

3. PROPOSED FACILITIES AND PROJECT COST

3.1 Proposed Facilities for Priority Projects

As studied in the previous Chapter the following plans are proposed as priority projects. The basic features of required facilities are also summarized as follows:

(1) Proposed Facilities for Priority Project in Sg. Air Mendidih Basin (Sungai Petani)

Item	Quantities (Length/Storage Capacity)	Size/Type
Drainage Channel Improvement		
Main Channel	1310 m	23.0~17.0m(w)/2.0m(d)
Line N	1090 m	11.0~1.5m(w)/2.0m(d)
Line O	630 m	3.5m(w)/2.0m(d)
Line P	1410 m	3.0~1.0m(w)/2.0m(d)
Detention Facilities		
Ppolis Hutan D.P.	48,700 m ³	Wet Pond
Upper Line P D.P.	89,00 m ³	Dry Pond
Sek. Men Sains On-site D.P.	54,000 m ³	Wet Pond
IKM On-site D.P.	3,300 m ³	Dry Pond
Line N Channel Storage	16,000 m ³	Wet Pond

(w) : width, (d) : depth

(2) Proposed Facilities for Priority Project in Line G Basin (Sungai Petani)

Item	Quantities (Length/Storage Capacity)	Size/Type
Drainage Channel Improvement		
Main Channel	2160 m	4.0~1.5m(w)/2.0m(d)
Diversion channel D-1	280 m	3.5m(w)/2.0m(d)
Connecting channel TK-1	180 m	3.5m(w)/1.0m(d)
Detention Facilities		
Taman Keladi D.P.	63,000 m ³	Dry Pond (Rehabilitation)
Taman Sri Wang D.P.	16,800 m ³	Dry Pond (Rehabilitation)
Upper Line G D.P.	24,700 m ³	Dry Pond
Middle Line G D.P.	48,300 m ³	Dry Pond

(w) : width, (d) : depth

(3) Proposed Facilities for Priority Project in Prt. Pokok Mangga (Melaka)

Item	Quantities (Length/Storage Capacity)	Size/Type
Drainage Channel Improvement		
Prt.Pkok Mangga	3260 m	8.0~3.0m(w)/1.8m(d)
New trunk drain	2550 m	13.0~7.0m(w)/1.8m(d)
Prt.Besar Limbongan	920 m	5.0m(w)/1.0m(d)
Prt. Lorong Pandan	1870 m	3.0~2.5m(w)/1.6m(d)
Prt. Malim	2230 m	3.5~2.0m(w)/1.8m(d)

(w) : width, (d) : depth

(4) Proposed Facilities for Priority Project in Sg. Ayer Salak Basin (Melaka)

Item	Quantities (Length/Storage Capacity)	Size/Type
Drainage Channel Improvement		
Main Channel	4780 m	65.0~11.0m(w)/1.8m(d)
Sg. Hitam	3910 m	13.0~9.0m(w)/2.5~2.0m(d)
Prt. AB11	2950 m	10.0~9.0m(w)/2.0~1.6m(d)
Tributaries	4100 m	9.5~6.0m(w)/1.8~1.3m(d)
Detention Facilities		
Bukit Rambai D.P.	59,000 m3	Dry Pond (Rehabilitation)
Tg.Minyak(1) D.P.	63,600 m3	Dry Pond
Upper Ayer Salak D.P.	20,000 m3	Dry Pond
Tg.Minyak(2) D.P.	70,400 m3	Wet Pond
Middle AB1 D.P.	29,300 m3	Wet Pond
Middle AB11 D.P.	54,200 m3	Dry Pond

(w) : width, (d) : depth

More detailed features of the components compared to the existing facilities are presented in Tables VI-14 to VI-17.

3.2 Construction Works and Project Costs

Based on the components of priority projects mentioned above the work quantities and project costs by the projects are summed up and tabulated in the following.

(1) Work Quantities

Work Item	Unit	Quantities				Total
		Sg. Air Mendidih	Line G	Pokok Mangga	Ayer Salak	
1. Channel Improvement						
Number of Channel		4	3	5	8	20
Channel Length	km	4.4	3.0	10.8	15.7	33.9
Earth Work	1000m ²	90.4	20.0	239.4	443.9	793.7
Concrete Work	1000m ³	5.9	5.3	51.0	0	62.2
Number of Box Culverts		11	5	6	14	36
Number of Bridge		8	0	10	8	26
2. Rehabilitation of Existing Detention Pond						
Number of Ponds		0	2	0	1	3
Area of Ponds	ha	-	3.3	-	2.1	5.4
Earth Work	1000m ³	-	32.7	-	12.9	45.6
Slope Protection	1000m ²	-	37.1	-	18.8	55.9
R.C. Structure	100m ³	-	0.4	-	0.3	0.7
Metal Work	ton	-	2.5	-	1.7	4.2
Road Work	100m ²	-	3.9	-	2.0	5.9
3. Construction of New Detention Pond						
Number of Ponds		2	2	0	5	9
Area of Ponds	ha	3.6	6.1	-	29.4	39.1
Earth Work	1000m ³	70.2	59.8	-	121.2	251.2
Slope Protection	1000m ²	31.6	58.7	-	45.2	135.5
Concrete Work	1000m ³	0	0.4	-	0.4	0.8
R.C. Structure	1000m ³	0.3	0.5	-	1.1	1.9
Metal Work	ton	0.9	0.9	-	2.3	4.1
Road Work	1000m ²	4.1	3.1	-	5.7	12.9
4. Construction of On-site Detention Pond						
Number of Ponds		3	0	0	0	3
Area of Open Space	ha	7.1	-	-	-	7.1
Earth Work	1000m ³	28.1	-	-	-	28.1
Bottom Protection	1000m ²	36.0	-	-	-	36.0
Concrete Work	1000m ³	0.7	-	-	-	0.7
Metal Work	ton	0.6	-	-	-	0.6

