

# **Tat Lan Hydrological Masterplan**

## **Volume IV: Pauktaw Township**

Yangon  
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## 6 PAUKTAW TOWNSHIP

### 6.1 OVERVIEW

In Pauktaw Township, a total of 51 villages were selected for the Tat Lan program. These are presented (with updated population figures and some additional comments) in the table below. Note that two villages were mentioned twice, so the total number of villages in the list is only 49.

Sr	Township	Village Tract	Village Name	# HH	POP TOT	Ethnicity	Vill_Pcode	Comments
1	Pauktaw	Ah Lel Kyun	Ah Lel Kyun	450	1733	Rakhine	197416	
2	Pauktaw	Byaing Thit	Byaing Thit	245	1012	Rakhine	197504	
3	Pauktaw	Byaing Thit	Kha Maung Tway	58	290	Rakhine	197508	
4	Pauktaw	Byaing Thit	Kyauk Maung	261	1,121	Rakhine	197505	This village has a lot more people than on the original list.
5	Pauktaw	Byaing Thit	Ma Nyin Kaing	114	516	Rakhine	197507	This village has a lot more people than on the original list.
6	Pauktaw	Byaing Thit	Nga Yae Chaing	153	670	Rakhine	197510	The village is listed as Nga Shin Chaing on the MIMU list, but that name is not correct.
7	Pauktaw	Byaing Thit	Ohn Ta Pin	77	327	Rakhine	197509	This village has a lot more people than on the original list.
8	Pauktaw	Byaing Thit	Pyin Gyi	100	440	Rakhine	197506	
9	Pauktaw	Chaung Thar Gyi	Chaung Thar Gyi	60	218	Rakhine	197417	
10	Pauktaw	Chaung Zauk	Chaung Zauk	291	1423	Rakhine	197411	
11	Pauktaw	Gyin Dway	Gyin Dway	190	810	Rakhine	197409	
12	Pauktaw	Hpa Tu Gyi	Ah Lel	325	1,447	Rakhine	197494	
13	Pauktaw	Hpa Tu Gyi	Hpa Yar Chaung	227	1,293	Rakhine	197496	This village has a lot more people than on the original list.
14	Pauktaw	Hpa Tu Gyi	Hpa Tu Chay	306	1,578	Rakhine	197495	This village has a lot more people than on the original list.
15	Pauktaw	Hpa Tu Gyi	Hpa Tu Gyi	157	643	Rakhine	197493	This village has much fewer people than on the original list.
16	Pauktaw	Hpa Tu Gyi	Aung Hla Pyin	120	542	Rakhine	197498	
17	Pauktaw	Hpa Tu Gyi	Tan Tin	172	788	Rakhine	197497	This village has a lot more people than in the original list.
18	Pauktaw	Kan Pyin Ywar Haung	Kan Paing Gyi	45	188	Rakhine	197475	
19	Pauktaw	Kan Pyin Ywar Haung	Kan Pyin Ku Lar	+/- 40	Data not available	Muslim	197476	This village is currently displaced.
20	Pauktaw	Kan Pyin Ywar Haung	Kan Pyin Ywar Haung	72	349	Rakhine	197473	
21	Pauktaw	Kyauk Su	Tan Hlwea Chaung	202	912	Rakhine	197503	This village has a lot more people than in the original list.

22	Pauktaw	Kyauk Su	Kyauk Su	189	741	Rakhine	197500	
23	Pauktaw	Kyauk Su	Mauk Pyar	209	878	Rakhine	197501	
24	Pauktaw	Kyauk Su	Nat Shin	246	997	Rakhine	197502	
25	Pauktaw	Nga Pyi Tet	Nga Pyi Tet	528	2,123	Rakhine	197477	This village has a lot more people than in the original list.
26	Pauktaw	Pon Nar Gyi	Cha Eik	Data not available	Data not available	Muslim	197414	This is a Muslim village. It is currently displaced.
27	Pauktaw	Pon Nar Gyi	Nget Chaung	Data not available	Data not available	Muslim		This is a Muslim village. It is currently displaced.
28	Pauktaw	Pon Nar Gyi	Thar Zay Kone	107	450	Rakhine	197415	
29	Pauktaw	Pyun Khaung	Pyun Khaung	325	1,382	Rakhine	197410	
30	Pauktaw	Saing Toke	Saing Toke	370	1157	Rakhine	197406	
31	Pauktaw	Sin Paik	Don	About 330	Data not available	Muslim	197422	This village is currently displaced.
32	Pauktaw	Sin Paik	Lin Bar Di Yar	About 60	Data not available	Muslim	197421	This village is currently displaced.
33	Pauktaw	Sin Paik	Sin Paik	230	870	Rakhine	197419	
34	Pauktaw	Tha Yet Chaung	Tha Yet Chaung	152	662	Rakhine	197499	
35	Pauktaw	Thar Zay	Kan Chaung	520	2,344	Rakhine	197408	
36	Pauktaw	Thar Zay	Thar Zay	227	1060	Rakhine	197407	
37	Pauktaw	Thit Poke	Thit Poke	560	2249	Rakhine	197412	
38	Pauktaw	Zee Cho Maw	Su Li Hpat Yan	+/- 70	Data not available	Muslim	197438	This village is currently displaced.
39	Pauktaw	Zee Cho Maw	Zee Cho Maw	124	533	Rakhine	197437	
40	Pauktaw	Sin Paik	Sin Paik Ywar Thit	Data not available	Data not available	Muslim	197420	This village is currently displaced.
41	Pauktaw	Byaing Thit	Kha Maung Tway					This is the same village as PT 03
42	Pauktaw	Byaing Thit	Kun Chaing	62	277	Rakhine	217994	
43	Pauktaw	Kan Pyin Ywar Haung	Kun Thee Pat Ku Lar	+/- 45	Data not available	Muslim	197474	This village is currently displaced.
44	Pauktaw	Byaing Thit	Kyauk Chaung					This is the same village as PT 07
45	Pauktaw	Byaing Thit	Nga Me Byin Peik Seik	140	500	Rakhine	217983	
46	Pauktaw	Byaing Thit	Nga Ra Pa Chaing Peik Se	300	1,450	Rakhine	217984	
47	Pauktaw	Hpa Tu Gyi	Nga Yoke Chaung	122	452	Rakhine	217998	
48	Pauktaw	Hpa Tu Gyi	Pa Din	72	402	Rakhine	218001	
49	Pauktaw	Pon Nar Gyi	Pon Nar Gyi	484	2297	Rakhine	197413	
50	Pauktaw	Byaing thit	Tha Byu Chaing	43	177	Rakhine	217996	The population of this village has reduced (perhaps seasonal fishermen were included in the original list)
51	Pauktaw	Kyauk Su	Thae Dway	120	527	Rakhine	217997	This village has doubled in population.

The Tat Lan villages in Pauktaw are found on three (clusters of) islands, and will be discussed island by island.



Map 1. Overview of Tat Lan villages in Pauktaw Township.



## 6.2 CENTRAL PAUKTAW (SECOND ISLAND FROM THE WEST)

On the second island from the ocean shore, there are fourteen Tat Lan villages in five clusters. The first two clusters of Tat Lan villages are on the north-eastern side of the island. This is a flat polder landscape. Of the seven Tat Lan villages in this area, three are Muslim villages. These villages were destroyed in the violence of 2012. Due to the situation, data collection could not yet be completed for these villages.

The other seven Tat Lan villages are on the southern half of the island. This is a narrow stretch of hills with small flat areas near the seashore on both sides. All paddy areas belonging to these villages have a gentle slope from the hills towards the shore. This means that the embankments around those areas only protect a narrow strip with the lowest-lying paddy fields, while the higher-lying paddy fields do not need protection. Besides, constructing sluices will not be feasible as only a small percentage of the catchments of these embankments is 'flat area', and the volume of drainage water that can be buffered is too small. Also, storm surges are very high in this area, and there is no way of planting enough mangroves near the shore because the sea gets deep quite quickly. This means that it is only possible to construct embankments that will not be damaged by either excess drainage water or a storm surge if these embankments are about 5-7 feet higher than spring high tide. That is prohibitively expensive.

It is therefore not advisable to construct or renovate embankments in these seven villages under Tat Lan: it is too expensive, and it is not at all sure that a reasonable guarantee can be given that the embankments will not break in the next cyclone or heavy rainshower. These villages can be included in the Tat Lan program for other activities, but should be left out of the embankment and sluice-related activities.

The north-western and north-central parts of the island are not included in Tat Lan.

