This report was funded by the Bank-Netherlands Water Partnership, a facility that enhances World Bank operations to increase delivery of water supply and sanitation services to the poor (for more information see www.worldbank.org/watsan/bnwp).

The views and opinions expressed in this report are those of the author(s) and do not necessarily reflect those of the World Bank, its Executive Directors, or the countries they represent. Any references provided in this document to a specific product, process, or service is not intended as, and does not constitute or imply an endorsement by the World Bank of that product, process, service, or its producer or provider.
Let me express my sincere congratulations to the many people who have labored to make this set of manuals on promoting hygiene and sanitation for Ger areas in Ulaanbaatar City a reality. I had the opportunity to observe the actual conduct of the community dialogue at Bayankhoshou as part of the process of developing these manuals. I am truly impressed by the process undertaken to empower the people to look into their own situations and their own hygiene and sanitation practice. In fact, the process has induced them to analyze the causes and factors affecting their own behaviors and define appropriate course of action required to improve their condition. This community-based process of demand-creation is what we need to make our people, especially those living in the Ger areas, active partners of development.

I therefore highly recommend to community development workers from all sectors and to the different community-based organizations the adoption and use of these documents (the Hygiene and Sanitation Situation Report and Manuals) in their efforts to upgrade and improve the living environment of our people in the Ger areas – especially those concerning hygiene and sanitation. These manuals are your tools for empowering our community to ensure and promote better access and practices of good hygiene and improved sanitation.

Finally, I would like to thank the Project Management Unit of the Second Ulaanbaatar Services Improvement Project (PMU USIP2) and the Japan Social Development Fund (JSDF) supported Community-Led Infrastructure Project as well as the World Bank-Netherlands Water Partnership, for envisioning and supporting this very innovative methodology of engaging the community in the pursuit of their own development. Truly, this demand-creation methodology is what the City of Ulaanbaatar needs to effectively respond to the emerging issues on hygiene and sanitation affecting the City – especially in the Ger areas.

The City of Ulaanbaatar is your partner in this noble development endeavor.

Mr. Batbayar
Mayor,
City of Ulaanbaatar,
Mongolia
PREFACE

The issue of improved hygiene and sanitation especially in the Ger areas in Ulaanbaatar City is an emerging problem affecting the population. It is especially so far the poor families, which have no access to the centralized water and sewerage service system. The population growth, resulting from in-migration in Ulaanbaatar has resulted in the urbanization of poverty, generally concentrated in the Ger areas. This further deteriorated the hygiene and sanitation situation affecting the health of the population, especially children. The morbidity pattern reveals high rate of water-borne and poor environment related diseases, such as, diarrhea and hepatitis A, particularly among children.

The City authorities of Ulaanbaatar in their effort to upgrade the living environment in the Ger areas have continuously searched for strategies and programmes that can help improve the hygiene and sanitation practices. Various bilateral and multilateral agencies, in collaboration with national and local governments have tested different approaches to address the problem. Lessons learned indicate that the community-based demand-creation strategy appears to be most promising and appropriate especially in the Ger areas of the City.

These set of manuals on “Hygiene and Sanitation in Ger Areas in Ulaanbaatar”, is a product of various consultative meetings and workshops with different stakeholders on hygiene and sanitation at the national, district, and community levels. Individual consultations were done among bilateral and multilateral organizations, national and local government offices, and non-governmental organizations involved in the promotion of hygiene and sanitation. A national consultative workshop was conducted followed by a district consultation meeting to define the situation and identify the courses of action.

The outputs and recommendations of the first two consultative workshops then presented to the community for validation. The community dialogue helped to further validate and clarifying the situation of hygiene and sanitation in Ulaanbaatar – especially in the Ger areas, as well as test the methodology for community-based demand creation.

These manuals aim at guiding and helping field workers in planning and implementing the promotion of the desirable hygiene practices and improved low-cost sanitation as components of the Community-Led Infrastructure Project (CLIP) under the JSDF as part of the USIP2. The community-based participatory methodology for demand creation would help the City of Ulaanbaatar in its efforts to upgrade and improve the living conditions of the poor people living in the Ger areas. These manuals on Hygiene and Sanitation in Ger areas in Ulaanbaatar have five complementary components and should be read and used together. These are:-

- The Hygiene and Sanitation Situation Report for Ger Areas, Mongolia – defines the current situation on hygiene and sanitation of the Ger areas in Ulaanbaatar, as well as in Mongolia as a whole.

- The Manual on Promotion of Hygiene and Sanitation in Ger Areas, Mongolia – is a guidebook for workers in undertaking the community-based demand creation methodology. It provides the step-by-step process that can guide workers in influencing the behavior and decision of families and communities to adopt desirable hygienic practices and improved sanitation.

- The Manual on Low Cost Sanitation Technologies for Ger Areas, Mongolia – provides various latrine options in building sanitary latrine based on the needs (demand) and capability of the families and the communities.
The Community Dialogue Tool Kit for Ger Areas, Mongolia – is a set of illustrated materials to be used by the workers to undertake the community-based demand creation methodology on hygiene and sanitation.


Specifically, this Manual on Low Cost Sanitation Technologies for Ger Areas, Mongolia describes the various latrine options, its advantages, disadvantages, building materials, bill of materials, costs, salient features and so on, for participatory bottom up planning and implementation of the sanitation improved services. It starts with no hardware investment to gradually improved latrine types like a ‘sanitation ladder’.

The set of manuals on Hygiene and Sanitation in Ger Areas in Ulaanbaatar is just the initiation of the many efforts in promoting community participatory process that will empower people. We hope that the users of these manuals will help the PMU-USIP2 to further improve the methodology. Your experiences and lessons learned would be very useful in further improving this methodology. In fact, we would appreciate receiving suggestions on how we can further improve the methodology as well as the content and design of these manuals.

The Project Management Unit of the Second Ulaanbaatar Services Improvement Project (PMU USIP2) recommends the adoption and use of these manuals to all community-based organizations (CBOs) and community development workers of all sectors in their pursuit and efforts to improve the hygiene and sanitation practices of the families and communities. The lessons learned in implementing this project can give valuable inputs in the formulation of national policies and programs on hygiene and sanitation especially for secondary cities and aimag centers.
ACKNOWLEDGEMENTS

This set of manuals on Hygiene and Sanitation in Ger areas in Ulaanbaatar is a product of series of consultations with various stakeholders at national, sub-national, and community levels. The development of the Situation Report and manuals is part of the over-all efforts of the City of Ulaanbaatar to upgrade and improve the hygiene and sanitation situation in the Ger areas under the Community-led Infrastructure Project (CLIP) with funding support from the Japan Social Development Fund.

Specifically the development of the Hygiene and Sanitation Situation Report and manuals is supported through the World Bank-Netherlands Water Partnership (BNWP). We also would like to thank our team of consultants from the World Bank (Santanu Lahiri, Henry Briones and Isbaljir Battulga) who provided us with technical support and guidance throughout the conceptualization and preparation of these manuals.

The Project Management Unit (PMU) of Second Ulaanbaatar Service Improvement Program (USIP2) of the City of Ulaanbaatar would like to thank the various multilateral and bilateral agencies and organizations, the different technical agencies of the national and local government units, and the community-residents of Bayankhousou, for their active participation and valuable inputs in the preparation of these manuals.

We would like to acknowledge the participation and inputs of various international agencies and organizations (UNICEF, WHO, French Action Faim, Red Cross, SEURECA, ICT Sain Consulting LLC). We also acknowledge the national government agencies (Public Health Institute and School of Public Health of the Ministry of Education, Department of Environmental Health of the Ministry of Health, Bureau of Inspection Monitoring and Standards, Ministry of City Urban Development, Ulaanbaatar City Planning and Policy Department) for their valuable inputs – especially in facilitating the national consultative workshop and reviewing the draft of the manuals.

Photographs are taken by Henry Briones, Santanu Lahiri and Chimbayar.

Schematic diagrams are by Santanu Lahiri.

Sketches and drawings are by Rajendra Sen.

Bharat Dahiya initiated and designed the Study titled, Mongolia: Low Cost Sanitation for the Urban Poor with twin objectives: (i) to support the implementation of the Japan Social Development Fund Grant Project, Community-led Infrastructure Development for the Urban Poor in Ulaanbaatar, and (ii) to facilitate the provision of technical assistance on low cost sanitation to the Government of Mongolia and the Municipality of Ulaanbaatar, in order to inform policy dialogue on this important urban poverty and environment related issue. Bharat Dahiya has been the Project Coordinator of the JSDF Project. Hubert Jenny (before leaving the World Bank) was the erstwhile Task Team Leader of the JSDF Project. The present Task Team Leader of this project is Takuyo Kamata. PMU USIP2 acknowledges the guidance of all the above-mentioned World Bank personnel for their support in the preparation of this report.

Henry Briones, Santanu Lahiri and Ishbaljir Battulja, World Bank Consultants were the key facilitators for the Hygiene and Sanitation National Consultation Workshop organized in 31st October, 2005.

Santanu Lahiri and Henry Briones prepared this report with overall guidance from Eduardo A. Perez and Pete Kolsky of World Bank in consultation with PMU USIP2.

Our thanks also go to Pete Kolsky, Eduardo A. Perez, Wouter Vandersypen, and Takuyo Kamata for their technical inputs in reviewing the manuals and their administrative support in mobilizing funds from the BNWP to support the development and publication of these manuals.
We also thank the Mayor of Ulaanbaatar City, Mr. Batbayar, for his encouraging support, visit to the community during the consultation with families, and endorsing this methodology for the promotion of hygiene and sanitation in the Ger areas of the City.

Finally, the many people and organizations who had contributed in the conceptualization, design, and preparation of these manuals and whose names we are not able to mention – the Program Management Unit of USIP2 extends sincere thanks to all of you.

Ms. Badamkhorloo
Director
Project Management Unit
Second Ulaanbaatar Service Improvement Project
Ulaanbaatar City, Mongolia
GLOSSARY

Community based organization: Private organizations, which do not make profit and focus on humanitarian and development activities for the benefit of the society.

Community dialogue: An approach, which stimulates community decision-making and community cost-sharing about a particular development activity. The approach also accesses the level of knowledge and current practices within the community, and is gender and poverty sensitive.

CLIP Community-led Infrastructure Development Project funded by Japan Social Development Fund grant, managed by the World Bank.

Drainage: Runoff resulting from rain, also referred to as wet weather flow.

Human Excreta: Solid (faeces) and liquid (urine) waste from humans.

Impervious: Not allowing liquid to pass through.

Informed Choice: Offering communities the choice between different types and levels of services, giving them the option to choose the one best suited to their requirements and means.

JSDF Japan Social Development Fund grant, managed by the World Bank.

Millennium development goals: At the Millennium Summit in September 2000 the 189 states of the United Nations reaffirmed their commitment to working toward a world of peace and security for all – a world in which sustaining development and eliminating poverty would have the highest priority. The Millennium Declaration was signed by 147 heads of state and passed unanimously by the members of the UN General Assembly. The eight Millennium Development Goals are established, comprise 18 targets and 48 indicators. Where possible, the targets are given as quantified, time-bound values for specific indicators.

PHAST: PHAST stands for Participatory Hygiene And Sanitation Transformation developed jointly by World Health Organisation and UNDP/World Bank Water and Sanitation Program (now known as Water and Sanitation Program under Energy and Water Division of the World Bank). PHAST is a participatory technique illustrated with drawings and sketches used for sanitation and hygiene behavior change for prevention of diarrheal disease.

PMU: Project Management Office under Second Ulaanbaatar Services Improvement Project of the City of Ulaanbaatar.

Permeable: Allowing liquid to soak in.

USIP2: Second Ulaanbaatar Services Improvement Project of the City of Ulaanbaatar.

Social marketing sanitation: The approach looks at sanitation and hygiene as “products” and seeks to understand and stimulate the supply and demand for these products in a way that can harness the productive potential of the private sector and the market.

Sanitation: The hygiene and sanitation sector professionals in Mongolia¹ defined sanitation as means of collecting and disposing of excreta and community liquid waste in a hygienic way so as not to endanger the health of individuals or the community as a whole.

Sanitation Facility: The facility that handles and disposes excreta, liquid and solid waste.

¹ In national consultation workshop held on 31st October, 2005.
<table>
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<tr>
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<th>Definition</th>
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<tbody>
<tr>
<td><strong>Sewerage</strong></td>
<td>This is an off-site system for the collection, transportation, treatment and disposal of sewage.</td>
</tr>
<tr>
<td><strong>Sewage</strong></td>
<td>Human excreta and sullage collectively known as sewage.</td>
</tr>
<tr>
<td><strong>Sludge</strong></td>
<td>Suspended solid in the septic tank.</td>
</tr>
<tr>
<td><strong>Sullage</strong></td>
<td>Non-excreta household wastewater that includes water disposed of as a result of bathing, laundry, dishwashing and other household water clean-up functions. In general, sullage waste from most households is disposed into the ground or into ditches and canals.</td>
</tr>
<tr>
<td><strong>Technological sanitation options</strong></td>
<td>Technically feasible, culturally acceptable and financially affordable models of sanitary latrines for proper collection and decomposition of human excreta.</td>
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PART A: INFORMED CHOICE

Introduction

The hygiene and sanitation sector professionals in Mongolia defined sanitation as means of collecting and disposing of excreta and community liquid waste in a hygienic way so as not to endanger the health of individuals or the community as a whole. The ‘sanitation informed choice’ is defined as a pre-selected set of latrine options that are locally suitable, culturally acceptable and economically affordable for the improvement of low cost sanitation services.

Latrine options in this manual are selected by hygiene and sanitation sector professionals through a series of consultations in a process referred to as “sanitation informed choice.”

The latrine options suitable for immediate application in Ger areas are highlighted in Part A of this manual.

The other potential latrine options that were discussed, but not selected by partners for immediate application are also highlighted in Part B of this manual, with explanations as to why they are mentioned as potential options, but not included for immediate application. The other latrine options are also highlighted at the end of Part B with explanations as to why they are not applicable in Ger areas, Mongolia.

The criteria that were adopted for selecting ‘sanitation informed choice for Ger areas’ are as follows:

- **Effective use**: Cultural acceptability and ablution habits of the users.
- **Water availability**: Availability of water for ablution or cleaning/washing.
- **Technical feasibility**: Climatic situation of the target area and situation of existing ground water table.
- **Affordability**: Capital and maintenance costs of latrines.
- **Up-gradibility**: Working life and up-gradation possibilities.
- **Supply chain**: Availability of building materials at local level.
- **Local Technical support**: Availability of local technical resources – the ‘critical mass’ to promote and support construction of different kinds of latrines.

This manual explains each latrine option. These options are arranged in ascending order, like a ladder – the sanitation ladder. The first option is offered without any hardware solution, the next step is a low-cost simple technology, and so on, through to the final option, which offers both improved technology with higher costs. This ‘sanitation ladder’ enables communities to decide on the option that is most suited to their requirement vis-à-vis their affordability.

