STORM AND WASTE WATER MANAGEMENT PLAN FOR MKABELA POULTRY

1. INTRODUCTION

One such proposed partnership is the establishment by Mkabela Poultry of one additional rearing house on The site "Waterval Farm " Waterval East Farm :Registered T 9085 / 2000: Portion 10 of the farm Waterval No. 987 in Extent 36.6416 hectares

Generally poultry farms require simple infrastructure. The poultry houses are fenced within a biosecure area. Security offices and ablution facilities for the workers are located within the biosecure area. Road access is imperative as feed is imported into the biosecure area and the birds, once fully developed, are captured and transported out of the area.

This storm and waste water management plan forms part of a Basis Assessment for the development of the poultry farm which has been compiled by Green Door Environmental.

Considering the basic infrastructure of the proposed poultry farm, this management plan addresses the following :-

- The management and safe disposal of waste water from the ablution facilities (grey water)
- The management and safe disposal of sewerage from the toilet facilities on site
- The separation of wash water areas from clean storm water runoff areas
- The containment and management of the wash water run off
- The management of clean storm water runoff from the farm

2. DESCRIPTION OF THE FARM AND ITS SURROUNDINGS

Portion 10 of the farm Waterval No. 987 comprises land which has already been cultivated under Forest and which contains a poultry site with two existing poultry houses. It slopes generally in a northerly direction towards the main road.

The proposed area slopes at gently from an existing farm access road west of the main farm buildings to the lowest part of the property.

The area is well maintained and no signs of erosion were noted.

The location is : 29 Deg 25'57.67 S & 30 Deg 37'01.82 E

Figure 1 - Aerial view of proposed development area (source: Google Earth)

Layout of the proposed Unit

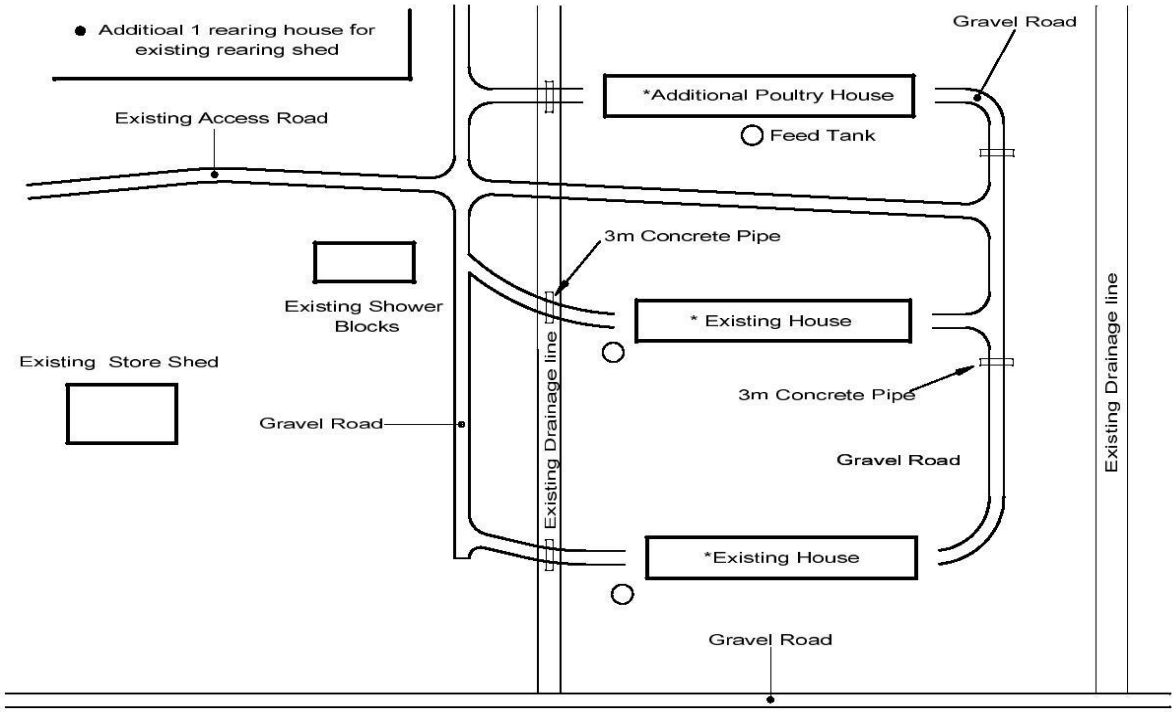


Figure 2 - View looking westwards wards from the proposed development area

Figure 3 - View looking Eastwards towards the main Road

3. THE PROPOSED DEVELOPMENT AND ITS IMPACTS

It is proposed that one additional poultry rearing house will be built alongside two poultry existing rearing houses . The additional poultry house will have an internal plan area of 120m long and 18m wide. The poultry house will be established on existing grassed property as shown in the proposed farm layout in Appendix C.

