

Figure 5-1: Condition of Gohagoda Landfill before Pilot Project

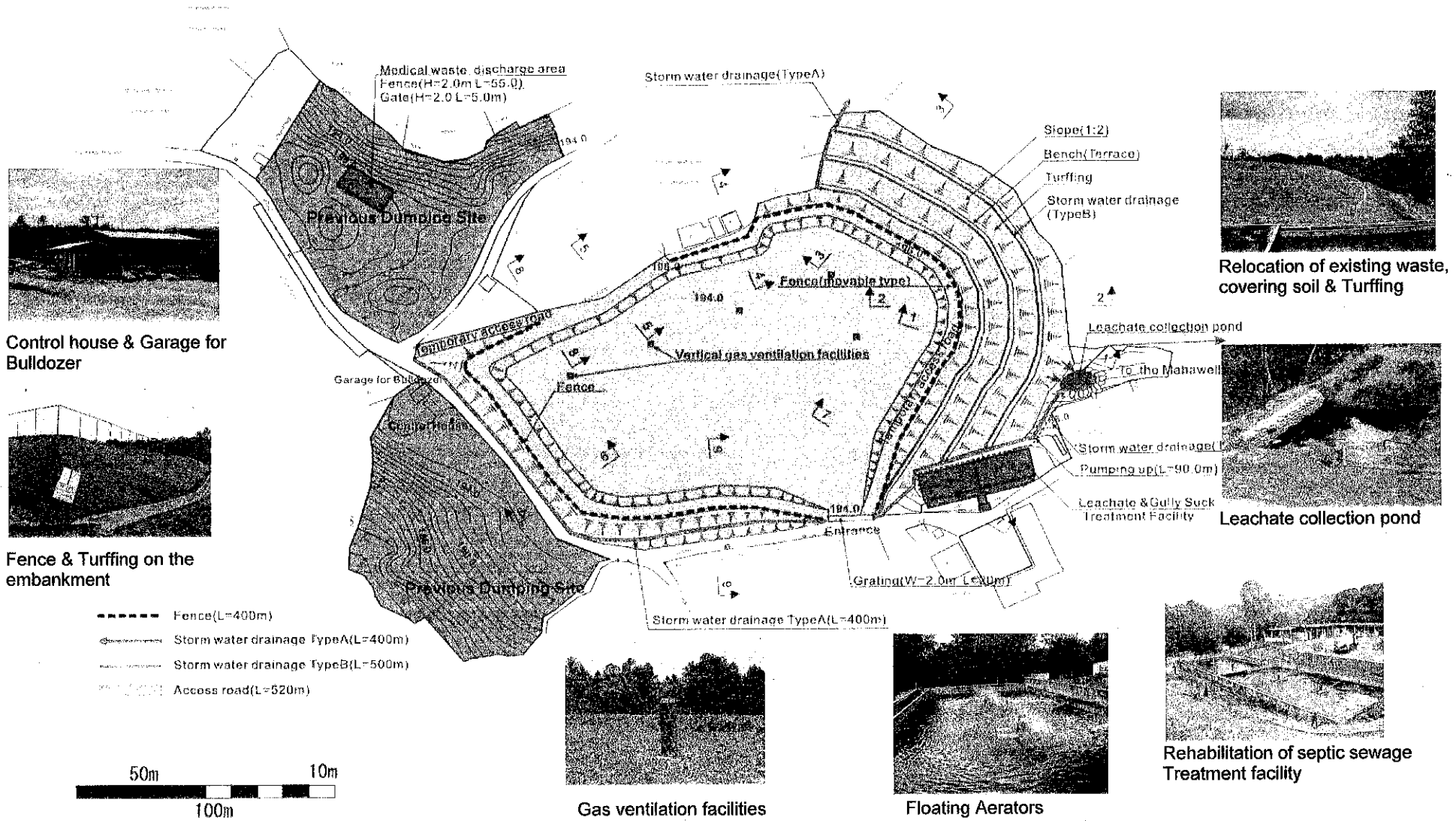
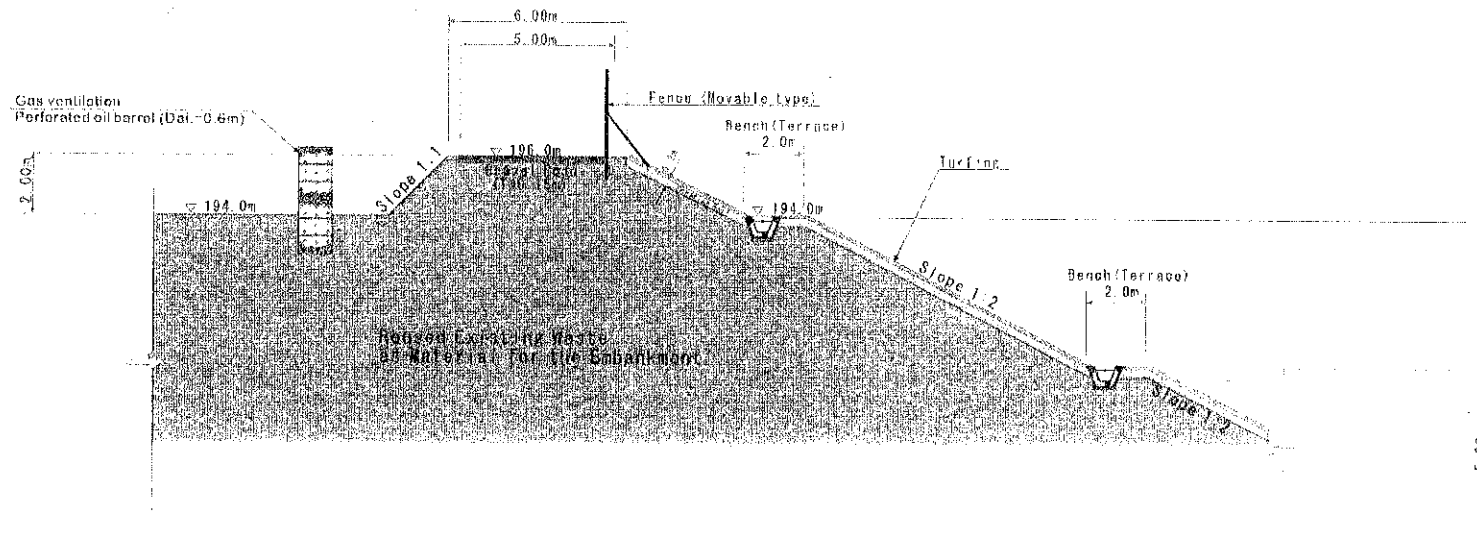


Figure 5-2: Layout of Improved Gohagoda Landfill

### Typical Section A



### Typical Section B

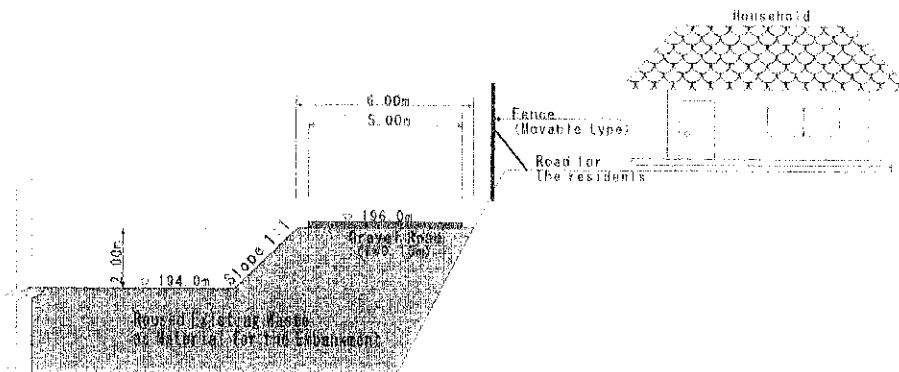


Figure 5-3: Typical section after improvement

Table 5-2: Conceptual Design of Improved Gohagoda Landfill Site

Item		Unit	Qty
Total area of improved landfill site		Ha	Approx. 2.5
Extent Capacity		M <sup>3</sup>	80,000
Life span		Years	2-3
Type of landfill method		-	Semi-Aerobic
Administration	Control office	No.	1
	Garage for bulldozer	No.	1
Security and safety facility	Fence (Fixed type)	L.S.	1
Sanitary waste disposal facility	Access road (gravel) for short term use	L.S.	1
Leachate collection Pond		L.S.	1
Modification of Gully suck and leachate treatment facility – System consist of mechanical aerators that fixed to the existing gully suck tanks		No.	1
Storm water drainage	Rip rap type on final slope (type “B”)	L.S.	1
	Rip rap type drain along the road (type “A”)	L.S.	1
Gas ventilation facility –Perforated oil barrel filled with rubble stone		Nos.	5
Disposal pit for medical waste		No.	1

### b.2 Leachate Collection Pond

A leachate collection pond was constructed at the lowest point of the fill in order to collect leachate seep from the bottom of the landfill. The facility was excavated pit supported with sand bags. Electrical pump and pipeline installed to divert collected leachate to the modified gully suck- Leachate treatment facility.

### b.3 Modification of Gully suck and leachate treatment facility

The existing gully suck disposal tanks were modified in order to treat leachate and gully suck. The tank receives approximately 23m<sup>3</sup> of gully suck, which collected from the septic tanks. The quality of septic sewage waste shows that it has already decomposed most of BOD but further treatment is needed to reduce the BOD before release to the inland water bodies. In addition to septic sewage, the facility receives leachate that pumped out from the leachate collection pond after modifications. Four aerators were installed in primary tank to enhance the degradation process and secondary tank was designed as settlement tank & temporary storage prior to discharge. The treated effluent is discharge to small stream flowing below the landfill facility.

