

## **6.5 Examination of the Loading Device for Heavy Waste**

### **6.5.1 Project Outline**

#### **a. Justification**

The waste collection work in the unplanned area is very labor intensive and slow. One of the causes of this problem is that waste discharged in the unplanned area is heavy throughout the year, because the waste contains a high percentage of ash and wastewater in winter and garden waste with soil in summer.

The draft M/P has proposed the dump truck as the waste collection equipment for the unplanned areas because the compaction cannot function with such heavy waste. However, the remaining problem is how to load such heavy waste onto the carrier. It is necessary to overcome this problem in order to improve the collection efficiency and the hard working conditions for collection workers.

The pilot project aims to find a simple practical system of loading heavy waste onto the carrier.

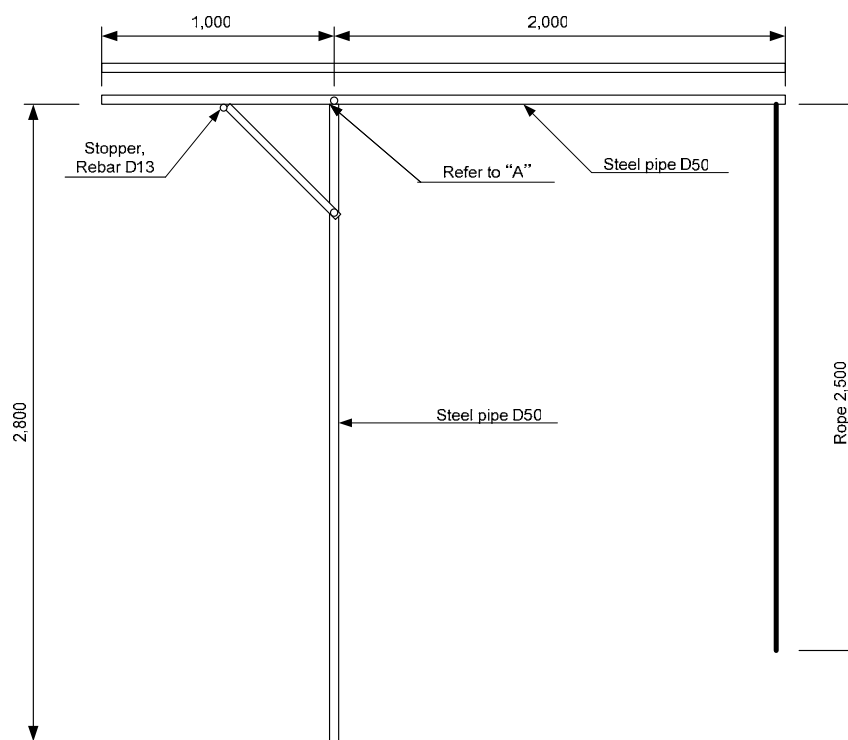
#### **b. Design of Lifting Device**

The eight devices used for loading waste, which were designed and fabricated by the Study team, were distributed to TUKs for trial usage. The results of trial usage were fed back for the further improvement of the lifting device.

The lifting device fabricated is shown below.



Picture: Trial Lifting Device



Part A

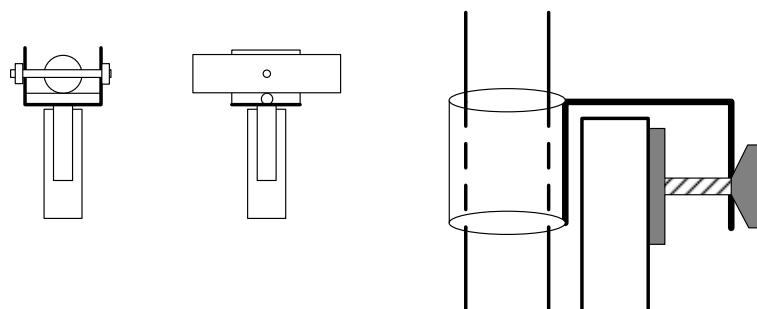


Figure 6-13: Design of Lifting Device

### c. Condition of Trial Usage

The Study team invited staff of TUKs to the fabrication site on 4 Dec. 2005 and handed them over to attendants after showing them how to use the device. TUKs which did not attend that meeting received later as shown below.

Table 6-4: Present Condition of Lifting Devices

Name of Tuk	Date of Handing Over	Nos	Guidance for the Usage	COMMENTS (as of middle January 2006)
Sukhbaatar	Early January	1	No	They have no opportunity to use it because of no collection service for unplanned area.
Chingeltei	Early January	2	Member did it.	They will try to use it.
Bayanzurkh	15 December	1	Yes	Not used since workers reluctant to use due to the fact that they consider handling the device will create increased work load for them
Songinokhairkhan	4 December	1	No	Not used so far, will try to use
Bayangol	Late December	1	No	Although they tried to use it, the pipe of the device bent due to too heavy waste. They stopped using it.
Khan-uul	4 December	1	Yes	Not used since workers reluctant to use due to the fact that they consider handling the device will create increased work load for them
Nalaikh	4 December	1	Yes	Requested for questionnaire to fill in.

#### d. PDM

Original project design matrix is shown below.

#### Project Design Matrix: PDMo

Name of Project: Development of the Loading Device for Heavy Waste  
Implementation Period : From Dec. 2005 to Mar. 2006  
Target Group: Vehicles and Operators working at gel area in all the TUKs

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goals			
1. The lifting device gets popular.	Number of devices used.	Questionnaire survey	
2. The waste loading work gets efficient.	Total loading time.	Time and motion survey	
Project Purposes			
1. The lifting device gets practical.	Willingness to use	Observation	
Outputs			
1. The lifting devices are used.	Number of crews using.	Questionnaire survey	
2. Results of trial uses are obtained.	Feed back information	Observation	
3. The lifting device is improved.	Improvement history.	Observation	
Activities	Input		
1. Lifting device is designed.	Study Team	TUK	Pre-condition
2. Lifting devices are fabricated.	Equipment		
3. Lifting devices are distributed to TUK.	• Lifting device 8 sets		

### 6.5.2 Monitoring and Evaluation

The condition of the project as of 15<sup>th</sup> January 2006 was evaluated in terms of Relevance, Effectiveness, Efficiency, Impact and Sustainability.