The following specific information is applicable to the development :-

3.1 Applicable development information

- The internal dimension of a poultry house is 120meters long by 18 meters wide.
- Each poultry house will be constructed on a level platform which is 140 meters long by 25 meters wide.
- The platform level will be adjusted to conform with the topography of the property.
- The additional roof area of the poultry house will be 2160 m². The combined roofed area for 3 houses is thus 0.360ha.
- The total area which is currently under cane is of the order of 30 ha

3.2 Road access to and with the poultry farm

- The existing gravel access off the main road will be upgraded to the entrance of the bio secure area
- New gravel roads will be constructed with in the bio secure area in order to facilitate access to the poultry house.

3.3 Waste water streams – sewerage and grey water

A security office and ablution facilities is located at the main access to the biosecure area.

The ablution facilities consist of:-

- showers 2 No (1 male and 1 female)
- 2 toilets and urinals for male workers
- 2 toilets for female workers
- 4 wash hand basins

Waste water flows from the ablution facilities (combination of grey water and sewerage) are at maximum 1000 liters per day. The grey water and sewerage is discharged via septic tank system

Refer to Appendix E for the sizing of the septic tank and associated evapo-transpiration area and the location of these facilities in Appendix C .

3.4 Wash water

- The poultry rearing houses are cleared out every 22 weeks and washed.
- 10000 litres of water are used to wash the inside of a poultry house once the solid waste has been removed.
- The wash water is separated at source (inlets within the poultry house) and piped via a separate waste water system to a settling chamber and containment facility where the solids will be removed from the wash water and the wash water will be allowed to evaporate.

Refer to appendix D for the sizing of the settling chamber and the containment facility.

4. DETAILS OF THE PROPOSED STORM AND WASH WATER INFRASTRUCTURE

4.1 Design principles – storm water

The basis of the design principle for storm water management infrastructure is as follows:-

1. All storm water from a 1 hour storm event with a 2 year Recurrence Interval (RI) falling on the roads surfaces will be retained/allowed to infiltrate on site
2. Infrastructure will be designed so as to ensure the post upgrade run off from a 24 hour storm event with a R l of 10 years will not be greater than the predevelopment level.
3. Post development infrastructure should minimize flood damage downstream from the farm for 50 year RI storms and prevent all flood damage for storms of lesser RI
4. All wash water (grey water) from the existing and new poultry houses will be separated at source and managed separately from the storm water runoff.

4.2 Design calculations

Please refer to appendix A, B and C for the proposed layout of the farm as well all the relevant design calculations.

4.3 Storm water management plan

1. *All storm water from a 1 (M60) hour storm event with a 2 year Recurrence Interval (RI) falling on the roads surfaces will be retained on site*.

   Ensure that all the new gravel roads on site have side drains at maximum 25 meter intervals. The access road is essentially a ring road and the fall on the ring road should be to the outside of the ring i.e away from the poultry farm. The side drains will then discharge the run off into existing vegetated land where the run off infiltrate into the existing soils.

2. *The post development out flow from a 24 hour storm event with a R l of 10 years shall not be greater than the predevelopment level*.

Construct large (3 meter wide) grassed drains which fall at slopes less than 1% towards the western boundaries of the bio secure area. Run off from the roofs will then flow from the concrete apron perimeter around the house and into the drains. The drains will direct the flow to the boundary where the run off will flow into a catchpit and then will be conveyed to the Eastern boundary via concrete pipe (250mm and finally a 4500mm pipe). The 450mm pipe will discharge onto a series of rock filled Reno Mattresses and into an existing natural drainage channel (which currently accepts all the run off from the area).

3. *Post development infrastructure should minimize flood damage down stream from the farm for 50 Recurrence Interval (RI) storms and prevent all flood damage for storms of lesser RI.*

   All storm water from roads will be directed into the cultivated areas to the east and west of the development. These area must be contoured so as to protect the areas from erosion during significant rain fall events.

