Annex 6
Soil Remediation Assessment of Effluent Lake

Soil Remediation of Effluent Lake

1. Site description and history

- The site subject to remediation (around 43 ha in total) used to be used as an overflow lake of Beit Lahia Wastewater treatment Plant
- The site is surrounded from the Western side predominantly by agriculture land, and from the Eastern side predominantly by the residential area and urban development area.

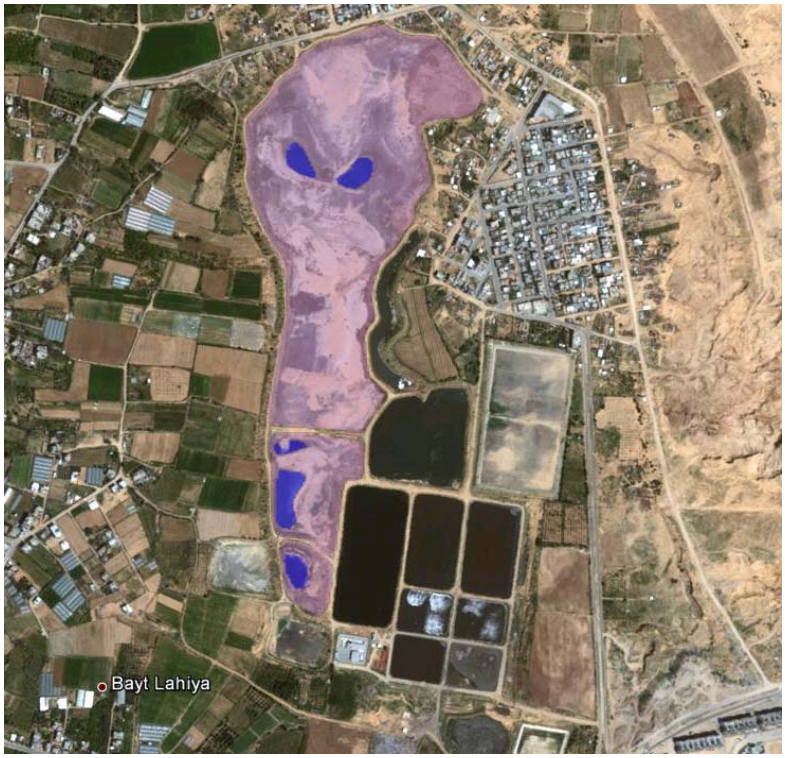


Figure 1 Remediation area

- The lake received effluents and sludge from the treatment plant. The sludge accumulated over the full surface with thickness that varies between 5 and 15 cm. The thickness reaches almost 50 cm in a limited area in and close to the still wet surfaces, which are the deepest surfaces of the lake.
- When this practice was stopped starting in 2007, when the emergency sewage project started to be implemented, the water started to be transferred to the new infiltration ponds located at the adjacent of the NGESTP.
- Currently, from the satellite image, around 90% of the surface area of the lake disappeared by percolating in the soil or evaporating. Only less than 10% of the area is still wet and split into five isolated small ponds, two in the North and three in the

South. These small remaining "lakes" are located in the relatively deepest points of the pond. The thickness of the deposited sludge is higher in, and immediately around, these lakes and it might reach 50 cm (Figure 1).

2. Soil and Sludge Measurement results and Analysis

2.1. Soil analysis

- The soil analysis, of soil samples taken in July 2012, show in general that soil does not suffer from neither heavy metals nor pathogenic contamination. This can be attributed to the possibility that the treatment plant didn't receive industrial waste, the main source of heavy metals, and the long period of 5 years since 2007 stabilized the deposited sludge and the top part of the soil.
- Samples were collected at different points and at two levels, the surface part (0-15 cm) and the top part (50 cm). Samples were analyzed for organic matter (OM) as a general indicator for organic contamination, nutrients (Nitrogen, and Phosphorus), as well as heavy metals (Lead, Copper, Cadmium, and Zink) as indicators for non-organic contamination.

2.2. Heavy metals:

- The soil humidity pH is fairly neutral and varies between 6.96 to 7.02. At this pH level, most of the heavy metals, if exist, will be adsorbed to the soil particles at the top part of it, and will not travel with seeping water to the groundwater aquifer.

Table 1 Heavy metal concentration at the effluent lake

mg/kg	Dry area		Wet area	
cm *	0-15	50	0-15	50
Pb	<0.010	<0.010	<0.010	<0.010
Cu	<0.010	<0.010	<0.010	<0.010
Cd	0.061	0.005	0.170	0.047
Zn	0.008	0.007	0.008	0.008

* below surface level

- The analysis of the samples of both surface and top levels shows neither untraceable levels of neither Lead (Pb) nor Copper (Cu). Except of Cadmium (Cd) concentration in the surface samples in the areas of thick deposition of sludge (0.17 mg/kg), concentrations of Cd and Zink (Zn) are very low.

2.3. Organic matter:

- In general, organic matter decays to its main compounds when deposits on land surfaces for relatively long time. The deposited sludge were subject to two different processes that helped decomposing; anaerobic process when the pond was full of water (2004 – 2007) and aerobic process (2007 – 2012) (Table 2).

Table 2 Organic matter concentration at the effluent lake

%	Dry area		Wet area	
cm *	0-15	50	0-15	50
OM	0.98	0.37	2.20	1.20
TN	0.09	0.05	0.08	0.08
TP	0.47	0.36	0.49	0.32

* below surface level

- The analysis of the samples of both surface and top levels shows very low levels of total Nitrogen (TN), which is expected due to the de-nitrification process that took place in the first period (2004 – 2007). The organic matter (OM) is less than 1% in the dry areas, because the sludge layer deposited in these areas is very thin, that helped an aeration / oxidation of most of the Carbon in the sludge during the second period (2007 – 2012).

3. Remediation options

Remediation possible options depend on a number of factors, two of them are highly decisive: (A) type and extent of the contamination, and (B) the future planned land use.

