

Total irrigation demand is 6.62 Mld. This figure is substantial and will have some impact on lake draw down during drought. Hence, this option is not recommended if there is an alternative source. Capital cost is high.

**Option 2** – All by Pipe Reticulation as below:

- Precinct 5 and nursery to source water from Sewage Treatment Plant (STP 2)- Demand 5.4 Mld
- Promenade, Precinct 6 & cemetery & religious area from Lake – Demand 0.6 Mld

Capital cost : RM 7.53 million ( inclusive RM 0.30 million for pipe jacking)  
O & M cost : RM 0.34million

This option utilises sewerage effluent as main source will significantly reduce dependence on the lake. Compared to option 1, it is cheaper in terms of capital and O&M cost.

**Option 3** – All by Pipe Reticulation

- Precinct 5, 6 and nursery from Sewage Treatment Plant (STP 2)- Demand 5.5 Mld
- Promenade from lake – Demand 0.04 Mld
- Cemetery & religious area from Mining Pond – Demand 0.28 Mld

Capital cost : RM 7.85 million(inclusive RM 0.15 million for pipe jacking)  
O & M cost : RM 0.47 million

This option utilizes mining pond water, which is highly acidic in nature. Therefore O&M cost becomes higher than Option 2 as treatment with lime is required. Moreover the long term impact due to acidic water is uncertain.

**Option 4** - All by Truck

Capital cost : RM 12.2 million  
O & M cost : RM 23.0 million

***Option 5 - All by JBA Water***

Capital cost : RM 1.05 million ( Not inclusive cost for upgrading of JBA main)  
O & M cost : RM 2.46 million

The total water demand is 6.62 Mld. Option not feasible due to high dependence on JBA water. JBA supply does not cater for this need. In addition, O & M cost is very high hence option not recommended.

***Proposed Option – Option 2***

This option utilises sewerage effluent as main source is in line with the policy to avoid over dependence on Putrajaya Lake. Compared to option 1 & 3, it is cheaper. As suitability of mining pond in Option 3 is also uncertain, option 2 is therefore recommended.

**1.5 Group V – Precincts 7, 8, 9, 10 and 11**

These precincts are located adjacent to each other on the north eastern part of the development. Precinct 9 and 10 are already been developed while 7, 8 and 11 are at various stages of construction.

***Option 1 - All by Pipe Reticulation from Lake with Intake Pump at PH 4***

Capital cost : RM 13.6 million (inclusive RM 7.75 million for pipe jacking)  
O & M cost : RM 0.18 million

This option will incur digging and pipe jacking at the existing paved areas. It is also most expensive in terms of capital cost. In addition in line with the no dig policy, no further consideration can be given.

***Option 2 – All by Pipe reticulation from Sewage Treatment Plant***

It is not considered as irrigation areas too far from source (STP1)

***Option 3 - All by Truck***

Capital cost : RM 1.35 million  
O&M cost : RM 5.22 million

Option is not recommended in view of its relatively higher cost (see proposed option) and its dependence on lake water. In addition, the lake as a source is far from Precinct 14, 15 & DE.

***Option 2 - All by Pipe from Sewage Treatment Plant STP1 except the Promenade***

Option considered not feasible for reasons:

- o STP water not suitable for promenade and religious area in Precinct 12
- o STP water is too far from Precinct 12

***Option 3 - All by truck***

Capital cost : RM 0.95 million

O & M cost : RM 3.22 million

Most expensive option in terms of O&M costs. Too many trucking (313 truck trips daily) can cause traffic congestion. Option hence discarded.

***Option 4 - All by JBA Water***

Capital cost : RM 0.77 million (Not inclusive cost for upgrading JBA main)

O & M cost : RM 0.38 million

Option is too dependent on JBA water. JBA policy does not cater for irrigation needs. Hence option is not considered further as it is also more expensive than the proposed option in terms of higher O&M cost.

***Proposed Option - Combination of pipe reticulation from lake and Sewage Water***

Capital cost : RM 3.61 million

O & M cost : RM 0.11 million

The sewage treatment plant (STP1) supplies 0.7 Mld of irrigation water, constituting 80 % of total demand of the 4 precincts. This option is preferred in line the policy to reduce dependency on lake water. This option is also cost effective than Option 1 hence

Very expensive option compared to the others. Moreover, too many trucking (508 truck trips daily) can cause traffic congestion. Hence, no further consideration will be given.

***Option 4 - All by JBA Water***

Capital cost : RM 1.04 million (Not inclusive cost for upgrading of JBA main)  
O&M cost : RM 0.61 million

Total irrigation demand is 1.53 Mld. Option is not feasible/ recommended for reasons:

- o the existing JBA supply does not cater for irrigation need especially during drought
- o incurs digging of the paved areas in all the 5 precincts
- o high O & M cost

***Option 5 - Combination of Trucking and JBA Water***

Capital cost : RM 1.22 million  
O & M cost : RM 2.70 million

Option is not feasible for reasons:

- o high O & M costs due to trucking
- o trucks plying protocol road and high speed roads are not practical

***Proposed Option - Combination of pipe reticulation from lake, trucking and JBA water.***

Capital cost : RM 4.81 million  
O & M cost : RM 0.77 million

Most feasible option as it utilises combination of sources thereby reduces dependence on JBA & lake water.

**1.6 Group VI – Precincts 12, 14, 15 & DE**

These 4 precincts are located next to each other and all are still under planning stage. Hence the implementation of irrigation facilities and pipe reticulation system become easier with lesser constraints.

***Option 1 - All by Pipe Reticulation from Lake with Pump Intake at PH6 located in Precinct 12***

Capital cost : RM 4.16 million  
O & M cost : RM 0.13 million

**1.7 Group VII – Precincts 16 & 17**

Precinct 16 is mostly been developed and with paved roads while Precinct 17 is still under preliminary planning stage.

***Option 1 - All by Pipe Reticulation with Pump Intake at PH3 (located in precinct 19)***

Capital cost : RM 3.08 million  
O & M cost : RM 0.07 million

As Precinct 16 is already paved, pipe reticulation will incur digging and jacking at paved areas. Hence option not recommended.

***Option 2 - All by Pipe Reticulation from Treated Sewage Plant STP1 (in Precinct 14) except Promenade vide pump Intake PH3***

Capital cost : RM 4.85 million ( inclusive RM 1.4 million for pipe jacking)  
O & M cost : RM 0.053 million

Sewage Plant STP 1 is far from irrigated areas. Moreover, pipe reticulation in Precinct 16 will incur digging / pipe jacking at existing paved areas hence option is not recommended.

***Option 3 - All by Truck***

Capital cost : RM 0.58 million  
O & M cost : RM 1.59 million

Option is too expensive in terms of O&M cost. Hence no consideration will be given.

***Option 4 - All by JBA Water***

Capital cost : RM 0.28 million (Not inclusive cost for upgrading JBA main)  
O & M cost : RM 0.18 million

Option will incur digging paved areas in Precinct 16. JBA water does not cater for irrigation need (the water demand of 0.46 Mld is substantial). In line with 'no dig policy' and avoid dependence on JBA water, option is not recommended.

***Proposed Option - Combination of Pipe Reticulation from Lake (Intake at PH3), trucking and JBA water for Precinct 16***

Capital cost	:	RM 1.86 million
O & M cost	:	RM 0.12 million

Option is recommended as it is technically most feasible and is line with the 'no dig policy' for Precinct 16.

**1.8 Group VIII- Precincts 19**

Precinct 19 is currently under planning stage. Hence pipe option is possible and preferred.

***Option 1 - All by Pipe Reticulation with Pump Intake at PH3 (located in precinct 19)***

Capital cost	:	RM 2.21 million
O & M cost	:	RM 0.098 million

Option dependent on lake water and incur high capital cost.

***Option 2 - All by Pipe Reticulation from Treated Sewage Plant STP2 (in Precinct 19) except Promenade vide pump Intake PH3***

Capital cost	:	RM 2.24 million
O & M cost	:	RM 0.088 million

Option uses sewage water hence reduces dependency on lake water.

***Option 3 - All by Truck***

Capital cost	:	RM 0.58 million
O & M cost	:	RM 2.93 million

Option is discarded as it is too expensive and incurred high O&M cost to irrigate Taman Lindungan.

***Option 4 - All by JBA Water***

Capital cost	:	RM 0.44 million (Not inclusive cost for upgrading JBA main)
O&M cost	:	RM 0.33 million

High O&M cost. Option not feasible as JBA does not supply water for irrigation especially during drought.

***Proposed Option*** – *Option 2 above (All by pipe from STP2 except promenade)*

Option 1 and 2 is comparable in terms of pipe length (5.6 KM) and distance from source. Option 2 is recommended as it will reduce dependency on lake water and is also cheaper.

TABLE J1

**IRRIGATION OPTION COST ESTIMATES  
PRECINCT 1 (GROUP 1)**

Group 1 - PRECINCT 1 Option 1 - All by Pipe Reticulation from Lake	CAPITAL COST			OPERATION & MAINTENANCE COST PER YEAR						LAND AREA (m <sup>2</sup> )	
	Demand (m <sup>3</sup> /d)	Capacity (kW)	Amount (RM)	Usage (kWh/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)		Amount (RM)
a. Intake & Pump House - PHA	40	2*1	100,000.00	56	0.23	3,349.00	2.00%	2,000.00		5,349.00	16*12
b. Pipe reticulation Extra over for pipe jacking dibs for working pit dibs for reinstating	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)	1.2698	0.00	2.00%	10,200.00		10,200.00	AREA (m wide)
	110	3,100	100.00	310,000.00							
	m	850	2,500.00	2,125,000.00							
	no.	13	30,000.00	390,000.00							
	m <sup>2</sup>	4,250	6.30	27,625.00							
Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)								
c. Watering system	-	-	1.50	92,500.00	83,280.75	3.00%	2,498.00	2.00%	1,665.00	4,164.00	
<b>Total</b>											
			<b>3,335,905.75</b>			<b>5,847.00</b>		<b>13,866.00</b>		<b>19,713.00</b>	<b>194</b>

**Option 2 - All by Pipe Reticulation from Treated Sewerage Water (STP1)**  
- Not considered as far from source

Option 3 - All by Truck										
	Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
b. Lorry	13 Trips	2		40	13.00	135,200.00			135,200.00	-
c. Depot	Lump	Sum	100,000.00		3.00%	3,000.00	2.00%	2,000.00	5,000.00	30*30
d. Intake	0		0.00		3.00%	0.00	2.00%	0.00	0.00	0*(15*25)
<b>Total</b>			<b>100,000.00</b>			<b>138,200.00</b>		<b>3,000.00</b>	<b>140,200.00</b>	<b>900</b>

Option 4 - All by JBA Water											
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
a. Watering system	-	-	1.50	92,500.00	83,280.75	3.00%	2,498.00	2.00%	1,665.00	4,164.00	
b. Water charges											
<b>Total</b>					<b>83,280.75</b>		<b>17,058.00</b>		<b>1,665.00</b>	<b>18,724.00</b>	<b>0</b>

