6+3.6)*12.0					=	86.40	m2	
Quantity of Water=	0.15	*	86.40	*	5.00	=	64.80	m3	
Q=	0.15	*	86.40			=	12.96	m/min	
H=							25.00	m	
	Q13.0m3/m * H25.0m * 75kw * 2(1)nos.								

2-13. Waste Water Basin

Quantity of Water=	345.60	+	64.80			=	410.40	m3	
V=	6.0*18.8*4.0					=	451.20	m3	O.K

APPENDIX – L

COST ESTIMATION
FOR PRIORITY PROJECT

APPENDIX - L COST ESTIMATION FOR PRIORITY PROJECT

Table of Contents

L.1 Estimated Unit Construction Cost of Pipeline

Item Description	Unit	L.C. (USD)	F.C. (USD)	Total (USD)
-1 DCI Pipe				
DCIP 1200mm	m	154	2,016	2,170
DCIP 1100mm	m	142	1,727	1,870
DCIP 1000mm	m	131	1,457	1,589
DCIP 900mm	m	120	1,202	1,322
DCIP 800mm	m	110	1,071	1,181
DCIP 700mm	m	100	858	958
DCIP 600mm	m	90	676	766
DCIP 500mm	m	81	506	587
DCIP 450mm	m	76	429	505
DCIP 400mm	m	71	366	437
DCIP 350mm	m	67	296	363
DCIP 300mm	m	62	249	311
DCIP 250mm	m	58	190	247
DCIP 200mm	m	53	152	205
-2 PVC Pipe				
PVC 300mm	m	16	136	152
PVC 250mm	m	14	102	116
PVC 200mm	m	12	74	86
PVC 150mm	m	10	53	63
PVC 100mm	m	8	36	44
PVC 75mm	m	8	30	37

L.2 Estimated Construction Cost of WTP

L.2.1 Expansion of the existing WTP

Item Description		L.C (USD)	F.C (USD)	Total (USD)
-A1	Raw Water Pump Facility			
	Civil and Architecture Works	61,000	170,000	231,000
	Mechanical and Electrical Works	0	603,000	603,000
	Sub Total of -A1	**61,000**	**773,000**	**834,000**
-A2	Receiving Well			
	Civil and Architecture Works	40,000	106,000	146,000
	Mechanical and Electrical Works	0	0	0
	Sub Total of -A2	**40,000**	**106,000**	**146,000**
-A3	Coagulo-sedimentation Basin			
	Civil and Architecture Works	143,000	381,000	524,000
	Mechanical and Electrical Works	0	27,000	27,000
	Sub Total of -A3	**143,000**	**408,000**	**551,000**
-A4	Rapid Sand Filter			
	Civil and Architecture Works	233,000	368,000	601,000
	Mechanical and Electrical Works	0	340,000	340,000
	Sub Total of -A4	**233,000**	**708,000**	**941,000**
-A5	Chemical Facility			
	Civil and Architecture Works	0	0	0
	Mechanical and Electrical Works	0	135,000	135,000
	Sub Total of -A5	**0**	**135,000**	**135,000**
-A6	Clear Water Reservoir			
	Civil and Architecture Works	115,000	357,000	472,000
	Mechanical and Electrical Works	0	30,000	30,000
	Sub Total of -A6	**115,000**	**387,000**	**502,000**
-A7	Transmission Pump Facilities			
	Civil and Architecture Works	0	0	0
	Mechanical and Electrical Works	0	1,569,000	1,569,000
	Sub Total of -A7	**0**	**1,569,000**	**1,569,000**
-A8	Electrical & Generator Facilities			
	Civil and Architecture Works	52,000	121,000	173,000
	Mechanical and Electrical Works	0	107,000	107,000
	Sub Total of -A8	**52,000**	**228,000**	**280,000**
-A9	Piping Works			
	Civil and Architecture Works	104,000	476,000	580,000
	Mechanical and Electrical Works	0	0	0
	Sub Total of -A9	**104,000**	**476,000**	**580,000**
	Total of Construction Cost	**748,000**	**4,790,000**	**5,538,000**
	Civil and Architecture Works	**748,000**	**1,979,000**	**2,727,000**
	Mechanical and Electrical Works	**0**	**2,811,000**	**2,811,000**

L.2.2 New West WTP

Item Description		L.C (USD)	F.C (USD)	Total (USD)
-A1	Intake Facility			
	Civil and Architecture Works	70,000	213,000	283,000
	Mechanical and Electrical Works	0	86,000	86,000
	Sub Total of -A1	**70,000**	**299,000**	**369,000**
-A2	Raw Water Pump Facility			
	Civil and Architecture Works	573,000	1,702,000	2,275,000
	Mechanical and Electrical Works	0	979,000	979,000
	Sub Total of -A2	**573,000**	**2,681,000**	**3,254,000**
-A3	Chemical Sedimentation Basin			
	Civil and Architecture Works	1,689,000	2,873,000	4,562,000
	Mechanical and Electrical Works	0	1,031,000	1,031,000
	Sub Total of -A3	**1,689,000**	**3,904,000**	**5,593,000**
-A4	Rapid Sand Filter			
	Civil and Architecture Works	986,000	1,157,000	2,143,000
	Mechanical and Electrical Works	0	3,601,000	3,601,000
	Sub Total of -A4	**986,000**	**4,758,000**	**5,744,000**
-A5	Chemical Facility			
	Civil and Architecture Works	156,000	363,000	519,000
	Mechanical and Electrical Works	0	803,000	803,000
	Sub Total of -A5	**156,000**	**1,166,000**	**1,322,000**
-A6	Clear Water Reservoir			
	Civil and Architecture Works	368,000	1,175,000	1,543,000
	Mechanical and Electrical Works	0	45,000	45,000
	Sub Total of -A6	**368,000**	**1,220,000**	**1,588,000**
-A7	Transmission Pump Facilities			
	Civil and Architecture Works	542,000	1,453,000	1,995,000
	Mechanical and Electrical Works	0	2,423,000	2,423,000
	Sub Total of -A7	**542,000**	**3,876,000**	**4,418,000**
-A8	Drainage Tank			
	Civil and Architecture Works	166,000	493,000	659,000
	Mechanical and Electrical Works	0	251,000	251,000
	Sub Total of -A8	**166,000**	**744,000**	**910,000**
-A9	Administration Facilities			
	Civil and Architecture Works	311,000	726,000	1,037,000
	Mechanical and Electrical Works	0	2,633,000	2,633,000
	Sub Total of -A9	**311,000**	**3,359,000**	**3,670,000**
-A10	Electrical & Generator Facilities			
	Civil and Architecture Works	207,000	484,000	691,000
	Mechanical and Electrical Works	0	1,775,000	1,775,000
	Sub Total of -A10	**207,000**	**2,259,000**	**2,466,000**
-A11	Piping Works			
	Civil and Architecture Works	213,000	2,393,000	2,606,000
	Mechanical and Electrical Works	0	0	0
	Sub Total of -A11	**213,000**	**2,393,000**	**2,606,000**
-A12	Other Works			
	Civil and Architecture Works	1,138,000	285,000	1,423,000
	Mechanical and Electrical Works	0	0	0
	Sub Total of -A12	**1,138,000**	**285,000**	**1,423,000**