Table 6-5: Evaluation Summary

	Relevance	Effectiveness	Efficiency	Impact	Sustainability
Overall Goal	<ul style="list-style-type: none"> <li>One of Japan's priority cooperation issues to Mongolia is environmental protection</li> </ul>	+		<ul style="list-style-type: none"> <li>There are no impacts found due to not enough usage.</li> </ul>	-
Project Purpose	<ul style="list-style-type: none"> <li>The improvement of waste collection efficiency and the increase of the service coverage ration for unplanned area is one to main issues to be overcome.</li> </ul>	<ul style="list-style-type: none"> <li>The lifting devices are not well used.</li> <li>The enough information has not been obtained though the usage.</li> <li>The original design of lifting device has not been improved.</li> </ul>	-		<ul style="list-style-type: none"> <li>The design of device has not been reached to the practical usage level.</li> <li>The problems to discourage people to use it are found as follows. <ul style="list-style-type: none"> <li>&gt;It creates increased work loads to workers.</li> <li>&gt;This design is applicable only half of dump trucks which have hinges of rear plate on the carrier.</li> </ul> </li> </ul>
Outputs			<ul style="list-style-type: none"> <li>TUKs except Bayangol TUK have not used the lifting device.</li> </ul>	-	
Activities					

Table 6-6: Overall Evaluations

Criterion	Result	Basis	Justification for Basis
Relevance	Very high	<ul style="list-style-type: none"> <li>One of Japan's priority cooperation issues to Mongolia is environmental protection</li> <li>The improvement of waste collection efficiency and the increase of the service coverage ration for unplanned area is one of main issues to be overcome.</li> </ul>	<ul style="list-style-type: none"> <li>Environmental protection is the priority issue for all stakeholders. Especially in unplanned area, the waste problem is serious because the collection coverage rate is very low. The difficulty of loading waste is one of causes.</li> </ul>
Effectiveness	Stagnant	<ul style="list-style-type: none"> <li>The lifting devices have not been well used.</li> <li>Enough information has not been obtained though the usage.</li> <li>The original design of lifting device has not been improved.</li> </ul>	<ul style="list-style-type: none"> <li>There has not been enough time since the devices were distributed in December and January.</li> </ul>
Efficiency	Low	<ul style="list-style-type: none"> <li>TUKs except Bayangol TUK have not used the lifting device.</li> </ul>	<ul style="list-style-type: none"> <li>According to the telephone interview conducted in the middle of January, only Bayangol TUK has used.</li> </ul>
Impacts	No impacts	<ul style="list-style-type: none"> <li>There are no impacts found due to insufficient usage.</li> </ul>	<ul style="list-style-type: none"> <li>Because they is insufficient usage, no impacts have been found.</li> </ul>
Sustainability	Low sustainability	<ul style="list-style-type: none"> <li>The design of device has not been reached to the practical usage level.</li> </ul>	<ul style="list-style-type: none"> <li>The present design has not been achieved to the sustainable level.</li> </ul>

### 6.5.3 Lessons and Recommendations

#### a. Results

The assessment on the loading devices for heavy waste after using them were summarized as follows.

- The handling of the lifting device isn't easy enough for workers due to too heavy weight and too long members and too many parts to be assembled for the usage. They understand that the usage of the device creates more work than the work saved by the device. It doesn't reduce their work load much, taken altogether.
- The lifting device of this design is applicable for the dump truck of which rear plate opens the top. Therefore, it is applicable for only half number of existing dump trucks.
- The pipe is not enough strong to lift waste. However, it will be too heavy to handle if the stronger pipe is used.

#### b. Recommendations

The implementation of the project concludes as follows.

- In order to develop the device which can be practically used for the work, the stronger and lighter material which is not available in Mongolia has to be used.
- To develop the device which is applicable for most dump trucks, the hydraulic system should be adopted.
- Considering the above conclusions, it is a better strategy to increase the collection frequency to reduce the waste collection amount from one household at once.

## **6.6 Raising public consciousness on waste issues**

### **6.6.1 Project Outline**

#### **a. Justification**

The most of the Ger areas in UB have long faced a serious problem of scattering waste. Illegal dumping by local residents is a main cause of it. Due to the lack or poor quality of collection service, many local residents dump their waste in an open space.

In Khoroo 4 of SKhD, where the UCDS is located, the improper operation of the UCDS and illegal dumping of waste in surrounding areas of the disposal site by collection vehicles worsened its situations. A large number of plastic bags were flown from not only from the UCDS but also illegal dump sites, and frequent fires at the disposal site polluted the ambient air seriously. According to the result of the Environment and Social Survey, local residents were well aware of these problems and often petitioned the municipality for solving them.

A pilot project, “Urgent Improvement of the Ulaan Chuluut disposal site”, was expected to mitigate air pollution and prevent collection vehicles from dumping waste in surrounding areas by improving the operation and management of the disposal site. In order to guarantee the continuous improvement of its operation after the completion of the pilot project, it was important to increase local residents’ awareness of SWM issues and to encourage them to keep their eyes on the landfill operation. A regular monitoring system with participation of local residents is a possible effective measure. In order to realize the participatory monitoring system, it was necessary for local residents to deepen their knowledge on SWM issues, in particular final disposal of waste.

The team decided to conduct another pilot project in Khoroo 4 (and later on in Khoroo 3), aiming at increasing public awareness on solid waste issues, so that two pilot projects could complement each other. The increase in people’s awareness of SWM issues could change people’s manner of discharging waste, but without improving the collection system in the Ger area, the impact of the project was expected to be limited.

#### **b. Project Design**

##### **b.1 Objectives**

The main objective of the project is to empower local people by raising their awareness and deepening their knowledge on SWM issues, in particular final disposal of waste, so that they would continue to oversee the operation and management of the UCDS after the pilot project at the disposal site is completed. Participatory Evaluation of the Pilot Project at the UCDS” was organized in order to provide local residents with an opportunity, in which they could acquire practical skills.

In order to ensure the continuous proper operation, an institutional system, a regular monitoring system with the participation of local representatives, was established. The monitoring committee, which consists of the environmental authorities and local representatives, implements a regular monitoring.