Option 5 - Combination of Truck (92 m <sup>3</sup> /d) and JBA Water (22 m <sup>3</sup> /d)											
P3. By Truck for Road (Q = 92 m <sup>3</sup> /day)											
	Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
b. Lorry	31 trips	5		92	13.00	310,960.00			310,960.00	-	
c. Depot	Lump	Sum	150,000.00		3.00%	4,500.00	2.00%	3,000.00	7,500.00	35*35	
d. Intake	0		0.00		3.00%	0.00	2.00%	0.00	0.00	0*(20*40)	
P4. By JBA Water for Government Reserve 1 and Public Utility (Q = 22 m <sup>3</sup> /day)											
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
a. Watering system	-	-	0.43	92,500.00	23,625.00	3.00%	709.00	2.00%	473.00	1,182.00	
b. Water charges											
<b>Total</b>					<b>173,625.00</b>		<b>324,177.00</b>		<b>3,473.00</b>	<b>327,650.00</b>	<b>1,325</b>

Proposed Option - Combination of Pipe Reticulation (92 m <sup>3</sup> /d) and JBA Water (22 m <sup>3</sup> /d)											
P1. By Pipe Reticulation for Road (Q = 92 m <sup>3</sup> /day)											
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)	1.2698	0.00	2.00%	8,520.00	Amount (RM)	AREA (m wide)	
	b. Pipe reticulation	110 - 140	4,000	104.00							416,000.00
	Extra over for pipe jacking dibs for working pit dibs for reinstating	m	400	2,500.00							1,000,000.00
	no.	9	30,000.00	270,000.00							
	m <sup>2</sup>	3,000	6.30	18,900.00							
Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)								
c. Watering system	-	-	2.00	92,500.00	103,000.00	3.00%	3,150.00	2.00%	2,100.00	5,250.00	
P4. By JBA Water for Government Reserve 1 and Public Utility (Q = 22 m <sup>3</sup> /day)											
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
a. Watering system	-	-	0.43	92,500.00	23,625.00	3.00%	709.00	2.00%	473.00	1,182.00	
b. Water charges											
<b>Total</b>				<b>1,808,025.00</b>			<b>11,867.00</b>		<b>10,893.00</b>	<b>22,760.00</b>	<b>2.00</b>

**Rationale for Proposed P1 view**

1. Trucking is the only option for the completed road system unless 'no dig policy' can be waived at completed landscape buffer along the road.
2. For VIP (3rd) and Public Utilities, JBA water is proposed as surrounding areas have been developed ('no dig policy').
3. JBA water is not proposed for the road system unless 'no dig policy' can be waived at completed landscape buffer along the road and the supply is limited.
4. Upgrading of JBA pipe in Option 4 is excluded.

**Note:**

- |                           |     |                        |                                   |     |                |   |     |                 |
|---------------------------|-----|------------------------|-----------------------------------|-----|----------------|---|-----|-----------------|
| 1) Watering system =      | 4   | low                    | 2) Intake capacity for trucking = | 1   | trucks per day | 9) Fertiliser =                           | 0.0 | kg              |
| 3) Irrigation frequency = | 200 | day per year           | 4) Irrigation time for trucking = | 15  | hour           | 10) Fertiliser slope =                    | 2.0 | 0.10            |
| 5) Truck capacity =       | 3   | trucks per year        | 7) Filling time for trucking =    | 2.5 | hour per batch | 11) Storage =                             | 1.0 | day demand      |
| 6) Truck type =           | 4   | m <sup>3</sup> per day | 8) Water depth =                  | 1.0 | m              | 12) All intake pump operation is based on |     | 1 day & 1 month |



TABLE J2

IRRIGATION OPTION COST ESTIMATES  
PRECINCT 13 (GROUP II)

OPERATION & MAINTENANCE COST PER YEAR		CAPITAL COST		LAND	
Area	Amount	Area	Amount	Area	Amount
AREA (m2)	36,412.00	AREA (m2)	17,118.00	AREA (m2)	56,160.00
AREA (m width)	16*12	AREA (m width)	16*12	AREA (m width)	194
% of Amount	13.00%	% of Amount	2.00%	% of Amount	2.00%
Capital Cost (RMB)	13,000.00	Capital Cost (RMB)	4,847.00	Capital Cost (RMB)	25,447.00
Amount (RMB)	36,412.00	Amount (RMB)	7,660.00	Amount (RMB)	56,160.00
% of Capital Cost	2.00%	% of Capital Cost	2.00%	% of Capital Cost	2.00%
Total	30,712.00	Total	12,712.00	Total	56,160.00

Option 2 - All by Pipe Retention from Treated Sewerage Water (STP)

Option 3 - All by Truck

Area	Amount	Area	Amount	Area	Amount
AREA (m2)	11,118.00	AREA (m2)	11,118.00	AREA (m2)	8,000
% of Amount	2.00%	% of Amount	2.00%	% of Amount	2.00%
Capital Cost (RMB)	4,847.00	Capital Cost (RMB)	4,847.00	Capital Cost (RMB)	3,718,925.00
Amount (RMB)	11,118.00	Amount (RMB)	11,118.00	Amount (RMB)	8,000
% of Capital Cost	2.00%	% of Capital Cost	2.00%	% of Capital Cost	2.00%
Total	401,847.00	Total	401,847.00	Total	401,847.00

Option 4 - All by JBA Water

Proposed Option - Pipe Retention from Lake (Wetland) to Nursery, Wetland and Primary Distributor Road (1029 m3/d) i.e. Zone VII

Area	Amount	Area	Amount	Area	Amount
AREA (m2)	16*12	AREA (m2)	16*12	AREA (m2)	194
% of Amount	13.00%	% of Amount	13.00%	% of Amount	2.00%
Capital Cost (RMB)	13,000.00	Capital Cost (RMB)	13,000.00	Capital Cost (RMB)	4,843.00
Amount (RMB)	36,412.00	Amount (RMB)	36,412.00	Amount (RMB)	55,760.00
% of Capital Cost	2.00%	% of Capital Cost	2.00%	% of Capital Cost	2.00%
Total	401,847.00	Total	401,847.00	Total	401,847.00

1. Trucking is the only option for the completed road system unless no dig policy can be waived or completed landscape buffer along the road.  
2. STP water is not proposed as the supply is limited.  
3. For nursery, pipe retention from Lake (Wetland) is proposed for cost effectiveness.  
4. Lifting of JBA pipe in Option 4 is excluded.

- 1) Working volume =
- 2) Working frequency =
- 3) Truck capacity =
- 4) Working days for working =
- 5) Working days for working =
- 6) Working days for working =
- 7) Working days for working =
- 8) Working days for working =
- 9) Working days for working =
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- 96) Working days for working =
- 97) Working days for working =
- 98) Working days for working =
- 99) Working days for working =
- 100) Working days for working =

TABLE J3

**IRRIGATION OPTION COST ESTIMATES  
PRECINCT 2,3,4 & 18 (GROUP III)**

		CAPITAL COST			OPERATION & MAINTENANCE COST PER YEAR						LAND	
		Demand (m <sup>3</sup> /d)	Capacity (kW)	Amount (RM)	Usage (kW/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
<b>Group III - PRECINCTS 2, 3, 4 &amp; 18</b>												
<b>Option 1 - All by Pipe Reticulation from Lake</b>												
Ia. Intake & Pump House - PH1		498	2*25	530,000.00	440	0.23	26,312.00	2.00%	10,600.00	36,912.00	16*12	
Ib. Intake & Pump House - PH2		498	2*25	530,000.00	440	0.23	26,312.00	2.00%	10,600.00	36,912.00	16*12	
		Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)		
I1. Pipe reticulation fr PH1		110 - 160	6,500	124.00	806,050.00	0.00	2.00%	16,120.00	16,120.00	2.00		
I2. Pipe reticulation fr PH2		110 - 160	10,900	124.00	1,339,200.00	0.00	2.00%	26,784.00	26,784.00	2.00		
		Park & Nursery Area (Ha)	Rate (RM/Ha)	Civic & Road Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
Ia. Watering system		0.76	52,500.00	6.66	32,500.00	389,578.88	3.00%	11,687.00	2.00%	7,792.00	15,479.00	
Ib. Watering system		1.10	52,500.00	4.83	32,500.00	311,490.38	3.00%	9,345.00	2.00%	6,236.00	15,575.00	
<b>Total</b>				<b>3,966,269.25</b>			<b>73,656.00</b>		<b>78,126.00</b>		<b>151,782.00</b>	<b>388</b>
<b>Option 2 - All by Pipe Reticulation from Treated Sewerage Water (STP1)</b>												
- Not considered as far from source												
<b>Option 3 - All by Truck</b>												
		Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
3b. Lorry		332 trips	166	54,632.00	895	13.00	3,364,114.00			3,364,114.00	-	
3c. Depot		Lump	Sum	1,300,000.00		3.00%	39,000.00	2.00%	26,000.00	65,000.00	130*130	
3d. Intake		1	300,000.00	600,000.00		3.00%	18,000.00	2.00%	12,000.00	30,000.00	2*(20*40)	
<b>Total</b>				<b>1,996,000.00</b>			<b>3,421,114.00</b>		<b>38,000.00</b>	<b>3,459,114.00</b>	<b>18,500</b>	
<b>Option 4 - All by JBA Water</b>												
		Park & Nursery Area (Ha)	Rate (RM/Ha)	Civic & Road Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
4a. Watering system		1.86	52,500.00	11.49	32,500.00	791,069.25	3.00%	21,032.00	2.00%	14,021.00	33,053.00	
4b. Water charges								996	1.40	362,544.00	362,544.00	
<b>Total</b>				<b>791,069.25</b>			<b>383,576.00</b>		<b>14,021.00</b>	<b>397,597.00</b>	<b>0</b>	
<b>Proposed Option - All by Pipe Reticulation from Lake (995 m<sup>3</sup>/d) except Government Parcels in Precinct 2 by JBA Water (81m<sup>3</sup>/d) i.e. Zone I &amp; II</b>												
<b>P1. By Pipe Reticulation from Lake to Nursery (Q = 996 m<sup>3</sup>/day) i.e. Zone I &amp; II</b>												
		Demand (m <sup>3</sup> /d)	Capacity (kW)	Amount (RM)	Usage (kW/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
P1a. Intake & Pump House - PH1		457	2*13	500,000.00	348	0.23	14,830.00	2.00%	10,000.00	24,830.00	16*12	
P1b. Intake & Pump House - PH2		457	2*13	500,000.00	348	0.23	14,830.00	2.00%	10,000.00	24,830.00	16*12	
		Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)		
P1c. Pipe reticulation fr PH1		110 - 160	4,500	124.00	558,050.00	0.00	2.00%	11,160.00	11,160.00	2.00		
P1d. Pipe reticulation fr PH2		110 - 160	4,150	124.00	514,660.00	0.00	2.00%	10,292.00	10,292.00	2.00		
		Park & Nursery Area (Ha)	Rate (RM/Ha)	Civic & Road Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
P1e. Watering system		0.76	52,500.00	5.37	32,500.00	322,084.88	3.00%	9,663.00	2.00%	6,442.00	16,105.00	
P1f. Watering system		1.10	52,500.00	4.83	32,500.00	311,490.38	3.00%	9,345.00	2.00%	6,236.00	15,575.00	
<b>P4. By JBA Water (Q = 81 m<sup>3</sup>/day)</b>												
		Park & Nursery Area (Ha)	Rate (RM/Ha)	Civic & Road Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
P4a. Watering system		-	-	1.29	21,000.00	26,997.60	3.00%	810.00	2.00%	540.00	1,350.00	
P4b. Water charges								81	1.40	29,484.00	29,484.00	
<b>Total</b>				<b>2,733,172.85</b>			<b>78,962.00</b>		<b>54,664.00</b>	<b>133,626.00</b>	<b>388</b>	

**Rationale for Proposed System**

- Pipe reticulation from Lake is proposed generally as nearby the source.
- JBA water is proposed for some government institutional reserve in Precinct 2 as developments are either completed or ongoing.
- JBA water is not proposed for other areas as the supply is limited.
- Upgrading of JBA pipes in Option 4 is excluded.