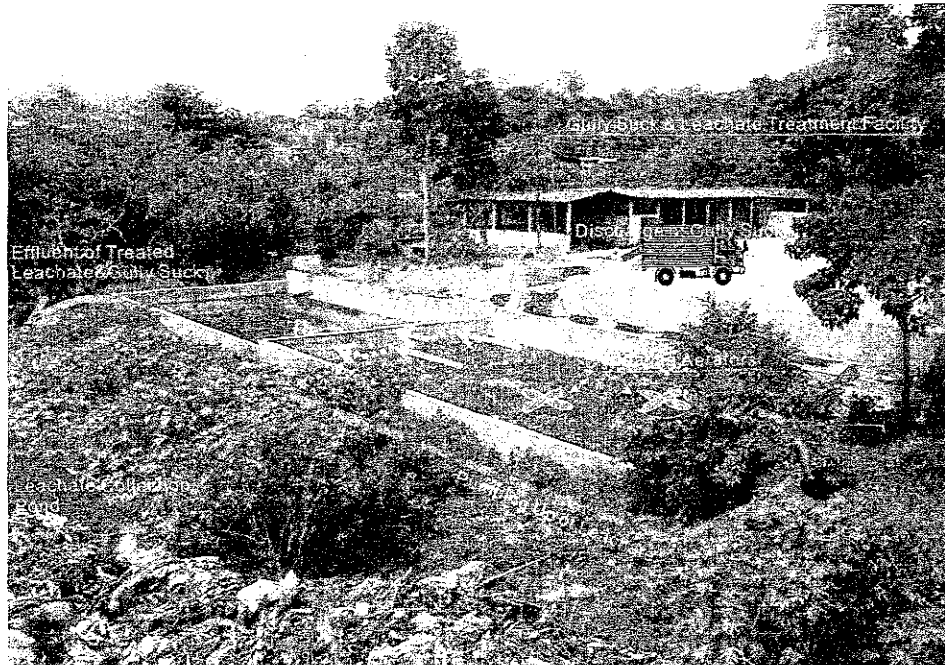


Figure 5-4: Concept of Treatment Facility for Leachate and Septic Sewage

#### b.4 Bench (terrace)

The purpose of bench was as follows.

- 1) To protect the slope by intercepting runoff water flowing on the slope.
- 2) To provide the enough space for the interceptor drain on benches.
- 3) To provide the enough working space for the slope maintenance.
- 4) To keep the waste filling slope stable.

The bench plan was as follows.

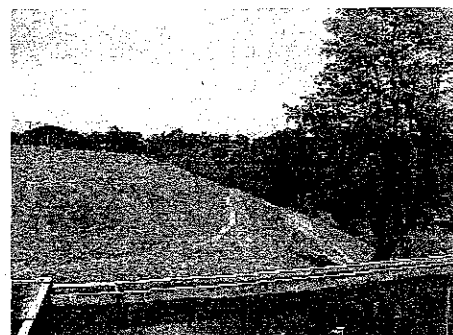
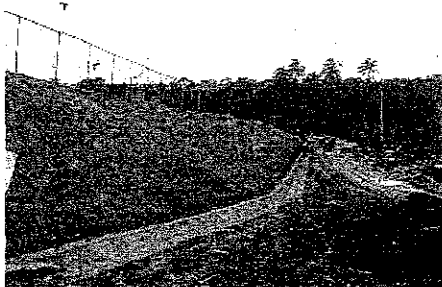
- Every 5 meters in height.
- 2 meters in bench width.



#### b.5 Turfing

The outside of slope of the waste filling was turfed for the following purposes.

- 1) Protection of the slope from erosion by runoff water.
- 2) Maintenance of the good view.



**b.6 Storm water Drain**

The storm water drain on the bench terrace and along the foot of the landfill was installed for the following purposes.

- 1) Minimization of leachate generation amount by intercepting runoff water into the site.
- 2) Maintenance of access road

Type “A” drain will be constructed along the road to collect storm water coming from surrounding area and slope of the fill. The collected water will be diverted to the small stream at the bottom of landfill.

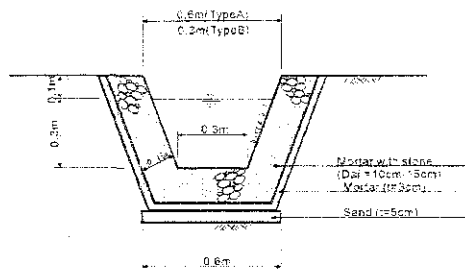


Figure 5-5: Riprap drain

**b.7 Gas Ventilating Facility**

The gas ventilating facility was provided to exhaust landfill gas generated in the landfilled waste to minimize the risk of gas explosion

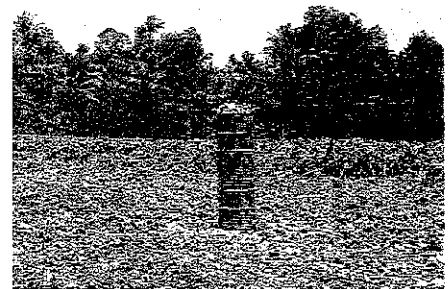
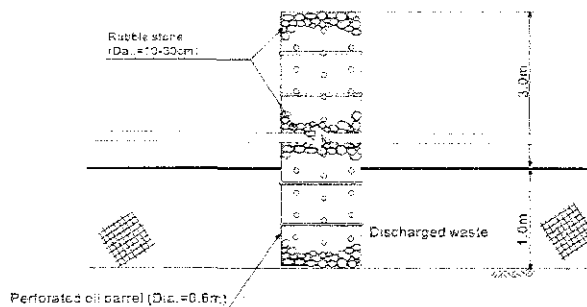


Figure 5-6: Gas Ventilating Facility

**b.8 Medical Waste Discharge Area**

The Medical Waste Discharge Area was constructed separately on the old dumping area. It receives the following wastes which require special care for handling.

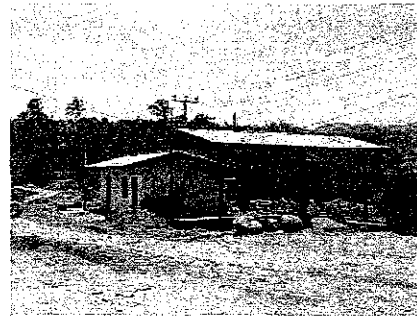
- Syringes
- Medical tools and goods which contacted blood

The disposal pit was completely surrounded by a gate and a fence to ensure nobody except the landfill staff can enter.



### b.9 Relocation of Control House and Garage for Bulldozer

The existing site office and garage for the bulldozer were demolished during the construction of landfill. Those facilities were relocated outside the landfill.



### b.10 Security facilities

A Movable fixed type fence was installed along the temporary access road on the embankment to prevent waste scattering from active filling area.

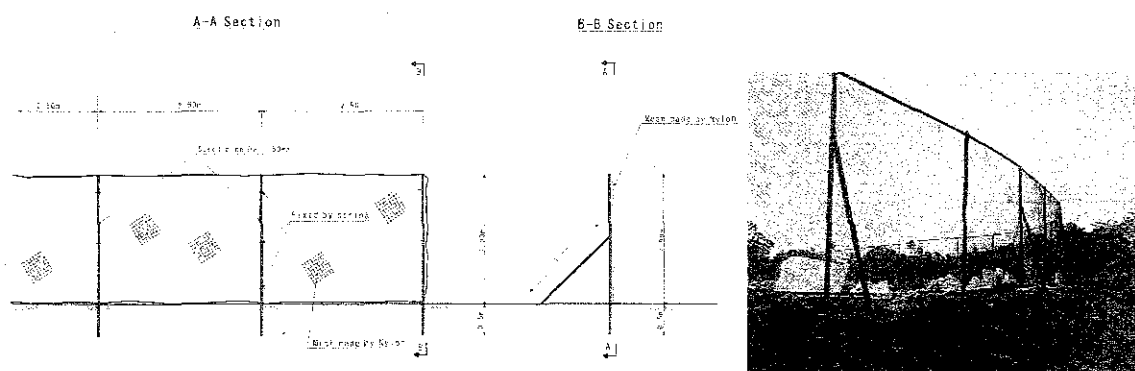


Figure 5-7: Movable type fence

### b.11 Construction of new Access roads

New access road was constructed around the landfill facility. The collection vehicles to dump its waste to the filling area use the constructed access road. The access road is located 2 m above the active filling area. The road was established by filling old waste on the Embankment and finished with compacted soil and gavel to easy access of collection vehicle.

## 5.2.2 Transfer the appropriate operation method for sanitary landfill operation

To improve the faculties at the landfill site is easy by construction, however to maintain the sustainable maintenance and operation is always very difficult. One of the reasons why sustainable maintenance is difficult is the staffs in charge of landfill operation does not know the operation method for sanitary landfill operation.

During the pilot projects, the counterparts who belong to Kandy Municipal Council and Nuwara Eliya Council were involved to the supervision of construction in order to transfer the method of construction of sanitary landfill site. After the completion of the improvement constructions, technical transfer, such as compress of discharged waste and covering soil, was conducted with

the bulldozers donated by JICA to Nuwara Eliya Municipal Council and Kandy Municipal Council. Further, the operation manual for sanitary landfill site was prepared in order to maintain the sustainable appropriate operation. The manual include following items.

**a. The Cell and Layer Operation with Daily Soil Cover**

The term cell is described the volume of material placed in a landfill during one operating period, usually one day (See ). A cell includes the solid waste deposited and the daily cover material surrounding it.