### 6.2.1 ZEE CHO MAW (PT 39), SU LI HPAT YAN (PT 38), KAN PAING GYI (PT 18), KAN PYIN YWAR HAUNG (PT 20), KAN PYIN KU LAR (PT 19), KUN THEE PAT KU LAR (PT 43)

Number	Township	Village Tract	Village
PT 39	Pauktaw	Zee Cho Maw	Zee Cho Maw
<b>Introduction</b>			
Zee Cho Maw has 124 households. 49 households cultivate 360 acres of paddy. There are 13 fishermen. The other households are landless.			
<b>Embankments</b>			
The fields of PT 39, PT 38, PT 18, PT 20, PT 19 and PT 43 are all adjoining, and can best be protected by a single ring embankment that also includes fields of different villages from Myint Gar and Kyauk Taung VTs. This embankment runs along the boundary between paddy fields and prawn ponds in the north and east, and along creeks in the south and west. The total length of such a ring embankment is about 117,000 feet (if the boundary between paddy fields and prawn ponds can be straightened here and there). Two stretches of this embankment (about 7,000 feet) have already been upgraded by the Irrigation Department. These do not need further works. Some other stretches have been rehabilitated by CDN, but elevation and sideslopes are not up to the proposed standard.			
In order to bring the remaining 110,000 feet to standard, it must be raised to an average height of 6.5' (more along the eastern side of the polder, and less along the western side of the polder). The width of the embankment must be 5' on the northern and eastern sides, and 3' on the southern and western sides. This will require about 7.5 million ft <sup>3</sup> of work (213,000 m <sup>3</sup> ). This will cost about 361 million MMK (424,000 USD).			
A problem in this area is the tension between Rakhine and Muslim villages. While it is understandable that each village wants its own territory surrounded by an embankment, Tat Lan should only focus on the embankment that protects paddy fields against the sea. This might act as a connecting factor between different villages. If people decide that they still want their fields separated, it is always possible to construct or upgrade boundary embankments, but that should be done by the communities themselves and it will have little or no impact on protecting fields against seawater.			
<b>Sluices</b>			
The total area enclosed by the proposed embankment is about 6,000 acres – of which about 5,000-5,500 acres are paddy fields. This area is fully low-lying, and it is located in Tidal Zone II. This means that a total of 6,000 / 270 ~ 22 sluice openings are needed. The survey team has not come across any concrete sluices in the area, which would mean that all sluices must be constructed from scratch. It would be best to do this in sluice structures with two or three openings, and reasonably spread out over the different village areas. When this is done, drainage will not be affected in case villages decide to separate their fields from other villages by building a boundary embankment.			

Number	Township	Village Tract	Village
PT 39	Pauktaw	Zee Cho Maw	Zee Cho Maw
<b>Drinking water</b> The village has three ponds, but these do not hold enough water. People asked for one pond to be deepened and fenced.			
<b>Irrigation</b> There is no irrigation at the moment. It might be possible to introduce treadle pumps.			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 38	Pauktaw	Zee Cho Maw	Su Li Hpat Yan
<b>Introduction</b> Su Li Hpat Yan has about 70 households. It was destroyed in the 2012 violence. Currently, the entire population is displaced. The village has about 800 acres of paddy land. It was not possible to speak to villagers and collect additional data.			
<b>Embankments</b> See PT 39.			
<b>Sluices</b> See PT 39.			
<b>Drinking water</b> The village has two ponds. It is not clear whether this is enough or not.			
<b>Irrigation</b> No data available			
<b>Other</b> No data available			

Number	Township	Village Tract	Village
PT 18	Pauktaw	Kan Pyin Ywar Haung	Kan Paing Gyi
<b>Introduction</b> Kan Paing Gyi has 45 households. 15 farmers cultivate 120 acres of paddy, and 10 household together grow about 0.5 acres of winter crops. Three households grow 1 acre of nipa palms.			
<b>Embankments</b> See PT 39.			
<b>Sluices</b> See PT 39.			
<b>Drinking water</b> The village has enough water.			
<b>Irrigation</b> There is no irrigation at the moment. It might be possible to introduce treadle pumps.			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 20	Pauktaw	Kan Pyin Ywar Haung	Kan Pyin Ywar Haung
<b>Introduction</b> Kan Pyin Ywar Haung has 72 households. 35 farmers cultivate 430 acres of paddy. Three households together grow 1 acre of nipa palms. Three households operate a total of 170 acres of prawn ponds, and 20 households operate 220 acres of salt pans.			
<b>Embankments</b> See PT 39.			
<b>Sluices</b> See PT 39.			
<b>Drinking water</b> The village has enough water.			
<b>Irrigation</b> There is no irrigation at the moment. It might be possible to introduce treadle pumps.			

Number	Township	Village Tract	Village
PT 20	Pauktaw	Kan Pyin Ywar Haung	Kan Pyin Ywar Haung
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 19	Pauktaw	Kan Pyin Ywar Haung	Kan Pyin Ku Lar
<b>Introduction</b> Kan Pyin Ku Lar was destroyed in the 2012 violence, and the population is displaced. It has about 40 households. The villagers are mostly labourers.			
<b>Embankments</b> See PT 39.			
<b>Sluices</b> See PT 39.			
<b>Drinking water</b> There is one shallow pond in the village. No data are available on whether or not this is enough.			
<b>Irrigation</b> No data available			
<b>Other</b> No data available			

Number	Township	Village Tract	Village
PT 43	Pauktaw	Kan Pyin Ywar Haung	Kun Thee Pat Ku Lar
<b>Introduction</b> Kun Thee Pat Ku Lar was destroyed in the 2012 violence and the entire population is displaced. It has about 45 households. The villagers are mostly labourers.			
<b>Embankments</b> See PT 39.			
<b>Sluices</b> See PT 39.			
<b>Drinking water</b> There is one shallow pond in the village. No data are available on whether or not this is enough.			
<b>Irrigation</b> No data available			
<b>Other</b> No data available			

### 6.2.2 NGA PYI TET (PT 25)

Number	Township	Village Tract	Village
PT 25	Pauktaw	Nga Pyi Tet	Nga Pyi Tet
<b>Introduction</b> Nga Pyi Tet has 528 households. Nga Pyi Tet VT covers a large area. 113 farmers cultivate 3,250 acres of paddy. Apart from this, there is 4,500 acres of prawn ponds and 1,500 acres of salterns.			
<b>Embankments</b> Nga Pyi Tet has two embankments: an external embankment around the prawn ponds, and an internal embankment around the paddy fields. Only the paddy embankment should be considered for rehabilitation under Tat Lan. This embankment is about 39,000 feet long. It must be given a freeboard of 2' and a crest width of 3'. That means the average height must be about 5'. This will require about 2.0 million ft <sup>3</sup> of work (56,500 m <sup>3</sup> ). This will cost about 96 million MMK (113,000 USD).			
<b>Sluices</b> The area enclosed by the paddy embankment is about 950 acres, of which about 95% is low-lying. This polder is in Tidal Zone II, which means that 950 / 270 ~ 4 sluice openings are needed. There are only wooden sluices at the moment.			



Number	Township	Village Tract	Village
PT 25	Pauktaw	Nga Pyi Tet	Nga Pyi Tet
<b>Drinking water</b>			
The village faces some drinking water shortage. When this happens, people go to adjoining villages. Nga Pyi Tet has ten ponds, but they dry up because the ponds are shallow (between 3' and 7' deep). If possible, ponds should be either deepened to increase storage or covered to reduce evaporation. If a stock of old lorry tyres can be found somewhere, they can be turned into floats by closing the inner circle and filling them with styrofoam. This is a method that has proven to reduce evaporation losses substantially, but a lot of tyres are needed.			
<b>Irrigation</b>			
There is not enough freshwater to make winter crops possible at the moment. If the embankment is repaired, it might be possible to introduce treadle pumps along blocked creeks.			
<b>Other</b>			
N/A			

### 6.2.3 AUNG HLA PYIN (PT 16), AH LEL (PT 12), HPA TU GYI (PT 15), HPA TU CHAY (PT 14)

Number	Township	Village Tract	Village
PT 16	Pauktaw	Hpa Tu Gyi	Aung Hla Pyin
<b>Introduction</b>			
Aung Hla Pyin has 120 households. 37 farmers cultivate 100 acres of paddy, of which 80 acres is near Myauk Pyin village, and 20 acres near Aung Ha Pyin. About 25 farmers grow winter crops on a total of 10 acres. Other households are engaged in fishing and/or casual labour (including wood cutting).			
<b>Embankments</b>			
N/A: No fields near the shore			
<b>Sluices</b>			
N/A: No fields near the shore			
<b>Drinking water</b>			
The village has some shortage of drinking water. The village has a pond and a well. If these do not give enough water, people dig shallow wells at the foot of the mountain. It would be good to turn this into a permanent well. Fencing is also needed.			
<b>Irrigation</b>			
The winter crops are irrigated from handdug wells near the fields.			
<b>Other</b>			
N/A.			

