

## 2. Development of Technical Option

### 2.1 Unit Price of Collection Vehicles

Item	Type	Unit Price (Ksh)
Compactor	8 m <sup>3</sup> (4t)	6,000,000
Container	8 m <sup>3</sup> (4t)	1,000,000
Detachable Container Truck	8 m <sup>3</sup> (4t)	6,000,000
Dump Truck	8 m <sup>3</sup> (4t)	5,000,000

### 2.1 Cost Estimate of Transfer Station

#### 2.2.1 Transfer Station at Langata (940t/d)

##### 1) Transfer Station

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
1.	Land Acquisition	m <sup>2</sup>	14,000	8,000	112,000
2.	Civil & Building				
2.1	Tree Cutting	m <sup>2</sup>	14,000	80	1,120
2.2	Excavation	m <sup>3</sup>	7,000	1,000	7,000
2.3	Embankment	m <sup>3</sup>	7,000	500	3,500
2.4	Access Road	m <sup>2</sup>	400	4,000	1,600
2.5	Retaining Wall	m <sup>2</sup>	1,200	1,600	1,920
2.6	Ramp Way	m <sup>2</sup>	960	170,000	163,200
2.7	Fence	m	600	12,000	7,200
2.8	Gate	unit	1	500,000	500
2.9	Weighing Building	m <sup>2</sup>	40	35,000	1,400
2.10	Refuse Transfer Building	m <sup>2</sup>	1,500	250,000	375,000
2.11	Workshop Building	m <sup>2</sup>	100	30,000	3,000
2.12	Water Treatment Building	m <sup>2</sup>	200	35,000	7,000
2.13	Car Washing Building	m <sup>2</sup>	50	30,000	1,500
2.14	Landscaping	m <sup>2</sup>	700	1,000	700
2.15	Pavement	m <sup>2</sup>	11,200	5,000	56,000
2.16	Drainage	m	480	3,000	1,440
2.17	Admi. Office	m <sup>2</sup>	200	50,000	10,000
	Sub Total				642,080
	1) Overhead (25% of Sub Total)				160,520
	2) Total of Civil & Building				802,600
3.	Equipment & Facility				
3.1	Transfer System	LS	1	940,000,000	940,000
3.2	Workshop	LS	1	100,000	100
3.3	Standby Generator	unit	1	5,000,000	5,000
3.4	Wheel Loader	unit	1	20,000,000	20,000
3.5	Electrical Work	LS	1	10,000,000	10,000
	Sub Total				975,100
	3) Overhead (25% of 50 % of Sub Total)				121,888
	4) Total of Equipment & Facility				1,096,988
	Total				2,011,588
	Engineering (10% of 2) +4))				281,419
	Grand Total				2,293,006

## 2) Transportation Vehicles

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
	Container (10t: 20m <sup>3</sup> )	unit	118	5,600,000	660,800
	Trailer Truck (10t: 20m <sup>3</sup> )	unit	40	12,500,000	500,000