The advantages of using daily cover are primarily in preventing windblown litter and odours, birds and vermin and in improving the site's visual appearance. It is also advocated as a means of shedding surface water during the filling sequence, thereby leachate management by reducing infiltration. At sites where daily covered is spread by bulldozer, a thickness less than 200mm is not be feasible, keeping in view the uneven surface of the waste.

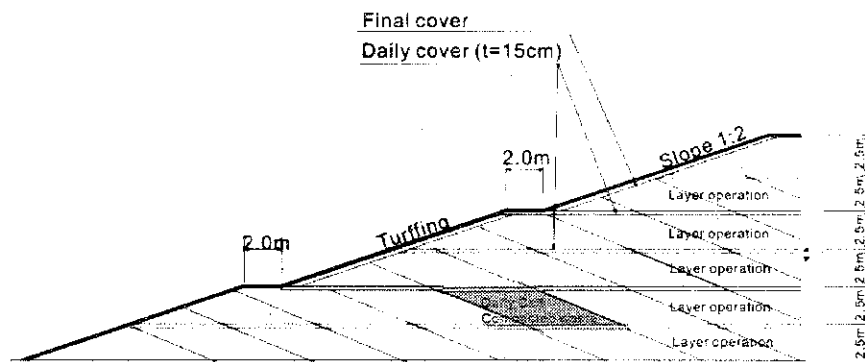


Figure 5-8: Daily Cell and Daily Soil Cover

A layer is a complete cell over the active area of the landfill.

**b. Leachate Treatment**

The leachate treatment facility requires the following O&M works.

- 1) Replacement of coconuts fibre every five years and to be discharged to the landfill site (Nuwara Eliya Moon Plains Landfill Site)
- 2) Replacement of charcoal filter periodically and to be discharged to the landfill site whenever necessary. (Nuwara Eliya Moon Plains Landfill Site)
- 3) Removing of sludge periodically and to be discharged to the landfill site whenever necessary

**c. Turfing on the Finished Slope**

Turfing on the finished slope is required for protection of the slope and mitigation of landscape.



**d. Extension of Gas Ventilation Facility**

The gas ventilations will be placed at a spacing of 30m to 50m on the landfill cover. The gas ventilation pipes will be extended every layer of operation. The height of each layer is 2.0m-2.5m; therefore the length of each extended gas is required 3.0m.

**e. Maintenance of Installed Facilities**

Fence, access road will be maintained when these are damaged. The drain will be cleaned every one month in order to prevent from blocking.

**f. Reception of Visitors**

The site will welcome visitors because this will be the model sanitary landfill site for Sri Lanka. MC staff will explain the design, operation and maintenance system for the landfill operation.

**g. Required Resources for O & M**

- Manpower
  - Supervisor (not full time): 1 person
  - Operator of Bulldozer: 1 person
  - Foreman: 1 person
  - Guard & record keeping: 1 person
  - Labour: 2 persons
- Heavy equipment
  - A bulldozer (full time) 1 unit
- Diesel and lubricant oil for a bulldozer
- Soil for covering waste: 1 to 2 loads per day.
- Electricity for a water pump & Floating aerators (Kandy Gohagoda Landfill Site)
- Material for gas venting facility
- Turfing on the sloping side

**5.2.3 Pilot project of improvement at Nuwara Eliya Moon Plains Landfill Site**

**a. Background**

The most serious solid waste problem in Nuwara Eliya was poor landfill condition. The previous Moon Plains landfill site caused the following serious problems.

- Many large trees planted were dying due to fire caused by inflammable waste.
- Leachate generated from waste was deteriorating shallow ground water and could affect the water quality in the Bomuruella reservoir which is located at the downstream side.
- The number of stray dogs near the site which sometimes attack people was increasing.

- There were many pests, especially flies, in the landfill site.

The most serious foreseen threat by the previous landfill operation was the high possibility of wide forest fire by inflammable waste dumped. However, all of these problems can be eliminated or reduced within the permissible level by the improvement of it to the sanitary method.

The Study has found that the improvement project of the Moon Plains existing Landfill Site in Nuwara Eliya would be excellent not only for Nuwara Eliya but also for the whole country because of the following reasons.

- a) The social and natural site condition is idealistic for the sanitary landfill site. There are no existing neighbourhoods and very good valley topography with very low permeable ground.
- b) The estimated acquired landfill capacity is sufficient for receiving all waste from Nuwara Eliya for 20 years.
- c) Not only the investment but also the operation and maintenance cost is the least with the sanitary landfill due to its very suitable natural and social conditions.
- d) The Moon Plains Landfill Site is the model sanitary landfill site in Sri Lanka where people can experience with the sanitary landfill method after the improvement.

Therefore, the implementation of the improvement project is highly recommended not only for Nuwara Eliya but also for the whole country.

#### **b. Location of the Moon Plains Landfill Site**

The Moon Plains Landfill Site is located in the plantation forest near Moon Plains Grama Seveka Division in Moon Plains village which faces Nuwara Eliya municipal council. The distance from Nuwara Eliya town centre to the landfill site is approximately 6km.

#### **c. Landfill facility at Moon Plains Landfill Site**

##### **c.1 Conceptual design of the landfill facility, extent capacity and life span**

Figure 5-9 shows Condition of Moon Plains Existing Landfill Site before Pilot Project, while Figure 5-10, Figure 5-11 and Table 5-3 show the conceptual design of the improved Moon Plains Landfill Site. The extent capacity is 191,000m<sup>3</sup>, while the life span of improved Moon Plain landfill site is approximately 20 years.



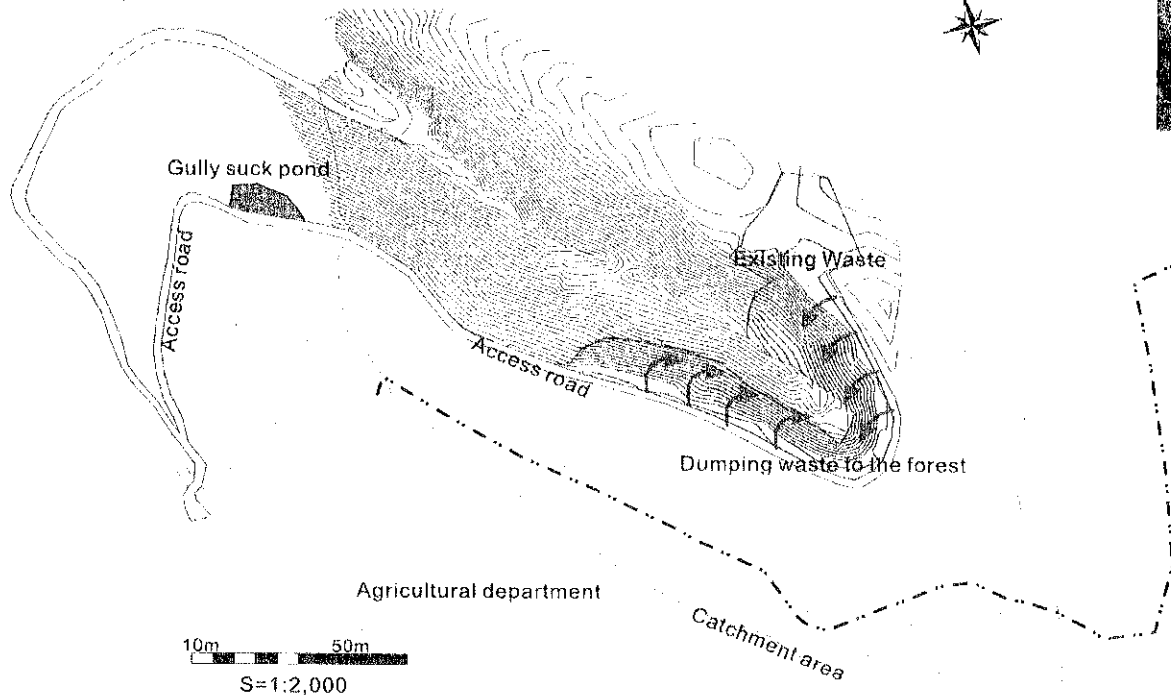
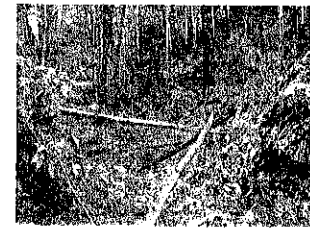
Fire & Smoke



Many Stray dogs



Many trees dying

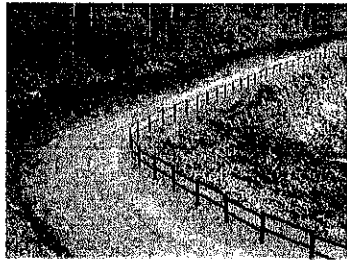


Many flies

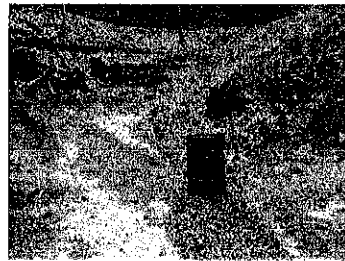


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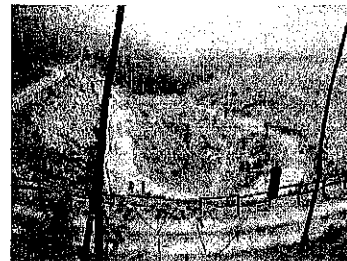
Figure 5-9: Condition of Moon Plains Landfill Site before Pilot Project