(2) Operation and Maintenance Cost

The operation and maintenance costs for the proposed facilities of priority projects are tentatively elaborated on the quarterly performance basis, comprising manpower and equipment costs as enumerated below, although any prospective service agencies for the works have not been fixed administratively.

(a) For Drainage Channel

Frequency (quarterly) : one time for 10,000 m²(channel area)

Manpower (man-day) : 9 men-days in total per time

Equipment (unit-day) : 1 backhoe, 1 dump truck, 4 grass cutter per time

(b) For Detention Pond

Frequency (quarterly) : one pond-time for (5,500m² of pond site)

Manpower (man-day) : 3.5 men-days in total per time

Equipment (unit-day) : 0.5backhoe, 0.5dump truck, 1.5grass cutter per time

Tables VI-18 and VI-19 show the unit operation and maintenance cost to be applied for all components of the priority projects. Each operation and maintenance cost by the facility and the project is also written down in Table VI-20 of the project cost, as mentioned below. Regarding the operation and maintenance of on-site detention ponds, it is not yet counted in this stage, since each owner of the land is generally expected to perform as part of voluntary works.

(3) Project Costs

The project costs of the priority projects are summed up as shown in Table VI-20. Totally, they amount to 8.8 million RM for the Air Mendidih project and 5.2 million RM for the Line G project in Sungai Petani, and 14.6 million RM for the Pokok Mangga project and 29.3 million RM for the Ayer Salak project in Melaka. For their annual operation and maintenance costs, 0.15 million RM for the Air Mendidih project, 0.11 million RM for the Line G project, 0.05 million RM for the Pkok

Mangga project and 0.53 million RM for the Ayer Salak project are also estimated in this stage and will be appropriated to maintain the proposed facilities.

4. IMPLEMENTATION PROGRAM AND DISBURSEMENT SCHEDULE

4.1 Implementation Program of Priority Projects

The proposed priority projects will be implemented from the year 2001 to 2005 to be incorporated in the 8th 5-year national development program. The implementation schedules of four priority projects are prepared based on the following considerations. The implementation programs for priority projects are as shown in Fig.VI-18 of Sungai Petani and Fig.VI-19 of Melaka, accompanying the estimated quantities of main works.

(1) Air Mendidih Project in Sungai Petani

Prior to the construction works the year 2001 to 2002 will be allocated for the detailed design and the land acquisition. The actual construction works of drainage channel improvement and detention facilities will commence in the year 2003 and terminate in 2005 with total construction period of 3 years. The drainage channel improvement will be started from the downstream portion to the upstream. Among detention facilities the on-site detention facilities will be constructed in the early time in expectation of easy implementation and early completion. As for the construction of detention ponds with relatively big work volumes, the most of the 3 years of construction period will be taken under normal conditions.

(2) Line G Project in Sungai Petani

As same as the above the detailed design will be conducted in the year 2001 and successively the land acquisition will be started in the year 2002. The construction work comprising the drainage channel improvement and the rehabilitation and construction of detention ponds will be executed from the year 2003 to 2005. The drainage channel improvement in the downstream portion and the rehabilitation of the existing detention ponds will be given priority in view of the high flood control efficiency of the areas.

(3) Pokok Mangga Project in Melaka

Following the above considerations the detailed design and the land acquisition will be carried out in the years 2001 and 2002, respectively. This project forms drainage

channel improvement only including the construction of new trunk drain. Therefore, relatively similar work volumes will be shared for the 3 years of construction period from the year 2003 to 2005.

(4) Ayer Salak Project in Melaka

The detailed design will be conducted in the year 2001 and the land acquisition will be started in the year 2002 and continued to the year 2004 in advance of the construction works. Required land acquisition area is estimated at extremely large amount compared to the other projects. Further, the work quantities of this project also amount to more than two times of those of the other projects. Accordingly, the 3 years of construction period from the year 2003 to 2005 will be allocated for the most of the work components except the constructions of relatively small-scale developments of detention ponds such as at Upper Ayer Salak, Middle AB1 and Middle AB11.

4.2 Disbursement Schedule of Priority Projects

The disbursement schedules of priority projects are prepared as shown in Table VI-20, referring to the above implementation program and considering annually average fund requirement for each project. In the table, the annual escalation rates of 4.5% for local currency and 1.2% for foreign currency are quoted from the latest figures used by JBIC loan project in Malaysia.

With regards to the annual O&M costs, the O&M cost for the drainage channel only will be appropriated from the second construction year to the third construction year in advance of the completion according to the progress of the channel improvement, although the O&M costs for the both of drainage channel and detention pond will be applied fully from the year 2006.