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2 Santanu Lahiri and Dr. Soutsakhone Chanthaphone, Consumers Choice...The Sanitation Ladder: Rural Sanitation Options in Lao PDR, Nam Saat, WSP-EAP / World Bank and UNICEF, 2000.

3 In national consultation workshop held on 31st October, 2005.

4 Source: R Franceys, J Pickford & R Reed, A guide to the development of on-site sanitation.

5 In Mongolia, the migrants are mostly poor families from the countryside and have settled in the peri-urban informal settlement areas – called as “Ger” areas.
The latrine options\textsuperscript{6} covered in this manual are:

- Option 1: Improve Traditional Practices
- Option 2: Conventional Pit Latrine
- Option 3: Lid Latrine
- Option 4: Ventilated Improved Single Pit Latrine
- Option 5: Ventilated Improved Double Pit Latrine

The latrines that are covered as potential options in Part B of this manual are:

- Option 6: Ecosan Toilet
- Option 7: Pour Flush Toilet – Single/Double Pits
- Option 8: Public Toilet and other facilities

This manual is aimed for the sanitation and hygiene workers of the local community-based organizations, Non-government Organizations and Khoroo/District authorities.

This manual will help the hygiene and sanitation workers/professionals to understand each option, its advantages and disadvantages, working life, operation and maintenance techniques, costs and salient features.

This manual will help workers/professionals to perform better as facilitators during community dialogue\textsuperscript{7} with individual households. This manual can be expected to serve as a technical guideline for the construction of their latrines, which will eventually help in transfer of knowledge to local users and authorities for scaling-up their sanitation services.

This manual needs to be read simultaneously with the other ‘Manual on Promotion of Hygiene and Sanitation in Ger Areas, Mongolia’ and ‘Community Dialogue Took-Kit for Ger Areas, Mongolia’ to have an in-depth understanding on how hygiene can be used as an entry point for the promotion of sanitation and its improved services.

Lastly, the development of this manual is a dynamic process and therefore, requires periodic up-dating to integrate the local and global learning.

\textbf{The main steps of community dialogue}

The main steps of Community Dialogue are as follows:-

- Ger Mapping
- Identification of Poorest of Poor (defining the poor)
- Gender analysis by tasks performed
- Owner of Resources in the Household
- Control of Resources in the Household
- Decision Making in the Community
- Hygiene Awareness Assessment
- Community’s perception of the Routes of Transmission of Faecal-Oral Contamination
- Local Blocking Methods of Faecal-Oral Contamination Routes
- Prioritization of the Problems in the Community
- Sanitation Ladder: Sanitation Informed Choice
- Assessment of the benefits of sanitation

\textsuperscript{6} In this manual, Rajendra Sen drew all the sketches and pictures, and Santanu Lahiri drew schematic diagrams.

\textsuperscript{7} Poor rural choose their water and sanitation services in Lao PDR, Dr. Nouanta Maniphousay, Nilanjana Mukherjee and Michael Seager, March 1998; and the Draft Manual on Community Dialogue for Nam Saat Programme, Nam Saat (Lao PDR), WSP-EAP and UNICEF, 2000.
Option 1: Improve Tradition Practices

There are many poor families in Ger areas that practice open defecation for various reasons. One such might be continuation of traditional practices prior to migration in Ger areas. **Some such families may not be ready at this point of time to build their own latrines; intervention in form of behavioral change may be the first option.**

Hand washing with soap after defecation and before eating meals will reduce the risk of fecal-oral transmission by as much as 50%. Simultaneously generating a demand for latrines should be a priority within this option.

This option will help to:
- Reduce the risk of fecal-oral diseases.
- Improve personal and community hygiene behavior.
- Generate demand for proper latrine construction.

User benefits:
- Better hygiene and health.
- Awareness regarding the benefits of better hygienic practices.
- Increasing demand for construction of their own latrine facilities.

Capital and recurrent costs:
- Negligible, only a small additional expenditure for extra soap use.

Salient features:
- Support the improvement of traditional practices, such as, hand washing with soap, proper disposal of children’s excreta etc. by conducting hygiene awareness activities.
- Conduct Community dialogue to create demand.
- Assign ‘sanitation teams’ to communicate regularly with families, until their demand is expressed through willingness-to-pay for latrine construction.

Disadvantages:
- This option will not fully eliminate the chances of transmission of excreta related infections.

---

8 Introduction to latrine, as a hardware component is important, but prior to supplying of hot water (which is essential in winter season in Mongolia) and soap for hand, dish, and clothes washing, especially diapers and infant clothing is more important [Courtesy: Karl Hansen, Team leader, PMU, USIP]. This will help in reduction of the risk of fecal-oral transmission by as much as 50%. This concept is focused on Option 1. Hand washing with soap after defecation and before eating meals is important and need to be practiced even after construction of latrines. For further details please see “Manual on Promotion of Hygiene and Sanitation in Ger areas, Mongolia”.

9 Hand washing interrupts the transmission of disease agents and so can significantly reduce diarrhea and respiratory infections, as well as skin infections and trachoma. A recent review (Curtis and Cairncross 2003) suggests that hand washing with soap, particularly after contact with feces (post-defecation and after handling a child’s stool), can reduce diarrheal incidence by 42-47 percent, while ongoing work by Rabie et al. suggests a 30 percent reduction in respiratory infections is possible through hand washing. This remains true even in areas that are highly fecally contaminated and have poor sanitation. Another current study found that children under 15 years of age living in households that received hand washing promotion and soap had half the diarrheal rates of children living in control neighborhoods (Luby et al. 2004). Since hand washing can prevent the transmission of a variety of pathogens, it may be more effective than any single vaccine. **Promoted on a wide-enough scale, hand washing with soap could be thought of as a ‘do-it-yourself’ vaccine.** [Extracted from “The Hand Washing Handbook, WSP, BNWP and World Bank”].

10 The sanitation stakeholders proposed in the national workshop that all sanitation projects should establish ‘sanitation teams’ at local household level to facilitate and promote sanitation activities.
Option 2: Conventional Pit Latrine

This type of latrine does not require water to function, though a small amount of water may be used occasionally to clean the squat-plate. This latrine is specifically designed for use in water-scarce areas, or where communities use dry cleansing materials, such as, paper, or where households do not benefit from house connections for water supply.

This latrine is being used in Ger areas for many years due to the scarcity of water and traditional habit of using dry cleansing materials by most of the Ger people. However, in absence of proper orientation and design, often these latrines are in unsanitary and unhygienic states. Therefore, this latrine is included in this manual to explain its salient features for effective use in Ger areas and could be the second option, or ‘next step’ in the sanitation ladder.

This latrine is built with an unlined (or lined) pit with a squat plate and a super-structure. This is particularly applicable for families who are extremely poor or newly settled in Ger areas or are planning to change their open defecation practices.

Local wooden planks, used oil drum, bricks, local stones and concrete can be used to line the pit, particularly in areas with loose soil.

Two wooden planks are often used instead of a squat plate in this conventional pit latrine. After using the latrine (defecation), ash or dry soil is added on the top of excreta to reduce odor and prevent flies to come in contact with excreta.

In case of Mongolia, the construction of superstructure is essential to protect users from snow, especially during winter period (between November and March). Therefore, the superstructure with proper doors and windows are essential even for this conventional pit latrine in Mongolia.

The materials used for roof are generally asbestos or galvanized sheets or wooden planks. The wall can be made of either Bamboo-plywood-mat-plastered with mud, or half brick and half Bamboo-plywood-mat-with mud plastering, or brick wall or hollow block wall or combination of any one of these.
User benefits:
- Safer water bodies.
- Reduced likelihood of open contact with excreta.
- Better health.
- It can be up-graded to lid latrine if squat plate is used instead of wooden planks.

Capital\(^\text{11}\) costs\(^\text{12}\):
- Approximately US$ 90 to US$ 220 is required for construction of this latrine. However, most of the construction materials required are available from scrap materials within the dwellings and therefore, in many occasions the actual cash requirement for construction of this latrine is minimal.

Recurrent costs:
- Negligible: required only for replacing damaged wooden planks for squatting. However, some recurrent costs may be necessary for maintenance of superstructure every 2-3 years.

Working life:
3 to 4 years, depending on number of users and the pit size.

User responsibility:
Maintenance of wooden planks used for squatting and the superstructure.

Materials required:
- For unlined pit: shovel to dig the pit.
- For lined pit: shovel to dig the pit and the lining materials e.g. any low cost durable material with a 3 to 4-year life. \textit{In all cases, the sidewall of the pit (0.5 m below from the ground) must be perforated.}
- Wooden planks for the squatting plate.
- Wooden floor, if constructed (sometime only two planks are used for squatting, no additional wooden planks are used for latrine floor).
- Superstructure: for privacy and protection from winter, made with any indigenous material.

Salient features:
- Wooden planks for squatting or Squat plate.
- Unlined or lined pit.
- Superstructure.

Disadvantages:
- Unpleasant smell; attracts flies.
- Does not fully eliminate the chances for transmission of excreta related diseases since excreta are exposed to flies and thus can be transmitted to food.
- Difficult/awkward to clean the latrine room.
- Children may feel unsafe to use the latrine.

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\(^{11}\) This can vary ± 15%.

\(^{12}\) Including the costs of superstructure to protect the users from snow, rain and cold, and also to provide privacy.
Option 3: Lid\textsuperscript{13} Latrine

This type of latrine does not require water to function, though a small amount of water may be used occasionally to clean the squat-plate. This is specifically designed for use in water-scarce areas, where people have to walk to get water, even from public taps, or where communities use dry cleansing materials, such as paper.

Definition:
A Lid Latrine is an improved Conventional Pit Latrine, provided with a self-closing or manual-closing lid (or cover) for squat holes to make it as fly-and-odor-proof as possible. In Mongolia, a special feature is to use two squat holes located side-by-side, with one having a bigger size for adults and the other with a smaller size for use of children\textsuperscript{14}. Therefore, there is need for lids for both the holes. Only one lid is opened, the other remaining closed.

User benefits:
- Initiate efforts to reduce the chances of excreta-related disease transmission, especially through flies.
- Affords privacy.
- Aesthetically improved environment and improved health and hygiene practice.

Advantages:
- Can be built with local materials.
- Easy construction and maintenance.
- Most suitable for water scarce Ger areas.
- Most suitable for Ger communities using dry cleansing materials.
- Can be upgraded to Ventilated Improved Single Pit Latrine, or directly to Pour Flush Single Pit Latrine\textsuperscript{15}.
- Suitable for areas with low population density, where adequate space is available for relocating latrine when it is almost full, especially at newly develop Ger areas.

Capital\textsuperscript{16} costs\textsuperscript{17}:
- Approximately US$ 110 to US$ 220 is required for construction of this latrine. However, most of the construction materials required are available from scrap materials within the dwellings.

---

\textsuperscript{13} Lid means a wooden cover with handle to close the squat holes after use.

\textsuperscript{14} People are afraid that children (between 2 – 5 years) may fall into the pit through the squatting hole meant for adults and therefore, Ger community specifically requested to keep provisions for two squatting holes, one for children and another for adults.

\textsuperscript{15} However, for up-grading VIP latrine to pour flush, the latrine room is required to be centrally heated, otherwise during winter the ambient temperature i.e., 0º C to - 35º C will freeze the water seal within the pour flush trap.

\textsuperscript{16} This can vary ± 15%.

\textsuperscript{17} Including the costs of superstructure to protect the users from snow, rain and cold, and also to provide privacy.
and therefore, in many occasions the actual cash requirement for construction of this latrine is minimal.

Recurrent costs:

Negligible: required only for replacing damaged wooden planks for squatting plate. However, some recurrent costs may be necessary for maintenance of superstructure every 2-3 years.

Working life:
3 to 4 years, depending on number of users and pit size.

User responsibility:
Maintenance of lids, squat plate and superstructure.

Materials required:
- For unlined pit: shovel to dig the pit.
- For lined pit\(^\text{18}\): shovel to dig the pit and the lining materials e.g. any low cost durable material with 3 to 4-year life. **In all cases, the sidewall of the pit (0.5 m below from the ground) must be perforated.**
- Squatting plate with wooden or brick or stone footrests for both the squatting holes.
- Wooden floor (Ger people generally prefer wooden floor during winter since it radiates less cold).
- Two wooden lids to cover the squatting holes.
- Superstructure: for privacy and protection from rain and winter, made with any indigenous material.

Salient features:
- Squat plate with two holes one for adults and one for children.
- Lids or covers for both holes.
- Two pairs of footrests on either side of squat holes.
- Pit below the squat hole.
- Does not require water to function.
- Cross ventilation to reduce the odor in the latrine room.
- After using the latrine (defecation), ash or dry soil is added on the top of excreta, as an extra protection (other than covering the hole by lid), to reduce odor and to prevent flies to come in contact with excreta.

Disadvantages:
- Not entirely odor-free and there are chances of disease transmission through flies and rodents if lids are not closed after use.
- Has to be relocated every 3 or 4 years when the pit is almost full.

\(^{18}\) If squatting plate is located in a way that the lined pit is a bit off-set with the latrine room and if provision is kept for desludging, then once the pit is almost full, it can be emptied via vacuum truck. In that case, single pit can be used for longer periods. This is also applicable to all other on-site latrines, where pit is properly lined.
Option 4: Ventilated Improved Single Pit Latrine

This type of latrine does not require water to function, though a small amount of water may be used occasionally to clean the squat-plate. This is specifically designed for use in water-scarce areas where people have to walk to get water, even from public taps, or where communities use dry cleansing materials, such as paper.

Definition:
A Ventilated Improved Single Pit Latrine, commonly known as VIP latrine, is an Improved Conventional Dry Pit Latrine, slightly offset from the pit with a tall vertical vent-pipe gradually tapered at the lower end, and covered at the top with a fly-screen and a cowl to prevent entry of rain water or snow.

The VIP latrine eliminates the chances of flies coming in direct contact with excreta. This prevents fly-borne transmission of fecal-oral diseases from latrines, a “major source of disease transmission”.

In Mongolia, the VIP latrine was introduced by external agencies. It was however not properly appreciated and did not become popular. During discussion with partners, it was revealed that the basic features of VIP latrines were not properly conceived and promoted, which might have created some dissatisfaction. Therefore, it is important to understand the basic design features of VIP latrine for its effective performance.

User benefits:
- Almost odorless.
- Greatly reduced risk of excreta-related and fly-borne disease transmission.
- Affords privacy.
- Aesthetically improved environment.
- Improved health and hygiene practice.

Advantages:
- Suitable for water scarce Ger areas.
- Suitable for Ger communities using dry cleansing materials.
- Limited amount of water is required for occasional cleaning of squat plate.
- Can be built with local materials.
- Low construction costs.
- Simple construction and maintenance, but it is important to understand the basic concept of how a VIP latrine works and why some features (ventilation, location of vent pipe, location of doors and windows etc.) are essential.
Suitable for low population density areas where space is available for relocating latrine when it is almost full.

