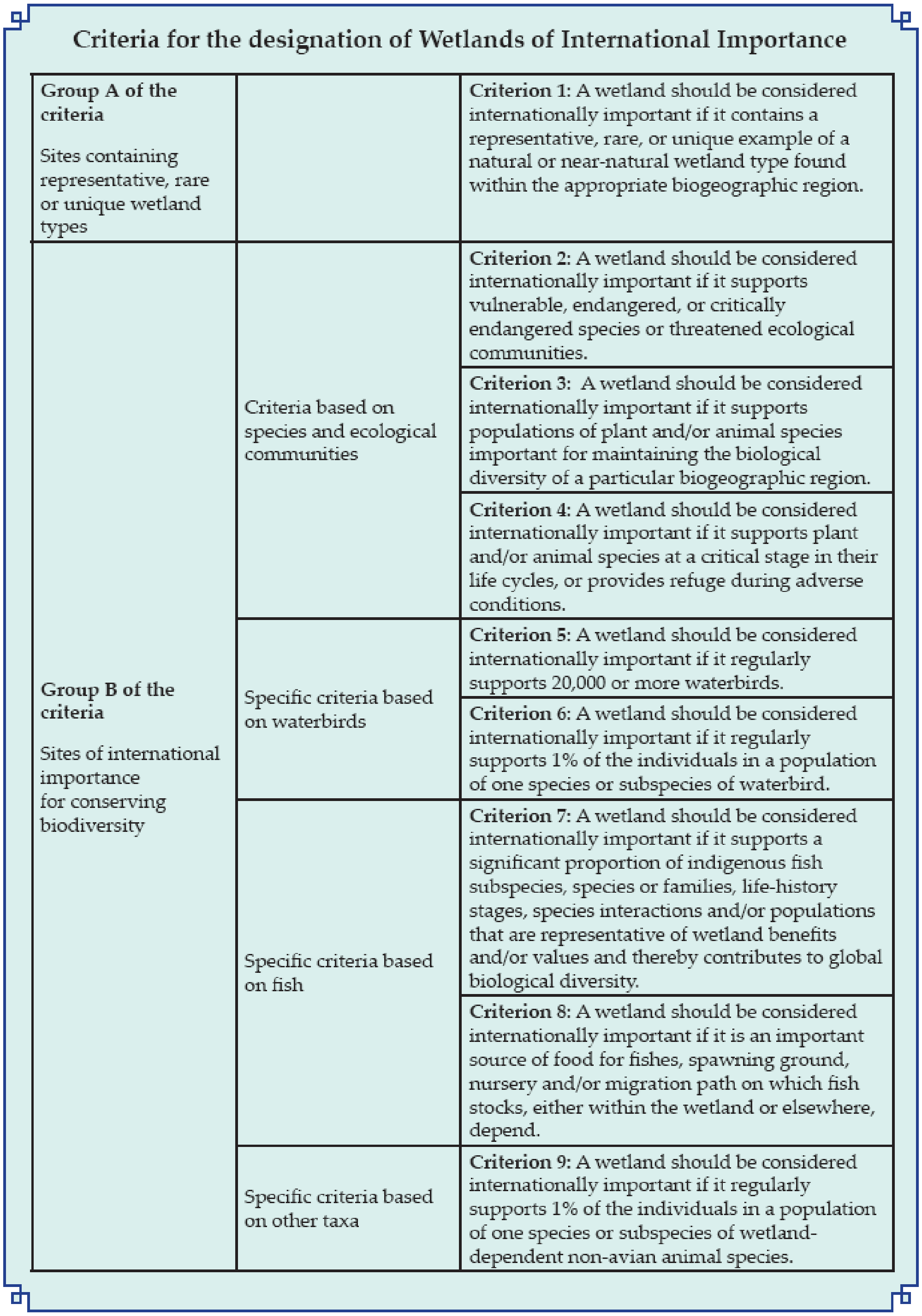
APPENDICES

APPENDIX

A

TABLE A.1
Criteria for the Designation of Wetlands of International Importance



Criteria for the designation of Wetlands of International Importance

Group A of the criteria Sites containing representative, rare or unique wetland types		**Criterion 1:** A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.
Group B of the criteria Sites of international importance for conserving biodiversity	Criteria based on species and ecological communities	**Criterion 2:** A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.
		Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.
		Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.
	Specific criteria based on waterbirds	**Criterion 5:** A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.
		Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.
	Specific criteria based on fish	**Criterion 7:** A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.
		Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.
	Specific criteria based on other taxa	**Criterion 9:** A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.

Source: Ramsar 2008b

APPENDIX
B

RAMSAR-NOMINATED WETLANDS OF MALAYSIA

B.1 KUCHING WETLANDS NATIONAL PARK

Nominated as a Ramsar site on November 8th 2005. It is a National Park which is located in Sarawak (01°41'N 110°14'E); and covers an area of 6,610 ha; National Park. A saline mangrove system with flora comprising predominantly the genera *Rhizophora, Avicennia* and *Sonneratia*. The site harbours such noteworthy species as Estuarine Crocodile *Crocodylus porosus*, Proboscis Monkey *Nasalis larvatus* (endemic to Borneo and listed as 'Endangered', IUCN Red List), Lesser Adjutant *Leptoptilos javanicus* ('Vulnerable'), and Griffith's Silver Leaf Monkey *Trachypithecus villosus*. The site has value as a breeding and nursery ground for fish and prawn species - 43 families of fishes and 11 species of prawns have been recorded, many of which are commercially important. Its proximity to the city of Kuching, the Damai resort complex, and two other national parks renders it of high potential value for tourism, education and recreation. The area is historically important: there was a Chinese settlement there probably as early as the 1st century AD, and early Malay, Hindu and Buddhist relics from the 9th century AD have been excavated at Santubong Village. The discovery of gold made the area an important trading and iron mining centre from the 7th to 13th centuries; some enigmatic rock carvings of human figures remain from this period. In the 15th century, Santubong was the site of the original Brunei Malay capital of Sarawak. Ramsar site no. 1568. Most recent RIS information: 2005.

B.2 PULAU KUKUP

Nominated as Ramsar site on January 31st, 2003. It a State Park is located in Johor (01°19'N 103°25'E); and covers an area of 647 ha. It considers an uninhabited mangrove island located 1 km from the southwestern tip of the Malaysian peninsula, one of the few intact sites of this type left in Southeast Asia. The wetland supports such species as the Flying Fox *Pteropus vampyrus,* Smooth Otter *Lutra perspicillata*, Bearded Pig *Sus barbatus*, Long-tailed Macaque *Macaca fascicularis*, all listed as threatened, vulnerable or near-threatened under the IUCN Red Book. Pulau Kukup has been identified as one of the Important Bird Areas (IBA) for Malaysia. Globally vulnerable Lesser Adjutant *Leptoptilos javanicus* chooses this as a stop-over and breeding ground. Pulau Kukup is important for flood control, physical protection (e.g. as a wind-breaker), and shoreline stabilization as it shelters the mainland town from severe storm events. The coastal straits between Pulau Kukup and the mainland are a thriving industry for marine cage culture. The mudflats are rich with shellfish and provide food and income to local people. Tourism is another use of the island and the government has further plans to promote ecotourism. Ramsar site no. 1287. Most recent RIS information: 2003.

B.3 SUNGAI PULAI

Nominated as Ramsar site on January 31st, 2003. It is a Forest Reserve which located in Johor (01°23'N 103°32'E); covered an area of 9,126 ha. The largest riverine mangrove system in Johor State, located at the estuary of the Sungai Pulai River. With its associated seagrass beds, intertidal mudflats and inland freshwater riverine forest the site represents one of the best examples of a lowland tropical river basin, supporting a rich biodiversity dependent on mangrove. It is home for the rare and endemic small tree *Avicennia lanata*, animals such as near-threatened and vulnerable Long-tailed Macaque, Smooth Otter and rare Flat-headed Cat and threatened birds species as Mangrove Pitta and Mangrove Blue Flycatcher, all included in the IUCN Red List. Relatively undisturbed parts including the Nipah swamps may be nesting sites of the Estuarine Crocodile. The site fringes play a significant role in shoreline stabilization and severe flood prevention in the adjacent 38 villages. The local population depends on the estuary as its mudflats, an ideal feeding, spawning and fattening ground, support a significant proportion of fish species. Other mangrove uses include wood cutting, charcoal production, aquaculture activities and eco-tourism. The current construction of a new port at the river estuary may represent a direct impact on the mangrove ecosystem, causing coastal erosion and water pollution from associated dredging and reclamation works and traffic. The site is managed in line with Integrated Management Plan for the sustainable use of mangroves in Johor state. Ramsar site no. 1288. Most recent RIS information: 2003.

