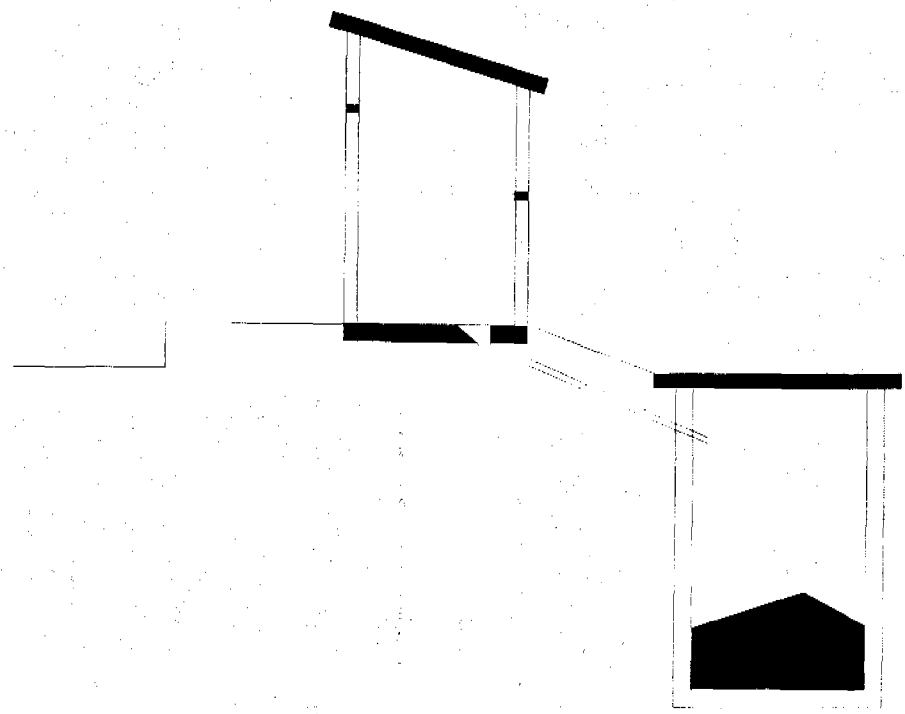
Final draft
For field-testing

GUIDELINES

FOR THE IMPROVEMENT OF SCHOOL SANITATION



Part 1:

From needs assessment to proposal for improvements of school sanitation and water supply (for non-drinking purposes)

June 2001

IRC International Water and Sanitation Centre

ITN Bangladesh
International Training Network
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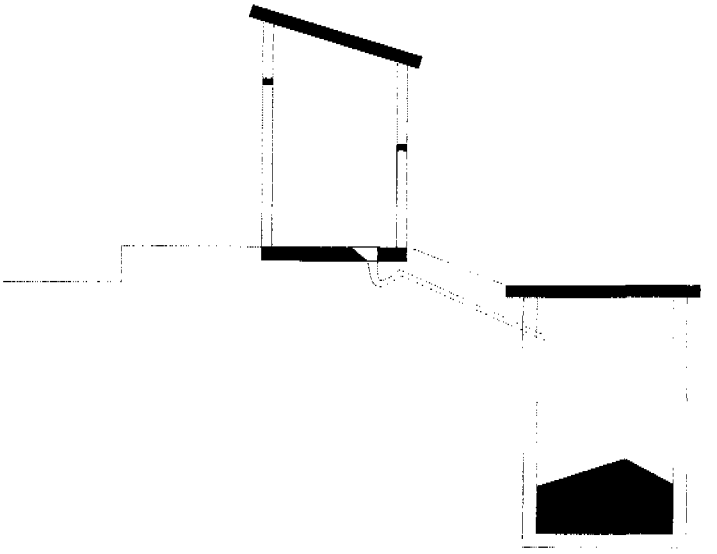

Part 1:

From needs assessment to proposal for improvements of school sanitation and water supply (for non-drinking purposes)

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Appendix Fact Sheets for:

1. INTRODUCTION

This *Guide* has been written for the improvement of sanitation conditions at schools.
The *Guide* together with the Fact sheets in which the different types of latrines are described will help the School Management Committee (SMC) to go through the process of improving the existing sanitation facilities in the school premises. This will result in the determination of what improvements in school sanitation are needed and which technical options will be most suitable considering the local environmental and social conditions and the capacity of the school to operate and maintain them. Since arsenic has emerged as such a pressuring issue in Bangladesh, the improvement of the water supply facilities will be limited to these facilities that will be used for handwashing, cleansing, flushing and cleaning purposes. The improvement of water supply facilities for drinking purposes is not included in this *Guide*.

Different actors can be distinguished in this process such as the Government of Bangladesh (GoB), the parents, the teachers, the students and their representative body the School Management Committee, NGOs, the private sector, the DPHE and other international or national organisations. Each of these actors has their own role and responsibility, depending on the region and context in which this *Guide* is used. Therefore the roles and responsibilities of the actors other than these of the parents, teachers, students and school committees will be described in the first chapter of this guide.

The first initiative will have to come from the school. They will have to organize meetings to investigate the need for the improvement of their sanitation and water supply facilities for non-drinking purposes and to plan the implementation of these improvements. The end result of the process will be a proposal for the implementation of the improvements in which is indicated which resources are needed. In the first chapter the procedures that can be followed to obtain assistance in the implementation process will be described. In this chapter it will also be indicated which organisations are in position to assist the school and what kind of assistance can be expected. As the school has to contribute to the total costs of construction as well as the operation and maintenance, the type and number of latrines must be within the financial capacity of the school.

The provision of safe sanitation and water for non-drinking purposes is a first step towards creating a healthy, physical learning environment. Experiences show however that mere construction of facilities will not have the envisaged impact and neither be sustainable. To derive the full health benefits from the facilities, the users will need to practise appropriate hygiene behaviour and make sure that that the facilities are kept in a healthy state. Therefore it is essential that the School Management Committee, together with the teachers and the parents ensure that lessons in hygiene education are taught on a regular basis and that the operation and maintenance of the facilities is well organised.

Although hygiene education is of vital importance, this *Guide* will not deal with this issue. The *Guide* will only provide guidelines on how a proposal for the sanitation facilities and the water supply facilities for non-drinking purposes can be made.

The steps of this process described in this *Guide* are:

1.1 CONDITIONS AND SUPPORT

1.2 CONVENE A SPECIAL MEETING

1.3 MEETING 2: ANALYSIS OF PROBLEMS

1.4 MEETING 3: ANALYSIS OF NEED FOR IMPROVEMENT SCHOOL SANITATION

1.5 MEETING 4: FORMULATION OF GOALS AND RESULTS AND OUTPUTS AND SELECTING THE SSIC

1.6 ANALYSIS OF SITUATION AND CONDITIONS

1.7 WHAT IS THE BEST SCHOOL LATRINE WE CAN AFFORD?

1.8 WHAT IS THE BEST WATER SUPPLY FOR NON-DRINKING PURPOSES WE CAN AFFORD

1.9 MEETING WITH ALL STAKEHOLDERS TO DISCUSSE PROPOSAL OF THE SSIC

1.10 MAKING PROPOSAL/PLAN FOR IMPLEMENTATION OF IMPROVEMENTS AND INDICATION OF RESOURCES REQUIRED

For every chapter it will be indicated for whom the chapter is meant. The first chapters include guidelines for the School Management Committee on how meetings can be facilitated. The other chapters include guidelines that can be used by a smaller group, the School Sanitation Implementation Committee. They include guidelines on which data have to be collected, on how to select the appropriate kind of facilities, and on how the proposal can be written.

In the Guide part 2, the constructions of the school sanitation improvements are shown, and in Guide part 3, the operation and maintenance is explained. Guide Part 2 helps the School Management Committee to go through the second part of the School Sanitation Improvement Process, the implementation. The second phase starts with the receiving of assistance and ends with the commissioning of physical structures of school latrines and urinals constructed by local mason(s) and other local labour using locally available materials. Guide Part 3 will help the School Management Committee with the operation and maintenance of the improved school sanitation facilities.

1.1 CONDITIONS AND SUPPORT FOR SMC

Comment

The aim of this chapter is to give an indication of the kind of support schools can expect to receive, which procedures they will have to follow in order to receive this support and which are the conditions they have to fulfill to be seen as a reliable partner. The present text is a preliminary as the conditions have to be specified by the organisations which will be using the Guide. Proposal for paragraphs and content in the chapter:

Support available

Discussed could be:
The kind of support that can be expected from the various organisations that will assist the school in the implementation of the improvements: e.g. – financial support – support in finalising the proposal – technical support during the construction activities – training on how to use the guide, how to organise meetings and how to use participatory techniques during meetings.

Conditions and procedures

Discussed could be:
The criteria, which the SMC has to fulfil before they receive support. For example: do they need to have collected their own contribution before they get support? Does the site have to be checked by a Government official before the proposal will be accepted? Maybe, before money will be allocated to the school, a government official will check the request with the existing circumstances as well as the reliability and viability of the SMC.

If external funds are made available the following paragraph will need to be included: Minimum and maximum amounts available

Discussed could be:
The amount of money that can be made available for the improvement of sanitation facilities. For instance minimum and maximum amounts that could be related for ex. to the numbers of students and teachers and the region.The amount of money that can be made available (minimum and maximum amounts) for the rehabilitation of sanitation and the water supply facilities for non-drinking purposes. Whether they get the money in installments? When is the last payment, after the inspection of the completed work? The amount/percentage to be contributed by the school for cost sharing (in cash, kind and labour).

Available support for School Management Committees

Discussed could be:
What support can they expect from the government, from NGOs or other organisations? Can they ask for support while collecting the data needed for writing the proposal, can they get support for the writing of the proposal? Can they get support from the NGO in facilitating in meetings?

When a course is organised which deals with issues such as how to use this Guide and how to facilitate meetings a paragraph need to be included with information on:

Where a SMC can get information on the course, by whom it is organized, how they can apply.
Note: Special skills are required for conducting sessions in a participatory manner. For the successful implementation of the improvements: the Headmaster/ Headmistress or any senior teacher from the school could get a short training (one/two days' training) on how to facilitate a meeting in a participatory manner. At the same time s/he may get a brief introduction on how to use this *Guide* and issues highlighted in the *Guide*.

1.2 CONVENE A SPECIAL MEETING FOR SMC

The Secretary of the School Management Committee (SMC), usually the Headmaster / Headmistress will convene a special meeting to discuss issues regarding sanitation of the school. S/he will invite all the teachers of the school, members of SMC, representatives from students (at least one boy and one girl student from each class) and some parents (including mothers of the students) to participate in the meeting.
We expect that teachers, students and parents will be involved in a participatory manner in the sequential process of analysis of problems, needs assessment and formulation of goals.

GOAL

The goal of the meeting is to jointly decide that we have specific problems in relation with existing sanitation and water supply facilities/situation for non- drinking purposes and to discuss the steps we can take to improve the situation.

ISSUE

- Convene special meeting to discuss on issues regarding sanitation and water supply for non-drinking purposes.

Introduction to the special meeting

We, the School Management Committee (SMC) appreciate involvement of students, parents and teachers in the whole process of identifying the problems associated with existing sanitation and water supply facilities for non drinking purposes in the school premises, defining specific needs for further improvement and setting goals for future actions. The idea is to bring all stakeholders together to jointly identify the problems in school sanitation and water supply in relation to handwashing, cleansing, flushing and cleaning of the latrines. During analysis of problems and the formulation of the goals and the results, we will be aware of the existing situation of the school and feel the need for improvement of the facilities. This will create demand for better facilities and as the suggested improvements reflect our own felt needs, we will be all motivated to participate spontaneously. Since arsenic pollution has emerged as such a pressuring issue, the improvement of the water supply facilities will be limited to these facilities that will be used for handwashing, cleansing, flushing and cleaning purposes. The improvement of water supply facilities for drinking purposes is not included in this programme.

The chairperson/ facilitator has to conduct the meeting using a participatory approach; s/he will try to involve all the participants to express their views and opinions. During the meeting we will observe the facilities, analyze our problems and discuss which steps we can take to improve the situation. The agenda of the meeting may be as follows:

Agenda of the Special meeting

- Introduction about the purpose of the meeting and key issues on school sanitation and water supply for non-drinking purposes.
- Brainstorm on problems with the existing sanitation and water supply.
- Overview of the meetings and steps which we can undertake to improve the situation
- Decision to commit ourselves to improve the sanitation and water supply facilities for non-drinking purposes.
- Miscellaneous.

Identification of problems related to existing sanitation facilities within the premises.

In this first meeting, our problems will be discussed in details. Opinions should be invited from all. The views of School Management Committee, teachers and parents will be asked upon their problems related to the existing facilities as well as school surroundings. Representatives of the students may be asked about their specific problems in relation with existing latrines and water supply facilities. Facilitator and female teachers may help the girl students to highlight their specific problems. Specific problems identified may be noted down on the blackboard or flipchart.
Problems that could be identified are the lack of sufficient sanitation facilities, the misuse of facilities, the poor conditions of the facilities, the fact that girls do not come to school because of the lack of sufficient facilities, no water for hand washing, etc.
To ensure that everybody will give his or her opinion and feels free to do so we can make use of cards. We can give all the participants a certain number of cards and asks them to write their comments on these cards. It is important to write only one issue per card, as we will then be able to group the cards according to categories. The facilitator or one of the teachers can help the parents that can not read or write to write the cards.
When all participants had a chance to write down his or her opinion on cards, the facilitator will read out all the cards and clue them on the wall. After we have all understood all the problems that have been identified we can group these problems in categories and in such a way that we identify our main problems that need to be addressed.
If problems related to the existing latrines and water supply facilities for non-drinking purposes within the premises are identified, we may feel the need for improvement of these facilities. Analysis of the problems by ourselves will motivate all of us to feel the needs for improvement and create demand for having better facilities.

Materials needed

For this meeting we may want to use a blackboard and flipchart for writing down the results of the analysis of problems, needs assessment and formulation of goals. We can use small cards on which people in the meeting can write their own views. All the materials, (e.g. blackboard, chalks, flipcharts, pens, papers, cards, flannel board and tape), that we want to use during the meeting should be kept ready before the meeting.

Description of the next steps and chapters which can be found in this Guide:

In the following chapters we can find guidelines for the follow-up activities which we will have to undertake. Before we can make the proposal we will have to have several meetings during which we can identify our problems, and formulate the goals, results and outputs we would like to achieve. When we have formulated the goals, a smaller group of us can have to responsibility to decide which type of latrines is the most suitable for our conditions and make a proposal. Before we sent this proposal, we have to have a final meeting during which we discuss the different options that have been worked out and we jointly decide on the most suitable type of latrine for our circumstances and financial capacity. In the list below we can find the various steps that we can go through. Each chapter will describe one step.

Chapter 1.3 Meeting 2: Analysis of the problems

- The objective of this meeting will be to jointly identify our problems related to existing sanitation facilities within the premises
- This meeting will be organised by the SMC.

Chapter 1.4 Meeting 3: Analysis of need for improvement of school sanitation

- The objective of this meeting will be to jointly identify the school's specific needs for rehabilitation and construction sanitation facilities and water supply facilities for non-drinking purposes.
- This meeting will be organised by the SMC

Chapter 1.5 Meeting 4: Formulation of goals and results and outputs and selecting the SSIC

- The objective of this meeting will be to jointly formulate the specific goals and expected results and outputs for rehabilitation and construction sanitation facilities and water supply facilities for non-drinking purposes.
- Another objective is to select the School Sanitation Implementation Committee.
- This meeting will be organised by the SMC

Chapter 1.6 Analysis of situation and conditions

- The objective of this activity will be to collect detailed and specific information on the condition of the present latrines and water supply, and information on the type of soil etc.
- This activity will be carried out by the SSIC

Chapter 1.7 What is the best school latrine we can afford?

- The objective of this activity is to decide on the type of latrine we want to construct and the improvements we want to make to the existing ones; and to calculate the cost involved for the rehabilitation of the existing facilities and the construction of new latrines.
- This activity will be carried out by the SSIC

Chapter 1.8 What is the best water supply facility for non drinking purposes we can afford?

- The objective of this activity is to decide on the type of water supply for non drinking purposes we want to construct and the improvements we want to make to the existing facilities; and to calculate the cost involved for the rehabilitation of the existing facilities and the construction of new facilities.
- This will be carried out by the SSIC

Chapter 1.9 Meeting with all stakeholders to discuss proposal of the SSIC

- The objective of this meeting is to decide together with all the stakeholders on the most suitable type of facilities and the amount of labour, local materials and cash money the school can make available.
- This meeting will be organised by the SSIC.

Chapter 1.10 Making proposal/plan for implementation of improvements and indication of resources required

- The objective of this activity is to prepare a proposal for implementation of improvements and identification of resources.
- This activity will carried out by the SSIC and the SMC together.

1.3 MEETING 2: ANALYSIS OF THE PROBLEMS FOR SMC

Introduction

During this second meeting we will jointly identify the problems in school sanitation. During this exercise we will become aware of the problems created by the existing sanitation facilities on the school premises and we will feel the need for improvement of the facilities. This will create demand for better facilities and we will be motivated to participate in improving these facilities.

GOAL

To jointly identify our specific problems in relation with existing sanitation facilities/situation.

ISSUE

- Identification of problems related to existing sanitation facilities within the premises

The agenda of the meeting may be as follows:

Agenda of the meeting

- Introduction on how to make observations on existing sanitation and water supply within the school premises.
- General observations on the existing sanitation and water supply for non-drinking purposes in the premises.
- Miscellaneous.

Materials needed

For this meeting we may want to use a blackboard and flipchart for writing down the results of the analysis of problems, needs assessment and formulation of goals. We can use small cards on which people in the meeting can write their own views. All the materials, (e.g. blackboard, chalks, flipcharts, pens, papers, cards, flannel board and tape), that we want to use during the meeting should be kept ready before the meeting.

Observation on existing sanitation and water supply facilities within the premises

The facilitator will explain how to make observations on the existing sanitation and water supply facilities in the premises. Then, we may go outside and have a look to surrounding situation of the school including the latrines and water supply facilities. The Headmaster / Headmistress will ensure that the latrines, water supply facilities and the school surroundings remain under normal condition. No abnormal activities or extra cleaning, sweeping is done prior to the meeting. We will carefully observe and analyze the situation around the school, especially behind the existing

latrines and nearby bushes or drains. If there are excreta here and there, it will indicate either insufficient number of latrines or the latrines are not used anymore for any reason.
While we go for observations on the existing sanitation and water supply facilities within the premises we should pay attention to the following issues:

Sanitation Facilities:

- What is the type of existing latrines? (are these single pit/ double pits/ pour-flush (single or double pits) latrines or attached with a septic tank?)
- What is the number of the available latrines and urinals?
- Is construction of the latrines O.K? (are the doors, plaster, roof etc. in good condition?)
- Are the latrines working well? (are pits/ double pits/ septic tanks/soak away working properly?)
- Are the latrines clean or are they dirty and smelly?
- Do the students relief themselves in the open field, behind the school building or in the nearby bushes or drains?
- Is this mainly done by girls/boys or by both?
- Is this done for urination or for defecation or for both?
- Can the latrines be locked from inside?
- Do these latrines have privacy in terms of proper doors and location?
- Are the latrines kept under lock and key during school time?
- Is there a hand washing facility (soap, ash etc.) available?
- Are urinals available for the boys?
- Are the urinals smelly?
- Do the girl students stay at home because of having no proper latrines or because they have to share with boys?
- What do girl students do if they have light diarrhoea or specific problems related to them being girls?
- Do the latrines need any special maintenance?
- Is the number of latrines available sufficient for the number of students / teachers in each shift we have in the school? etc.
- Other observations.