   The run off from the roofs and grassed area within the bio secure area will be attenuated by the grassed drains and will then flow into and existing natural drainage channel. The existing natural drainage channel has to date not suffered any serious erosion or scouring and with the provision of rock filled mattresses at the discharge point significant damage is not expected during significant 50 year RI storms.

4. *All wash water (grey water) from the existing and new poultry houses will be separated at source and managed separately from the storm water run off.*

   All wash water will be separated at source and piped via dedicated infrastructure to a separate containment dam (see appendix D for sizing of containment dam) via a settling chamber. The wash water will not be allowed to mix with the storm water.

4.4 Wash water management

4.5 Design principles

The following design principles will be used to size and design the grey water pipe work and containment facility:-

1. Containment dam to be sized based on
   a. Minimum volume of the dam to be = number of poultry houses connected to the facility x $10m^3$
   b. Area of the dam to be set to achieve maximum evaporation
   c. Freeboard to be set such that there is no overflow during the lowest month of evaporation[1] and a storm event occurs with a RI of 10 years and duration of 24 hours.
2. 80% of the suspended solids to be removed by means of a settling tank positioned prior to the containment dam.
3. Containment dam to be placed above the 1:50 year flood contour.
4. Pipe work to be in accordance with SABS 0400-P

[1] Evaporation figures taken from SASRI weather station at Bruyns Hill

4.6 Infrastructure requirements

1. A dam will be provided for the single poultry house and located as per the drawing shown in appendix C. The dam will be sized to accommodate wash water from 3 houses.
2. The dams will be lined with a 1.5mm thick HDPE liner
3. Catchpits (2 No. per poultry house) located within the poultry house will allow cleaners to sweep wash water into the wash water system.
4. The pipes will be laid at a minimum slope of 1/50 (minimum diameter to be 200mm) so as to enable self cleaning velocities to be generated.

4.6.1 Containment dam size

The size of the containment dam for the propose poultry houses is as follows:-

- The plan area of the containment facility shall be a minimum of 400 m^2- plan area to be 20x20 meters
- The minimum height of the embankment surrounding the containment dam shall be 800mm
- The dam shall be lined with a 1.5mm HDPE liner and the base cover with 100mm of 19mm stone aggregate.

5. DISPOSAL OF SEWERAGE AND GREYWATER

Sewerage and grey water is disposed of through a septic tank and associated evapo-transpiration area. These are be located outside the biosecure area and upslope of cultivated lands.

Refer to Appendix E for the relevant calculations for the sizing of the septic tank and associated evapotranspiration area.

- Septic tank size - 5 x 1.5x 0.6 (depth x width x depth)
- Evapo-transpiration area – 445 m^2

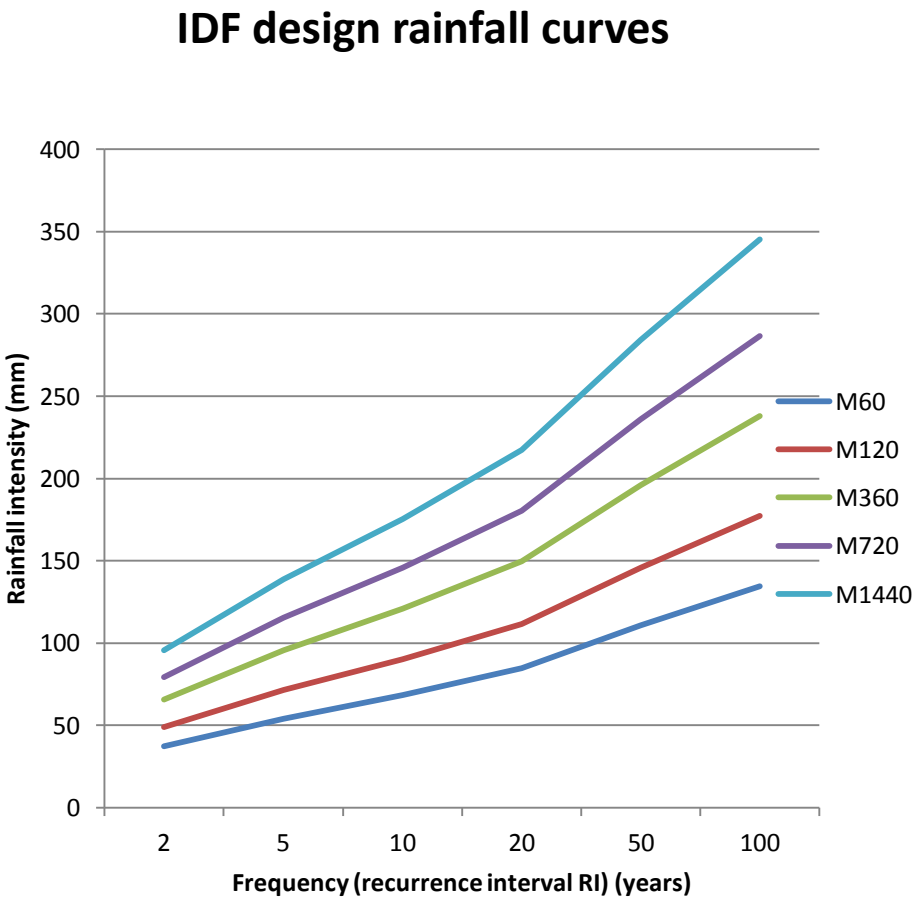
Refer to layout in Appendix C for the location of the septic tank and evapo-transpiration area.