Number	Township	Village Tract	Village
PT 12	Pauktaw	Hpa Tu Gyi	Ah Lel
<b>Introduction</b>			
Ah Lel has 325 households. 18 farmers cultivate 171 acres of paddy. Another 100 acres of land in the hillsides is cultivated. Most households engage in casual labour and/or in fishing			
<b>Embankments</b>			
N/A: No fields near the shore			
<b>Sluices</b>			
N/A: No fields near the shore			
<b>Drinking water</b>			
The village has some shortage of drinking water. There are five ponds and a well, but the ponds are shallow (2 x 4', 1 x 7' and 2 x 8' deep). There is no space for new ponds, so the best option is to deepen the existing ponds.			
<b>Irrigation</b>			
N/A			
<b>Other</b>			
N/A			

Number	Township	Village Tract	Village
PT 15	Pauktaw	Hpa Tu Gyi	Hpa Tu Gyi

Number	Township	Village Tract	Village
PT 15	Pauktaw	Hpa Tu Gyi	Hpa Tu Gyi
<b>Introduction</b> This village has 157 households. 32 households cultivate a total of 292 acres of paddy (240 acres near Myauk Pyin village, and 52 acres near the village). Winter crops are grown on 10 acres. There is 30 acres of cultivation in the hills. Most households engage in casual labour or fishing.			
<b>Embankments</b> N/A: No fields near the shore			
<b>Sluices</b> N/A: No fields near the shore			
<b>Drinking water</b> The village has enough drinking water. People asked for fencing for one of the three ponds.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 14	Pauktaw	Hpa Tu Gyi	Hpa Tu Chay
<b>Introduction</b> The village has 306 households. Of these, 44 are engaged in paddy cultivation on 259 acres. Only 15 acres is near the village; the rest is near Nga Pyi Tet (PT 25). There is a lot of poverty in this village.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive. For the fields near Nga Pyi Tet, see PT 25.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> There is some shortage of drinking water every year. The village has two ponds and three wells. People asked for another pond. It might also be possible to divert water from the little river between this village and Hpa Tu Gyi towards the ponds.			
<b>Irrigation</b> Not feasible			
<b>Other</b> N/A			

#### 6.2.4 HPA YAR CHAUNG (PT 13), NGA YOKE CHAUNG (PT 47), TAN TIN (PT 17)

Number	Township	Village Tract	Village
PT 13	Pauktaw	Hpa Tu Gyi	Hpa Yar Chaung
<b>Introduction</b> This village has 227 households. 43 farmers own 146 acres of paddy fields. Besides, 45 farmers cultivate 76 acres of fields in the hills. It is not clear whether this is the same group as the paddy farmers or a different group.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has three ponds, four wells and three springs. During the end of the dry season, there is not enough water available, and people dig temporary wells along the stream that flows next to the village. People ask for another well, which might be good if it is dug near the stream. Otherwise, it might be better to look at installing buffer reservoirs at the springs, and/or at constructing a small diversion structure to feed water from the stream to the ponds.			
<b>Irrigation</b> Not feasible.			

Number	Township	Village Tract	Village
PT 13	Pauktaw	Hpa Tu Gyi	Hpa Yar Chaung
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 47	Pauktaw	Hpa Tu Gyi	Nga Yoke Chaung
<b>Introduction</b> The village has 122 households. People cultivate about 50 acres of fields in the hills with corn, beans, pumpkin, etc. in the rainy season, as well as fruit trees.			
<b>Embankments</b> This village has no embankments.			
<b>Sluices</b> N/A			
<b>Drinking water</b> The village faces a severe water shortage during the dry season, but water is available along the bed of the stream, a little into the hills. There are two wells in poor condition. People have asked for repair of the existing wells and construction of two new wells near the stream.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 17	Pauktaw	Hpa Tu Gyi	Tan Tin
<b>Introduction</b> This village has 172 households. 29 farmers cultivate the 83 acres of paddy near the village. 73 farmers grow about 50 acres of winter crops. Besides, there are many people who cultivate fields in the hills.			
<b>Embankments</b> N/A: No fields near the shore			
<b>Sluices</b> N/A: No fields near the shore			
<b>Drinking water</b> The village has one well and two springs. Sometimes there is a shortage of water. To address this, people asked for the renovation of the well. Depending on the yield of the springs and the well, another well might be needed. If storage tanks are not available near the springs, it might be good to install these.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

#### 6.2.5 PA DIN (PT 48)

Number	Township	Village Tract	Village
PT 48	Pauktaw	Hpa Tu Gyi	Pa Din
<b>Introduction</b> Rakhine has 72 families. All are into fishing. Only one farmer cultivates four acres of paddy behind the village, and in total there is about 20 acres of shifting cultivation, done by several households.			
<b>Embankments</b> N/A: No fields near the shore			
<b>Sluices</b> N/A: No fields near the shore			
<b>Drinking water</b> The village has one (small) pond, one spring and one well. During the end of the dry season, people experience some shortage of drinking water. Upgrading of the spring (with a buffer reservoir) will improve the situation. People have also asked for another pond.			
<b>Irrigation</b> N/A			

<b>Number</b>	<b>Township</b>	<b>Village Tract</b>	<b>Village</b>
PT 48	Pauktaw	Hpa Tu Gyi	Pa Din
<b>Other</b> N/A			

### 6.3 CENTRAL PAUKTAW (EAST PHA YONE KA ISLAND)

East Pha Yone Ka island is a long, narrow island that is slightly wider at its northern end. There are 17 villages on this island, all of which are included in Tat Lan. Along the centreline of the island is a row of hills, while the northern, western and eastern shores are more flat. Directly north of this island is a small uninhabited island that is cultivated by people from some of the Tat Lan villages. North of that are two more small islands that are not included in Tat Lan.

With exception of four polders belonging to Kyauk Maung (PT 04), Tan Hlwea Chaung (PT 21), Nat Shin (PT 24) and Tha Yet Chaung (PT 34), all paddy areas on this island have a gentle slope from the hills towards the shore. This means that the embankments around those areas only protect a narrow strip with the lowest-lying paddy fields, while the higher-lying paddy fields do not need protection. Besides, constructing sluices will not be feasible as only a small percentage of the catchments of these embankments is 'flat area'. Also, storm surges are very high in this area, and there is no way of planting enough mangroves near the shore because the sea gets deep quite quickly. This means that it is only possible to construct embankments that will not be damaged by either excess drainage water or a storm surge if these embankments are about 5-7 feet higher than spring high tide. That is prohibitively expensive.

It is therefore not advisable to construct or renovate embankments in these villages under Tat Lan: it is too expensive, and it is not at all sure that a reasonable guarantee can be given that the embankments will not break in the next cyclone or heavy rainshower. All these villages can be included in the Tat Lan program for other activities, but should be left out of the embankment and sluice-related activities (except for the polders in the three villages mentioned above).

#### 6.3.1 THA YET CHAUNG (PT 34), TAN HLWEA CHAUNG (PT 21), MAUK PYAR (PT 23), NAT SHIN (PT 24), KYAUK SU (PT 22), THAE DWAY (PT 51), KYAUK MAUNG (PT 04)

Number	Township	Village Tract	Village
PT 34	Pauktaw	Tha Yet Chaung	Tha Yet Chaung
<b>Introduction</b>			
Tha Yet Chaung has 152 households. 56 farmers grow 243 acres of paddy. 28 of the farmers grow winter crops on a total of 7 acres. There are 61 fishermen. The other households depend on casual labour.			
<b>Embankments</b>			
There are two polders cultivated by farmers from Tha Yet Chaung for which embankment renovation is a feasible option. One of the polders, directly north of the village, is also cultivated by farmers from Tan Hlwea Chaung (PT 21). This polder is 116 acres large, and it is protected by an embankment of 8,500 feet long. It must be upgraded to an average height of about 7' (freeboard 2', crest width 3'). This will require about 929,000 ft <sup>3</sup> of work (26,300 m <sup>3</sup> ). This will cost about 44.6 million MMK (52,500 USD). The second polder is on an island directly north of the village. This polder is known as the War Kyun field, and has 108 acres of paddy fields. The embankment around the field is 8,500 feet long. It must be upgraded to an average height of about 5'6". This will require about 536,400 ft <sup>3</sup> of work (15,200 m <sup>3</sup> ). This will cost about 25.7 million MMK (30,400 USD).			
<b>Sluices</b>			
The first polder has one brick sluice (3' wide). This is not enough. One sluice opening (design for Tidal Zone III, but 5' high) must be added. The sluice that is already there might need to be removed if it is too small to fit into the new embankment cross-section. If its size fits with the new embankment cross-section, nothing needs to be done about it. The second polder does not have any masonry or concrete sluices. One sluice opening (design for Tidal Zone III, but 5' high) must be built.			
<b>Drinking water</b>			
The village has six ponds, some of which dry up. In order to address the shortage of fresh water, two short embankments south of the village must be upgraded. This will create a freshwater reservoir with a capacity of 20-30,000 m <sup>3</sup> . Upgrading these embankments (and installing proper spillway structures) will cost approximately 40-50,000 USD.			
<b>Irrigation</b>			
N/A.			
<b>Other</b>			
N/A			