Water Supply Facilities:

- Are water supply facilities available in the premises?
- Can the water from these facilities be used for drinking purposes? (if we don't know we might have to get the water tested on the presence of arsenic and other parameters which are dangerous when the water is used for drinking purposes.
- Is there enough water available for washing hands, cleansing, flushing and cleaning of the latrines?
- How is the physical condition of the water supply facilities?
- What is the distance between water supply facility and latrines?
- Are different sources of water used for sanitation and drinking purposes?
- Is the environment of water supply facility clean and does a soak away exist?
- Other observations.

1.4 MEETING 3: ANALYSIS OF NEED FOR IMPROVEMENT SCHOOL SANITATION FOR SMC

Introduction

After the identification of the problems we will need to observe the existing facilities and identify the needs for improvement of existing latrines and water supply facilities for non-drinking purposes. Unless we feel the need, we will not be motivated to take initiatives to rehabilitate and construct latrines and water supply facilities. As per our needs, we will determine our demand. To express our demand, we can say that we will go for such and such improvements of the existing infrastructure. If we morally support and feel the demand for the improvements, it will create willingness to pay for the infrastructure by us and by the parents in cash, kind or labour.

GOAL

To identify the school's specific needs for rehabilitation and construction sanitation facilities and water supply facilities for non-drinking purposes.

ISSUES

- Observation on existing sanitation and water supply facilities within the premises.
- Discussion on existing sanitation and water supply facilities within the premises.
- Identification of specific needs in relation with sanitation and water supply facilities for non-drinking purposes.

The agenda of the meeting may be as follows:

Agenda of the meeting

- Analysis of the problems in relation with existing sanitation and water supply for non-drinking purposes in the premises.
- Needs assessment for improvement of existing facilities.
- Miscellaneous.

Materials needed

For this meeting we may want to use a blackboard and flipchart for writing down the results of the analysis of problems, needs assessment and formulation of goals. We can use small cards on which people in the meeting can write their own views. All the materials, (e.g. blackboard, chalks, flipcharts, pens, papers, cards, flannel board and tape), that we want to use during the meeting should be kept ready before the meeting.

Identification of specific needs in relation with sanitation facilities and water supply facilities for non-drinking purposes

Now we will discuss in detail the observations on sanitation and water supply situation within the school premises. In this way we will find the specific needs for improvement of sanitation and water supply facilities at our school. From the needs analysis we may get indications of specific needs for rehabilitation and or construction of sanitation facilities and the rehabilitation of water supply facilities. For example, the number of existing latrines may not be sufficient with respect to the number of students and teachers. In this case, we will feel the need to construct new latrines. If the pits are not properly functioning, we have to organize some maintenance work. If the latrines are found dirty and smelly we have to organize regular cleaning. In case of worn out handpump for water supply, it may require some maintenance work, i.e., replacement of nuts, bolts, handle etc. A table as shown below can be filled out by the facilitator during discussion on the problem analysis and needs assessment:

Example:

Infrastructure	*Specific Problems*	*Needs for Improvement*	*Specific Tasks for Improvement*
Sanitation Facility	There is no separate latrine for girl students.	New latrines need to be constructed for girl students.	
	The doors can not be locked from inside.	Catchhooks need to be replaced.	
Water Supply Facility	The handle of the existing No.6 handpump is broken down.	The handle of the existing No. 6 handpump needs to be replaced.	

1.5 MEETING 4: FORMULATION OF GOALS AND RESULTS AND OUTPUTS AND SELECTING THE SSIC FOR SMC

Introduction

During the discussion in the previous meeting, we have already clearly identified the problems and needs for improvement. Analysis of the needs will indicate some specific actions to be done by us for the improvement of present sanitation and water supply facilities within the school premises. If we feel the demand of some improvements, we will be able to outline some specific tasks for rehabilitation and construction of facilities. The exercise we will do during this third meeting, will motivate us to formulate the goals for better facilities. Also if we feel the priority for fulfilling the demand, we will be ready to contribute in cash or kind for the improvement of the facilities.

GOALS

- The goal of this meeting is to jointly formulate the goals and results we want to achieve and to determine specific tasks for rehabilitation/ construction of sanitation facilities and water supply facilities for non-drinking purposes.
- To select representatives of the meeting for the School Sanitation Implementation Committee (SSIC)
- To promote the formation of a School Health Club.

ISSUES

- Identification of specific tasks for improvements needed for sanitation and water supply facilities for non-drinking purposes.
- Selection of representatives for the School Sanitation Implementation Committee (SSIC).
- Promotion of formation of School Health Club.

Introduction to the meeting

During this meeting we will identify specific tasks for improvements and decide who will be responsible for their implementation. At the end of the meeting we may select a School Sanitation Implementation Committee. This committee is a temporarily body or task force which is set up to organise the implementation of the improvements. The committee will be responsible for organizing the activities that need to be undertaken after the first meeting. The agenda of the meeting may be as follows:

Agenda of the meeting

- Short presentation of the problem analysis and needs for improvements
- Formulation of the goal and results/outputs
- Appointment of members of the School Sanitation Implementation Committee
- Miscellaneous

Identification of specific tasks for improvements needed for sanitation and water supply facilities for non-drinking purposes

During the needs assessment we have already identified some needs for improvement. Now, we have to set our goals, which means what specific activities are to be carried out on priority basis. We will discuss the following issues for identifying specific tasks for improvements of sanitation and water supply facilities for non-drinking purposes.

- Does the school go for maintenance/ rehabilitation of existing latrines?
- Does the school go for construction of new latrines?
- Does the school go for construction of urinals?
- Does the school go for construction of new separate latrines for girl students?

- Does the school go for the construction of new separate latrines for female and male teachers?
- Does the school arrange for hand-washing facilities, and water for cleansing, cleaning and flushing?
- Does the school go for the rehabilitation and maintenance of the existing handpump?

During discussion on the formulation of the goals the facilitator can fill out a table as shown below:

Example:

Infrastructure	***Specific Problems***	***Needs for Improvement***	***Specific Tasks for Improvement***
Sanitation Facility	There is no separate latrine for girl students.	New latrines need to be constructed for girl students.	Proposal should be written for constructing new latrines for girl students.
	The doors can not be locked from inside.	Catchhooks need to be replaced.	Catchhooks of the two existing latrines should be immediately replaced from the contingency fund of the school.
Water Supply Facility	The handle of the existing No.6 handpump is broken down.	The handle of the existing No.6 hand-pump is broken down.	The handle of the handpump should to be replaced and the required fund will be raised from us for this.
	The water of the pump is not safe for drinking purposes because of the presence of arsenic, but the pump has not been painted red	The pump will have to be painted red	Red paint should immediately be bought and the pump should be immediately painted red

Selection of School Sanitation Implementation Committee

At the end of the meeting we will decide whether we will set up a School Sanitation Implementation Committee that will be responsible to carry out all the follow up activities needed to improve the school sanitation.

The SSIC will be responsible for the collection of detailed data needed for the selection of the appropriate sanitation and water supply facilities and the supervision of the rehabilitation and construction activities. This does not mean that the members of the SSIC will be the only ones involved in the whole process. They will be responsible to ensure that the rehabilitation of the facilities takes place, that everyone contributes his or her share and that the construction of the facilities will take place in a proper way. A number of technological sanitation and water supply options are described in this *Guide*. The SSIC will determine the most suitable option on the basis of our demand, the local social and environmental conditions and our financial capacity. On basis of their proposal we will make our final decision. During this meeting we will also discuss our contributions towards the project.

During the implementation phase the SSIC will be responsible for all the practical daily activities. It will get a mandate to implement the project and will report weekly back to the SCM.
If we decide that we need such a committee to help us in the implementation of the improvements we may select members from the meeting that are willing and capable to form the School Sanitation Implementation Committee (SSIC). After completion of the construction activities the SSIC will have no further responsibilities and the School Management Committee will be responsible for organising the operation and maintenance of the facilities.

Hygiene education

The students and teachers will only benefit from the improved facilities if they use them always and if they use them in the right way. But also good hygiene behaviour is important for their health. We also will have to make sure that the improved facilities are kept in good hygienic condition and that the structures remain intact.

To help the students to practise appropriate hygiene behaviour and ways how to use the facilities in a proper way, the teachers will have to introduce some extra curricula activities in relation with sanitation practices and hygiene education in the school. During these hygiene lessons the students will not only learn how to use the facilities but will also learn the importance of the proper use of the facilities.

School Health Club

Some enthusiastic teachers may take the initiative to form a Health Club in the school. The club may organize regular supervision of sanitation situation of the school by group of students in roaster. Also the club can organize games and drawing competition on the sanitation related issues. The senior members of the club may be responsible for teaching and demonstrating hygiene behaviour to the junior members. The club may establish some linkage with the Thana Health Complex, so that the doctor/health worker may come for routine check-up and give advice to the members of the School Health Club every month. The School Health Club may extend its activities as required.

The School Health Club should only be set up, when the idea is supported by the teachers and when students are willing to join the club. The formation of an extra club with no responsibilities or enthusiastic members will not be effective and can even demotivate the teachers and the students in the implementation of the improvements.

1.6 ANALYSIS OF SITUATION AND CONDITIONS FOR SSIC

Introduction

In the previous meetings, we already set some specific activities, which are to be undertaken for the improvement of present sanitation and water supply facilities. Some of these we can directly start by using the contingency fund of the school or raising fund from among us. But for major rehabilitation and the construction of new facilities we require detailed information on the conditions of the existing facilities and local situation.

GOAL

To gather required data and information on the condition of the existing facilities as well as the local situation needed for technology choice.

ISSUES

- Observations and analysis of the condition of the existing facilities.
- Gather specific information on the local situation needed for technology choice.

Observations and analysis of situations / conditions of school premises

We, the SSIC will have to observe the existing sanitation and water supply facilities and surrounding situation of the school. We will have to determine the type of soil where the latrines will be installed. If necessary, we may have to perform some tests, which will indicate how quickly the water can pass through ground. This is called permeability of soil. We can find the needed information on how this can be tested in the Fact sheet "Percolation test".
We also have to collect information on the yearly flood level, highest flood level, condition of different components of the existing facilities, etc.

For gathering the specific information needed for technology choice we can fill out the following table along with the teachers. As the information will help us to determine the improvements we need to make, we have to make sure that the information is correct.

Specific topic on which information/data is needed	***Possible ranges or information***	***Local situation/condition***
Type of soil – stability	Loose; stable	
Permeability (how water is absorbed by soil) (may need field test as described in appendix ....)	High absorption; low absorption	
Depth of ground water level in dry season (deepest level)	Metres or feet below ground level	
Depth of highest groundwater level in wet season (most shallow level)	Metres or feet below ground level	
Yearly flood level	Metres or feet above ground level	
Highest flood level in last five years	Metres or feet above ground level	
Are present latrines types similar to the latrines described in the list of types in the Fact sheets?	Yes or No	
Present type of school latrines, as described in the Fact sheets	See Fact sheets, give names	
Total number of existing latrines	Number	
Are there separate latrines for girls?	Yes .. or . No	
Are there separate latrines for female teachers?	Yes .. or . No	
Condition of doors (also hinges and frame) for privacy	Good; fair (needs repair); bad (needs replacement)	
Condition of roofs for protection	Good; fair (needs repair); bad (needs replacement)	
Condition of slabs and pans	Good; fair (needs repair); bad (needs replacement)	
Condition of vent pipes	Good; fair (needs repair); bad (needs replacement	
Condition of Y-junctions	Good; fair (needs repair); bad (needs replacement	
Condition of concrete covers	Good; fair (needs repair); bad (needs replacement)	
Condition of concrete rings	Good; fair (needs repair); bad (needs replacement)	
Is there any water supply facility near the latrine?	Yes or No	
If yes, what type of water supply facility is there?	No. 6 hand pump/ Tara handpump/ Other locally improvised tubewell/ Piped water supply	
How far is the water supply facility from the latrines?		
What is the physical condition of the water supply facility?	Good; fair (needs repair); bad (needs replacement)	
Is the water from the facility safe for drinking purposes?	Yes or No	

1.7 WHAT IS THE BEST SCHOOL LATRINE WE CAN AFFORD? FOR SSIC

Introduction

There are many different types of latrines. Those that are suitable for the school are different from those we have at home. This is because many students and teachers will use the latrine on the same day. One latrine will surely not be enough for all; we need several latrines. And our daughters and girl students do not feel comfortable if they have to use the same latrine as the boys. And when so many students are using the same latrine, the building must be strong. Of course, anybody using the latrine must leave it as clean as it was when he/she entered. That means that the inside of the latrine must be easy to clean. The latrine must also give the students and teachers privacy and protection against the rain and sun. All this has to be considered when choosing the latrines we want to build for our school.

But other aspects we can not influence because they are given by nature. We all know them very well, as they are part of our daily life: e.g. the level of the water in the ground, and the fact that water poured in a hole in the ground stays there for same time or in other places has gone in no time. Also the fact that the pit you dig may collapse or stays stable when you go deeper. And then we have the floods that hit many parts of Bangladesh. We have to build our latrines high enough that the floods do not make the latrine content flow out of the pits and create very serious risks for the spread of diseases such as cholera.
And then there are also cost factors, the nicer the latrine the more expensive but not necessary safer or more convenient. As we will have to contribute towards the construction of the latrines as well as cover all the cost for its operation and maintenance in the future, we have to determine what we can afford to contribute before we can decide which type of latrine is the most suitable for us.

We have now some latrines, which are not in a very good state. We should also improve these old ones by including the suggestions made for good latrines. Then we have really improved the situation.

But when we have rehabilitated and constructed all these school latrines we need to maintain them all and make sure that the students and the teachers use them properly, otherwise we have in no time the same bad situation as we have now. And that we want to avoid. For the long term sustainability it is important that we not only consider the construction and installation cost but also the operation and maintenance cost which the SMC will have to pay every year.

This chapter will help us in this process. There are several steps to take.
With the information collected in chapter 1.6 and the different latrine options presented in the Fact Sheets, which can be found in the appendix of this *Guide,* we will be able to decide which type of latrine is suitable for our local social and environmental conditions and affordable to us. With the suggestions given in this chapter, we will able decide how many latrines and urinals we need in total, whether we will need separate latrines for the boys and girls students and for the female and male teachers. Furthermore some considerations are listed which we will need to take into account when we decide where the latrines should be located.

When we have decided what type and number of latrines is suitable and which improvements we want to make on the existing facilities, we will be able to calculate the cost involved.
When have collected all this information we will be ready to organize a meeting with the SMC, all the teachers and some parents and students. During this meeting we will have to decide how much labour, local materials and cash money we will be able to allocate for the improvements on latrines and water supply as well as for the construction of the new facilities and whether we all agree with the option as presented by the SSIC. The final decision must be supported by all.

GOAL

- To get to know different types of latrines and when we can use these considering the existing natural factors in our area.
- To get to know different types of latrines and to be able to decide which ones are suitable for our social and financial conditions.
- To decide on the type of latrine we want to construct and which improvements we want to make on the existing sanitation .
- To calculate the cost involved for the rehabilitation of the existing facilities and the construction of new latrines, as well as the cost of the operation and maintenance of the facilities.

ISSUES

- Overview of suitability and the construction and maintenance cost of different types of latrines
- Identification of the repairs we can make to our present latrines and the cost involved
- Decision on the number of latrines needed for teachers, girl students and boy students, and number of urinals for the boy students
- Selection of the best, most suitable and affordable school latrines
- Calculation of cost involved for the rehabilitation of the existing latrines and the construction of new latrines

Considerations before we select our improved sanitation facility

For the selection of the most appropriate latrines for our situation we have to make decisions on several issues. We have to decide on the number of latrines, whether we want separate latrines for our boy and girl students, whether a latrine with an open drop hole is acceptable to us and whether the superstructure is such that all students, boys and girls of all ages feel safe and comfortable to use them. We also have to take into consideration the environmental factors such as the soil condition, ground water level and the construction as well as the operation and maintenance cost of the different options.
When we finally have decided which type of latrine is the most suitable for us, we have to decide where the latrines should be located. The latrines should be located in such a way, that they don't pollute the water from the Tube well (TW), but meanwhile are near enough to a water source to encourage the students to wash their hands after they have used the latrines. The latrines should be located on the school premises in such a way that especially the girl students feel safe using the latrines.

The number of latrines

For the decision on the number of latrines we will have to look into the following issues:
Are there enough latrines or do we need more?
Do we have separate latrines for boy and girl students? Or do we need these?
Do we have separate latrines for female and male teachers? Or do we need these?
Which number of latrines is acceptable for us?
Can we repair the existing latrines ourselves, or is any mason or technician nearby who can?

Guidelines for the number of latrines required for teachers, girl students and boy students

The following guidelines cán be used for the calculation:

- For teachers (male and/or female): one latrine for every 40 teachers or part of that in any shift
- For girl students: one latrine for every 40 girls or part of that in any shift
- For boy students: one latrine for every 80 boys or part of that in any shift
- For boy students: one urinal for every 50 students or part of that in any shift

For our own situation we can fill out the table below.

School group	*Number in each group in any shift*	*Number of latrines urinals required*	*Number of existing latrines and urinals*	*Number of new required latrines and urinals*
Male teachers		latrines:		
Female teachers		latrines		
Girl students		latrines:		
Boy students		latrines:		
Boy students		urinals:		

Pre-selection of school latrine options

The main differences between the different options are whether the latrine is a latrine with an open drop hole or an offset pit latrine with pour-flush and if the latrines have one pit or two pits. Both type of latrines have a system to ensure that the latrine doesn't smell; in the direct pit latrine this is done by ventilation and for the offset latrine this is done by the water seal. For the use of offset pour-flush latrines we will need to use more water.

We have to decide whether we find a latrine with an open drop hole acceptable or not. If we prefer the construction of offset pit latrines we have to make sure that sufficient water is available for flushing, cleansing, and cleaning and we have to check whether the infiltration capacity of the soil is high enough to allow the infiltration of all the liquids which will be collected in the pit during the day. .
We also have to decide whether we want to use the sludge when it is safe. If this is the case we might decide to have a double pit where the sludge can remain until it is safe. If we don't want to use the sludge we might as well take latrines with a single pit; in this case we will need to dig a pit in which the sludge can be disposed.

We have to ask the following questions:

1. Do we find a latrine with an open drop hole (direct pit) acceptable or do we want an offset latrine?
2. When we consider off-set latrines we have to take into consideration the availability of water for flushing, the permeability of the soil and the ground water level.
   - If not enough water is available we have to reconsider the use of direct pit latrines.
   - If the permeability of the ground is low we have to build a soak away or reconsider the use of a direct pit latrine.
   - If the ground water level is high we should reconsider the use of direct pit latrines.
   - If the permeability of the ground is low and the ground water table high we first should consider the use of a direct pit latrine and then the construction of a soak away.
   - If the maximum or highest ground water level is higher than 1 meter below floor/slab level and the minimum or lowest less than 2 meters below floor/slab level and/or the infiltration capacity of the soil less than 11 l/m^2.day we will have to consider more costly types of latrines such as the pour-flush latrine with 2-chamber septic tank with soak-away, drainage field or eva-transpiration mound. Another option would be eco-sanitation.
3. We have to decide whether we want a single or a double pit. If we will use the safe sludge as fertilizer on our fields or sell it we could consider a double pit. If we do not intend to use the safe sludge we might as well build single pit latrines, as this will be less expensive and as we will have to dig another pit anyway to dispose the sludge.