The project has also a long-term object to reduce illegal dumping by changing people’s manner of discharging waste. Without the actual improvement of the collection service, however, it is almost impossible to force them to stop dumping waste in an open space. Therefore, under the pilot project, the team provided a place for both local residents and a collection service provider (TUK of SkhD) to discuss about the current problems and

possible solutions in order to share a sense of problems among all the stakeholders. The result of the discussion will be reflected in the master plan.

## **b.2 Approaches**

The main approaches to the pilot project summarized below.

### **b.2.1. Framework**

This pilot project is divided into two parts according to the two following different objectives,

- Establishment of Regular Participatory Monitoring System at the UCDS  
To empower local people and authorities to participate in the process of monitoring and controlling the operation and management of the UCDS  
by raising their awareness and deepening their knowledge on SWM  
by establishing a institutional system, a regular participatory monitoring system
- Reduction of illegal dumping  
To reduce illegal dumping of waste by raising awareness and changing local people's manner of discharging waste

### **b.2.2. Targets**

The target groups of each part are shown below.

Monitoring and Controlling the O&M of UCDS	Reduction of illegal dumping
<ul style="list-style-type: none"> <li>■ Local residents (in Khoroo 3 &amp; 4)</li> <li>■ Local NGOs</li> <li>■ Local authorities (Khoroo office of No. 3&amp;4)</li> <li>■ Regulatory bodies (Special inspection department of MUB, MOE, and so on)</li> <li>■ NGOs (national level)</li> </ul>	<ul style="list-style-type: none"> <li>■ Local Residents (in Khoroo 4)</li> <li>■ Local NGOs</li> <li>■ TUK (SkhD)</li> </ul>

### **b.2.3. Procedures**

The procedures are summarized according to the objectives.

#### Establishment of Regular Participatory Monitoring System

A regular monitoring is critical to the continuous proper operation by the Nuut Co. after the pilot project is completed. In addition, if it is possible for local residents to participate in the monitoring activity, the effect of the monitoring was expected to be enhanced, because they can keep their eyes on the disposal operation on a daily basis. In order to make this participation possible, the regular monitoring system by the monitoring committee was established.

#### **(1) Establishment of Monitoring Committee**

In order to incorporate the participatory mechanism, the monitoring committee with the participation of local representatives was created, and the monitoring committee was given an authority to conduct a monitoring of the UCDS regularly.

#### **(2) Members of the Monitoring Committee**

The proposed members of the monitoring committee were selected from both the local (Khoroo) and City/National side. In the beginning, the Kohoo 4 governor was chosen as the chairperson, so that the local representatives could take an initiative. Due to the lack of experience in pollution control activities and the limited number of staff and budget,

however, Khoroo 4 in practice could not take an initiative in the two preparatory activities, the Participatory Evaluation of the Pilot Project at the UCDS”.

In order to make the regular monitoring system work, the members of the committee were reshuffled, by replacing a Khoroo governor with a staffer of the Specialized Inspection Department of MUB as a chairperson. In stead, the number of representatives from the local side was increased in order to enhance their influence. Participants of nation-wide NGOs were also changed, and a local NGO, Tolgot, newly joined. The modified members of the monitoring committee are shown below.

Table 6-7: Members of the Monitoring Committee

Initially Proposed Members

	Organization
Chairperson	Khoroo 4 Governor
Local side	a staffer of local health center
	a local school teacher
	a representative of local residents
City/ National Side	a staffer of City Specialized Inspection Department
	a staffer of MUB
	a staffer of MUB
	a staffer of MOE
	a staffer of NGOs (World Vision)
	a staffer of NGOs (Baigal Erdene Fund)

Definitive Members

	Organization
Chairperson	an instector of City Specialized Inspection Department
Local side	a staffer of Khoroo 4 (former environment inspector)
	a staffer of Khoroo 3 (coordinator)
	a health center staffer (Khoroo 4)
	a school teacher (Khoroo 4)
	a representative of local residents (Khoroo 4)
	a representative of local residents (Khoroo 3)
	a local NGO staffer (Tolgoit)
City/National Side	a staffer of MUB
	a staffer of MUB
	a staffer of MOE
	a staffer of NGO (World Vision)
	a staffer of NGO (Leader of Mongolian Ecologist)

### (3) Monitoring Method

#### 1) Basic Ideas

The monitoring method was simplified as much as possible in order to make the system work without expert knowledge, equipments or a large portion of the budget. The monitoring data is based on the observation and do not require any chemical and physical analysis. Members of the monitoring committee visit the disposal site and evaluate the environment and operational conditions of the disposal site according to the check list.

The check-sheet is shown below.

<b>Check List for the regular monitoring</b>		Date				
		Weather/Temperature				
		Name				
		Name of organization				
<b>Category A: Environment effect and operational conditions (Before and after the construction)</b>						
<b>Environment Effect</b>						
No	Items	Acceptable	Medium	Terrible	Score	Note
A1	Fire & Smoke	3	2	1		
A2	Offensive odor	3	2	1		
A3	Wastewater	3	2	1		
A4	Waste scattering	3	2	1		
A5	Animals (dogs, birds, etc)	3	2	1		
A6	Vermin (flies, worms, etc)	3	2	1		
A7	View	3	2	1		
<b>Operational Conditions (how much the operator control the whole landfill operation)</b>						
No	Items	Well controlled or operated	Medium	Terrible	Score	Note
A8	Whole operation	3	2	1		
A9	Working situations of waste pickers	3	2	1		
A10	collection vehicles	3	2	1		
A11	Bulldozer and other landfill operation heavy vehicles	3	2	1		
A12	Location of unloading waste	3	2	1		
Total of Category A						
<b>Category B: Function of facilities (After finishing construction)</b>						
No	Items	Functioning	Medium	Not-functioning	Score	Note
B1	Access road	3	2	1		
B2	Weighbridge (measurement facilities and computer system)	3	2	1		
B3	On-site road	3	2	1		
B4	Working face (Movable type of fence for preventing waste scattering, etc)	3	2	1		
B5	Gas removal facilities	3	2	1		
B6	Security facilities Fence (fixed type), Gate, Bank	3	2	1		
B7	Leachate treatment facilities	3	2	1		
B8	Drainage systems	3	2	1		
Total of Category B						
Comment						

Figure 6-14: Check-sheet for Monitoring

Each item of the check-sheet is given a score, ranging from 1 to 3<sup>1)</sup>, according to the answer. After the monitoring, the average score of each item is calculated and saved as the result of the monitoring.