Access road



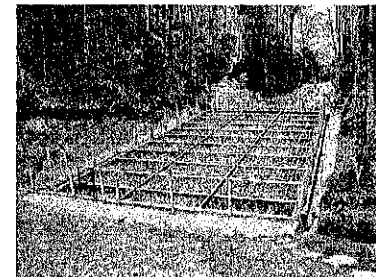
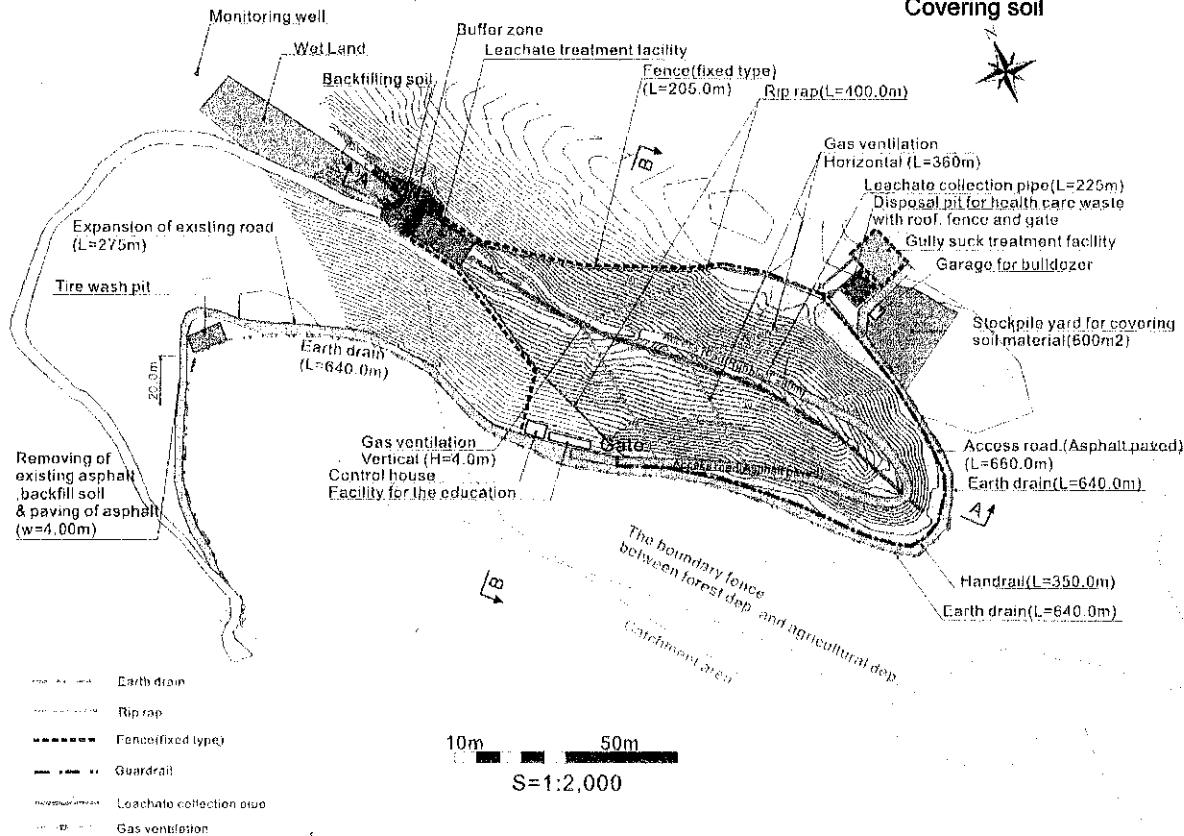
Gas ventilating facility



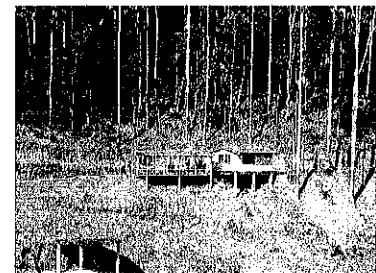
Relocation of existing waste & Covering soil



Leachate collection facility



Leachate treatment facility



Control house & Education facility

Figure 5-10: Layout of Improved Moon Plain Landfill Site

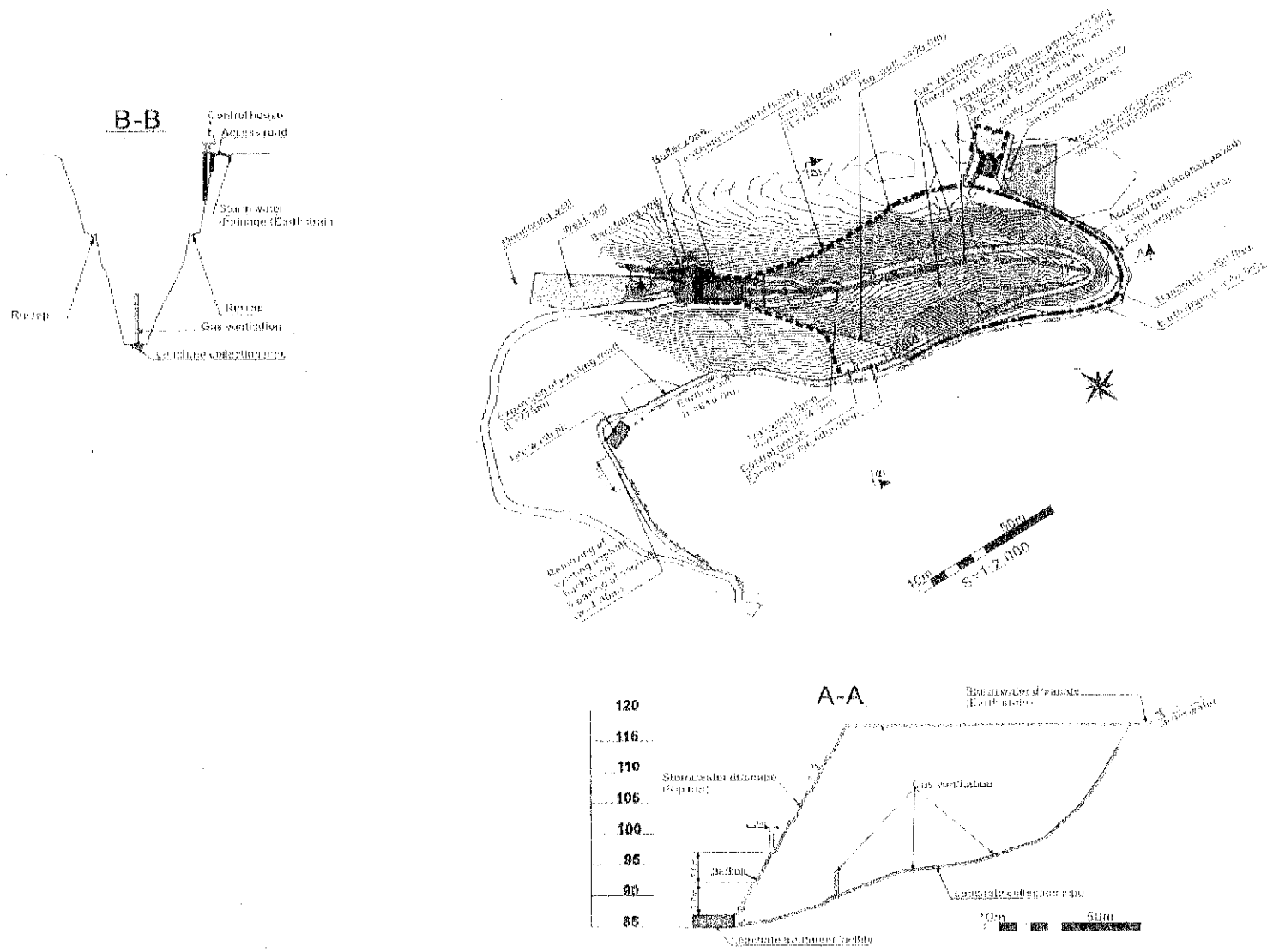


Figure 5-11: Layout Plan & Cross Section of Improved Moon Plain Landfill Site

Table 5-3: Conceptual Design of Improved Moon Plain Landfill Site

Item		unit	Qty
Total area of improved landfill site		ha	approx. 2.0
Extent Capacity		m <sup>3</sup>	191,000
Life span		years	20
Type of landfill method		-	Semi-Aerobic
Administration	Control office	no.	1
	Garage for bulldozer	no.	1
Education	Education facility for sanitary landfill	no.	1
Security and safety facility	Gate	no.	1
	Fence (Fixed type)	L.S.	1
	Handrail	L.S.	1
Sanitary waste disposal facility	Access road (asphalt paved) for long term use	L.S.	1
	Access road (gravel) for short term use	L.S.	1
	Fence (Movable type)	L.S.	1
Leachate collection facility			
-Perforated drainage with rubble stone		L.S.	1
-Bed rock as natural liner instead of artificial liner			
Leachate treatment facility –Combine system which consists of coconuts fibre biological conductor, charcoal filter and wet land		no.	1
Gully sucker treatment facility		no.	1
Storm water drainage	Rip rap type along the waste filling slope	L.S.	1
	Earth drain type along the road	L.S.	1
Gas ventilation facility –Perforated oil barrel filled with rubble stone		nos.	10
Tire wash pit		no.	1
Disposal pit for infectious waste		no.	1
Monitoring well		no.	1

### c.2 Low permeability of bottom layer

The bottom layer must be enough low permeable in order to protect groundwater from infiltration of leachate into the ground. However, the provision of artificial liner is always the largest conflict in the construction cost. The best solution is, therefore, the full utilization of the natural condition. In order to examine whether natural ground can be utilized for the low permeable layer for the landfill site, the geological survey was conducted at the site in October 2002 in the Study. The result of geological survey is as follows.