For the pre-selection of the suitable school latrine options for our situation we can make use of the table below, which gives an overview of the various latrine types and their suitability in certain conditions, the Fact Sheets which can be found in the appendix of this *Guide*, as well as the flow diagram which will help us making the decision. In the table we will also be able to find the construction cost as well as the operation and maintenance cost for each type.

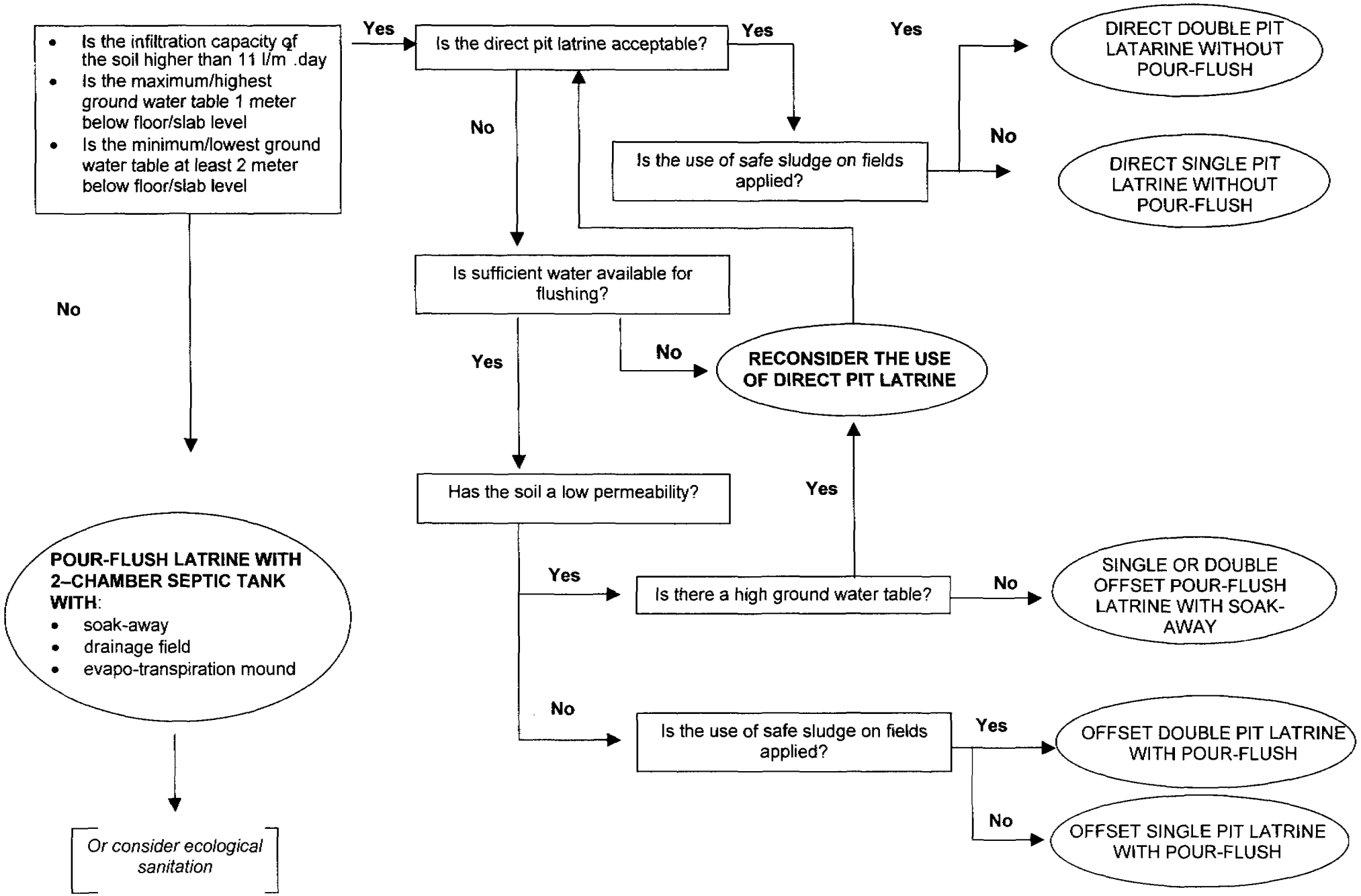
Table of the different latrine types

In the following table, you can find which type of latrine is suitable or just not suitable in certain conditions and an indication of the cost for construction and the O&M costs per year is given.

Latrine type	*Suitable for high groundwater table*	*Suitable for areas prone for floods, tidal floods or flushes*	*Suitable for loose soils*	*Suitable for soils of low permeability*	*Water requirement*	*Ease of construction*	*Ease of maintenance*	*Capital cost indication (excl superstructure)[1] (Price level 1998)*	*O&M[2] cost indication per year*	*Remarks*
Direct single pit latrine without pour-flush	Yes, if raised	Yes, if raised	Yes, if fully lined	Not for clay soils	No	Easy	Easy	Tk 9,000	Tk 500	Sludge unsafe
Direct double pit latrine without pour-flush	Yes, if raised	Yes, if raised	Yes, if fully lined	Not for clay soils	No	Easy	Easy	Tk 12,000	Tk 800	Safe sludge
Offset single pit latrine with pour-flush	Yes, if raised and with soak-away	Yes, if raised	Yes, if fully lined	Yes, with soak-way	Yes	Easy	Easy	Tk 9,000	Tk 400	Sludge unsafe
Offset double pit latrine with pour-flush	Yes, if raised and with soak-away	Yes, if raised	Yes, if fully lined	Yes, with soak-way	Yes	Fairly easy	Easy	Tk 13,000	Tk 700	Safe sludge
Pour-flush latrine with 2-chamber septic tank with soak-away	Yes, if raised	Yes, if raised	Yes	Yes	Yes	Not easy	Not easy	Tk 83,000	Tk 2,500	Sludge unsafe
Pour-flush latrine with 2-chamber septic tank with drainage field	No	Yes, if raised	Yes	Yes, very much	Yes	Not easy	Not easy	Approx. same as septic tank with soak-away option	Tk 2,400	Sludge unsafe
Pour-flush latrine with 2-chamber septic tank with evapo-transpiration mound	Yes	Yes, if raised	Yes	Not applicable	Yes	Not easy	Not easy	Approx. same as septic tank with soak-away option	Tk 2,400	Sludge unsafe
Solar heated single-vault ecological latrine with urine separation	Yes	Yes	Yes	Yes	No	Easy	Difficult	No information yet	No information yet	Safe dehydrated material
Double-vault ecological latrine with urine separation	Yes	Yes	Yes	Yes	No	Easy	Difficult	No information yet	No information yet	Safe dehydrated material
Urinal	Yes	Yes, if raised	Yes	Yes	Yes, a bit	Easy	Easy	Tk 1,500	Tk 60	

If more than one latrine is needed, then the walls of the substructure and pits, and the soak-aways can be shared. In this way some 10% can be saved on the cost of the substructure and some 15-20% on the cost of the superstructure. The Sub-Assistant Engineer of DPHE can for your own situation give you the information what you would save.

1. Cost includes full lining. Superstructures' cost range between Tk 8,000 and 11,0000 depending on the materials used, see separate Fact Sheet.
2. O&M = operation and maintenance


Is the infiltration capacity of the soil higher than 11 l/m².day
Is the maximum/highest ground water table 1 meter below floor/slab level
Is the minimum/lowest ground water table at least 2 meter below floor/slab level
Yes
Is the direct pit latrine acceptable?
Yes
Yes
DIRECT DOUBLE PIT LATARINE WITHOUT POUR-FLUSH
No
Is the use of safe sludge on fields applied?
No
DIRECT SINGLE PIT LATRINE WITHOUT POUR-FLUSH
No
Is sufficient water available for flushing?
Yes
No
RECONSIDER THE USE OF DIRECT PIT LATRINE
Has the soil a low permeability?
Yes
Yes
Is there a high ground water table?
No
SINGLE OR DOUBLE OFFSET POUR-FLUSH LATRINE WITH SOAK-AWAY
POUR-FLUSH LATRINE WITH 2–CHAMBER SEPTIC TANK WITH:
soak-away
drainage field
evapo-transpiration mound
No
Is the use of safe sludge on fields applied?
Yes
OFFSET DOUBLE PIT LATRINE WITH POUR-FLUSH
No
OFFSET SINGLE PIT LATRINE WITH POUR-FLUSH
Or consider ecological sanitation

Variations in materials of the latrine building

For the hygienic condition of the latrine the pits, the slab and pan are the most important. The latrine building gives privacy and protection to the users, and so is also important. But we can use different materials, some perhaps nicer but also more expensive. The local materials we have in our village cost less than the materials from the city that are available for sale at the thana bazar. Using local material will reduce our contribution, but on the other hand we may have to do more frequent repairs as these materials may be less durable.
Prices may vary a lot according to the place where in Bangladesh the latrines are built. In some places sand might not be available and thus will need to come from far and will thus cost more money than in other regions. This *Guide* will only give estimates of costs; we, the SSIC, will have to check whether these costs correspond with the local prices when writing the proposal.

The following table gives building options with indication of costs for the construction of super structures:.

Building materials	***Locally available or from bazar***	***Indicative total cost Tk. (price level 1998)***
Brick walls (inside plastered), RCC roof and GI door with angle frame	Bricks: maybe locally or on thana bazar; Cement and sand: village or thana bazar; GI-door: thana bazaar	11,000
Brick walls (inside plastered), CIS roof and GI door with angle frame	Bricks: may be locally or on thana bazar; Cement and sand: village or thana bazar; GI-door: thana bazaar	8,000
Walls and roof of CI on angle frame and GI door on angle frame	All materials available from thana bazaar	8,500
For walls and door bamboo matting on bamboo frame or timber frame, CIS roof	Bamboo: usually locally CIS: village or thana bazar	3,100
Wooden doors including wooden frame, in case latrines are inside an existing building	Timber: village or thana bazar	4,000

For a block of latrines, we can save materials for the building as some walls will be common. In this way, we can save about 15 – 20 % of the construction cost. If more than one latrine is needed then the walls of the substructures and pits, and the soak-aways can be shared. In this way some 10% can be saved on the cost of the substructures. The Sub-Assistant Engineer of DPHE might be able to can give you the information what you would save in your own situation.

Repairs

During the needs assessment we may have found that the present latrines in our school need repairs to make them safe and hygienic. We may have seen already the condition and know the structural problems. We may have also seen that these problems are the result of the students and ourselves (SMC and teachers) not using the latrines properly, not paying sufficient attention to the cleaning of the latrines, not making minor repairs when needed and not emptying the pits when they are full.

The table below shows common problems and repairs needed with an indication of the costs. We can use this table to make a plan for rehabilitation and also estimate the costs involved. Our own village mason can do all these repairs and all materials are available at the village or thana bazar.

Problem	*Repairs needed*	*Estimated costs Tk. (price level 1998)*
Door broken or does not give privacy; hinges loose	Repair panels of door (if metal then at workshop); put new hinges and grease them	1,000
Door can not be locked from inside	Make simple lock mechanisms using a hook and eye	100
Door can not be locked from outside	Attach two eyes (one on door and one in the wall) and buy padlock	150
Cement plaster comes off the walls	Remove loose parts and re-plaster with good cement mortar	200
RCC roof leaking	Clean and re-plaster the roof with strong cement mortar (3 cm) or put CI sheets on existing roof	500
Slab is broken or has holes	Put new cement mortar or replace the slab entirely	500
Latrine pan is broken	Replace latrine pan	300
For double offset pits: Y-junction does not work	Construct Y-junction according to details (ask) and put brick stopper to block flow to one pit	1,200
Ventilation pipe is broken or does not work	Install new 50mm (2") PVC vent pipe (length 50 cm (2')	100
Cover slabs are broken or missing	Put new RCC cover slabs of good quality	300
Concrete rings of pit are broken	Put new RCC rings of good quality	250/ring
Pits are full	Empty pits by using bucket or scoop, and apply sludge to field if sludge is safe	200
Pits are full	Empty pits by using bucket or scoop, and dig another pit in which sludge will be kept, if sludge is unsafe	400

Installation and maintenance considerations for pre-selected options

When we have made a first pre-selection which options would be suitable for our conditions, we can compare these options considering factors that influence the installation and the maintenance. We can compare the cost, the availability of skilled labour to construct the latrines, and the cost for the operation and maintenance. The following questions might help to do so:

1. Can we easily get the materials needed for the construction of the latrines?
2. Can we construct the latrines ourselves?
3. Can we hire labour to dig pits and construct the latrines?
4. What are the construction cost of the different options? Can we afford all the options?
5. Do the latrines need a lot of operational care?
6. Can we carry out the operation and maintenance of the latrines ourselves or do we need to hire labour for it?
7. What are the operation and maintenance costs?

Precautions in case of high floods

In case of a high flood that means more than 0.30m (1 foot) above the ground level, most probably the school will be closed. If the water rises more then the latrines will overflow and fresh excreta will contaminate the direct school environment and may create serious health risks for the people around. Also after the floods, the health risks will remain for some time. We will therefore build the latrine up to slab level height of 0.60m above the ground level. To prevent overflowing in case the flood comes higher, we fix the slabs of the pit covers and other covers by putting heavy stones or concrete blocks on it. The drop hole and pan will be closed off (sealed) with plastic bags filled with sand. The school management will do that before the school is closed.

How will our school latrines look like?

We know how many latrines we need and we know what latrine types are suitable. As we probably need several new latrines for the students, we will consider building them next to each other. Then we save building materials and so save costs.
In this paragraph we will go step by step through the process of deciding the number of latrines needed, the optimal/best lay-out for the latrines and the calculation of the estimated cost. After each step we can find a table which we can use for our own situation.

The number of latrines and the layout

Example

The school has now two pour-flush latrines built next to each other. One is for the teachers and one for the students (for both girls and boys).
We have 160 girls and 200 boys and ten teachers; there is only one shift of teaching.

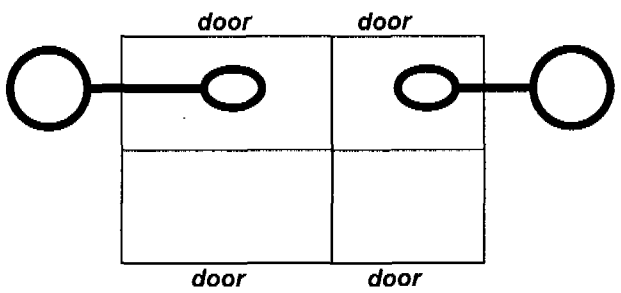
School group	*Number in each group in any shift*	*Number of latrines Urinals required*	*Number of existing latrines and urinals*	*Number of new required latrines and urinals*
Teachers	10	(10:40) gives 1 latrine	1	0
Girl students	160	(160:40) gives 4 latrines	-	4
Boy students	200	(200:80) gives 3 latrines	1	2
Boy students	200	(200:50) gives 4 urinals	-	4

We will build four new toilets for the girl students, and two new for the boys, plus four urinals. We will also use the present latrines. The girls' latrines will be located at a distance from those for the boys and the teachers. The urinals will be next to the boys' latrines.

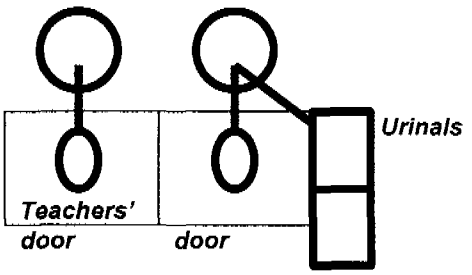
*We chose for the **Single offset pour-flush latrine**.*

It may look like this:

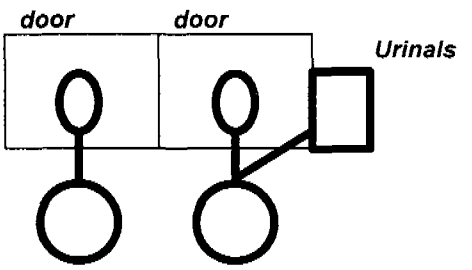
For the girls:



For boys and teachers:



Existing:



For this stage of the request, we may want to ask for some assistance from the Thana assistant engineer or the NGO. He will help us to come to the most efficient layout and to find the cost of the total improvements for school latrines.

For our own situation:

School group	*Number in each group in any shift*	*Number of latrines Urinals required*	*Number of existing latrines and urinals*	*Number of new required latrines and urinals*
Male teachers		(.. :40) gives latrine		
Female teachers		(.. :40) gives latrine		
Girl students		(.. :40) gives latrines		
Boy students		(.. :80) gives latrines		
Boy students		(.. :50) gives urinals		

Location of the latrines

After we have decided on the number of the latrines and the lay-out we have to decide where to locate the latrines. We have to make sure that the latrines are located in such a way that they don't pollute the water from the TW, but meanwhile are near enough to a water source to encourage the students to wash their hands after they have used the latrines. We also have to make sure that the latrines are located in such a way that especially the girl students and the youngest students feel safe using them. So when we decide where the latrines have to be build we have to make sure that:

- The latrines are at least 15 meters away from the water supply to prevent contamination of the source;
- The latrines are less than 15 meters away from a water supply facility where hands can be washed;
- The latrines are located in such a way that the teachers can supervise them;
- The latrines for the girl students are located in such a way that they feel safe using them.

The total estimated cost

For the estimation of the cost we can use the amounts mentioned in the Fact sheets. We must realize that these amounts are estimates and that in a later stage we will need to check these amounts. For this we will need to collect prices for the materials and need to ask local contractors for tenders.

Example

We will build four new toilets for the girl students, and two new for the boys, plus four urinals. We will also rehabilitate the two present latrines. We have chosen for the construction of off-set single pit latrine with pour-flush latrines.

Group	*Number required*	*Unit cost sub-structure*	*Saving for adjacent units*	*Total for substr.*	*Unit cost latrine building*	*Saving for 2 blocks*	*Total cost latrine building*	*Total Cost*
Rehabilitation	2	2,000		4,000	2,000	---	4,000	8,000
Teachers/boys	2	9,000	10%	16,200	8,200	15%	13,600	29,800
Girls	4	9,000	10%	32,400	8,200	15%	27,200	59,600
Urinals	4	--		----	1,500	10%	5,400	5,400
							Grand total	102,800

For our own situation:

Group	*Number required*	*Unit cost sub-structure*	*Saving for adjacent units*	*Total for substr.*	*Unit cost latrine building*	*Saving for 2 blocks*	*Total cost latrine building*	*Total Cost*
Rehabilitation								
Teachers/boys								
Girls								
Urinals								
							Grand total	

1.8 WHAT IS THE BEST WATER SUPPLY FOR NON-DRINKING PURPOSES WE CAN AFFORD FOR SSIC

Introduction

To get the full health benefits from the improved facilities, we will have to make sure that the students and the teachers can practise appropriate hygiene behaviour such as hand washing, cleansing and that that the facilities can be kept clean. Therefore it is essential for the school to have access to sufficient water and we have to find funds to provide soap.
Since arsenic pollution has emerged as such a pressuring issue, here the scope for the improvement of the water supply facilities will be limited to its use for sanitation purposes. For hand-washing, cleansing, pour-flushing and cleaning of the latrines, we do not really need water of the same quality as for drinking. The water from any tube well or from a nearby pond will do. Therefore we will especially give attention to the improvement of those water sources nearby the expected location of the latrines.
If we have a water supply system that gives water, we must look at the condition of it. Repairs may be needed to have it functioning well. But then we also have to make sure that we maintain it by doing regular preventive maintenance and repairs.