(A) The type and extent of the contamination

The soil analysis show that the contamination is limited to relatively higher level of Cadmium in a spatially limited area, under and immediately around the wet areas, which represents 15-20% of the total pond area. Cadmium oxide and sulfide are relatively insoluble while the chloride and sulfate salts are soluble. The adsorption of cadmium onto soils and silicon or aluminum oxides is strongly pH-dependent, increasing as conditions become more alkaline. When the pH is below 6-7, cadmium is desorbed from these materials. Cadmium has considerably less affinity for the absorbents tested than do copper, zinc, and lead and might be expected to be more mobile in the environment than these materials. Studies have indicated that cadmium concentrations in bed sediments are generally at least an order of magnitude higher than in the overlying water.

Addition of anions, such as humate or tartrate, to dissolved cadmium causes an increase in adsorption. The mode by which cadmium is adsorbed to the sediments is important in determining its disposition towards remobilization. Cadmium found in association with carbonate minerals, precipitated as stale solid compounds, or co-precipitated with hydrous iron oxides would be less likely to be mobilized by re-suspension of sediments or biological activity. Cadmium absorbed to mineral surfaces (e.g., clay) or organic materials would be more easily bio-accumulated or released in the dissolved state when sediments are disturbed, such as during flooding.

(B) The future planned land use

The area is owned by the Palestinian Endowment Authority. After proper remediation, it is expected that he land will be returned back to the Authority. From the surrounding area in Bait-Lahia, the site can be used as agricultural or residential area. In the absence of a clear land use plan for the site, both options will remain valid. However, according to the Master Plan of the surrounding site it will be used as an urban or residential area (kindly refer to Appendix 3).

3.1. Options analysis and recommendation

3.1.1. Technical options – overview

A special and well developed tool (FRTR Screening matrix[1]) is used to identify the best remediation option. The following table 3 shows only a relevant extract of the overall matrix of options.

The following section, presents various options that could be used in steps in remediating the site.For the purpose of the remediation options, a model was prepared by the consultant to compare between the different options. Table 3 below presents the technically possible options that can be used to remediate the effluent lake at BLWWTP.

Table 3Technically possible remediation options

N/A - Not Applicable I/D - "Insufficient Data" ◈ - Level of Effectiveness highly dependent upon specific contaminant and its application	Developme	Treatment	O&M	Capital	System Re Maintainabi	Relative Co	Time	Availability
Soil, Sediment, Bedrock, and Sludge								
3.1 In Situ Biological Treatment								
4.1 Bioventing	●	●	●	●	●	●	◑	●
4.2 Enhanced Bioremediation	●	●	○	◑	◑	●	◑	●
4.3 Phytoremediation	●	●	●	●	○	●	○	◑
3.2 In Situ Physical/Chemical Treatment								
4.4 Chemical Oxidation	●	●	○	◑	◑	◑	●	●
4.5 Electrokinetic Separation	●	○	○	◑	◑	○	◑	◑
4.6 Fracturing	●	◑	◑	○	◑	◑	◑	●
4.7 Soil Flushing	●	●	○	◑	◑	◑	◑	●
4.8 Soil Vapor Extraction	●	○	○	◑	●	●	◑	●
4.9 Solidification/Stabilization	●	●	◑	○	●	●	●	●
3.3 In Situ Thermal Treatment								
4.10 Thermal Treatment	●	○	○	○	●	◑	●	●
3.4 Ex Situ Biological Treatment (assuming excavation)								
4.11 Biopiles	●	●	●	●	●	●	◑	●
4.12 Composting	●	●	●	●	●	●	◑	●
4.13 Landfarming	●	●	●	●	●	●	◑	●
4.14 Slurry Phase Biological Treatment	●	○	○	○	◑	◑	◑	●
3.5 Ex Situ Physical/Chemical Treatment (assuming excavation)								
4.15 Chemical Extraction	●	○	○	○	◑	◑	◑	●
4.16 Chemical Reduction /Oxidation	●	◑	◑	○	●	◑	●	●
4.17 Dehalogenation	●	◑	○	○	○	○	◑	◑
4.18 Separation	●	◑	○	◑	●	◑	●	●
4.19 Soil Washing	●	○	○	○	●	◑	●	●
4.20 Solidification/Stabilization	●	●	◑	○	●	●	●	●
3.6 Ex Situ Thermal Treatment (assuming excavation)								
4.21 Hot Gas Decontamination	○	●	○	○	●	●	●	◑
4.22 Incineration	●	●	○	○	◑	○	●	●
4.23 Open Burn/Open Detonation	●	●	○	○	●	●	●	●
4.24 Pyrolysis	●	●	○	○	○	○	●	●
4.25 Thermal Desorption	●	●	○	○	◑	◑	●	●

[1]Federal Remediation Technologies Roundtable, 2007 (www.frtr.gov/matrix2/top_page.html)

4. Cost of Potential Remedial Technologies

The subject remediation program may be used as a model for future similar programs. Because this process is relatively new in Gaza, it is important to develop a program that is designed to reduce risks to human health and the environment at the same time is implementable in Gaza. For that reason, a simple financial model is designed to help in this evaluation.

Table 4 presents preliminary cost estimates for each of the alternatives presented above. These costs were developed by the consultant. It should be noted that these costs should be used primarily for comparison purposes.

Table 5: Estimated Costs for Remediation Alternatives

		Duration (yrs)	Total cost (mio. USD)
1	Doing nothing – limiting access to the site	6.0	9.31
2	Phytoremediation	3.0	5.23
3	Placement of clay cap	1.0	3.59
4	Placement of three-layer cap.	1.5	5.50
5	Encapsulation of the site	2.5	11.28
6	Rinsing of soil	6.0	24.75

The total cost is a sum of different cost items as shown in the following chart[2].