6. Appendix A

6.1 AVAILABLE HYDROLOGICAL INFORMATION

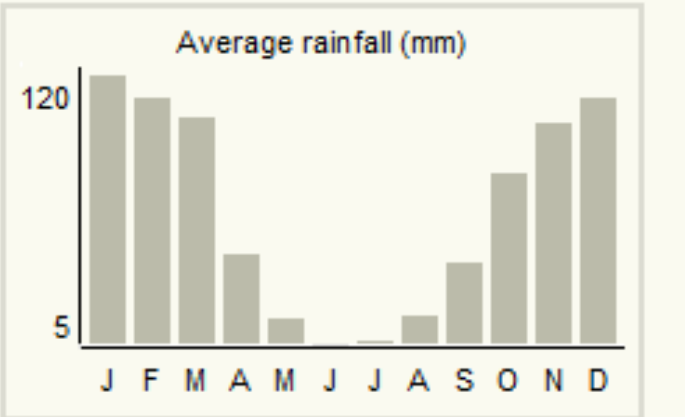
6.1.1 Design rainfall

The following Intensity, duration frequency curves (IDF) will be used. The curves have been determined by the University of Natal based on rain fall records for closest area to the farm.



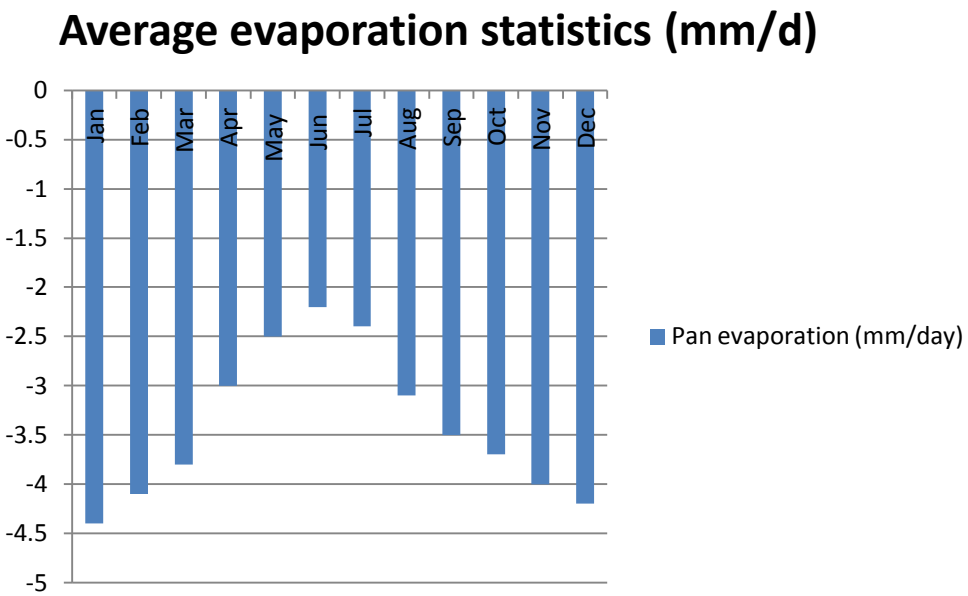
6.2 Rainfall statistics

The following rainfall statistics have been obtained from the SASRI weather station located at Josephine Bridge:-