- 1) The upper strata above 1.0 to 3.7 metres below the ground are clay soil and weathered rock. Its permeability is about  $10^{-5}$  to  $10^{-6}$  cm/sec.
- 2) The lower strata below 1.0 to 3.7 metres below the ground is a bedrock strata which has sufficient low permeability.

Although the soil material of upper strata satisfy the required permeability of the landfill site, more reliable lower strata, rock mass, will be used as the impermeable layer for the landfill site.

In addition, as the geological survey recommended, wherever joints/discontinuities are found on rock mass during the excavation for the leachate collection pipe laying work, the clay will be filled into them and they will be covered by cement mortar in order to ensure it impermeable.

In order to utilize the lower strata as the low permeable layer, the leachate treatment facility is constructed at the lowest point of the landfill disposal area in order to block all leachate flow and to introduce it to the leachate collection pipe.

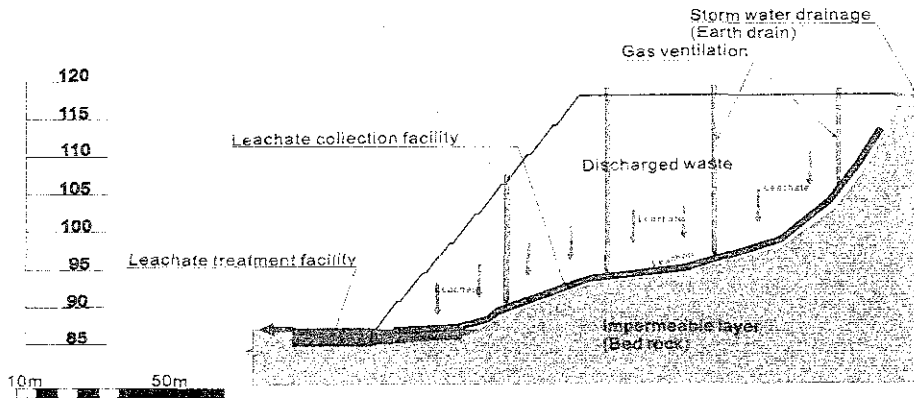


Figure 5-12: Leachate Treatment Facility for Blocking Leachate

**c.3 Leachate collection pipe network**

The leachate collection pipe network was installed to achieve the following purposes.

- 1) To collect and to introduce leachate generate in the site to the leachate treatment facility.
- 2) To naturally supply air into the inside of landfill to accelerate the waste decomposition process.

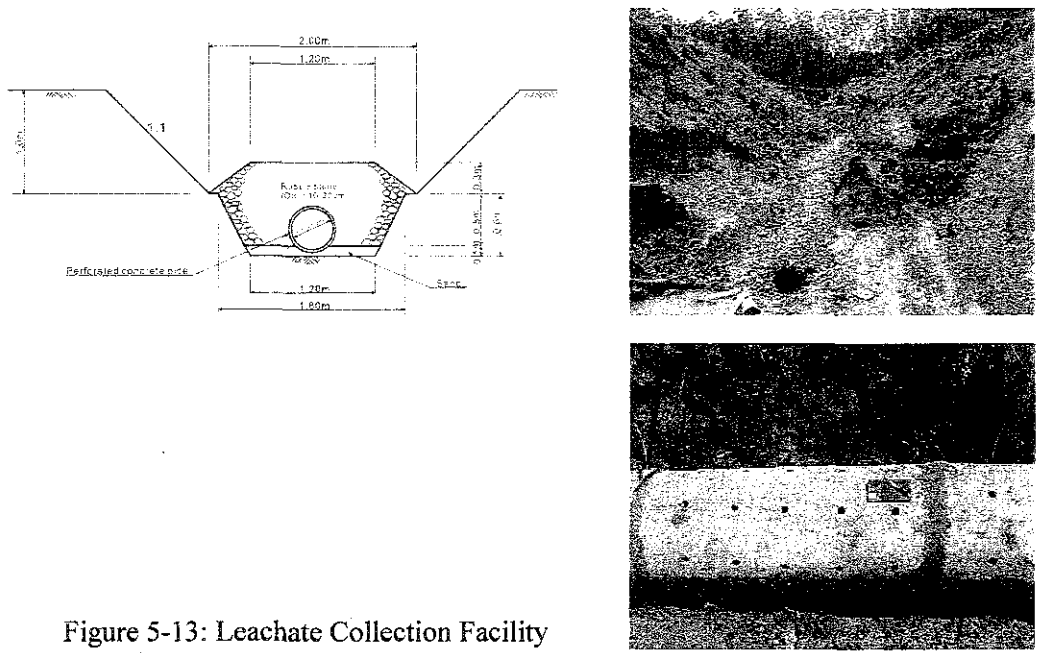


Figure 5-13: Leachate Collection Facility

#### c.4 Leachate Treatment process

The selection of the most suitable leachate treatment system for the site was very important in the project planning because there were many available systems which have different advantages and disadvantages. The following three points were mainly considered in the selection of the system.

- Required area
- Required technical skill for the operation
- Required operation and maintenance cost

Table 5-4 showing the comparison of the suitability of five common methods for the site resulted that the combine system which consist of coconuts fibre biological conductor, charcoal filter and wet land was the most suitable for this site.

Final treated effluent is discharged to the perennial stream through wet land.

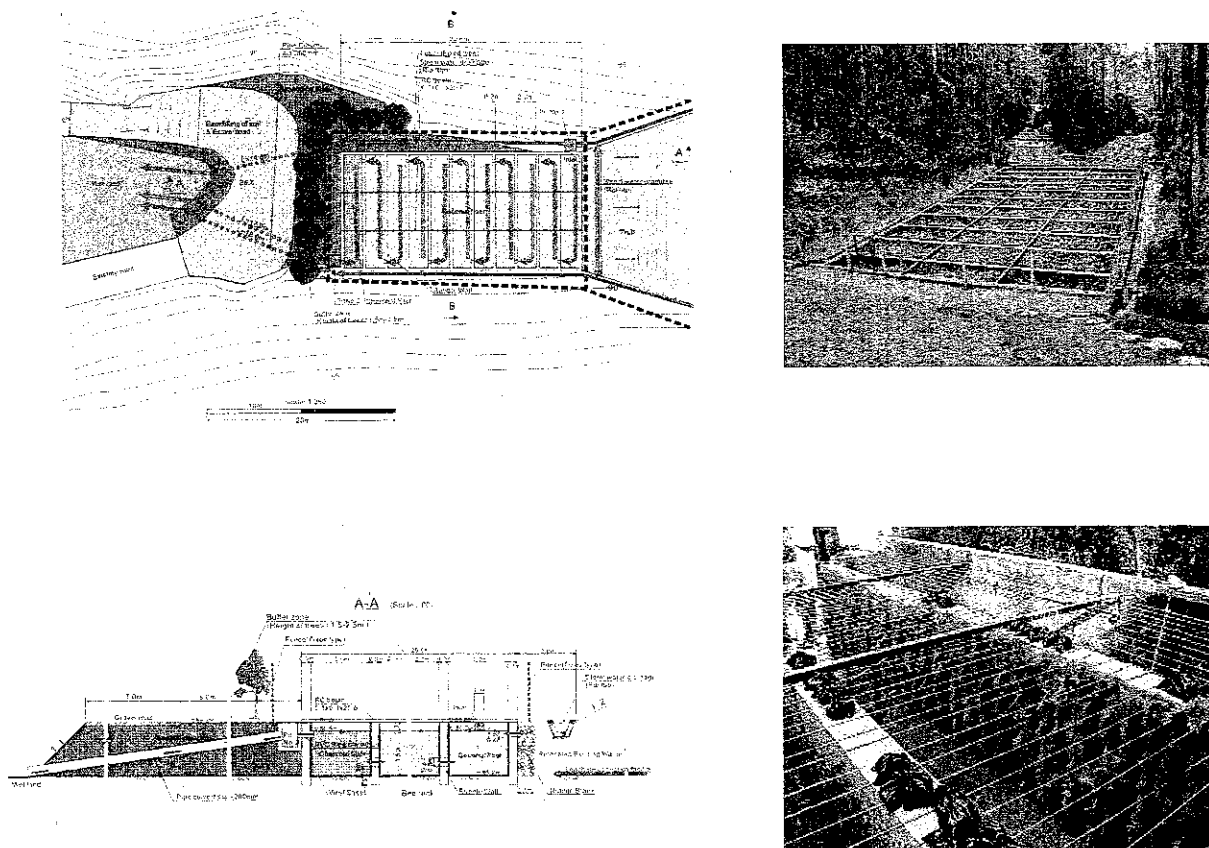


Figure 5-14: Leachate Treatment Facility



Table 5-4: Comparison of Leachate Treatment Methods for the Moon Plains landfill site