In order to standardize the evaluation by each committee member, the guideline was prepared.

<sup>1)</sup> The higher the point is, the higher its condition is evaluated



Table 6-8: Assessment Guideline for the Check-sheet

Environmental Conditions

No	Items	Choices	Assessment Guideline
A1	Fire & Smoke	Acceptable	there is only spot fire and smoke
		Medium	
		Terrible	Most of landfill surface is covered with smoke due to fire
A2	Offensive odor	Acceptable	
		Medium	
		Terrible	
A3	Wastewater	Acceptable	
		Medium	
		Terrible	
A4	Waste scattering	Acceptable	A small amount of waste is scattered at the entrance area, on the access road, and in the surrounding part of the disposal site
		Medium	A lot of waste is scattered at the entrance area and on the access road, but it is still possible for vehicles to reach to the land fill area
		Terrible	There are too much volume of waste on the access road for vehicles to reach to the landfill area
A5	Animals (dogs, birds, etc)	Acceptable	There are few animals.
		Medium	
		Terrible	There is a lot of animals
A6	Vermin (flies, worms, etc)	Acceptable	There are few vermins
		Medium	
		Terrible	There is a lot of vermins
A7	View	Acceptable	Generally clean as a landfill site
		Medium	
		Terrible	Very dirty in spite of landfill site

Operational Conditions

No	Items	Choices	Assessment Guideline
A8	Whole operation	Well controlled or operated	Machinery movement is well controlled by the controller
		Medium	
		Terrible	No control at all
A9	Working situations of waste pickers	Well controlled or operated	Safely working
		Medium	
		Terrible	Dangerous working condition
A10	collection vehicles	Well controlled or operated	Condition of collection vehicles are good
		Medium	
		Terrible	Smoke, noise and rough operation are observed
A11	Bulldozer and other landfill operation heavy vehicles	Well controlled or operated	Wastes are leveled by the bulldozer
		Medium	
		Terrible	There is a lot of unloaded wastes without leveling
A12	Location of unloading waste	Well controlled or operated	Collection vehicles are unloading wastes at designated place
		Medium	
		Terrible	Collection vehicles are disposing wastes as they like

Function of facilities

No	Items	Choices	Assessment Guideline
B1	Access road	Functioning	Smooth surface and well maintained
		Medium	
		Not functioning	Many holes and no maintenance
B2	Weighbridge (measurement facilities and computer system)	Functioning	Weighing data is recorded everyday.
		Medium	
		Not functioning	Frequent breakdown
B3	On-site road	Functioning	Smooth surface and well maintained
		Medium	
		Not functioning	Many holes and no maintenance
B4	Moveable type of fence	Functioning	Many plastics and papers are trapped by the fence
		Medium	
		Not functioning	No wastes are trapped or damaged
B5	Gas removal facilities	Functioning	Gas removal pipe is extended according to the landfilling
		Medium	
		Not functioning	Gas removal pipe is varied with wastes and not functioning

B6	Security facilities Fence (fixed type), Gate, Bank	Functioning	There is no damage and well maintained
		Medium	
		Not functioning	Fence is damaged and no replacement
B7	Leachate treatment facilities	Functioning	Well maintained
		Medium	
		Not functioning	No maintenance
B8	Drainage systems	Functioning	Drainage is provided for heavy rain
		Medium	
		Not functioning	No drainage is provided

## 2) Frequency

The planned frequency of the monitoring is once every three months.

## 3) Monitoring Procedures

The monitoring is conducted according to the following procedures.

- To observe the conditions of the disposal site and fill in the check sheet
- To calculate the scores and sum up the result at the garage of the disposal site
- To exchange opinions with the Nuut Co based on the monitoring result
- To compile the monitoring data

## (4) Participatory Evaluation of the Pilot Project at the UCDS

The participatory evaluation was an attempt in which local residents and NGOs were invited to the UCDS twice, before the emergency improvement pilot project started and after it was completed, and checked the environment and operational conditions there, so that they could evaluate the effect of the project by comparing these conditions. This evaluation activity had a large impact on participants, considerably increasing people's awareness of disposal site issues and deepening their knowledge on final disposal.

Regulatory bodies are included in the monitoring committee members, but even regulatory bodies as well as local residents were not familiar with final disposal of waste as at the start of the pilot project. In order to provide an opportunity for them to acquire practical skills, they were invited to the participatory evaluation activities in order to take a practice of monitoring (these monitoring activities were regarded the first and second monitoring).

## Reduction of illegal dumping

### (1) Community Meeting (Reduction of illegal dumping)

The main activity of the section of "Reduction of Illegal Dumping" was to organize a community meeting. Its purpose was to share the sense of awareness on the current collection system and major problems such as illegal dumping among all the stakeholders. At the end of the meetings, participants discussed about possible solutions.

The main participants are shown below:

- Local residents (around 50)
- TUK of SKhD (Director and several staff)
- Local NGOs

The result of the discussion was reflected in the master plan.

### (2) Preparation of Educational Materials

Various educational materials were prepared for the pilot project. A series of 4 leaflets had various functions such as the notice of the pilot project, the progress report of the project, a

request from the collection service provider, and so on. The JICA study newsletters were also used as a public relations materials, as well as educational materials.

Materials	# of copies printed	Content
Presentation materials		<ul style="list-style-type: none"> <li>◆ Explanation of the JICA study and its pilot projects</li> <li>◆ Introduction to SWM, in particular final disposal</li> </ul>
Leaflet	No. 1 2,000	<ul style="list-style-type: none"> <li>◆ Announcement of the start of the pilot project and notice of upcoming events</li> <li>◆ Asking local residents for their cooperation</li> </ul>
	No. 2 2,000	<ul style="list-style-type: none"> <li>◆ Report of the result of the community meeting</li> <li>◆ Notice of upcoming events</li> </ul>
	No. 3 2,000	<ul style="list-style-type: none"> <li>◆ Request from TUK (how to discharge waste)</li> <li>◆ Result of participatory evaluations</li> </ul>
	No. 4 2,000	<ul style="list-style-type: none"> <li>◆ Introduction of the current disposal site</li> <li>◆ Tentative summary of pilot projects</li> </ul>
Banners against illegal dumping	5	◆ for 5 places along the access road
Poster against illegal dumping	700	◆ for public places in UB
Small items	750	◆ for participants of various activities

### b.3 Workflow

The workflow of the project is shown in the figure below.