B.4 TANJUNG PIAI

Nominated as Ramsar site on January 31st, 2003. It is a State Park which is located in Johor State (01°16'N 103°31'E); and covered an area of 526 ha. The site consists of coastal mangroves and intertidal mudflats located at the southernmost tip of continental Asia, especially important for protection from sea-water intrusion and coastal erosion. Tanjung Piai supports many threatened and vulnerable wetland-dependent species such as Pig-tailed Macaque and Long-tailed Macaque, birds like Mangrove Pitta, Mangrove Blue Flycatcher, Mangrove Whistler. Globally vulnerable Lesser Adjutant may be observed in the vicinity of the site. The Scaly Anteater, Common Porcupine, Smooth Otter and Bearded Pig are classified as vulnerable or near threatened listed in the IUCN Red Book 2000. Waters of the four main rivers traversing Tanjung Piai are abundant with commercially valuable species. The site enjoys the status of a State Park for eco-tourism -- a visitor centre with boardwalks near the southern tip of the park provides interpretive materials, guided walks, and overnight facilities, with a World Wetlands Day programme beginning in 2003. Due to increased sea traffic, the western side of Tanjung Piai has been affected by oil spills which caused natural erosion processes in nearly 70 ha of the mangrove forest. In addition, the new port being established in the estuary of Sungai Pulai will likely lead to increased wave energy reaching the east shore of Tanjung Piai, thus accelerating coastal erosion. Ramsar site no. 1289. Most recent RIS information: 2003.

B.5 TASEK BERA

Nominated as Ramsar site on November 10th, 1994. It is a Forest Reserve located in Pahang State (0258⁏’N 10236⁏’E); and covered an area of 38,446 ha. The site is considered a State Reserve for Conservation. An excellent example of a "blackwater" ecosystem which includes open water, a reed swamp area, and swamp forest with grasslands on the periphery. The site supports high species diversity, including 328 species of algae, 19 aquatic plants, 64 zooplankton, an abundance of aquatic insects, shrimp, crab and 95 species of fish (most indigenous, and including the endangered Asian Bonytongue or Arowana). All amphibians and reptiles of Malaysian tropical swamps are represented as well as 119 bird species, of which two, Masked Finfoot and Crested Fireback, are threatened. Indigenous people inhabit the area and depend on its natural resources, the fishery in particular, for their livelihood. Ecotourism is promoted. Other site uses include conservation education and scientific research. Ramsar site no. 712. Most recent RIS information: 1998.

APPENDIX
C

POLYNOMIAL APPROXIMATION OF IDF CURVES

A total of 26 urban areas in the Peninsular of Malaysia have been given a maximum intensity-duration-frequency (Department of Irrigation and Drainage of Malaysia, 2000) using Equation C.1 which was, therefore, used to express the Rainfall Intensity-Duration-Frequency (IDF) Relationships for the Paya Indah wetland catchment.

$$\ln\left(\underset{t}{\overset{R}{I}}\right) = a + b\ln(t) + c[\ln(t)]^2 + d[\ln(t)]^3 \qquad \text{(C.1)}$$

where

$\underset{t}{\overset{R}{I}}$: is the average rainfall intensity (mm/hr) for ARI *R* and duration *t*

R: is average return interval (years)

t: is duration (minutes)

a, b. c and d: are fitting constant dependent on ARI (the average recurrence interval)

Table C.1 presents values of the coefficients of fitness in Equation C. 1 for storm ARIs of between 2 years and 100 years for Kuala Lumpur.

TABLE C.1
Coefficients of the Fitted IDF Equation for Kuala Lumpur

Return Period (Year)	Parameter			
	a	**b**	**c**	**d**
2	4.775	0.598	-0.231	0.012
5	5.029	0.564	-0.231	0.012
10	5.019	0.635	-0.247	0.013
20	5.382	0.471	-0.217	0.012
50	5.46	0.473	-0.216	0.012
100	5.518	0.489	-0.218	0.012

Source: Department of Irrigation and Drainage of Malaysia, 2000

Result of the average rainfall intensity (mm/hr) for ARI 100 years and for different durations are presented in Figures C.1 to C.7 and Table C.2

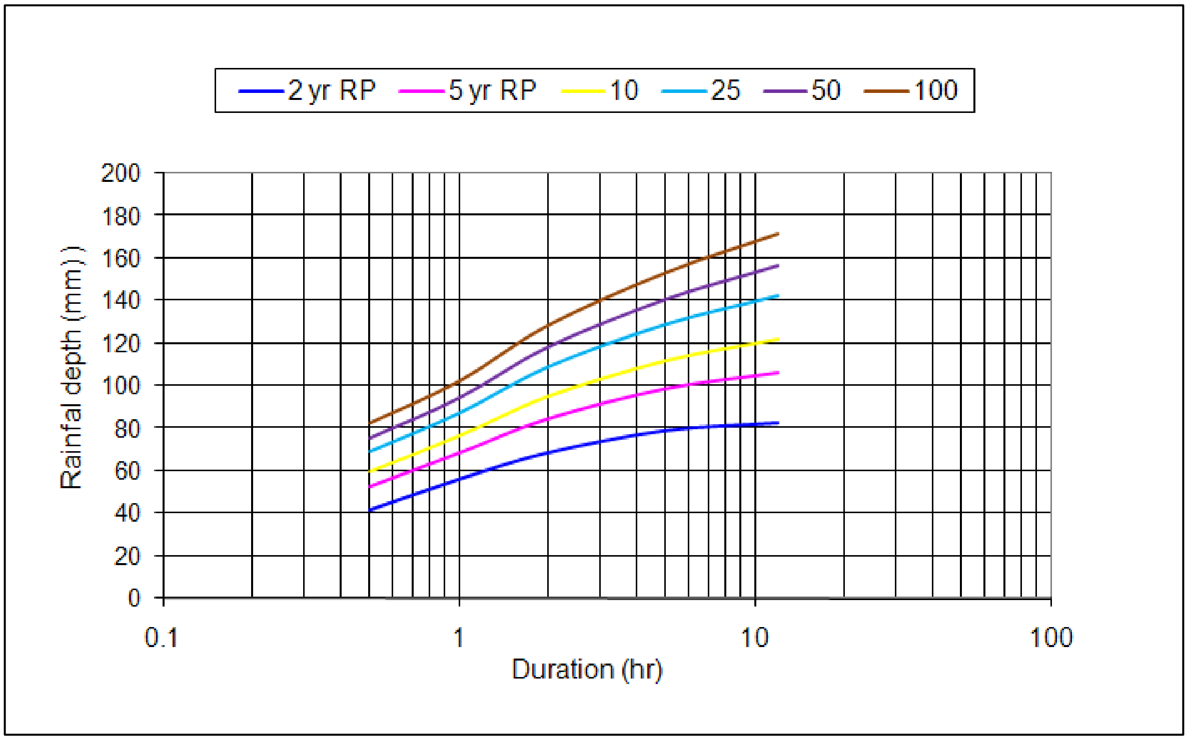


FIGURE C.1
Rainfall Intensity-duration-frequency (IDF) Curve for the Paya Indah Wetland Catchment