**Notes**

- |                           |   |                                   |                                |   |   |  |                        |                     |                           |                            |  |
|---------------------------|---|-----------------------------------|--------------------------------|---|---|--|------------------------|---------------------|---------------------------|----------------------------|--|
| 1) Working window = 8 hrs | 2) Irrigation frequency = 360 days per year | 3) Truck capacity = 7 cubic water | 4) Truck trip = 6 hrs. per day | 5) Intake capacity for trucking = 0 m <sup>3</sup> truck per hour | 6) Tripulation time for trucking = 15 hrs | 7) Billing time for trucking = 0.5 hrs per batch | 8) Water depth = 1.5 m | 9) Forecast = 0.6 m | 10) Pond slope = 1 (1:10) | 11) Storage = 1 day demand | 12) All intake pump capacities are based on 1 day & 1 steady |
|---------------------------|---|-----------------------------------|--------------------------------|---|---|--|------------------------|---------------------|---------------------------|----------------------------|--|

TABLE J4  
(Sheet 1/2)

IRRIGATION OPTION COST ESTIMATES  
PRECINCT 5,6 & 20 (GROUP IV)

		CAPITAL COST			OPERATION & MAINTENANCE COST PER YEAR						LAND
		Demand (m <sup>3</sup> /d)	Capacity (kW)	Amount (RM)	Usage (kWh/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
<b>Group IV - PRECINCT 5, 6 &amp; 20</b>											
<b>Option 1 - All by Pipe Reticulation from Lake</b>											
1a. Intake & Pump House - PH5		6,621	3*125	3,400,000.00	3,064	0.23	183,227.00	2.00%	48,600.00	231,227.00	18*14
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)			Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)
1b. Pipe reticulation	110 - 350	18,145	204.00	3,700,560.00			0.00		74,011.00	74,011.00	2.00
Extra over for pipe jacking	m	50	2,500.00	125,000.00							
ditto for working pit	m	1	30,000.00	30,000.00							
ditto for reinstating	m <sup>2</sup>	18,095	6.50	117,585.00							
	Park & Nursery	Civic & Road									
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
1c. Watering system	3.75	52,500.00	16.35	52,500.00	1,034,236.75	3.00%	31,627.00	2.00%	21,085.00	52,712.00	
<b>Total</b>				<b>7,427,381.75</b>			<b>114,854.00</b>		<b>143,096.00</b>	<b>357,950.00</b>	<b>254</b>
<b>Option 2 - Precinct 5 &amp; nursery by Pipe Reticulation from Treated Sewerage Water (STP2 - 5404 m<sup>3</sup>/d) and Precinct 6, Precinct 5 promenade &amp; cemetery from Lake (611 m<sup>3</sup>/d)</b>											
2a. Intake & Pump House - SP2		5,404	3*105	1,650,000.00	2,384	0.23	134,523.00	2.00%	33,000.00	187,523.00	18*14
2b. Intake & Pump House - PH5		611	2*20	400,000.00	360	0.23	21,528.00	2.00%	8,000.00	29,528.00	16*12
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)			Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)
2c. Pipe reticulation fr SP2	110 - 350	14,000	204.00	2,856,000.00			0.00			0.00	2.00
Extra over for pipe jacking	m	100	2,500.00	250,000.00							
ditto for working pit	m	2	30,000.00	60,000.00							
ditto for reinstating	m <sup>2</sup>	13,900	6.50	90,350.00							
2d. Pipe reticulation fr PH5*	110 - 160	8,000	124.00	992,000.00			0.00			0.00	2.00
	Park & Nursery	Civic & Road									
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
2e. Watering system	3.75	52,500.00	8.11	52,500.00	622,760.25	3.00%	18,683.00	2.00%	12,455.00	31,138.00	
2f. Watering system	-	-	8.22	52,500.00	431,476.50	3.00%	12,944.00	2.00%	8,630.00	21,574.00	
	Volume (m <sup>3</sup> )	Rate (RM)	Amount (RM)				Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
EXCAVATION for Storage Pond		7,192	12.00	86,304.00				2.00%	1,726.00	1,726.00	60*60
2g. SP2 at STP2 (PSP 19)											
	Capacity (m <sup>3</sup> /day)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
DISINFECTANT using sodium hypochlorite		5,404		90,000.00	3,404	0.006	66,265.00	2.00%	1,800.00	68,065.00	10*15
2h. STP1 for SP1											
<b>Total</b>				<b>7,628,890.75</b>			<b>273,343.00</b>		<b>65,611.00</b>	<b>332,954.00</b>	<b>4,198</b>
<b>Option 3 - Precinct 5, 6 &amp; nursery by Pipe Reticulation from Treated Sewerage Water (STP2 - 5452 m<sup>3</sup>/d) except promenade from lake and cemetery from mining pond (276 m<sup>3</sup>/d)</b>											
3a. Intake & Pump House - SP2		5,452	3*105	1,650,000.00	2,384	0.23	134,523.00	2.00%	33,000.00	187,523.00	18*14
3b. Intake & Pump House - PH5		276	2*1.3	100,000.00	64	0.23	3,927.00	2.00%	2,000.00	5,927.00	13*11
3c. Intake & Pump House - PH8		276	2*7.5	220,000.00	160	0.23	9,568.00	2.00%	4,400.00	13,968.00	13*11
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)			Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)
3d. Pipe reticulation fr SP2	110 - 350	14,000	204.00	2,856,000.00			0.00			0.00	2.00
Extra over for pipe jacking	m	50	2,500.00	125,000.00							
ditto for working pit	m	1	30,000.00	30,000.00							
ditto for reinstating	m <sup>2</sup>	13,950	6.50	90,675.00							
3e. Pipe reticulation fr PH5	110 - 160	8,000	124.00	992,000.00			0.00			0.00	2.00
3f. Pipe reticulation fr PH8	110 - 160	4,000	124.00	496,000.00			0.00			0.00	2.00
	Park & Nursery	Civic & Road									
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
3g. Watering system	3.75	52,500.00	8.11	52,500.00	622,760.25	3.00%	18,683.00	2.00%	12,455.00	31,138.00	
3h. Watering system	-	-	0.92	52,500.00	48,069.00	3.00%	1,462.00	2.00%	961.00	2,403.00	
3i. Watering system	-	-	7.30	52,500.00	383,407.50	3.00%	11,502.00	2.00%	7,668.00	19,170.00	
	Volume (m <sup>3</sup> )	Rate (RM)	Amount (RM)				Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
EXCAVATION for Storage Pond		7,192	12.00	86,304.00				2.00%	1,726.00	1,726.00	25*25
3j. SP2 at STP2 (PSP 19)											
	Capacity (m <sup>3</sup> /day)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
DISINFECTANT using sodium hypochlorite		5,452		90,000.00	5,452	0.006	66,225.00	2.00%	1,800.00	68,025.00	10*15
3k. STP1 for SP1				50,000.00							
3l. Dosing facility for mining pond		276									
<b>Total</b>				<b>7,870,215.75</b>			<b>266,270.00</b>		<b>84,018.00</b>	<b>470,288.00</b>	<b>2,069</b>

TABLE J4  
(Sheet 2/2)

IRRIGATION OPTION COST ESTIMATES  
PRECINCT 5,6 & 20 (GROUP IV)

		CAPITAL COST			OPERATION & MAINTENANCE COST PER YEAR						LAND AREA (m <sup>2</sup> )
		Number	Rate (RM)	Amount (RM)	Operation Cost		Maintenance Cost		Total		
					Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	
<b>Option 4 - All by Truck</b>											
1b Lorry	2,207 trips	368			5,621	13.09	22,378,980.00			22,378,980.00	-
1c Depot		Lump	Sum	2,500,000.00			3.00%	60,000.00	2.00%	40,000.00	100,000.00
1d. Intake		24	100,000.00	10,200,000.00			3.00%	306,000.00	2.00%	204,000.00	110,000.00
<b>Total</b>				<b>12,200,000.00</b>			<b>22,744,980.00</b>		<b>244,000.00</b>	<b>23,988,980.00</b>	<b>67,200</b>
<b>Option 5 - All by JBA Water</b>											
		Park & Nursery		Clinic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	AREA (m <sup>2</sup> )
		Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)						
5a. Watering system.		3.75	52,500.00	16.33	52,500.00	1,054,250.75	3.00%	31,627.00	2.00%	21,085.00	52,712.00
							Demand (m <sup>3</sup> /day)	Rate (RM)		Amount (RM)	
5b. Water charges							5,621	1.40		2,410,044.00	
<b>Total</b>						<b>1,054,250.75</b>		<b>2,441,671.00</b>		<b>21,085.00</b>	<b>2,462,756.00</b>
<b>Proposed Option = Option 2</b>											
<b>I.e. Precinct 5 &amp; nursery by Pipe Reticulation from Treated Sewerage Water (STP2 - 5404 m<sup>3</sup>/d) and Precinct 6, Precinct 5 promenade &amp; cemetery from Lake (611 m<sup>3</sup>/d) i.e. Zone Y &amp; X</b>											
<b>Total</b>						<b>1,528,896.75</b>		<b>273,342.00</b>		<b>45,611.00</b>	<b>339,554.00</b>

**Rationale for Proposed System**

1. Pipe reticulation from Lake is proposed for proximity and from mining pond for cemetery for sensitivity.
2. Pipe reticulation from treated sewerage water (STP2) for other zone is proposed to minimize the lake drawdown.
3. JBA water is not proposed as the supply is limited.
4. Irrigation for promenade at Precinct 19 (47m<sup>3</sup>/d) is proposed to be tapped from PDS nearby.
5. Upgrading of JBA pipe in Option 4 is excluded.