Item Description	L.C (USD)	F.C (USD)	Total (USD)
Total of Construction Cost	**6,419,000**	**26,944,000**	**33,363,000**
Civil and Architecture Works	**6,419,000**	**13,317,000**	**19,736,000**
Mechanical and Electrical Works	**0**	**13,627,000**	**13,627,000**

L.3 Estimated Construction Cost of Transmission Pipeline

Item Description	Unit	LC/m	FC/m	Quantity	L.C. (USD)	F.C. (USD)	Total (USD)
-B1 DCIP 1000mm	m	131	1,457	9,100	1,196,377	13,262,249	14,458,626
DCIP 700mm	m	100	858	3,750	375,113	3,218,775	3,593,888
DCIP 500mm	m	81	506	4,450	358,848	2,251,344	2,610,192
DCIP 200mm	m	53	152	250	13,310	37,933	51,243
Total of Construction Cost					**1,944,000**	**18,770,000**	**20,714,000**

L.4 Estimated Construction Cost of Transmission Pump Station

L.4.1 Pump Station at North Low SR

Item Description	L.C. (USD)	F.C. (USD)	Total (USD)
-C1 Building Work			
Civil and Architecture Works	222,000	568,000	790,000
Sub Total of -C1	**222,000**	**568,000**	**790,000**
-C2 Pump Equipment Work			
Mechanical and Electrical Works	0	1,089,000	1,089,000
Sub Total of -C2	**0**	**1,089,000**	**1,089,000**
-C3 Electrical Work			
Mechanical and Electrical Works	0	593,000	593,000
Sub Total of -C3	**0**	**593,000**	**593,000**
-C4 Piping Work			
Civil and Architecture Works	20,000	166,000	186,000
Sub Total of -C4	**20,000**	**166,000**	**186,000**
Total of Construction Cost	**242,000**	**2,416,000**	**2,658,000**
Civil and Architecture Works	**242,000**	**734,000**	**976,000**
Mechanical and Electrical Works	**0**	**1,682,000**	**1,682,000**

L.5 Estimated Construction Cost of Distribution Main Facility

L.5.1 North Low SR Facilities (Low Zone)

Item Description	L.C. (USD)	F.C. (USD)	Total (USD)
-D1 Excavation Work			
Civil and Architecture Works	25,000	99,000	124,000
Sub Total of -D1	**25,000**	**99,000**	**124,000**
-D2 Structure Work			
Civil and Architecture Works	669,000	1,903,000	2,572,000
Sub Total of -D2	**669,000**	**1,903,000**	**2,572,000**
-D3 Painting Work			
Civil and Architecture Works	9,000	175,000	184,000
Sub Total of -D3	**9,000**	**175,000**	**184,000**
-D4 Piping Work			
Civil and Architecture Works	60,000	672,000	732,000
Mechanical and Electrical Works	0	99,000	99,000
Sub Total of -D4	**60,000**	**771,000**	**831,000**
Total of Construction Cost	**763,000**	**2,948,000**	**3,711,000**
Civil and Architecture Works	**763,000**	**2,849,000**	**3,612,000**
Mechanical and Electrical Works	**0**	**99,000**	**99,000**

L.5.2 North High SR Facilities (High Zone)

Item Description	L.C. (USD)	F.C. (USD)	Total (USD)
-D1 Excavation Work			
Civil and Architecture Works	23,000	99,000	122,000
Sub Total of -D1	**23,000**	**99,000**	**122,000**
-D2 Structure Work			
Civil and Architecture Works	624,000	1,777,000	2,401,000
Sub Total of -D2	**624,000**	**1,777,000**	**2,401,000**
-D3 Painting Work			
Civil and Architecture Works	8,000	164,000	172,000
Sub Total of -D3	**8,000**	**164,000**	**172,000**
-D4 Piping Work			
Civil and Architecture Works	27,000	246,000	273,000
Mechanical and Electrical Works	0	70,000	70,000
Sub Total of -D4	**27,000**	**316,000**	**343,000**
Total of Construction Cost	**682,000**	**2,356,000**	**3,038,000**
Civil and Architecture Works	**682,000**	**2,286,000**	**2,968,000**
Mechanical and Electrical Works	**0**	**70,000**	**70,000**