## 2.2.2 Transfer Station at Dandora Dump Site (940t/d)

### 1) Transfer Station

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
1.	Land Acquisition	m <sup>2</sup>	13,000	8,000	104,000
2.	Civil & Building				
2.1	Tree Cutting	m <sup>2</sup>	0	80	0
2.2	Excavation	m <sup>3</sup>	6,500	1,000	6,500
2.3	Embankment	m <sup>3</sup>	6,500	500	3,250
2.4	Access Road	m <sup>2</sup>	800	4,000	3,200
2.5	Retaining Wall	m <sup>2</sup>	690	1,600	1,104
2.6	Ramp Way	m <sup>2</sup>	960	170,000	163,200
2.7	Fence	m	460	12,000	5,520
2.8	Gate	unit	1	500,000	500
2.9	Weighing Building	m <sup>2</sup>	40	35,000	1,400
2.10	Refuse Transfer Building (inc. Recycling Facility)	m <sup>2</sup>	3,000	250,000	750,000
2.11	Workshop Building	m <sup>2</sup>	100	30,000	3,000
2.12	Water Treatment Building	m <sup>2</sup>	200	35,000	7,000
2.13	Car Washing Building	m <sup>2</sup>	50	30,000	1,500
2.14	Landscaping	m <sup>2</sup>	650	1,000	650
2.15	Pavement	m <sup>2</sup>	10,400	4,000	41,600
2.16	Drainage	m	560	3,000	1,680
2.17	Admi. Office	m <sup>2</sup>	200	50,000	10,000
	Sub Total				1,000,104
1)	Overhead (25% of Sub Total)				250,026
2)	Total of Civil & Building				1,250,130
3.	Equipment & Facility				
3.1	Transfer System	LS	1	940,000,00	940,000
3.2	Workshop	LS	1	100,000	100
3.3	Standby Generator	unit	1	5,000,000	5,000
3.4	Wheel Loader	unit	2	20,000,00	40,000
3.5	Electrical Work	LS	1	10,000,00	10,000
3.6	Belt Conveyor (Recycling Facility - Tilting)	line	6	4,000,000	24,000
3.7	Belt Conveyor (Recycling Facility - Level)	line	6	4,000,000	24,000
	Sub Total				1,043,100
3)	Overhead (25% of 50 % of Sub Total)				130,388
4)	Total of Equipment & Facility				1,173,488
	Total				2,527,618
	Engineering (10% of 2) +4))				242,362
	Grand Total				2,769,979

## 2) Transportation Vehicles

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
	Container (10t: 20m <sup>3</sup> )	unit	118	5,600,000	660,800
	Trailer Truck (10t: 20m <sup>3</sup> )	unit	24	12,500,000	300,000

## 2.2.3 Transfer Station at Dandora Dump Site (1,590t/d)

### 1) Transfer Station

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
1. Land Acquisition		m <sup>2</sup>	28,000	8,000	224,000
2. Civil & Building					
2.1	Tree Cutting	m <sup>2</sup>	0	80	0
2.2	Excavation	m <sup>3</sup>	14,000	1,000	14,000
2.3	Embankment	m <sup>3</sup>	56,000	500	28,000
2.4	Access Road	m <sup>2</sup>	800	4,000	3,200
2.5	Retaining Wall	m <sup>2</sup>	900	1,600	1,440
2.6	Ramp Way	m <sup>2</sup>	960	170,000	163,200
2.7	Fence	m	760	12,000	9,120
2.8	Gate	unit	1	500,000	500
2.9	Weighing Building	m <sup>2</sup>	40	35,000	1,400
2.10	Refuse Transfer Building (inc. Recycling Facility)	m <sup>2</sup>	4,150	250,000	1,037,500
2.11	Workshop Building	m <sup>2</sup>	100	30,000	3,000
2.12	Water Treatment Building	m <sup>2</sup>	200	35,000	7,000
2.13	Car Washing Building	m <sup>2</sup>	50	30,000	1,500
2.14	Landscaping	m <sup>2</sup>	1,400	1,000	1,400
2.15	Pavement	m <sup>2</sup>	22,400	4,000	89,600
2.16	Drainage	m	560	3,000	1,680
2.17	Admi. Office	m <sup>2</sup>	200	50,000	10,000
Sub Total					1,372,540
1)	Overhead (25% of Sub Total)				343,135
2)	Total of Civil & Building				1,715,675
3. Equipment & Facility					
3.1	Transfer System	LS	1	1,200,000,000	1,200,000
3.2	Workshop	LS	1	100,000	100
3.3	Standby Generator	unit	1	5,000,000	5,000
3.4	Wheel Loader	unit	2	20,000,000	40,000
3.5	Electrical Work	LS	1	10,000,000	10,000
3.6	Belt Conveyor (Recycling Facility - Tilting)	line	6	4,000,000	24,000
3.7	Belt Conveyor (Recycling Facility - Level)	line	6	4,000,000	24,000
Sub Total					1,303,100
3)	Overhead (25% of 50 % of Sub Total)				162,888
4)	Total of Equipment & Facility				1,465,988
Total					3,405,663
Engineering (10% of 2) +4))					318,166
Grand Total					3,723,829