**Note**

- |                               |              |                                     |                 |   |                 |
|-------------------------------|--------------|-------------------------------------|-----------------|---|-----------------|
| 1) Working window = 8         | hour         | 7) Intake capacity for trucking = 4 | trucks per hour | 9) Production = 0.6                           | ton             |
| 2) Irrigation frequency = 260 | day per year | 8) Irrigation time for trucking = 8 | hour            | 10) Pond slope = 1                            | to 1D           |
| 3) Truck capacity = 7         | cubic meter  | 9) Filling time for trucking = 0.5  | hour per batch  | 11) Storage = 1                               | day (detention) |
| 4) Truck trip = 8             | cc. per day  | 10) Water depth = 2.4               | m.              | 12) All intake pump capacities are based on 1 | day & 1 standby |

TABLE J5  
'Sheet 1/2)

IRRIGATION OPTION COST ESTIMATES  
PRECINCTS 7,8,9,10 &11 (GROUP V)

	CAPITAL COST				OPERATION & MAINTENANCE COST PER YEAR						LAND
	Demand (m <sup>3</sup> /d)	Capacity (kWh)	Amount (RM)	Operation Cost		Maintenance Cost		Total	AREA (m <sup>2</sup> )		
				Usage (kWh/day)	Rate (RM)	Amount (RM)	% of Capital C			Amount (RM)	
<b>Group V - PRECINCTS 7, 8, 9, 10 &amp; 11</b>											
<b>Option 1 - All by Pipe Reticulation from Lake</b>											
Is. Intake & Pump House - PH	1,523	2*20	820,000.00	456	0.23	27,269.00	2.00%	16,400.00	43,669.00	16*12	
P5a. Intake & Pump House (Sq. Gajah)	58	2*1	120,000.00	56	0.23	3,349.00	2.00%	2,400.00	5,749.00	13*11	
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)		Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)	
Id. Pipe reticulation fr. PH	110 - 200	24,310	154.00	3,743,748.00		0.00	2.00%	74,875.00	74,875.00	2.00	
Extra cover for pipe jacking	m	3,300	2,500.00	8,250,000.00							
ditto for working pit	m	50	30,000.00	1,500,000.00							
ditto for manrating	m <sup>2</sup>	21,910	6.50	141,765.00							
P5b. Pipe reticulation	110	100	100.00	10,000.00			2.00%	200.00	200.00	2.00	
	Park & Nursery		Civic & Road								
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
Ic. Watering system	1.04	52,500.00	18.04	52,500.00	1,043,742.00	3.00%	31,312.00	2.00%	20,875.00	52,187.00	
<b>Total</b>					<b>13,629,247.00</b>		<b>61,430.00</b>		<b>114,750.00</b>	<b>176,680.00</b>	<b>339</b>

**Option 2 - All by Pipe Reticulation from Treated Sewerage Water (STP1)**

Not considered as fr. from sources

**Option 3 - All by Truck**

	Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
3b. Lorry	500 trips	83		1,525	13.00	5,134,500.00			5,134,500.00	-
3c. Depot		Sum	450,000.00		3.00%	13,500.00	2.00%	9,000.00	22,500.00	95*95
3d. Intake	1	305,000.00	305,000.00		3.00%	27,000.00	2.00%	18,000.00	45,000.00	3*(20*40)
<b>Total</b>			<b>1,350,000.00</b>			<b>5,185,000.00</b>		<b>27,000.00</b>	<b>5,212,000.00</b>	<b>11,425</b>

**Option 4 - All by JBA Water**

	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
4a. Watering system	1.04	52,500.00	18.04	52,500.00	1,043,742.00	3.00%	31,312.00	2.00%	20,875.00	52,187.00	
4b. Water charges						Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM)	Amount (RM)	Amount (RM)	
						1,525	1.40	553,100.00		553,100.00	0
<b>Total</b>					<b>1,043,742.00</b>			<b>586,412.00</b>	<b>20,875.00</b>	<b>607,287.00</b>	<b>0</b>

**TABLE J5**  
**(Sheet 2/2)**

**IRRIGATION OPTION COST ESTIMATES**  
**PRECINCTS 7,8,9,10 & 11 (GROUP V)**

		CAPITAL COST			OPERATION & MAINTENANCE COST PER YEAR						LAND
					Operation Cost		Maintenance Cost		Total		
<b>Option V - PRECINCTS 7, 8, 9, 10 &amp; 11 (Cont'd)</b>											
<b>Combination of Trucking (690 m<sup>3</sup>/d) and JBA Water (746m<sup>3</sup>/d) i.e. Zone IV</b>											
<b>P1. By Pipe Reticulation (Q = 90 m<sup>3</sup>/day)</b>											
	Demand (m <sup>3</sup> /d)	Capacity (kW)	Amount (RM)	Usage (kW/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
P1a. Intake & Pump House - PH4	90	2*4	150,000.00	104	0.23	6,219.00	2.00%	3,000.00	9,219.00	16*12	
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)		Amount (RM)		Amount (RM)	Amount (RM)	AREA (m wide)	
P1b. Pipe reticulation fr PH4	110 - 140	0	104.00	0.00					0.00	2.00	
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
P1&5c. Watering sys.	0.00	32,500.00	0.00	52,500.00	0.00	3.00%	0.00	2.00%	0.00	0.00	
	Volume (m <sup>3</sup> )	Rate (RM)	Amount (RM)		Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
<b>P3. Trucking (Q = 690 m<sup>3</sup>/day)</b>											
	Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
3b Lorry	230 trips	38		690	13.00	2,330,848.00			2,330,848.00	-	
3c. Depot		Lump	Sum		3.00%	6,000.00	2.00%	4,000.00	10,000.00	50*50	
3d. Intake		1	300,000.00		3.00%	9,000.00	2.00%	5,000.00	15,000.00	1*(20*40)	
<b>P4 - JBA Water (Q = 746 m<sup>3</sup>/day)</b>											
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
4a. Watering system	1.58	52,500.00	9.22	52,500.00	566,863.50	3.00%	17,006.00	2.00%	11,337.00	28,343.00	
	Volume (m <sup>3</sup> )	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM)			Amount (RM)	Amount (RM)	
4b. Water charges				746	1.40	271,544.00			271,544.00	271,544.00	
<b>Total</b>			<b>1,216,863.50</b>			<b>2,640,617.00</b>			<b>24,337.00</b>	<b>2,664,954.00</b>	<b>3,494</b>

<b>Option 6 - Proposed Option</b>											
<b>Combination of Pipe Reticulation (355 m<sup>3</sup>/d), JBA water (1091 m<sup>3</sup>/d) and Trucking (79 m<sup>3</sup>/d)</b>											
	Demand (m <sup>3</sup> /d)	Capacity (kW)	Amount (RM)	Usage (kW/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
P1a. Intake & Pump House - PH4	355	2*6.5	360,000.00	168	0.23	10,046.00	2.00%	7,200.00	17,246.00	18*14	
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)		Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)	
P1b. Pipe reticulation fr PH4	110 - 160	16,000	124.00	1,984,000.00		0.00	2.00%	39,680.00	39,680.00	2.00	
Extra cover for pipe jacking	m	300	2,500.00	750,000.00							
disc for working pit	no.	20	30,000.00	600,000.00							
disc for reinstating	m <sup>2</sup>	15,700	6.50	102,050.00							
	Volume (m <sup>3</sup> )	Rate (RM)	Amount (RM)		Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
<b>P3. Trucking (Q = 79 m<sup>3</sup>/day)</b>											
	Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
3b Lorry	26 trips	4		79	13.00	266,682.00			266,682.00	-	
3c. Depot		Lump	Sum		3.00%	4,500.00	2.00%	3,000.00	7,500.00	35*35	
3d. Intake		1	300,000.00		3.00%	9,000.00	2.00%	5,000.00	15,000.00	1*(20*40)	
<b>P4 - JBA Water (Q = 1091 m<sup>3</sup>/day)</b>											
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
3g. Watering system	1.58	52,500.00	9.22	52,500.00	566,863.50	3.00%	17,006.00	2.00%	11,337.00	28,343.00	
	Volume (m <sup>3</sup> )	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM)			Amount (RM)	Amount (RM)	
4b. Water charges				1,091	1.40	397,160.00			397,160.00	10*15	
<b>Total</b>			<b>4,812,913.50</b>			<b>704,294.00</b>			<b>67,217.00</b>	<b>771,611.00</b>	<b>2,429</b>

**Rationale for Proposed System**

1. Trucking is the only option for the road system (completed or ongoing) unless 'no dig policy' can be waived.
2. Upgrading of JBA pipe in Option 4 is excluded.

**Note:**

- |                               |              |                                      |                 |  |            |
|-------------------------------|--------------|--------------------------------------|-----------------|--|------------|
| 1) Watering window = 8        | hour         | 3) Intake capacity for trucking = 8  | trucks per time | 9) Trochoid = 0.8  | m          |
| 2) Irrigation frequency = 200 | day per year | 6) Irrigation time for trucking = 12 | hour            | 10) Pond slope = 2   | 1 : 10     |
| 3) Truck capacity = 7         | cubic meter  | 7) Filling time for trucking = 0.1   | hour per load   | 11) Storage = 1  | day demand |
| 4) Truck trip = 6             | no. per day  | 8) Water depth = 7.4                 | no.             | 12) All intake pump quantities are based on 1 daily & 3 steady |            |

TABLE J6

IRRIGATION OPTION COST ESTIMATES  
PRECINCTS 12,14,15 & DE (GROUP VI)

	CAPITAL COST				OPERATION & MAINTENANCE COST PER YEAR						LAND AREA (m <sup>2</sup> )
	Demand (m <sup>3</sup> /d)	Capacity (kW)	Amount (RM)	Usage (kW/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	
<b>Group VI - PRECINCTS 12, 14, 15 &amp; DE</b>											
<b>Option 1 - All by Pipe Reticulation from Lake</b>											
1a. Intake & Pump House - PH6	338	2*25	800,000.00	440	0.23	26,312.00	2.00%	16,500.00	42,112.00	16*12	
1b. Pipe reticulation	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)	0.00	0.00%	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m wide)	
	110 - 200	10,840	154.00	2,593,360.00							
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
1c. Watering system	2.24	52,500.00	12.42	52,500.00	769,329.75	3.00%	23,080.00	2.00%	15,387.00	38,467.00	
<b>Total</b>			<b>4,162,689.75</b>			<b>49,392.00</b>		<b>83,254.00</b>	<b>132,646.00</b>	<b>194</b>	