Can be upgraded to Pour Flush Single Pit Latrine\(^{19}\).

**Capital\(^{20}\) costs\(^{21}\):**

- Approximately US$ 110 to US$ 220 is required for construction of this latrine. However, most of the construction materials required are available from scrap materials within the dwellings and therefore, in many occasions the actual cash requirement for construction of this latrine is minimal. In the costing of On-site Pit latrines in tropical countries the costs of superstructure is not included, especially for traditional and Lid latrines, but in Mongolia, superstructure is essential to protect people from snow and thus included even within the cost of traditional and Lid latrines. Therefore, the cost difference between Traditional/Lid Latrine and VIP Latrine is in Mongolia is only USD 20 – much lesser than differences between similar latrines in tropical countries.

**Recurrent costs:**

- Cash: US$ 2 - 5 per year for replacement of fly-screen and trap, if necessary.
- Investment in kind: US$ 1 - 10 per year for superstructure and squat plate maintenance.

**Working life:**

3 to 4 years, depending on number of users and pit size.

**User's responsibility:**

Maintenance of vent pipe, fly screen, squat plate and superstructure.

**Materials required:**

- For unlined pit: shovel to dig the pit.
- For lined pit\(^{22}\): shovel to dig the pit and the lining materials e.g. any low cost durable material with 3 to 4-years of lifespan. **In all cases, the sidewall of the pit (0.5 m below from the ground) must be perforated.**
- Wooden floor (Ger people generally prefers wooden floor) with two squatting holes (one for adults and one for children) with footrests made of wood or other materials.
- Vent pipe: asbestos-cement/PVC/brick or any indigenous material.
- Fly screen: standard metal fly screen/PVC covered fiberglass screen/mosquito net.
- Superstructure: any locally available indigenous material, but care should be taken to ensure no direct sunlight enters the latrine room.

**Salient features:**

- Squat plate with two holes – one for adults and one for children.
- Two pairs of footrests on either side of squat holes.
- The vent pipe should be at least 150 mm in diameter. Outer surface of the vent pipe should be painted black, wide at the top and gradually tapering downwards. This will help the air within the vent pipe to become warmer by absorbing more sunlight with the help of black outer lining to create a convection updraft, which will draw air and gases from the latrine room through the pit via the vent pipe. The latrine room then becomes odorless. Therefore, it is essential to locate the vent pipe in such a position that it receives direct sunlight. To avoid flies to come in contact with excreta, the doors and windows of the latrines should be located either in the north or south directions to avoid entry of direct sunlight inside the latrine room. If flies still

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19 However, for upgrading VIP latrine to pour flush, the latrine room is required to be centrally heated. Otherwise, during winter the ambient temperature i.e., 0º C to - 35º C will freeze the water seal within the pour flush trap.

20 This can vary ± 15%.

21 Including the costs of superstructure to protect the users from snow, rain and cold, and also to provide privacy.

22 If squatting plate is located in a way that the lined pit is a bit off-set with the latrine room and if provision is kept for desludging, then once the pit is almost full, it can be emptied via vacuum truck. In that case, single pit can be used for longer periods. This is also applicable to all other on-site latrines, where pit is properly lined.
enter the latrine room, they are attracted by sunlight filtering through the vent pipe and move upwards and get trapped. These are essential features for any VIP latrine. If one of these factors is over looked, the VIP latrine will start mal-functioning\textsuperscript{23}.

- Fly screen covers top of vent pipe for trapping flies, with a cowl to prevent entry of rainwater or snow.
- Single pit under the squat plate.
- Direct sunlight should not enter the latrine room through door and window.
- The window should always be located high in the wall, preferably above the door. No other ventilation should be provided within the latrine room.
- After using the latrine (defecation), ash or dry soil can be added as an extra precaution on the top of excreta to reduce odor and prevent flies to come in contact with excreta.

Disadvantages:

- Not completely odor-free.
- Lid should not be used.
- Must be relocated every 3 to 4 years, when pit is almost full.

\textsuperscript{23} Due to wrong designing.
Option 5: Ventilated Improved Double Pit Latrine

This type of latrine does not require water to function, though a small amount of water may be used occasionally to clean the squat-plate. This is specifically designed for use in water-scarce areas, where people have to walk to get water, even from public taps, or where communities use dry cleansing materials, such as, paper.

Definition:
A Ventilated Improved Double Pit Latrine is similar to a Ventilated Improved Single Pit Latrine, with only two differences: (i) having two pits and two holes for vent pipe, but only one vent pipe is in use at a time and the other is sealed; and (ii) two pairs of two squatting holes (one for adults and one for children). The second pair, which is not in use, is also sealed. Otherwise, all other features are similar to VIP Single Pit latrine.

The VIP Double Pit Latrine like VIP Single Pit eliminates the chances of flies coming in direct contact with excreta. This prevents fly-borne transmission of fecal-oral diseases from latrines, a "major source of disease transmission".

User benefits:
- Almost odorless.
- Greatly reduced risk of excreta-related and fly-borne disease transmission.
- Affords privacy.
- Aesthetically improved environment.
- Improved health and hygiene practice.

Advantages:
- Suitable for water scarce Ger areas.
- Suitable for Ger communities using dry cleansing materials.
- Limited water required for occasional cleaning of squat plate.
- Can be built with local materials.
- Low construction costs.
- Simple construction and maintenance.
Can be upgraded to Pour Flush Twin-Pit Latrine\textsuperscript{24}.

- Long lasting and the digested sludge can be used as soil conditioner every 3 to 4 years.
- Suitable for populated areas where free space is not available for relocating latrine when it is almost full.

**Capital\textsuperscript{25} costs\textsuperscript{26}:**
- Approximately US$ 140 to US$ 290 is required for construction of this latrine. However, some of the construction materials required are available from scrap materials within the dwellings and therefore, in many occasions the actual cash requirement for construction of this latrine is minimal.

**Recurrent costs:**
- Cash: US$ 5 - 10 per year for replacement of fly-screen and trap (if necessary).
- Investment in kind: US$ 5 - 15 per year for superstructure and squat plate maintenance.

**Working life:**
- Can be used life long by using alternate pits.

**User responsibility:**
- Maintenance of vent pipe, fly screen, squat plate and superstructure.

**Materials required:**
- Twin pits: shovel to dig the pit, and the good lining materials, which can be used for life long. *In all cases, the sidewall of the pit (0.5 m below from the ground) must be perforated though the partition wall between two pits should be non-perforated and impermeable.*
- Wooden floor (Ger people generally prefer wooden floor) with two squatting holes (one for adults and one for children) with footrests made of wood or other materials.
- Vent pipe: asbestos-cement/PVC/brick or any indigenous material.
- Fly screen: standard metal fly screen/PVC covered fiberglass screen/mosquito net.
- Superstructure: any locally available indigenous material, but care should be taken to ensure that no direct sunlight enters the latrine room.

**Salient features:**
- Squatting plate with two pair of holes, one set for adults and children (for non-using pit), another similar set of holes for pit that is under use.
- Two pairs of footrests on either side of squat holes.
- The vent pipe should be at least 150 mm in diameter. Outer surface of the vent pipe should be painted black, with wider at the top and gradually tapering downwards. This will help the air within the vent pipe to become warmer by absorbing more sunlight with the help of black outer lining to create a convection updraft, which will draw air and gases from the latrine room through the pit via the vent pipe. Thus, the latrine room becomes odorless. Therefore, it is essential to locate the vent pipe in such a position that it receives direct sunlight. To avoid flies coming in contact with excreta, the doors and windows of the latrines should be located either at the north or south directions to avoid entry of direct sunlight inside the latrine room. If flies still enter the latrine room, they will get attracted by sunlight filtering through the vent pipe and move upwards and get trapped. **These are essential features for any VIP latrine. If one of these factors is over looked, the VIP latrine will start mal-functioning\textsuperscript{27}.

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\textsuperscript{24} However, for up-grading Ventilated Improved Double Pit Latrine to Pour Flush Double Pit, the latrine room is required to be centrally heated, otherwise the ambient temperature during winter i.e., 0\degree C to -35\degree C will freeze the water seal within the pour flush trap.

\textsuperscript{25} This can vary ± 15%.

\textsuperscript{26} Including the costs of superstructure to protect the users from snow, rain and cold, and also to provide privacy.

\textsuperscript{27} Due to wrong designing.
filled-up, the vent pipe is removed from the vent hole to the other vent hole of the twin pits by unsealing it. Simultaneously a seal is made on the vent hole from where it is shifted. The odor emitted from digested sludge of the filled-up pit will penetrate the adjacent side of the earth below the surface through perforated holes and thus, prevent rodents from entering (due to strong smell) into the filled-up pit.

- Fly screen covers top of vent pipe for trapping flies, with a cowl to prevent entry of rainwater or snow.
- Impermeable wall is required between two adjacent pits to make sure liquid from digested sludge do not percolate from one pit to the other.
- Direct sunlight should not enter the latrine room through door and window.
- The window should always be located high in the wall, preferably above the door. No other ventilation should be provided within the latrine room.
- After using the latrine (defecation), ash or dry soil can be added as an extra precaution on the top of excreta to reduce odor and prevent flies to come in contact with excreta.

Disadvantages:
- Not completely odor-free.
- Lid should not be used.
- In non-using pit, two squat holes and the vent hole need to be sealed.
# Sanitation Ladder: At-A-Glance

<table>
<thead>
<tr>
<th>OPTION 1: Improve Traditional Practices</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce the risk of fecal-oral diseases.</td>
<td>Does not fully eliminate the chances for transmission of excreta related diseases.</td>
</tr>
<tr>
<td>Improve personal and community hygiene behavior.</td>
<td></td>
</tr>
<tr>
<td>Generate demand for proper latrine construction.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION 2: Conventional Pit Latrine</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safer water bodies.</td>
<td>Unpleasant smell; attracts flies.</td>
</tr>
<tr>
<td>Reduced likelihood of open contact with excreta.</td>
<td>Does not fully eliminate the chances for transmission of excreta related diseases.</td>
</tr>
<tr>
<td>Affords privacy.</td>
<td>Unpleasant smell; attracts flies.</td>
</tr>
<tr>
<td>Better health.</td>
<td>Does not fully eliminate the chances for transmission of excreta related diseases since excreta are exposed to flies and thus, can be transmitted by them to food.</td>
</tr>
<tr>
<td>Difficult/awkward to clean the latrine room.</td>
<td></td>
</tr>
<tr>
<td>Children may feel unsafe to use the latrine.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION 3: Lid Latrine</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affords privacy.</td>
<td>Not entirely odor-free.</td>
</tr>
<tr>
<td>Constructed of largely local materials, therefore cost is negligible.</td>
<td>Chances of disease transmission through flies and rodents.</td>
</tr>
<tr>
<td>Easy construction and maintenance.</td>
<td>Users must be explained that they should always replace lid after use.</td>
</tr>
<tr>
<td>Most suitable for water scarce areas.</td>
<td>Has to be relocated every 3 or 4 years when the pit is almost full.</td>
</tr>
<tr>
<td>Most suitable for communities using dry cleansing materials.</td>
<td></td>
</tr>
<tr>
<td>Can be upgraded to Ventilated Improved Single Pit Latrine, or directly to Pour Flush Latrine.</td>
<td></td>
</tr>
<tr>
<td>Suitable for areas with low population density, where adequate space is available for relocating latrine when it is almost full.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION 4: Ventilated Improved Single Pit Latrine</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost odorless if constructed properly.</td>
<td>Not completely odor-free.</td>
</tr>
<tr>
<td>Greatly reduced risk of excreta-related and fly-borne disease transmission.</td>
<td>Lid should not be used.</td>
</tr>
<tr>
<td>Affords privacy.</td>
<td>Selection of the location of windows, doors and vent pipe (including its shape) is important for functioning, often misguided by technicians if not properly trained.</td>
</tr>
<tr>
<td>Aesthetically improved environment.</td>
<td>Must be relocated every 3 to 4 years, when pit is almost full.</td>
</tr>
<tr>
<td>Can be upgraded to Pour Flush Single Pit Latrine.</td>
<td></td>
</tr>
<tr>
<td>Improve health and hygiene practices.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTION 5: Ventilated Improved Double Pit Latrine</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almost odorless.</td>
<td>Not completely odor-free.</td>
</tr>
<tr>
<td>Greatly reduced risk of excreta-related and fly-borne disease transmission.</td>
<td>Partition wall between pits should not be perforated to prevent percolation of liquid from one pit to the other.</td>
</tr>
<tr>
<td>Affords privacy.</td>
<td>Lid should not be used.</td>
</tr>
<tr>
<td>Aesthetically improved environment.</td>
<td>Selection of the location of windows, doors and vent pipes (including its shape) is important for functioning, often misguided by technicians if not properly trained.</td>
</tr>
<tr>
<td>Improve health and hygiene practices.</td>
<td></td>
</tr>
<tr>
<td>Can be upgraded to Pour Flush Double Pit Latrine.</td>
<td></td>
</tr>
<tr>
<td>Provides permanent solution and have long working life.</td>
<td></td>
</tr>
</tbody>
</table>
Cost Comparison: At-A-Glance

It is always important to express the costs of services to local people in a way that they understand the cost factors easily. As a country Mongolia is unique due to its cold climatic condition and historical background. Almost every person in Mongolia eats meat and drinks milk. Therefore, the capital cost of latrines in this manual is summarized in terms of consumption of meat and the recurrent costs in terms of costs of consumption of milk. It assumes, therefore, that it will be easy for field workers as well as Mongolian Ger people to understand the latrine costs and their potential situation on affordability. The graph below has highlighted the cost comparisons between the five options that have been mentioned earlier.

A family on an average consumes 25 kilos of meat every month in Mongolia. It means one family spends around USD 50 every month. Therefore, annually one family spends almost USD 600. The capital cost of a moderate latrine is around USD 140. It means one family can build a latrine with 24% of the costs that they spend annually for consumption of meat.

One family on an average drinks 10 litres of milk that costs about USD 5. This means that in one year one family spend USD 60. The O&M costs of maintaining a latrine is around USD 24, i.e., 42% of costs that one family spends only on drinking milk.

The above figures are just assumptive on the basis of current observations. The average family size is considered as five persons per family.

For detail cost breakdown please see Part C: Bill of Materials and Costs of Latrines, Page numbers 27 – 44 of this manual.