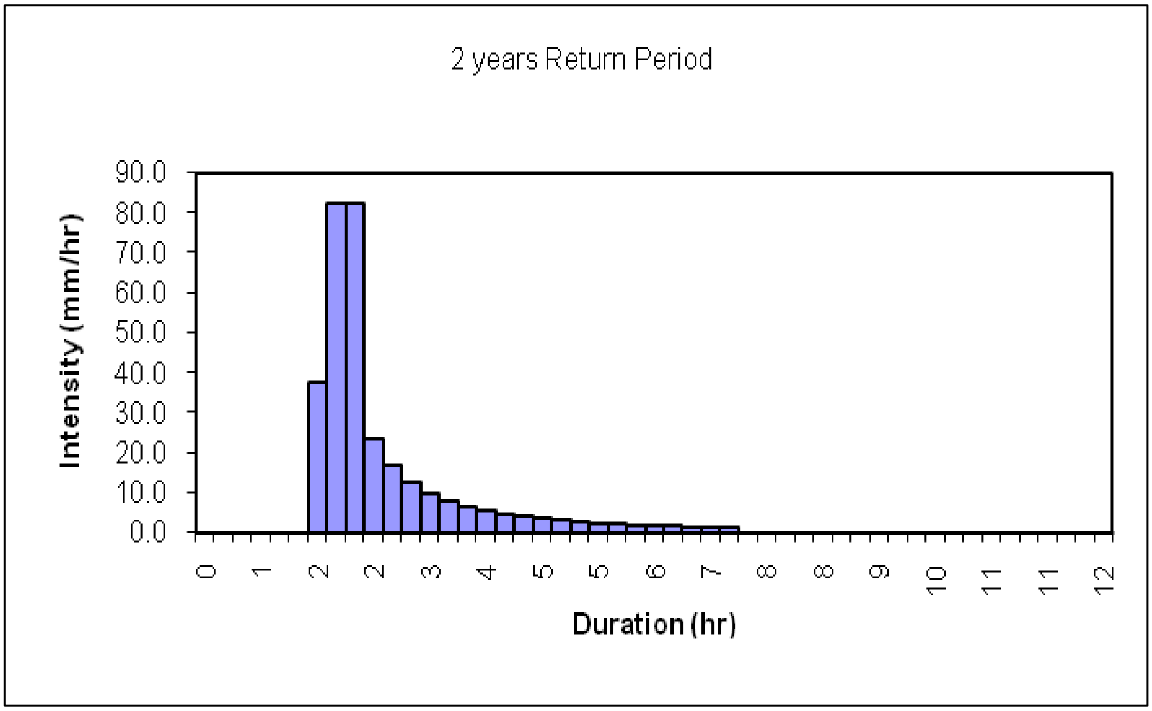


FIGURE C.2
Frequency of Storm Events in 2-years Period

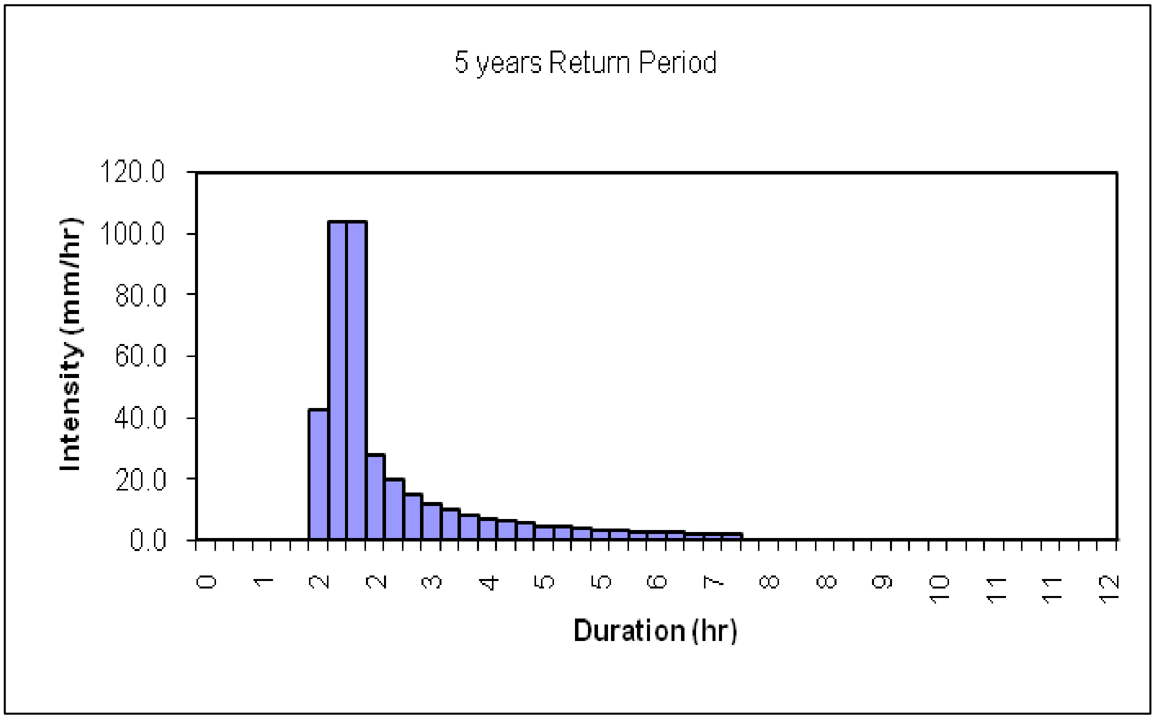


FIGURE C.3
Frequency of Storm Events in 5-years Period

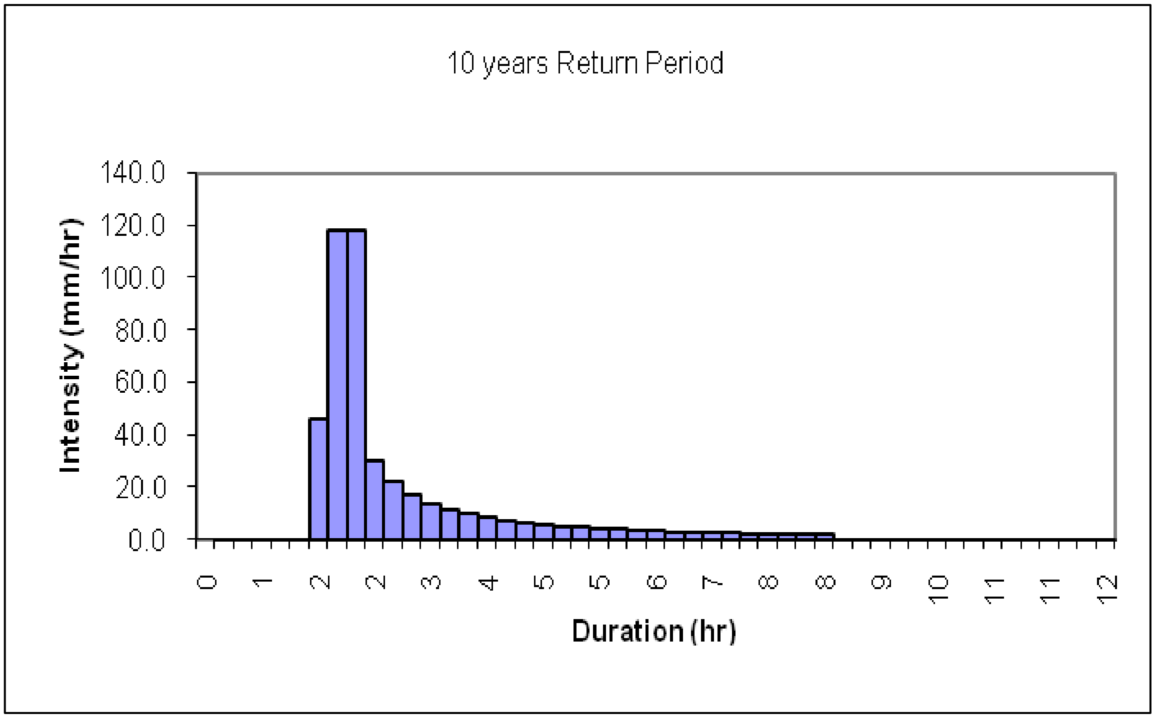


FIGURE C.4
Frequency of Storm Events in 10-years Period

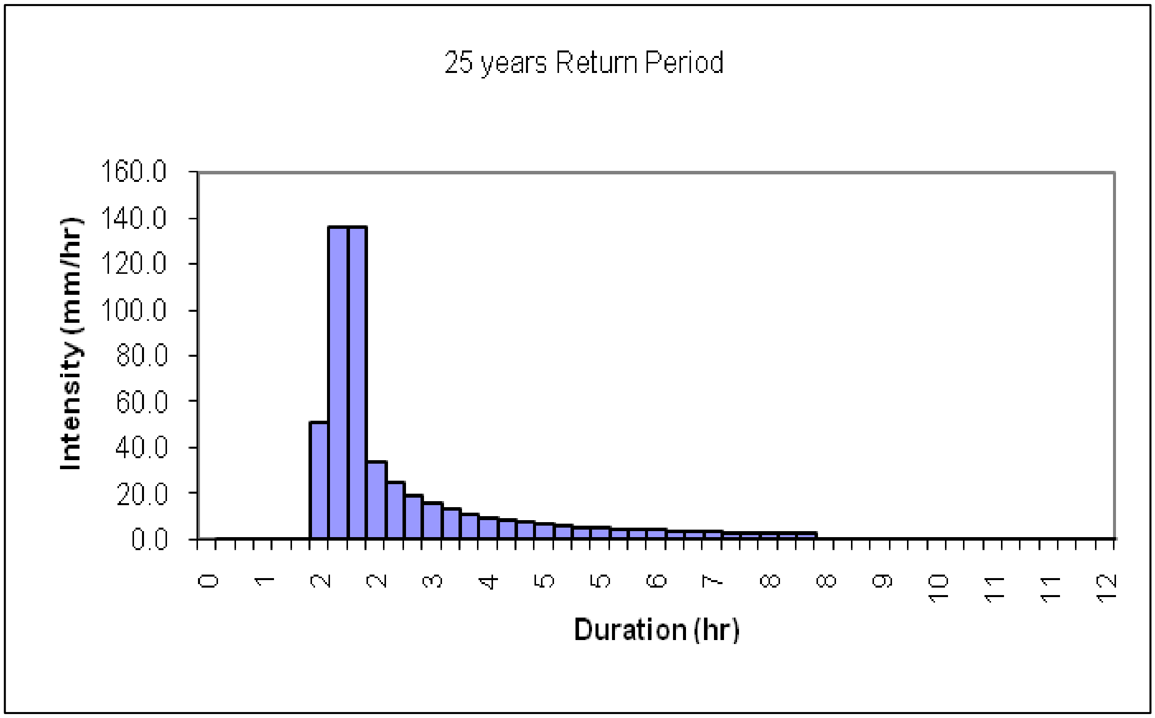


FIGURE C.5
Frequency of Storm Events in 25-years Period

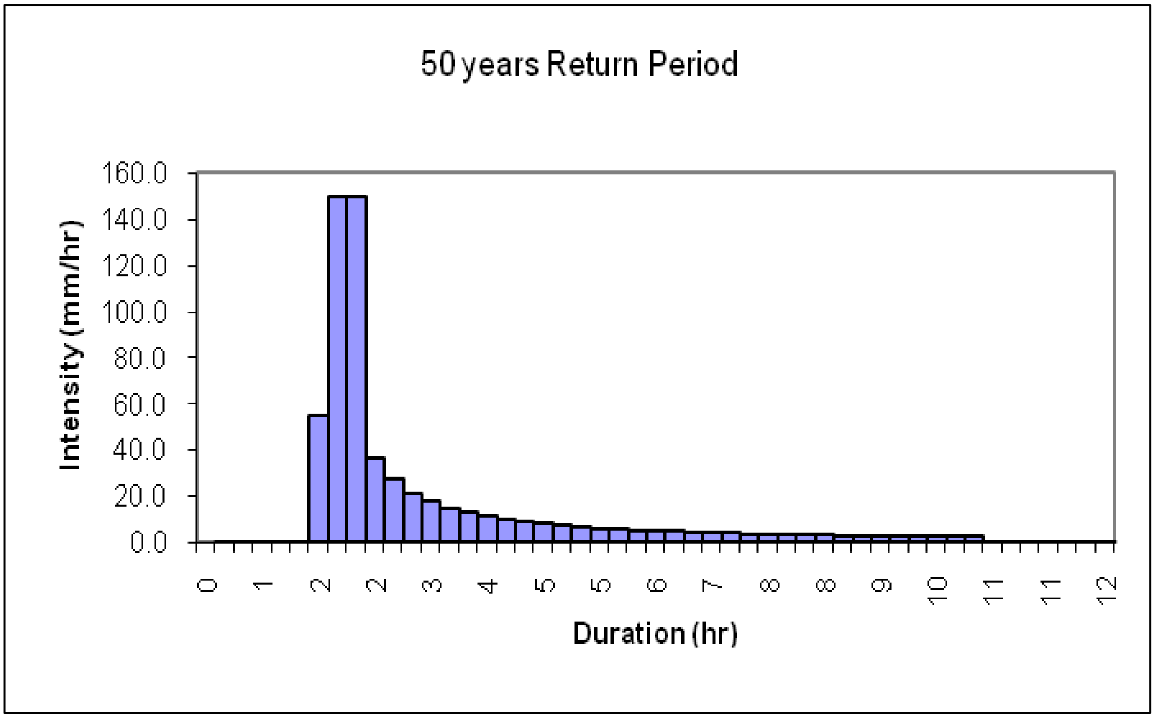


FIGURE C.6
Frequency of Storm Events in 50-years Period

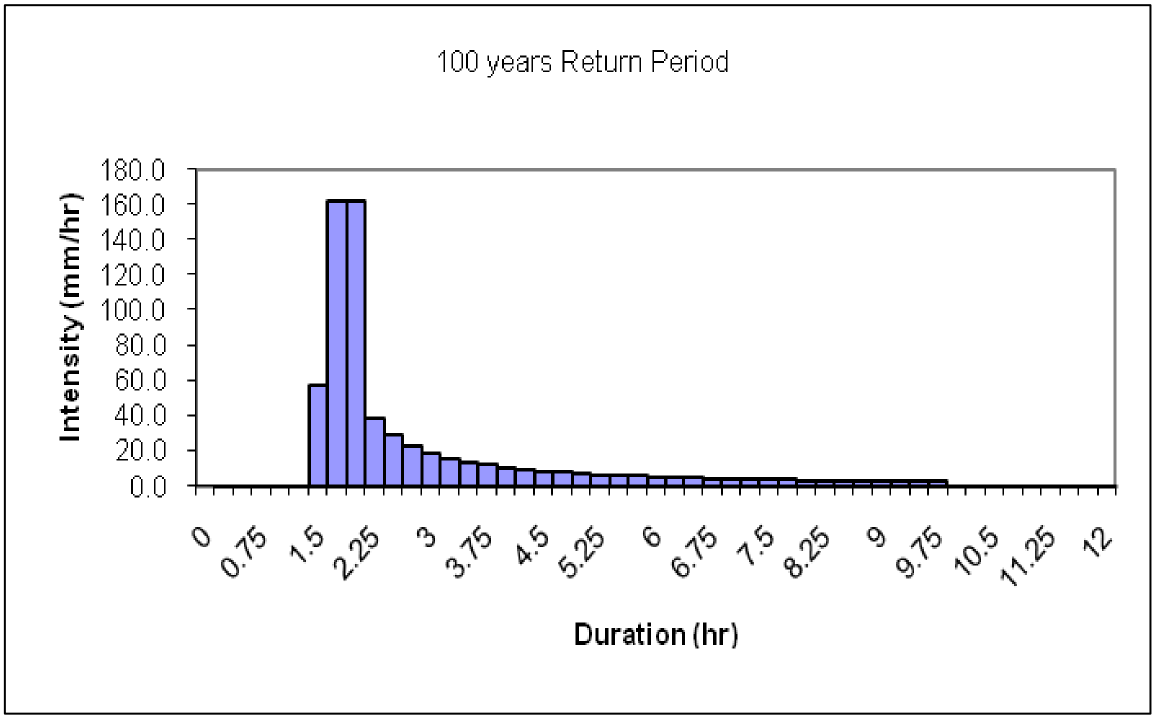


FIGURE C.7
Frequency of Storm Events in 100-years Period

TABLE C.2
Rainfall Intensity-duration-frequency (IDF) Estimation for the Paya Indah Wetland Catchment

Station	**Duration R Period**	**Average Rainfall Depth (mm)**				
		30 min	**1 hr**	**2 hr**	**5 hr**	**12 hr**
Sungai Kampung Manggiss	200	90.16	107.3	149.76	199.15	220.58
	100	83.42	100.22	139.19	183.57	202.84
	50	76.65	93.12	128.58	167.92	185.03
	25	69.83	85.97	117.9	152.16	167.09
	10	60.63	76.32	103.49	130.92	142.91
	5	53.36	68.69	92.09	114.11	123.77
	3	47.58	62.62	83.03	100.75	108.57
	2	42.36	57.15	74.87	88.71	94.86
Prang Besar	200	83.69	103.33	124.54	146.11	169.14
	100	77.66	96.52	116.02	135.64	156.05
	50	71.6	89.68	107.46	125.14	142.9
	25	65.5	82.79	98.84	114.56	129.66
	10	57.28	73.5	87.21	100.3	111.82
	5	50.77	66.15	78.01	89.01	97.69
	3	45.6	60.31	70.71	80.05	86.48