GOAL

- To decide on which improvements we want to make on the existing water supply facilities.
- To calculate the cost involved for the rehabilitation of the existing facilities and the construction of new facilities, as well as the cost of the operation and maintenance of the facilities.

ISSUES

- Identification of the repairs we can make to our present water supply facilities for non drinking purposes and cost involved
- Calculation of cost involved for the rehabilitation of the existing latrines and the construction of new latrines

Repairs of existing water supply systems

As we all know, we probably have a water supply system at the school. In stead of going for a new water supply system, which is expensive, we should first consider to improve or repair the one we have already at the school. Most schools have a Shallow tube Well (STW) supplying water that is certainly very OK for cleansing, flushing and cleaning, and also in many cases for drinking. But that needs to be confirmed by a test on the presence of arsenic in the water by the responsible department. If an arsenic test has been done and has configured positive, we will have to make sure that the water pump is and stays painted red and that it will not used for drinking purposes.
If we have a water supply that is not functioning well, we have to find out the problems we have to solve.

The most common problems with STWs are:
- Clogged filter pipe
- Cup seals worn out
- Valves leaking
- Bolts and nuts worn out
- Washers missing
- Pumphead cover broken
- Hinge-bolt worn out

The local technician can easily repair all problems except the clogged filter pipe. The parts needed are all available at the village or thana bazar against a reasonable cost. Only if the filter is clogged, which can be concluded from a very low production of the pump while there is enough

water in the well, then the well has to be re-developed which needs expertise and pumping equipment that is not available in the village or thana.

Protecting the well from contamination

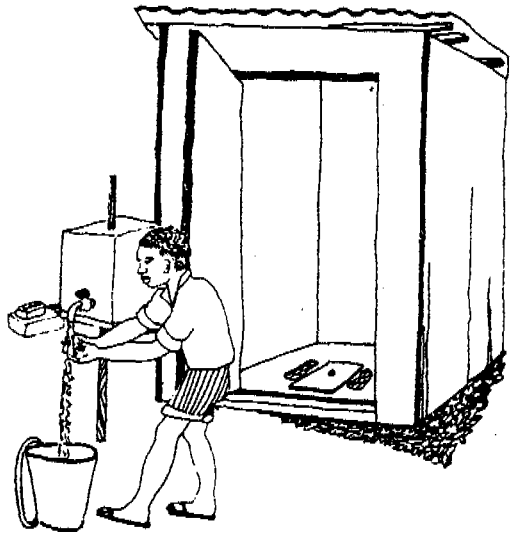
We all are aware of the fact that the well can be polluted by various sources of contamination such as latrines and livestock. We therefore need to make sure that the water supply is well protected from such sources of contamination, especially when the water is also used for drinking purposes.

We should protect the water supply by:
- Locating the well at least 15 meters from the latrines, live stock sheds and waste pits;
- Building a raised wall or fence around the well to keep the animals away
- Placing a drainage ditch around the well to prevent surface water and spilled water contaminating the well and to keep the surrounding ground dry

Hand-washing facility

If the STW is less than 15 meters from the latrines, it will easily be used as the facility for hand-washing after latrine use. If the STW is too far or not on the way to the classrooms, then a separate hand-washing facility is to be provided. This can consist of a small water tank with a tap. The tank has to be filled with water from the STW by the responsible students' group in the morning and if needed once more during the day.
A plastic water tank of 200 litres cost about Tk 1,500, but an old oil drum (with cover) that has been properly cleaned will also do. A small tap can easily be attached.
For both options it is important to build a soak-away to drain the waste water to prevent that spilled water forms muddy pools.

Below some simple but effective hand-washing facilities are shown; they hardly cost money.



... water close at hand will facilitate the practice of handwashing: an example ...

To make the hand-washing more effective it is better that the students and the teachers make use of soap. We therefore have to discuss with the School Management Committee that sufficient soap is provided by the school.

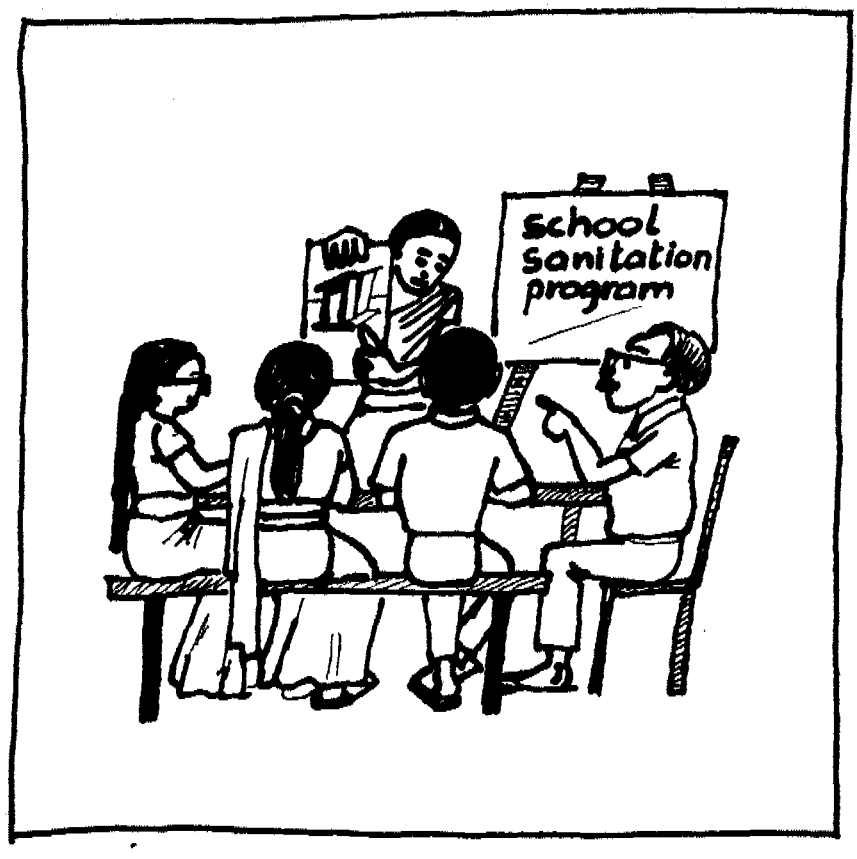
Considerations before we select our improved water supply

For the decision on which water supply facilities are the most suitable for our situation, we will make use of the information collected in part 1.6 of this *Guide*. We first have to decide whether we need to improve our water supply facility or whether the facility is adequate for our situation. If there is no water available for flushing the toilet and hand washing we have to use the water in a pond near by. For the good use of water for flushing and hand washing we have to ensure that the

water is available nearby the latrines. If this is not the case we have to consider the construction of storage reservoirs for flushing as well as for hand washing.

Estimated cost of the required water supply system and the needed repairs to existing STW

Required technologies/repairs	**Estimated cost**
Repair existing STW if needed	Tk
Construction of storage reservoir for hand-washing if STW is far away from the latrines	Tk
Construction of storage reservoir for flushing if STW is far away from the latrines	Tk
Total costs	Tk



1.9 MEETING WITH ALL STAKEHOLDERS TO DISCUSS THE PROPOSAL OF THE SSIC FOR SMC

Introduction

Now that the SSIC has made a proposal on which type of latrines and water supply facilities for non-drinking purposes are the most suitable for our local environmental and social conditions and which they think we can afford, we all have to make the final decision together. During this meeting we have to decide how much money we can contribute for the improvements of the facilities and we have to decide whether the type of latrine which is proposed by the SSIC suits us all.

GOAL

To decide together with all the stakeholders on the most suitable type of facilities and the amount of labour, local materials and cash money the school can make available.

ISSUES

- Decision on the type of facilities that is the most suitable for us
- Decision on the amount of labour, local materials and cash money the school can make available for the latrines and water supply improvements

Introduction to the meeting

During this meeting the SSIC will present their proposal for the improvements that we need to make on our sanitation and water supply facilities and will let us know the cost involved.
Now we know the type of latrines that would be possible in our situation and we know an estimate of the total cost involved building these. We also know the amount of money that is needed to improve the water supply facilities. These latrines and water supply facilities will be ours; they will fully belong to the school.
We have to decide whether we can afford to pay the construction costs and all the operation and maintenance cost. If not all of us are well off to contribute in terms of money, we can also contribute our labour during the construction or maintenance work and collect local materials.
During the meeting we have to discuss what contributions we can make as a school, i.e. through SMC members, teachers, students, and their parents. This could be doing some physical work as digging pits, collecting local materials such as sand and khoa and assisting the local mason in his work of building the latrines.

Expected Contributions from the Various Stakeholders	***Expected Contributions in Thaka***
• School funds • Financial contribution from SMC • Private financial contribution from members of SMC • Private financial contribution from parents • Raised funds through activities of the students • Labour contribution from parents • Materials contribution from parents • Extra donations or from fund raising activities	
Total expected amount available	Tk

1.10 MAKING PROPOSAL/PLAN FOR IMPLEMENTATION OF IMPROVEMENTS AND INDICATION OF RESOURCES REQUIRED FOR SMC AND SSIC

Introduction

By now we have decided what specific tasks will be done by us for the repairs and improvements of existing sanitation and water supply facilities for non-drinking purposes in the school. We also decided specific technology options for new sanitation and water supply facilities and identified the maintenance work required and roughly estimated total cost for these improvements, and how much we will be contributing ourselves.

Now we have to make a proposal/plan for implementation of improvements including time schedule, manpower, materials, resources and budget required for the improvements. This proposal will be forwarded to the organisation which will assist us in the implementation of the improvements as indicated in chapter 1.1. Later on, detailing of this proposal into an implementation plan will be made after receiving the support. How to prepare a proposal/plan, which will be forwarded for requesting financial support, is described in this chapter.

GOAL

To prepare a proposal for implementation of improvements and identification of resources.

ISSUES

- Making a list of the tasks identified for improvements of the existing sanitation and water supply facilities for non-drinking purposes.
- Making an overall plan including time schedule, manpower, materials, resources and budget for the improvements.
- Finalising the calculation of the contributions of the school and parents and the financial support which will be requested from the organisation which will assist us in the implementation process.

Making a list of the tasks identified for improvements of the existing sanitation and water supply facilities

We have to make a comprehensive list of the tasks we have identified for the improvements of the existing facilities and for which financial support will be asked in addition to our contribution.

A table as shown below can be used as an example for this exercise

Infrastructure	*Type of Task*	*Option Chosen*	*Existing Option*	*Requirements / tasks for improvements*
Sanitation facility	New construction	Single offset pour-flush latrine	N/A	4 latrines for girl students 3 latrines for boy students 1 latrine for teachers
	New construction	Urinals	N/A	2 urinals for boy students
Water Supply facility	Maintenance	N/A	No.6 Handpump	Replacement of handle

For our own situation we can use the table below.

Infrastructure	*Type of Task*	*Option Chosen*	*Existing Option*	*Requirements / tasks for improvements*
Sanitation facility				
Water Supply facility				

Making an overall plan including time schedule, manpower, materials, resources and budget for the improvements.

We have to give a brief overview on time required for tasks, manpower required during this period, resources available in terms of financial capabilities, etc. We also have to prepare a rough budget on the same.

We get the detailed information on resources and costs needed for the improvements from the following tables and the tables with the required materials and labour which can be found in the Fact sheets. The first table is an example only. Our own requirements are filled out in the second table.

TABLE: Indicative resources required for the planned improvements (example only)

Tasks	*Time required*	*Man-power required*	*Special skill required*	*Man-power available*	*Materials required*	*Materials available*	*Remarks*
Sanitation facilities:							
Rehabilitation of 2 existing latrines	2 weeks	1 mason week	--	Unskilled labour and/or free labour; Village mason	Cement; sand, bricks, PVC vent pipe, concrete ring and slab	All at thana market	The village is far away from the District and Thana market. So, higher transportation cost is required.
Construction of 6 new latrines (single pit pour-flush, offset)	2 months	4 man-weeks for digging; 8 man weeks for mason	1 Sub-Assistant Engineer form DPHE to supervise from time to time.	Unskilled labour and/or free labour; Village mason	Cement, sand, brick, slab with pan, Rings, PVC pipe, GI sheet and other accessories.	District and Thana markets.	See previous remark
Construction of 4 urinals	2 weeks	1 man-week for mason	None	Same as above	Same as above	Thana market	See previous remark
Water Supply facilities:							
Maintenance of No. 6 hand tubewell	2 days	1 pump-mechanic	-None-	1 pump-mechanic	Handle, headcover, nuts, bolts and pins.	Thana market.	
Repair of concrete platform	1 day	1 day for Village mason	None	Village mason	Cement, khoa and sand	Thana market	

Table: Indicative resources required for our own planned improvements

Tasks	*Time required*	*Man-power required*	*Special skill required*	*Man-power available*	*Materials required*	*Materials available*	*Remarks*
Sanitation facilities:							
Rehabilitation of 2 existing latrines							
Construction of 6 new latrines (single pit pour-flush, offset)							
Construction of 4 urinals							
Water Supply facilities:							
Maintenance of No. 6 hand tubewell	2 days	1 pump-mechanic	-None-	1 pump-mechanic	Handle, headcover, nuts, bolts and pins.	Thana market.	
Repair of concrete platform	1 day	1 day for Village mason	None	Village mason	Cement, khoa and sand	Thana market	

Calculation of the total cost of the rehabilitation and construction works

We have to make a detailed overview on the labour and materials needed for the rehabilitation of the existing facilities and the construction of the new latrines and urinals. To finalise the proposal we will have to find out the cost for the different materials and prices for labour. We will also use this information to calculate the contributions in kind and in cash which will need to be made by the school and parents. The information on the materials and the labour needed for the construction of new latrines can be found in the tables with the required labour and materials which are part of the Fact sheets. For the information of the prices for the materials we will have to go to Thana market and find out. For the labour we will have to ask the local masons.

Table: Calculation of the total cost of the rehabilitation and construction works

Activity -- Resource	*Units*	*Quantities for the rehabilitation of latrines*	*Quantities for construction of new latrines*	*Quantities for construction of new urinals*	*Total units*	*Unit cost*	*Total cost*
Labour needed							
Masons (days)							
Unskilled labourers (days)							
Materials needed							
Cement	bags						
Khoa	M^3						
Sand	M^3						
Bricks	Nr						
Steel bars	Kg						
Latrine slab	Nr						
Latrine pan	Nr						
Hinges, catch hooks etc.	Nr						
Drain pipe 100mm	M						
Vent pipe 40/50 mm	M						
Water seal (U- shaped)	Nr						
Cast iron manhole cover 450mm. Dia.	Nr						
Perforated concrete rings, 3 ft	Nr						
Non-perforated concrete rings, 3 ft	Nr						
Concrete ring slabs	Nr						
					Total estimated cost		

Calculations of the total contributions of the SMC and the parents

When submitting the proposal we will have to indicate how much of the total estimated cost will be contributed by us, the SMC member, teachers, students and the amount we request from supporting organisations. For this, we will have to make use of the information we have gathered during the meeting we had to decide what financial contributions as well as contributions in kind we can make as a school, i.e. through SMC members, teachers, students, and their parents. We can make use of the tables below to express our planned contributions in kind in cash.
We can use the following table, "Calculations of contribution in kind of the SMC and the parents", to express our planned contributions in kind in cash. We can use the next table "Calculation of the total contributions of the SMC and the parents can make available for this project on school latrines and water supply" for calculating the total amount we can contribute to the improvement of the school sanitation facilities.

Table: Calculations of contributions in kind of the SMC and the parents

Resources and materials needed for construction of xx latrines and xx urinals	*Total units needed*	*Cost per unit*	*Number of units SMC and parents will contribute in kind*	*Contribution in kind per unit expressed into cash*
Labour				
Masons (days)				
Unskilled labour (days)				
Materials				
Cement				
Khoa				
Sand				
Bricks				
Steel bars				
Latrine slab				
Latrine pan				
Hinges, catch hooks etc.				
Drain pipe 100mm				
Vent pipe 40/50 mm				
Water seal (U- shaped)				
Cast iron manhole cover 450mm. Dia.				
Perforated concrete rings, 3 ft				
Non-perforated concrete rings, 3 ft				
Concrete ring slabs				
			Total contributions in kind expressed in cash	

Table: Calculation of the total contributions of the SMC and the parents can make available for this project on school latrines and water supply

Total school contributions (in kind and cash)	Tk
Total parents' contributions (in kind and cash)	Tk
Extra donations or from fund raising activities	Tk
Total expected amount available	Tk

Estimated total costs, local contributions and requested funds (an example)

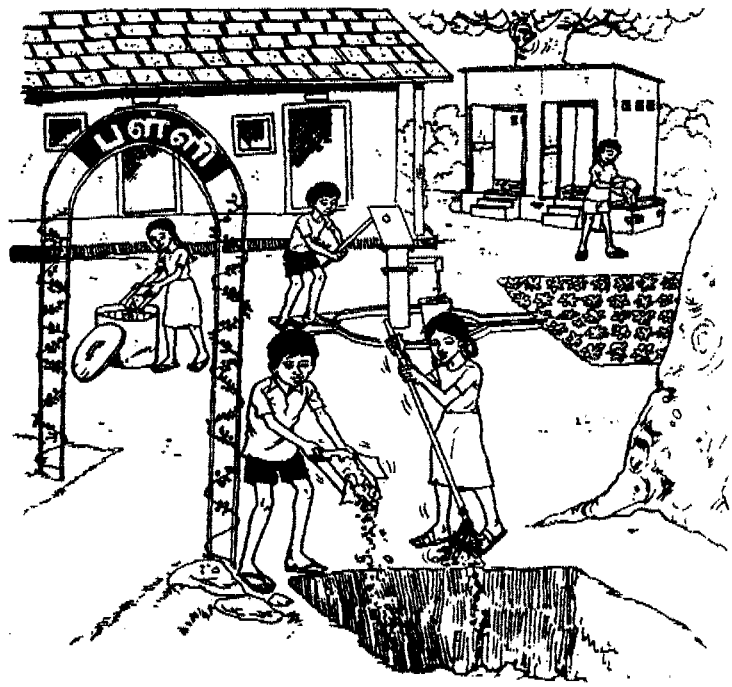
When we submit the final proposal we will have to indicate which percentage of the total cost will be contributed by us, the SMC, teachers, students and parents and which percentage we will request to be funded by the supporting organisation. For these calculations we can make use of the tables below.

Table: Estimated total costs, local contributions and requested funds (an example)

Total estimated cost	*Tk*	*102,800*	*100 %*
Contribution from school etc.	Tk	25,400	(25%) of total cost
Fund to be requested	Tk	77,400	(75%) of total cost

Table: Estimated total costs, local contributions and requested funds for our own improvements

Total estimated cost		***100 %***
Contribution from school etc.		(x%) of total cost
Fund to be requested		(xx%) of total cost



Fact sheet

Appendix

- Types of School Sanitation
- Criteria for choosing the most suitable latrine
- Direct single pit latrine without pour-flush
- Direct double pit latrine without pour-flush
- Offset single pit latrine with pour-flush
- Offset double pit latrine with pour-flush
- Soak-away as possible addition for:
  - The offset single pit latrine with pour-flush
  - The offset double pit latrine with pour-flush
- Solar-heated single-vault ecological latrine with urine separation
- Double-vault ecological latrine with urine separation
- Pour-flush latrine with 2-chamber septic tank with soak-away
- Pour-flush latrine with 2-chamber septic tank with drainage field
- Pour-flush latrine with 2-chamber septic tank with evapo-transpiration mound
- Urinals
- Superstructures
- Latrines in flood-prone areas
- Percolation test

Types of School Sanitation

INTRODUCTION

In these Fact Sheets the different types of latrines will be discussed as well as their suitability and operation and maintenance requirements. The first fact sheet includes a list of criteria that need to be considered when choosing a latrine as well as a flow chart which will help to choose the suitable type of latrine for the local environmental conditions. In the following fact sheets, a short description of the technology will be given for each latrine, followed by a description for which conditions the latrine is suitable, the cost for construction and operation and maintenance, a description of the necessary operation and maintenance and a list of materials and the amount of labour which is needed to construct the latrine type. These list do not include the materials and labour which is needed for the construction of the superstructures. This information can be found in a separate fact sheet. A more detailed description of how to build the different latrine types will be provided in Guide 2. In Guide 3 the required operation and maintenance is described.
The last fact sheet contains the instructions on how a simple percolation test can be carried out.