	Activated Sludge system	Aerobic Pond Systems	Rotating Biological Contactor System	Recirculation System	Combine system which consist of coconuts fibre biological conductor, charcoal filter and wet land
Description	The activated process is a continuous-flow, aerobic biological process for the treatment of domestic and biodegradable industrial wastewaters. The process provides a high-quality effluent and is characterized by the suspension of microorganisms, which are maintained in a relatively homogeneous state with the wastewater by mixing induced by the aeration system. The overall treatment process will include preliminary, and often primary, treatment before the aeration basin(s). The mixed liquor is discharged to a secondary clarifier where the microorganisms settle out and are recycled to the aeration basin. Excess sludge is piped to separate sludge-handling processes. The clarifier overflow proceeds to disinfection and final discharge or to supplemental treatment, if required.	Historically, aerobic wastewater stabilization pond systems have been a principal biological treatment method for a variety of wastewaters ranging from residential domestic to complex industrial. They may be used alone or in combination with other treatment processes. The advent of aeration via mechanical sources added yet a broader use of pond systems.  The three principle types of aerobic ponds are 1. Aerobic 2. Facultative 3. Aerated Furthermore, pond systems are characterized hydraulically as discharge, controlled discharge or retention (no discharge to surface waters).	A rotating biological contactor (RBC) is an attached-growth process wherein the media are rotated through a basin of wastewater. The microorganisms are attached to large-diameter synthetic mounted on a horizontal shaft and placed at about 40% submergence in a contoured-bottom tank. Generally, the media are some 10 to 12 ft (3-3.5 m) in diameter and rotate at a peripheral velocity of 60 ft/min (0.3 m/s). The preferred temperature range for an RBC system is 55 to 90°F (13 to 32°C). Thus, in colder climates the units are enclosed for climatic control.	The process of recirculation is as follows. 1. Leachate collection by perforated pipe at the landfill site 2. Retention of leachate at a pond 3. Pumping up leachate for landfill site 4. Distribution of leachate at the landfill site The leachate is treated by contacting with waste and evaporated through the recirculation process. Advantages: 1. The process of landfill stabilisation is accelerated 2. The constituents of the leachate are attenuated by biological, chemical and physical changes occurring with the landfill. Disadvantages: 1. Not applicable for the area having low evaporation 2. Poor operation makes the disposal area muddy and inaccessible.	The coconut fibre biological contactor system is a continuous-flow, Anaerobic biological process for the treatment of domestic and biodegradable industrial wastewaters. The system is introduced by the Rubber Research Institute of Sri Lanka for rubber effluent treatment but applicable to any biodegradable wastewater. The special arrangement of Coconut fibre is called Bio-Brush that gives the structural stability to hold the thrust of biomass accumulation and gas formation on surface of fibre, leaving enough void space for releasing gas and mixing of hydraulic flow. To increase the overall efficiency of the treatment system, the treated wastewater is further purified through a Charcoal filter followed by a Constructed Wetland. The system operates with gravity flow without any moving parts consequently minimum maintenance requirement.
Required technical skill for operation	High degree of technical skill required.	A simple technical skill required.	A simple technical skill is required.	A simple technical skill is required.	A simple technical skill required.
O&M cost	Very expensive	Cheap	Expensive	Cheap	Cheap
Area for leachate treatment facility	Enough for the facility. The area for the facility of activated sludge system is required less than 250m <sup>2</sup> which can be available.	Not enough for the facility. The area for the facility of activated sludge system is required more than 250m <sup>2</sup> which can be available.	Enough for the facility. The area for the facility of activated sludge system is required less than 250m <sup>2</sup> which can be available.	Enough for the facility. The area for the facility of activated sludge system is required less than 250m <sup>2</sup> which can be available.	Enough for the facility. The area for the facility of the system is required less than 250m <sup>2</sup> which can be available.
Evaluation of treatment	It is too difficult for Nuwara Eliya MC to operate the treatment facility with a high degree of technical skill. In addition the required O&M cost is too expensive	The area for treatment facility at the Moon Plains landfill site is not enough for the facility of aerobic pond system	It is difficult for Nuwara Eliya MC to maintain the treatment facility because rotated disk can not obtained in Sri Lanka, when it is required to replace.	Recirculation system is not suitable at Nuwara Eliya due to quite low evaporation and high precipitation.	The operation technology is simple and cheap. Therefore it is easy to operate and maintained the system with locally available materials and technical knowledge.
Result	Not suitable	Not suitable	Not suitable	Not suitable	Very suitable

### c.5 Bench (terrace)

The purpose of bench was as follows.

- 1) To protect the slope by intercepting runoff water flowing on the slope.
- 2) To provide the enough space for the interceptor drain on berms.
- 3) To provide the enough working space for the slope maintenance.
- 4) To keep the waste filling slope stable.

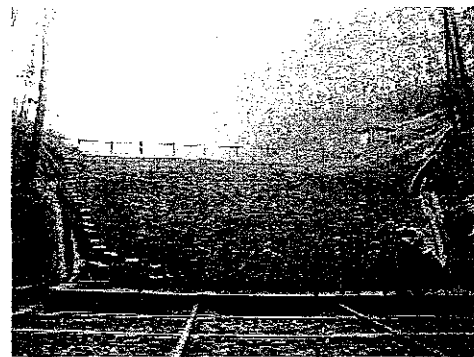
The bench plan was as follows.

- Every 4 meters in height.
- 2 meters in bench width.

### c.6 Turfing

The outside of slope of the waste filling was turfed for the following purposes.

- 1) Protection of the slope from erosion by runoff water.
- 2) Maintenance of the good view.



### c.7 Fence (movable type)

The movable fence was placed depending on the landfill operation for prevention of waste scattered to outside of the site.

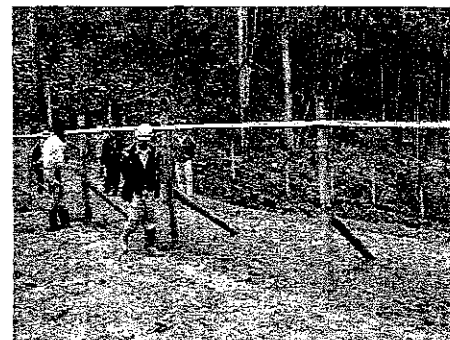
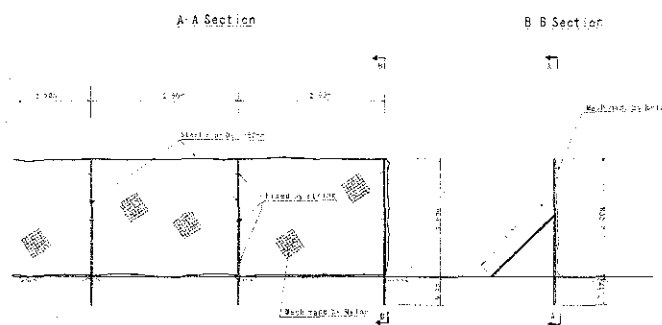


Figure 5-15: Fence (movable type)

### c.8 Storm water Drain

The storm water drain was installed for the following purposes.

- 1) Minimization of leachate generation amount by intercepting runoff water into the site.
- 2) Maintenance of access road
- 3) Provision of a guide for the landfill slope.

The earth drain was provided along the access road to intercept all runoff from the outside of the access road.

Riprap lined drain was provided along the slope of the waste filling area.

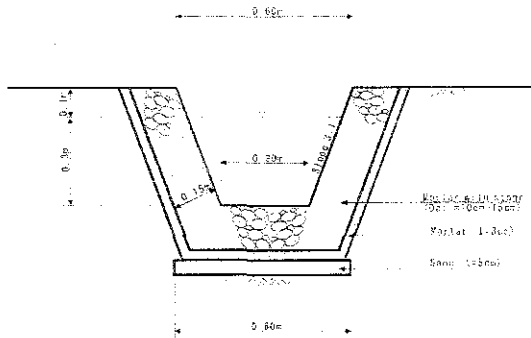


Figure 5-16: Riprap Lined Storm water Drain

### c.9 Gas Ventilating Facility

The gas ventilating facility was provided for the following purposes.

- 1) Exhaust landfill gas generated in the landfilled waste to minimize the risk of gas explosion
- 2) Acceleration of waste decomposition process with supplying air into the landfilled waste through gas ventilating facility (semi-aerobic type)

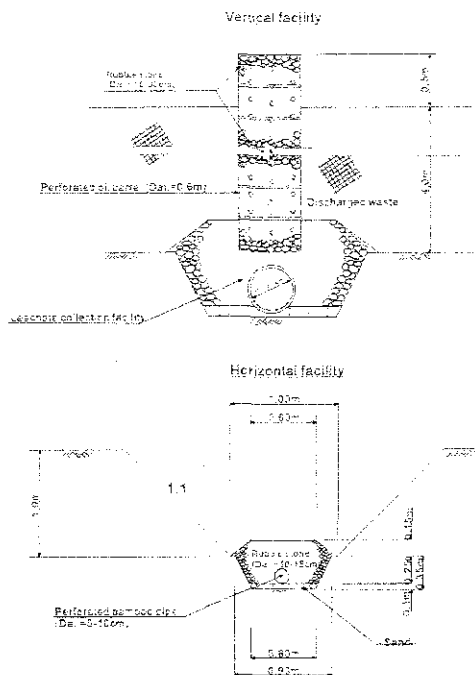


Figure 5-17: Gas Venting Facility

**c.10 Disposal Pit for Healthcare Waste**

The disposal pit for healthcare waste was constructed separately. It receives the following wastes which require special care for handling.

- Syringes
- Medical tools and goods which contacted blood

The disposal pit was completely surrounded by a gate and a fence to ensure nobody except the landfill staff can enter.

In order to avoid the leachate generation from healthcare waste, the following facilities to avoid the entry of runoff water into the site was provided.

- 1) A roof to cover the whole disposal pit
- 2) Drain surrounding the whole disposal pit to intercept the runoff water.