L.6 Estimated Construction Cost of Distribution Main & Sub-main

L.6.1 High Zone

Item Description	Unit	LC/m	FC/m	Quantity	L.C. (USD)	F.C. (USD)	Total (USD)
-E DCIP 900mm	m	120	1,202	382	45,966	459,217	505,184
DCIP 800mm	m	110	1,071	2,085	229,788	2,233,473	2,463,261
DCIP 700mm	m	100	858	341	34,110	292,694	326,804
DCIP 500mm	m	81	506	4,145	334,253	2,097,038	2,431,291
DCIP 400mm	m	71	366	9,311	662,850	3,407,547	4,070,397
DCIP 300mm	m	62	249	1,419	88,148	352,792	440,940
DCIP 200mm	m	53	152	36,008	1,917,066	5,463,494	7,380,560
Total of Construction Cost					**3,312,000**	**14,306,000**	**17,618,000**

L.6.2 Low Zone

Item Description	Unit	LC/m	FC/m	Quantity	L.C. (USD)	F.C. (USD)	Total (USD)
-E DCIP 1000mm	m	131	1,457	611	80,328	890,465	970,793
DCIP 800mm	m	110	1,071	2,296	253,042	2,459,498	2,712,540
DCIP 700mm	m	100	858	3,525	352,606	3,025,649	3,378,254
DCIP 600mm	m	90	676	1,962	177,129	1,325,802	1,502,931
DCIP 500mm	m	81	506	621	50,077	314,176	364,254
DCIP 400mm	m	71	366	10,247	729,484	3,750,095	4,479,579
DCIP 300mm	m	62	249	8,151	506,340	2,026,502	2,532,842
DCIP 200mm	m	53	152	22,223	1,183,153	3,371,896	4,555,048
Total of Construction Cost					**3,332,000**	**17,164,000**	**20,496,000**

L.7 Estimated Construction Cost of Distribution Network

L.7.1 High Zone

Item Description	Unit	LC/m	FC/m	Quantity	L.C. (USD)	F.C. (USD)	Total (USD)
-F PVC 150mm	m	10	53	15,400	151,998	815,584	967,582
PVC 100mm	m	8	36	87,200	729,864	3,123,504	3,853,368
Total of Construction Cost					**882,000**	**3,939,000**	**4,821,000**

L.7.2 Low Zone

Item Description	Unit	LC/m	FC/m	Quantity	L.C. (USD)	F.C. (USD)	Total (USD)
-F PVC 150mm	m	10	53	30,500	301,035	1,615,280	1,916,315
PVC 100mm	m	8	36	173,300	1,450,521	6,207,606	7,658,127
Total of Construction Cost					**1,752,000**	**7,823,000**	**9,575,000**

L.7.3 Kiosuku

Item Description	Unit	LC/m	FC/m	Quantity	L.C. (USD)	F.C. (USD)	Total (USD)
-F Kiosuku	m	10,000	0	300	3,000,000	0	3,000,000
Total of Construction Cost					**3,000,000**	**0**	**3,000,000**

APPENDIX – M

PROJECT EVALUATION
FOR PRIORITY PROJECT

APPENDIX - M PROJECT EVALUATION FOR PRIORITY PROJECT

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M.1 Calculation Sheet of Operation and Maintenance Cost Estimation

Operation and Maintenance Cost (Feasibility Study)

(Cost in USD, Price Level of March 2009)

	[A] Total Treatment Cpacity (m3/day)	[B] NRW Ratio	[C] Annual Revenue Water (m3/year)	O&M Cost (USD/year)							[K] O&M cost per revenue water (USD/m3)
				[D] Personnel	[E] Electricity	[F] Chemical	[G] Spareparts	[H] Staff Training	[I] Others	[J] Total	
2009	7,000	60%	851,667	0 (0%)	165,669 (30%)	86,005 (16%)	158,474 (29%)	0 (0%)	135,149 (25%)	545,297 (SDG1,205,106)	0.64 (SDG1.41)
2012	14,000	52%	2,044,000	630,407 (40%)	462,998 (29%)	172,010 (11%)	106,540 (7%)	63,041 (4%)	143,500 (9%)	1,578,495 (SDG3,488,473)	0.77 (SDG1.70)
2015	77,000	44%	13,115,667	1,898,986 (28%)	2,696,612 (40%)	946,053 (14%)	421,472 (6%)	189,899 (3%)	615,302 (9%)	6,768,325 (SDG14,957,998)	0.52 (SDG1.15)
2020	77,000	36%	14,989,333	1,876,043 (28%)	2,696,612 (40%)	946,053 (14%)	421,472 (6%)	187,604 (3%)	612,779 (9%)	6,740,564 (SDG14,896,647)	0.45 (SDG0.99)
2025	77,000	28%	16,863,000	1,985,110 (29%)	2,696,612 (39%)	946,053 (14%)	421,472 (6%)	198,511 (3%)	624,776 (9%)	6,872,535 (SDG15,188,303)	0.41 (SDG0.91)

[B] NRW (Non-Revenue Water) Ratio: Assumed 60% in 2009, 100% - (Physical loss 20% x Revenue collection ratio) for 2012-2025
Revenue collection ratio: 60% (2012), 70% (2015), 80% (2020), 90% (2025)

[C] Annual Revenue Water: [A: Total treatment capacity] / 1.2 (max. daily factor) x (100% - [B: NRW ratio]) x 365

[D] Personnel cost Cost of [D], [E], [F] and [G] for 2009-2015 are assumed from estimation in M/P

[E] Electricity cost With reference to "[D] O&M Cost: Personnel", "[E] O&M Cost: Electricity"

[F] Chemical cost "[F] O&M Cost: Chemical", "[G] O&M Cost: Spare parts"

[G] Spareparts cost Cost for 2020-2025 are estimated by prorationing of total capacity of F/S facility and M/P facility.