**Option 2 - All by Pipe Reticulation from Treated Sewerage Water**  
- not considered as far from source.

**Option 3 - All by Truck**

	Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
2b. Lorry	317 trips	52		938	13.00	12,194.00	2.90%	7,000.00	3,170,440.00	-
2c. Depot	Lump	Sum	350,000.00		3.00%	10,500.00	2.90%	17,500.00	17,500.00	80*80
2d. Intake	2	300,000.00	600,000.00		3.00%	18,000.00	2.90%	12,000.00	30,000.00	10*10*40
<b>Total</b>			<b>950,000.00</b>			<b>3,198,940.00</b>		<b>19,000.00</b>	<b>3,217,940.00</b>	<b>8,000</b>

**Option 4 - All by JBA Water**

	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
3a. Watering system	2.24	52,500.00	12.42	52,500.00	769,329.75	3.00%	23,080.00	2.00%	15,387.00	38,467.00	
3b. Water charges											
<b>Total</b>					<b>769,329.75</b>		<b>344,512.00</b>		<b>15,387.00</b>	<b>379,899.00</b>	<b>0</b>

**Proposed Option - Combination of Pipe Reticulation from Lake (237 m<sup>3</sup>/d) & Treated Sewerage Water (695m<sup>3</sup>/d) i.e. Zone VI & IX**

<b>P1. By Pipe Reticulation (Q = 932 m<sup>3</sup>/day)</b>											
	Demand (m <sup>3</sup> /d)	Capacity (kW)	Amount (RM)	Usage (kW/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
P1a. Intake & Pump House - PH6	237	2*25	250,000.00	360	0.23	9,568.00	2.00%	5,000.00	14,568.00	16*12	
P1a. Intake & Pump House - SP1	695	2*20	820,000.00	360	0.23	21,528.00	2.00%	16,400.00	37,928.00	16*12	
P1b. Pipe reticulation to PH6	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)	0.00	0.00%	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m wide)	
	110 - 140	5,790	104.00	601,120.00							
P1b. Pipe reticulation to SP1	110 - 225	8,360	154.00	1,280,240.00	0.00	0.00%	0.00	0.00	0.00	2.00	
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
P1.2. Water. sys	2.24	52,500.00	12.42	52,500.00	769,329.75	3.00%	23,080.00	2.00%	15,387.00	38,467.00	
<b>EXCAVATION for Storage Pond</b>	Capacity (m <sup>3</sup> /day)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM) <td>% of Capital C</td> <td>Amount (RM)</td> <td>Amount (RM)</td> <td>Amount (RM)</td> <td>AREA (m<sup>2</sup>)</td>	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
	P2d. SP1 at STP1 (Pp 14)	1,029	12.00	12,348.00		2.00%	247.00	247.00	247.00	30*30	
<b>DISINFECTION using sodium hypochlorite</b>	Capacity (m <sup>3</sup> /day)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM) <td>% of Capital C</td> <td>Amount (RM)</td> <td>Amount (RM)</td> <td>Amount (RM)</td> <td>AREA (m<sup>2</sup>)</td>	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
	P2e. STP1 for SP1	695	40,500.00	695	0.01	21,210.00	2.00%	810.00	22,020.00	10*15	
<b>Total</b>			<b>3,613,537.75</b>			<b>75,348.00</b>		<b>37,844.00</b>	<b>113,238.00</b>	<b>1,440</b>	

**Rationale for Proposed System**

1. Pipe reticulation from lake for Precinct 12 is proposed as nearby the source.
2. Pipe reticulation from treated sewerage water (STP1) is proposed due to proximity and to minimise lake drawdowns for Precincts 14, 15 & DE.
3. JBA water is not proposed as the supply is limited.
4. Upgrading of JBA pipe in Option 4 is excluded.

**Note:**

- |   |   |  |
|---|---|--|
| 1) Working window = 4 hour                | 2) Irrigation time for trucking = 4 hour  | 3) Fuel cost = 0.4 \$/litre                                |
| 2) Irrigation frequency = 250 cubic meter | 3) Irrigation time for trucking = 11 hour | 4) Fuel cost = 1.1 \$/litre                                |
| 3) Truck capacity = 7 cu. per day         | 4) Water depth = 2.4 m                    | 5) All truck pump quantities are based on 1 day & 1 steady |
| 4) Truck up = 4                           |   |  |

TABLE J7  
(Sheet 1/2)

IRRIGATION OPTION COST ESTIMATES  
PRECINCTS 16 & 17 (GROUP VII)

		CAPITAL COST			OPERATION & MAINTENANCE COST PER YEAR						LAND
		Demand (m <sup>3</sup> /d)	Capacity (k/W)	Amount (RM)	Usage (kWh/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
<b>Group VII - PRECINCTS 16 &amp; 17</b>											
<b>Option 1 - All by Pipe Reticulation from Lake</b>											
1a. Intake & Pump House - PHA2		462	2*22	330,000.00	392	0.23	23,642.00	2.00%	6,600.00	30,042.00	16*12
		Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)		Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)
1b. Pipe reticulation		110 - 160	9,242	124.00	1,146,008.00		0.00	22,920.00	22,920.00	2.00	
Extra over for pipe jacking		m	400	2,500.00	1,000,000.00						
ditch for working pit		m	10	30,000.00	300,000.00						
ditch for reinstating		m <sup>2</sup>	3,100	6.50	20,150.00						
		Park & Nursery	Civic & Road	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
		Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
1c. Watering system		0.38	52,500.00	4.94	52,500.00	279,074.25	3.00%	8,372.00	5,581.00	13,953.00	
<b>Total</b>						<b>3,075,222.25</b>		<b>31,814.00</b>	<b>25,101.00</b>	<b>66,915.00</b>	<b>138</b>
<b>Option 2 - All by Pipe Reticulation from Treated Sewerage Water (STP1 - 420 m<sup>3</sup>/d) except promenade from Lake (42 m<sup>3</sup>/d)</b>											
1a. Intake & Pump House - PHA3		420	2*20	330,000.00	360	0.23	21,528.00	2.00%	6,600.00	28,128.00	18*12
2b. Intake & Pump House - PH3a		42	2*2	110,000.00	72	0.23	4,306.00	2.00%	2,200.00	6,506.00	13*11
		Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)		Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)
2c. Pipe reticulation @ PHA3		110 - 160	15,950	124.00	1,977,800.00		0.00		0.00	2.00	
2d. Pipe reticulation @ PH3a		110	8,000	100.00	800,000.00		0.00		0.00	2.00	
Extra over for pipe jacking		m	400	2,500.00	1,000,000.00						
ditch for working pit		m	10	30,000.00	300,000.00						
ditch for reinstating		m <sup>2</sup>	3,100	6.50	20,150.00						
		Park & Nursery	Civic & Road	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
		Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
2e. Watering system		0.38	52,500.00	4.94	52,500.00	279,074.25	3.00%	8,372.00	5,581.00	13,953.00	
		Volume (m <sup>3</sup> )	Rate (RM)	Amount (RM)		Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
EXCAVATION for Storage Pond @ PHA3 at STP1 (PSP 12)		650	12.00	7,800.00			2.00%	158.00	158.00	25*25	
		Capacity (m <sup>3</sup> /day)	Amount (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
DISINFECTION using sodium hypochlorite											
2g. STP1 for PHA3		420		25,000.00	420	0.005	4,019.00	2.00%	500.00	4,519.00	10*15
<b>Total</b>				<b>4,849,920.25</b>			<b>38,225.00</b>		<b>15,039.00</b>	<b>53,264.00</b>	<b>1,114</b>
<b>Option 3 - All by Truck</b>											
		Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
3b. Lorry		154 trips	26		462	13.00	1,561,560.00			1,561,560.00	
3c. Depot		Lump	Sum	275,000.00		3.00%	8,250.00	2.00%	5,500.00	13,750.00	60*60
3d. Intake		1	300,000.00	300,000.00		3.00%	9,000.00	2.00%	6,000.00	15,000.00	1*20*40
<b>Total</b>				<b>872,000.00</b>			<b>1,578,810.00</b>		<b>11,500.00</b>	<b>1,590,310.00</b>	<b>4,400</b>
<b>Option 4 - All by JBA Water</b>											
		Park & Nursery	Civic & Road	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
		Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
4a. Watering system		0.38	52,500.00	4.94	52,500.00	279,074.25	3.00%	8,372.00	5,581.00	13,953.00	
		Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM)		Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
4b. Water charge					462	1.40	188,168.00			188,168.00	
<b>Total</b>				<b>279,074.25</b>			<b>176,940.00</b>		<b>5,581.00</b>	<b>182,121.00</b>	<b>0</b>



**TABLE J7  
(Sheet 2/2)**

**IRRIGATION OPTION COST ESTIMATES  
PRECINCTS 16 & 17 (GROUP VII)**

	CAPITAL COST				OPERATION & MAINTENANCE COST PER YEAR						LAND
	Operation Cost		Maintenance Cost		Total						
<b>Group VII - PRECINCTS 16 &amp; 17 (Cont'd)</b>											
<b>Proposed Option - Combination of Pipe Reticulation from Lake (417 m<sup>3</sup>/d), Truck (16 m<sup>3</sup>/d) and JBA Water (28 m<sup>3</sup>/d) i.e. Zone III</b>											
<b>P1. By Pipe Reticulation from Lake (Q = 466 m<sup>3</sup>/day)</b>											
	Demand (m <sup>3</sup> /d)	Capacity (k <sup>3</sup> /d)	Amount (RM)	Usage (k <sup>3</sup> /day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
P1a. Intake & Pump House - PH3	417	2*20	475,600.00	384	0.23	22,963.00	2.00%	9,300.00	32,463.00		10*12
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)		Amount (RM)			Amount (RM)		AREA (m <sup>2</sup> )
P1b. Pipe reticulation fr PH3	110 - 160	6,570	124.00	814,680.00			0.00		0.00		2.00
	Park & Nursery		Civic & Road								
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
Se. Watering system	0.35	52,500.00	3.58	92,500.00	207,653.25	3.00%	6,250.00	2.00%	4,153.00	10,383.00	
<b>P3. By Truck (Q = 16 m<sup>3</sup>/day)</b>											
		Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
P3b. Lorry	5 trips	1			16	13.00	5,418.00			54,418.00	-
P3c. Depot		Lump	80m	50,000.00		3.00%	1,500.00	2.00%	1,000.00	2,500.00	15*15
P3d. Intake		1	300,000.00	300,000.00		3.00%	9,000.00	2.00%	6,000.00	15,000.00	15*(10*20)
<b>P4 - By JBA Water (Q = 28 m<sup>3</sup>/day)</b>											
	Park & Nursery		Civic & Road								
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)	Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
P4a. Watering system	-	-	0.75	21,000.00	15,750.00	3.00%	473.00	2.00%	315.00	788.00	
P4b. Water charges						Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM)	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
						28	1.40	10,192.00		10,192.00	
<b>Total</b>				<b>1,863,087.45</b>			<b>104,776.00</b>		<b>20,968.00</b>	<b>125,744.00</b>	<b>612</b>

**Rationale for Proposed System**

1. Pipe reticulation from Lake is proposed for perimeter and other areas in Precincts 17 is proposed due to proximity.
2. Trucking for other completed areas in Precinct 16 due to 'no dig' policy.
3. JBA water is proposed for government/institutional reserves in Precinct 16 as surrounding under construction and 'no dig' policy.
4. JBA water is not proposed for other areas as the supply is limited.
5. Upgrading of JBA pipe in Option 4 is included.