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28 Mongolia consists of almost 2.5 Million of people and 21 million live stocks. Consequently meat consumption is common in Mongolia irrespective of economic status.
Up-grading costs for latrines

UP-GRADING CAPITAL COSTS PER FAMILY PER UNIT IN USD

| In Cash | 0 | 90 - 220 | 20 - 40 | 10 - 40 | 30 - 70 | 0 - 40 |

UP-GRADING RECURRENT COSTS PER FAMILY PER ANNUM USD

| In Cash | 0 | 0 | 0 | 3 - 15 | 7 - 10 | 0 |

Please note that all the above capital costs are upgrading costs in US Dollars (USD) per unit. The recurrent costs are costs in USD per family per year. **The above are not actual capital and recurrent costs**.

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29 For actual capital and recurrent costs of latrines, please see the graph in page 24, and/or Part C of this manual, Page numbers 36-53.
PART B: OTHER POTENTIAL OPTIONS FOR LATRINES

In many ways improvement of services is a cumulative outcome of historical background, cultural habits and passion for sustainable development among people. As time moves, however, improvement of various services take place and the demand for better services is generated. People’s desires for higher level of services emerge. For example, in Mongolia, conventional telephones are available. After mobile facilities emerged in Mongolia, in the year 2002 almost 260 thousand Mongolians had mobile phones. Again in the year 2002, there were 35 radio stations and 27 television stations in Ulaanbaatar. But when an additional 11 cable TV stations were made available, more than 30,000 households got cable connections\(^{30}\). The above examples show, people co-opt upgraded technologies if they are offered in the right time and in the right place. Following similar logic, few more latrine options are added in this manual as potential options under Part B, though stakeholders have not selected them for immediate application. These options however, might be useful in the near future once other services improve.

In recent years, there has been global explosion of interest in the potential for recycling human wastes as agricultural and horticultural nutrients. Ecological Sanitation (EcoSan) has been defined in a number of ways. Some insist that sanitation cannot be ecologically efficient unless it is on-site with urine separation for more efficient recycling. Others adhere to a broader definition that stresses the need to consider environmental impacts of all sanitation technologies to minimize deleterious environmental impacts while maximizing fruitful reuse of waste to the extent possible. Much of the debate under this “broader” definition revolves around the phrase “to the extent possible”, with many engineers and development workers uncertain about what a practical level of EcoSan may be. EcoSan options are particularly appropriate in conditions of rocky soil and high water table, where above ground construction is involved and there is no significant additional construction cost involved in facilitating the emptying of the pit. In these cases, the structures for “conventional low-cost sanitation” (e.g. pit latrines, VIPs etc) are virtually identical to those for EcoSan, and it would only be “natural” to explore the market for recycling of waste products.\(^{31}\) Ecosan toilet therefore, is included as one of the potential options under Part B.

As we know, the Second Ulaanbaatar Service Improvement Project (USIP2) is currently on going. The USIP2 Project will provide drinking water to water kiosks in many Ger areas, out of which 15% Ger households nearer to water kiosks will also have the opportunity to avail of piped water connections. Therefore, scope of pour flush latrine may emerge once water is available through piped connections to some of the households. Therefore, this option is also included as one of the potential options under Part B.

The Feasibility Study Report for USIP2 says 50% of Khashaa owners reported not having any further space for digging their new pits. Also many poor Ger families do not have space to construct their own latrines. In such a situation, scope of Public Toilet might be worth to exploring, especially considering the situation of the poorest of poor in Ger areas. This Public Toilet option therefore, is also included as one of the potential options under Part B.

While highlighting the potential options in Part B of this manual however, it has to be remembered that none of these options should be “pushed” to any household or community until they are fully appreciated, sincerely desired, and demanded with willingness-to-contribute. The same caution is also applicable to all sanitation hardware facilities.


\(^{31}\) Extracted from: Draft: The Sanitation Challenge: Some strategic thinking from WSP, Pete Kolsky, August. 2003
Option 6: Ecosan\textsuperscript{32} Toilet

Definition

Ecosan toilet is a modified version of compost latrine where urine and excreta are separated prior to collection in the on-site pits.

Ecological sanitation is a system that collects and safely reuses human excreta for agriculture with a view toward saving water and preventing water pollution. Such systems are used in a number of countries including China, Vietnam, India, South Africa, Germany, Sweden and Mexico.

Advantages:

- It offers a safe sanitation solution that prevents disease and promotes health by successfully and hygienically removing pathogen-rich excreta from the immediate environment.
- It is environmentally sound as it does not contaminate ground or surface water, and also does not use scarce water resources for washing or flushing of the toilet.
- It creates a valuable resource that can be productively recycled back into the environment. Over time, through proper management and storage, excreta are transformed from a harmful product into productive assets.
- This latrine will be most suitable for places where high ground water exists.
- After using the latrine (defecation), ash or dry soil is added on the top of excreta to reduce odor and prevent flies from coming in contact with excreta.

Disadvantages:

- The decomposition of faeces will be slow during winter in Mongolia and therefore, the retention time of faeces needs to be increased. Thus the dimension of both the urine collection tank and pit for excreta digestion will be increased leading to higher capital costs of this unit in comparison with similar units constructed in tropical countries.
- It will be difficult to introduce such a latrine where recycling of waste is not practiced or appreciated and also not being practiced traditionally.
- Initially some small-scale action researches are necessary in Mongolia\textsuperscript{33} prior to mainstreaming the application for sanitation projects.

Tentative\textsuperscript{34,35} costs:\textsuperscript{34}

- Approximately US$ 130 to US$ 250 is required for construction of this latrine. However, most of the construction materials required are available from scrap materials within the dwellings and therefore, in many occasions, the actual cash requirement for construction of this latrine is minimal. The cost of this latrine is low in comparison with tropical countries since the pits for

\textsuperscript{32} Most of the text related to Ecosan latrine is extracted from the document written by Uno Winblad, The Next Generation Toilet – A Global Perspective;

\textsuperscript{33} Ecosan Project has now been initiated in Mongolia with support from GTZ.

\textsuperscript{34} This can vary ± 15%.

\textsuperscript{35} Including the costs of superstructure to protect the users from snow, rain and cold, and also to provide privacy.
this latrine in Mongolia needs to be built below the ground like other latrines. The raised latrine
with steps are not acceptable in Mongolian culture since people think that during winter, steps
with frozen snow will be difficult to walk and children may fall down.

Negligible for some recurrent costs may be required for superstructure after every 2-3 years.

Working Life:

Life time use, depending upon pit size and number of users.

Users Responsibility:

Requires training on how to use and clean the squat plate and pan regularly.
Requires periodical desludging of digested sludge for application to the plant as fertilizer and
urine for recycling in agricultural land/ backyard gardening.

Materials Needed:

Specially designed squatting pan that collects urine and faeces separately.
On-site pit: shovel to dig the pit, and good lining materials, which can be used life long.
Latrine floor: The squatting pan should be fixed into either a squat plate just on the top of the
pit or to be aligned from toilet floor for off-set pit. Proper finishing needs to be done on the floor
with neat finish.
Cover for off-set pit: Concrete cover/wooden slab.
Superstructure: any locally available indigenous material.
Vent pipe: requires vent pipe for odor to escape and to release humidity of sludge from the pit.
Collecting tank: Two separate collecting tanks, one for excreta and one for urine.

Important features:

Ecological sanitation has four main features:

**Diversion:** It means that urine and faeces are collected in separate places within a latrine unit.
This is not as difficult as it sounds because urine and faeces come from different body
openings and take off in separate directions. Urine is piped into one container or tank, faeces
drop into another container.

**Containment:** It means that urine and faeces are stored separately in a secure device until
safe for recycling.

**Sanitization:** It means that pathogenic organisms in faeces and urine are reduced to a
harmless level by primary on-site treatment. For faeces this is done by dehydration and
retaining sludge for 6-8 months. Most of the humidity of the fresh faeces is removed via a vent
pipe.

**Recycling:** It means that the end products of the diversion-containment-sanitization process
are used for agricultural land or back-yard gardening as nutrient enriched fertilizer.

**Why is Ecosan toilet not included for immediate application in Ger Areas?**

During consultation with partners including communities two different views emerged.

The majority mentioned that recycling of waste is not popular and culturally acceptable in Mongolia. In addition to that, back yard gardening is not popular in Ger areas and therefore, utilization of digested sludge and collected urine will be a problem for Ger people. Most of the professionals and stakeholders of sanitation sector in Mongolia therefore, are a little ‘iffy’ to select this option for immediate application.

During the national consultation workshop it was informed that an improvement of the living environment and housing for Ger-areas by piloting Ecosan is already initiated in Mongolia with support from GTZ. Therefore, some professionals are keen to include this option in the informed choice.

Therefore, this option is included under Part B.
Panel 7: Pour Flush Toilet – Single/Double Pits

Definition:
The Pour Flush Latrine refers to the Single Pit/Twin-Pit Pour Flush system, which consists of a pan and trap (the bowl), with a single pit/twin-pit either just below the bowl (on-set type), or slightly away from the bowl (off-set type). The Pour Flush latrine is a specially designed water-seal latrine, which requires only 2-3 liters of water for each manual flushing. The water-seal eliminates odor, and prevents rodents from entering the latrine room from the pit.

Advantages:
- Odor free.
- Provide privacy.
- Little chance for transmission of excreta-related disease.
- Can support good health and hygiene practices.
- Appropriate where water is available.
- Water requirement for flushing is low (2-3 liters).
- Construction and maintenance are cheap and easy.
- Offset type can be placed within the dwelling.
- Suitable for less populated areas where space is available for relocating the pit once filled-up for single pit type, but for twin-pit it can also be suitable for densely populated areas since it works life long.
- Possible to upgrade to small bore sewer system.

Disadvantages:
- Water is necessary for flushing.
- In high ground water table, there is a risk of groundwater pollution.
- Not appropriate where communities use dry cleansing materials.
- Needs training for the initial users on how to use and maintain the latrine pans.
- Locally manufactured bowls are often of bad quality due to lack of proper quality control.

Tentative costs:
- Approximately US$ 130 to US$ 240 for single pit and US$ 160 to US$ 310 for twin-pit latrine is required for construction. However, some of the construction materials required are available from scrap materials within the dwellings and therefore, in many occasions the actual cash requirement for construction of this latrine is minimal.

Recurrent costs:
- The recurrent costs will be around US$ 10 – 20 per year.

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36 This can vary ± 15%.
37 Including the costs of superstructure to protect the users from snow, rain and cold, and also to provide privacy.
Working Life:
- 2 - 3 years for single pit and life long for twin pits.

Users Responsibility:
- Need training on how to use.
- Need to clean the squat plate and pan regularly.
- No paper, cotton, sanitary pad etc. should be thrown into the pan (that should be disposed of separately in garbage bins/pits); otherwise water seal will be blocked.
- Water for flushing is a must after each use.

Materials Needed:
- Options for Pour Flush Pans: Plain cement, plastic, mosaic, fiber glass, ceramic etc. The water seal should be 20 mm. For offset type pour flush, S-type trap need to be used.
- Single Pit\textsuperscript{38}/ Twin-pit: Shovel to dig the pit/pits, and good lining materials, which can be used life long. In case of twin-pit, a junction box is required.
- Latrine floor with footrests: The bowl/pan should be fixed into either a squat plate just on the top of the pit or to be aligned from toilet floor for off-set pit.
- Cover for off-set pit: Concrete cover and superstructure: Any locally available indigenous material.

Important features:
- Pour Flush Pan/Bowl with water seal of 20 mm.
- Squat platform / floor where bowl and water-seal trap fixed along with footrests.
- Lined or unlined pit for on-set type; lined pit for off-set type.
- In both cases, single or twin-pit, the sidewall of the pit (0.5 m below from the ground) must be perforated. In case of twin-pit, the partition wall between two pits should be non-perforated and impermeable.
- Superstructure and cross ventilation is essential to eliminate odor inside the latrine room. The bottom of the door must have some clearance to allow air to move inside the latrine room. The window should be located at the opposite side of the door, meaning thereby, on the top of the back wall, which will allow air to come inside the latrine room from the bottom of the door and drive away odor through window.
- Suitable for areas where water supply is supplied by the water kiosks/individual piped water connections.
- The latrine room is required to be centrally heated to make sure the ambient temperature within the latrine room should not drop anytime to freezing temperature to prevent freezing of water seal.

Why is pour flush latrine not included for immediate application in Ger Areas?

Most of the Ger areas consist of poor households, comprising of temporary settlement huts, known as Gers. They fetch water either from water kiosks or from a vendor and use 20-30 litres of water per day. In such water scarce areas, with no room heating system (water seal will freeze during winter without room heating provisions) proposing pour flush is not suitable. However, as USIP2 may provide some house connections, out of which the households who have room heating system may look for this latrine as an option and therefore, this design is added in Part B as a potential option.

\textsuperscript{38} If squatting plate is located in such a way that the lined pit is a bit off-set with the latrine room and if provision is kept for desludging, then it can be emptied via vacuum truck. In that case, the single pit can be used for longer periods.
Option 8: Public Toilet and Other Facilities

This Option is meant for community use.

As per local registration data in Mongolia 208 community toilets already exist\(^{39}\) among 84,000 families in Ger areas, out of which 49\%, i.e., 101 community toilets are running in good condition\(^{40}\). This implies that the use of public toilet is nothing new\(^{41}\) in Mongolia.

In some old Ger areas in Ulaanbaatar, which are densely populated, there are several extremely impoverished families who do not have any latrines and also do not have any land to build their latrines\(^{42}\). Where do they go for defecation?

As we know, the overall impact of sanitation depends upon effective use of latrines by individual as well as community. For example, in one community even 90\% families build and effectively use their latrines and only the remaining 10\% go for open defecation. This alone can create a high health risk for fecal-oral transmission for the whole community. Therefore, sanitation needs to be seen both at the household as well as community levels. The poor people who do not have resources including space to build their latrines need some solutions for sanitation.

Sanitation simultaneously also needs to be seen in a wider perspective from the point of view of overall personal hygiene, the facilities for defecation, bathing and washing clothes with hot water, especially during winter between November and March.

As we know, the IDA funded Second Ulaanbaatar Service Improvement Project (USIP2) is planning to build ‘water kiosks’ in many Ger areas (some of which are overlapping with sites of Low Cost Sanitation Project funded through JSDF grant). In overlapping areas, where USIP2 brings water directly through piped water supply, the construction of ‘Option 8: Public Toilet’ might be possible due to availability of running water through piped water supply.

The ‘Community-led Infrastructure Development for the Urban Poor in Ulaanbaatar, funded by JSDF grant in Mongolia’, has three components: (i) community-led infrastructure development (CLIP) component, (ii) Low Cost Sanitation (LCS) component and (iii) Monitoring and evaluation component. Under CLIP component, communities will have opportunity to choose their own infrastructure that they would like to improve. Therefore, there is an opportunity even for communities to consider for ‘Option 8: Public Toilet’ under CLIP if this option is offered.

This option therefore has the potential for application if three project/components, such as, USIP2, CLIP and LCS are properly coordinated since all three projects/components are managed by a single executing agency, i.e., PMU of USIP2.