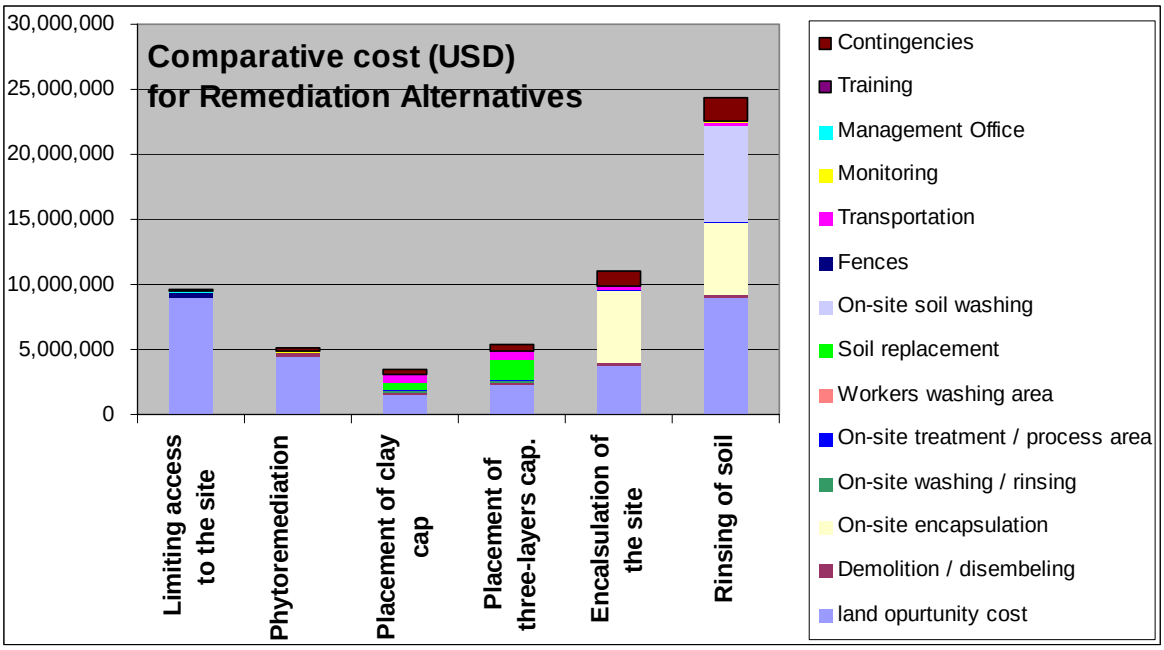


Chart 1 Different Cost assumption for different remediation options

[2] The model output of different cost and alternatives are presented at Appendix

5. Conclusions

- It should be noticed that the cost is very sensitive to the Land opportunity cost, which is directly affected by the remediation duration period. The consultant's estimated value is 35,000 USD/ha/yr.
- Based on the outcome of the cost analysis model, it is recommended to replace the top layer (average 50 cm) of the contaminated part of the soil (around 4.3 ha), with cleaner sand from the adjacent area. The total cost is estimated at 3.6 million USD, and can be maximum one year.
- If the land opportunity cost drops to 30% of the consultant's estimated value, i.e. to 10,000 USD/ha/yr, both options 2 and 3 will have almost the same total cost (around 2.3 million USD), however, option 3 (top soil replacement) still takes 1/3rd of the required time.
- Comparative cost for different options is presented at the chart below.