**Note:**

- |                             |                       |                                     |                         |   |               |
|-----------------------------|-----------------------|-------------------------------------|-------------------------|---|---------------|
| 1) Watering vehicle = 4     | 2) Area = 4           | 3) Trucks capacity for trucking = 8 | 4) Trucks per hour = 11 | 5) Production = 1.8   | 6) m          |
| 7) Disposal frequency = 200 | 8) day per year = 365 | 9) Disposal fee for trucking = 11   | 10) hour = 1            | 11) Total trips = 1   | 12) (10)      |
| 3) Truck capacity = 3       | 4) value water = 2    | 5) Filling time for trucking = 0.5  | 6) hour per batch = 1   | 7) Storage = 1  | 8) day demand |
| 4) Truck trip = 4           | 5) no. per day = 4    | 6) Water depth = 2.4                | 7) m                    | 8) All trucks carry quantities are based on 1 day @ 1 monthly |               |

TABLE J8

**IRRIGATION OPTION COST ESTIMATES  
PRECINCT 19 (GROUP VIII)**

	CAPITAL COST				OPERATION & MAINTENANCE COST PER YEAR						LAND	
	Demand (m <sup>3</sup> /d)		Capacity (kW)		Amount (RM)	Usage (kW/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)		Amount (RM)
<b>Group VIII - PRECINCT 19</b>												
<b>Option 1 - All by Pipe Reticulation from Lake</b>												
1a. Intake & Pump House - PH3		858	2*40	960,000.00	680	0.23	40,664.00	2.00%	19,200.00	59,864.00	16*12	
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)			Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m wide)	
1b. Pipe reticulation	110 - 250	5,600	144.00	806,400.00			0.00	2.00%	16,128.00	16,128.00	2.00	
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)								
1c. Watering system	1.42	52,500.00	7.05	52,500.00	444,601.50	3.00%	13,338.00	2.00%	8,892.00	22,230.00		
<b>Total</b>				<b>2,211,001.50</b>			<b>54,002.00</b>		<b>44,220.00</b>	<b>98,222.00</b>	<b>194</b>	
<b>Option 2 - All by Pipe Reticulation from Treated Sewerage Water (STP2 - 830 m<sup>3</sup>/d) except promenade from Lake (28 m<sup>3</sup>/d)</b>												
		Demand (m <sup>3</sup> /d)	Capacity (kW)	Amount (RM)	Usage (kW/day)	Rate (RM)	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
2a. Intake & Pump House - PH3		28	2*1.5	110,000.00	64	0.23	3,827.00	2.00%	2,200.00	6,027.00	13*11	
2b. Intake & Pump House - SP2		830	2*40	980,000.00	680	0.23	40,664.00	2.00%	19,600.00	60,264.00	16*12	
	Nominal Diameter (mm)	Length (m)	Rate (RM)	Amount (RM)			Amount (RM)			Amount (RM)	AREA (m wide)	
2c. Pipe reticulation fr PH3	110	2,530	100.00	253,000.00			0.00			0.00	2.00	
2d. Pipe reticulation fr SP2	110 - 225	3,370	134.00	451,580.00			0.00			0.00	2.00	
	Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
	Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)								
2e. Watering system	1.42	52,500.00	7.05	52,500.00	444,601.50	3.00%	13,338.00	2.00%	8,892.00	22,230.00		
<b>Total</b>				<b>2,239,181.50</b>			<b>57,829.00</b>		<b>30,692.00</b>	<b>88,521.00</b>	<b>339</b>	
<b>Option 3 - All by Truck</b>												
		Number	Rate (RM)	Amount (RM)	Demand (m <sup>3</sup> /day)	Rate (RM/m <sup>3</sup> )	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )	
3a. Labour												
3b. Lorry	286 trips	48			858	13.00	2,900,040.00			2,900,040.00	-	
3c. Depot		Lump	Sum	275,000.00		3.00%	8,250.00	2.00%	5,500.00	13,750.00	70*70	
3d. Intake	1		300,000.00	300,000.00		3.00%	9,000.00	3.00%	6,000.00	15,000.00	1*(20*40)	
<b>Total</b>				<b>575,000.00</b>			<b>2,917,290.00</b>		<b>11,500.00</b>	<b>2,928,790.00</b>	<b>5,700</b>	
<b>Option 4 - All by JBA Water</b>												
		Park & Nursery		Civic & Road		Amount (RM)	% of Capital Cost	Amount (RM)	% of Capital C	Amount (RM)	Amount (RM)	AREA (m <sup>2</sup> )
		Area (Ha)	Rate (RM/Ha)	Area (Ha)	Rate (RM/Ha)							
4a. Watering system	1.42	52,500.00	7.05	52,500.00	444,601.50	3.00%	13,338.00	2.00%	8,892.00	22,230.00		
						Demand (m <sup>3</sup> /day)	Rate (RM)	Amount (RM)		Amount (RM)		
4b. Water charges						858	1.40	312,312.00			312,312.00	
<b>Total</b>				<b>444,601.50</b>				<b>325,680.00</b>	<b>8,892.00</b>	<b>334,542.00</b>	<b>0</b>	
<b>Proposed Option - Option 2</b>												
<b>Option 2 - All by Pipe Reticulation from Treated Sewerage Water (STP2 - 830 m<sup>3</sup>/d) except promenade from Lake (28 m<sup>3</sup>/d)</b>												
<b>Total</b>				<b>2,239,181.50</b>			<b>57,829.00</b>		<b>30,692.00</b>	<b>88,521.00</b>	<b>339</b>	

**Rationale for Proposed System**

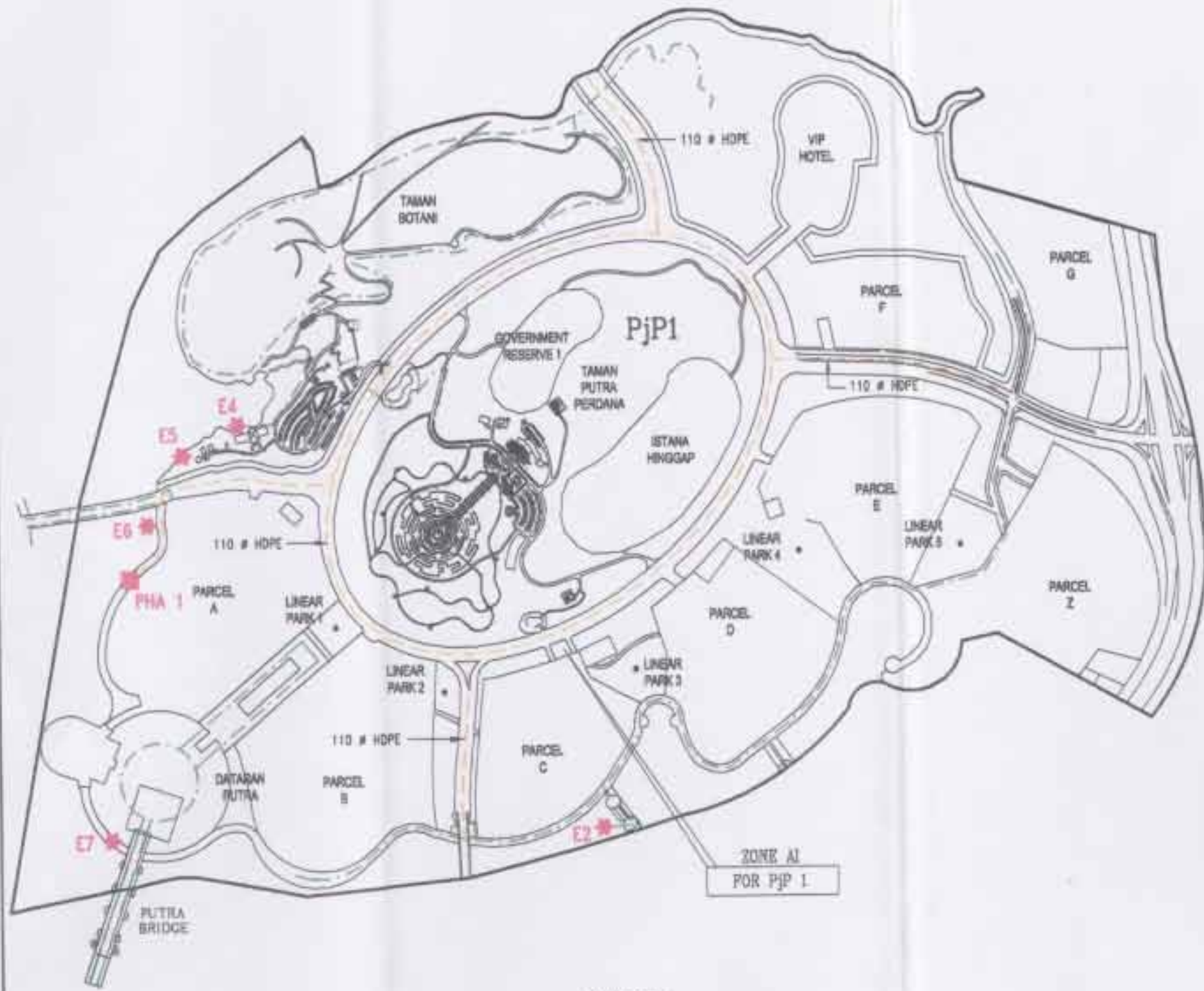
1. Pipe reticulation from Lake is proposed for promenade is proposed due to proximity.
2. Upgrading of JBA pipe in Option 4 is excluded.