GOAL

- To get an overview of the different types of latrines that are suitable for the social context of the school as well as for the local environmental conditions
- To get an overview of the costs for the construction and the operation and maintenance of the different types of latrines
- To get an overview of the operation and maintenance requirements of the different types of latrines

ISSUES

- Different types of latrines
- The suitability of the different types of latrines considering the type of soils, flood levels and groundwater levels
- Construction and maintenance cost of different types of latrines

TABLE OF THE DIFFERENT LATRINE TYPES

In the following table, you can find which type of latrine is suitable or just not suitable in certain conditions and an indication of the cost for construction and the O&M costs per year is given.

Latrine type	*Suitable for high groundwater table*	*Suitable for areas prone for floods, tidal floods or flushes*	*Suitable for loose soils*	*Suitable for soils of low permeability*	*Water requirement*	*Ease of construction*	*Ease of maintenance*	*Capital cost indication (excl superstructure)[1] (Price level 1998)*	*O&M[2] cost indication per year*	*Remarks*
Direct single pit latrine without pour-flush	Yes, if raised	Yes, if raised	Yes, if fully lined	Not for clay soils	No	Easy	Easy	Tk 9,000	Tk 500	Sludge unsafe
Direct double pit latrine without pour-flush	Yes, if raised	Yes, if raised	Yes, if fully lined	Not for clay soils	No	Easy	Easy	Tk 12,000	Tk 800	Safe sludge
Offset single pit latrine with pour-flush	Yes, if raised and with soak-away	Yes, if raised	Yes, if fully lined	Yes, with soak-way	Yes	Easy	Easy	Tk 9,000	Tk 400	Sludge unsafe
Offset double pit latrine with pour-flush	Yes, if raised and with soak-away	Yes, if raised	Yes, if fully lined	Yes, with soak-way	Yes	Fairly easy	Easy	Tk 13,000	Tk 700	Safe sludge
Pour-flush latrine with 2-chamber septic tank with soak-away	Yes, if raised	Yes, if raised	Yes	Yes	Yes	Not easy	Not easy	Tk 83,000	Tk 2,500	Sludge unsafe
Pour-flush latrine with 2-chamber septic tank with drainage field	No	Yes, if raised	Yes	Yes, very much	Yes	Not easy	Not easy	Approx. same as septic tank with soak-away option	Tk 2,400	Sludge unsafe
Pour-flush latrine with 2-chamber septic tank with evapo-transpiration mound	Yes	Yes, if raised	Yes	Not applicable	Yes	Not easy	Not easy	Approx. same as septic tank with soak-away option	Tk 2,400	Sludge unsafe
Solar heated single-vault ecological latrine with urine separation	Yes	Yes	Yes	Yes	No	Easy	Difficult	No information yet	No information yet	Safe dehydrated material
Double-vault ecological latrine with urine separation	Yes	Yes	Yes	Yes	No	Easy	Difficult	No information yet	No information yet	Safe dehydrated material
Urinal	Yes	Yes, if raised	Yes	Yes	Yes, a bit	Easy	Easy	Tk 1,500	Tk 60	

If more than one latrine is needed, then the walls of the substructure and pits, and the soak-aways can be shared. In this way some 10% can be saved on the cost of the substructure and some 15-20% on the cost of the superstructure. The Sub-Assistant Engineer of DPHE can for your own situation give you the information what you would save.

1. Cost includes full lining. Superstructures' cost range between Tk 8,000 and 11,0000 depending on the materials used, see separate Fact Sheet.
2. O&M = operation and maintenance

Criteria for choosing the most suitable latrine

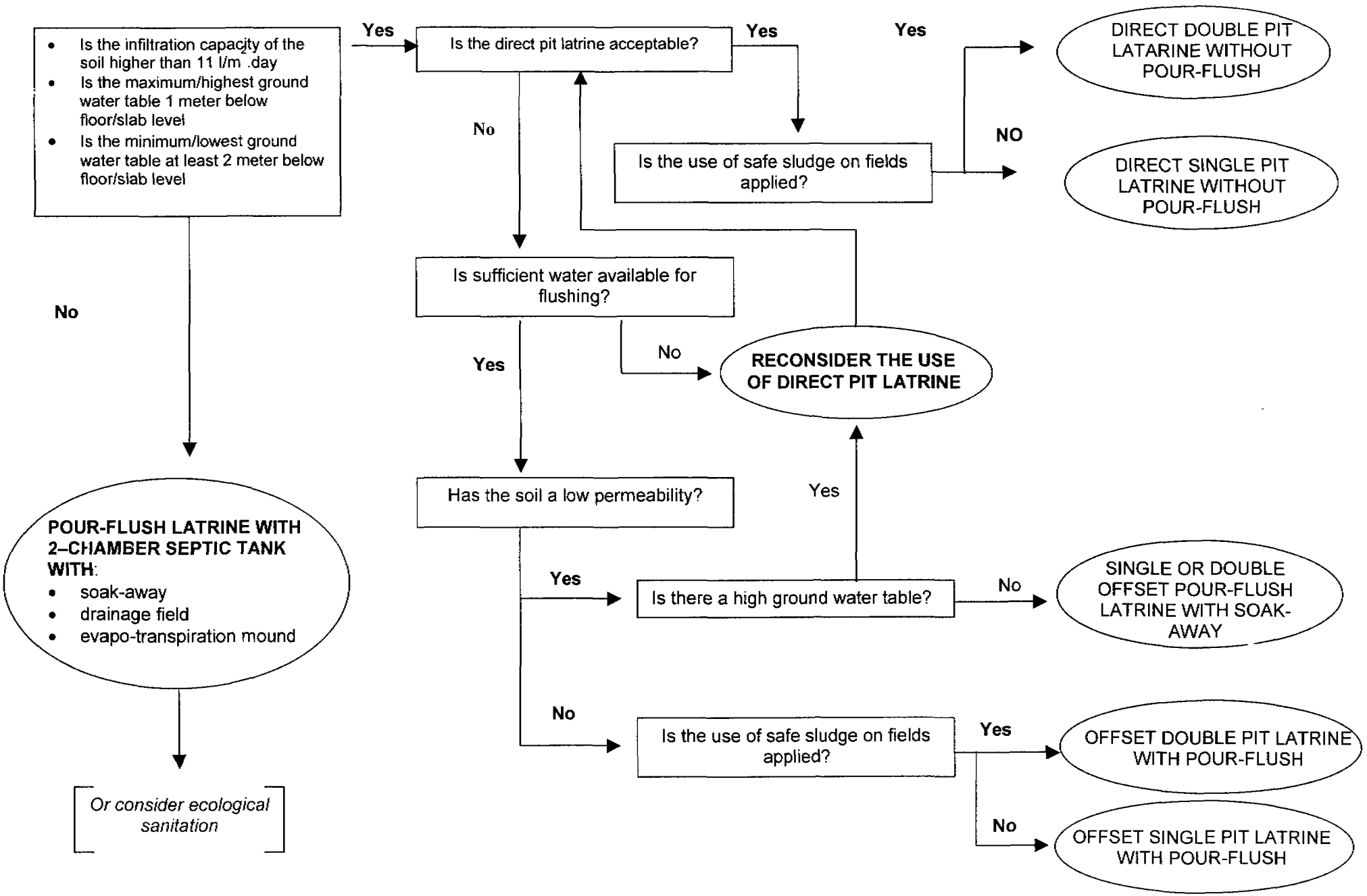
INTRODUCTION

Several aspects need to be considered when choosing a latrine. One of the important aspects which need to be considered is whether the technology is suitable for the local conditions such as the ground water level. But it also needs to be considered whether the design is suitable and acceptable for the users (boys and girls students and the male and female teachers) whether the structure is strong enough for the number of users and whether the school can afford the construction and the operation and maintenance cost involved. Furthermore it is important to make sure that the latrine is easy to clean, and that the latrine gives the students and teachers sufficient privacy and protection against the rain and sun.
In this first fact sheet a flow chart which can be used to choose the suitable type of latrine for the local environmental and some social conditions can be found as well as a list of other criteria that need to consider when choosing a latrine.

FLOW DIAGRAM

Aspects that are considered in the flow diagram:

- The infiltration capacity of the soil
- The maximum – highest ground water level, below the slab (wet season)
- The minimum, lowest ground water level, below the slab (dry season)
- Is the direct pit latrine acceptable?
- Is the use of safe sludge applied?
- Is sufficient water available for flushing?


Is the infiltration capacity of the soil higher than 11 l/m².day
Is the maximum/highest ground water table 1 meter below floor/slab level
Is the minimum/lowest ground water table at least 2 meter below floor/slab level
Yes
Is the direct pit latrine acceptable?
Yes
Yes
DIRECT DOUBLE PIT LATARINE WITHOUT POUR-FLUSH
No
Is the use of safe sludge on fields applied?
NO
DIRECT SINGLE PIT LATRINE WITHOUT POUR-FLUSH
No
Is sufficient water available for flushing?
No
RECONSIDER THE USE OF DIRECT PIT LATRINE
Yes
Has the soil a low permeability?
Yes
POUR-FLUSH LATRINE WITH 2–CHAMBER SEPTIC TANK WITH:
soak-away
drainage field
evapo-transpiration mound
Yes
Is there a high ground water table?
No
SINGLE OR DOUBLE OFFSET POUR-FLUSH LATRINE WITH SOAK-AWAY
No
Is the use of safe sludge on fields applied?
Yes
OFFSET DOUBLE PIT LATRINE WITH POUR-FLUSH
No
OFFSET SINGLE PIT LATRINE WITH POUR-FLUSH
Or consider ecological sanitation

OTHER CRITERIA

Cost aspects:

- Is the type of latrine affordable? - If not consider cheaper options – and investigate using the flow chart whether these alternative options are suitable for the environmental conditions;
- Are the operation and maintenance cost affordable? - If not consider cheaper options – and investigate using the flow chart whether these alternative options are suitable for the environmental conditions;

Availability of skills and materials in the community:

- Are the required skills and materials for construction available in the community? - If not consider alternative options – and investigate using the flow chart whether these alternative options are suitable for the environmental conditions;
- Are the required skills and materials for the operation and maintenance available in the community? - If not consider alternative options – and investigate using the flow chart whether these alternative options are suitable for the environmental conditions.

Number of latrines:

- Is there a need for separate latrines for the boy students and for the girl students
- Is there a need for separate latrines for the female and the male teachers
- How many students will use the latrines in any teaching shift

Location of the latrines:

- Are the latrine pits and soak-aways at least 15 meters away from the (ground) water supply, to prevent contamination of the source;
- Are the latrines less than 15 meters away from a water supply facility where water can be fetched for anal cleansing and where hands can be washed, to encourage the students to practise this important behaviour;
- Are the latrines located in such a way that the teachers can supervise them;
- Are the latrines for the girls located in such a way that especially the girl students feel safe and comfortable using them.

Direct single pit latrine without pour-flush

Brief description

This latrine consists of a single pit covered with a slab with a drop hole, a vent pipe covered with a fly screen and a sealed slab at the rear of the latrine. This slab can be removed at the end of the dry season, and preferably during the school holiday, to dig out part of the sludge under the removable slab. Wind blowing across the top of the vent pipe creates a flow of air which sucks out the foul smelling gasses from the pit. The vent pipe plays also an important role in the insect control. Insects are attracted to light and if the latrine is suitable dark inside they will fly up the vent pipe to the light. They cannot escape because of the fly screen, so they are trapped in the top of the pipe until they dehydrate and die.

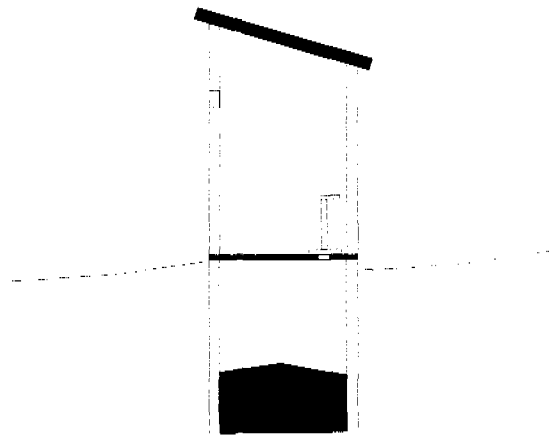
Suitability

The direct single pit latrine without pour flush is suitable:

- for areas where in the wet season, the maximal (highest) groundwater level is at least 1 meter below floor/slab level (to allow sufficient infiltration), and in the dry season, the minimal ground water level at least 2 meter below the floor/slab level (to allow the drying up of the sludge during the dry season)
- for soils with low permeability, but not for soils with an infiltration capacity lower than 11 l/m^{2}day such as clay soils, (to allow sufficient infiltration of urine and the water used for cleansing)
- for loose soils if fully lined
- because it does not require any water for flushing
- because it is easy to construct
- because it is easy to maintain

What is special to this type

- Pit directly under slab
- No water seal
- Ventilation trough the vent pipe
- Maximal ground water level at least 1 meter below floor level
- Minimal groundwater level at least 2 meters below floor level
- Full lining (which needs to be perforated to allow infiltration) only needed if soil is unstable
- Pit sludge not safe when pit is emptied
- Pit should partly be emptied at the end of the dry season and preferably during the school holiday



Cost

- Construction cost approx. 9,000 Thaka including full lining plus 8,000 – 11,000 Thaka for the construction of a superstructure
- Maintenance cost approx. 500 Thaka per year

Operation

Operation of this latrine is quite simple and consists of regular cleaning the slab with a limited amount of water and if available a limited amount of detergents, to remove any excreta and urine. The floor, squatting pan, door handles and other parts of the superstructure have to be cleaned daily. The door must always be closed so the superstructure remains dark inside. The drop hole should never be closed as this blocks airflow.

Maintenance

For the maintenance every month the floor slab has to be checked for cracks and the vent pipe and fly screen must be inspected to ensure they are not corroded or damaged. Repair of the superstructure may be necessary too. Every year, at the end of the dry season, part of the faeces should be dug out. As these faeces have not decomposed yet, these should be handled with care and buried in a pit covered with soil. After at least a year, when the contents of this pit have decomposed into harmless humus it can be can be used as a good fertiliser.

Actors implied and skills required for the construction and the O&M

The caretaker will be responsible:

- to keep the latrines clean
- to inspect for damages and cracks
- to perform small repairs
- to monitor the level of the contents of the pit
- to dig out at the end of the dry season and preferably before the start of the new school year part of the sludge in the pit
- to transfer the unsafe sludge to a temporary pit

The local unskilled labour could be involved in:

- the digging of the pits
- the emptying of the pit at the end of the dry season and before the new school year
- the execution of small repairs on the slab and the superstructure

The skills of the local mason are needed for:

- the building of the latrines

Problems and remarks

- Odour problems may occur during the night and early morning in latrines relying more on solar radiation for the air flow in the vent pipe than on wind speed.
- In areas with soils with a low infiltration capacity (around 11 l/m^2.day or lower) the use of water for cleansing should be limited or even better be avoided.
- Pit sludge is not safe when pit is emptied.

Required Labour

	Units	Quantities
Masons	days	3
Unskilled labourers	days	10.5

Required materials

	Units	Quantities
Cement	Bags	6.7
Khoa	m^3	2.2
Sand	m^3	1
Bricks	Nr	928
Steel bars	Kg	8.5
Latrine slab	Nr	
Latrine pan	Nr	1
Hinges, catch hooks etc.	Nr	4
Drain pipe 100mm	M	
Vent pipe 40/50 mm	M	4
Water seal (U- shaped)	Nr	
Cast iron manhole cover 450mm. dia.	Nr	
Perforated concrete rings, 3 ft	Nr	
Non-perforated concrete rings, 3 ft	Nr	
Concrete ring slabs	Nr	

Direct double pit latrine without pour-flush

Brief description

This latrine consists of two pits which are covered with two slabs with each a drop hole and a vent pipe covered with fly screens but only one superstructure. Only one pit is used at the time. When the contents of the pit reach the level of 0.5 meter below the slab, its drop hole is covered and the second pit is used. After a period of at least one-year, the contents of the first pit can be removed safely and used as soil conditioner. This pit can be used again when the second pit has filled up. This alternating cycle can be repeated indefinitely.
Wind blowing across the top of the vent pipe creates a flow of air which sucks out the foul smelling gasses from the pit. The vent pipe plays also an important role in the insect control. Insects are attracted to light and if the latrine is suitable dark inside they will fly up the vent pipe to the light. They cannot escape because of the fly screen, so they are trapped in the top of the pipe until they dehydrate and die.

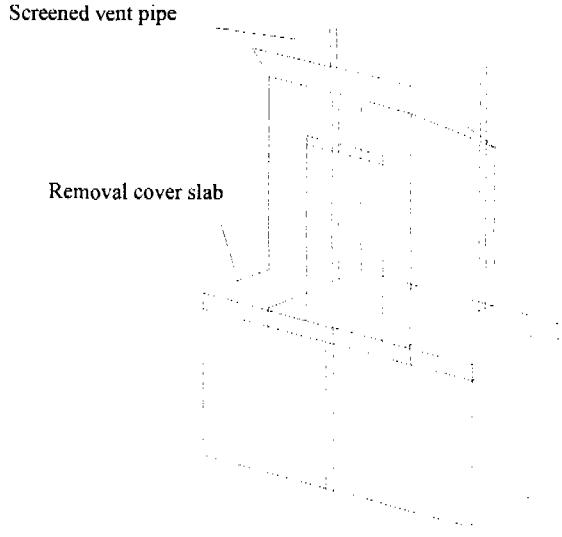
Suitability

The direct double pit latrine without pour flush is suitable:

- for areas where in the wet season, the maximal (highest) groundwater level is at least 1 meter below floor/slab level (to allow sufficient infiltration), and in the dry season, the minimal ground water level at least 2 meter below the floor/slab level (to allow the drying up of the sludge during the dry season)
- for soils with low permeability, but not for soils with an infiltration capacity lower than 11 l/m^{2}day such as clay soils (to allow sufficient infiltration of urine and the water used for cleansing)
- for loose soils if fully lined
- because it does not require any water for flushing
- because it is easy to construct
- because it is easy to maintain

What is special to this type?

- Pit directly under latrine building
- No water seal
- Ventilation trough the vent pipe
    - Maximal ground water level at least 1 meter below
    - floor level
    - Minimal roundwater level at least 2 meters below floor level
    - Full lining (which needs to be perforated to allow infiltration) needed
    - Use one pit at the time (alternating)
    - Pit should be emptied before the contents of the other
    - pit reach 0.5 meter below the slab
    - Pit should be emptied at the end of the dry season and preferably during the school holiday
    - Pit sludge is safe



Cost

- Construction cost approx. 12,000 Thaka including full lining, plus 8,000 – 11,000 Thaka for the construction of a superstructure
- Maintenance cost approx. 800 Thaka per year

Operation

Operation of this latrine is quite simple and consists of regular cleaning the slab with a limited amount of water and if available a limited amount of detergents, to remove any excreta and urine. The floor, squatting pan, door handles and other parts of the superstructure have to be cleaned daily. The door must always be closed so the superstructure remains dark inside. The drop hole should never be closed as this blocks airflow.