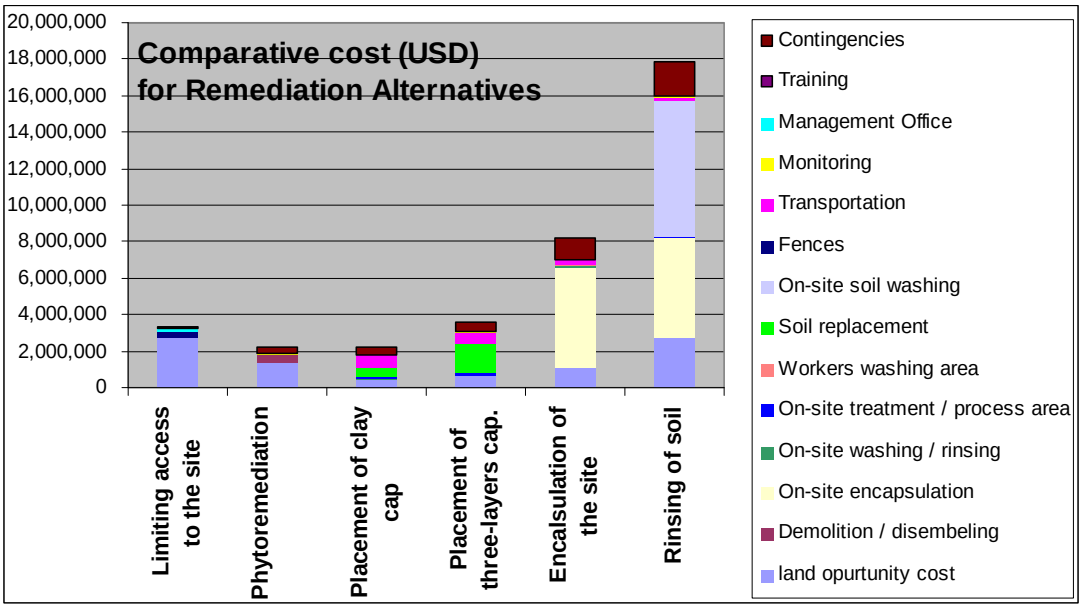


Chart 2 Comparative costs for different remediation alternatives

Appendix
Model output

Generic Costs

1					Years ------->	6.0	3.0		1.0	1.5		2.5	6.0
						Alternative cost factors							
		Unit	Qty	USD/Unit	USD	F1	F2	F3	F4	F5	F6	F7	F8
999	**Land compensation**	**ha p.a.**	**43**	**35,000**	1,505,000	**6.0**	**3.0**	**0.0**	**1.0**	**1.5**	**0.0**	**2.5**	**6.0**
1000	**Phyto remediation**				408,000	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0
1100	leveling	ha	8.0	2,500	20,000								
1200	plants	ha	8.0	3,000	24,000								
1300	plantation	ha	8.0	2,500	20,000								
1400	maintainance				344,000								
1410	irrigation	ha	8.0	1,000	8,000								
1420	cleaning	ha	8.0	1,000	8,000								
1430	final removal	ha	8.0	6,000	48,000								
1440	disposal	ton	160.0	500	80,000								
1450	Other salvage parts	ton	400.0	500	200,000								
					-								
2000	**On-site encapsulation**				5,461,687							1.0	1.0
	Cement	ton	19,511	250	4,877,813								
	Sand	ton	19,511	12	232,672								
	Mixing and placing	ton	23,414	15	351,203								
3000	**On-site washing / rinsing**				44,000	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0
	Set-up	L.S.	1	8,000	8,000								
	Running	wk	12	3,000	36,000								
	Pretreatment	m^3	-	10.0	-								
4000	**On-site treatment / process area (for trucks and equipment)**				121,265	0.0	0.4	0.4	1.0	1.0	0.4	0.6	0.6
	Set-up	L.S.	1	8,000	8,000								
	Running	wk	12	3,000	36,000								
	Pretreatment	m^3	7,726	10.0	77,265		0.0	0.0	1.0	1.0	0.0	0.4	0.4
5000	**Workers washing area**				**21,240**	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Set-up	L.S.	1	6,000	6,000								
	Running	wk	12	1,000	12,000								
	Pretreatment	m^3	648	5.0	3,240								
6000	**Soil replacement**				**515,097**	0.0			1.0	3.0			
	Soil Cutting	m^3	23,414	10	234,135								
	Sand	m^3	23,414	4.5	105,361								
	Sand placement	m^3	23,414	7.5	175,601								
7000	**On-site soil washing**				**7,381,253**	0.0							1.0
	Soil Cutting	m^3	23,414	10	234,135								
	Washing basin	num	1	6,000	6,000								
	Chemicals	ton	5,151	250	1,287,743								
	Treatment				5,853,375								
8000	**Fences**				**375,000**	1.0	0.0	1.0					
	Material	m^2	15,000	15	225,000				0.0				
	Construction	m^2	15,000	10	150,000								
9000	**Transportation**				608,751	0.0	0.0	0.0	1.0	1.0	0.0	0.4	0.4
9100	Loading				46,827								
9110	Soil	m^3	23,414	2.0	46,827								
9120	Brick / concrete	ton	-	3.0	-								
9130	Metal pieces	ton	-	4.0	-								
9200	Tavel	trip	5,151	100	515,097		0.0					0.4	0.4
9300	Unloading				46,827								
10000	**Monitoring**				**28,830**	0.4	0.5	0.6	1.0	1.0	1.0	1.0	1.0
10100	Equipment				750								
10110	Soil Sampler	No	1	50	50								
10120	Air Sampler	No	1	700	700								
10200	Analysis	Sample	432	65	28,080								
11000	**Management Office**				**146,400**	0.9	0.1	0.1	0.1	0.1	0.1	0.1	0.1
11100	Set-up	L.S.	1	6,000	6,000								
11200	Running	wk			140,400								
12000	**Training**				**21,500**	0.2	0.7	0.8	0.9	1.0	1.0	1.0	1.0
12100	Training subjects				8,000								
12200	General Health and Safety	Trainee	20	250	5,000								
12300	Specific	Trainee	30	100	3,000								
12200	Workers allowance	Trainee.day	50	30	1,500								
12300	Trainer	Day	8	1,500	12,000								
13000	**Remediation consultant**				376,000	0.1	0.2	0.3	0.3	0.4	0.3	0.6	1.0
	Fixed costs	L.S.	1	40,000	40,000								
	Running costs	wk	12	28,000	336,000								

Generic Costs

1					Years ------->	6.0	3.0		1.0	1.5		2.5	6.0
						Alternative cost factors							
		Unit	Qty	USD/Unit	USD	F1	F2	F3	F4	F5	F6	F7	F8
20000	**Contengincies**				2,786,492	0.0	0.1	0.1	0.1	0.2	0.1	0.4	0.7
999	**Land compensation**	%	5.0%	1,505,000	75,250								
1000	**Phyto remediation**	%	10.0%	408,000	40,800								
2000	**On-site encapsulation**	%	15.0%	5,461,687	819,253								
3000	**On-site washing / rinsing**	%	10.0%	44,000	4,400								
4000	**On-site treatment / process area**	%	15.0%	121,265	18,190								
5000	**Workers washing area**	%	10.0%	21,240	2,124								
6000	**Soil replacement**	%	10.0%	515,097	51,510								
7000	**On-site soil washing**	%	20.0%	7,381,253	1,476,251								
8000	**Fences**	%	10.0%	375,000	37,500								
9000	**Transportation**	%	30.0%	608,751	182,625								
10000	**Monitoring**	%	15.0%	28,830	4,325								
11000	**Management Office**	%	10.0%	146,400	14,640								
12000	**Training**	%	15.0%	21,500	3,225								
13000	**Remediation consultant**	%	15.0%	376,000	56,400								

Dimensions

total area	43	ha		
contaminated area	43,000	m^2	10%	
Area for clay removed at 0.15 m depth:	12,900	m^2	30%	0.15
Area for clay removed at 0.50 m depth:	12,900	m^2	30%	0.5
Area for clay removed at 0.75 m depth:	17,200	m^2	40%	0.75
Volume of clay (steped removal):	23,414	m^3		
Weight of clay (steped removal):	51,510	ton		
Volume of clay (1.0 m removal):	35,475	m^3	100%	0.75
Weight of clay (1.0 m removal):	78,045	ton		