[H] Staff training 10% of [D: personnel cost] is assumed

[I] Others 10% of total of ([D]+[E]+[F]+[G]+[H])

[K] O&M cost per revenue water [J: Total O&M cost] / [C: annual revenue water]

M.2 Calculation Sheet of Annual Fund Requirement

Annual Fund Requirement (Priority Project)

(thousand USD)

		Total (2011 - 2015)			2011			2012			2013		
		Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total
I	Procurement/ Construction	101,457	23,076	124,533	12,234	2,541	14,775	12,234	2,541	14,775	25,663	5,998	31,661
					Ph-1: +7000m3/day (Total: 14,000 m3/day)						Ph-2		
(1)	Phase-1A: Rehabilitation + Expansion of existing WTP	11,242	1,772	13,014	5,621	886	6,507	5,621	886	6,507	0	0	0
(2)	Phase-1B: Distribution pipelines	7,898	1,976	9,874	3,949	988	4,937	3,949	988	4,937	0	0	0
(3)	Phase-1C: Distribution pipelines	5,328	1,334	6,662	2,664	667	3,331	2,664	667	3,331	0	0	0
(4)	Phase-2: Construction of New WTP (1/3)	76,989	17,994	94,983	0	0	0	0	0	0	25,663	5,998	31,661
II	Administration Cost (2% of I)	2,029	462	2,491	245	51	296	245	51	296	513	120	633
III	Consulting Service (10% of I)	10,144	2,308	12,452	1,223	254	1,477	1,223	254	1,477	2,566	600	3,166
IV	Base cost (I +II +III)	113,630	25,846	139,476	13,702	2,846	16,548	13,702	2,846	16,548	28,742	6,718	35,460
V	Physical contingency (10% of IV)	11,362	2,586	13,948	1,370	285	1,655	1,370	285	1,655	2,874	672	3,546
VI	Project cost (IV+V)	124,992	28,432	153,424	15,072	3,131	18,203	15,072	3,131	18,203	31,616	7,390	39,006
VII	Price escalation (FC: 4.1%, LC:7.0% of IV) (Price Index, Price level of 2009 is [100].)	22,145 -	9,208 -	31,353 -	1,147 [108]	412 [114]	1,559	1,755 [113]	640 [123]	2,395	5,012 [117]	2,088 [131]	7,100
VIII	Total Finance Required (VI+VII)	147,137	37,640	184,777	16,219	3,543	19,762	16,827	3,771	20,598	36,628	9,478	46,106
								Phase-1 total finance		40,360			

	2014			2015		
	Foreign Currency	Local Currency	Total	Foreign Currency	Local Currency	Total
I	25,663	5,998	31,661	25,663	5,998	31,661
	Ph-2: +63000m3/day (Total: 77,000 m3/day)					
(1)	0	0	0	0	0	0
(2)	0	0	0	0	0	0
(3)	0	0	0	0	0	0
(4)	25,663	5,998	31,661	25,663	5,998	31,661
II	513	120	633	513	120	633
III	2,566	600	3,166	2,566	600	3,166
IV	28,742	6,718	35,460	28,742	6,718	35,460
V	2,874	672	3,546	2,874	672	3,546
VI	31,616	7,390	39,006	31,616	7,390	39,006
VII	6,395 [122]	2,704 [140]	9,099	7,836 [127]	3,364 [150]	11,200
VIII	38,011	10,094	48,105	39,452	10,754	50,206
				Phase-2 total finance		144,417

Base year for cost estimation: March 2009
Exchange rate: US$1 = SDG 2.21
Physical contingency: 10% of base cost
Price escalation (Foreign currency): 4.1%/annum
Price escalation (Local currency): 7.0%/annum

M.3 Economic Cost – Benefit Analysis

Economic Cost - Benefit Analysis

(in thousand USD)

Year	Economic Benefit	Cost		Free Cash Flow
		Investment (Base cost)	O&M	
2011	1,438	16,548	545	-15,655
2012	11,430	16,548	1,578	-6,696
2013	14,395	35,460	1,578	-22,643
2014	16,605	35,460	1,578	-20,433
2015	28,917	35,460	6,768	-13,311
2016	30,764	0	6,763	24,001
2017	32,648	0	6,757	25,891
2018	34,557	0	6,752	27,805
2019	36,478	0	6,746	29,732
2020	38,899	0	6,741	32,158
2021	40,580	0	6,767	33,813
2022	42,794	0	6,793	36,001
2023	44,383	0	6,820	37,563
2024	46,594	0	6,846	39,748
2025	48,797	0	6,873	41,924
2026	48,797	0	6,873	41,924
2027	48,797	0	6,873	41,924
2028	48,797	0	6,873	41,924
2029	48,797	0	6,873	41,924
2030	48,797	0	6,873	41,924
2031	48,797	0	6,873	41,924
2032	48,797	0	6,873	41,924
2033	48,797	0	6,873	41,924
2034	48,797	0	6,873	41,924
2035	48,797	0	6,873	41,924
2036	48,797	0	6,873	41,924
2037	48,797	0	6,873	41,924
2038	48,797	0	6,873	41,924
2039	48,797	0	6,873	41,924
2040	48,797	0	6,873	41,924
2041	48,797	0	6,873	41,924
2042	48,797	0	6,873	41,924
2043	48,797	0	6,873	41,924
2044	48,797	0	6,873	41,924
2045	48,797	0	6,873	41,924
2046	48,797	0	6,873	41,924
2047	48,797	0	6,873	41,924
2048	48,797	0	6,873	41,924
2049	48,797	0	6,873	41,924
2050	48,797	0	6,873	41,924
Total	1,689,204	139,476	251,730	1,297,998

EIRR	24.71%

Economic Benefit (1/2)