	2	40.94	55.05	64.12	71.97	76.36
Landang Bukit Cheeding	200	94.77	119.35	141.17	151.54	169.14
	100	87.16	110.34	130.61	140.87	156.05
	50	79.51	101.3	120.01	130.16	142.9
	25	71.81	92.2	109.33	119.37	129.66
	10	61.43	79.92	94.94	104.83	111.82
	5	53.22	70.2	83.55	93.32	97.69
	3	46.69	62.48	74.51	84.18	86.48
	2	40.81	55.52	66.35	75.94	76.36

APPENDIX

D

TABLE D.1
Monthly Rainfall at the Paya Indah Wetland Catchment*

Category	year	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Rainfall	1999	201.60	43.000	113.65	82.300	175.80	136.85	184.85	159.80	366.70	103.90	366.70	103.90
	2000	183.13	102.78	186.96	128.26	89.420	178.42	118.16	174.34	260.47	153.46	242.53	159.71
	2001	155.83	216.79	69.690	246.60	81.700	79.380	173.43	84.010	157.86	199.70	217.64	200.57
	2002	83.080	15.670	114.60	366.66	144.62	93.050	65.960	96.320	153.98	75.210	340.65	281.14
	2003	220.87	138.45	110.86	243.71	74.390	92.480	128.55	112.47	81.370	119.96	310.53	173.02
	2004	115.25	87.770	114.03	199.99	77.450	119.80	293.32	117.78	146.39	229.94	308.50	159.18
	2005	54.140	106.09	86.430	146.44	82.490	107.10	93.900	30.200	40.800	108.30	212.00	155.10
	2006	81.100	124.30	75.170	116.63	250.12	131.00	190.5	138.00	40.500	281.00	460.00	209.00
	2007	169.00	151.00	200.10	237.50	175.50	48.500	174.2	189.00	204.50	252.00	171.30	233.00
	2008	218.00	82.000	328.50	157.00	79.500	138.10	159.5	164.50	-	-	-	-