Number	Township	Village Tract	Village
PT 21	Pauktaw	Kyauk Su	Tan Hlwea Chaung
<b>Introduction</b> Tan Hlwea Chaung has 202 households. There are 61 farmers, who cultivate 314 acres of paddy (and 4 acres of winter crops). 20 people engage in hillside cultivation on 15 acres.			
<b>Embankments</b> See PT 34. For the other paddy fields of the village, embankment and sluice renovation is not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> See PT 34 and see above.			
<b>Drinking water</b> The village has seven ponds, but faces a water shortage at the end of the dry season. This is likely because of two problems. Firstly, the ponds are not very deep (between 4.5 and 9 feet), while evaporation losses for the dry season are 3 feet or a little more. Secondly, some of the water from the ponds is used for winter crop cultivation. This can require a lot of water. One option to address the water shortage is to deepen the ponds. A second thing that needs to be done is the working out of well-calculated rules for how much land can be irrigated from the pond while still keeping enough water for drinking purposes. If needed, one or two extra ponds can be dug.			
<b>Irrigation</b> Some fields are irrigated from the ponds. This needs to be reviewed. See above.			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 23	Pauktaw	Kyauk Su	Mauk Pyar
<b>Introduction</b> Myauk Pyar has 209 households. 43 farmers cultivate 237 acres of paddy fields. 14 people cultivate winter drops on a total of 4 acres. There is also cultivation on the hillsides.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has four ponds, a spring and a tubewell. These do not provide enough water at the end of the dry season. People asked for more ponds.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 24	Pauktaw	Kyauk Su	Nat Shin
<b>Introduction</b> Nat Shin has 246 households. 32 households cultivate 165 acres of paddy. The vast majority of the households are into fishing.			
<b>Embankments</b> Nat Shin has some paddy fields southwest of the village, and the remaining paddy fields re east of the village. The paddy fields to the southwest (and the adjoining fields of Kyauk Su village) are protected by an embankment with a total length of about 6,700 feet. This embankment must be upgraded to an average height of 5'. That will require about 266,000 ft <sup>3</sup> of work (7,500 m <sup>3</sup> ). This will cost about 12.8 million MMK (15,000 USD).			
<b>Sluices</b> The polder mentioned above has a catchment area of 200 acres, of which 35-40% is low-lying. The area is in Tidal Zone I, but a single sluice of the type for Tidal Zone I would be excessive. There are already four sluice openings in place with a combined width of 7'. One new sluice of the type for Tidal Zone III must be added, and all sluices must be fitted with flap gates.			



Number	Township	Village Tract	Village
PT 24	Pauktaw	Kyauk Su	Nat Shin
<b>Drinking water</b> The village has three ponds and a tubewell. There is some shortage in the dry season. When that happens, people dig temporary wells. Because the ponds are shallow, it might be possible to deepen them.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 22	Pauktaw	Kyauk Su	Kyauk Su
<b>Introduction</b> Kyauk Su has 189 households. Of these, 65 farmers together own 87 acres of paddy fields. 19 of the farmers also engage in hillside cultivation, while 10 farmers engage in winter cropping.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has seven ponds, most of which are shallow. There is some water shortage at the end of the dry season. Only four of the ponds are used for drinking. The people suggested to renovate the ponds. Deepening them would probably make most sense.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 51	Pauktaw	Kyauk Su	Thae Dway
<b>Introduction</b> Thae Dway has 120 households. 74 are into fishing. 6 farmers cultivate 40 acres of paddy, and 6 farmers cultivate 2 acres of winter crops. There are 40 landless households.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has three ponds, of which two are used for drinking. In the last month of the dry season, there is usually not enough water. People then dig temporary wells. In the dry season, many people migrate into the village for fishing purposes. This means that more water is needed. People preferred to renovate the existing ponds (with fencing included), and to construct a shallow well.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 04	Pauktaw	Byaing Thit	Kyauk Maung
<b>Introduction</b> Kyauk Maung has 261 households. 76 farmers cultivate 570 acres of paddy; 14 of the farmers also grow 20 acres of winter crops. There are 74 fishermen, and 111 households dependent on casual labour.			

Number	Township	Village Tract	Village
PT 04	Pauktaw	Byaing Thit	Kyauk Maung
<b>Embankments</b>			
<p>South of the village, there are 250 acres of low-lying paddy fields that need to be protected by upgrading a 20,000 feet long embankment. This embankment will need to be upgraded to an average height of about 5'6". That require about 1.3 million ft<sup>3</sup> of work (35,700 m<sup>3</sup>). This will cost about 60.6 million MMK (71,300 USD).</p> <p>The village has two other paddy areas, but there the low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive. In order to protect the embankment against damage by the sea, mangroves must be planted in front of it.</p>			
<b>Sluices</b>			
<p>The catchment area of the proposed embankment is about 660 acres, of which 35-40% is low-lying. Being located in Tidal Zone I, this means that one sluice with a width of 6' is needed. However, as the embankment is very long, it is better to construct four or five sluice openings of the design for Tidal Zone III (but with a sluice height of 5'-6') at regular intervals along the embankment, provided that the sluices are built on a rocky foundation.</p>			
<b>Drinking water</b>			
The village has enough drinking water.			
<b>Irrigation</b>			
<p>The villagers have constructed a small reservoir around 2000, but it has broken because the villagers did not have access to adequate technical knowledge at the time. If renovated, this 200 foot long embankment will store about 2 acrefeet of water, which is enough for irrigating 2-5 acres of winter crops (depending on residual soil moisture on planting and rainfall during the growing season). This will cost about 40,000 USD</p>			
<b>Other</b>			
N/A			

### 6.3.2 MA NYIN KAING (PT 05), OHN TA PIN (PT 07 = PT 44)

Number	Township	Village Tract	Village
PT 05	Pauktaw	Byaing Thit	Ma Nyin Kaing
<b>Introduction</b>			
<p>This village has 114 households. There are 20 farmers, who cultivate 82 acres of paddy. Eight of them also grow 4 acres of winter crops. There are 44 fishermen, and 50 landless households. Fishing is the dominant source of income in the village.</p>			
<b>Embankments</b>			
Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b>			
Not feasible.			
<b>Drinking water</b>			
<p>The village faces some shortage of drinking water. There are two ponds, three springs and two wells. If two or three of the springs are upgraded, the village will have enough water. Besides, it might be good to deepen the ponds, which are very shallow.</p>			
<b>Irrigation</b>			
N/A			
<b>Other</b>			
N/A			

Number	Township	Village Tract	Village
PT 07 = PT 44	Pauktaw	Byaing Thit	Ohn Ta Pin (also known as Kyauk Chaung)
<b>Introduction</b>			
<p>Ohn Ta Pin has 77 households. It is a poor village, mostly dependent on fishing. Eleven households cultivate 41 acres of paddy. Twenty households grow winter crops on 5 acres. There are 39 fishermen, and 27 landless households.</p>			
<b>Embankments</b>			
Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			

Number	Township	Village Tract	Village
PT 07 = PT 44	Pauktaw	Byaing Thit	Ohn Ta Pin (also known as Kyauk Chaung)
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has two ponds (for domestic use, not drinking), three hand-dug wells, two springs (one has a water collection tank). There is some shortage at the end of the dry season. If the other spring can also be fitted with a water collection tank, the effective yield will increase.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

### 6.3.3 BYAING THIT (PT 02)

Number	Township	Village Tract	Village
PT 02	Pauktaw	Byaing Thit	Byaing Thit
<b>Introduction</b> Byaing Thit has 245 households. About 70 are reported to be fishermen, 60 are landless, and 50-80 are into farming. Reportedly, 220 acres of rainy season paddy and 20 acres of winter crops are cultivated.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has seven ponds (2 for drinking, 5 for domestic use) and one well. All the ponds dry up towards the end of the dry season, and people dig hand-dug wells during that time. One pond is damaged. People have asked for rehabilitation and fencing of the ponds. It might be possible to deepen one or more ponds (although the drinking water ponds are already 13-15 feet deep). If seepage is a problem, lining might be useful.			
<b>Irrigation</b> There is no irrigation in the area, and no possibilities for developing irrigation			
<b>Other</b> N/A			

### 6.3.4 KUN CHAUNG (PT 42)

Number	Township	Village Tract	Village
PT 42	Pauktaw	Byaing Thit	Kun Chaung
<b>Introduction</b> Kun Chaung has 62 households. There are five farmers who cultivate 67.5 acres of paddy. Four farmers grow 1 acre of winter crops. There are 16 fishermen. The remaining 41 households are dependent on casual labour.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has enough drinking water.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