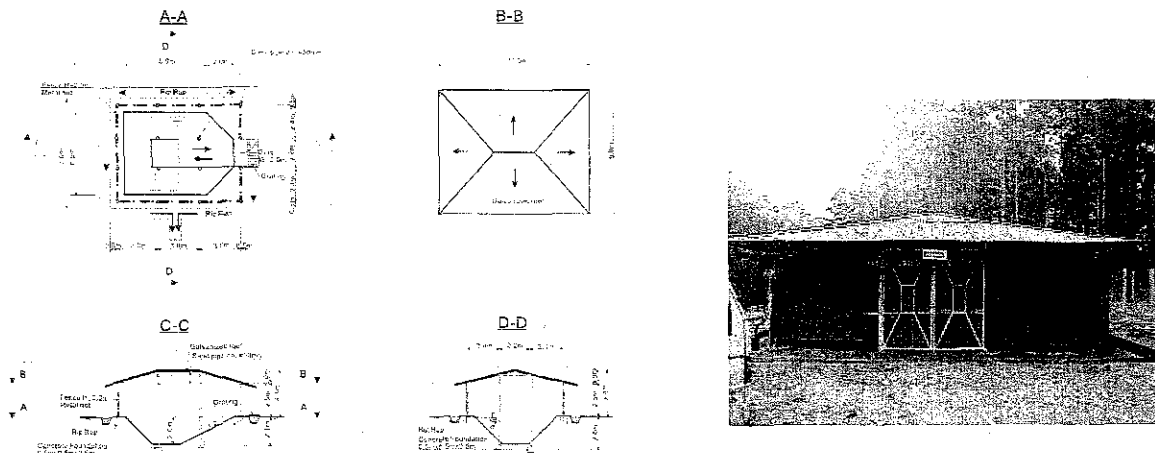


Figure 5-18: Disposal Pit for Healthcare Waste

**c.11 Tire Wash Pit**

Tire of collection vehicle is washed in order to prevent litter the waste or mud, attached to the collection vehicle.

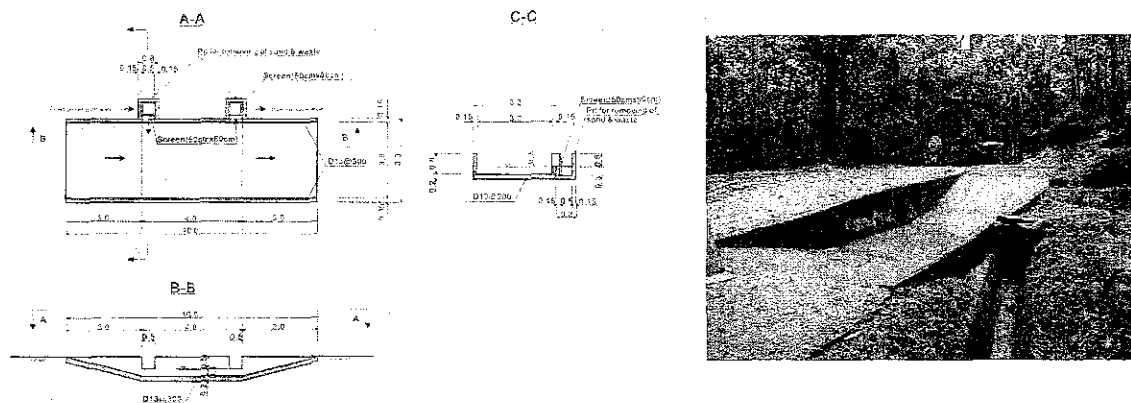


Figure 5-19: Tire Wash Pit

**c.12 Gully suck treatment facility**

The gully sucker treatment facility was constructed separately. It receives the gully suck comes from Nuwara Eliya town periodically.

The gully suck treatment facility consists of sedimentation tanks and the coconuts fibre biological conductor. Final treated effluent is discharged to the perennial stream through storm water drainage and wet land.

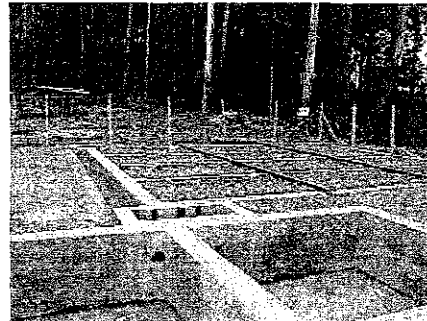
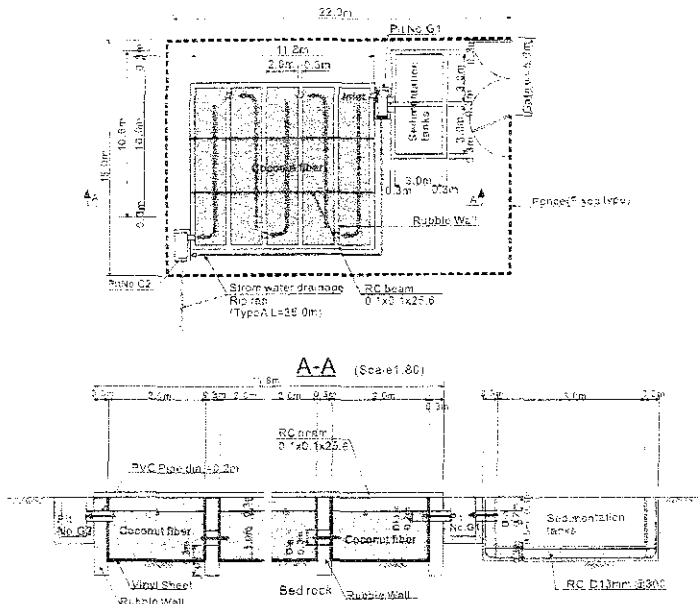


Figure 5-20: Gully suck treatment facility

**c.13 Administrative Facilities**

- 1) A site office was built to provide a proper space for administrative work, rest space, and sanitary facility for employees in the landfill site.
- 2) A store house was built to keep tools, materials, safety goods, etc.
- 3) A garage for a bulldozer was built to secure and to protect a bulldozer.

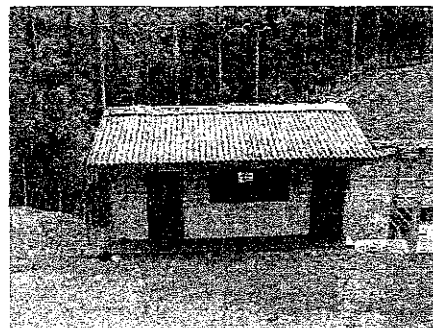
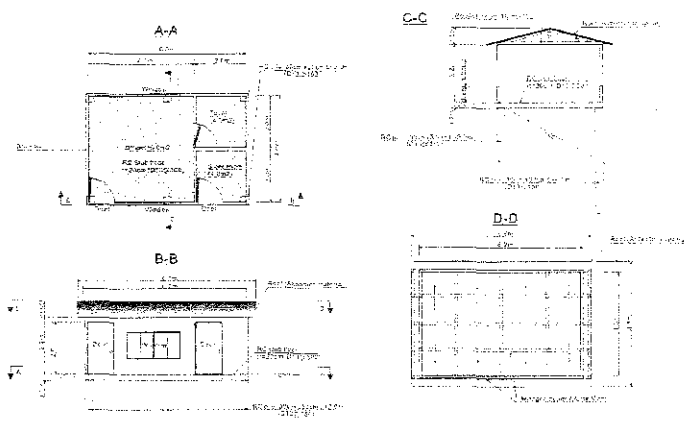


Figure 5-21: Administrative Facilities

**c.14 Education Facility for Sanitary Landfill Method**

The education facility to teach the sanitary landfill method to visitors was installed, because this landfill site is the model sanitary landfill site.

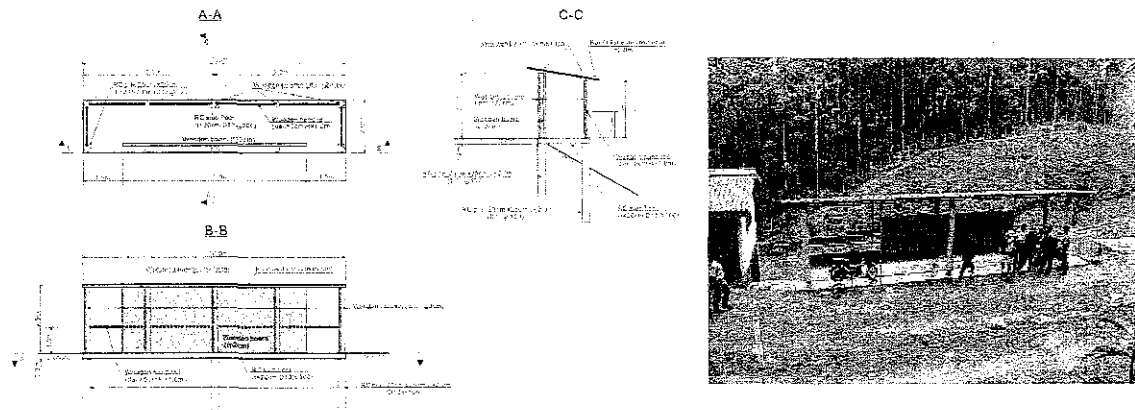


Figure 5-22: Education Facility for Sanitary Landfill Method

**c.15 Security facilities**

A gate and fences were constructed to control the entry to the site. Fences functions as the waste scattering net as well.