* Values are in mm

APPENDIX

E

TABLE E.1
Monthly Evapotranspiration at the Paya Indah Wetland Catchment*

Category	year	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Evapotranspiration	1999	107.9	117.0	119.7	121.5	135.6	121.5	129.0	121.8	140.1	119.0	114.6	114.7
	2000	113.2	118.6	123.7	134.1	108.5	121.2	131.1	122.5	140.1	122.8	114.9	113.5
	2001	109.7	114.0	125.2	132.0	122.8	123	131.1	124.0	140.7	121.8	117.6	116.6
	2002	120.6	123.8	130.5	134.4	124.9	124.5	132.4	125.6	138.9	123.7	114.6	115.3
	2003	112.2	116.2	125.2	131.4	124.0	123.9	128.7	124.9	139.8	120.3	114.0	115.6
	2004	119.4	122.7	126.2	135.3	124.6	124.2	126.5	124.3	141.0	121.8	117.0	116.3
	2005	120.3	123.5	134.2	138.3	125.9	127.5	131.8	128.3	147.6	123.1	117.6	115.0
	2006	123.4	126.3	135.6	136.5	131.2	133.6	135.1	136.3	145.8	129.4	124.2	121.5
	2007	121.6	124.1	138.2	138.7	133.2	135.3	134.4	134.1	147.8	127.6	122.6	122.3
	2008	123.1	124.6	134.2	135.8	132.4	134.5	136.7	133.8	-	-	-	-

* Values are in mm

APPENDIX
F

TABLE F.1
Dimensions and Basic Statistics for the Cross sections of the River Network for the Modelled Catchment

Branch Name	**Number of Cross-sections**	**Width** (m)			**Depth** (m)		
		Max.	**Min.**	**Average**	**Max.**	**Min.**	**Average**
Langat River	68	800	76.491	207.08	12.505	2.51	6.05
North Canal	09	10	3.20	5.47	9.20	1.00	5.35
North Canal_N1	03	3.20	3.20	3.20	6.50	5.824	6.06
North Canal_S1	03	3.20	3.20	3.20	5.602	5.00	5.20
North-Inlet-Canal (SWL1)	04	3.20	3.20	3.20	5.10	5.00	5.075
South-Inlet-Canal	07	15.40	3.20	8.43	6.50	3.00	4.83
Cyberjaya Canal	04	39.0	34.0	35.25	6.30	6.10	6.20
Outlet	14	4.25	4.25	4.25	9.69	1.125	3.85
Visitor Lake	08	550	70.0	331.25	3.0	2.0	2.50

TABLE F.1 Continued

Visitor-Main-Connect	02	12	12	12	1.0	1.0	1.0
Main Lake	06	520	470	505	6.40	2.0	2.89
Main-Palm-Connect	02	3.8	3.0	3.4	2.95	1.98	2.46
Driftwood Lake	03	200	200	200	4.5	3.45	4.17
Driftwood-Tin-Connect	02	6.0	6.0	6.0	3.5	3.5	3.5
Tin Lake	10	1430	100	810	16.66	1.74	8.96
Tin-Perch-Connect	02	10	10	10	2.5	2.5	2.5
Perch Lake	05	345	165	278	5.5	4.1	4.72
Perch-Marsh-Connect	02	12	12	12	1.25	1.2	1.225
Marsh Lake	07	250	160	201.43	6.5	4.15	5.47
Marsh-Padi-Connect *	02	06	06	06	1.0	1.0	1.0
Padi Lake *	04	305	220	276.25	6.3	3.90	5.30

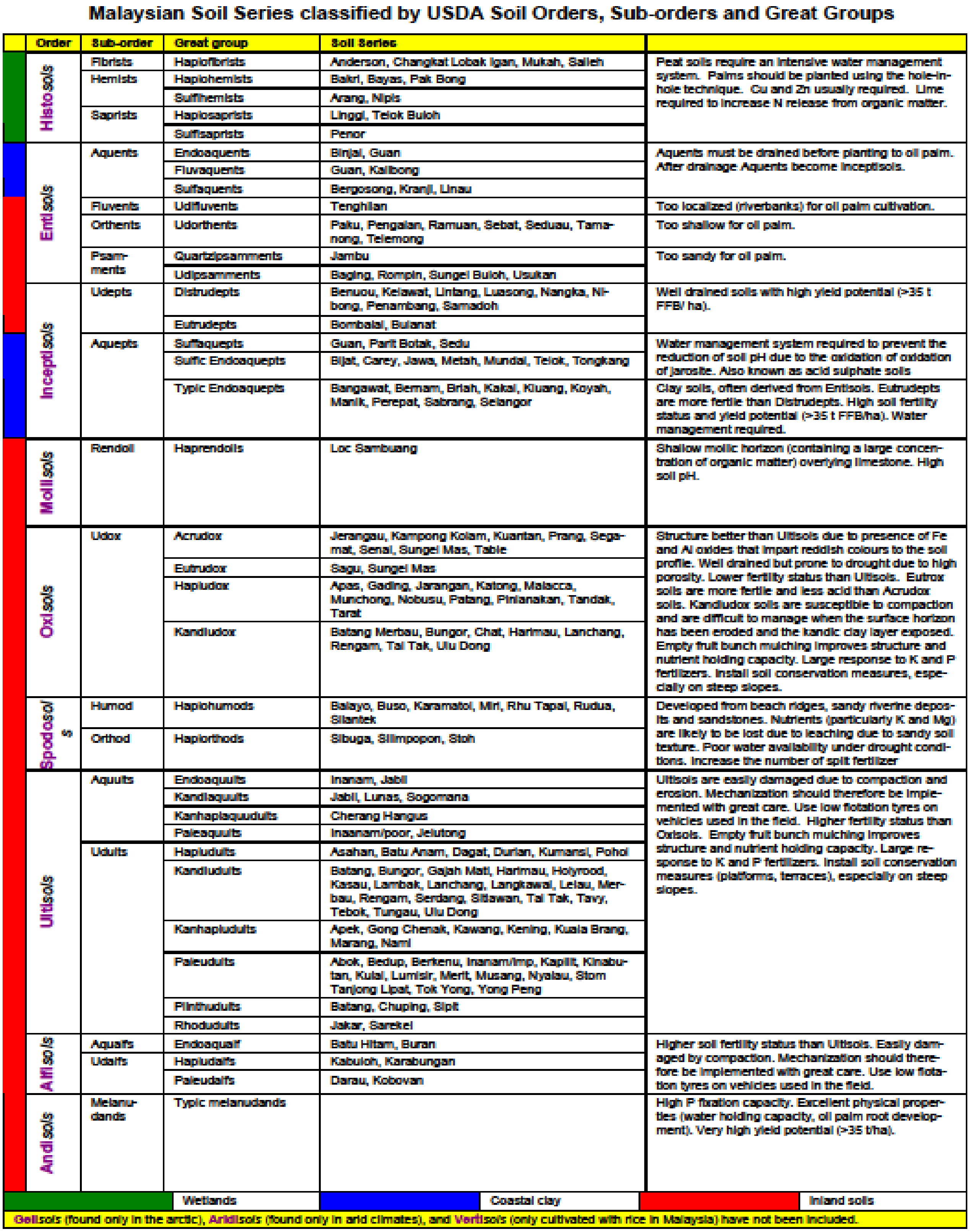
TABLE F.1 Continued

Padi-Swamp-hen-Connect *	04	06	06	06	4.01	2.00	4.58
Swamp-hen Lake *	02	180	180	180	6.00	6.00	6.00
Swamp-hen-Lotus-Connect	2.0	6.0	6.0	6.0	1.4	1.4	1.4
Lotus lake	10	670	350	427	5.3	2.0	3.88
Chalet Lake	06	400	220	300	5.6	2.0	5.05
Croc-Hippo Lake	08	150	03	67.38	5.5	2.0	4.58
Lotus-Outlet (SWL2)	03	6.0	6.0	6.0	3.5	3.4	3.47

* Dry Drainage

APPENDIX G

TABLE G.1



Malaysian Soil Series classified by USDA Soil Orders, Sub-orders and Great Groups