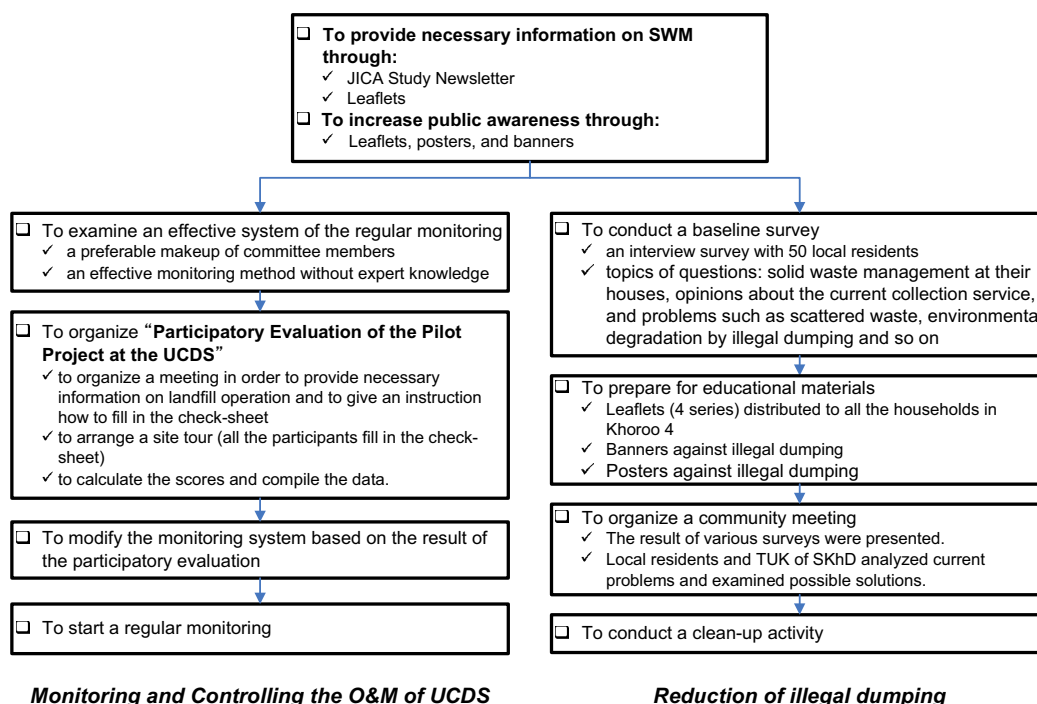


Figure 6-15: Work Flow

## 6.6.2 Evaluation

### a. Result of each activity

#### a.1 Establishment of Regular Participatory Monitoring System at the UCDS

##### a.1.1. Participatory Evaluation of the Pilot Project at the UCDS

The participatory evaluation was organized twice, on July 28 and October 18, 2005. The second activity was implemented as part of the third workshop. The numbers of participants

of the first and second evaluation are shown in the table below.

Table 6-9: Number of Participants of the Participatory Evaluation

	Committee members	Local residents	Others (NGO)	Total
First Evaluation	6	20		26
Second Evaluation	6	44	2	52

The program of the first evaluation activity is shown below.

Table 6-10: Program of First Participatory Evaluation

	Subject	Presenter
1	Opening Remark	Mr. Ganbold Khoroo 4 Governor
Lectures at a meeting room		
2	Background and Outline of Pilot Project "Urgent improvement of Ulaan Chuluut disposal site." "Raising public consciousness on waste issues"	Mr. Delgerbayar, MUB
3	Outline of Regular Monitoring System and Introduction of Monitoring Committee members	Mr. Delgerbayar, MUB
4	Introduction of Sanitary Landfill Operation and how to fill in the check-sheet	Mr. Delgerbayar, MUB
5	Improvement Plan of UCDS	Mr. Jambaldorj, Nuuts. Co
Site Tour		
6	To visit the disposal site and fill in the check-sheet	Mr. Jambaldorj, Nuuts. Co
Q&A at a meeting room		
7	Questions & Answers/ To fill in the questionnaire	
8	Closing remark	



Presentation  
First Participatory Evaluation (Before the construction work started)



Site Tour



Site Tour

Second Participatory Evaluation (Just after the completion of the facility construction)



Site Tour

Figure 6-16: Pictures of Activities

The results of the two evaluations by local residents and NGOs are shown below (the result by committee members is shown later). Since the second evaluation was conducted soon after the facility construction work was completed, its scores tended to be higher.

Table 6-11: Result of the Evaluation by Local Residents and NGOS

Items	Average Score of First Evaluation	Average Score of Second Evaluation
<b>1.Environmental Effect</b>		
Fire & Smoke	1.1	2.5
Offensive odor	1.1	2.4
Wastewater	1.4	2.8
Waste scattering	1.0	2.4
Animals (dogs, birds, etc)	1.2	2.6
Vermin (flies, worms, etc)	1.1	2.8
View	1.0	2.7
<b>2.Operational Conditions</b>		
Whole operation	1.0	2.8
Working conditions of waste pickers	1.1	1.9
Collection vehicles	1.0	2.6
Bulldozer and other landfill operation heavy vehicles	1.1	2.7
Waste dumping location	1.0	2.8
<b>3.Facilities</b>		
Access road	-*	2.9
Weighbridge(Control house)	-	2.8
On-site road	-	2.9
Working face (Moveable fence etc)	-	2.9
Gas removal facilities	-	2.9
Security facilities: fence (fixed type), Gate, Bank	-	2.9
Leachate Treatment Pond	-	2.9
Drainage system	-	2.9

\* At the time of the first evaluation, these facilities were not constructed yet and were excluded from the evaluation targets.

At the end of the first evaluation activities, local participants were asked to answer to the questionnaire about the participatory evaluation method, the way of organizing the evaluation activity, and changes in their awareness and knowledge on final disposal of waste.

A part of its result is shown below. It can be said that this evaluation activity raised people's awareness and deepened their knowledge on solid waste management to some extent. Moreover, many of them well understood the importance of the monitoring and pledged to continue to keep their eyes on the disposal site.