Maintenance

For the maintenance every month the floor slab has to be checked for cracks and the vent pipe and fly screen must be inspected to ensure they are not corroded or damaged. Repair of the superstructure may be necessary too. In the double pit system the caretaker should regularly check the level of the contents of the pit. If the contents of the pit reach 0.5 meter below the slab, the other pit has to be emptied. This must be preferably done at the end of the dry season so that the content is relatively dry. The squat hole is sealed and the other pit is taken into use. If the pit has been properly closed for at least twelve to fifteen months the contents of the pit have decomposed into harmless humus which forms a good fertiliser.

Actors implied and skills required for the construction and the O&M

The caretaker will be responsible:

- to keep the latrines clean
- to inspect for damages and cracks
- to perform small repairs
- to monitor the level of the contents of the pit
- to empty the full pit if the sludge is safe
- to dispose the safe sludge (humus) and to switch over to the other pit

The local unskilled labour could be involved in:

- the digging of the pits
- the transfer of pits
- the emptying of the full pit if the sludge is safe
- the execution of small repairs on the slab and the superstructure

The skills of the local mason are needed for:

- the building of the latrines
- might be needed for the transfer of the slab and superstructure to the new pit

Problems and remarks

- Odour problems may occur during the night and early morning in latrines relying more on solar radiation for the air flow in the vent pipe than on wind speed.
- Pits can be emptied manually if their contents have been left to decompose at least for a year.
- In areas with soils with a low infiltration capacity (around 11 l/m^2.day or lower) the use of water for cleansing should be limited or even better be avoided.
- An extra concern for the double pit latrine system could be that the content of the pit may not decompose safely because the double pits are too close to each other without an effective seal between them, allowing liquids to percolate from one pit to another.

Required Labour

For the substructure only

	Units	Quantities
Masons	days	4
Unskilled labourers	days	15

Required materials

For the substructure only

	Units	Quantities
Cement	Bags	8
Khoa	M^3	3.4
Sand	m^3	1.2
Bricks	nr	1125
Steel bars	kg	15.2
Latrine slab	nr	
Latrine pan	nr	2
Hinges, catch hooks etc.	nr	8
Drain pipe 100mm	m	
Vent pipe 40/50 mm	m	8
Water seal (U- shaped)	nr	
Cast iron manhole cover 450mm. dia.	nr	
Perforated concrete rings, 3 ft	nr	
Non-perforated concrete rings, 3 ft	nr	
Concrete ring slabs	nr	

Offset single pit latrine with pour-flush

Brief description

The superstructure of an offset single pit latrine with pour-flush is half a meter away from the leach pit. A short length of sufficiently sloping (1:10) PVC leads from the U trap of the pan down to the pit. The pour-flush latrines overcome the problems of flies, mosquitoes and odour by the installation of a pan with a water seal (a U-shaped conduit partly filled with water) in the defaecation hole. After using the latrine, it is flushed by pouring two and half liters of water in the pan.

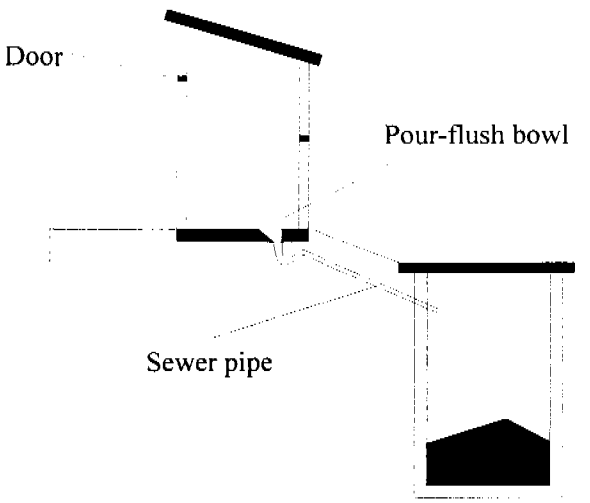
Suitability

The direct single pit latrine with pour-flush is suitable:

- for high ground water table, if raised and connected to a soak-away
- for areas prone for floods, tidal floods or flushes, if raised
- for loose soils, if fully lined
- for soils with low permeability, if built with soak-away
- but does require water for flushing
- because it is easy to construct
- because it is easy to maintain

What is special to this type

- Leach pit behind the latrine building
- Water seal; water needed for pour-flush
- Pit as deep as possible (until groundwater level)
- Full lining (which needs to be perforated to allow infiltration) only needed if soil is unstable
- Pit sludge not safe when pit is emptied
- Empty by removing the slab
- Soak-away needed if soil does not absorb water (low permeability), see the Fact Sheet description of a soak-away



Cost

- Construction cost approx. 9,000 Thaka including full lining plus 8,000 to 11,000 Thaka for the construction of a superstructure
- Maintenance cost approx. 400 Thaka per year

Operation

Before use the pan is wetted with a little water to avoid faeces sticking to the pan. After use the pan is flushed with maximal two and half liters of water. No material that could obstruct the U-trap should be thrown into the pan. Furthermore the operation consists of regular cleaning. The slab should be regularly cleaned with a limited amount of water and limited amount of detergents, to remove any excreta and urine. The floor, squatting pan, door handles and other parts of the superstructure have to be cleaned daily.

Maintenance

Pan and U-trap have to checked monthly for cracks. If the excreta does not flush quickly, the PVC pipes may be choked. Unblocking without delay using scoops and long twigs is needed. Repair of the superstructure may be necessary too.
Every year, at the end of the dry season, part of the faeces should be dug out. As these faeces have not decomposed yet, these should be handled with care and buried in a pit covered with soil. After at least a year, when the contents of this pit have decomposed into harmless humus it can be can be used as a good fertiliser.

Actors implied and skills required for the construction and the O&M

The caretaker will be responsible:

- to keep the latrines clean
- to inspect for damages and cracks
- to perform small repairs
- to monitor the level of the contents of the pit
- to empty the pit at the end of the dry season and preferably during the school holiday
- to transfer the unsafe sludge to a temporary pit

The local unskilled labour could be involved in:

- the digging of the pit
- the emptying of the pit and transferring the unsafe sludge to a temporary pit
- the execution of small repairs on the slab and the superstructure

The skills of the local mason are needed for:

- the building of the latrines
- might be needed for the transfer of the slab and superstructure to the new pit

Required Labour

For the substructure only

	Units	Quantities
Masons	days	4
Unskilled labourers	days	9

Required materials

For the substructure only

	Units	Quantities
Cement	bags	3.8
Khoa	m^3	1.9
Sand	m^3	1.1
Bricks	nr	411
Steel bars	kg	6
Latrine slab	nr	
Latrine pan	nr	1
Hinges, catch hooks etc.	nr	4
Drain pipe 100mm	m	3.5
Vent pipe 40/50 mm	m	
Water seal (U- shaped)	nr	1
Cast iron manhole cover 450mm. dia.	nr	
Perforated concrete rings, 3 ft	nr	15
Non-perforated concrete rings, 3 ft	nr	5
Concrete ring slabs	nr	2

Offset double pit latrine with pour-flush

Brief description

The superstructure of an offset double pit latrine with pour-flush latrine is a short distance away from the two leach pits. A short length of sufficiently sloping (1:10) PVC leads from the U trap of the pan down to the pit. The pour-flush latrines overcome the problems of flies, mosquitoes and odour by the installation of a pan with a water seal (a U-shaped conduit partly filled with water) in the defaecation hole. After using the latrine, it is flushed by pouring two and half liters of water in the pan.
The double offset systems enables alternating use of the two pits. When the first pit is full it should be left for at least twelve to eighteen months, the period required for adequate pathogen destruction. When after this period the second pit gets filled up, the decomposed contents of the first pit can safely be removed by hand and used as organic fertilizer.

Suitability

The offset double pit latrine with pour-flush is suitable:

- for high ground water table, if raised and connected to a soak-away
- for areas prone for floods, tidal floods or flushes if raised
- for loose soils if fully lined
- for soils with low permeability, if connected to a soak-away
- but does require water for flushing
- because it is fairly easy to construct
- because is easy to maintain

What is special to this type?

- Leach pit behind the latrine building
- Water seal; pour-flush needed
- Pit not very deep, until ground water level
- Full lining (which needs to be perforated to allow infiltration) needed
- Use one pit at the time (alternating)
- Empty full one just before other pit is full by removing slab
- Pit sludge is safe
- Can be connected to a soak-away

Cost

- Construction cost approx. 13,000 Thaka including full lining plus 8,000-11,000 Thaka for the construction of a superstructure
- Maintenance cost approx. 700 Thaka per year

Operation

Before use the pan is wetted with a little water to avoid faeces sticking to the pan. After use the pan is flushed with two and half liters of water. No material that could obstruct the U-trap should be thrown into the pan. Furthermore the operation consists of regular cleaning. The slab should be regularly cleaned with a limited amount of water and limited amount of detergents, to remove any excreta and urine. The floor, squatting pan, door handles and other parts of the superstructure have to be cleaned daily.

Maintenance

Pan and U-trap have to be checked monthly for cracks, and the diversion box for blockage. If the excreta does not flush quickly, the PVC pipes or diversion box may be choked. Unblocking without delay using scoops and long twigs is needed. Repairs of damages and cracks of the superstructure may be necessary too. In the double pit system the caretaker should regularly check the level of the contents of the pit. If the contents of the pit reach the inflow pipe level, the other pit has to be emptied. This must be at the end of the dry season (and preferably during the school holiday) so that the content is relatively dry. If a pit is full the PVC pipe to this pit is blocked in the diversion box and the other pit is taken into use. If the pit has been properly closed for at least twelve to fifteen months the contents of the pit have decomposed into harmless humus which forms a good fertiliser.

Actors implied and skills required for the construction and the O&M

The caretaker will be responsible:

- to keep the latrines clean
- to unblock choked pipes and diversion box
- to inspect for damages and cracks
- to perform small repairs
- to monitor the level of the contents of the pit
- to empty the pit if the sludge is safe
- to switch over to the other pit

The local unskilled labour could be involved in:

- the digging of the pits
- the transfer to another pit
- the emptying of the pits if the sludge is safe
- the execution of small repairs on the slab and the superstructure

The skills of the local mason are needed for:

- the building of the latrines

Problems and remarks

- Frequents problems could be problems such as the blocking of U-trap because of bad design or improper use or the damage of U-trap caused by improper unblocking. Pour-flush latrines are unsuitable where it is common practice to use bulky materials for cleansing which can not be flushed through the U-trap.
- An extra concern for the offset double pit latrine with pour-flush could be that the content of the pit may not decompose safely because the double pits are too close to each other without an effective seal between them, allowing liquids to percolate from one pit to another.

Required Labour

For the substructure only

	Units	Quantities
Masons	Days	6
Unskilled labourers	Days	13

Required materials

For the substructure only

	Units	Quantities
Cement	bags	5.8
Khoa	m^3	2.8
Sand	m^3	1.3
Bricks	nr	580
Steel bars	kg	10
Latrine slab	nr	
Latrine pan	nr	1
Hinges, catch hooks etc.	nr	4
Drain pipe 100mm	m	7.5
Vent pipe 40/50 mm	m	
Water seal (U- shaped)	nr	1
Cast iron manhole cover 450mm. dia.	nr	
Perforated concrete rings, 3 ft	nr	22
Non-perforated concrete rings, 3 ft	nr	8
Concrete ring slabs	nr	3

Soak-away as possible addition for:
the offset single pit latrine with pour-flush
the offset double pit latrine with pour-flush

Brief description

A soak-away is a pit into which the liquid effluents from the leach pit are disposed to infiltrate into the ground. The size of the soak-away should not be less than that of the leach pit. The pit may be filled with stones, broken bricks, etc., in which case no lining is needed, or lined with precast RCC rings. The top 0.3 m (the upper ring) should be a "non" perforated ring. If no lining is used, the top 0.5. meter should be lined to provide a firm support for the reinforced concrete cover slab.

Suitability

The off set single pit latrine with pour-flush and with soak-away and the offset double pit latrine with pour-flush and with soak-away are suitable:

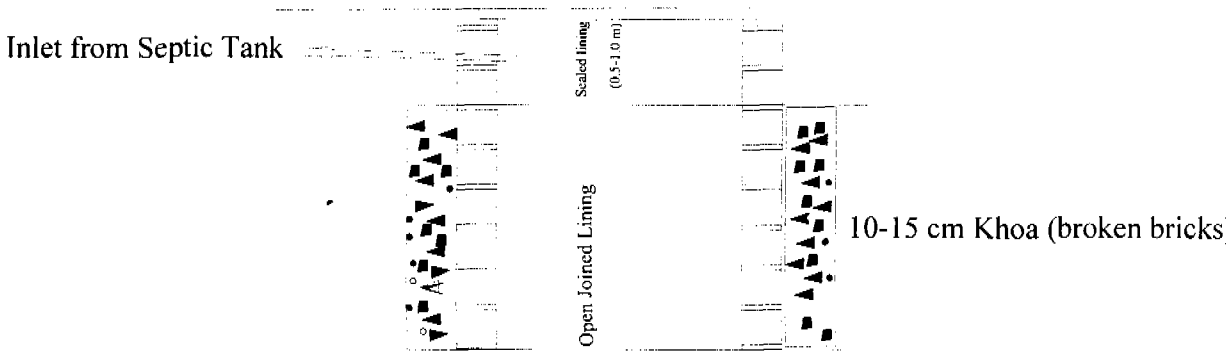
- for high ground water table, if raised
- for areas prone for floods, tidal floods or flushes if raised
- for loose soils if fully lined
- for soils with low permeability
- but do require water for flushing
- because they are easy to fairly easy to construct
- because they are fairly easy to maintain

What is special to this type (soak-away)?

- Needed to make absorption of all liquids possible
- Full pit lining needed if soil unstable
- If lined, put *khoa* outside lining
- Make pit as deep as possible

Cost

- Construction cost for the soak-away approx. 5,000 Thaka
- Maintenance cost approx. 200 Thaka per year



Operation

Hardly any activities for operation are required, except for observing if overflowing occurs.

Maintenance

The maintenance activities consist of unblocking the delivery pipe if necessary, repair the broken parts and remove the obstructions in delivery pipes.

Actors implied and skills required for the construction and the O&M

The caretaker is responsible:

- to check the outflow and the performance of the soak-away
- to clean if necessary

The skills of the local artisan will be needed for:

- the repair of the broken parts
- removing the obstructions in delivery pipes
- the construction of the soak-away

Problems and remarks

Planting of trees adjacent to the soak-away can improve both transpiration and permeability.

Required Labour

For the substructure only

	Units	Quantities
Masons	days	1
Unskilled labourers	Days	4

Required materials

For the substructure only

	Units	Quantities
Cement	Bags	0.3
Khoa	m^3	2
Sand	m^3	0.02
Bricks	Nr	12
Steel bars	Kg	2.8
Latrine slab	Nr	
Latrine pan	Nr	
Hinges, catch hooks etc.	Nr	4
Drain pipe 100mm	M	3.5
Vent pipe 40/50 mm	M	
Water seal (U- shaped)	Nr	
Cast iron manhole cover 450mm. dia.	Nr	
Perforated concrete rings, 3 ft	Nr	10
Non-perforated concrete rings, 3 ft	Nr	2
Concrete ring slabs	Nr	

Solar-heated single-vault ecological latrine with urine separation

Brief description

In ecological sanitation the prevention of the transmission of diseases is the most important factor. Also any pollution of the environment, both of water and soil, is prevented. On the other hand the valuable nutrients present in human faeces can be returned to the soil. To block the transmission of diseases and pollution of the environment, the disease agents in the human faeces must be killed as quickly as possible. That is achieved by dehydrating the fresh faeces. To maintain a very dry condition in the vault, this construction must be water tight, especially as there is a lot of rain and often flooding in our village. To keep the material in the vault dry, it is not allowed that the urine and the cleansing water drains into the vault, so that is diverted to a trough and drained to a flower bed (below the ground level). A small amount of ash is thrown over the faeces after every use. Actually, this design uses the heat of the sun to remove any moisture from the material by heating it up and have the moist removed through the ventilation pipe. At the backside of the latrine, the metal cover is painted black and directed to the south to have a maximum exposure to the sun. Every other week, the fresh faeces are raked towards the back of the vault where it dries up further into a safe, non-smelling humus product. This product can be handled and transported without risks. It is excellent fertiliser for the field. The solar-heated single-vault latrine is a continuous system. It needs very good care and proper use, and strict operation and maintenance.

Suitability

The single-vault eco-latrine is suitable:

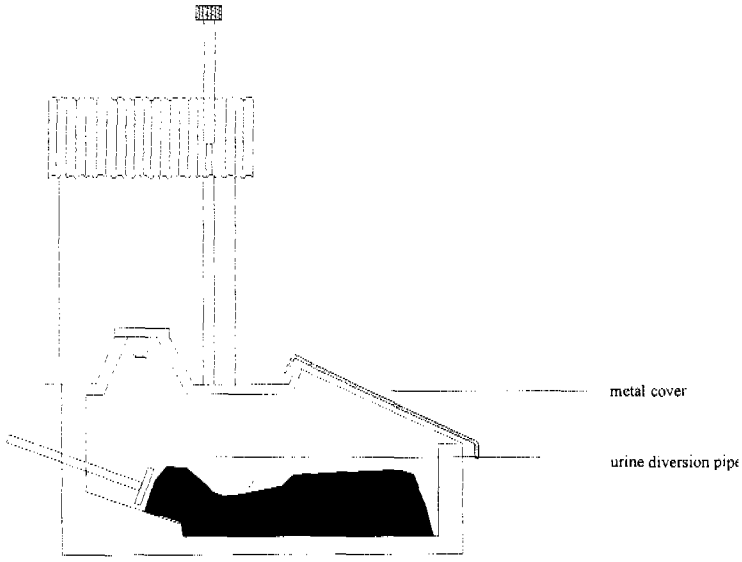
- if school management and users (teachers and students) at school have a high motivation for using the eco-latrine requiring more user attention
- if advantages of this ecological sanitation are appreciated in view of health and environment (the risks for sanitation-related diseases need to be reduced to a minimum level; groundwater contamination prevented, important if groundwater from nearby the school is used for drinking)
- if caretakers understand the process and are motivated to meet the operation and maintenance requirements
- if a safe dry material is wanted (or can be sold) for use as fertiliser; urine can also be used as fertiliser
- for areas with high ground water table and areas with regular flooding
- for areas with soils having very low permeability
- if conditions do not allow pour-flush toilets or direct pit latrines
- if water for flushing is not available

What is special to this type?

- One single water-tight vault
- Solar heating at the back of the latrine (pointing southwards) through light-metal cover that is painted black; solar heating speeds up drying of faecal material
- Vault directly under slab; straight drop hole without water seal

- Separation of urine and cleansing water to avoid too moist material in vault
- Urine and cleansing water are drained (below the ground level) into bed with plants or flowers
- Ventilation to reduce moisture (and possible bad smells)
- Dry (dehydrated) material is very safe and can be removed after quarter of a year
- Needs special care both in use and in operation and maintenance
- Not suitable if people are not allowed to touch the dry decomposed material for religious reasons

Cost



- Construction cost in El Salvador of the household type costs about US$ 165 or 8,250 Thaka, including superstructure.
- Operation and maintenance cost are not known for the situation in Bangladesh.
- The dry material usable as fertiliser can be sold to farmers.