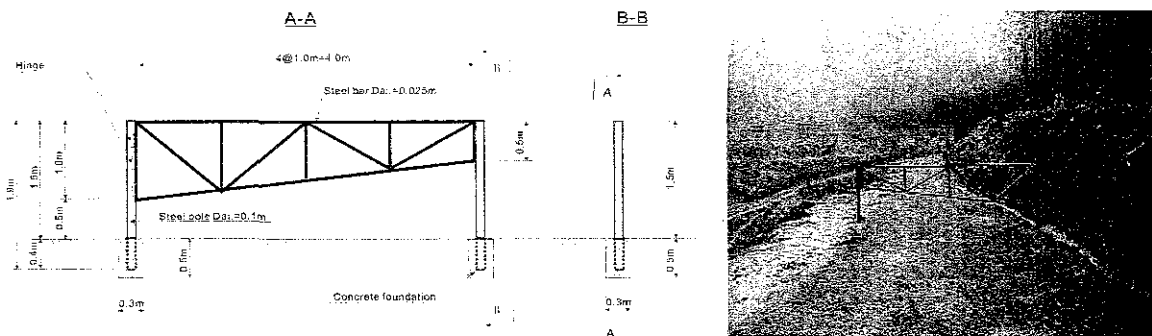


Figure 5-23: Gate

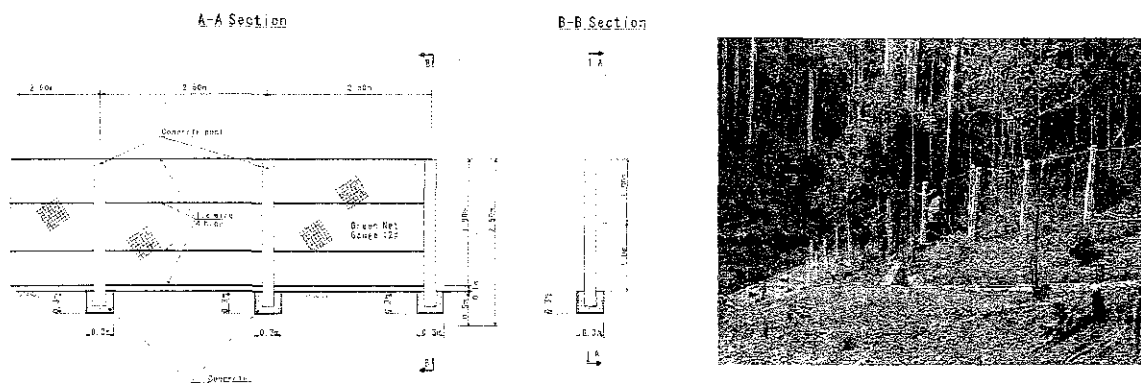


Figure 5-24: Fence (fixed type)

**Safety facility**

Handrails was provided to protect people from falling down from the top of slope to the disposal area.

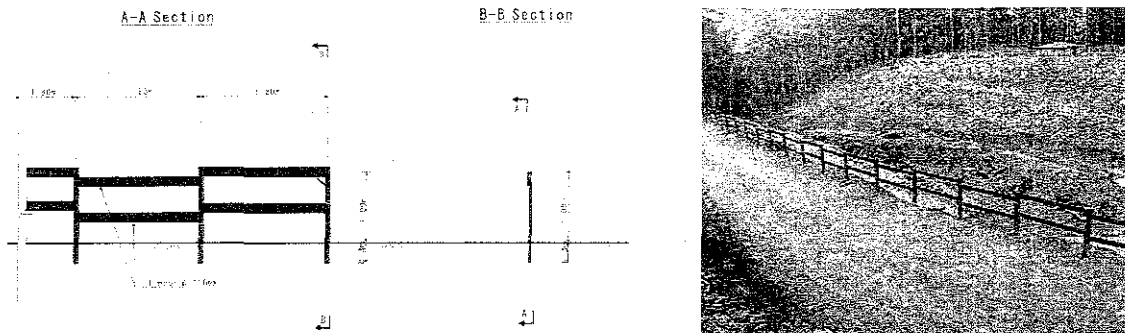


Figure 5-25: Handrail

**c.16 Access road**

Provision of a good access road is very important for landfilling operation because many waste collection vehicles have to access to a disposal area even on wet days..

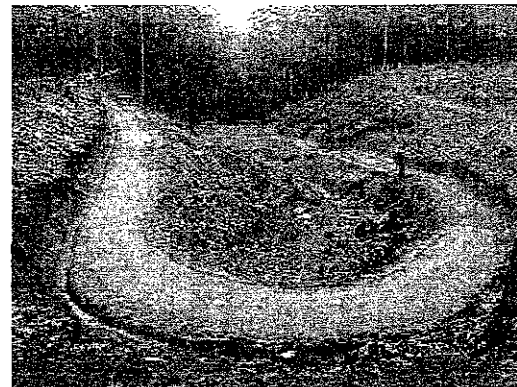
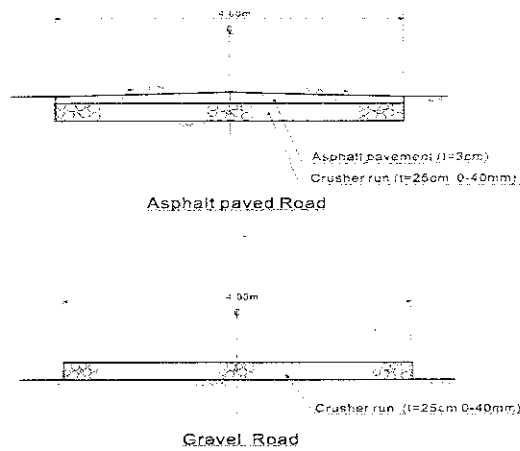


Figure 5-26: Typical Cross Section of Access Road

## 5.2.4 Establishment of the necessary public consideration and monitoring system for operation of the sanitary landfill site

The monitoring committee was established for the following purpose.

- to ensure the landfill operation in compliance with the method stated in the landfill operation manual.
- to keep the transparency of the landfill operation.

The monitoring committee holds meeting periodically and makes the monitoring results available to the public.

### a. Proposed member of the monitoring committee

The proposed monitoring committee members are as follows.

Table 5-5: Proposed Monitoring Committee Members

Position	Eligibility
Chairman	Chairman of the health committee
Member 1	a municipal council member elected from the ward near the landfill site
Member 2	a municipal council staff in Health Department
Member 3	a municipal council staff in Works Department
Member 4, 5	representatives of neighbourhoods
Member 6	a Central Environmental Authority staff
Member 7	a staff in local environmental NGO

### b. Monitoring frequency

Period	Frequency
<b>Before the construction</b> The first monitoring will be executed before the commencement of the construction work in order to understand and to keep record the original condition.	1 time
<b>During the first six months</b>	every month
<b>After six months</b> If the monitoring committee judges that the monthly monitoring is not necessary, the monitoring frequency will be reduced after the six months landfill operation. However, the monitoring has to be done at least every three months.	every three months

### c. Monitoring check list

The Study Team prepared the check list of the monitoring for the landfill operation. The monitoring committee shall execute according to the monitoring check list.



Table 5-6: Draft Check List for the Landfill Operation

Check list Monitoring Committee for the Moon Plains Landfill Site					Date:		
					Time:		
<b>Category A: Environmental effect (Before and after construction)</b>							
No	Items	Acceptable	Medium	Terrible	Score	Notes	
A1.	Fire & Smoking	0	1	2			
A2.	Offensive dour	0	1	2			
A3.	Waste water	0	1	2			
A4.	Withering of trees caused by discharged waste	0	1	2			
A5.	Waste scattering	0	1	2			
A6.	Animals (Dogs, monkeys, birds etc.)	0	1	2			
A7.	Vermin (Flies etc.)	0	1	2			
A8.	View	0	1	2			
A9.	Entry of scavenger (If no scavenger is the site : select "0" )	0	-	2			
Total of Category A							
<b>Category B : Function of facilities (After finishing of construction)</b>							
No	Items	Functioning	Medium	No functioning	Score	Notes	
B1.	Drainage system						
	B1-1.Rip pap	0	1	2			
	B1-2.Earth drain	0	1	2			
B2.	Leachate collection & treatment system	0	1	2			
B3.	Gas ventilation system	0	1	2			
B4.	Discharge pit for the health care	0	1	2			
B5.	Gully suck treatment facility	0	1	2			
B6.	Access road						
	B6-1.Asphalt road	0	1	2			
	B6-2.Gravel road	0	1	2			
B7.	Tire wash pit	0	1	2			
B8.	Security facilities						
	B8-1.Gate	0	1	2			
	B8-2.Fence	0	1	2			
	B8-3.Guardrail	0	1	2			
B9.	Waste scattering prevention net fence	0	1	2			
B10.	Turffing	0	1	2			
Total of Category B							
Comment:							
Name & Signature							

## 5.2.5 Assessment of the Projects

### a. Improvement of Nuwara Eliya Moon Plain landfill site in Nuwara Eliya

The following effects have been observed since improvement of the landfill site:

- There is no fire or smoke caused by discharged waste at the landfill site. No plantation trees are damaged by smoke and fire.
- There is little offensive odour.
- There are few pests such as flies and mosquitoes.
- There are few stray dogs, monkeys and crows.
- There is little scattered waste.
- There has been a decrease in the generation of leachate.
- The landscape has improved.
- The collection vehicles can easily approach the dumping area due to the paving of the access road.
- The citizens take an interest in the operation of the landfill site because of the establishment of the monitoring committee.

The facilities of Moon Plain sanitary landfill site are designed very simply and made from cheap material which is available domestically. Therefore, Nuwara Eliya Municipal Council can easily operate and maintain it without any high technology or expensive operational costs.

Many elementary school students have visited Moon Plain landfill site under the program for environmental education since starting operations in November 2003. Moreover, other neighboring local authorities have also visited the site to see the facilities of the sanitary landfill. Moon Plain landfill site is performing most effectively as a model sanitary landfill site in Sri Lanka.