Year	WtoP for the existing situation (SDG/mo.)	House connection customer			Public tap customer			Water tanker customer		
		WtoP for improved service (SDG/mo.)	No. of households	Economic benefit (x1000 SDG/year)	WtoP for improved service (SDG/mo.)	No. of households	Economic benefit (x1000 SDG/year)	Monthly water charge per household (SDG/mo.)	No. of households	Economic benefit (x1000 SDG/year)
2009	80	80	2,153	0.0	80	2,603	0.0	80	0	0.0
2010	80	80	2,799	0.0	80	2,949	0.0	80	0	0.0
2011	80	80	3,639	0.0	80	3,321	0.0	80	0	0.0
2012	80	134	16,372	10,609.1	110	4,269	1,536.8	110	0	0.0
2013	80	134	18,782	12,170.7	110	4,564	1,643.0	110	3,808	1,370.9
2014	80	134	21,449	13,899.0	110	4,885	1,758.6	110	4,077	1,467.7
2015	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2016	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2017	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2018	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2019	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2020	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2021	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2022	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2023	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2024	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2025	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2026	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2027	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2028	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2029	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2030	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2031	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2032	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2033	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2034	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2035	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2036	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2037	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2038	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2039	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4
2040	80	134	24,410	15,817.7	110	19,179	6,904.4	110	26,154	9,415.4

WtoP (Willingness to Pay): Results of the socio-economic survey in the Study
No. of households: [population served] / 7.8 persons per household

Economic Benefit (2/2)

Year	Non-domestic customer							Year	Total Economic Benefit (x1000 SDG/year)
	WtoP for the existing situation (SDG/m3)	Non-domestic water consumption without project (m3/day)	Benefit Without project	WtoP for improved service (SDG/m3)	Non-domestic water consumption (m3/day)	Benefit With project	Economic benefit (x1000 SDG/year)		
2009	13.1	1,451.6	6,940.7	13.1	1,451.6	6,940.7	0.0	2009	0.0
2010	13.1	1,451.6	6,940.7	13.1	1,757.1	8,401.5	1,460.8	2010	1,460.8
2011	13.1	1,451.6	6,940.7	13.1	2,116.3	10,119.0	3,178.3	2011	3,178.3
2012	13.1	1,451.6	6,940.7	22.0	2,497.6	20,055.4	13,114.7	2012	25,260.6
2013	13.1	1,451.6	6,940.7	14.3	4,515.4	23,568.2	16,627.5	2013	31,812.1
2014	13.1	1,451.6	6,940.7	14.3	5,079.7	26,513.4	19,572.7	2014	36,698.0
2015	13.1	1,451.6	6,940.7	6.4	16,570.9	38,709.7	31,769.0	2015	63,906.5
2016	13.1	1,451.6	6,940.7	6.2	18,909.0	42,791.0	35,850.3	2016	67,987.8
2017	13.1	1,451.6	6,940.7	6.0	21,441.2	46,956.1	40,015.4	2017	72,152.9
2018	13.1	1,451.6	6,940.7	5.8	24,173.3	51,174.9	44,234.2	2018	76,371.7
2019	13.1	1,451.6	6,940.7	5.6	27,113.1	55,419.2	48,478.5	2019	80,616.0
2020	13.1	1,451.6	6,940.7	5.5	30,271.3	60,769.6	53,828.9	2020	85,966.4
2021	13.1	1,451.6	6,940.7	5.3	33,333.9	64,484.5	57,543.8	2021	89,681.3
2022	13.1	1,451.6	6,940.7	5.2	36,553.6	69,378.8	62,438.1	2022	94,575.6
2023	13.1	1,451.6	6,940.7	5.0	39,940.1	72,890.6	65,949.9	2023	98,087.4
2024	13.1	1,451.6	6,940.7	4.9	43,486.1	77,774.9	70,834.2	2024	102,971.7
2025	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2025	107,840.9
2026	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2026	107,840.9
2027	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2027	107,840.9
2028	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2028	107,840.9
2029	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2029	107,840.9
2030	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2030	107,840.9
2031	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2031	107,840.9
2032	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2032	107,840.9
2033	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2033	107,840.9
2034	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2034	107,840.9
2035	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2035	107,840.9
2036	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2036	107,840.9
2037	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2037	107,840.9
2038	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2038	107,840.9
2039	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2039	107,840.9
2040	13.1	1,451.6	6,940.7	4.8	47,171.3	82,644.1	75,703.4	2040	107,840.9

WtoP for non-domestic customers: Assumed by unit water consumption of domestic customer (house connection)

APPENDIX – N

PRE-ENVIRONMENTAL IMPACT ASSESSMENT

APPENDIX - N PRE-ENVIRONMENTAL IMPACT ASSESSMENT

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N.1 Description on Compensation in New Land Act, 2009

Article	Description
5. Objectives	- Recognizing customary law and practices related to land owned by communities as part of the normative system of land regulation as long as they are consistent with the provisions of the Interim Constitution of Southern Sudan 2005, this Act and laws; - Facilitating the reintegration and resettlement of Internally Displaced Persons, Retunees and other categories of persons whose rights to land were or are affected by the civil war: - Guaranteeing a fair and prompt compensation to any person whose right of occupancy, ownership or recognized long standing occupancy of customary use of land is revoked or otherwise interfered with by the government under this Act or any other law.
30. Rights of the usufructuary	(3) Any natural fruit attached to the land at the end of the usufruct shall be to the benefit of the owner without mutual compensation for ploughing, harrowing and harvesting of the seeds.
64. Compensation for the community	Notwithstanding the provision of section 72 of the Act, any community or persons affected by such activities in the area of investment shall be compensated in accordance with the provision of section 75 of this Act and Article 180(7) of the Constitution.
80. Compensation	(1) The compensation shall be just, equitable, and shall take into account the following factors: a) the purpose for which the land is being utilized; b) the land market value; and c) the value of the investment in it by those affected and their interest. (2) The compensation shall be in cash or in kind or both according to the agreement. (3) Where any land expropriated for public purpose is necessary to remove any person there from in customary occupation, compensation shall be paid as may be agreed upon. (4) Where any land expropriated for public purpose is the subject of a lease under this Act, compensation shall be paid to the lessee as may be agreed upon. (5) No transfer of ownership or rights over land shall be made until the type, amount, method and timing of the payment of compensation has been agreed upon with those affected. (6) Subject to the provisions of sub-section (1) herein, if no agreement is reached in the compensation modalities, the case may be determined by the Southern Sudan Land Commission ascribed until such compensation is fully paid. (7) Where payment of compensation is not made within sixty days of transfer of the property, the affected persons shall, in addition, receive interest on the sum due at commercial rates, recoverable until such compensation is fully paid.