Operation

The use and operation of this eco-latrine needs special attention, and therefore adequate user-education and (health) motivation is needed. This special care is needed because the urine and the cleansing water are not allowed to flow into the vault. The cleansing water is collected in a trough and mixed with the urine. This mix may contain pathogens and therefore it is definitely not safe to handle. The mix is drained in a bed (below the surface) next to the latrine in which plants or flowers can grow. Special care is to be taken to keep the material in the vault as dry as possible as this stimulates the dehydration process. Wet material in the vault will smell, attracts flies and other insects, and pathogens will survive longer. If the content in the vault is too wet, even with the solar heating, the material is not safe to handle after the recommended period of 12 weeks of intervals.

Every evening an extra two cups of ash are spread over the fresh faeces. Once every other week, the dry material is raked towards the backside of the vault to avoid accumulation on one heap. This also speeds up the drying of the material in the vault. The floor of the latrine needs to be cleaned daily with a minimum of water that is drained away through the special trough. Care must be given that the drain holes for urine and water do not get choked with solid materials.

Maintenance

Every twelve weeks, the dried, safe material heaped up at the backside of the vault needs to be removed. To be at the safe side, it is first put in bags and stored for at least another two months before it is applied on the fields or gardens. If the urine-drain gets choked it has to be unblocked. The light-metal vault cover needs to be painted black every other year. The hinges need to be greased regularly. The concrete and brick construction including floor and walls has to be checked for cracks, and be repaired if needed. The fly screen over the ventilation pipe has to be inspected to see whether it is still intact. Otherwise it has to be replaced. The plants or flowers on the bed need to be cut.

Actors involved and skills required for the construction and O&M

The caretaker will be responsible:

- to keep the inside of the latrines clean
- to rake the dry faeces from the heap under the drop hole to the backside of the vault under the solar heater.
- to add daily extra ashes on top
- to check that urine drain pipes do not get choked
- to inspect damages and cracks
- to make small repairs

Local unskilled labour could be involved in:

- assisting in preparing the foundation and construction of the eco-latrine
- emptying of the vault content into gunny or nylon bags and after storage transporting it to the fields

The local skilled mason is needed for:

- the building of the double-vault eco-latrine

Problems and remarks

Teachers and students at the school need to be educated on the use and functioning of the eco-latrine. This type of sanitation fits in the ecological cycle of nutrients; the system and processes can be explained in the physics ad environmental science classes in the higher grades. Hygiene education is needed to make users aware of the importance of proper use, and to indicate that the dehydrated dry faeces are safe to handle. Although the habit may be that cleansing is done over the drop hole, in this system it must be done over the trough next to it to avoid liquids entering the vault. If this is an issue for some or many in our society we should discuss it seriously. Also the handling of the dry material (that is actually dehydrated human faeces) may be a serious issue that needs to be discussed as many may not find that (easily) acceptable for religious reasons. From other Muslim countries, the experience is that people's reservations disappear when they see the results of the properly managed eco-latrines. A visit to other eco-latrines at schools

in the region or to the demonstration latrine at the NGO office could be organised. For boys and male teachers, and for girls separate urinals should be built to reduce the risks to moisten the vault content but also to reduce the construction cost as urinals are much cheaper and also more convenient.

Double-vault ecological latrine with urine separation

Brief description

In the faeces of people agents are usually present that can cause all kinds of diseases. If these agents come in contact with ground water, it gets contaminated and the water may transfer diseases if drunk untreated. If the faeces are kept dry these so-called pathogens die off very quickly; most within an hour, some strong ones may survive for a maximum of a few months under these conditions. Therefore, the urine and the water used for cleansing must be separated from the faeces. Usually, a small amount of ash is added after each use. This dry (faecal) material does not attract flies and it also does not smell. The resulting dry and safe material could be used as fertiliser, if wanted.

This ecological latrine has two chambers placed on a solid reinforced concrete floor. The entire construction is placed above the ground level. If flooding occurs, the opening for removal of the dry material is placed 60 cm (or more) above the ground level. In the double-vault system one vault is in use at the time. If the one in use is nearly full (design period six months), it is sealed with dry soil, and the other vault is used from then other until it is nearly full. Removal of dry material can easily be done by shovel. The ventilation helps to make the material drier as it allows the moisture to disappear.

Suitability

The double-vault eco-latrine is suitable:

- if school management and users (teachers and students) at school have a high motivation for using the eco-latrine requiring more user attention
- if advantages of this ecological sanitation are appreciated in view of health and environment (the risks for sanitation-related diseases need to be reduced to a minimum level; groundwater contamination prevented, important if groundwater from nearby the school is used for drinking)
- if caretakers understand the process and are motivated to meet the operation and maintenance requirements
- if a safe dry material is wanted for use as fertiliser; urine can also be used as fertiliser
- for areas with high ground water table and areas with regular flooding
- for areas with soils having very low permeability
- if conditions do not allow pour-flush toilets or direct pit latrines
- if water for flushing is not available
- because it is easy to construct

What is special to this type?

- Two water tight vaults
- Vaults directly under slab; straight drop hole without water seal
- Separation of urine and cleansing water to avoid too moist material in vault
- Urine and anal cleansing water are drained (below ground level) into bed with plants or flowers
- Ventilation to reduce moisture (and possible bad smells)

- Dry material is very safe and can be removed after half a year (intervals of shifting)
- Needs special care both in use and in operation and maintenance
- Not suitable if people are not allowed to touch the dry decomposed material for religious reasons

Cost

- Construction in India for the household type costs about US$ 100 or 5,000 Thaka, including superstructure with brick walls, CIS roof and GI door with angle frame
- Operation and maintenance cost are not known for the situation in Bangladesh.
- The dry material usable as fertiliser can be sold to farmers.

Operation

The use and operation of this eco-latrine needs special attention, and therefore adequate user-education and (health) motivation is needed. This special care is needed because the urine and the cleansing water are not allowed to flow into the vault. The cleansing water is collected in a trough and mixed with the urine. This mix may contain pathogens and therefore it is definitely not safe to handle. The mix is drained into a bed (below the surface) next to the latrine in which plants or flowers can grow. Special care is to be taken to keep the material in the vault as dry as possible as this stimulates the dehydration process. Wet material in the vault will smell, attracts flies and other insects, and pathogens will survive longer. If the content is wet, the result will not be a safe material after a six-month interval, and is therefore also not safe to handle. Every evening an extra two cups of ash are spread over the fresh faeces. Once a week, the dry material is spread over the entire surface of the vault to avoid accumulation on one heap. This is done through the drop-hole using a stick that is kept in the plant bed next to the latrine. The floor of the latrine needs to be cleaned daily with a minimum of water that is drained away through the special trough. Care must be given that the drain holes for urine and water do not get choked with solid materials.

Maintenance

Maintenance is needed in the shifting to the empty vault when the one in use is about to become full that is if the dry material level is less than 40 cm from the latrine floor. The full vault is then sealed with dry soil and the drop hole covered with a small concrete slab and lean mortar. Emptying of the vault is done from the back by opening the wall and removing the dry, smell-free and safe humus-like material. This material can be used (sold) as fertiliser. At the bottom of the vault dry material such as rice straw or grasses are put to receive the faeces and absorb the moisture. The back-wall of the emptied vault is closed again with bricks and lean mortar. If the urine-drain gets choked it has to be unblocked.

The concrete and brick construction including floor and walls has to be checked for cracks, and be repaired if needed. The fly screen over the ventilation pipe has to be inspected to see whether it is still intact. Otherwise it has to be replaced. The plants on the bed need to be cut.

Actors involved and skills required for the construction and O&M

The caretaker will be responsible:

- to keep the inside of the latrines clean
- to level the dry faeces in the vault in use and put extra ashes on top
- to check that urine drain pipes do not get choked
- to inspect damages and cracks
- to make small repairs
- to monitor the level of the dry faecal material in the vault
- to seal the full vault with dry soil and the drop hole with a slab and lean mortar

Local unskilled labour could be involved in:

- assisting in preparing the foundation and construction of the eco-latrine
- emptying of the vault content and transporting it to the fields

The local skilled mason is needed for:

- the building of the double-vault eco-latrine
- the opening of the back-wall of the vault to be emptied
- the closing of the back-wall of the emptied vault

Problems and remarks

Teachers and students at the school need to be educated on the use and functioning of the eco-latrine. This type of sanitation fits in the ecological cycle of nutrients; the system and processes can be explained in the physics ad environmental science classes in the higher grades. Hygiene education is needed to make users aware of the importance of proper use, and to indicate that the dehydrated dry faeces are safe to handle. Although the habit may be that cleansing is done over the drop hole, in this system it must be done over the trough next to it to avoid liquids entering the vault. If this is an issue for some or many in our society we should discuss it seriously. Also the handling of the dry material (that is actually dehydrated human faeces) may be a serious issue that needs to be discussed as many may not find that (easily) acceptable for religious reasons. From other Muslim countries, the experience is that people's reservations disappear when they see the results of the properly managed eco-latrines. A visit to other eco-latrines at schools in the region or to the demonstration latrine at the NGO office could be organised. For boys and male teachers, and for girls separate urinals should be built to reduce the risks to moisten the vault content but also to reduce the construction cost as urinals are much cheaper and also more convenient.

Pour-flush latrine with 2-chamber septic tank with soak-away

Brief description

The pour-flush latrine is about one meter away from the septic tank. A short length of sufficiently sloping PVC (1:10) leads from the U trap of the pan down to the tank. The pour-flush latrine overcomes the problems of flies, mosquitoes and odour by the installation of a pan with a water seal (a U-shaped conduit partly filled with water) in the defeacation hole. After using the latrine, it is flushed by pouring water in the pan.

A septic tank is a watertight settling tank to which wastes are carried by water flushed down a short PVC pipe. A septic tank does not dispose of wastes; it only helps to separate and digest the solid matter. The liquid effluent flowing out of the tank is from a health point of view as dangerous as raw sewage and remains to be disposed of by soaking into the ground trough the soak-away. The sludge accumulating in the tank must be removed regularly, usually once every one to five years, depending on site, number of users and kind of use.

In double-compartment tanks the first compartment has twice the volume of the second. The total volume of the tank should be at least three times of the average volume of water used daily. The conventional septic tank works well where the soil conditions are suitable. Every tank must have a ventilation system to allow escape of explosive gases from the tank. Septic tanks are more expensive than other on site sanitation systems and require sufficient piped water.

A soak-away is a pit into which the liquid effluents from the septic tank are disposed to infiltrate into the ground. The capacity of the pit should not be less than that of the septic tank. The pit may be filled with stones, broken bricks, etc., in which case no lining is needed, or lined with precast RCC rings. The top 0.3 m (the upper ring) should be a "non" perforated ring. If no lining is used, the top 0. meter should be lined to provide a firm support for the reinforced concrete cover slab.

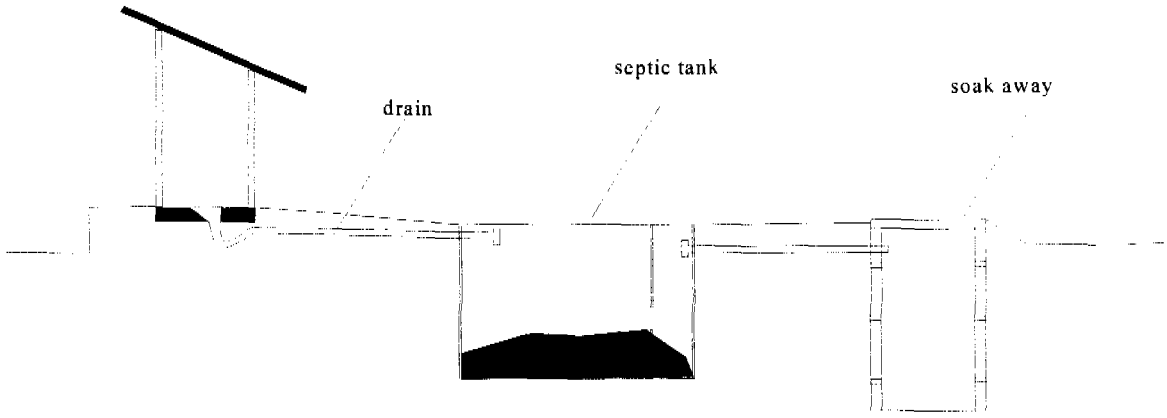
Suitability

The pour flush latrine with 2-chamber septic tank with soak-away is suitable:

- for high ground water table, if raised
- for areas prone for floods, tidal floods or flushes if raised
- for loose soils
- for soils with low permeability
- where a lot of water is used for flushing
- but it is not easy to construct
- but it is not easy to maintain

What is special to this type?

- Sludge remains in septic tank
- Liquids flow to soak-away
- Sludge from tank is not safe when removed



Cost

- Construction cost of the septic tank with soak-away approx. 83,000 Thaka
- Construction cost of superstructure approx. 8,000 – 11,000 Thaka
- Maintenance cost approx. 2,500 Thaka per year

Operation

Regular cleaning of the toilet with a bit of detergent is unlikely to be harmful, the use of large amounts of detergents or chemicals may disturb the biochemical process in the tank. Unblocking of the U-trap when blocked. On a monthly base the floor, squatting pan, U-trap need to be checked and if necessary small repairs need to be carried out. When the tank is full it needs to be emptied. This needs to be done al least once every five years. And as the sludge is not safe this is preferably done mechanically or if manually then the sludge needs to be handled with extreme care. The removed sludge needs to be buried in a pit and covered with soil. After a year, when the contents of the pit have decomposed into harmless humus it can be used as a good fertiliser.

Maintenance

Routine inspection is needed to check whether desludging is needed and to ensure that there are no blockages to the inlet or the outlet. The tank should be emptied when solids occupy between one-half and two thirds of the total depth between the water level and the bottom of the tank.

Actors implied and skills required for the construction and the O&M

The caretaker is responsible:

- to keep the latrines clean
- to inspect for damages and cracks
- to perform small repairs
- to unblock u-trap when blocked
- to control the vents
- to monitor the level of the contents of the tank
- to contact a firm or contractor for the emptying of the tank when necessary

A local artisan can be involved:

- in the repair of the squatting pan, U-trap or any other repair on the structures

A firm or contractor is needed:

- for emptying the tank
- controlling the tank and the vents
- to carry out major repairs if needed

Problems and remarks

- Many problems are due to inadequate consideration being given to amount of liquid disposed. Large flows entering the tank may cause a temporarily high concentration of suspended solids in the effluent owning to disturbance of the solids, which have settled out.
- This type of latrine is unsuitable for areas where water is scarce and where financial resources are insufficient for construction of the system, or where safe tank emptying cannot be done or afforded.

Required Labour

For the substructure only

	Units	Quantities
Masons	days	24
Unskilled labourers	days	77

Required materials

For the substructure only

	Units	Quantities
Cement	bags	52.3
Khoa	m^3	2.1
Sand	m^3	8.5
Bricks	nr	17.517
Steel bars	kg	52
Latrine slab	nr	
Latrine pan	nr	1
Hinges, catch hooks etc.	nr	6
Drain pipe 100mm	m	6
Vent pipe 40/50 mm	m	3.5
Water seal (U- shaped)	nr	1
Cast iron manhole cover 450mm. dia.	nr	3
Perforated concrete rings, 3 ft	nr	
Non-perforated concrete rings, 3 ft	nr	
Concrete ring slabs	nr	

Pour-flush latrine with 2-chamber septic tank with drainage field

Brief description

In this fact sheet attention is only given to the issue related to a drainage field. Therefore this fact sheet should be read in combination with the Fact sheet on the pour flush latrine with 2-chamber septic tank and soak-away.

A drainage field consists of gravel filled underground trenches, into which the liquid effluents coming form the septic tank are led through open-joint (stoneware) or perforated (PVC) pipes, allowing the effluents to filtrate into the ground. Initially the infiltration into the ground might be high, but after several years the soil clogs and an equilibrium infiltration rate is reached. If the sewage flow exceeds the equilibrium rate of the soil, eventually the sewage will surface over the drainage field.
Trenches are usually 0.3-0.5 m wide with a depth of 0.6-1.0 m below the top of the pipes. They are laid with a 0.2-0.3% gradient and containing 20-50 mm diameter gravel with 0.3 to 0.5 m of soil on top, with a barrier of straw or building paper to prevent soil from washing down. They should be laid in series so that as each trench fills it overflows to the next one. This ensures that each trench is used either fully or not at all.
Trenches should be 2 m apart, or twice the trench depth if this is greater than 1 m. The bottom of a trench should be at least 0.5 to 1 m above groundwater, bedrock or impermeable soil and land slope should not exceed 10%. An equal area of land should be kept in reserve for possible extension or replacement of the drain field if it becomes clogged.
Compared to a soak-away, a drainage field is often used where larger quantities of liquid effluents are produced.

Suitability

The pour flush latrine with drainage field is suitable:

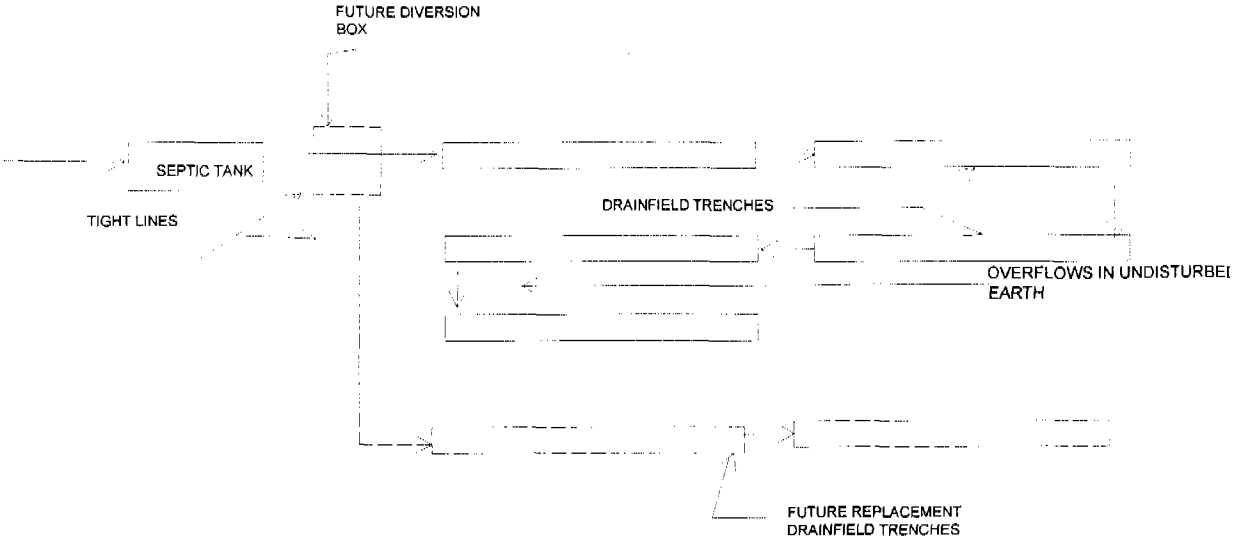
- for areas prone for floods, tidal floods or flushes if raised
- for loose soils
- for soils with very low permeability
- for latrines that require water for flushing
- but is not easy to construct
- but is not easy to maintain
- but is not suitable for high ground water table

What is special to this type?