\(^{39}\) Choibalsan soum in Dornod, and Tsogttsetsi and Hurmen soums in Omnogobi have the highest number of public or shared latrines. Many cases were registered in Ulaanbaatar Ger areas where a simple pit latrine is used as a public or shared latrine. [source: Access to water and sanitation services in Mongolia, UNICEF, UNDP and Ministry for Nature and Environment, December 2004].


\(^{41}\) In some places, USIP2 will bring water by water tankers to ‘Water Kiosks’.

\(^{42}\) “Moreover, as a result of a number of relocations of pit latrine, most households have no space in their plot for further repositioning of latrine”. [source: Access to water and sanitation services in Mongolia, UNICEF, UNDP and Ministry for Nature and Environment, December 2004].
In addition to that, cross sectoral learning shows that in many occasions where demands for services are low, demands may increase with the improvement of service level. For example, in the telecommunication sector, use of landlines was quite low, whereas the demand for mobile phones is high though costly, even in Mongolia.

With this cross-sectoral learning, many sub-options are also provided within the ‘Option 8: Public Toilet’. These are already working well in many other developing countries. **Adding up of these sub-options will also help and attract the private sector. In fact this will generate a perception of sanitation as a socio-commercial sector and thus, may foster public-private partnership for sanitation in Ger areas.**

### Getting the mix right: A wide range of needs and solutions

Anyone working within sanitation, especially in urban areas, is aware that there are a wide range of needs and solutions. Residents have differing requirements (e.g. for excreta disposal only, or for the safe disposal of substantial bathing, laundry and other household water), and different constraints (e.g. space, cash, and water supply access.) Sanitation improvement will consist of a shift in this mix, and not the wholesale adoption of a single approach. The management of this mix cannot be left wholly to the market for a variety of reasons, the most important being that individual households do not directly feel all the consequences of their actions. Government has an important role in guiding and promoting the evolution of the range of options, without stifling the freedom of individuals and communities to find their own solutions. This is not a plea for traditional master plans that often sit on engineers’ shelves for lack of finance, but rather for careful study and analysis of the situation, the actors involved, and the forces in play that determine what “solution” will be found by households and communities to their sanitation problem.

Government can play a key role in:
- Providing resources for assessment of the existing situation
- Identifying the players who are currently involved (either as “part of the solution” or “part of the problem”)
- **Thinking through the most realistic and viable future mixes of options**
- Identifying and reducing constraints that limit the evolution of the mix of solutions in the right direction (e.g. limited capacity in the sector, over-rigid technical specifications, etc.)
- Identifying and applying appropriate set of incentives (complete with Rules, Rewards, and Referees) to steer the evolution in the right direction
- Providing the necessary focus and leadership for the overall effort

[Extracted from: Draft - The Sanitation Challenge: Some strategic thinking from WSP, Pete Kolsky, August. 2003].

### The ‘Option 8: Public Toilet’ can be built with following sub-options:

1. **Public Toilet = latrine compartments + washing basins.**
2. **Public Toilet = latrine compartments + washing basins + bathing rooms.**
3. **Public Toilet = latrine compartments + washing basins + bathing rooms + washing room for clothes + some place for laundry.**
4. **Public Toilet = latrine compartments + washing basins + bathing rooms + washing room for clothes + some place for laundry + incinerator to burn the used sanitary pads/clothes.**

**Definition:**
This is a community ‘Public Toilet’, consisting of multiple (may be three) latrine compartments, connected to a junction box, through which excreta goes into twin pits. These twin pits need to be designed for community level (for 50 – 70 users) and will work alternatively, one at a time (same as twin-pit latrine for individual households). Therefore, water requirement for flushing will be minimal – approximately 2-3 litres for flushing and thus, the hydraulic loading to pits will also be minimum and will be easy to percolate through these pits into sub-soil (same as other on-site latrines). The wastewater from other units (if installed), such as, wastewater from bathing compartments, washing basins and washing clothes will be diverted to appropriate treatment mechanism prior to final treatment.

[43 Please see the section on ‘Wastewater Disposal’, page 61 of this manual.]
discharge (may be to open drains). Therefore, the wastewater will not contribute any hydraulic load to twin pits and not create any damage to sub-surface water. In addition, the wastewater will be treated and discharged to open drains, which is a better option than untreated wastewater, which will in any case be flowing when new water kiosks are commissioned as this aspect has not been addressed in USIP2.

Now, each sub-component of this Public Toilet is briefly described below. However, if community is interested in applying any of the sub-options described below, they should request PMU to carry out a feasibility study of that sub-option with possible cost breakdown prior to actual construction. Therefore, the detailed cost breakdown is not mentioned in this manual since initial parameters (number of users, frequency of use per person per day, where this unit will be located – at high water ground area, or low water ground area etc.) need to be fixed prior to preparing a detailed design and cost breakdown.

Salient Features:

- **Heating arrangement:** The Public Toilet must have heating system to make sure the ambient temperature within the room is much above the freezing temperature.

- **The Latrine Compartments:** The number of latrine compartments needs to be discussed with potential users. Latrine compartments are not used for 24 hours, however, in a specific time the demand for using latrines are high. Therefore sometimes, in public toilets more urinals are provided separately than latrine compartments. If this public toilet is designed for all, not only for women and children, two separate latrine blocks are required with two different entry points.

- **Twin Pits:** In many developing countries, public toilet and school toilet with twin pits are common. Therefore, there is no risk involved in having twin pits instead of septic tank. Moreover, the twin-pit system will reduce the hydraulic load and the system will function better. However, during winter no liquid will percolate through these pits. Consequently, additional storage capacities need to be calculated. The pipes connected from pans to junction box, S-traps need to be used. One pit may function for 2-3 years (depending upon design calculation), then the other pit will be used, while the excreta in the first pit will be liquefied and gasified and volume will be reduced to allow re-using of the first pit. However, vacuum trucks are available in Ger areas, which can also be used for emptying pits if people are not willing-to reuse the digested sludge as fertilizer. The Junction Box and both pits need to be covered by reinforced concrete slabs to make sure no one opens these slabs to satisfy their curiosity or for any other unorthodox reasons.

- **Bathing Rooms:** The number of bathing rooms also needs to be calculated as per demand of the users. Hot water will be supplied during winter, which will allow the users to bath and keep themselves clean.

- **Washing Rooms and Basins:** Washing rooms for washing clothes and washing basin for washing hands and faces will be provided with hot water, which will also foster the improvement of personal hygiene.

- **Laundry and Personal Commodities:** Facilities for laundry, ironing clothes, buying soaps, tooth brushes, tooth paste, sanitary pads, shaving creams, shaving sets etc. will be provided to encourage people to use all these facilities to run the complex in a semi-commercial no-profit-no-loss basis and simultaneously foster personal hygiene.

- **Management of Liquid Waste:** To manage the liquid waste a collection chamber with adequate retention period (depending upon the wastewater type, the retention period will be

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44 There are many management models that can be applied for this Public Toilet: (i) this can be managed by ‘sanitation teams’, which will consist of group of households at the lowest level, (ii) by Private Sector or NGOs or CBOs, as per ‘out-put based contract agreement’ signed between PMU, Khoroo authority and the managing agency, (iii) Unemployed youth by establishing a cooperative etc.
Incinerator for disposal of sanitary clothes and sanitary napkins: Both biodegradable and non-biodegradable waste can prove hazardous for health, if proper and complete disposal is not done. In communities disposal of sanitary clothes and sanitary napkins of women, especially for the adolescent girls, is a big problem. It affects the proper functioning of toilets when disposed in the toilet and serious health problems if thrown out in garbage dumps or in the open or into latrine pans. But generally people do not want to discuss this issue in open, since they feel embarrassing to talk. There is, therefore, an imminent need to address this important issue of sanitary waste disposal effectively to help proper excreta disposal system. Thus, a low cost incinerator is developed with two chambers, an emission control system along with a door for firing and removal of ash. In each latrine compartment for ladies, there is a spout/opening in the toilet wall for disposal of soiled napkins into the chamber. The soiled napkin drops on the wire gauze in the chamber on the other side of the toilet wall. This dropped napkin and other waste are fired on weekly basis through the door /firing inlet in the lower chamber. The entire incinerator is attached to the outer wall of the toilet. A smoke vent is provided for the disposal of gaseous substances while setting fire in the sanitary wastes.

**Case Study from Tamil Nadu, India: Incinerator for disposal of sanitary clothes and sanitary napkins:**

An innovative low cost technology incinerator has been developed for proper disposal of sanitary wastes in Tamil Nadu of India. This can possibly be added with the Public Toilet cum shower and laundry facilities. This design is simple, safe and cost effective. It has already been installed and effectively used in many rural schools and women sanitary complexes in Tamil Nadu of India. The incinerator burns/incinerates wastes like soiled cloth, cotton waste, napkins, paper towels etc. The waste gets converted into ash and other non-hazardous residues. The incinerator is user friendly and manually operated. The cost of this technology is not very high, around US $ 350 to 450 only.

This simple addition to the toilets is highly appreciated by adolescent girls. The use of incinerator has removed the inhibitions among girls, helps them to attend schools during menstruation and has made them comfortable attending the school during those days. There are also no blockages of toilets due to sanitary waste disposal into the toilets. With such low investment required for incinerators, a public toilet (or even school toilet) can install such technology in toilets for better disposal of sanitary waste to check health hazards.

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**Why Public Toilet with shower and laundry is not included for immediate application in Ger Areas?**

This option is obviously not a low cost sanitation option for households and therefore, not included within the Part A of this manual for immediate application in Low Cost Sanitation Project funded by JSDF for Ger households. There are other issues also... Cost/capita need not be high, even if total capital cost for a PT is higher than for a single family latrine. Issues to consider that make PTs problematic include, (a) management of public toilets, (b) cost recovery and (c) sustainability. However, during consultations with partners, the requests also came to include this option to explore whether this option can be piloted either through either CLIP or similar projects. Therefore, this option is highlighted in Part B of this manual.

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45 Please see the section on ‘Wastewater Disposal’, page 61 of this manual.
Other Options: Why are they not included in this manual?

The Mongolian Government is committed to shift from ‘supply driven approach’ to ‘community-led sanitation initiatives’ for Ger areas. This is a new process for Mongolian sector partners. The earlier sanitation initiatives were mainly externally driven, where development of local capacities were not adequately addressed, supply chain was not created, participatory approach was lacking, and understanding of community-led process and technology options were not properly addressed.

In this background, the Project Management Unit (PMU) of Community-led Infrastructure Project funded through JSDF with other partners have reached consensus to move forward to implement community-led low cost sanitation approach, which is indeed challenging, but can be achieved through step-by-step approach.

Other latrine options, which may come-up in future for consideration are as follows:-

- Compost Latrine
- Vietnam Double Vault Latrine
- Dehydrating Latrine
- Small Bore Sewer System
- The Condominial Sewerage System

### The Condominial Sewerage – can it be an option for Ger areas?

A condominial sewerage system is a simplified version of sewerage system and less expensive than conventional systems, but have same benefits. Carrying away the effluent from pits or sumps might be a potential solution for densely populated Ger area, especially the Gers, which have natural topography to allow liquid to flow by gravity.

However, the main challenge is the falling of ambient temperature in Mongolia during winter, which falls up to – 35 ° C. During winter, the liquid freezes. The freezing line in Mongolia goes upto almost 4 feet below the ground level. Therefore, the condominial sewerage needs to be laid below this freezing line, which will increase the laying costs and overall capital costs of the scheme.

However, this type of technology is still worth exploring by conducting a preliminary feasibility study.

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46 As well as the PMU for USIP2.
PART C: BILL OF MATERIALS AND COSTS OF LATRINES

List of different alternative sub-options for ‘sanitation informed choice’ highlighted in this manual.47

1. Superstructure
   1.1 Roof Part
      1.1.1 Type of Roof: G.I/ Asbestos Roofing Sheets
      1.1.2 Type of Roof: Wooden Planks Roofing Sheets

   1.2 Wall Part
      1.2.1 Type of wall: Bamboo plywood-mat with mud plastering with Door
      1.2.2 Type of wall: Half Brick Masonry and Half Bamboo plywood mat with mud plastering with Door
      1.2.3 Type of wall: Haft Brick masonry and Half Wooden Planks with Door
      1.2.4 Type of wall: Wooden Planks with Door
      1.2.5 Type of Wall: Full Brick masonry with Door
      1.2.6 Type of Wall: Full Cement Hollow Blocks with Door

2. Floor Slab
   2.1 Type of slab: Wooden slabs for single/double holes with footrests & lids/ without lids

3. Lining Part
   3.1 Type of lining: Oil-drum Single for Pit Lining
   3.2 Type of lining: Wooden Planks for Single Pit Lining
   3.3 Type of lining: Brick masonry for Single Pit Lining
   3.4 Type of lining: Concrete ring for Single Pit Lining
   3.5 Type of lining: Stone Masonry for Single Pit Lining
   3.6 Type of lining: Brick Masonry for Double Pit Lining

47 Please note that the development of these sub-options for offering various choices to community during community dialogue is a dynamic process. These sub-options need to be further validated, revised, adopted and adapted periodically to make this manual effective and updated.
### 1.1.1 Superstructure: Roof Part: Type of Roof: G.I/ Asbestos Roofing Sheets

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>G.I. / AC roofing sheets including clamping and fixing them into positions with necessary arrangements.</td>
<td>m²</td>
<td>5.0</td>
<td>5.0</td>
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<tr>
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<tr>
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<td>Unskilled (in kind)</td>
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</tr>
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<td>Total</td>
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<td></td>
<td></td>
<td>25</td>
</tr>
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</table>

This can vary ± 15%.

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This can vary ± 15%.
1.1.2 Superstructure: Roof Part: Type of Roof: Wooden Planks Roofing Sheets

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<tr>
<th>Items</th>
<th>Description</th>
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<th>Price</th>
<th>Costs US$</th>
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</table>

49 This can vary ± 15%.
### 1.2.1. Superstructure: Wall Part: Type of wall: Bamboo plywood-mat, mud plastering with Door

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<tr>
<th>Items</th>
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<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
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<td></td>
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This can vary ± 15%.
### Sanitation Ladder: Bill of Materials and Costs

1.2.2. Superstructure: Wall Part: Type of wall: Half Brick Masonry, Half Bamboo plywood mat, mud plastering with Door

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<th>Items</th>
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<th>Quantity</th>
<th>Price</th>
<th>US$</th>
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<td>with mud plastering</td>
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<td></td>
<td></td>
</tr>
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<td>8.0</td>
<td>16.0</td>
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</tr>
<tr>
<td>Labor</td>
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<td><strong>Total</strong></td>
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51 This can vary ± 15%.
1.2.3. Superstructure: Wall Part: Type of wall: Half Brick Masonry and Half Wooden Planks with Door

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<th>Items</th>
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<td>day</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>58.4</td>
</tr>
</tbody>
</table>

This can vary ± 15%.