### 2) Transportation Vehicles

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
	Container (10t: 20m <sup>3</sup> )	unit	199	5,600,000	1,114,400
	Trailer Truck (10t: 20m <sup>3</sup> )	unit	40	12,500,000	500,000

## 2.2.4 Kibera Railway Station Loading Facility(940t/d)

### 1) Loading Facility

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
1. Land Acquisition		m <sup>2</sup>	14,900	8,000	119,200
2. Civil & Building					
2.1	Excavation	m <sup>2</sup>	7,450	1,000	7,450
2.2	Embankment	m <sup>3</sup>	7,450	500	3,725
2.3	Access Road	m <sup>2</sup>	400	4,000	1,600
2.4	Retaining Wall	m <sup>2</sup>	960	1,600	1,536
2.5	Ramp Way	m <sup>2</sup>	1,600	170,000	272,000
2.6	Fence	m	600	12,000	7,200
2.7	Gate	unit	2	500,000	1,000
2.8	Weighing Building	m <sup>2</sup>	40	35,000	1,400
2.9	Refuse Transfer Building	m <sup>2</sup>	1,500	250,000	375,000
2.10	Workshop Building	m <sup>2</sup>	100	30,000	3,000
2.11	Water Treatment Building	m <sup>2</sup>	200	35,000	7,000
2.12	Car Washing Building	m <sup>2</sup>	50	30,000	1,500
2.13	Landscaping	m <sup>2</sup>	745	1,000	745
2.14	Pavement	m <sup>2</sup>	4,470	4,000	17,880
2.15	Drainage	m	480	3,000	1,440
2.16	Improvement of Railway Lines	m	500	150,000	75,000
2.17	Admi. Office	m <sup>2</sup>	200	50,000	10,000
Sub Total					787,476
1)	Overhead (25% of Sub Total)				196,869
2)	Total of Civil & Building				984,345
3. Equipment & Facility					
3.1	Transfer System	LS	1	940,000,000	940,000
3.2	Workshop	LS	1	100,000	100
3.3	Standby Generator	unit	1	5,000,000	5,000
3.4	Wheel Loader	unit	1	20,000,000	20,000
3.5	Forklift	unit	1	28,000,000	28,000
3.6	Electrical Work	LS	1	10,000,000	10,000
Sub Total					1,003,100
3)	Overhead (25% of 50 % of Sub Total)				125,388
4)	Total of Equipment & Facility				1,128,488
Total					2,232,033
Engineering (10% of 2)+4))					211,283
Grand Total					2,443,316

### 2) Containers for Railway Transport

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
	Container (20t: 40m <sup>3</sup> )	unit	199	12,600,000	1,486,800