Source: The Land Act 2009 (16th February 2009) / Ministry of Legal Affairs & Constitutional Development

N.2 Noise Assessment

(1) Present Sound Level

The main sources of noise are generator and pump in water supply facilities. The present level of noise of these equipments was measured in the existing water treatment plant and the result is shown in the following table.

Table N.2.1 Power and Noise Level of Noise Source in Existing WTP

Sound Source	Specification	Result of Measurement	Condition
Generator	300 KV	103.5 dB(A)	10 minutes/ 1m from source
	1250 KV	100.9 dB(A)	Exhaust 1 minute / 1 m from source
		91.3 dB(A)	Intake 1 minute / 1 m from source
Pump	28.1 KW	91.0 dB(A)	1 m from source

Present ambient sound levels in the study area are measured as shown in following table and figure.

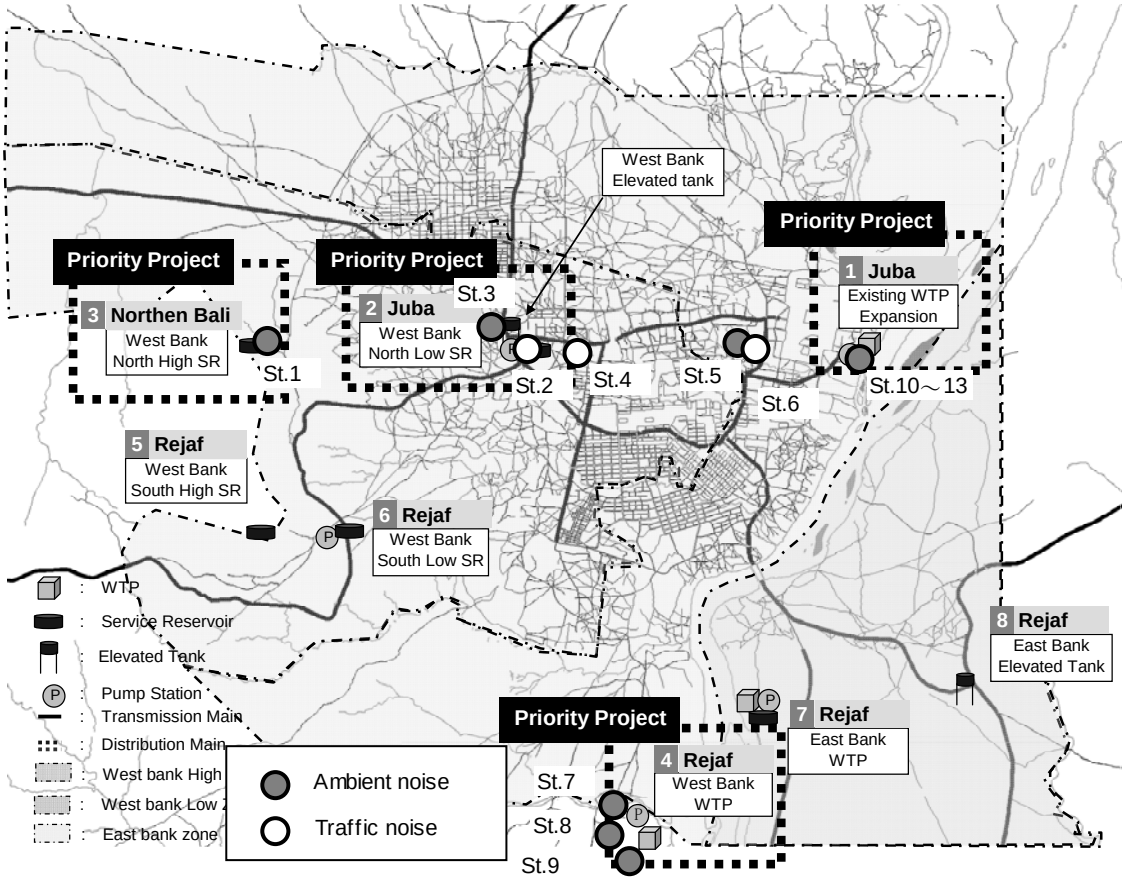

Figure N.2.1 Location Map of Sound Level Measurement

Table N.2.2 Results of Sound Level Survey

No.	Relevant Facility	Location / Payam	Coordinates (elevation)	Category of Noise	Sound Level dB(A), LAeq, 10min	Date	Other Information
St.1	West Bank High SR	Jebel Körök / Norther Bali	N 04-50-48.9 E 31-33-15.9 (531ms)	Ambient Noise	60.9	2009/06/23 14:40	Neighboring quarry site is under operation
St.2	West Bank Low SR	Memorial Ground	N 04-51-01.7 E 31-34-55.1 (508ms)	Ambient Noise	59.9	2009/06/23 15:33	Traffic volume Vehicle 63, Motor Bike 59
St.3		Nearest Residential Area	N 04-51-02.7 E 31-34-44.9 (503ms)	Ambient Noise	52.1	2009/06/23 15:46	-
St.4	Water Tanker Route	Hainyahama / Along the Pariament Road	N 04-51-01.0 E 31-35-06.3 (507ms)	Traffic Noise	71.3	2009/06/23 16:08	Traffic volume Vehicle 196, Motor Bike 127
St.5	Water Tanker Route	Juba Hospital Compound	N 04-51-03.5 E 31-36-32.3 (472ms)	Ambient Noise	57.7	2009/06/23 16:45	Surveyed point is 50 ms from road
St.6		Along the Hospital Road	N 04-51-03.8 E 31-36-34.3 (476ms)	Traffic Noise	71.9	2009/06/23 16:30	Traffic volume Vehicle 197, Motor Bike 56
St.7	New WTP	Nearest Residential Area	-	Ambient Noise	43.0	2009/06/22 10:27	-
St.8		Tokiman Primary School	N 04-47-34.1 E 31-35-31.2 (457ms)	Ambient Noise	62.3	2009/06/22 11:07	Students were playing foot ball on the ground
St.9		Testing well No.3	N 04-46-25.6 E 31-35-45.3 (457ms)	Ambient Noise	37.4	2009/06/22 10:42	No residential area
St.10	Expansion WTP	Southern area office	-	Operation Noise	58.4	2009/06/19 09:20	Office space
St.11		Reserver	-	Operation Noise	77.1	2009/06/19 09:35	In front of generator
St.12		On the top of Sedimentation Tank	-	Operation Noise	78.4	2009/06/19 09:50	-
St.13		Boundary nearest generator (south)	-	Operation Noise	64.3	2009/06/29 09:10	-

Note) Sound level was measured by sound level meter (Lion NL27, made in Japan)

(2) Results of Noise Level Estimation

As indicated in the following table, the proposed facilities that noise level should be estimated are expansion water treatment plant, West Water Treatment Plant, and North Low Service Reservoir, which have pump and / or generator.

Table N.2.3 Proposed Facilities for Sound Level Estimation