**Note:**

- |                           |     |              |                                   |     |                 |   |     |                |
|---------------------------|-----|--------------|-----------------------------------|-----|-----------------|---|-----|----------------|
| 1) Watering window =      | 8   | hour         | 3) Intake capacity for trucking = | 8   | trucks per hour | 9) Freeboard =                              | 0.6 | m              |
| 2) Irrigation Frequency = | 200 | day per year | 6) Irrigation time for trucking = | 12  | hour            | 10) Final slope                             | 2   | (1 : 1)        |
| 3) Truck capacity =       | 7   | cubic meter  | 7) Filling time for trucking =    | 0.5 | hour per batch  | 11) Storage =                               | 1   | day (at least) |
| 4) Truck trip =           | 8   | one per day  | 8) Water depth =                  | 1.4 | m               | 12) All intake pump quantities are based on |     |                |
- 1 duty & 1 standby



SCALE = 1:1000  
Metres 100 0 200

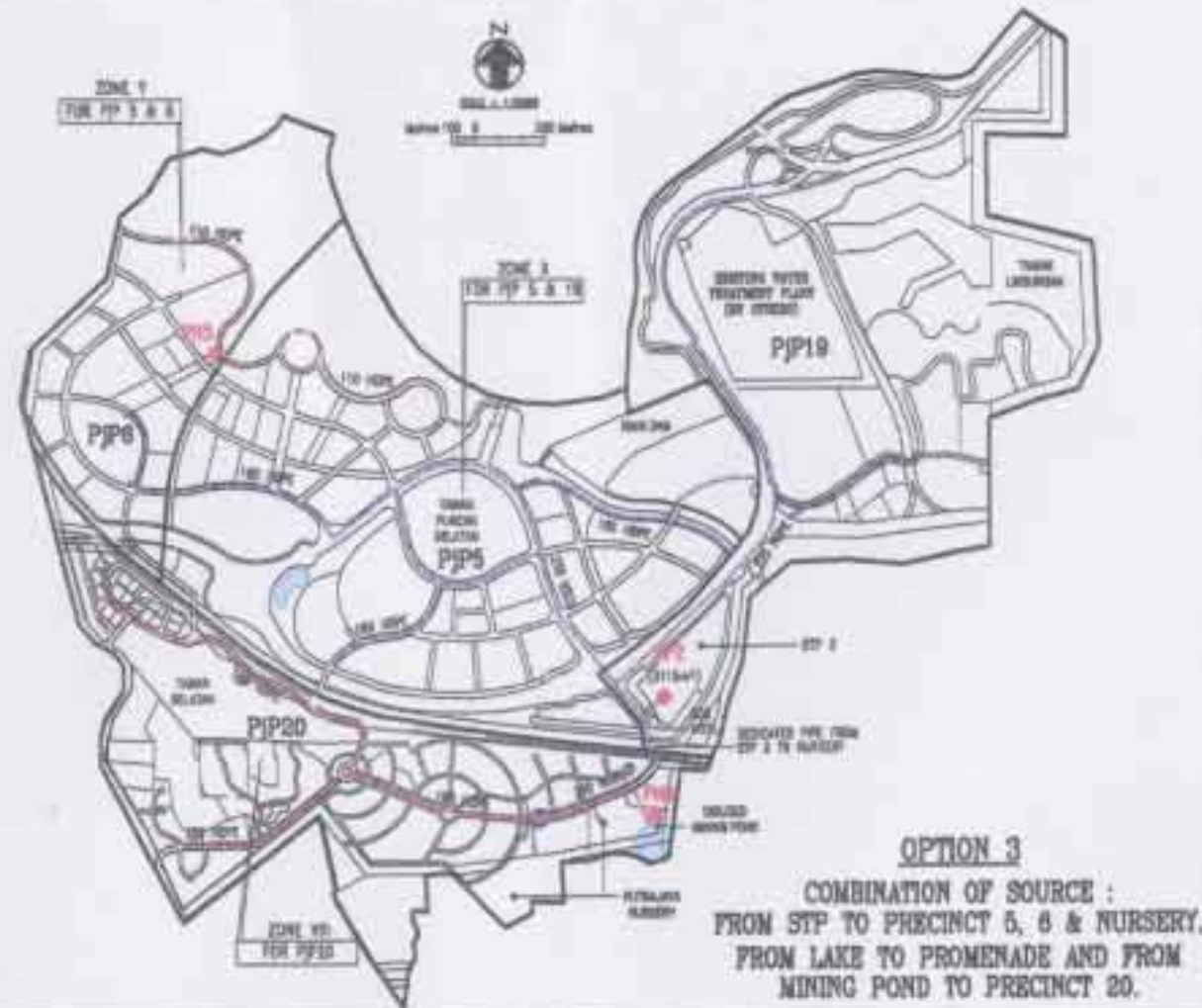


- LEGEND:**
- PRECINCT BOUNDARY
  - PIPE FROM LAKE
  - - - PIPE FROM STP
  - - - EXISTING PIPE
  - EXISTING DRAINAGE RETENTION PONDS
  - PROPOSED INTAKE FROM LAKE (PH1-PH8 & PHA1-PH8)
  - PROPOSED INTAKE FROM SEWAGE TREATMENT PLANT (SP1 & SP2)
  - ✱ EXISTING INTAKE
  - ✱ E1 WETLAND MAIN PUMPING STATION } FOR WATER CIRCULATION TO WETLANDS
  - ✱ E2 UPPER BISA PUMPING STATION }
  - ✱ E3 PHASE 1A (ZONE 6) PUMPING STATION
  - ✱ E4 TAMAN BOTANI PUMPING STATION
  - ✱ E5 TAMAN PUTRA PERDANA PUMPING STATION
  - ✱ E6 BRIDGE 10 SUBVERSIBLE PUMP
  - ✱ E7 DATARAN PUTRA & PUTRA BRIDGE PUMPING STATION
  - ✱ E8 TAMAN WARISAN PERTAMAK PUMPING STATION (PUMP TO STP)
  - ✱ E9 PM RESIDENCE PUMPING STATION
  - ✱ E10 TAMAN KWASAN PUMPING STATION
  - ✱ E11 PERSIDRAN WARISAN PUMPING STATION
  - ▲ ST1 TAMAN WARISAN PERTANIAN STORAGE TANK (EXISTING)
  - STP SEWERAGE TREATMENT PLANT
  - PjP1 PUTRAJAYA PRECINCT 1

**OPTION 1**  
ALL SOURCE FROM LAKE



**IRRIGATION MASTER PLAN FOR PUTRAJAYA**  
ALTERNATIVE IRRIGATION SYSTEM  
FOR PRECINCT 1



- LEGEND:**
- PRECINCT BOUNDARY
  - PIPE FROM LAKE
  - PIPE FROM STP
  - PIPE FROM MINING POND
  - EXISTING PIPE
  - EXISTING DRAINAGE RETENTION POND
  - PROPOSED INTAKE FROM LAKE (PH1-PH8)
  - PROPOSED INTAKE FROM SEWAGE TREATMENT PLANT (SP1 & SP2)
  - STP SEWAGE TREATMENT PLANT
  - PJP PUTRAJAYA PRECINCT I
  - (D1ha<sup>2</sup>) POND AREA



**IRRIGATION MASTER PLAN FOR PUTRAJAYA**  
ALTERNATIVE IRRIGATION SYSTEM FOR  
PRECINCTS 5, 6 & 20



SCALE = 1:20000

Metres 200 0 200 400 600 Metres  
metres



LEGEND:

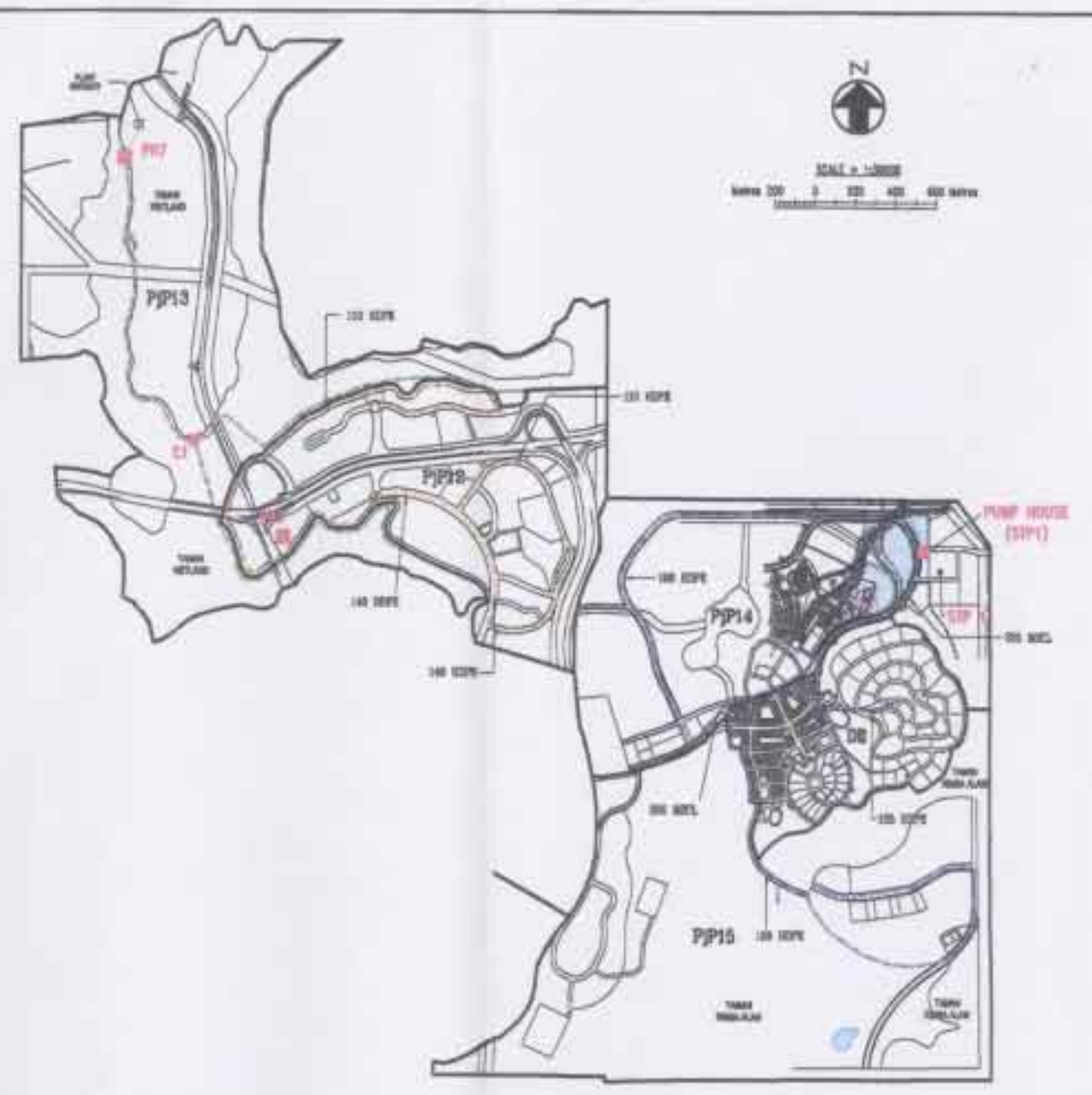
- PRECINCT BOUNDARY
- PIPE FROM LAKE
- PIPE FROM STP
- PIPE FROM RETENTION POND
- EXISTING PIPE
- EXISTING DRAINAGE RETENTION PONDS
- PROPOSED INTAKE FROM LAKE (PH1-PH8 & PHA1-PHA6)
- PROPOSED INTAKE FROM SEWAGE TREATMENT PLANT (SP1 & SP2)
- EXISTING INTAKE
- E1 WETLAND MAIN PUMPING STATION
- E2 UPPER ISA PUMPING STATION
- E3 PHASE 1A (ZONE 6) PUMPING STATION
- E4 TAMAN BOTANI PUMPING STATION
- E5 TAMAN PUTRA PERDANA PUMPING STATION
- E6 BRIDGE 10 SUBMERSIBLE PUMP
- E7 DATARAN PUTRA & PUTRA BRIDGE PUMPING STATION
- E8 TAMAN WARISAN PERTANAH PUMPING STATION (PUMP TO STI)
- E9 PM RESIDENCE PUMPING STATION
- E10 TAMAN KAWASAN PUMPING STATION
- E11 PERSEKUTUAN WARISAN PUMPING STATION
- ST1 TAMAN WARISAN PERTANAH STORAGE TANK (EXISTING)
- STP SEWERAGE TREATMENT PLANT
- PjP1 PUTRAJAYA PRECINCT 1