Table 6-12: Result of the Questionnaire

How much did you understand what the sanitary landfill operation is?		How did you understand about the regular monitoring system?	
very well	11	very well	6
some extent	8	some extent	9
not at all	1	a little	3
		(blank)	3
Total	20	Total	21

How much did you understand about the pilot project at the Ulaan Chuluut disposal site?	
very well	11
some extent	8
not at all	1
Total	20

Some of comments the participants made are summarized below.

- It is very important evaluation.
- I am supporting it very much.

- As a citizen, I think that people need this kind of event and that evaluation method will be sophisticated in the near future. I have been participating in JICA project activities 3 times since November 2004, so I have aware of this training. From now on, please increase the number of participants and make it open as it is now. Good success.
- The training was very well organized, handing over good prepared materials. The half-day training showed the disposal site situation on spot.
- Good luck. Today's event gave a certain number of people with an opportunity to understand the disposal site.
- Today's event made the participants understand that it is really important to dispose the waste properly at the disposal site. I have never been to the disposal site before and I realized today that the plastic bags are everywhere. Is there any way to reuse the plastic bags, it seems it occupies large area of the disposal site.
- Good luck. I am impressing because the project is going to implement in a high level of activity.
- I am very glad for today's event because it is the time to take care of it.

#### a.1.2. Regular monitoring with the participation of local representatives

Since even the regulatory bodies were not familiar with final disposal issues, as previously mentioned, the first and second monitoring were conducted along with the participatory evaluation activities. The study team mainly organized these two monitoring work.

After the modification of the committee members, the third and forth regular monitoring was organized on May 24, 2006, and on August 30, 2006, respectively. The third monitoring was the first one which was proactively organized by the committee itself, with assistance from the study team. In the case of the forth monitoring, it was organized on the same day of the waste picker meeting, and the representatives of waste pickers also joined the monitoring as observers.

After the site tour and point-rating evaluation of the current conditions, the chairperson organized a meeting at the garage of the UCDS. The director of the UCDS also joined the meeting. At the meeting, the average scores were calculated and all the members exchanged their opinions. All the participants were actively involved in the discussion. In particular, new members from NGOs positively contributed to the discussion, making a suggestion of new evaluation items and necessary facilities for the staff of the disposal site. Many of them expressed their concern about scattering of plastic waste. They insisted that it was necessary to take countermeasures, such as the construction of the 3<sup>rd</sup> embankment bank, the installation of fences, and the application of sheet to cover the bed of collection vehicles.

The result of the four monitoring activities is shown below.

Table 6-13: Result of Monitoring

	Average Score			
	First Monitoring (Preparation)	Second Monitoring (Preparation)	Third Monitoring	Fourth Monitoring
those who conducted monitoring	6 members	6 members	11 modified members	10 modified members
<b>1.Environmental Effect</b>				
Fire & Smoke	1.2	2.0	2.0	3.0
Offensive odor	1.2	2.0	2.0	1.8
Wastewater	2.2	2.7	2.8	3.0
Waste scattering	1.0	2.3	2.2	2.7
Animals (dogs, birds, etc)	1.5	2.2	2.5	2.9
Vermin (flies, worms, etc)	1.2	2.5	2.7	2.9
View	1.0	2.3	2.5	2.6

	Average Score			
	First Monitoring (Preparation)	Second Monitoring (Preparation)	Third Monitoring	Fourth Monitoring
<b>2.Operational Conditions</b>				
Whole operation	1.2	2.5	2.8	2.8
Working conditions of waste pickers	1.0	1.8	1.8	2.4
Collection vehicles	1.2	2.3	2.5	2.8
Bulldozer and other landfill operation heavy vehicles	1.3	2.0	2.3	2.9
Waste dumping location	1.0	2.5	2.4	3.0
<b>3.Facilities</b>				
Access road	_*	2.8	2.8	2.9
Weighbridge(Control house)	-	2.7	3.0	2.9
On-site road	-	2.8	2.3	2.8
Working face (Moveable fence etc)	-	2.8	2.4	2.6
Gas removal facilities	-	2.8	2.9	3.0
Security facilities: fence (fixed type), Gate, Bank	-	2.8	2.5	2.6
Leachate Treatment Pond	-	2.7	2.6	3.0
Drainage system	-	2.7	2.3	3.0

## a.2 Reduction of illegal dumping

### a.2.1. Baseline Survey

The baseline survey was conducted on August 25 and 26, 2005. The target of the interview survey was all the households in Khoroo 4. The distribution of samples of the survey by Khoroo is shown below. In Khoroo 4, Khoroo 5-8 are stretched across the hill side areas, where a lot of newcomers live and there is little or no collection service.

Table 6-14: Distribution of samples by Heseg

Heseg 1	Heseg 2	Heseg 3	Heseg 4	Heseg 5-6	Heseg 7	Heseg 8	total
6	5	6	7	6	6	12	48

Distribution of Samples by Sex

Female	64.6%
Male	35.4%
Total	100.0%

The results of the survey are summarized below.

- All the respondents but one recognized the problem of scattered waste and that it was caused by illegal dumping.
- About 3 quarters of the respondents thought that ordinary people in Khoroo 4 were the most responsible for illegal dumping in Khoroo 4.
- About 40 percent of the respondents thought that the regular and scheduled collection service was the most effective solution to prevent local residents in Khoroo 4 from dumping waste in an open space.
- About 40 percent of the respondents need the collection service twice a month.

### a.2.2. Community meeting

In order to share the awareness of problems related to solid waste management in Khoroo 4 among all the stakeholders, a community meeting was organized on the 14<sup>th</sup> of September.

#### (1) Participants

- Local residents (71 people)
- TUK (Director and 3 staffers)

- Facilitator (Ms. Tuul, local NGO of Tolgoit)
- Observer (JICA and JICA study team members)

## (2) Program

The community meeting was organized according to the following program.