- Sludge remains in pit
- Liquids flow to drain pipes
- Sludge from pit is not safe when removed
- Only possible if soil absorbs liquids

Cost

- Construction cost for a septic tank with a drainage field are approx. the same or higher that the cost of a septic tank with soak-way (excluding the cost of the latrine superstructure)
- Maintenance cost approx. 2,400 Thaka per year



Operation

Hardly any activities for operation and maintenance required, except for observing if overflowing occurs.

Maintenance

The maintenance activities for the drainage field are not very complicated. They consist of cleaning the tank outflow and checking if still in order, deblocking the delivery pipe if necessary, cleaning the diversion boxes from time to time, control plant growth to prevent roots from entering the trenches and carry out the necessary repairs.

Actors implied and skills required for the construction and the O&M

The caretaker is responsible:

- to check the outflow of the tank and the performance of the drainage field
- to control the plant growth
- to switch once every six to twelve months to another drainage field
- to clean the diversion boxes

The skills of the local artisan will be needed for:

- the repair of the broken parts
- for removing the obstructions in delivery pipes
- for the construction of the latrine and the drainage field

Problems and remarks

- The problems that can occur are overflowing leach lines, unpleasant odour, groundwater contamination and social conflict over siting of the drainage fields.
- A drainage field is unsuitable where insufficient space, water or financial resources for construction are available, where bedrock or groundwater are at shallow depth.

Required Labour

For the substructure only

	Units	Quantities
Masons	days	24
Unskilled labourers	days	77

Required materials

For the substructure only

	Units	Quantities
Cement	bags	52
Khoa	m^3	2
Sand	m^3	8.5
Bricks	nr	17.517
Steel bars	kg	50
Latrine slab	nr	
Latrine pan	nr	1
Hinges, catch hooks etc.	nr	6
Drain pipe 100mm	m	6
Vent pipe 40/50 mm	m	3.5
Water seal (U- shaped)	nr	1
Cast iron manhole cover 450mm. dia.	nr	3
Perforated concrete rings, 3 ft	nr	
Non-perforated concrete rings, 3 ft	nr	
Concrete ring slabs	nr	

Pour-flush latrine with 2-chamber septic tank with evapo-transpiration mound

Brief description

In this fact sheet attention is only given to the issue related to an evapo-transpiration mound. Therefore this fact sheet should be read in combination with the Fact sheet on the pour flush latrine with 2-chamber septic tank and soak-away.

Where the soil is impermeable or difficult to excavate or where the water table is near the surface a possible solution is the use of an evapo-transpiration mound. This ensures a greater depth and dispersion of the effluent's travel into the soil, as well as removing much of its water content through the evapo-transpiration of the plants planted on the top. An evapo-transpiration mound is filled with sand and gravel into which the liquid effluents coming from the septic tank are led through perforated laterals allowing the effluents to filtrate into the ground or to evapo-transpirate.

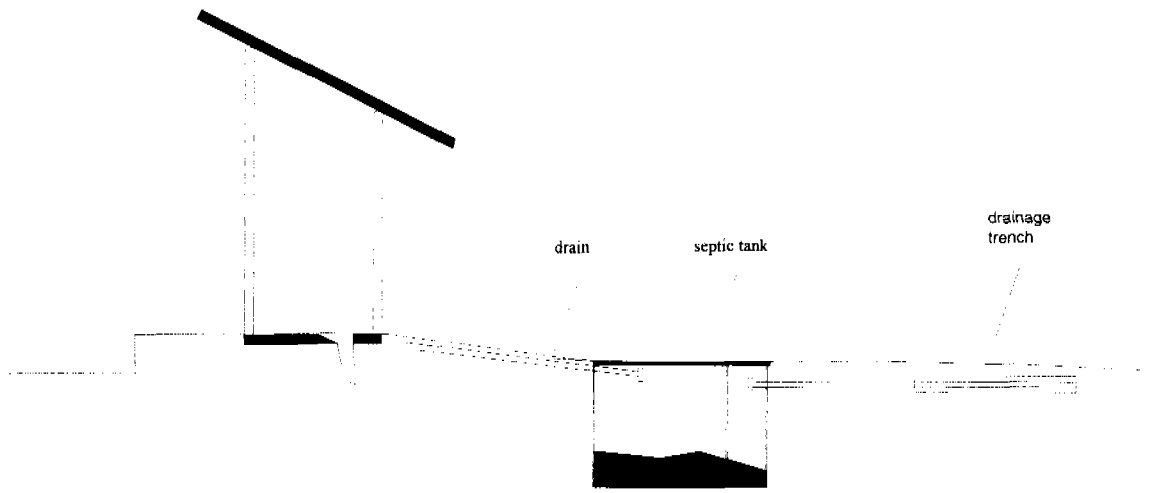
Suitability

The pour flush latrine with evapo-transpiration mound is suitable:

- for high ground water table, if raised
- for areas prone for floods, tidal floods or flushes if raised
- for loose soils
- for latrines that require water for flushing
- but is not easy to construct
- but is not easy to maintain

What is special to this type

- Sludge remains in the pit
- Liquids flow to evapo-transpiration mound
- Needed if very high groundwater level



Cost

- Construction cost for pour flush latrine with evapo-transpiration mound approx. the same or higher that the cost of a septic tank with soak-way (excluding the cost of the latrine superstructure)
- Maintenance cost approx. 2,400 Thaka per year

Maintenance

The maintenance activities for the evapo-transpiration mound are not very complicated. They consist of cleaning the tank outflow and checking if still in order, deblocking the delivery pipe if necessary, making sure that the grasses grow on top of the mound and carry out the necessary repairs.

Actors implied and skills required for the construction and the O&M

The caretaker is responsible:

- to check the outflow of the tank and the performance of the drainage field
- to ensure grass growth

The skills of the local artisan will be needed for:

- the repair of the broken parts
- removing the obstructions in delivery pipes
- the construction of the latrine and the drainage field

Required Labour

For the substructure only

	Units	Quantities
Masons	days	24
Unskilled labourers	days	77

Required materials

For the substructure only

	Units	Quantities
Cement	bags	52
Khoa	m^3	2
Sand	m^3	8.5
Bricks	nr	17.517
Steel bars	kg	50
Latrine slab	nr	
Latrine pan	nr	1
Hinges, catch hooks etc.	nr	6
Drain pipe 100mm	m	6
Vent pipe 40/50 mm	m	3.5
Water seal (U- shaped)	nr	1
Cast iron manhole cover 450mm. dia.	nr	3
Perforated concrete rings, 3 ft	nr	
Non-perforated concrete rings, 3 ft	nr	
Concrete ring slabs	nr	

Urinals

Brief description

Urinals must be seen as part and parcel of school sanitation facilitate as they reduce the number of latrines needed, and as urinal spaces are cheaper than latrines this reduces the over cost. Furthermore the use of urinals might prevent the accidental fouling of the boy's latrines, which is in many cases the prime cause of unpleasant odours.
One urinal may include several urinal spaces. A urinal space is 0.6 meter of urinal channel. Urinals can be built as separate buildings or as part of a toilet block, i.e. using the back or sidewall of the latrines.
A raised footstep with a slope separates the urine channel from the concrete floor. It is very important that a though plastic or stainless steel trap is incorporated in the drain to prevent debris blocking the pipes.
The compartment walls should be plastered and steel floated up to 1.2 meters above the floor. This should then be painted with a "urine" resistant washable paint.
The urinals will be connected to a soak-away (see for more information the soak-away fact sheet).

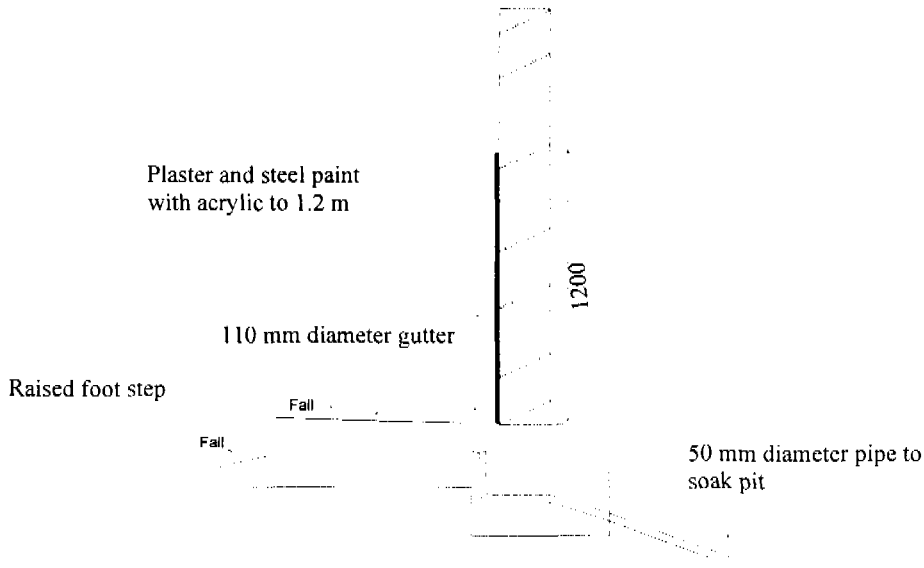
Suitability

The urinal is suitable:

- for high ground water table
- for areas prone for floods, tidal floods or flushes if raised
- for loose soils
- for soils with low permeability
- because it does require a bit of water
- because it is easy to construct
- because it is easy to maintain

What is special to this type

- For boys
- Easier than using latrines
- Cheaper than latrine



Detail of Urinal Design

Cost

- Construction cost approx. 1,500 Thaka
- Maintenance cost approx. 60 Thaka per year

Operation

Operation of the urinal is quite simple and consists of regular cleaning the raised footstep and the urine channel with a limited amount of water and if available a limited amount of detergents, to remove the urine.

Maintenance

For the maintenance every month the raised footstep, the urine channel and the floor have to be checked for cracks and damages. Repair of the superstructure may be necessary too.
The maintenance activities of the soak-away consist of unblocking the delivery pipe if necessary, repair the broken parts and remove the obstructions in delivery pipes.

Actors implied and skills required for the construction and the O&M

The caretaker will be responsible:

- to keep the urinals clean
- to remove obstructions in the delivery pipes
- to inspect for damages and cracks
- to perform small repairs
- to check the outflow and the performance of the soak-away

The local unskilled labour could be involved in:

- the digging of the pits
- the execution of small repairs on the slab and the superstructure

The skills of the local mason are needed for:

- the building of the urinals
- the construction of the soak-away

Problems and remarks

Planting of trees adjacent to the soak-away can improve both transpiration and permeability.

Required Labour

Excluding the construction of a soak-away

	Units	Quantities
Masons	days	1
Unskilled labourers	days	2

Required materials

Excluding the construction of a soak-away

	Units	Quantities
Cement	bags	1.6
Khoa	m^3	
Sand	m^3	0.3
Bricks	nr	145
Steel bars	kg	
Latrine slab	nr	
Latrine pan	nr	
Hinges, catch hooks etc.	nr	
Drain pipe 100mm	m	0.5
Vent pipe 40/50 mm	m	
Water seal (U- shaped)	nr	
Cast iron manhole cover 450mm. dia.	nr	
Perforated concrete rings, 3 ft	nr	
Non-perforated concrete rings, 3 ft	nr	
Concrete ring slabs	nr	

Superstructures

Brief description

The latrine building gives privacy and protection to the users, and so it is also important. We can use different materials, some perhaps nicer but also more expensive. The local materials we have in our village cost less than the materials from the city that are available for sale at the thana bazar. Using local material will reduce our contribution, but on the other hand we may have to do more frequent repairs as these materials may be less durable. Prices may vary a lot according to the place where in Bangladesh the latrines are built. In some places sand might not be available and thus will need to come from far and will thus cost more money than in other regions.

The following table gives building options with indication of prices for the construction of super structures.

Building materials	*Locally available or from bazar*	*Indicative total cost Tk. (price level 1998)*
Brick walls (inside plastered), RCC roof and GI door with angle frame	Bricks: maybe locally or on thana bazar; Cement and sand: village or thana bazar; GI-door: thana bazaar	11,000
Brick walls (inside plastered), CIS roof and GI door with angle frame	Bricks: may be locally or on thana bazar; Cement and sand: village or thana bazar; GI-door: thana bazaar	8,000
Walls and roof of CI on angle frame and GI door on angle frame	All materials available from thana bazaar	8,500
For walls and door bamboo matting on bamboo frame or timber frame, CIS roof	Bamboo: usually locally CIS: village or thana bazar	3,100
Wooden doors including wooden frame, in case latrines are inside an existing building	Timber: village or thana bazar	4,000

Required Labour

For the construction of a CI Wall and Roof structure

	Units	Quantities
Masons	days	1
Unskilled labourers	days	2
Mystery	days	0.5
Carpenter	days	2

For the construction of a Brick Wall and CI Roof structure

	Units	Quantities
Masons	days	6
Unskilled labourers	days	8
Mystery	days	
Carpenter	days	

Required materials

For the construction of a CI Wall and Roof structure

	Units	Quantities
Cement	Bags	
Sand	m^3	
Bricks	Nr	
Latrine door	Nr	
Angle iron	M	28
Fixing nuts	Nr	56
Roofing sheets CI	m^2	13.4
Drain pipe 100mm		1
Vent pipe 40/50 mm	M	4

For the construction of a Brick Wall and CI Roof structure

	Units	Quantities
Cement	Bags	4.7
Sand	m^3	0.9
Bricks	Nr	548
Latrine door	Nr	1
Angle iron	M	6
Fixing nuts	Nr	12
Roofing sheets CI	m^2	4
Drain pipe 100mm		
Vent pipe 40/50 mm	M	4

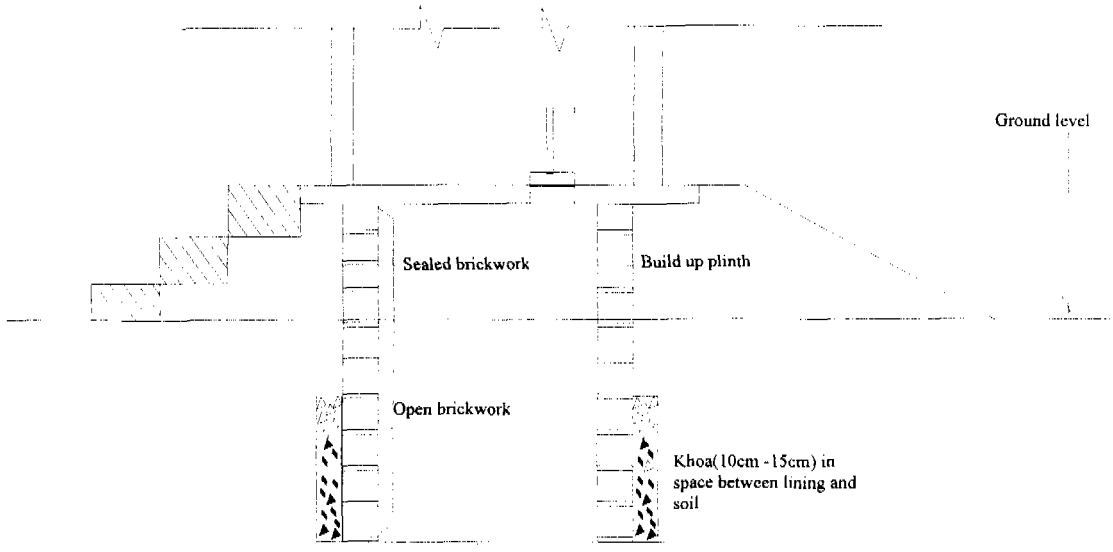
For a block of latrines, we can save materials for the building as some walls will be common. In this way, we can save about 15 – 20 % of the construction cost. If more than one latrine is needed then the walls of the substructures and pits, and the soak-aways can be shared. In this way some 10% can be saved on the cost of the substructures. The Sub-Assistant Engineer of DPHE might be able to can give you the information what you would save in your own situation.

Latrines in flood-prone areas

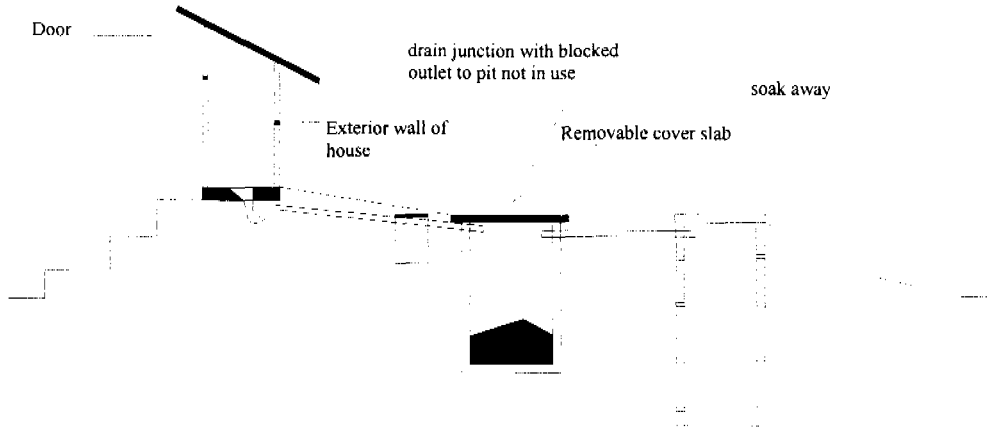
Brief description

When in flood-prone areas latrines are built at the ground level, then floods will make the pits to overflow. This will lead to contamination of the direct school environment. In order to avoid this overflowing the level of the slab needs to be raised to above the highest flood level occurring once in every five year. But if the water level rises to more than 0.60 m (2 feet) above ground level, the school is likely to be closed and latrines will no longer be used and holes sealed off. So it is not needed to put the slabs higher than 0.60 m above ground level.

Latrines in a flood-prone area will look like this



Direct single pit latrine in flood-prone area



Single off set pour-flush latrine with soak-away

Percolation test

Brief description

Soil permeability refers to the rate at which liquid percolates into the soil. Percolation of water into soil can be measured by digging a hole, pouring in water, and timing the rate at which the water drains out of the hole. This is called a percolation test. The test is fairly simple to conduct, but it must be done carefully in order to yield accurate results.
It is important to realise that percolation is the movement of water through a wetted soil. Therefore it is important to make sure that the soil is sufficiently wetted before starting the test.

Materials needed

Materials needed for a percolation test:

- shovel
- water
- measuring stick
- measuring tape or ruler
- gravel
- board – about 40 cm. long
- pencil

Procedure to conduct the test

1. Dig a hole of about 300 mm in diameter or 300 mm square with a depth of 1.5 meters, or less if the ground water level is shallow. Make the walls of the hole vertical. Scrape the walls to remove any patches of compacted soil. Place about 50 mm of clean gravel in the bottom of the hole.

2. Fill the hole with water and let it soak overnight. This will allow ample time for the soil to be properly wetted and ensure that the test result is the percolation rate of the soil.

3. Place a board across the center of the hole and anchor it firmly in place, by placing a rock on each end. The board must not be moved until the test is completed. Mark a point near the center of the board, this point can be used as reference mark for measuring the water level.

4. As most or all the water poured in the day before will have drained away, pour more water in the hole so that the depth of the water in the pit is 200 mm.

5. Place a measuring stick next to the reference mark on the board and slide it down until it just touches the water surface. Ripples on the water can be observed when the stick touches. Record the exact time and draw a horizontal line on the stick, using the edge of the board as a guide.

6. Repeat this step at an hour interval. If the water level drops rapidly, repeat it at half an hour interval.
   During this part of the test the water level should drop more than 100 mm. If it does, pour in more water so that the depth of the water is 200 mm again and continue the test.