**6.3.5 NGA ME BYIN PEIK SEIK (PT 45), THA BYU CHAING (PT 50), NA RA PA CHAING PEIK SEIK (PT 46)**

Number	Township	Village Tract	Village
PT 45	Pauktaw	Byaing Thit	Nga Me Byin Peik Seik
<b>Introduction</b> The village has 140 households. 40 farmers cultivate 120 acres of paddy. There are 30 fishermen and 60 households dependent on casual labour.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has two ponds (one for drinking, one for domestic use), two wells and a spring (which has been fitted with a collection tank). For two months in the year, the ponds dry up and the yield of the wells and spring are low. People then dig temporary wells inside the ponds. It would be good to deepen the existing ponds to increase storage. If possible, the drinking water pond (40'x 40'x4') might also be enlarged.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 50	Pauktaw	Byaing Thit	Tha Byu Chaing
<b>Introduction</b> The village has 43 households, of whom only one is into farming. This household grows 2 acres of paddy. There are 32 fishermen and 8 households dependent on casual labour. During the fishing season, several households from elsewhere stay in the village to fish.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has one pond and one spring (which has a water collection tank). For one month in the year, the pond is dry, and people queue for a very long time at the spring. People asked for support to renovate the pond. It would be good if the pond can be deepened, and possibly enlarged. They have rocks available for stone pitching on the sea-facing side of the embankment around the pond.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 46	Pauktaw	Byaing Thit	Nga Ra Pa Chaing Peik Seik
<b>Introduction</b> This village has 300 households. Most (234) are dependent on unskilled labour. There are 6 farmers who grow 24 acres of paddy. 7 farmers grow 4 acres of winter crops. There are also 20 fishermen.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has four ponds, five wells and a spring. For one and a half months every year, the ponds dry up and the village has a shortage of water. People then queue up at the spring, which is quite far from the village. It would be good if the existing ponds can be renovated. There are two that are particularly shallow (2' and 6').			

Number	Township	Village Tract	Village
PT 46	Pauktaw	Byaing Thit	Nga Ra Pa Chaing Peik Seik
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

#### 6.3.6 KHA MAUNG TWAY (PT 03 = PT 41)

Number	Township	Village Tract	Village
PT 03	Pauktaw	Byaing Thit	Kha Maung Tway
<b>Introduction</b> This village has 58 households. Farming is done by 24 households (on 67 acres), fishing is done by 14 households, and 20 households are landless labourers. Winter crops are cultivated by 2 farmers (1 acre in total)			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> This village has two ponds and three wells. All of these dry up in April. During the end of the dry season, people collect water at a spring that is quite far away. Because everybody goes to collect water from the same spring, people have to wait quite a long time. People have asked for renovation (and fencing) of the existing ponds and wells. Lining and/or deepening of the ponds might be an option. Alternatively, it would be good if a storage tank with multiple taps can be constructed near the spring to reduce the waiting time.			
<b>Irrigation</b> Not available, and not possible to develop			
<b>Other</b> N/A			

#### 6.3.7 PYIN GYI (PT 08)

Number	Township	Village Tract	Village
PT 08	Pauktaw	Byaing Thit	Pyin Gyi
<b>Introduction</b> Pyin Gyi has 100 households. There are 41 farmers, who grow 150 acres of paddy. 12 farmers grow 10 acres of winter crops. There are 31 fishermen, and 25 households dependent on casual labour. Some shifting cultivation also happens.			
<b>Embankments</b> Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b> Not feasible.			
<b>Drinking water</b> The village has three ponds and four wells. Two of the ponds were renovated by Save the Children after Giri. All the ponds dry up in April, despite the fact that they are reasonably deep. The yield of the wells is also very low by then, and people are forced to go to a spring that is about 2 hours away. Seepage seems to be a problem for the ponds, because even after correcting for evaporation, the ponds should hold more than double the total water requirement of the people living in Pyin Gyi. Provision of lining (either clay or plastic) will likely increase the availability of water in the village.			
<b>Irrigation</b> N/A			
<b>Other</b> N/A			

### 6.3.8 NGA YAE CHAING (PT 06)

Number	Township	Village Tract	Village
PT 06	Pauktaw	Byaing Thit	Nga Yae Chaing
<b>Introduction</b>			
This village has 153 households. There are 22 farmers, cultivating 68 acres of paddy. Fishing is the main source of income in the village. There are 80 fishermen. 48 households depend on casual labour for their income.			
<b>Embankments</b>			
Not feasible. The low-lying area is such a small percentage of the catchment area that a good combination of embankment and sluice designs would become too expensive.			
<b>Sluices</b>			
Not feasible.			
<b>Drinking water</b>			
The village has two ponds (one of which is damaged) and five wells. For about 1 ½ months each year, people face a shortage of water. The ponds should be renovated to provide enough water. People also asked for one more well.			
<b>Irrigation</b>			
N/A			
<b>Other</b>			
N/A			



## 6.4 EASTERN PAUKTAW

The third area in Pauktaw where villages have been selected for Tat Lan is a large island on the eastern border of the township. This large island (actually a cluster of smaller islands separated by narrow creeks) has a total surface area of about 37,000 acres. There are 17 villages, which all have been included in the Tat Lan village list. The entire island is flat. Those parts which are not creeks, mangroves or villages are used for paddy cultivation, aquaculture or salt production. The total productive land of this island is around 30-32,000 acres.

In order to enable interior villages to stay accessible, the largest creeks must stay in open connection to the sea. This splits the island into seven separate polders. There are many embankments in the area, but for Tat Lan the absolute minimum that must be renovated is the outer embankments around each of these polders. Some of these embankments fall under the responsibility of the Irrigation Department; the remainder can be included under Tat Lan (see below).

If four locks can be built at the mouths of creeks that have embankments on both sides (near Thar Zay, near Pyun Khaung, and in the two creek openings north and south of Ah Lel Kyun), then the total length of embankments required can be reduced to about 200,000 feet. This will reduce the cost of embankments by about 600-650,000 USD. The locks will cost about 200,000 USD, so the net cost reduction will be around 400-450,000 USD.

In this area, the storm surge caused by Giri was between 3 and 5 feet above spring high tide level. Because it will be too expensive to raise the embankment crest level, it will be essential to maintain mangroves around the outer boundary of the island, and to plant new mangroves where necessary. The mangroves will take some of the energy out of a storm surge, and make sure that the level of the storm surge will be lower by the time it reaches the embankment.

### 6.4.1 SAING TOKE (PT 30), THAR ZAY (PT 36)

Number	Township	Village Tract	Village
PT 30	Pauktaw	Saing Toke	Saing Toke
<b>Introduction</b>			
This village has 370 households. Of these, only 63 engage in farming. The vast majority of the households depend on casual labour. The village reportedly has a total of 1,170 acres of paddy land, 278 acres of prawn ponds, and 30 acres of salterns.			
<b>Embankments</b>			
Saing Toke and Thar Zay are located in the northernmost polder. This polder has a total surface area of almost 4,000 acres. Of this, about 2,500 acres is paddy fields. The remainder is taken up by creeks, two villages, prawn ponds and salterns. Some of the paddy fields also belong to villages on other islands, including Kan Chaung (PT 35). The total length of the embankment around this polder is about 70,000 feet. Of this, 12,300 feet have recently been upgraded by the Irrigation Department. This leaves a total of about 57,000 feet to be renovated under Tat Lan. The embankment must be upgraded to an average height of 6'6", and be given a crest width of 5' along the southern half because it is used for transport. This will require about 4.6 million ft <sup>3</sup> of work (130,000 m <sup>3</sup> ). This will cost about 220 million MMK (259,000 USD).			
<b>Sluices</b>			
This polder is located in Tidal Zone II. Almost 100% is flat land. This means that a sluice opening is needed for every 270 acres. That gives a total of 4,000 / 270 ~ 15 sluice openings. There are currently no stone or concrete sluice openings in the embankment, only wooden sluices. This means that 15 new sluice openings must be constructed. That will cost an estimated 250-350,000 USD. The existing sluices can stay in place as long as they do not undermine the structural stability of the embankment.			
<b>Drinking water</b>			
The village has enough drinking water throughout the year. Fencing needs to be provided around the ponds to improve safety.			
<b>Irrigation</b>			
Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b>			
N/A			

Number	Township	Village Tract	Village
PT 36	Pauktaw	Thar Zay	Thar Zay
<b>Introduction</b>			
Thar Zay has 227 households. Of these, 78 are reported to engage in paddy cultivation (cultivating 747 acres, partly in an adjoining polder), and 20 engage in fishing. The other households depend on casual labour.			
<b>Embankments</b>			
See PT 30. For the embankment around the adjoining polder, see PT 11.			
<b>Sluices</b>			
See PT 30			
<b>Drinking water</b>			
This village has some shortage of drinking water during the dry season. When that happens, people collect water from Saing Toke, which is less than 500 metres away. It might be possible to construct an additional pond for this village.			
<b>Irrigation</b>			
Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b>			
N/A			