6.3 S Pan evaporation statistics

The following evaporation statistics have been obtained from the SASRI weather station at Josephine Bridge :-



7. Appendix B

7.1 Relevant run off calculations

Peak run - off calculations

The Rational Method will be used to estimate the peak run off as follows:-

Q={CxIxA}/360 m3/sec

Where C = Run off coefficient
I = Rainfall intensity for a particular Recurrence interval
A= Catchment area

Run off coefficients

The run off coefficients will be calculated using the method as proposed by the DWAF as follows:-

Predevelopment run off Coefficient			**Post development run off coefficient**		
Steepness Slope (Cs)	%		Lawn sandy <2%		0.08
<3%	20	0.05	Lawn sandy> 7%		0.18
3-10%	80	0.11	Lawn heavy<2%	5	0.15
10-30%		0.2	Lawn heavy>7%	65	0.3
Cs	100	0.10	Residential single		0.4
Permeability (Cp)			Flats		0.6
Very perm (dunes)		0.05	Industry light		0.65
Perm (light soil)	50	0.1	Industry heavy		0.7
Semi (most soils)	50	0.2	Business local		0.6
Impermeable (rock, paving)		0.3	Roads/roofs	30	0.95
Cp	100	0.15		100	
Vegetable growth					

Dense bush		0.05			
Cult land	100	0.15			
Grassland		0.25			
Bare Surfaces		0.3			
Cv	100	0.15			
Ct (predev)		0.40	Ct (postdev)		0.49

Area calculations

	Area (ha)
Total area of catchment pre development	10
Total roofed area post development	0.75
Total impervious roads post development	0.15
Post development drainage area less roads	9.85

Pre-development flows Q (pre dev) m3/s

	Return interval			
Duration	2	10	20	50
1	0.51	0.733	0.77	0.898
12	0.75	1.30	1.35	1.73
24	1.46	1.49	1.53	1.86

Post development flows Q (post dev) m3/s

Roads

	Return interval			
Duration	2	10	20	50
1	0.02	0.03	0.04	0.05
12	0.03	0.06	0.08	0.11
24	0.04	0.07	0.09	0.12

Roofs and drainage area

	Return interval			
Duration	2	10	20	50
1	0.80	1.46	1.81	2.37
12	1.52	2.78	3.45	4.51
24	1.77	3.26	4.04	5.28

Quantity of runoff to be captured from roads		0.46	m3
Maximum flow post development		1.486	m3/s
Post development flow without roads		1.426	m3/s
Flow to be attenuated	246m³		