Prices

Item	Unit	$/Unit
Clay	m^3	5.50
Sand	m^3	4.50
Salvage steel	ton	5,000.00
Transportation	1.0 km.trip	20.00
	10 km.trip	35.00
	50 km.trip	100.00
	100 km.trip	140.00
Soil cutting	m^3	10.00
Cement	ton	250.00
Guard	p.m.shift	700.00
Three layers cap / clay cap factor	ratio	3.00
land value (rent)	yr	35,000.00

		Limiting access to the site	Phytoremediation	Placement of clay cap	Placement of three-layers cap.	Encalsulation of the site	Rinsing of soil
999	land opurtunity cost	9,030,000	4,515,000	1,505,000	2,257,500	3,762,500	9,030,000
1000	**Demolition / disembeling**	0	408,000	0	0	0	0
2000	**On-site encapsulation**	0	0	0	0	5,461,687	5,461,687
3000	**On-site washing / rinsing**	0	0	44,000	44,000	44,000	44,000
4000	**On-site treatment / process area**	0	44,000	121,265	121,265	74,906	74,906
5000	**Workers washing area**	0	21,240	21,240	21,240	21,240	21,240
6000	**Soil replacement**	0	0	515,097	1,545,291	0	0
7000	**On-site soil washing**	0	0	0	0	0	7,381,253
8000	**Fences**	375,000	0	0	0	0	0
9000	**Transportation**	0	0	608,751	608,751	243,500	243,500
10000	**Monitoring**	11,532	14,740	28,830	28,830	28,830	28,830
11000	**Management Office**	126,000	16,085	16,085	16,085	16,085	16,085
12000	**Training**	4,300	16,100	19,481	21,429	21,500	21,500
13000	**Remediation consultant**	54,842	72,384	128,528	151,926	209,513	376,000
20000	**Contingencies**	78,590	359,828	378,238	481,258	1,197,491	1,854,489
	USD	**9,680,263**	**5,467,377**	**3,386,514**	**5,297,574**	**11,081,252**	**24,553,489**

Appendix – 2

MITIGATION AND PREVENTIONS MEASURES FOR THE FAUNA DURING THE REMEDIATION LAKE OR DECOMMISIONING ACTIVITIES
(Especially snakes and mice or rats)

MITIGATION AND PREVENTIONS MEASURES FOR THE FAUNA DURING THE REMEDIATION LAKE OR DECOMMISIONING ACTIVITIES
(Especially snakes and mice or rats)

Unwanted snakes, especially common snakes, may appear during the remediation activities or the decommissioning the BLWWTP, especially if the activities held during the spring. Often, they've been hiding (or overwintering) in spaces or underground. They enter through cracks or holes surrounding the existing trees or underground soil. These spaces provide shelter and warm places for a snake to spend the winter. When spring returns or when they are disturbed by the remediation or decommissioning activities, the snakes reappear outside.

Following is the measures proposed by the Consultant (besides the close coordination with the Ministry of Health and Ministry of Agriculture related to the reported cases and found wildlife, if any, during the activities). These measures includes, as well, the preventions to be considered by the contractor of the remediation works and the decommissioning for protection of workers and wildlife (fauna)

Measures and protection of the snakes on the site area for remediation works or decommissioning activities:

a. **Seal the cracks;** Deter snakes by sealing the cracks and filling holes or cracks on the ground or between the trees roots. Most snakes can fit through a 1/2-inch-wide crack. It is advisable to fill the crack when snakes determined not inside the crack or hole (during the summer, it is determined that the snake will not be in the crack or hole), otherwise, it would die inside the hole and cause odor problems.
b. **Eliminate their food source – Mice;** Snakes may also appear when they are looking for a place to overwinter, or may be searching for food -- specifically mice. By eradicating rodents from the area.

   Mice can be controlled by removing their food sources, nesting sites, or by trapping them. To prevent the entry to the area, wastes (i.e. soil piles, pipe piles, sanitary wastes) should be removed regularly to reduce the piles on site.

c. **Landscaping;** Certain types of landscaping may be appealing to snakes. Avoid having piled wastes on site (as mentioned above). In addition, keeping the site dry may also reduce the attraction prey items (worms, slugs, or frogs) that some species of snake feed on.

d. **Remove hiding spots;** Snakes seek out sites that provide cover for both them and their prey. The easiest way to discourage snakes is to remove these hiding spots. Move any debris or dispose it in a frequent period in which rodents might reside away from site. Trim shrubs and trees to create a space of at least 6 inches between the ground and the first branches. The larger the mowed area, the lower the chance of having snakes near the site area in addition, it is also makes it easier to see a snake on site.

e. Fencing; The only way to absolutely keep snakes to escape from the site area is with fencing. Snake-proof fencing can be made by modifying a normal chain-link, picket, or split-rail fence. Attach 24-inch-high hardware cloth (1/4-inch weave) or aluminum flashing to the outside bottom of the fence. Bury the bottom of the hardware cloth or flashing 2 to 4 inches into the soil. Gates should have the same snake-proofing and be kept closed to be effective.

The fence has to go all the way around the specific site area to be remediated or decommissioned. Snakes tend to travel along a fence rather than go over it. If the fence ends or has an opening, the snakes will enter the outside site area at this point and might cause the disturbance to the inhabitant nearby. Fill any mammal burrows that appear near the fence.

If there is no existing fence, aluminum flashing could be used to encircle the site. The flashing should be 24-inches high and buried 2 to 4 inches into the soil.

f. Removing unwanted snakes; If the contractor encounters an unwanted snake in a site area, there are a number of humane, nonlethal methods of removing them. The method includes using the snack catcher sticks and put in inside the cage (prepared onsite by the contractor). However, the close coordination and the guidance from the Ministry of Agriculture might be needed to assist the common ways of removing the unwanted snakes according to their dangerous levels.

g. Trapping; There are several types of snake traps available. The best are one of the various styles of funnel traps. Traps work best inside closed area, but can be used outside along a snake-proof fence. They should be placed length-wise, so that when a snake moves along the fence it will enter the trap. Traps should be used to remove a specific snake that you know is present.

h. Relocating; Once you have trapped or found the snake, you will need to relocate it. This means picking it up and putting it in a container for transport to the new habitat or temporarily relocation before return it back to the natural habitat after the activities are completed. Nonvenomous snakes can be lifted with a garden rake or shovel. If the snake is small, the workers can use a gloved hand. Transport the container to an appropriate site (new habitat) for release. However, the relocation of the found fauna or temporary relocation has to be discussed and agreed between the contractor and the Ministry of Agriculture.