#### 6.4.2 GYIN DWAY (PT 11), KAN CHAUNG (PT 35), PYUN KHAUNG (PT 29)

Number	Township	Village Tract	Village
PT 11	Pauktaw	Gyin Dway	Gyin Dway
<b>Introduction</b>			
The village has 190 households. Of these, 72 households cultivate 700 acres of paddy. 5 households operate 140 acres of prawn ponds, and another 5 households operate 80 acres of salterns. Fishing is done by 11 households.			
<b>Embankments</b>			
The fields of Gyin Dway, Kan Chaung, Pyun Khaung (and part of the fields of Thar Zay) are protected by one single ring embankment. This embankment has a total length of about 107,000 feet, and the enclosed area is about 6,100 acres. Of the embankment, a stretch of 50,000 feet around Pyun Khaung has already been renovated by the Irrigation Department. The remaining 57,000 feet must be renovated under Tat Lan. The average height of this embankment must be 7', including a freeboard of 3'. Crest width must be 4'. This will require about 5.6 million ft <sup>3</sup> of work (159,000 m <sup>3</sup> ). This will cost about 270 million MMK (317,500 USD).			
<b>Sluices</b>			
For this area (Tidal Zone II, 100% low-lying), a total of 6,100 / 270 ~ 23 sluice openings are needed. The assessment team observed five concrete structures with flap gates. These have a total of six openings of 6' wide and nine openings of 7' wide (total 99', equivalent to 19.8 standard sluice openings). The existing wooden sluices have enough capacity, but it would be good if they can be replaced by three concrete sluice openings – either in one structure, or three openings distributed across the embankment in appropriate locations.			
<b>Drinking water</b>			
There is some shortage in the dry season. If that happens, people go to Thar Zay Kone (PT 28) to collect water. That village has a very large pond. Gyin Dway has five ponds, which are all quite shallow. It might be possible to either deepen existing ponds or construct an additional pond for this village. For this, a study must be done to assess the risk of hitting salt water if a pond is deepened. It might also be good to construct a tank for the school.			
<b>Irrigation</b>			
Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b>			
N/A			

Number	Township	Village Tract	Village
PT 35	Pauktaw	Thar Zay	Kan Chaung
<b>Introduction</b> Kan Chaung has 520 households, of whom 261 engage in farming on 2291 acres. 30 households are fishermen, and the rest depends on casual labour.			
<b>Embankments</b> See PT 11 and PT 30			
<b>Sluices</b> See PT 11 and PT 30			
<b>Drinking water</b> The village has some water shortage during the dry season. When that happens, people go to nearby villages to collect water. Villagers asked for an additional pond.			
<b>Irrigation</b> Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b> N/A			

Number	Township	Village Tract	Village
PT 29	Pauktaw	Pyun Khaung	Pyun Khaung
<b>Introduction</b> Pyun Khaung has 325 households. 60 farmers own about 660 acres of paddy, about 40 acres of salterns and 400 acres of prawn ponds.			
<b>Embankments</b> See PT 11. The entire embankment around this village has been rehabilitated by the Irrigation Department.			
<b>Sluices</b> See PT 11			
<b>Drinking water</b> There is some shortage at the end of the dry season. When this happens, people go to Thar Zay Kone (3 km away), where there is a very large pond. The existing ponds are quite shallow. Over half of the water that gets into the pond will normally be lost to evaporation and seepage. If it is possible to deepen these ponds without hitting salty groundwater, that would result in a substantial availability of drinking water in the village. Alternatively, an additional pond could be dug if space is available.			
<b>Irrigation</b> Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b> N/A			

#### 6.4.3 AH LEL KYUN (PT 01)

Number	Township	Village Tract	Village
PT 01	Pauktaw	Ah Lel Kyun	Ah Lel Kyun
<b>Introduction</b> Ah Lel Kyun has 450 households. Of these, 112 are reported cultivate 1,100 acres of paddy. Another 40 households engage in fishing. The other households are dependent on casual labour. There are reportedly 300 acres of prawn ponds, and 100 acres of salterns.			

Number	Township	Village Tract	Village
PT 01	Pauktaw	Ah Lel Kyun	Ah Lel Kyun
<p><b>Embankments</b></p> <p>Ah Lel Kyun is located between two creeks. There are two embankments: one to the west of the village, and one to the east of the village.</p> <p>The western embankment protects an area of about 150 acres of paddy. This embankment has a length of about 15,700 feet. It was rehabilitated by RTA Associates, but has no freeboard and an insufficient sideslope. It needs to be raised to 2' above spring high tide (average height 6'). This will require about 1.0 million ft<sup>3</sup> of work (29,100 m<sup>3</sup>). This will cost about 49.4 million MMK (58,200 USD).</p> <p>The eastern embankment protects an area of about 1,500 acres of paddy, prawn ponds and salterns. This embankment has a length of about 39,000 feet. Of this, about 11,400 feet is being rehabilitated by the Irrigation Department. The remaining part was rehabilitated by RTA Associates, but has no freeboard and an insufficient sideslope. The height of this embankment must be raised to 2' above spring high tide (average height 7'). This will require about 2.5 million ft<sup>3</sup> of work (70,000 m<sup>3</sup>). This will cost about 118 million MMK (139,000 USD).</p>			
<p><b>Sluices</b></p> <p>In the western embankment, there is one wooden sluice with a slide gate. This polder needs one sluice opening. The existing sluice is probably sufficient, but it would be good to fit it with a flap gate. Alternatively, the entire sluice can be replaced by a masonry / concrete version.</p> <p>In the eastern embankment, there are two concrete sluices (each with two openings of 4'6" wide) in the stretch rehabilitated by the Irrigation Department. One is in poor condition, the other is in reasonable condition. Besides, there is a one masonry sluice (one opening of 4'6") in the stretch that was rehabilitated by RTA Associates. This sluice is in poor condition.</p> <p>Being located in Tidal Zone II, this polder needs 1,500 / 270 ~ 5.6 sluice openings. If the existing five openings are fitted with flap gates and repaired where necessary, one additional sluice opening needs to be added.</p>			
<p><b>Drinking water</b></p> <p>Ah Lel Kyun has some shortage of drinking water in the dry season. When that happens, people go to nearby villages to collect water. It would be good if one additional pond can be constructed.</p>			
<p><b>Irrigation</b></p> <p>Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.</p>			
<p><b>Other</b></p> <p>N/A</p>			

#### 6.4.4 CHAUNG ZAUK (PT 10), THIT POKE (PT 37)

Number	Township	Village Tract	Village
PT 10	Pauktaw	Chaung Zauk	Chaung Zauk
<p><b>Introduction</b></p> <p>Chaung Zauk has 291 households. According to local reports, 44 households cultivate a total of 578 acres, 50 households are fishermen, and 100 households are dependent on casual labour. (it is not clear what the other households do). There is about 120 acres of salt pans near the village.</p> <p>In this area, there are a lot of conflicts between prawn pond owners and paddy farmers.</p>			
<p><b>Embankments</b></p> <p>The paddy fields and prawn ponds of Chaung Zauk and Thit Poke are surrounded by a ring embankment that was constructed in 1963-4 by the Irrigation Department. This embankment is about 64,000 feet long and in need of rehabilitation, but the Irrigation Department has no plans for doing this. Because of that, it is good if this embankment can be included in Tat Lan. In total, the embankment protects an area of about 4,500 acres.</p> <p>This embankment must be upgraded to an average height of 6'. The freeboard must be 2', and the crest width must be 4'. This will require about 3.8 million ft<sup>3</sup> of work (109,000 m<sup>3</sup>). This will cost about 184 million MMK (217,000 USD).</p> <p>UNDP has upgraded an embankment that cuts the polder in two, and separates the paddy fields from the prawn ponds. If the ring embankment is rehabilitated, no additional works are needed on the UNDP embankment.</p>			

Number	Township	Village Tract	Village
PT 10	Pauktaw	Chaung Zauk	Chaung Zauk
<b>Sluices</b>			
This polder is in Tidal Zone II. There are three concrete sluice structures in the embankment. One has four culverts of 3' diameter with flap gates, one has three openings of 5' wide and is fitted with flap gates, and the third had three openings of 6' wide but is totally damaged due to undermining. On top of that, there are six wooden sluices with a total of eleven openings (with an average width of 3'). In order to provide sufficient drainage, the polder needs 4,500 / 270 ~17 sluice openings of the proposed standard design. If the existing sluices are repaired and the wooden sluices are replaced, an additional 12 sluice openings need to be constructed.			
<b>Drinking water</b>			
The village has enough drinking water.			
<b>Irrigation</b>			
Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b>			
N/A			