Table 6-15: Program of Community Meeting

	Time	Topic	
1	6:00 – 6:15	Special Topic Progress of the pilot project at Ulaan Chuluut Disposal Site	Mr. Jambaldorj Nuuts. Co
2	6:15 – 6:30	Introduction of the meeting Ice Breaking Game	Ms. Tuul
3	6:30 – 6:35	Introduction of participants Opening Remark	Ms. Tuul Mr. Ganbold Khoroo 4 Governor
<b>Part I: Sharing information on current conditions</b>			
4	6:35 – 6:50	Result of Baseline Survey (People's awareness of solid waste management and the manner how to store and discharge waste in Khoroo 4)	Ms. Selenge JICA study team
5	6:50 – 7:05	Current collection service in Khoroo 4	Mr. Donrov TUK
6	7:05 – 7:10	Result of Time & Motion survey	Ms. Selenge JICA study team
<b>Part II: Discussion</b>			
7	7:10 – 7:20	Explanation how to proceed discussion	Ms. Tuul
8	7:20 – 8:40	Group discussion and presentation of the result of discussion (including a tea break)	Ms. Tuul
9	8:40 – 8:50	Summary of discussion	Ms. Tuul
10	8:50 – 8:55	Closing Remark	Ms. Batsaikhan MUB

## (3) Conclusions of the discussion

At the group discussions, various topics ranging from the quality of collection service and collection fee to the discharge manners of local residents. The results of the discussions are summarized below.

### Current collection system

- Collection days should be fixed
- Number of collection vehicles and collection workers should be increased
- Collection frequency should be at least twice a month
- Collection vehicles should have a cover and not overload waste

### Local residents' manners

- Waste should be kept in a container
- A drainage hole should be installed in each house and waste water generated from cooking and laundry should not be mixed with kitchen waste.
- Local residents should pay a collection fee

### Others

- A monitoring system should be established to stop illegal dumping.
- Those who dump illegally should be fined and those who catch someone dumping waste should receive a bonus.
- Small gullies (resulted from soil erosion) should be filled with soil.
- Air an advertisement on radio or TV in order to prevent illegal dumping and to encourage use of the collection service etc.



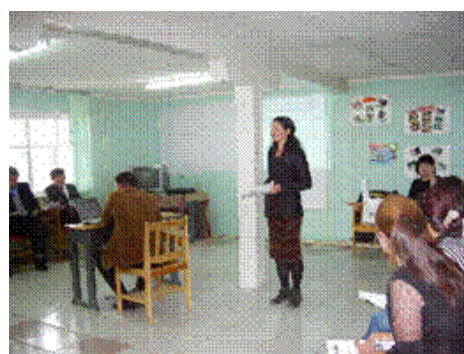
The TUK director expressed the requests from TUK to local residents how to store and discharge waste. These requests were summarized in the leaflet and distributed to the all the households.

#### **a.2.3. Clean-up Activity**

The clean-up activity was organized in Khoroo 4 on October 20, 2005. 30-40 people participated in the activity in order to clean the main road and its surrounding areas.



Baseline Survey



Community Meeting



Community Meeting



Community Meeting



Clean-up Activity

Figure 6-17: Pictures of Activities

#### **b. Changes in People's Awareness**

This project focuses attention on people's awareness of solid waste management issues. It is difficult to evaluate the level of the awareness.

One indicator of the evaluation is self-assessment of the awareness level. In addition, it is important to check the level of understanding about solid waste issues and actual behaviors of dealing with waste.

Under the JICA study, various interview surveys and meetings were conducted, in order to obtain a level of awareness (self-assessment) and understanding (oral assessment) and actual behavior (self-assessment). In this section, the result of interview surveys and group meetings are briefly introduced.

## **b.1 Result of Interview Surveys, Group Meetings and Observation Survey**

### **b.1.1. Interview Survey**

#### **Baseline survey**

The baseline survey was conducted soon after the pilot project started. The result of the survey showed;

- Most of the respondents were well aware of problems caused by improper solid waste management;
- Scattered waste and disposal site were their main concerns; and
- About 3 quarters of the respondents attributed illegal dumping to local residents

#### **Questionnaire survey after the First Participatory Evaluation**

As shown in a.1.1, all the local participants (20 local residents) were required to fill in a simple questionnaire, after the site tour of the disposal site for evaluation. Its result indicated that;

- Before the pilot project, people's interest in UCDS were already high;
- Local participants tended to think that they knew the disposal site well, regardless of the actual level of their understanding;
- Most of participants understood the monitoring method to some extent and supported the idea of regular monitoring; and
- All but one thought that the first participatory evaluation increased their awareness of the disposal site.

#### **Follow-up survey of the Second Public Hearing**

Aside from the pilot project, 3 public hearings were organized as a part of the feasibility study of the new disposal site construction plan in Narangiin Enger. Local residents from both Khoroo 3 and 4 participated in these hearings. The team conducted a follow-up survey (an interview survey) after each hearing, in order to obtain how much participants understood the content of presentations and how they thought about the development plan.

At present, Khoroo 3 participated in the regular monitoring activity, but in the first half of the pilot project, only local residents from Khoroo 4 participated in pilot project events. As a result, the result of the follow-up survey of the first public hearing showed the difference in the level of understanding of disposal site and landfill operation.

### **b.1.2. Group Meetings**

#### **Third workshop**

Under the JICA study scheme, three workshops were organized. Unlike the previous two workshops, the third workshop made local residents in Khoroo 4 targets and let them evaluate the progress of two pilot projects there. (The details of the workshop are shown in the Databook.)

In total, 55 local residents participated in the workshop. A part of the result of the evaluation is shown below.

- 20 participants replied that people in Khoroo 4 were more aware of waste issues, while 7 respondents replied that there was no change in public awareness.
- Regarding the actual people's behavior, 23 participants did not recognize the improvement, while 7 people thought there were some improvements.
- The educational materials received relatively high marks, but many participants required more: to combine practical training programs with educational materials, to increase the distribution frequency, and to make sure that leaflets are distributed to all the households, to expand public relation activity by using mass media such as radio and TV, and so on.
- Participants expressed their hopes that the collection system itself and the condition of the access road will be improved.

## **b.2 Observation survey**

Before the pilot project started, the team observed the conditions of illegal dumping in Khoroo 4. The observation survey was conducted again on 2nd Feb 2006.

The results are shown below. Since the collection system did not change, the conditions of illegal dumping were not changed much.



Figure 6-18: Comparison of Illegal Dumping

## **c. Evaluation**

As previously mentioned, it is difficult to evaluate the change in people's awareness. For the evaluation of the pilot project, the following information is used.