Position of new Unit

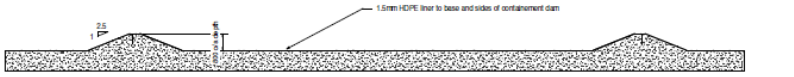
8. Appendix D

8.1 Containment dam sizing for 4 poultry houses

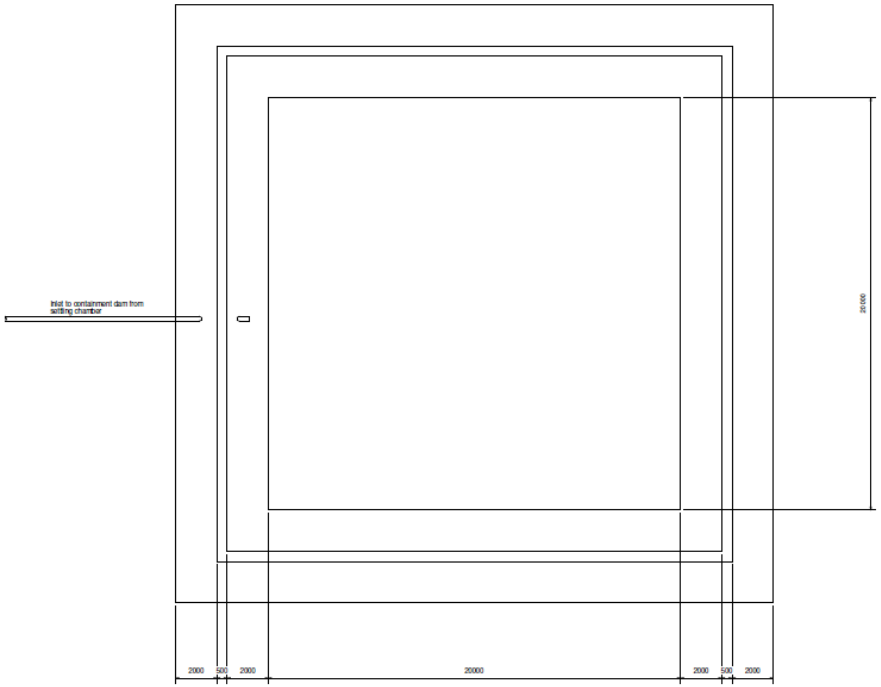
Wash Water Dam sizing

Number of houses	1											
Period between cleans	280											
Wash water per house	10											
Set area of dam	200											
Set depth of dam	0.8											
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days in month	31	28	31	30	31	30	31	31	30	31	30	31
	31	59	90	120	151	181	212	243	273	304	334	365
	0	40	80	120	160	200	240	280	320	360	400	440
Pan evaporation (mm/day)	-4.4	-4.1	-3.8	-3	-2.5	-2.2	-2.4	-3.1	-3.5	-3.7	-4	-4.2
Inflow to dam	0	40	40	0	40	0	40	0	40	0	40	0
Evaporation	-54.56	-45.92	-47.12	-36	-31	-26.4	-29.76	-38.44	-42	-45.88	-48	-52.08
Cumulative volume	0	74.08	192.88	84	89	93.6	90.24	81.56	78	74.12	72	67.92
Rain fall	116.6	80.7	64	46.3	18.2	20.6	29.8	33.1	40.2	67.7	96.6	106.4
Freeboard	0.8	0.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8

8.2 Typical containment dam

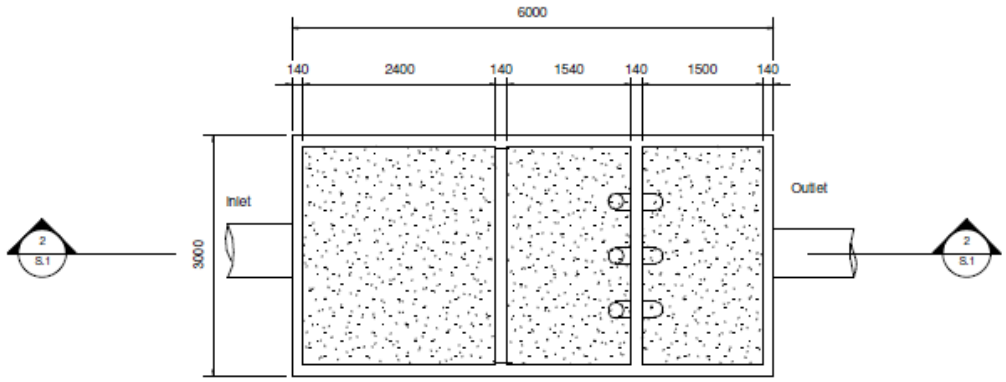


Typical section

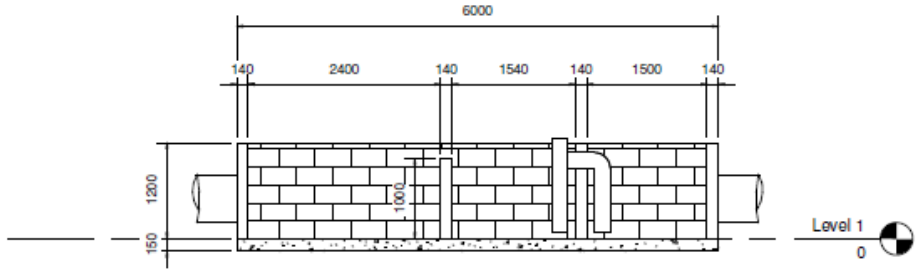


Plan on containment dam

8.3 Typical settling chamber



1 Plan on settling chamber
1 : 50



2 Typical section
1 : 50

9. Appendix E

9.1 Septic tank and evapotranspiration area calculations

Septic tank size calculations

Percolation rate	100	l/m2/d
Effluent loading	1000	l/d
Area of wetted side	4.5	m2
Depth	1.5	
Length	5	
Width	0.6	

Evapotranspiration area calculations

Ar=[FcxFdxEt]/e

Evaportranspiration rate e	2.2
Terraine concerntration	1
Depth infiltration	0.8

Ar = 226 m2