---

52 This can vary ± 15%.
### 1.2.4. Superstructure: Wall Part: Type of wall: Wooden Planks with Door

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wooden planks</td>
<td>(25 mm thick)</td>
<td>m²</td>
<td>10.7</td>
<td>5.0</td>
<td>53.5</td>
</tr>
<tr>
<td>Nails</td>
<td>(50 mm)</td>
<td>Kg.</td>
<td>4</td>
<td>2.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Door</td>
<td></td>
<td>m²</td>
<td>2.0</td>
<td>8.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Labor</td>
<td>Skilled</td>
<td>day</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Unskilled (in kind)</td>
<td>day</td>
<td>4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>77.5</td>
</tr>
</tbody>
</table>

Bill-of-material includes door and all four walls, though it is not shown in the sketch.

This can vary ± 15%.
### 1.2.5. Superstructure: Wall Part: Type of Wall: Full Brick masonry with Door

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brick</td>
<td>Nos.</td>
<td>629</td>
<td>0.07</td>
<td></td>
<td>44.03</td>
</tr>
<tr>
<td>Cement</td>
<td>Kg.</td>
<td>90</td>
<td>0.07</td>
<td></td>
<td>6.30</td>
</tr>
<tr>
<td>Sand</td>
<td>m$^3$</td>
<td>0.4</td>
<td>12.6</td>
<td></td>
<td>5.04</td>
</tr>
<tr>
<td>Door</td>
<td>m$^2$</td>
<td>2.0</td>
<td>8.0</td>
<td></td>
<td>16.0</td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>day</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Unskilled (in kind)</td>
<td>day</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>71.37</td>
</tr>
</tbody>
</table>

Bill-of-material includes door and all four walls, though it is not shown in the sketch.

---

54 This can vary ± 15%.
1.2.6. Superstructure: Wall Part: Type of Wall:
Full Cement Hollow Blocks with Door

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Hollow Blocks (250 mm X 75 mm X 25 mm with hollow inside):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cement</td>
<td>Kg.</td>
<td>250</td>
<td>0.07</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td>Stone Chips</td>
<td>m³</td>
<td>0.72</td>
<td>23.6</td>
<td>17.0</td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>m³</td>
<td>0.36</td>
<td>12.6</td>
<td>4.6</td>
</tr>
<tr>
<td></td>
<td>Door</td>
<td>m²</td>
<td>2.0</td>
<td>8.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Labor</td>
<td>Skilled</td>
<td>day</td>
<td>2</td>
<td>1.0</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Unskilled (in kind)</td>
<td>day</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>57.1</td>
</tr>
</tbody>
</table>

Bill-of-material includes door and all four walls, though it is not shown in the sketch.

55 This can vary ± 15%.
2.1. Floor Slab: Type of slab: Wooden slab with single/ double holes with footrests, with/ without lids

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Wooden slabs and others</td>
<td>L.S</td>
<td>-</td>
<td>-</td>
<td>20.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20.0</td>
</tr>
</tbody>
</table>

Notes:
1. Lids also can be constructed without hinge.
2. Two holes are suggested by Ger people, one for adult and one for children. One lid always needs to be closed while other will be in use.
3. In case of VIP latrine, no lid should be used.
4. In case of Conventional Pit Latrine, the costs of two planks are integrated with the superstructure costs.

56 This can vary ± 15%.
3.1. Lining Part: Type of lining: Oil-drum for single pit lining

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Used oil drum single pit</td>
<td>m²</td>
<td>9.5</td>
<td>8.0</td>
<td>76.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>76.0</td>
</tr>
</tbody>
</table>

57 This can vary ± 15%.
3.2. Lining Part: Type of lining: Wooden planks for single pit lining

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Wooden planks for single pit</td>
<td>m²</td>
<td>9.5</td>
<td>8.0</td>
<td>76.0</td>
</tr>
<tr>
<td>Labor</td>
<td>Skilled</td>
<td>day</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Unskilled</td>
<td>day</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td>76.0</td>
</tr>
</tbody>
</table>

This can vary ± 15%.

---

58 This can vary ± 15%.
3.3. Lining Part: Type of lining: Brick masonry for single pit lining

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Bricks</td>
<td>Nos.</td>
<td>450</td>
<td>0.07</td>
<td>31.5</td>
</tr>
<tr>
<td></td>
<td>Cement</td>
<td>Kg.</td>
<td>78.6</td>
<td>0.07</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>m³</td>
<td>0.36</td>
<td>12.6</td>
<td>4.5</td>
</tr>
<tr>
<td>Labor</td>
<td>Skilled</td>
<td>day</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Unskilled</td>
<td>day</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport</td>
<td>-</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>41.5</td>
</tr>
</tbody>
</table>

59 This can vary ± 15%.

60 Around 5.3 cft, i.e., 0.15 m³ amount of cement mortar is required. [In 1 m³ of brick work around 350 numbers of bricks are required. The brick size is considered as 10” X 5” X 3”. If the brick size differs, accordingly, the number of bricks and cement mortar requirement will also need to be changed].
### 3.4. Lining Part: Type of lining: concrete slab for single pit lining

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>cement</td>
<td>Kg.</td>
<td>264</td>
<td>0.07</td>
<td>18.5</td>
</tr>
<tr>
<td></td>
<td>sand</td>
<td>m³</td>
<td>0.55</td>
<td>12.6</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td>stone chips</td>
<td>m³</td>
<td>1.1</td>
<td>23.6</td>
<td>26.0</td>
</tr>
<tr>
<td>Labor</td>
<td>skilled</td>
<td>day</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>unskilled (in kind)</td>
<td>day</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>54.4</td>
</tr>
</tbody>
</table>
3.5. Lining Part: Type of lining: stone masonry for single pit lining

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Stone</td>
<td>m³</td>
<td>2.3</td>
<td>4.0</td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td>Cement</td>
<td>Kg</td>
<td>153</td>
<td>0.07</td>
<td>10.7</td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>m³</td>
<td>0.86</td>
<td>12.6</td>
<td>10.8</td>
</tr>
<tr>
<td>Labor</td>
<td>Skilled</td>
<td>day</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Unskilled In kind)</td>
<td>day</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>33.7</td>
</tr>
</tbody>
</table>

This can vary ± 15%.
3.6. Lining Part: Type of lining: Brick masonry for double pit lining

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Brick</td>
<td>Nos.</td>
<td>788</td>
<td>0.07</td>
<td>55.2</td>
</tr>
<tr>
<td></td>
<td>Cement</td>
<td>Kg.</td>
<td>132.5</td>
<td>0.07</td>
<td>9.3</td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>m³</td>
<td>0.56</td>
<td>12.6</td>
<td>7.0</td>
</tr>
<tr>
<td>Labor</td>
<td>Skilled</td>
<td>day</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Unskilled</td>
<td>day</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>77.5</td>
</tr>
</tbody>
</table>

This can vary ± 15%.
## EXAMPLE: COST OF ONE VENTILATED IMPROVED SINGLE PIT LATRINE:

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials</strong></td>
<td>G.I. / AC roofing sheets including clamping and fixing them into positions with necessary arrangements.</td>
<td>m²</td>
<td>5.0</td>
<td>5.0</td>
<td>25</td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td>Skilled</td>
<td>day</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Unskilled (in kind)</td>
<td>day</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>27.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials</strong></td>
<td>Bamboo plywood mat sheets with mud plastering including binding</td>
<td>m²</td>
<td>11.0</td>
<td>1</td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>Door</td>
<td>m²</td>
<td>2.0</td>
<td>8.0</td>
<td>16.0</td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td>Skilled</td>
<td>day</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Unskilled (in kind)</td>
<td>day</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>27.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials</strong></td>
<td>Wooden slabs and vent pipe</td>
<td>L.S</td>
<td>-</td>
<td>-</td>
<td>20.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>20.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials</strong></td>
<td>Stone</td>
<td>m³</td>
<td>2.3</td>
<td>4.0</td>
<td>9.2</td>
</tr>
<tr>
<td></td>
<td>Cement</td>
<td>Kg</td>
<td>153</td>
<td>0.07</td>
<td>10.7</td>
</tr>
<tr>
<td></td>
<td>Sand</td>
<td>m³</td>
<td>0.86</td>
<td>12.6</td>
<td>10.8</td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td>Skilled</td>
<td>day</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Unskilled (in kind)</td>
<td>day</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>33.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Therefore, the cost of one sample VIP – Single Pit latrine will be: US$ \[25 + 27 + 20 + 33.7\] = US$ 105.7 \(\approx\) US$ 110. With ± 15%, the costing range for the above mentioned model will be around: **US$ 95 to US$ 130**

Please note that the current cost for constructing one VIP – Single Pit Latrine with support from UNICEF is US$ 125 to US$ 150.

---

64 This can vary ± 15%.
### EXAMPLE: COST OF ONE VENTILATED IMPROVED DOUBLE PIT LATRINE:

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Materials</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wooden planks roofing sheets (25 mm thick)</td>
<td>m²</td>
<td>4.42 = 5.0</td>
<td>8.0</td>
<td>40.0</td>
<td></td>
</tr>
<tr>
<td>Nails</td>
<td>Kg,</td>
<td>1</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>day</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Unskilled (in kind)</td>
<td>day</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>42.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wooden planks (25 mm thick)</td>
<td>m²</td>
<td>10.7</td>
<td>5.0</td>
<td>53.5</td>
<td></td>
</tr>
<tr>
<td>Nails (50 mm)</td>
<td>Kg.</td>
<td>4</td>
<td>2.0</td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td>Door</td>
<td>m²</td>
<td>2.0</td>
<td>8.0</td>
<td>16.0</td>
<td></td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>day</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Unskilled (in kind)</td>
<td>day</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>77.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wooden slabs and others</td>
<td>L.S</td>
<td>-</td>
<td>-</td>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Items</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Price</th>
<th>Costs US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brick</td>
<td>Nos.</td>
<td>788</td>
<td>0.07</td>
<td>55.2</td>
<td></td>
</tr>
<tr>
<td>Cement</td>
<td>Kg.</td>
<td>132.5</td>
<td>0.07</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td>m³</td>
<td>0.56</td>
<td>12.6</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td><strong>Labor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>day</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Unskilled (in kind)</td>
<td>day</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>77.5</td>
</tr>
</tbody>
</table>

Therefore, the cost of one sample VIP Double Pit latrine will be: US$ [42 + 77.5 + 20 + 77.5] = US$ 217 ≈ US$ 220. With ± 15%, the costing range for the above mentioned model would be around:

**US$ 190 to US$ 255**

Please note that the current cost for constructing one VIP – Single Pit Latrine with support from UNICEF is US$ 125 to US$ 150.
1. Design

This manual will briefly highlight the key elements of design, construction, operation and maintenance of on-site latrines. The detailed design, construction, operation and maintenance of on-site latrines have been described in many books and therefore not repeated in this manual. References are made in appropriate places in this manual for interested person to read those documents.

1.1 Latrine Pits

When calculating the dimensions of a pit, three conditions must be satisfied, such as:

- The pit should have sufficient storage capacity for all the sludge that will accumulate during its operational life or before its planned emptying.
- At the end of the pit’s operational life there should still be sufficient space left for the contents to be covered with a sufficient depth of soil to prevent surface contamination with pathogenic organisms (soil seal depth, which usually is kept 0.5 m).
- There should be sufficient wall area available at all times to enable any liquid in the pit to infiltrate the surrounding soil.

The storage volume of pit depends upon three factors:

- The effective life of the pit, meaning the retention period of accumulated sludge in the pit.
- The average number of people using the pit.
- The estimated maximum sludge accumulation rate per person per year.

Once the effective volume of the pit is calculated, the plan area is decided. This should be based on local preference, ground conditions and construction materials. In Mongolia people generally prefer rectangular shape of pit and therefore, area should be calculated accordingly. The area inside the lining is utilized for sludge accumulation, not the excavated area. Having determined the plan, shape and area, the depth of pit required for sludge accumulation is calculated.

<table>
<thead>
<tr>
<th>Suggested Maximum Sludge Accumulation Rates for Pit Latrine Design in Mongolia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of use</strong></td>
</tr>
<tr>
<td>Wastes retained in water where degradable anal cleaning materials are used</td>
</tr>
<tr>
<td>Wastes retained in water where non-degradable anal cleaning materials are used</td>
</tr>
<tr>
<td>Wastes retained in dry conditions where degradable anal cleaning materials are used</td>
</tr>
<tr>
<td>Wastes retained in dry conditions where non-degradable anal cleaning materials are used</td>
</tr>
</tbody>
</table>

In very cold conditions, with temperatures less than -10 degree C, excreta falling into pit may freeze before the pile has time to slump. The pit will not be filled efficiently, instead it will contain a frozen mound of excreta and void spaces. Due to this factor, the volume of pits per capita (person), allocated for sludge storage, needs to be greater in cold regions than in warm/ tropical ones. Therefore, in Mongolia the values for maximum sludge accumulation rates for pit latrines litre per person per year is taken as much as double that of warmer area, [Source: Out in the cold, Mark Buttle and Michael Smith, WEDC, Page 45, 2004].

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67 Mongolians generally prefer rectangular shaped pits.
1.2 Infiltration area
It is assumed that the soil pores below the sludge surface are blocked. In that case additional wall area must be allowed for infiltration of the liquids above the sludge. The infiltration area excludes the soil seal depth since the top 0.5 meter of a pit has a fully sealed lining. Assuming that all the liquid entering the pit lies on top of the sludge, the liquid depth will rise until the area of contact between liquid and soil is large enough to permit infiltration of the daily intake of liquid.

Therefore, the Pit Depth = Sludge depth + Infiltration Depth + Soil Seal Depth.

<table>
<thead>
<tr>
<th>Recommended Infiltration Capacities (litre per m² per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of soil</td>
</tr>
<tr>
<td>--------------</td>
</tr>
<tr>
<td>Coarse or medium sand</td>
</tr>
<tr>
<td>Fine sand, loamy sand</td>
</tr>
<tr>
<td>Sandy loam, loam</td>
</tr>
<tr>
<td>Porous silty clay and porous silty clay loam</td>
</tr>
</tbody>
</table>

[Source: Out in the cold, Mark Buttle and Michael Smith, WEDC, Page 45, 2004].

1.3 Calculation of Pit Size
On the basis of the above design criteria, any pit size can be calculated.

Example:
A family consisting of 5 people in Ger area of Ulaanbaatar City intends to construct a Ventilated Improved Single Pit Latrine to last for 3 years and plans to desludge the pit every 3 years through vacuum cleaning truck. The family uses papers for anal cleaning and sullage is disposed separately. Then what will be the size of the pit?

The Sludge Volume = 5 nos. × 3 years × 0.18 = 2.7 m³.