Number	Township	Village Tract	Village
PT 37	Pauktaw	Thit Poke	Thit Poke
<b>Introduction</b>			
Thit Poke has 560 households. About 70 households cultivate some 670 acres of paddy. Most of the other households are casual labourers. The village reportedly has 100 acres of salterns and about 700 acres of prawn ponds.			
<b>Embankments</b>			
See PT 10			
<b>Sluices</b>			
See PT 10			
<b>Drinking water</b>			
The village has enough water throughout the year.			
<b>Irrigation</b>			
Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b>			
N/A			

#### 6.4.5 CHAUNG THAR GYI (PT 09), THAR ZAY KONE (PT 28), PON NAR GYI (PT 49), SIN PAIK (PT 33), DON (PT 31), NGET CHAUNG (PT 27), LIN BAR DI YAR (PT 32), CHA EIK (PT 26), SIN PAIK YWAR THIT (PT 40)

Number	Township	Village Tract	Village
PT 09	Pauktaw	Chaung Thar Gyi	Chaung Thar Gyi
<b>Introduction</b>			
Chaung Thar Gyi has 60 households. 17 households cultivate 92 acres of paddy. The village also has about 5 acres of salterns and 45 acres of prawn ponds. Most of the households depend on casual labour.			
<b>Embankments</b>			
Chaung Thar Gyi (PT 09), Thar Zay Kone (PT 28), Pon Nar Gyi (PT 49), Sin Paik (PT 33), Don (PT 31), Nget Chaung (PT 27), Lin Bar Di Yar (PT 32), Cha Eik (PT 26) and Sin Paik Ywar Thit (PT 40) have their paddy fields located in one cluster that is best protected by a single ring embankment. This embankment is about 78,000 feet long, and protects an area of about 8,000 acres. This embankment must be given a freeboard of 3' and a crest width of 5' (because it is used for transport). The average height of this embankment will be 7'6". This will require about 10 million ft <sup>3</sup> of work (284,000 m <sup>3</sup> ). This will cost about 481 million MMK (566,000 USD).			

Number	Township	Village Tract	Village
PT 09	Pauktaw	Chaung Thar Gyi	Chaung Thar Gyi
<b>Sluices</b>			
This area falls into Tidal Zone II, and 95-100% is flat land. This means that for the entire polder 8,000 / 270 ~ 30 standard sluice openings are necessary. There are three concrete sluice structures (with 5 openings) in the Rakhine villages. The Muslim villages could not be assessed due to the security situation. This means that a total of 25 additional sluice openings will be needed for this polder. If there are more sluices in the Muslim villages, this number can be reduced.			
<b>Drinking water</b>			
This village has enough drinking water.			
<b>Irrigation</b>			
Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b>			
N/A			

Number	Township	Village Tract	Village
PT 28	Pauktaw	Pon Nar Gyi	Thar Zay Kone
<b>Introduction</b>			
Information obtained from this village is not entirely clear. There are 107 households, most of whom are reported to be casual labourers. On the other hand, 50 farmers are reported to cultivate 1,000 acres. There is also 14 acres of salterns, and 35 acres of prawn ponds.			
<b>Embankments</b>			
See PT 09			
<b>Sluices</b>			
See PT 09			
<b>Drinking water</b>			
There is some shortage in the dry season. If this happens, people go to nearby villages to collect drinking water. People requested for an additional pond.			
<b>Irrigation</b>			
Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b>			
N/A			

Number	Township	Village Tract	Village
PT 49	Pauktaw	Pon Nar Gyi	Pon Nar Gyi
<b>Introduction</b>			
Pon Nar Gyi is a large village 484 households. It has a lot of paddy land belonging to it (2,600 acres), but it is only cultivated by 86 farmers. There is also reported to be 50 acres of salterns, and 2,000 acres of prawn ponds. Most of the households however are dependent on casual labour, and often they are underemployed.			
<b>Embankments</b>			
See PT 09			
<b>Sluices</b>			
See PT 09			
<b>Drinking water</b>			
The village has some shortage of water in the dry season. When that happens, people go to nearby villages. This village either needs another pond (there are already ten ponds), or existing ponds must be deepened where possible. The ponds are currently between 3 and 6 feet deep, which is quite shallow.			
<b>Irrigation</b>			
Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b>			
N/A			



Number	Township	Village Tract	Village
PT 33	Pauktaw	Sin Paik	Sin Paik
<b>Introduction</b>			
Sin Paik has 230 households, most of which depend on casual labour. 30 farmers cultivate a total of 350 acres of paddy. There is also 50 acres of salterns and 400 acres of prawn ponds reported.			
<b>Embankments</b>			
See PT 09			
<b>Sluices</b>			
See PT 09			
<b>Drinking water</b>			
The village faces some shortage in the dry season. People then go to nearby villages to collect drinking water. The village has two shallow ponds (3 and 5 feet deep). People have asked for another pond. Deepening might actually be better (if it is possible to avoid the ponds becoming salty), given the evaporation losses that amount to about 3 feet over a six-month dry season.			
<b>Irrigation</b>			
Small-scale irrigation of fields (using treadle pumps) is only possible if the salinity in blocked creeks can be reduced to acceptable levels.			
<b>Other</b>			
N/A			

Number	Township	Village Tract	Village
PT 31	Pauktaw	Sin Paik	Don
<b>Introduction</b>			
Don is a Muslim village that was affected by the 2012 violence. Due to the prevailing situation, it was impossible to assess the situation in this village. It has about 330 households.			
<b>Embankments</b>			
See PT 09			
<b>Sluices</b>			
See PT 09			
<b>Drinking water</b>			
No information available. The village has at least one pond.			
<b>Irrigation</b>			
No information available			
<b>Other</b>			
No information available			

Number	Township	Village Tract	Village
PT 27	Pauktaw	Pon Nar Gyi	Nget Chaung
<b>Introduction</b>			
Nget Chaung is a Muslim village that was affected by the 2012 violence. Due to the prevailing situation, it was impossible to assess the situation in this village			
<b>Embankments</b>			
See PT 09			
<b>Sluices</b>			
See PT 09			
<b>Drinking water</b>			
No information available			
<b>Irrigation</b>			
No information available			
<b>Other</b>			
No information available			

Number	Township	Village Tract	Village
PT 32	Pauktaw	Sin Paik	Lin Bar Di Yar
<b>Introduction</b>			
Lin Bar Di Yar is a Muslim village that was affected by the 2012 violence. Due to the prevailing situation, it was impossible to assess the situation in this village. The village has about 60 households.			
<b>Embankments</b>			
See PT 09			
<b>Sluices</b>			
See PT 09			
<b>Drinking water</b>			
No information available. The village has one pond.			
<b>Irrigation</b>			
No information available			
<b>Other</b>			
No information available			

Number	Township	Village Tract	Village
PT 26	Pauktaw	Pon Nar Gyi	Cha Eik
<b>Introduction</b>			
Cha Eik is a Muslim village that was affected by the 2012 violence. Due to the prevailing situation, it was impossible to assess the situation in this village			
<b>Embankments</b>			
See PT 09			
<b>Sluices</b>			
See PT 09			
<b>Drinking water</b>			
No information available			
<b>Irrigation</b>			
No information available			
<b>Other</b>			
No information available			

Number	Township	Village Tract	Village
PT 40	Pauktaw	Sin Paik	Sin Paik Ywar Thit
<b>Introduction</b>			
Sin Paik Ywar Thit is a Muslim village that was affected by the 2012 violence. Due to the prevailing situation, it was impossible to assess the situation in this village			
<b>Embankments</b>			
See PT 09			
<b>Sluices</b>			
See PT 09			
<b>Drinking water</b>			
No information available			
<b>Irrigation</b>			
No information available			
<b>Other</b>			
No information available			

## 6.5 SUMMARY OF SUGGESTED INTERVENTIONS IN PAUKTAW

The table below summarises the possible interventions in Pauktaw Township, which covers about a quarter of all Tat Lan villages.

As can be seen, the total budget required for addressing all embankments and sluices in the 49 villages is between 3.8 and 4.3 million USD. This involves about 1.1 million m<sup>3</sup> of earthworks, the construction of 90 sluice openings (0 of the type for Tidal Zone I, 82 of the type for Tidal Zone II, 8 of the type for Tidal Zone III and 0 concrete pipes), and the repair of 11 sluice openings.

Note that there are 20 villages that do not require embankments or sluices, or where construction of embankments and sluices is not financially feasible due to the shape of the landscape.

For irrigation development, there is one village where a small dam can be constructed. This will cost about 40,000 USD, and benefit about 5 acres of winter crops. In several villages, there is potential for the introduction of treadle pumps. These can be either distributed, or demonstrated and linked to microcredit interventions.