	Order	Sub-order	Great group	Soil Series	
🟩	Histosols	Fibrists	Haplofibrists	Anderson, Changkat Lobak Igan, Mukah, Salleh	Peat soils require an intensive water management system. Palms should be planted using the hole-in-hole technique. Cu and Zn usually required. Lime required to increase N release from organic matter.
🟩		Hemists	Haplohemists	Bakri, Bayas, Pak Bong	
🟩			Sulfhemists	Arang, Nipis	
🟩		Saprists	Haplosaprists	Linggi, Telok Buloh	
🟩			Sulfisaprists	Penor	
🟦	Entisols	Aquents	Endoaquents	Binjai, Guan	Aquents must be drained before planting to oil palm. After drainage Aquents become Inceptisols.
🟦			Fluvaquents	Guan, Kalbong	
🟦			Sulfaquents	Bergosong, Kranji, Linau	
🟥		Fluvents	Udifluvents	Tenghilan	Too localized (riverbanks) for oil palm cultivation.
🟥		Orthents	Udorthents	Paku, Pengalan, Ramuan, Sebat, Seduau, Tamanong, Telemong	Too shallow for oil palm.
🟥		Psamments	Quartzipsamments	Jambu	Too sandy for oil palm.
🟥			Udipsamments	Baging, Rompin, Sungei Buloh, Usukan	
🟥	Inceptisols	Udepts	Distrudepts	Benuou, Kelawat, Lintang, Luasong, Nangka, Nibong, Penambang, Samadoh	Well drained soils with high yield potential (>35 t FFB/ ha).
🟥			Eutrudepts	Bombalai, Bulanat	
🟦		Aquepts	Sulfaquepts	Guan, Parit Botak, Sedu	Water management system required to prevent the reduction of soil pH due to the oxidation of oxidation of jarosite. Also known as acid sulphate soils
🟦			Sulfic Endoaquepts	Bijat, Carey, Jawa, Metah, Mundai, Telok, Tongkang	
🟦			Typic Endoaquepts	Bangawat, Bernam, Briah, Kakal, Kluang, Koyah, Manik, Perepat, Sabrang, Selangor	Clay soils, often derived from Entisols. Eutrudepts are more fertile than Distrudepts. High soil fertility status and yield potential (>35 t FFB/ha). Water management required.
🟥	Mollisols	Rendoll	Haprendolls	Loc Sambuang	Shallow mollic horizon (containing a large concentration of organic matter) overlying limestone. High soil pH.
🟥	Oxisols	Udox	Acrudox	Jerangau, Kampong Kolam, Kuantan, Prang, Segamat, Senai, Sungei Mas, Table	Structure better than Ultisols due to presence of Fe and Al oxides that impart reddish colours to the soil profile. Well drained but prone to drought due to high porosity. Lower fertility status than Ultisols. Eutrox soils are more fertile and less acid than Acrudox soils. Kandiudox soils are susceptible to compaction and are difficult to manage when the surface horizon has been eroded and the kandic clay layer exposed. Empty fruit bunch mulching improves structure and nutrient holding capacity. Large response to K and P fertilizers. Install soil conservation measures, especially on steep slopes.
🟥			Eutrudox	Sagu, Sungei Mas	
🟥			Hapludox	Apas, Gading, Jarangan, Katong, Malacca, Munchong, Nobusu, Patang, Pinianakan, Tandak, Tarat	
🟥			Kandiudox	Batang Merbau, Bungor, Chat, Harimau, Lanchang, Rengam, Tai Tak, Ulu Dong	
🟥	Spodosols	Humod	Haplohumods	Balayo, Buso, Karamatoi, Miri, Rhu Tapai, Rudua, Silantek	Developed from beach ridges, sandy riverine deposits and sandstones. Nutrients (particularly K and Mg) are likely to be lost due to leaching due to sandy soil texture. Poor water availability under drought conditions. Increase the number of split fertilizer
🟥		Orthod	Haplorthods	Sibuga, Silimpopon, Stoh	
🟥	Ultisols	Aquults	Endoaquults	Inanam, Jabil	Ultisols are easily damaged due to compaction and erosion. Mechanization should therefore be implemented with great care. Use low flotation tyres on vehicles used in the field. Higher fertility status than Oxisols. Empty fruit bunch mulching improves structure and nutrient holding capacity. Large response to K and P fertilizers. Install soil conservation measures (platforms, terraces), especially on steep slopes.
🟥			Kandiaquults	Jabil, Lunas, Sogomana	
🟥			Kanhaplaquudults	Cherang Hangus	
🟥			Paleaquults	Inaanam/poor, Jelutong	
🟥		Udults	Hapludults	Asahan, Batu Anam, Dagat, Durian, Kumansi, Pohol	
🟥			Kandiudults	Batang, Bungor, Gajah Mati, Harimau, Holyrood, Kasau, Lambak, Lanchang, Langkawai, Lelau, Merbau, Rengam, Serdang, Sitiawan, Tai Tak, Tavy, Tebok, Tungau, Ulu Dong	
🟥			Kanhapludults	Apek, Gong Chenak, Kawang, Kening, Kuala Brang, Marang, Nami	
🟥			Paleudults	Abok, Bedup, Berkenu, Inanam/imp, Kapilit, Kinabutan, Kulai, Lumisir, Merit, Musang, Nyalau, Stom Tanjong Lipat, Tok Yong, Yong Peng	
🟥			Plinthudults	Batang, Chuping, Sipit	
🟥			Rhodudults	Jakar, Sarekei	
🟥	Alfisols	Aqualfs	Endoaqualf	Batu Hitam, Buran	Higher soil fertility status than Ultisols. Easily damaged by compaction. Mechanization should therefore be implemented with great care. Use low flotation tyres on vehicles used in the field.
🟥		Udalfs	Hapludalfs	Kabuloh, Karabungan	
🟥			Paleudalfs	Darau, Kobovan	
🟥	Andisols	Melanudands	Typic melanudands		High P fixation capacity. Excellent physical properties (water holding capacity, oil palm root development). Very high yield potential (>35 t/ha).

🟩	Wetlands	🟦	Coastal clay	🟥	Inland soils

Gelisols (found only in the arctic), Aridisols (found only in arid climates), and Vertisols (only cultivated with rice in Malaysia) have not been included.

Source: (IPNI, 2007)

APPENDIX

H

TABLE H.1
Soil Profile Definition and Soil Parameters used in the Model

MSHE [a] **Code**	**Soil** Type [b]	**Cassini Coordinates**		**Infiltration Rate** (*k* [m/s])	**Saturated Water Content** (Θ_s)	**Water Content at Field Capacity** (Θ_{fc})	**Water Content at Wilting Point** (Θ_w)
		X	**Y**				
1	MDL	-3732.43	-33552.35	2.10E-08	0.28	0.15	0.16
	MDL	-4315.24	-33635.60	9.70E-09	0.31	0.11	0.15
	MDL	-3159.06	-33580.10	7.00E-08	0.30	0.14	0.16
	MDL	-4013.07	-32914.03	5.40E-08	0.33	0.16	0.18
	MDL	-3846.16	-33739.22	8.30E-08	0.34	0.12	0.17
	MDL	-4117.52	-32578.31	5.66E-08	0.28	0.11	0.17
	MDL	-5231.08	-32164.70	6.77E-08	0.34	0.11	0.16
	MDL	-5009.16	-33580.34	5.40E-08	0.31	0.10	0.20
	MDL	-5101.81	-34092.87	1.39E-09	0.24	0.09	0.17
	MDL	-49647.64	-33186.26	2.44E-08	0.30	0.17	0.20
2	SBM	-6729.74	-31748.41	6.48E-07	0.38	0.29	0.23
	SBM	-7173.78	-30971.33	5.20E-07	0.41	0.34	0.22
	SBM	-6424.46	-30971.33	5.07E-07	0.42	0.27	0. 20
	SBM	-6979.51	-29999.97	4.40E-08	0.34	0.23	0.22
	SBM	-6313.44	-28584.58	5.12E-07	0.33	0.31	0.25
	SBM	-6813.00	-27613.22	3.90E-08	0.38	0.27	0.22
	SBM	-5258.83	-27280.19	3.67E-07	0.36	0.26	0.23
	SBM	-4537.26	-26142.32	1.40E-07	0.37	0.27	0.23
	SBM	-5169.76	-26947.54	8.56E-07	0.36	0.33	0.21
	SBM	-5294.83	-28036.41	8.93E-07	0.36	0.29	0.21

TABLE H.1 (Continued)

7	Perang series	-2920.81	-25051.38	1.01E-07	0.38	0.26	0.15
	Perang series	-3645.98	-24985.45	7.05E-07	0.37	0.24	0.17
	Perang series	-4357.96	-24589.91	3.71E-06	0.37	0.28	0.16
	Perang series	-3487.76	-24260.29	3.22E-08	0.33	0.34	0.15
	Perang series	-3250.43	-23561.49	2.80E-07	0.43	0.33	0.18
	Perang series	-3327.72	-24501.14	5.81E-08	0.34	0.35	0.17
	Perang series	-34451.2	-24961.33	5.35E-07	0.33	0.38	0.18
	Perang series	-4246.11	-25277.31	4.24E-07	0.35	0.32	0.16
	Perang series	-4363.17	-23320.24	4.11E-07	0.36	0.27	0.21
	Perang series	-3250.43	-24374.52	3.73E-07	0.86	0.24	0.18
12	Peat series	-7877.520	-35988.19	2.02E-04	0.67	0.68	0.27
	Peat series	-9423.010	-35988.19	1.11E-05	0.77	0.67	0.27
	Peat series	-11249.50	-35988.19	8.64E-05	0.69	0.64	0.28
	Peat series	-8720.510	-34723.70	1.07E-04	0.68	0.64	0.26
	Peat series	-9329.340	-34583.20	1.20E-06	0.78	0.73	0.31
	Peat series	-9797.670	-33494.33	1.18E-04	0.76	0.78	0.25
	Peat series	-10605.54	-34957.86	3.62E-05	0.69	0.68	0.27
	Peat series	-9200.550	-33997.79	5.71E-05	0.74	0.62	0.28
	Peat series	-9704.010	-34267.08	1.28E-05	0.73	0.66	0.29
	Peat series	-9802.220	-35796.21	1.15E-05	0.79	0.74	0.33