Let's consider a rectangular pit with internal dimensions of 1.8 m by 2.5 m,
Then the depth required for sludge is = [2.7 / (1.8 × 2.5)] = 0.6 m

Since paper is used for anal cleaning and sullage is disposed separately, the infiltration area can be ignored.

The soil seal depth = 0.5 m

Therefore, total depth = [0.6 + 0 + 0.5] = 1.1 m, say 3.6 ft, which is generally above the high ground water table.

Therefore, the internal dimensions of pit will be 2.5 m length, 1.8 m breadth and 1.1 m depth.

On the basis of above design criteria, a general set of pit size is suggested for dry latrines (Option 2 to Option 6) where dry cleaning materials are used.

<table>
<thead>
<tr>
<th>Users (in numbers)</th>
<th>Sludge Retention Period (in years)</th>
<th>Sludge Accumulation Rates (litre per person per year)</th>
<th>Length (m)</th>
<th>Breadth (m)</th>
<th>Depth (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3</td>
<td>180</td>
<td>2.5</td>
<td>1.8</td>
<td>1.1</td>
</tr>
<tr>
<td>10</td>
<td>3</td>
<td>180</td>
<td>3.2</td>
<td>2.8</td>
<td>1.1</td>
</tr>
<tr>
<td>15</td>
<td>2</td>
<td>180</td>
<td>3.2</td>
<td>2.8</td>
<td>1.1</td>
</tr>
</tbody>
</table>


69 However, please note that once sludge accumulation rates are different, the pit size will also differ.

70 Intentionally the depth of the pit is kept within 4 feet since in the worst scenario high ground table is found around 4 feet from the ground. Where ground water is below 6-8 feet, more depth can be kept for pit and therefore, length and breadth of the pit will reduce.
During consultation meeting with partners in Ulaanbaatar, it was revealed that some pits constructed 15 years back in Ger areas with 3-4 meter depth is not yet filled-up and still serving well. Similarly, in some places, pits are over-flowing or back-flushing, especially during summer. This is mainly due to discharging of sullage into the pits. Therefore, it is advisable not to discharge sullage to on-site latrine pit and use separate pits for sullage disposal\textsuperscript{71} instead.

To learn more about construction, operation, maintenance and ground water pollution please read:

- A guide to the development of on-site sanitation, R. Francesys, J. Pickford and R. Reed, WEDC and WHO, 1992 [visit site: http://www.who.int/docstore/water_sanitation_health/onsitesan/ch03.htm#b4-Chapter%204%20Technical%20Options]
- Out in the cold, Mark Buttle and Michael Smith, WEDC, 2004. [visit site: http://www.who.int/eng/contents/aceh/wsh/books/oitc/oitc.htm]

2. Construction Features for Sanitation facilities

The latrines are mostly constructed with wooden planks in Ger areas. However, some Ger households also prefer constructing latrine with bricks or concrete slabs. In cold regions, concrete structure (slabs, pits and walls) can suffer from lack of strength caused by small cracks in the material. These cracks form while the concrete is curing, due to ice expansion within the concrete material. Seasonal variations in temperature may result in further weakening of such structures. It is worth bearing in mind that these local construction contractors and builders should be competent at making concrete of reasonable quality under the prevailing conditions, and their skills are worth using. If the concrete is kept warm, it reaches a ‘critical hardness’ before its temperature falls below freezing. The concrete can then be allowed to cool without any significant loss of strength resulting from the expansion of contained water turning into ice. There are several ways to keep concrete warm:

- Construct components (e.g., latrine slabs) indoors or, for in-situ concrete, construct a shelter so that the whole area can be heated to above zero degree C.
- Mix in-situ concrete using warm water, then cover the concrete for insulation to retain heat (known as thermos curing).

Therefore, it might be more effective if all construction works are organized during summer season prior to winter. That will make the construction work easy and cost effective. However, during winter the soil bearing capacity increases while during summer there is always a chance that the pit will collapse if the pit lining is not constructed carefully. Therefore, it is also important to make sure that the slab and pit lining construction are safe and sound for both summer and winter seasons.

The local people have experiences of building their own Gers and houses. Therefore, they can use the same experiences to build the latrines. Only thing they need to be remembered is to follow the basic features of each option is described in Part A and Part B of this manual. Establishing any standard for construction sometimes is counter productive since it stops all kinds of innovations. In fact, local experiences can always guide local people decide what works and what does not in their specific areas. This needs to be taken fully into account.

3. Operation and maintenance of on-site sanitation

The principle of all types of pit latrine is to collect and dispose of excreta in a hygienic way so as not to endanger the health of individuals or the community as a whole. The accumulated excreta or sludge inside a pit of on-site latrine starts breaking up into liquid and gas in absence of air by the anaerobic\textsuperscript{72}

\textsuperscript{71} Please see the section on ‘Wastewater Disposal’, page 61 of this manual.

\textsuperscript{72} Aerobic bacteria is the bacteria that activates in presence of air/ oxygen and anaerobic bacteria is the bacteria that activates in absence of oxygen / air.
bacteria thus reducing the volume of sludge. The liquid percolates through the side wall of the pits. Therefore, in on-site pit latrines, it is important that bacteria functions effectively and liquids have adequate space to percolate through the side walls of the pits.

Mongolia is a cold weather country, where during November and March ambient temperature falls to below 35º C. The bacteria, both aerobic and anaerobic, halt functioning in sub-zero temperatures. Frozen ground is largely impermeable. Therefore liquid from the sludge in the pit is not able to soak away in the winter. In very cold conditions, with temperatures less than -10º C, excreta falling into pit may freeze before the pile has time to slump. The pit will not be filled efficiently. Instead, it will contain a frozen mound of excreta, urine and void spaces. Therefore, during November and March in Mongolia, the on-site latrine pits are basically acting as a sump/storage chamber to accumulate all excreta and urine in freezing condition until temperature rises above 0º C.

The biological process restarts in the summer from April onwards till October, while the temperature increases above 0º C. Activities of bacteria increase as ambient temperature rises.

Therefore, no chemicals should be added into the pit that may destroy the bacteria and create mal-functioning of the sludge digestion process.

Some key points are highlighted below related to operation and maintenance of on-site latrines.

<table>
<thead>
<tr>
<th>Thumb-rules for Operation and Maintenance of On-site Latrines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do's</strong></td>
</tr>
<tr>
<td>🌿 Use dry cleansing materials in Conventional Pit Latrine, Lid Latrine, VIP Single Pit, Double Pit Latrine and EcoSan Toilet.</td>
</tr>
<tr>
<td>🌿 Small quantity of water can be used for occasional cleaning of the squatting plate.</td>
</tr>
<tr>
<td>🌿 Water is essential for functioning of Pour Flush latrines.</td>
</tr>
<tr>
<td>🌿 Piped water connection is must for the Public toilet for flushing and maintaining cleanliness of the toilet.</td>
</tr>
<tr>
<td>🌿 The squatting plate needs to be cleaned daily. Unclean squatting plate can be a source for spreading pathogenic bacteria and diseases.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

3.1 Emptying pits
The emptying of single pits containing fresh excreta presents problems because of the active pathogens in the sludge. In areas, where land availability is not a constraint, it is often advisable to dig another pit for a new latrine. The original pit may then be left for several years and when the second is
filled it may be simplest to re-dig the first pit rather than to excavate a new hole in hard ground. The digested sludge will not cause any health problems and is beneficial as a fertilizer. However, in present Ger situation, especially after privatization of land in year 2003, when the land has become costly and consequently increasing difficult get space for relocating a latrine.

In this scenario, construction of twin pits might be a longer-term solution, which also needs to empty after every 2-3 years.

In Mongolian culture, usage of digested dry sludge as fertilizer is uncommon and not appreciated. Under these circumstances, usage of vacuum truck for desludging is the only option left.

The vacuum cleaning truck is available at the district level. It is owned by district authorities and run by private companies on 'contract service basis'. USIP2 also has planned to buy five new vacuum cleaning trucks to support the desludging process.

From this perspective, more active involvement of private sector with public sector might be worth exploring.

Once the raw or half-digested sludge are taken away by vacuum cleaning truck, it is important to know where and how they dispose of the night soils. Commissioning of some Sludge Drying Beds in areas at a considerable distance from Ulaanbaatar can be a feasible option for Mongolia due to easy availability of land in remote areas.
4. Groundwater Pollution

4.1 Current Situation
Ulaanbaatar’s underground arterial basin supplies 91 percent of the city’s population with fresh water. The water supply system consists of four main sources and 156 wells. Central apartment residents use water from the upper river sources and the Amgalan area. Water drawn from these sources meets water quality requirements. However, in Ger area housing and factories, the 3rd and 4th lower river water sources (Tolgoit and factory district) are very polluted with a high amount of bacteria. The water pollution in some of these sources is much higher than the recommended minimum. The remaining 9 percent of the city’s population, primarily living in semi-rural areas and summer cottages, use spring and river water. The fact that many of these smaller rivers and springs are also polluted, provokes some of the residents to bring out water from the city.

In the central and northern area of Ulaanbaatar, ground water levels have increased 0.5 to 0.8 meters and annual fluctuations reached 1.0-2.0 meters. The marshland in the Ger housing areas of Zuun Ail, Nogoon Nuur and Bayanhoshuu is widening, and the ground water level under Peace Avenue has risen and now floods with rains, causing the channel of river Baruun Selbe to be leveled with soil. There are several environmental degradations that affect the city’s surface and ground water area due to human activities, i.e., falling of the ground water level in the arterial basin; declining water flows in the rivers; deforestation and increased run-off; and dehydration in water basin areas. According to information from a 2003 water quality monitoring study, water quality of the Tuul River in the center of Ulaanbaatar is classified as only “medium clean.” However, in Ger housing areas up to 25 km downstream, near Songino, the water is “polluted” up to 10 times the clean water standard. Even in semi-rural areas 10 km from the Songino, near Hadan Hyasaa, the Tuul River is only “minimally clean”. Only near Altanbulag soum, approximately 50 km from the city, does the water quality return to being “medium clean”73.

The responsibility for waste collection in Ulaanbaatar has been decentralized to the district level.

The local registration data in 2003 revealed that74:

- there are 84,000 families in Ger areas in 67,000 Khashaa (wooden fences).
- there are 40,000 – 50,000 pit latrines and 208 community latrines.
- there are 40 community soak pits, out of which 82% meet standards.
- there are 31,114 individual soak pits in Ger areas, out of which 41% meet standards.
- 14% of Gers have no pit latrines.
- 34% of Gers have no soak pits.

Sludge from the waste treatment plant is collected in lagoon system where the sludge is dried. The sludge is disposed at a special dumpsite for sludge South of the city. Most of the waste is disposed at the three main central dumpsites: Dari Erkh, Ulaan Chuluut and Morin Davaa.
4.2 Potential risk of ground pollution from on-site latrines

There is little information about survival of either viruses or bacteria in groundwater, although it appears that low temperature favors long survival times. Enteric bacteria may survive in cool groundwater for more than three months. Field experiments indicate that the maximum distance that viruses and bacteria travel in groundwater before being destroyed is equal to the distance traveled by the groundwater in about ten days.

In fine-grained soils and pollution sources surrounded by a mature organic mat, the distance traveled may be as little as 3 m, whereas a new source in fast-flowing groundwater may cause pollution up to 25 m downstream. The pollution extends from the source in the direction of groundwater flow, with only limited vertical and horizontal dispersion. However, this does not apply to pollution in fissured ground, where the pollution may flow through the fissures for several hundred meters, often in an unpredictable direction.

Soakage pits pose a risk to health where there is an inadequate separation between the pit and the groundwater table. Under these circumstances, pathogens may contaminate water supply in the vicinity. However, where the pit is well above the groundwater table, water may be safely abstracted from a well or borehole a few meters away from a latrine. In saturated zone (below the ground water table), bacteria and viruses have been observed to travel several hundred meters with groundwater. As such it is very difficult to establish a safe minimum lateral spacing between a water supply and an on-site sanitation unit in saturated soil because of complexity of factors such as permeability and hydraulic gradients that control saturated flow rate. Nonetheless, in most cases the commonly used figure of a minimum of 15 m between a pollution source and a downstream water abstraction point will be satisfactory. Where the abstraction point is not downstream of the pollution, i.e., to the side or upstream, the distance can be reduced provided that the groundwater is not abstracted at such a rate that its direction of flow is turned towards the abstraction point. This is particularly useful in densely populated communities, where shallow groundwater is used as a water supply.

4.3 Reducing the pollution from a pit latrine with a barrier of sand

Unless water is extracted locally for domestic purposes, pollution of groundwater from on-site sanitation does no harm and is preferred to the considerable risks associated with defecation in the open. A depth of two metres of unsaturated sandy or loamy soil below a pit or drainage trench is likely to provide an effective barrier to groundwater pollution and there may be little lateral spread of pollution. Where the groundwater is shallow, artificial barriers of sand around pits can control pollution. However, keeping in view the concerned on ground water pollution and percolation problem, all pits are designed up to a maximum 1.1 meter depth to make sure pits are above the high groundwater table, even in the worst scenarios. It is important to mention that though a general perception in Mongolia is that on-site latrines are creating ground water pollution, such evidence is not obtained. Moreover, it has been recognized that the lack of proper management of sullage and solid waste might be the main reasons for ground water pollution. Therefore, it is worthwhile to conduct a study to identify and prioritize the main ‘polluting factors’ in Ger areas related to ground water pollution.

To learn more on construction, operation, maintenance and ground water pollution please read:

- A guide to the development of on-site sanitation, R. Franceys, J. Pickford and R. Reed, WEDC and WHO, 1992 [visit site: http://www.who.int/docstore/water_sanitation_health/onsitesan/ch03.htm#b4-Chapter%204%20Technical%20options ]
- Out in the cold, Mark Buttle and Michael Smith, WEDC, 2004. [visit site: http://www.who.or.id/eng/contents/aczh/wsh/books/oitc/oitc.htm ]

76 Sand is very costly in Ulaanbaatar and therefore, it might not be possible to apply sand envelop in pits for poor Ger families.
77 A guide to the development of on-site sanitation, R. Franceys, J. Pickford and R. Reed, WEDC and WHO, 1992
5. Waste Water Disposal: The Situation, current issues and some potential options

5.1 The Situation
The current condition of wastewater treatment plants in Mongolian urban centers is a major problem in urban development. At the same time, a significant deterioration in the functioning of about 120 centralized wastewater treatment plants in virtually every urban center has occurred. Roughly one third of the plants do not work at all, while another third operates only partially. Virtually all of the wastewater treatment plants and related facilities suffer from the lack of repair and maintenance, as well as from the absence of any appropriate incentive structure for treatment and/or arrangements for cost recovery. The main wastewater treatment in Ulaanbaatar was designed to treat 230,000-240,000 m$^3$/day, but actual raw sewage inputs are in the range of 150,000-170,000 m$^3$/day. Some leather and wool industries without their own treatment plants discharge wastewater to the central collection channel without treatment. As a result, heavy metals, Cr6 (sulphit) enter the wastewater treatment plant and destroy the bacteria, resulting in mal-functioning of the treatment system. Some recent studies have shown that the plant is only about 40 to 50 percent effective in cleaning the sewage. The plant discharges its effluent directly into the Tuul River. With the continued rapid growth of Ulaanbaatar and its population, the level of pollution discharged from these plants has already reached a critical stage and requires immediate attention78.