## 2.2.5 Juja Railway Station Unloading Facility(940t/d)

### 1) Unloading Facility

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
1. Land Acquisition		m <sup>2</sup>	6,000	300	1,800
2. Civil & Building					
2.1	Excavation	m <sup>3</sup>	3,000	1,000	3,000
2.2	Embankment	m <sup>3</sup>	3,000	500	1,500
2.3	Access Road	m <sup>2</sup>	4,000	4,000	16,000
2.4	Retaining Wall	m <sup>2</sup>	0	1,600	0
2.5	Ramp Way	m <sup>2</sup>	0	150,000	0
2.6	Fence	m	300	12,000	3,600
2.7	Gate	unit	1	500,000	500
2.8	Weighing Building	m <sup>2</sup>	40	35,000	1,400
2.9	Workshop Building	m <sup>2</sup>	100	30,000	3,000
2.10	Car Washing Building	m <sup>2</sup>	50	30,000	1,500
2.11	Landscaping	m <sup>2</sup>	300	1,000	300
2.12	Pavement	m <sup>2</sup>	4,800	4,000	19,200
2.13	Drainage	m	300	3,000	900
2.14	Improvement of Railway Lines	m	1,000	150,000	150,000
2.15	Admi. Office	m <sup>2</sup>	200	25,000	5,000
Sub Total					205,900
1)	Overhead (25% of Sub Total)				51,475
2)	Total of Civil & Building				257,375
3. Equipment & Facility					
3.1	Truck Scale	unit	2	2,500,000	5,000
3.2	Car Washing Equipment	unit	1	3,500,000	3,500
3.3	Workshop	LS	1	100,000	100
3.4	Standby Generator	unit	1	5,000,000	5,000
3.5	Folklift	unit	1	22,000,000	22,000
2.15	Electrical Work	LS	1	10,000,000	10,000
Sub Total					45,600
3)	Overhead (25% of 50 % of Sub Total)				5,700
4)	Total of Equipment & Facility				51,300
Total					310,475
Engineering (10% of 2)+4))					30,868
Grand Total					341,343

### 2) Transportation Vehicles to Final Landfill Site

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
	Trailer Truck (20t: 40m <sup>3</sup> )	unit	15	12,600,000	189,000

## 2.2.6 Mavoko Railway Station Unloading Facility(940t/d)

### 1) Unloading Facility

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
1.	Land Acquisition	m <sup>2</sup>	6,000	300	1,800
2.	Civil & Building				
2.1	Excavation	m <sup>3</sup>	3,000	1,000	3,000
2.2	Embankment	m <sup>3</sup>	3,000	500	1,500
2.3	Access Road	m <sup>2</sup>	4,000	4,000	16,000
2.4	Retaining Wall	m <sup>2</sup>	0	1,600	0
2.5	Ramp Way	m <sup>2</sup>	0	150,000	0
2.6	Fence	m	300	12,000	3,600
2.7	Gate	unit	1	500,000	500
2.8	Weighing Building	m <sup>2</sup>	40	35,000	1,400
2.9	Workshop Building	m <sup>2</sup>	100	30,000	3,000
2.10	Car Washing Building	m <sup>2</sup>	50	30,000	1,500
2.11	Landscaping	m <sup>2</sup>	300	1,000	300
2.12	Pavement	m <sup>2</sup>	4,800	4,000	19,200
2.13	Drainage	m	300	3,000	900
2.14	Improvement of Railway Lines	m	1,000	150,000	150,000
2.15	Admi. Office	m <sup>2</sup>	200	50,000	10,000
	Sub Total				210,900
1)	Overhead (25% of Sub Total)				52,725
2)	Total of Civil & Building				263,625
3.	Equipment & Facility				
3.1	Truck Scale	unit	2	2,500,000	5,000
3.2	Car Washing Equipment	unit	1	3,500,000	3,500
3.3	Workshop	LS	1	100,000	100
3.4	Standby Generator	unit	1	5,000,000	5,000
3.5	Forklift	unit	1	28,000,000	28,000
2.15	Electrical Work	LS	1	10,000,000	10,000
	Sub Total				51,600
3)	Overhead (25% of 50 % of Sub Total)				6,450
4)	Total of Equipment & Facility				58,050
	Total				323,475
	Engineering (10% of 2)+4))				32,168
	Grand Total				355,643

### 2) Transportation Vehicles to Final Landfill Site

No.	Item	Unit	Quantity	Unit Price (Ksh)	Cost (x 10 <sup>3</sup> Ksh.)
	Trailer Truck (20t: 40m <sup>3</sup> )	unit	15	12,600,000	189,000

### **3. Photo Data**

#### **3.1 Collection Vehicles**

##### **3.1.1 CCN**







### 3.1.2 Private Collectors







### 3.1.3 At Dandora Dump Site



Waste Pickers at Unloading





Stacking or Slip at Rainy Days