In order to bring drinking water availability up to standard in all 62 villages on the list, the following interventions are needed:

- Enlarge or deepen 36-66 ponds
- Construct 6-11 ponds
- Provide lining for 1-12 ponds
- Upgrade 5-11 springs
- Construct 5-7 wells
- Renovate 3 wells
- Construct 1 reservoir
- Possibly construct 1 or 2 structures to divert stream water to ponds

This will cost anywhere between 100,000 and 300,000 USD (but probably above 200,000 USD). Detailed cost estimated still need to be made for several villages, and in several locations further analysis is needed to determine the best interventions. Note that in some villages, the number of ponds, wells, etc. that should be renovated or constructed depends on the available budget.

No other infrastructure is needed, but a reservation must be made for planting mangroves.

Village	Embankments		Sluices		Irrigation		Drinking water		Other infrastructure	
	M <sup>3</sup>	US \$	No.	US \$	Intervention	US \$	Intervention	US \$	Intervention	US \$
PT 01	99,100	197,200	1 sluice opening (T.Z. II type), repair of 5 existing sluice openings (incl. fitting flap gates), and 1 sluice opening (T.Z. III type)	30,000-40,000	Possibly introduce treadle pumps	PM	Construct 1 pond	2,000-3,000	N/A	-
PT 02	N/A	-	N/A	-	N/A	-	Deepen 1 or 2 ponds (and provide fencing). Possibly provide lining for 1-7 ponds	PM	N/A	-
PT 03 = PT 41	N/A	-	N/A	-	N/A	-	Renovate 2 ponds (possibly including lining), upgrade 1 spring.	PM	N/A	-
PT 04	35,700	71,300	4-5 sluice openings (T.Z. III type)	25,000-35,000	1 small dam	40,000	N/A	-	N/A	-
PT 05	N/A	-	N/A	-	N/A	-	Upgrade 2 or 3 springs. Deepen 2 ponds.	PM	N/A	-
PT 06	N/A	-	N/A	-	N/A	-	Renovate 2 ponds. Construct 1 well.	PM	N/A	-
PT 07 = PT 44	N/A	-	N/A	-	N/A	-	Upgrade 1 spring	PM	N/A	-
PT 08	N/A	-	N/A	-	N/A	-	Provide lining for 1-3 ponds	PM	N/A	-
PT 09	284,000	566,000	25 sluice openings (T.Z. II type)	450,000-600,000	Possibly introduce treadle pumps	PM	N/A	-	N/A	-
PT 10	109,000	217,000	Repair to two existing sluice structures and 12 new sluice openings (T.Z. II type)	225,000-300,000	Possibly introduce treadle pumps	PM	N/A	-	N/A	-
PT 11	159,000	317,500	3 sluice openings (T.Z. II type)	55,000-75,000	Possibly introduce treadle pumps	PM	Deepen 3-5 ponds or construct 1 pond	3,000-6,000	N/A	-
PT 12	N/A	-	N/A	-	N/A	-	Deepen 5 ponds	5,000-10,000	N/A	-

Village	Embankments		Sluices		Irrigation		Drinking water		Other infrastructure		
	M <sup>3</sup>	US \$	No.	US \$	Intervention	US \$	Intervention	US \$	Intervention	US \$	
PT 13	N/A		- N/A		- N/A		- Construct 1 well and/or upgrade 2-3 springs and/or divert stream water to existing ponds	PM	N/A		-
PT 14	N/A		- N/A		- N/A		- Construct 1 pond or divert stream water to existing ponds	2,000-5,000	N/A		-
PT 15	N/A		- N/A		- N/A		- Fencing for 1 pond	PM	N/A		-
PT 16	N/A		- N/A		- N/A		- Construct 1 lined well	PM	N/A		-
PT 17	N/A		- N/A		- N/A		- Renovate 1 well. Possibly upgrade 2 springs (storage tanks) and/or construct 1 new well	PM	N/A		-
PT 18	See PT 39	See PT 39	See PT 39	See PT 39	Possibly introduce treadle pumps	PM	N/A		- N/A		-
PT 19	See PT 39	See PT 39	See PT 39	See PT 39	No data available		No data available		No data available		
PT 20	See PT 39	See PT 39	See PT 39	See PT 39	Possibly introduce treadle pumps	PM	N/A		- N/A		-
PT 21	See PT 34	See PT 34	See PT 34	See PT 34	N/A		- Deepen 2-7 ponds	2,000-14,000	N/A		-
PT 22	N/A		- N/A		- N/A		- Deepen 2-4 ponds	2,000-8,000	N/A		-
PT 23	N/A		- N/A		- N/A		- Construct 1 or 2 ponds	2,000-6,000	N/A		-
PT 24	7,500	15,000	1 sluice opening (T.Z. III type) and fitting of 4 flap gates	10,000-15,000	N/A		- Deepen 3 ponds	3,000-6,000	N/A		-
PT 25	56,500	113,000	4 sluice openings (T.Z. II type)	70,000-100,000	Possibly introduce treadle pumps	PM	Deepen 2-10 ponds	2,000-15,000	N/A		-
PT 26	See PT 09	See PT 09	See PT 09	See PT 09	No data available		No data available		No data available		
PT 27	See PT 09	See PT 09	See PT 09	See PT 09	No data available		No data available		No data available		
PT 28	See PT 09	See PT 09	See PT 09	See PT 09	Possibly introduce treadle pumps	PM	Construct 1 pond	2,000-3,000	N/A		-
PT 29	See PT 11	See PT 11	See PT 11	See PT 11	Possibly introduce treadle pumps	PM	Deepen 2-3 ponds or construct 1 pond	2,000-6,000	N/A		-

Village	Embankments		Sluices		Irrigation		Drinking water		Other infrastructure	
	M <sup>3</sup>	US \$	No.	US \$	Intervention	US \$	Intervention	US \$	Intervention	US \$
PT 30	130,000	259,000	15 sluice openings (T.Z. II type)	250,000-350,000	Possibly introduce treadle pumps	PM	Provide fencing around ponds	PM	N/A	-
PT 31	See PT 09	See PT 09	See PT 09	See PT 09	No data available		No data available		No data available	
PT 32	See PT 09	See PT 09	See PT 09	See PT 09	No data available		No data available		No data available	
PT 33	See PT 09	See PT 09	See PT 09	See PT 09	Possibly introduce treadle pumps	PM	Deepen 2 ponds or construct 1 pond	2,000-4,000	N/A	-
PT 34	41,500	82,900	2 sluice openings (T.Z. III type)	12,000-15,000	N/A	-	Upgrade reservoir	40,000-50,000	N/A	-
PT 35	See PT 11 and PT 30	See PT 11 and PT 30	See PT 11 and PT 30	See PT 11 and PT 30	Possibly introduce treadle pumps	PM	Construct 1 pond	2,000-3,000	N/A	-
PT 36	See PT 30 and PT 11	See PT 30 and PT 11	See PT 30 and PT 11	See PT 30 and PT 11	Possibly introduce treadle pumps	PM	Construct 1 pond	2,000-3,000	N/A	-
PT 37	See PT 10	See PT 10	See PT 10	See PT 10	Possibly introduce treadle pumps	PM	N/A	-	N/A	-
PT 38	See PT 39	See PT 39	See PT 39	See PT 39	No data available		No data available		No data available	
PT 39	213,000	424,000	22 sluice openings (T.Z. II type)	400,000-500,000	Possibly introduce treadle pumps	PM	Deepen and fence 1 pond	PM	N/A	-
PT 40	See PT 09	See PT 09	See PT 09	See PT 09	No data available		No data available		No data available	
PT 42	N/A	-	N/A	-	N/A	-	N/A	-	N/A	-
PT 43	See PT 39	See PT 39	See PT 39	See PT 39	No data available		No data available		No data available	
PT 45	N/A	-	N/A	-	N/A	-	Deepen 2 ponds (possibly enlarge one of them)	2,000-5,000	N/A	-
PT 46	N/A	-	N/A	-	N/A	-	Renovate 4 ponds	4,000-8,000	N/A	-
PT 47	N/A	-	N/A	-	N/A	-	Repair 2 wells and construct 2 wells	PM	N/A	-
PT 48	N/A	-	N/A	-	N/A	-	Upgrade 1 spring and construct 1 pond	PM	N/A	-
PT 49	See PT 09	See PT 09	See PT 09	See PT 09	Possibly introduce treadle pumps	PM	Deepen 2-5 ponds or construct 1 pond	2,000-10,000	N/A	-
PT 50	N/A	-	N/A	-	N/A	-	Renovate 1 pond	1,000-2,000	N/A	-
PT 51	N/A	-	N/A	-	N/A	-	Renovate 3 ponds and construct 1 well	PM	N/A	-
<b>Total</b>	1,135,300	2,262,900	82 (T.Z. II type), 8 (T.Z. III type), 11 (repair)	1,527,000-2,030,000	1 small dam, treadle pumps	PM		PM		PM