**OPTION 1**  
 ALL SOURCE FROM LAKE

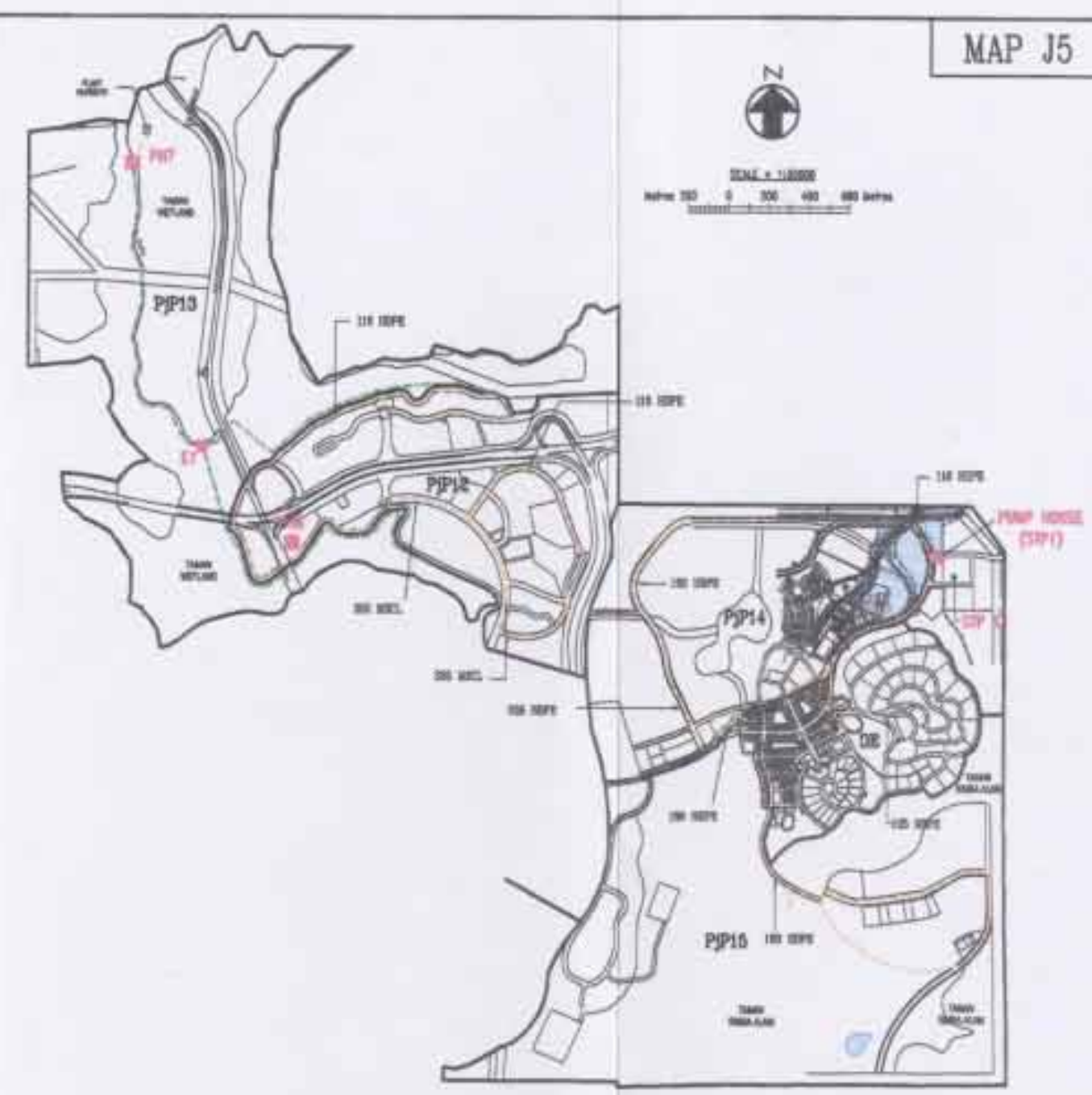


**IRRIGATION MASTER PLAN FOR PUTRAJAYA**  
 ALTERNATIVE IRRIGATION SYSTEM  
 FOR PRECINCTS 7, 8, 9, 10 & 11

MAP 14



**PROPOSED OPTION**  
 COMBINATION OF SOURCE : FROM LAKE TO PRECINCT 12  
 AND FROM STP1 TO PRECINCT 14, 15 AND DE



**OPTION 1**  
 ALL SOURCE FROM LAKE

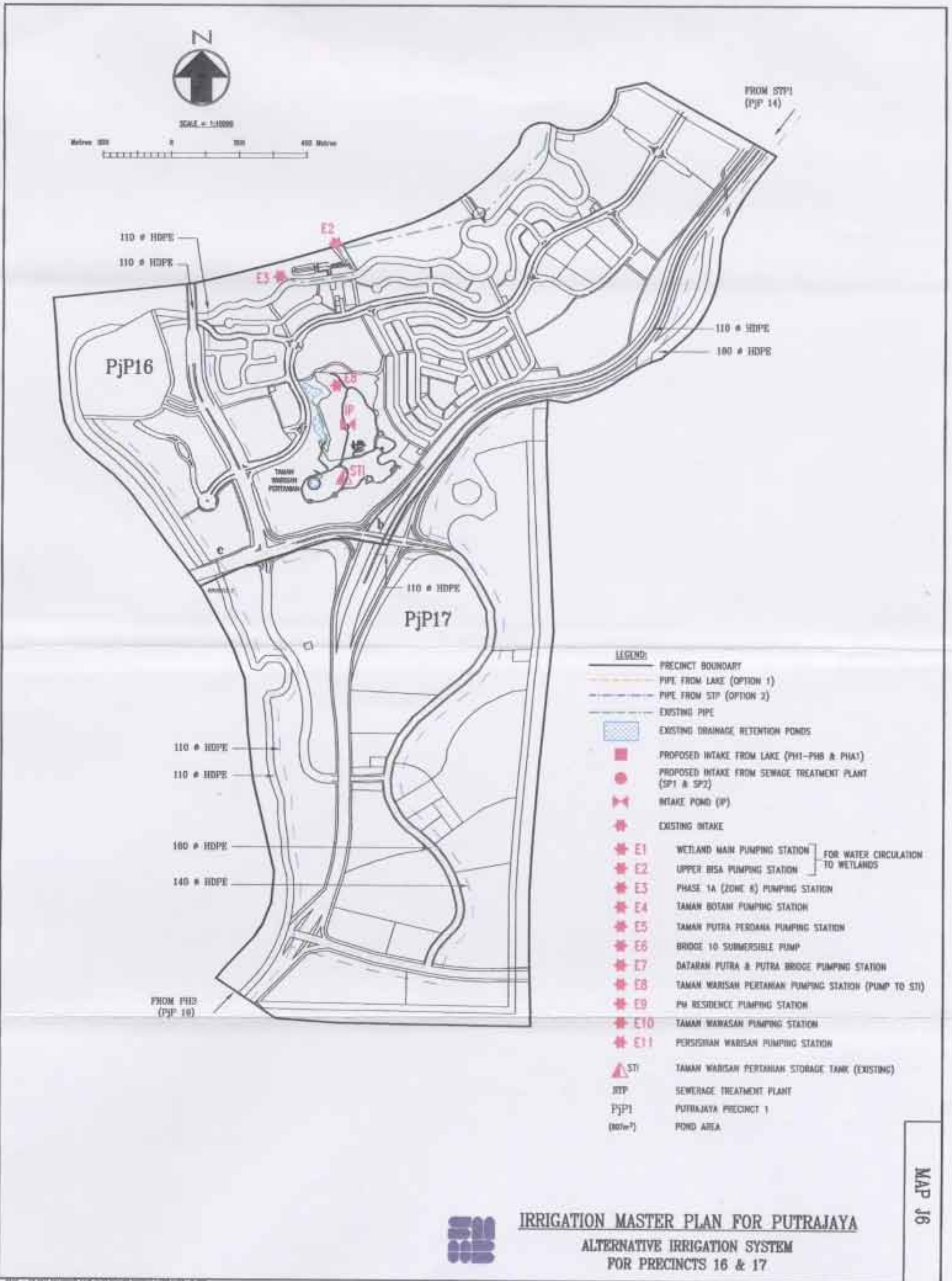
- LEGEND**
- PRECINCT BOUNDARY
  - PIPE FROM LAKE
  - PIPE FROM STP
  - EXISTING WATER CIRCULATION PIPE FOR WETLAND
  - EXISTING DRAINAGE COLLECTION PIPES
  - PROPOSED INTAKE FROM LAKE (PP13-PP15 & PPA1-PPA4)
  - PROPOSED INTAKE FROM SEWAGE TREATMENT PLANT (STP1, PPA2 & PPA3)

- EXISTING INTAKE**
- C1 WETLAND MAIN PUMPING STATION FOR WATER CIRCULATION TO WETLAND
  - C2 UPPER WEA PUMPING STATION
  - C3 PHASE 1A (ZONE B) PUMPING STATION
  - C4 TAMAN BERTAM PUMPING STATION
  - C5 TAMAN PUTRA PERMATA PUMPING STATION
  - C6 BLOK 10 SUBVERSILE PUMP
  - C7 BUKITAN PERIA & PUTRA BERSEK PUMPING STATION
  - C8 TAMAN PERMATA PERSEKIAN PUMPING STATION (PUMP TO STP)
  - C9 PW RESIDENT PUMPING STATION
  - C10 TAMAN WANGSA PUMPING STATION
  - C11 PERSEKIAN WANGSA PUMPING STATION

- ▲ STP TAMAN BERSAH PERSEKIAN STORING TANK (EXISTING)
- STP SEWAGE TREATMENT PLANT
- PPA1 PUTRAJAYA PRECINCT 1



**IRRIGATION MASTER PLAN FOR PUTRAJAYA**  
 ALTERNATIVE IRRIGATION SYSTEM  
 FOR PRECINCTS 12, 14, 15 & DE



MAP 16



**IRRIGATION MASTER PLAN FOR PUTRAJAYA**  
**ALTERNATIVE IRRIGATION SYSTEM**  
**FOR PRECINCTS 16 & 17**