Facility/Location	Target for Noise Forecast	Major Facility				Reason
		WTP	SR	PUMP	Generator	
1. Existing WTP Expansion / UWC compound (Juba Payam)	●	●		●		Some pumps will be expanded
2. North Low SR / Memorial Ground near parliament (Juba Payam)	●		●	●	●	Pumps and generator will be installed
3. North High SR / Jebel Körök North (Northern Bali)	–		●			Forecast is not required since there is no noise source
4. West WTP / Khor Roml River Crossing Point (Rejaf Payam)	●	●		●	●	Pumps and generator will be installed

Table N.2.4 Estimation of Noise Impact by Facility

Facility Name	Facility of Sound Source	Sound Source	Power Level dB(A)	Distance from Sound Source to Analyzed Point A (m)	Decay Sound Level by Building Wall dB(A)	Analyzed Sound Level dB(A)*	a) Combination Sound Level at Analyzed Point A dB(A)	b) Present Ambiental Sound Level dB(A)	Combination Sound Level between a) and b) at Analyzed Point A dB(A)	Conservation Target Value Residential & Industrial Area **65dB(A)** day time
Existing WTP expansion	Generator	Generator B / 300KVA	103.5	50.0	0	61.5	63.8	64.3	**67.1**	Predicted value does not meet a requirement of target value. Mitigation measures against existing generator should be carried out.
	Raw water pump house	Pump A / 18.5KW	91.0	30.0	25	28.5				
		Pump B / 18.5KW	91.0	29.0	25	28.8				
	Transmission and distribution pump house	Pump A / 90 KW	91.0	70.0	25	21.1				
		Pump B / 90 KW	91.0	67.0	25	21.5				
		Pump C / 90 KW	91.0	64.0	25	21.9				
North Low SR	Generator	300KVA	103.5	20.0	25	44.5	44.7	59.9	**60.0**	Predicted value meet a requirement of target value
	Transmission pump house	Pump A / 90 KW	91.0	27.0	25	29.4				
		Pump B / 90 KW	91.0	27.0	25	29.4				
West WTP	Generator	1,500 KVA	100.9	110	25	27.1	38.0	37.40	**40.7**	Predicted value meet a requirement of target value
	Raw water pump house	Pump A / 18.5KW	91.0	260	25	9.7				
	Transmission pump house	Pump A / 90 KW	91.0	70	25	21.1				
		Pump B / 90 KW	91.0	75	25	20.5				
		Pump C / 90 KW	91.0	80	25	19.9				

Note) Forecast of sound level is given by the following formulation:

Lr=Lw-8-20log(r), Lr: Forecasted value, Lw: Power level of sound source, r: distance

i) Existing WTP Expansion

Analyzed sound level is 67.1 dB (A) at the boundary in the following figure, which exceeds the target value. The existing WTP has two generators and one of them is operated under normal conditions. In the priority project, additional pumps and a sedimentation tank will be installed to expand the capacity. Although pumps installed in the priority project are selected as sound source, pumps will be installed inside a soundproof building so that the sound from the pumps will be diminished. Therefore, the major sound source is existing two generators without any mitigation measures. The priority project uses existing generators and does not include installation of generator. Construction of other facilities for expansion of existing WTP does not affect present sound level. Therefore, a mitigation measure is required for existing generators, which should be carried by GOSS.