TABLE H.1 (Continued)

13	SKG	-7590.080	-41628.44	3.42E-08	0.32	0.26	0.21
	SKG	-10282.11	-41683.94	3.06E-08	0.31	0.23	0.25
	SKG	-12308.07	-40379.56	6.88E-07	0.39	0.31	0.25
	SKG	-13889.99	-39019.67	3.63E-07	0.37	0.31	0.24
	SKG	-15277.63	-38103.82	6.82E-07	0.39	0.25	0.23
	SKG	-17636.63	-37632.02	5.14E-07	0.34	0.22	0.24
	SKG	-20439.67	-35189.77	3.23E-07	0.35	0.24	0.23
	SKG	-19867.42	-38472.04	2.16E-08	0.31	0.27	0.21
	SKG	-21028.17	-36802.81	7.78E-07	0.31	0.23	0.22
	SKG	-19742.56	-36613.29	5.12E-07	0.33	0.28	0.24

[a] MSHE: MIKE SHE

[b] Soil type:

MDL: Mined Land soil association
SBM: Serdang-Bungor-Munchong soil series;
SKG: Selangor-Kanchung soil series

APPENDIX

I

TABLE I.1 Engineering Borehole Log for PI 1

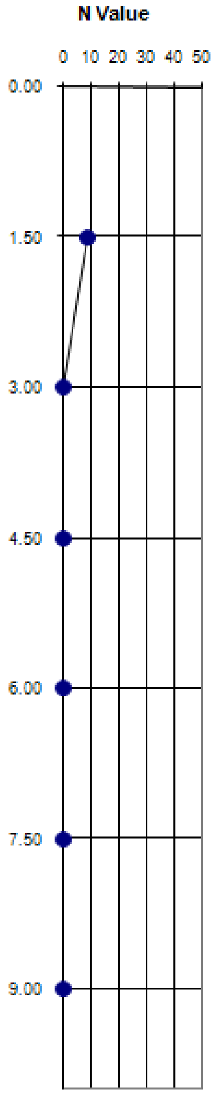
Project : PENYIASATAN HIDROGEOLOGI KAWASAN PAYA INDAH
Location : PAYA INDAH, SELANGOR
Client : University of Malaya
Consultant :
Architect :

Rig type: YBM
Drill Method: ROTARY
Casing Type: NW

Driller : IBRAHIM
Supervisor :
Check by : Majid

Sheet 1 of 3
Borehole No: **BH 1**
Job No:
Reduced Level: 8.29 m
Final water level 1
Date started: 16.02.07
Date Completed: 25.02.07

Depth (m)	Strata Thick-ness	Description of Strata	Log	SAMPLING DETAIL Sample No.		Depth (m) From	To	Rec. Ratio	SPT BLOW COUNT Penetration in mm 75	75	75	75	75	75	N Value
1		Medium stiff, organic material		P1/D1	▨	1.000	1.450		3	3	3	4	1	1	**9**
3		Very soft, grey, very fine sandy-CLAY SLIME	ss	P2/D0	▨	3.000	3.450		0	0	0	0	0	0	**0**
4		SLIME	ss	P3/D0	▨	4.500	4.950		0	0	0	0	0	0	**0**
6		SLIME	ss	P4/D0	▨	6.000	6.450		0	0	0	0	0	0	**0**
7		SLIME	ss	P5/D0	▨	7.500	7.950		0	0	0	0	0	0	**0**
9		Medium stiff, grey, very fine sandy-CLAY		P6/D2	▨	9.000	9.450		1	1	1	2	2	1	**6**



SPT PLOT

LEGEND:

PM	▥	Pressuremeter Test
D	☰	Disturbed Sample
P	▨	Standard Penetration
UD	"	Undisturbed Sample
G	☰	Geonor Vane Test
VS	▩	Vane Share Test
C	▩	Rock Coring
CL	-	Core Length
CR	-	Core Recovery
RQD	-	Rock Quality Designa

REMARK :

Date	Time hrs	Depth of hole (m)	Depth of casing (m)	Depth of water (m)

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Example:
50/120 = 50 Blows/120mm

Cohesive Soil (N)	0	2	4	8	15	30	
	V.soft	soft	M.stiff	stiff	V.stiff	Hard	
Non-cohesive Soil (N)	0	4	10	30	50		
	V.loose	Loose	M.dense	Dense	V.dense		

TABLE I.1 (cont'd)

Project : PENYIASATAN HIDROGEOLOGI KAWASAN PAYA INDAH

Location : PAYA INDAH, SELANGOR

Client : University of Malaya
Consultant :
Architect :

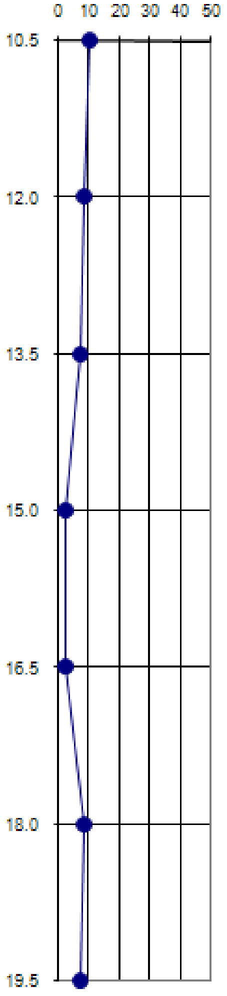
Rig type: YBM
Drill Method: ROTARY
Casing Type: NW

Driller : IBRAHIM
Supervisor :
Check by : Majid

Sheet 2 of 3
Borehole No: **BH 1**
Job No:
Reduced Level: 8.29 m
Final water level 1
Date started: 16.02.07
Date Completed: 25.02.07

Depth (m)	Strata Thick-ness	Description of Strata	Log	SAMPLING DETAIL Sample No.		Depth (m) From	To	Rec. Ratio	SPT BLOW COUNT Penetration in mm 75	75	75	75	75	75	N Value
10															
		Stiff, grey CLAY with some organic material		P7/D3	▨	10.500	10.950		2	1	2	2	3	3	**10**
11															
12		Loose, light grey, clayey-SAND with minor gravel		P8/D4	▨	12.000	12.450		1	1	2	2	2	2	**8**
13															
		Ditto (water lost)		P9/D0	▨	13.500	13.950		1	1	1	2	2	2	**7**
14															
15		Very soft, grey, fine sandy CLAY with minor organic material SLIME	ss ss ss ss ss ss ss	P10/D0	▨	15.000	15.450		2	0	0	0	0	0	**2**
16															
		SLIME	ss ss ss ss ss	P11/D5	▨	16.500	16.950		1	1	1	1	0	0	**2**
17															
18				P12/D6	▨	18.000	18.450		1	1	1	1	2	2	**8**
19															
				P13/D0	▨	19.500	19.950		1	1	1	2	2	2	**7**
20															

N Value



SPT PLOT

LEGEND:

PM	▥	Pressuremeter Test
D	▤	Disturbed Sample
P	▨	Standard Penetration
UD	"	Undisturbed Sample
G	▤	Geonor Vane Test
VS	▦	Vane Share Test
C	▩	Rock Coring
CL	-	Core Length
CR	-	Core Recovery
RQD	-	Rock Quality Designa

REMARK :

Date	Time hrs	Depth of hole (m)	Depth of casing (m)	Depth of water (m)

ENGEO BUMI CO. LTD.