5.2 Current Issues
The lack of funding for new infrastructure on wastewater management is not the main issue.

The main issue is how to create an enabling policy environment in the wastewater arena, where policies are developed in consultation and applied effectively for people to enjoy the benefits and see the impact. This needs to be done in partnerships, partnership between users – local governments – CBOs/ NGOs - public utilities – private sector and academic/research institutions, where national government can play a catalytic role.

These efforts are currently missing in the sanitation sector and need immediate attention.

The general awareness, advocacy and incentives for achieving ‘cleanliness’ are not prioritized or adequately recognized. Therefore, each household tries to discharge their wastewater outside their fencing wall. The cumulative effect of the same in Ger areas are alarming. The possible option to collect wastewater and treat the influent through biological treatment mechanisms, followed by drying of the digested sludge is practiced. No deficiencies exist in the conceptual part. But, almost all plants are running below their planned efficiency. This is due to lack of proper policy environment, implementation and effective quality control.

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All of these above concerns need to be discussed and addressed – but not in a same forum with water supply or excreta disposal, which often takes away the focus from wastewater management to either water supply or excreta disposal system. Following sector forum, the possible and more effective feasible options for wastewater in Ger areas can be evolved for application.

Lastly, it is important to change the mind set of existing sector partners, many of whom do not see “waste as resources”. Global experiences show recycling of wastewater is not only ecologically feasible, but also advisable in the perspective of a fragile eco-system. In Mongolia waste is still seen as only an object that needs to be got rid off. It requires further discussion to change the mind set of some professionals and senior decision makers to make the wastewater management system more effective, economically beneficial, environment friendly and sustainable.

5.3 Some Potential Options

It is essential to organize a sector forum on wastewater management with special emphasis on Ger areas. However, people in Ger areas, cannot wait for this sector forum to happen. Therefore, some potential options are suggested for application in Ger areas, which need to be further discussed, validated and refined in future sector forums on wastewater options.

<table>
<thead>
<tr>
<th>Depth of Groundwater or Impervious Layers</th>
<th>Acceptable Disposal Method</th>
<th>Amount of Quantity of Wastewater discharged</th>
<th>Materials required for Construction</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6 m – 2.0 m</td>
<td>Soakage Trench</td>
<td>Less than 50 litres per person per day, but more than 5 litres per person per day</td>
<td>Gravel, pebbles, concrete or hollow blocks, perforated or open-jointed sewer pipe, galvanized metal pipe with 50-100 mm diameter extending from dwelling to trench, broken bricks, grass, straw.</td>
<td>Soakage Trenches are 0.6 – 1.0 meter deep and shallower than drum or pits. Therefore, soakage trenches are suitable where groundwater is between 1.6 m – 2.0 m. However while designing the soakage trench/pit or sump, it is important to consider an additional retention time of liquid during winter, when liquid will freeze immediately after entering into the above mentioned units.</td>
</tr>
<tr>
<td>2.0 m or more</td>
<td>Sump (drum-type)</td>
<td>Less than 5 litres per person per day</td>
<td>200-litre old used oil drum, with wooden or metal cover.</td>
<td></td>
</tr>
<tr>
<td>2.0 m or more</td>
<td>Sump (pit-type)</td>
<td>Less than 5 litres per person per day</td>
<td>Concrete or hollow blocks, bricks, stones, gravel or pebbles, with wooden or metal cover.</td>
<td></td>
</tr>
<tr>
<td>2.0 m or more</td>
<td>Soakage Pit</td>
<td>Less than 50 litres per person per day, but more than 5 litres per person per day</td>
<td>Rocks, straw, hay or grass, clay, plastic or galvanized metal pipe (50-100 mm diameter) long enough to extend from dwelling to pit.</td>
<td></td>
</tr>
</tbody>
</table>

The recently organized national consultation workshop was the first attempt to bring all the stakeholders together to map out the overall scenario on hygiene and sanitation with special emphasis on Ger areas. As a result, various guidelines and documents have been developed and the current situation on wastewater revealed. The proposed sector forum on wastewater management will be a follow-up activity of the first consultation meeting to keep the momentum going to address the Low Cost Sanitation Solutions for Ger areas.
## Potential Options for individual Public Toilet in Ger areas:

<table>
<thead>
<tr>
<th>Depth of Groundwater or Impervious Layers</th>
<th>Acceptable Disposal Method</th>
<th>Amount of Quantity of Wastewater discharged</th>
<th>Materials required for Construction</th>
<th>Remarks</th>
</tr>
</thead>
</table>
| 1.6 m or more                            | Mini Filtration System                | Less than 50 litres per person per day, but more than 5 litres per person per day | Gravel, pebbles, concrete or hollow blocks, galvanized metal pipes and fittings, concrete slabs, rounded shaped thermocol with mosquito net. | Salient Features:  
- Screening  
- Primary Sedimentation  
- Raised Mound System [specially effective for Ger areas with natural slopes]  
- Secondary Sedimentation  
- Discharge to open drains |

### 1.6 m or more

**Vetiver Grass Technology (VGT)**

<table>
<thead>
<tr>
<th>Amount of Quantity of Wastewater discharged</th>
<th>Materials required for Construction</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 50 litres per person per day, but more than 5 litres per person per day</td>
<td>A native grass of India has traditionally been in use in India for contour protection and essential-oil production. Taking clues from its traditional usage in environmental protection, The World Bank initiated several projects in India in 1980s for systematic development of Vetiver Grass Technology (VGT), now popularly known as Vetiver System (VS). Large-scale developments have since taken place in the advancement of VS in environmental protection; highlighting that vetiver: (i) is native to hygro-environment such as wetland, lagoon and bog, (ii) is extremely tolerant to drought as well as waterlogged/submergence conditions, (iii) is effective for soil and water conservation, and (iv) is endowed with excellent biological features to ameliorate wastewater and pollution mitigation. In cold place like Mongolia, similar Jiji grass, a 'cold vetiver' for cold region has been discovered. It is found in even in saline soils in northwest China, such as, Inner Mongolia, Ningxia, Xinjiang Provinces and it grows extremely well. The grass has strong, deep (at least 3 meters), profuse roots and is completely drought proof, and withstands extreme cold.</td>
<td></td>
</tr>
</tbody>
</table>

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80 Vietnamese innovated a filter, consisting of round-shaped thermocol (polystyrene) between mosquito nets and tied horizontally with ropes inside primary sedimentation tank just below its outlet to arrest colloidal and suspended matters, which reduces loads on bio-filtration.

81 Source: The schematic diagram extracted from the book “Out in the cold”: [http://www.who.or.id/eng/contents/aceh/wsh/books/oitc/oitc.htm](http://www.who.or.id/eng/contents/aceh/wsh/books/oitc/oitc.htm)

82 Source: Meeting Report: Vetiver system ecotechnology for water quality improvement and environmental enhancement. For details visit: [http://www.vetiver.com/CHN_nanchangcon.htm](http://www.vetiver.com/CHN_nanchangcon.htm)
The development of ‘sanitation informed choice’ is part of an overall community-based low cost sanitation approach. The usefulness and impact of ‘sanitation informed choice’ depends on various factors that need to be taken proper care of. These factors are briefly highlighted below.

### Key Factors

<table>
<thead>
<tr>
<th></th>
<th>Past Trend in Mongolia</th>
<th>Proposed Trend in LCS/CLIP in Mongolia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planning</strong></td>
<td>Top-down from central level, driven by external support.</td>
<td>Bottom-up ‘demand driven approach’ is introduced in planning: from community to Khoroo, upto central level.</td>
</tr>
<tr>
<td><strong>Focus of Activities</strong></td>
<td>Quick construction of latrines.</td>
<td>Thrust is more on behavioral change through proper hygiene awareness with rapid response to demand for building latrines.</td>
</tr>
<tr>
<td><strong>Target Areas for Government Services</strong></td>
<td>Mostly accessible, better-off Khesigs.</td>
<td>Focusing on equity: poor and rich, man and women, adult and child, normal and disabled.</td>
</tr>
<tr>
<td><strong>Decision-making</strong></td>
<td>Project Team with support from ESAs decides and promotes ‘single technology’.</td>
<td>Set of options (sanitation informed choice), which are technically suitable, culturally acceptable and economically affordable are offered to households and community. It is upto each household to decide for their own latrine and wastewater facilities.</td>
</tr>
<tr>
<td><strong>Financial Scenario</strong></td>
<td>Subsidized by the Project – community pays as little as possible and thus, has less accountability.</td>
<td>Project will provide some seed money to community as a ‘revolving fund’ to disburse ‘minimum subsidy’, which will be a part (may be 50%) of ‘minimum technically feasible option’ to the poorest households. This means that if a family chooses a VIP latrine worth of US$ 220, the family will still receive a ‘subsidy’ on the basis of 50% of the ‘minimum technically feasible option’, may be i.e., US$ 110. Therefore, the family will receive US$ 55. This amount will be paid as a loan and therefore, the family should return back this amount may be in 24 - 36 monthly installments. How it will be collected and by whom need further discussions. However, where maximum number of households is poor, ‘out-put-based award’ system can also be offered, meaning if the whole area (may be 150 - 200 families) achieves eradication of open defecation, a special award may be given with prize money. In this case local cross subsidy might be generated for poorest families by richer ones, to achieve a prestigious reward from the national government. These financial mechanisms and incentives are not yet fully discussed and agreed upon. This will be done during Start-up workshops of LCS/CLIP Project.</td>
</tr>
<tr>
<td><strong>Management of latrine systems</strong></td>
<td>Weak and non-existent.</td>
<td>‘Sanitation teams’ will be formed at the household level to support and coordinate sanitation services.</td>
</tr>
<tr>
<td><strong>Partnerships with other government agencies and mass organizations</strong></td>
<td>Partnerships exist mainly between the government agencies.</td>
<td>New partnerships will be developed between: users-CBOs/NGOs – government agencies – private sector. In future attempts will be made to expand the partnership with Mass Media.</td>
</tr>
<tr>
<td><strong>Partnerships with ESAs</strong></td>
<td>Project specific.</td>
<td>Programmatic.</td>
</tr>
<tr>
<td><strong>Private enterprise</strong></td>
<td>Limited.</td>
<td>Requires Policies, strategies and regulatory body to make PPP effective.</td>
</tr>
<tr>
<td><strong>National standards</strong></td>
<td>Few national standards – not properly disseminated and also out-dated.</td>
<td>Requires Policy and Strategies on LCS, than standards to keep the Programme on track, but also allow flexibilities and innovations.</td>
</tr>
<tr>
<td><strong>Diversity in Staffing</strong></td>
<td>Mainly engineers.</td>
<td>Variety of mix: social scientists, engineers, economists, gender specialists, communication specialists etc</td>
</tr>
<tr>
<td><strong>Learning Process</strong></td>
<td>Individual Project or Consultant Report.</td>
<td>Proposed continuous learning process by organizing sector forums, joint review missions, case studies, annual review meetings and regular networking.</td>
</tr>
</tbody>
</table>
PART F: GUIDELINES FOR PLANNING AND IMPLEMENTATION

The new approach urges the Project Management Unit (PMU) to organize series of Start-up Workshops with stakeholders and potential users to prepare detailed Project Implementation Plan (Plan of activities) with following details:

- Finalize the co-sharing pattern of improved sanitation services (what will be contribution from project and how, and how much will be shared by communities/ households, who will handle the fund at local level).
- Disbursement plans.
- Procurement Plans\(^{83}\).
- Training Plans.
- Hygiene Awareness plans with indicators to measure progress.
- Sanitation Improvement Plans with indicators to measure progress.
- Learning Plans.
- Implementation of Khesigs/Khoroos Hygiene and Sanitation Action Plans.

Implementation of Khesigs/Khoroos Hygiene and Sanitation Action Plan

The responsible CBOs (hired by PMU) in consultation with INGOs, communities, private sector, Khesigs and Khoroos leader will develop these action plans, which will be monitored on day-to-day basis by the local ‘sanitation teams’. The PMU will oversee the whole activities.

It is important to highlight at the conclusion that the assessment of progress on sanitation need to be measured both in terms on quantity and quality with proper emphasis on assessing the behavioral change, which is the key to any sanitation Programme. Therefore, the monitoring tools like Methodology for Participatory Assessment (MPA)\(^{84}\) can be designed to be “built-in” for monitoring and evaluation of the progress of hygiene and sanitation improved services.

<table>
<thead>
<tr>
<th>Is it not the right moment to start developing the sanitation strategies for Ger areas?</th>
</tr>
</thead>
</table>

The Low Cost sanitation Project will deliver new innovations. As many ideas will emerge, is it not the right moment to start planning for developing a vision and strategies for Sanitation Sector in Mongolia, with special emphasis on Ger areas, where all the emerging learnings from Low Cost Sanitation Projects can be parallelly built-in?

The National Consultation Workshop held on 31\(^{st}\) October 2005 in Ulaanbaatar strongly recommended an immediate development of Sanitation Strategy.

But still questions remain as to how to start with and who will provide the assistance?

This needs to be addressed by sector partners as soon as possible.

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\(^{83}\) This plan is already existing.

\(^{84}\) Sustainability, Planning and Monitoring, Nilanjana Mukherjee and Christine van Wijk, WSP, World Bank and IRC, March 2003.
Following five documents have been prepared under Low Cost Sanitation Project funded by JSDF.

<table>
<thead>
<tr>
<th>Target Group</th>
<th>Documents Produced by JSDF Funded Low Cost Sanitation Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community</td>
<td>Hygiene and Sanitation Situation Report For Ger Areas, Mongolia</td>
</tr>
<tr>
<td>Field workers from CBOs/NGOs, Health workers from Khoroo/Districts and PMU USIP2 staff, and/or implementing agencies of similar projects.</td>
<td>Manual on Promotion of Hygiene and Sanitation in Ger Areas, Mongolia</td>
</tr>
<tr>
<td>All stakeholders at national and local level.</td>
<td>Manual on Low Cost Sanitation Technologies For Ger Areas, Mongolia</td>
</tr>
<tr>
<td>All stakeholders at national and local level.</td>
<td>Community Dialogue Tool Kit For Ger Areas, Mongolia</td>
</tr>
<tr>
<td>All stakeholders at national and local level.</td>
<td>Guidelines for Implementation of Low Cost Sanitation Project in Ger Areas, Mongolia</td>
</tr>
</tbody>
</table>

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