In urban and suburban areas, cage or boxtraps are generally the most practical removal devices. Foot traps may be used in some areas, especially if they can be set in water. Some cities have ordinances prohibiting the use of certain types of traps, so local authorities should be contacted before any removal efforts are begun.

Measures and protection of the rats or rodent on the site area for remediation works or decommissioning activities:

In general, as the rats or rodent are belong to the normal and common wildlife and not considered as endanger animals and might cause damage or injury to the workers and the surrounding populations if it is not controlled and released outside the project site. In general, it is allowed to control rats or rodents that are causing damage or injury. They may

control these animals without permit from any authority. Following is the standard procedure for caring the rats or rodent found during the activities:

a. **Live trap;**A normal live trap will work to trap the animals. It can be baited with fish, chicken, fish flavored cat food or canned tuna. The mesh must be small enough so the animals cannot reach through the wire and get the bait--one-half inch or smaller will be adequate. Most of the bait should be placed inside the trap near the back, but a few morsels should be placed in front of and just inside the trap. Live traps are available for rent or loan from rental companies and some animal shelters and nature centers, or they can be purchased or made. Coordination between the contractor and the Ministry of Agriculture might help to identify the local practice to trap the animals.

b. **Shooting;** Although shooting is often an effective control technique in rural areas, however, it is prohibited in towns and cities. This approach is not recommended by the Consultant as the more common technique is available on the project site.

c. **Unprotected picked;** Rats or rodents are wild animals and no attempt should be made to pick them up or pet them, even if they appear tame. Although rabies is quite rare in the project area, no bite by a wild carnivore should be ignored. These animals are normally not aggressive, but will defend themselves if captured or cornered. If the workers are bitten, every attempt should be made to capture or kill it (without damage to the head) so that it can be tested for rabies by the Ministry of Health. Medical treatment and advice should also be sought.

d. **Prevention from the infectious disease caused by the parasite;** It might be possibility to have worm or parasite of rats or rodent that can cause human health problems under certain circumstances. These parasites live in the animal's intestine and shed microscopic eggs which are passed in the feces. These eggs can become infective to people or other animals after about 30 days. The greatest potential for problems is for people who may come into close contact with areas contaminated with fecal material, particularly small children who may place dirty hands or objects in their mouths. Therefore, isolation of the area is necessary and the use of standard protection of the workers during the site activities is compulsory.

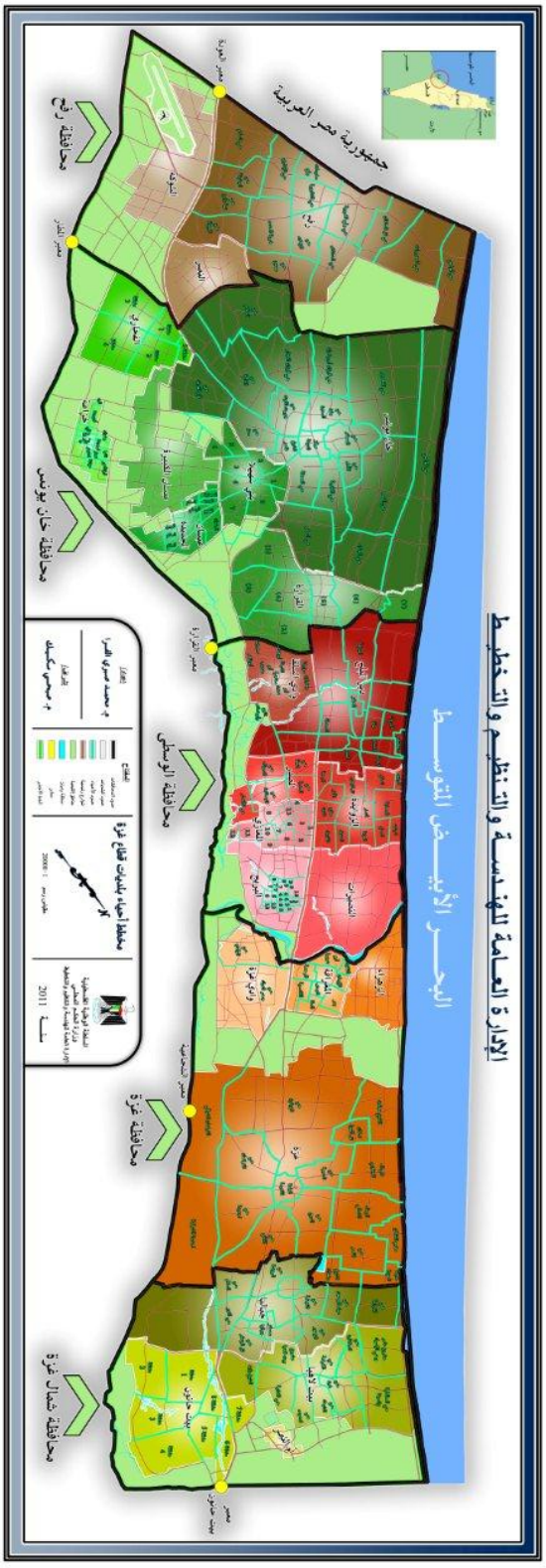
Photo logs below presents the example of locally and temporarily made cages that can be utilize during the remediation works and during the decommissioning of the treatment plant (BLWWTP).