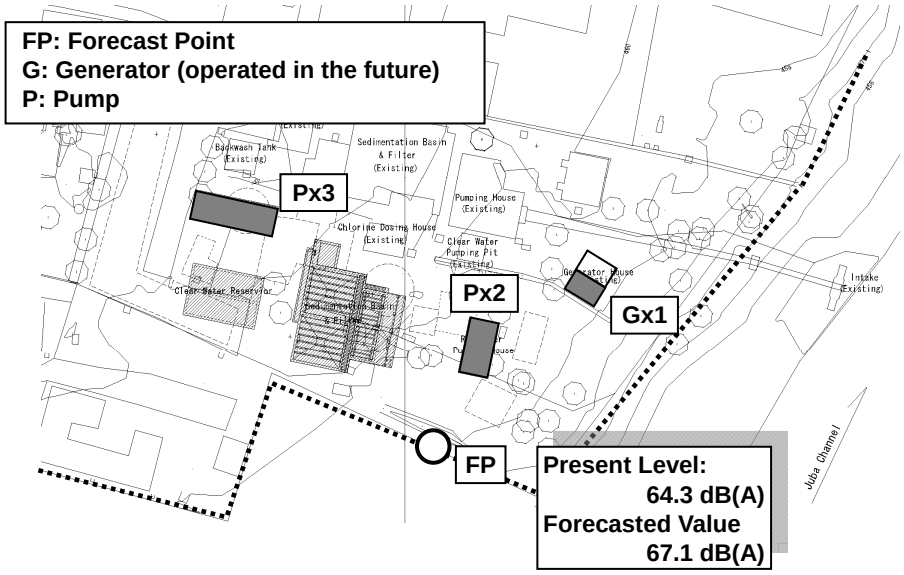

Figure N.2.2 Estimated Sound Level on South Boundary in Existing WTP

ii) West Bank North Low SR

The analyzed sound level is 60.0 dB (A), which does not exceed the target value at the boundary in the following figure. The nearest residential area is more than 200 m away from the sound sources such as generators and pumps of the priority project. These equipments will be installed in a soundproof building. Therefore, these equipments do not give any significant impacts to the surrounding area.

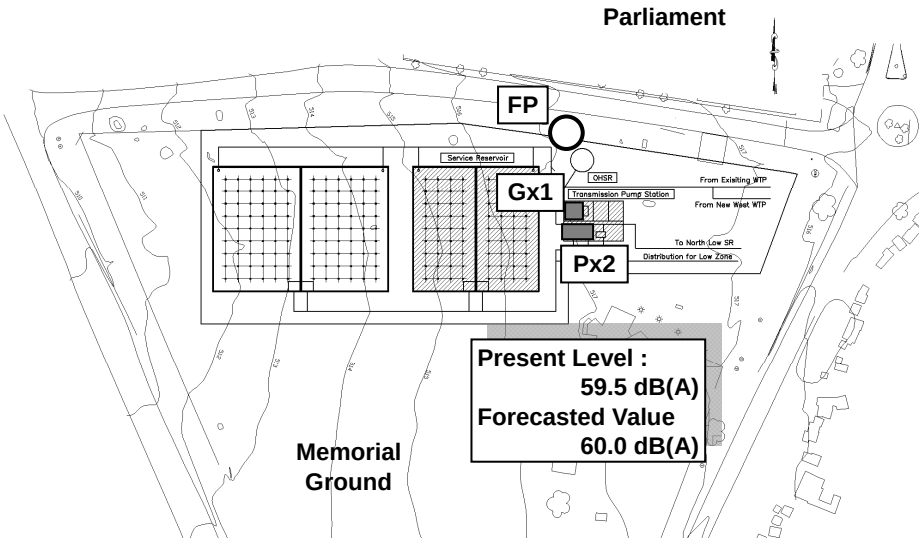

Figure N.2.3 Estimated Sound Level on North Boundary in North Low SR

iii) West Bank WTP

The analyzed sound level is 40.7 dB (A), which does not exceed the target value at the boundary in the following figure. The nearest residential area is more than 400 m away from the sound sources such as generators and pumps of the priority project. These equipments will be installed in a soundproof building. Therefore, these equipments do not give any significant impacts to the surrounding area.

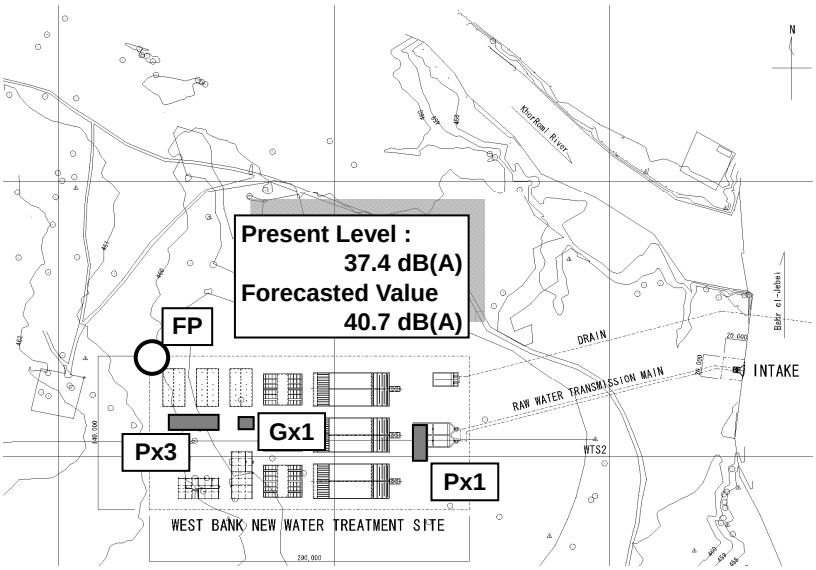

Figure N.2.4 Estimated Sound Level on the North Boundary in West WTP

(3) Impact from the Increase of Water Tankers

The operation of water tank truck is estimated at 2,675 round trips per day in 2015. The current operation is about 600 round trips per day, and the operation in 2015 will increase about 2,075 round trips (4,150 single trips) per day, which will increase traffic noise level of the roads. The noise level of the increase of trips is estimated as given in table below.

Table N.2.5 Result of Noise Forecast by Water Tankers

	Present Traffic Volume (2008)				Additional Water Tanker		Forecasted Sound Level			
Road Name	Total Traffic Number 24hrs	Large (app.5%)	small and other type (app. 95%)	Rate 24h/day 12h	Present Numbers	Additional Numbers	a) Predicted Present Sound Level	b) Predicted Future Sound Level	c) Measured Present Sound Level	d) Forecasted Sound Level c) + (b-a)
May Street (Parliament Road)	16,256	813	15,443	1.33	1200 (600trips)	4,150 (2,075trips)	67.9	68.4	**71.3**	**71.8**