- Self-assessment information about awareness of solid waste management and behavior of dealing waste

- Oral assessment information about solid waste management
- Result of observation survey to check whether there is a change in actual behavior of dealing waste and in illegal dumping in Khoroo 4.

## **c.1 Monitoring and Controlling the O&M of UCDS**

### **c.1.1. Awareness/understanding level**

As shown by the result of the baseline survey, local residents in Khoroo 4 were already well aware of the problems caused by the UCDS. Still, it can be said that participatory evaluation activities deepened the knowledge of local participants on solid waste management and raised their awareness further.

Many of the local participants well understood the importance of the monitoring of the UCDS. Even though the number of the participants is limited, they are expected to take a leading role in keeping their eyes on the disposal site in the future.

### **c.1.2. Regular monitoring system with participation of local representatives**

Due to the reshuffle of the committee members, the first regular monitoring was successfully finished. It seems that for a certain period, the City Specialized Inspection Department is the most suitable organization to organize the monitoring committee. Local participants were actively involved in the discussions at the end of the monitoring.

There are still several issues to be solved in order to make the regular monitoring system sustainable.

- To secure a budget for a regular monitoring  
This monitoring system does not require a large amount of money, but a minimum budget for such items as transportation and data management is necessary. It is necessary for MUB to secure the budget.
- To decide how to manage the acquired data  
The result of the monitoring can be managed by a simple worksheet on the computer. Most of the data of the inspection department, however, has not been computerized yet. It is necessary for the department to modify the data management system.
- To decide how to make the obtained data open to the public  
It is important to share the obtained data with other local residents in order to keep their awareness level and to ensure the impact of the monitoring on the operation of the disposal site. During the study period, the data can be open to the public through the newsletter and website. It is necessary to decide how to make the obtained data open to the public.

## **c.2 Reduction of illegal dumping**

### **c.2.1. Awareness level**

Same as the awareness level of the disposal site, local residents were well aware of the problems caused by illegal dumping before the pilot project. In addition, they recognized that local residents were mainly responsible for it.

There were a core group of people who attended almost every meeting and activity. They were actively involved in various activities and deepened their knowledge. The team hopes that these residents, mainly women, would take a leading role in the future.

### **c.2.2. People's behavior**

Even though the majority of residents knew the pilot project through leaflets and banners, it seems that the actual impact of the pilot project on them was limited, due to the lack of practical improvement of the collection system.

## **6.6.3 Lessons and Recommendations**

### **a. Monitoring and Controlling the Operation and Management of the UCDS**

#### **a.1 Responsible organization**

It is preferable that the locals take a main role in conduction a regular monitoring. At this moment, few local organizations have enough ability to take responsibility of the regular monitoring. In the case of Sri Lank, a Buddhist monk was appointed as the chairperson of the monitoring committee, but in the project site the team could not find an individual, such as a religious leader, who can take a socially responsible role. The team drew a conclusion that the City Specialized Inspection Department was the most suitable body to organize the regular monitoring at this moment.

On the other hand, MUB has a plan to assign one officer in charge of environment issues to all the Khoros in UB in a future. This could make it possible for the Khoroo government to take on the role of the responsible organization in the future. The team expects that through the monitoring activity the staff of Khoroo 3 & 4 government could acquire the skills and experience in order to assume the responsible role for the monitoring of the new disposal site.

#### **a.2 Data management and information disclosure**

The participatory evaluation of the pilot project raised the awareness of the local participants. It is necessary to keep the level of this awareness. In addition, it is important to continue to take an effort to promote further public participation. The disclosure of the data of the regular monitoring and sharing it with local residents are very critical in order to realize them.

In general, the disclosure of environment data is not promoted much in MUB. It is necessary for MUB to examine the data management and information disclosure system of the environment data.

### **b. Reduction of illegal dumping**

Every time, several dozens of local residents participated in meetings and activities. There were a core group of people, who attended almost all activities. Considering the population of the Khoroo 4, it can be said that the influence of the pilot project was limited to some specific people. The team hopes that these people will take a leading role when discharging rules or source-separation is introduced in the future.

In order to expand the effect of the pilot project and to increase the awareness level in the whole community, it is necessary to take another step: introducing discharge rules while improving actual collection system.

During the socialist era, there were regular collection services and local people followed discharge rules. Local people in their 40's and older, with the exception of newcomers, remembered it well. At a community meeting, some of them expressed their willingness to follow new discharge rules if they were introduced. Therefore, once the collection schedule is fixed by increasing or upgrading equipments, it will be possible to introduce discharge rules and then to decrease illegal dumping.

## Project Design Matrix: PDMo

Name of Project: Raising Public Consciousness on Waste Issues  
 Implementation Period : From July, 2005 to Jan. 2006.  
 Target Group: Residents in Khoroo 4

Narrative Summary		Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<b>Overall Goals</b>				
1. Participatory monitoring system contribute to proper landfill operation		Monitoring record	Monitoring data	
2. There is no scattering waste		Change in view at former illegal dumping sites	Observation survey	
<b>Project Purposes</b>				
1. To increase awareness of local residents on waste issues		The number of assistances given by the Study Team.	Interview survey	
2. To deepen knowledge of local residents on final disposal of waste		Depth of understanding	Interview survey	
3. To establish the monitoring committee and start regular participatory monitoring of the disposal site		Monitoring record	Monitoring data	
4. To prevent local residents from dumping waste in public space		Change in view at former illegal dumping sites	Observation survey	
<b>Outputs</b>				
1. Establishment of monitoring committee and regular monitoring		Monitoring record	Monitoring data	
2. Educational materials				
3. Recommendation from local residents and TUK about collection system in Khoroo 4				
<b>Activities</b>		Input		Pre-condition
1. Leaflets were prepared and distributed to all the households in Khoroo 4		<b>Study Team</b>  <b>Human Resource</b> • Expert <b>Equipment and materials</b> • Leaflets 4 x 2,000 copies • Banners 5 sheets. • Posters 700 copies • Small goods 750 pieces	<b>Human Resource</b> • Staff  <b>MUB</b>	
2. Banners were prepared and hung along the access road				
3. Posters were prepared and distributed to all the Khoros in the Ger area of UB				
4. Small goods were prepared and distributed participants various activities				
5. Community meetings were organized				
6. Participatory evaluation was organized twice				
7. The regular monitoring started				