Figure 1 Photo logs of temporary site shelter for snake and rats / rodent

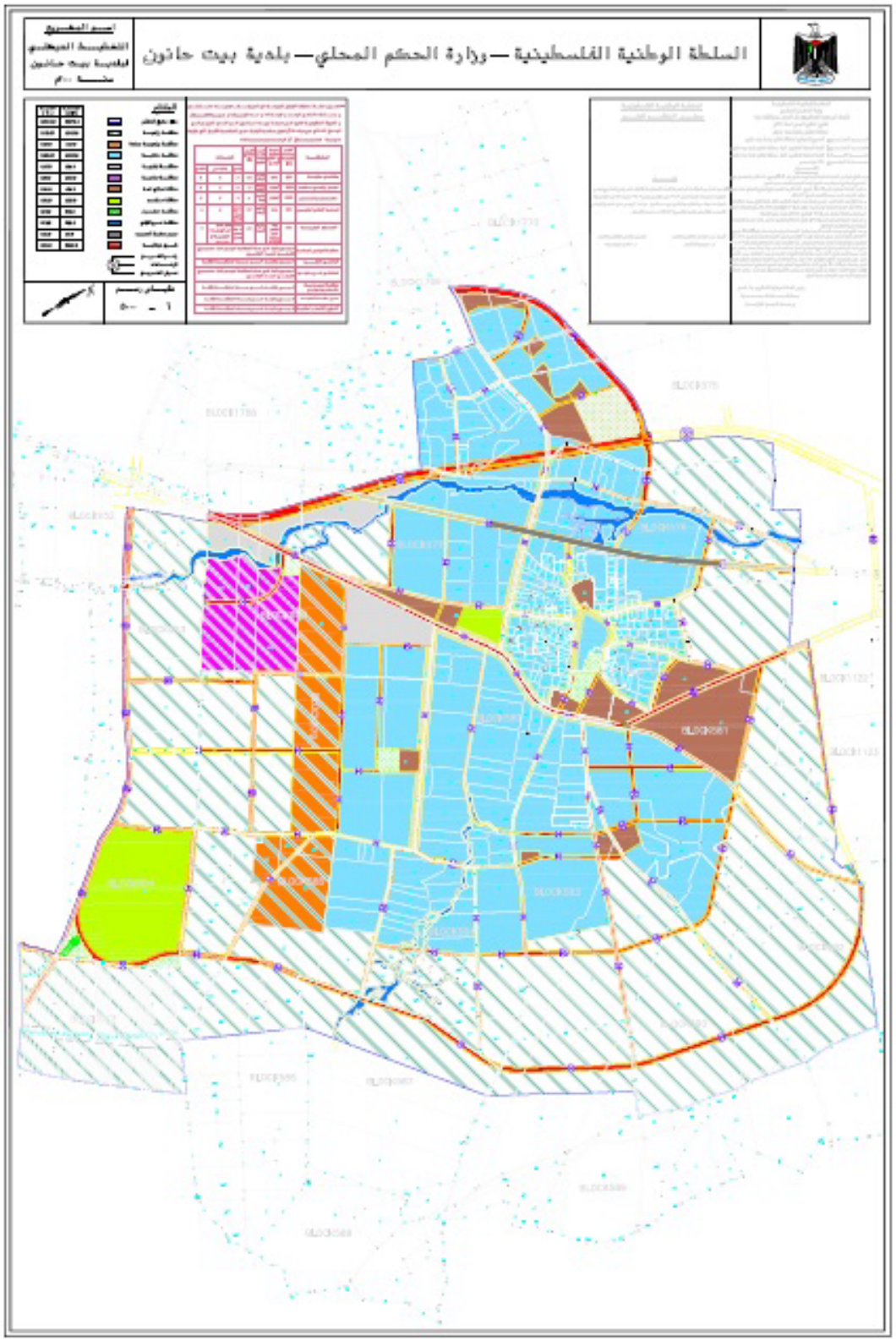
Appendix – 3

Urban Planning of surrounding Effluent Lake – BLWWTP

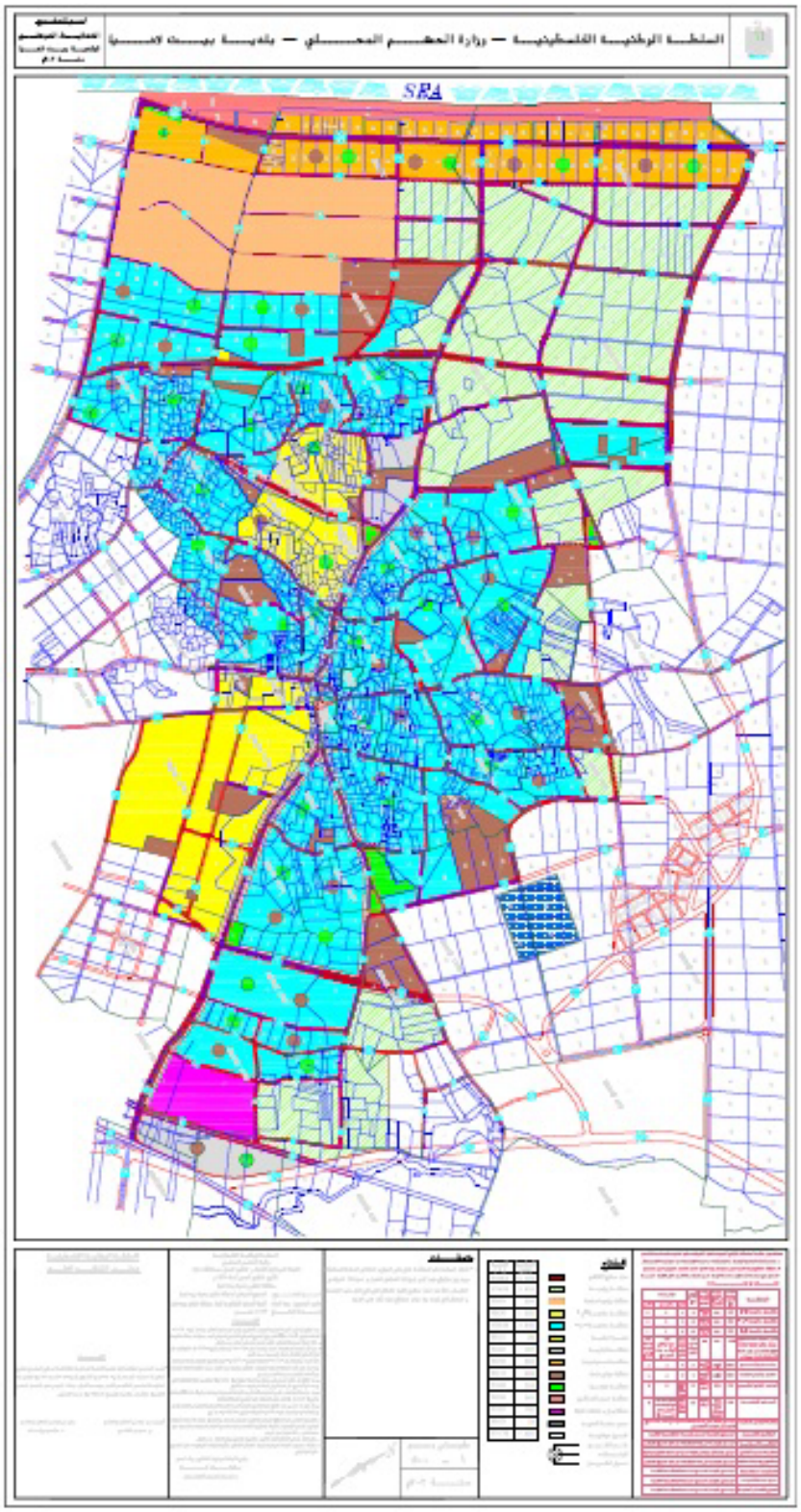
Urban Planning of Gaza Strip



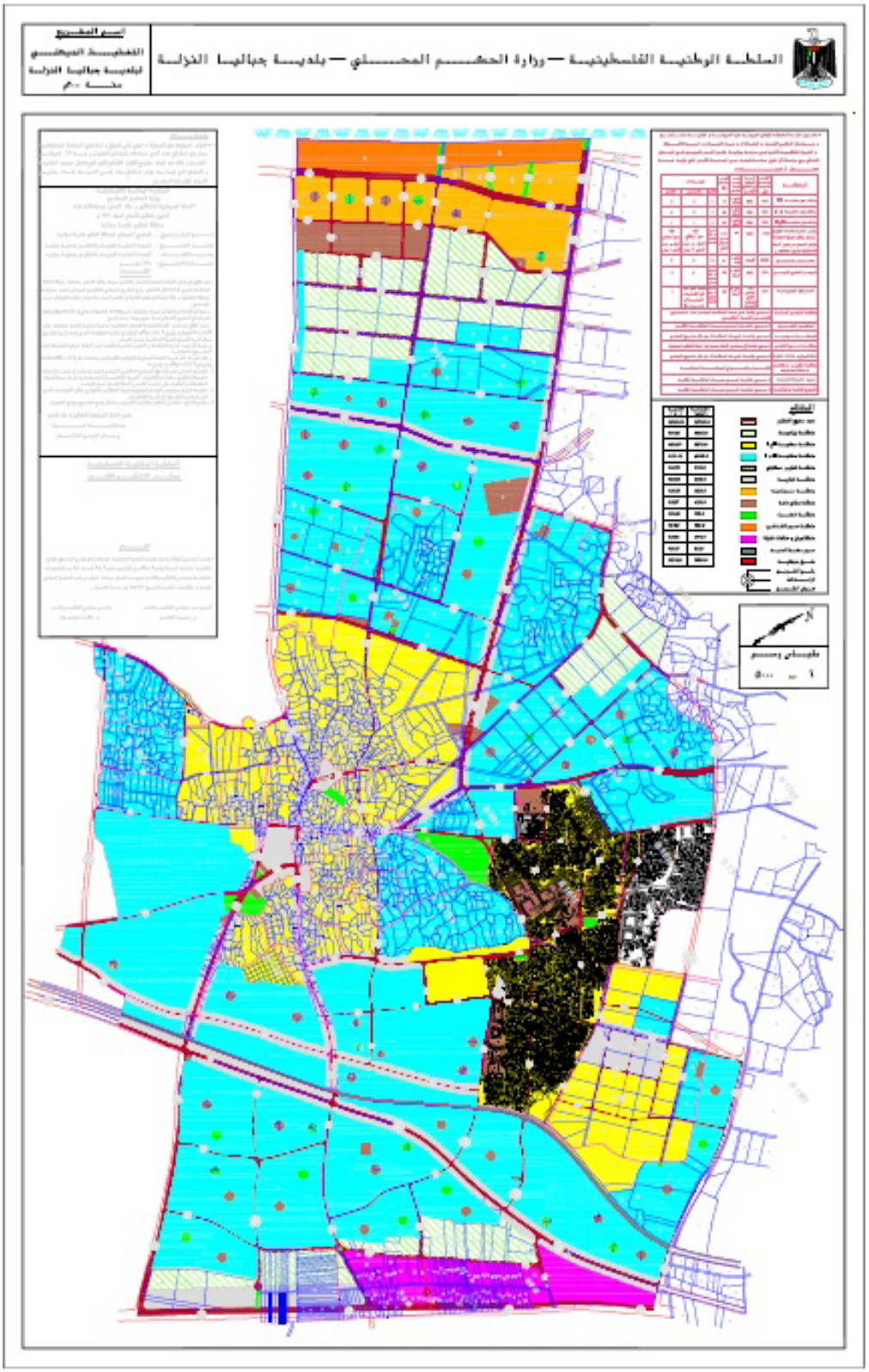
Urban Planning of Beit Hanoun



Urban Planning of Beit Lahia



Urban Planning of Jabalia



Urban Planning of Um Nasser