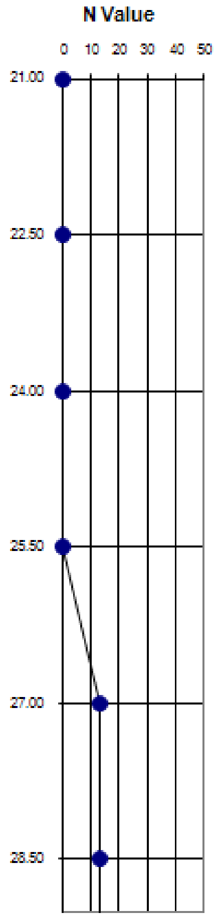
Example:
50/120 = 50 Blows/120mm

Cohesive Soil (N)	0	2	4	8	15	30	
	V.soft	soft	M.stiff	stiff	V.stiff	Hard	
Non-cohesive Soil (N)	0	4	10	30	50		
	V.loose	Loose	M.dense	Dense	V.dense		

TABLE I.1 (cont'd)

Project : PENYIASATAN HIDROGEOLOGI KAWASAN PAYA INDAH Location : PAYA INDAH, SELANGOR		Sheet 3 of 3 Borehole No: **BH 1** Job No: Reduced Level: 8.29 m
Client : University of Malaya Consultant : Architect :	Rig type: YBM Drill Method: ROTARY Casing Type: NW	Driller : IBRAHIM Supervisor : Check by : Majid
		Final water level 1 Date started: 16.02.07 Date Completed: 25.02.07

Depth (m)	Strata Thick-ness	Description of Strata	Log	SAMPLING DETAIL Sample No.		Depth (m) From	To	Rec. Ratio	SPT BLOW COUNT Penetration in mm 75	75	75	75	75	75	N Value
			ss ss ss												
21		SLIME	ss	P14/D0	▨	21.000	21.450		3	0	0	0	0	0	**0**
			ss ss ss												
22			ss ss												
			ss	P15/D0	▨	22.500	22.950		0	0	0	0	0	0	**0**
			ss												
23			ss ss ss ss												
24			ss	P16/D0	▨	24.000	24.450		0	0	0	0	0	0	**0**
			ss												
		SLIME	ss ss												
25			ss ss												
			ss	P17/D0	▨	25.500	25.950		0	0	0	0	0	0	**0**
			ss ss												
26															
27		Very stiff, grey, clayey-SAND		P18/D7	▨	27.000	27.450		1	2	4	3	3	3	**13**
28															
		Very stiff,dark grey, clayey-SAND, fine to medium grained		P19/D0	▨	28.500	28.950		7	5	6	2	4	4	**16**
29															
30		Same as above		P20/D8	▨	30.500	30.950		9	5	4	2	2	2	10



SPT PLOT

LEGEND:

PM	▥	Pressuremeter Test
D	☰	Disturbed Sample
P	▨	Standard Penetration
UD	"	Undisturbed Sample
G	☰	Geonor Vane Test
VS	▒	Vane Share Test
C	▓	Rock Coring
CL	-	Core Length
CR	-	Core Recovery
RQD	-	Rock Quality Designa

REMARK :

Date	Time hrs	Depth of hole (m)	Depth of casing (m)	Depth of water (m)

Example:
50/120 = 50 Blows/120mm

Cohesive Soil (N)	0	2	4	8	15	30	
	V.soft	soft	M.stif	stiff	V.stiff	Hard	
Non-cohesive Soil (N)	0	4	10	30	50		
	V.loose	Loose	M.dense	Dense	V.dense		

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APPENDIX
J

PUMPING TEST DATA

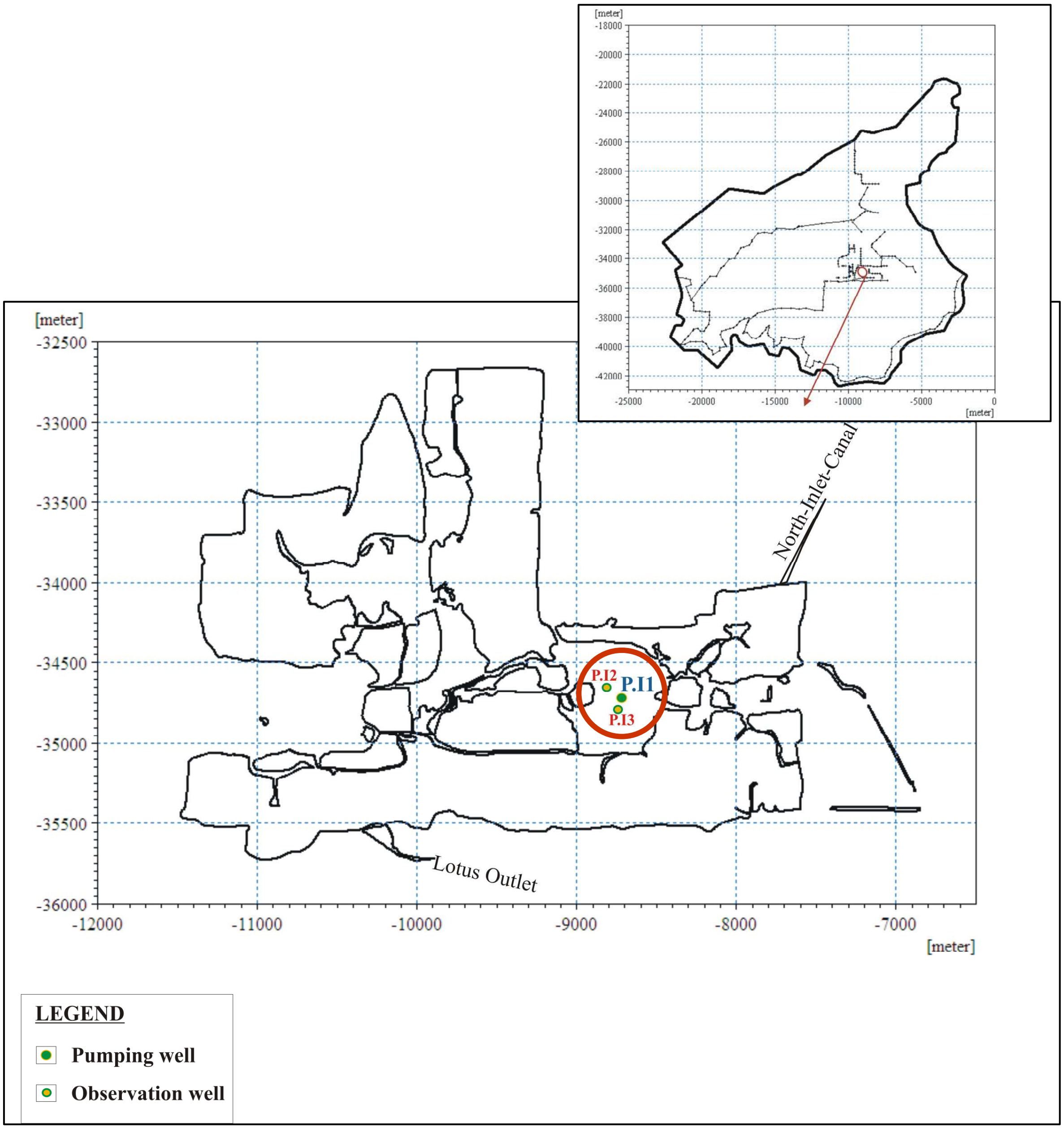


FIGURE J.1
Location of the Pumping Test

TABLE J.1
Data of Constant Rate Pumping Test at the Observation Well PI1

Well No.	: PI 1	Date & Time of Test Kick-Start :	17.03.2007 8:00 AM
Location	: Paya Indah Wetlands, Selangor D.E.	Date & Time of Test Stopping :	17.03.2007 12:10 PM
Well Depth :	30 m	Pump Depth :	0.00 m
Screen Position :	29 - 30 m	Static Water Level :	1.56 m
Well Collar Height :	0.12 m	Pumping Rate :	0.88 m^3/h
Distance from Pumping Well :	5.50 m		

Date Time	Time after Pumping Started (minute)	Water Level (m)	Drawdown (m)	Date Time	Time after Pumping Started (minute)	Water Level (m)	Drawdown (m)
17.03.2007	0	1.56	0.00		120	4.34	2.78
8.00 am	0.2	1.59	0.03		160	4.44	2.88
	0.5	1.63	0.07		200	4.53	2.97
	1.0	1.71	0.15		250	4.66	3.10
	1.5	1.82	0.26		300		
	2.0	1.93	0.37		350		
	2.5	2.01	0.45		400		
	3.0	2.11	0.55		450		
	3.5	2.19	0.63		500		
	4.0	2.26	0.70		550		
	4.5	2.33	0.77		600		
	5.0	2.39	0.83		700		
	6.0	2.48	0.92		800		
	7.0	2.58	1.02		900		
	8.0	2.66	1.10		1000		
	9.0	2.71	1.15		1200		
	10.0	2.77	1.21		1400		
	15	3.12	1.56		1600		
	20	3.17	1.61		1800		
	25	3.32	1.76		2000		
	30	3.43	1.87		2440		
	35	3.66	2.10		2480		
	40	3.72	2.16		2720		
	45	3.77	2.21		2960		
	50	3.86	2.30		3200		
	55	3.92	2.36		3440		
	60	3.99	2.43		3680		
	70	4.08	2.52		3920		
	80	4.15	2.59		4160		
	90	4.25	2.69		4320		
	100	4.28	2.72				

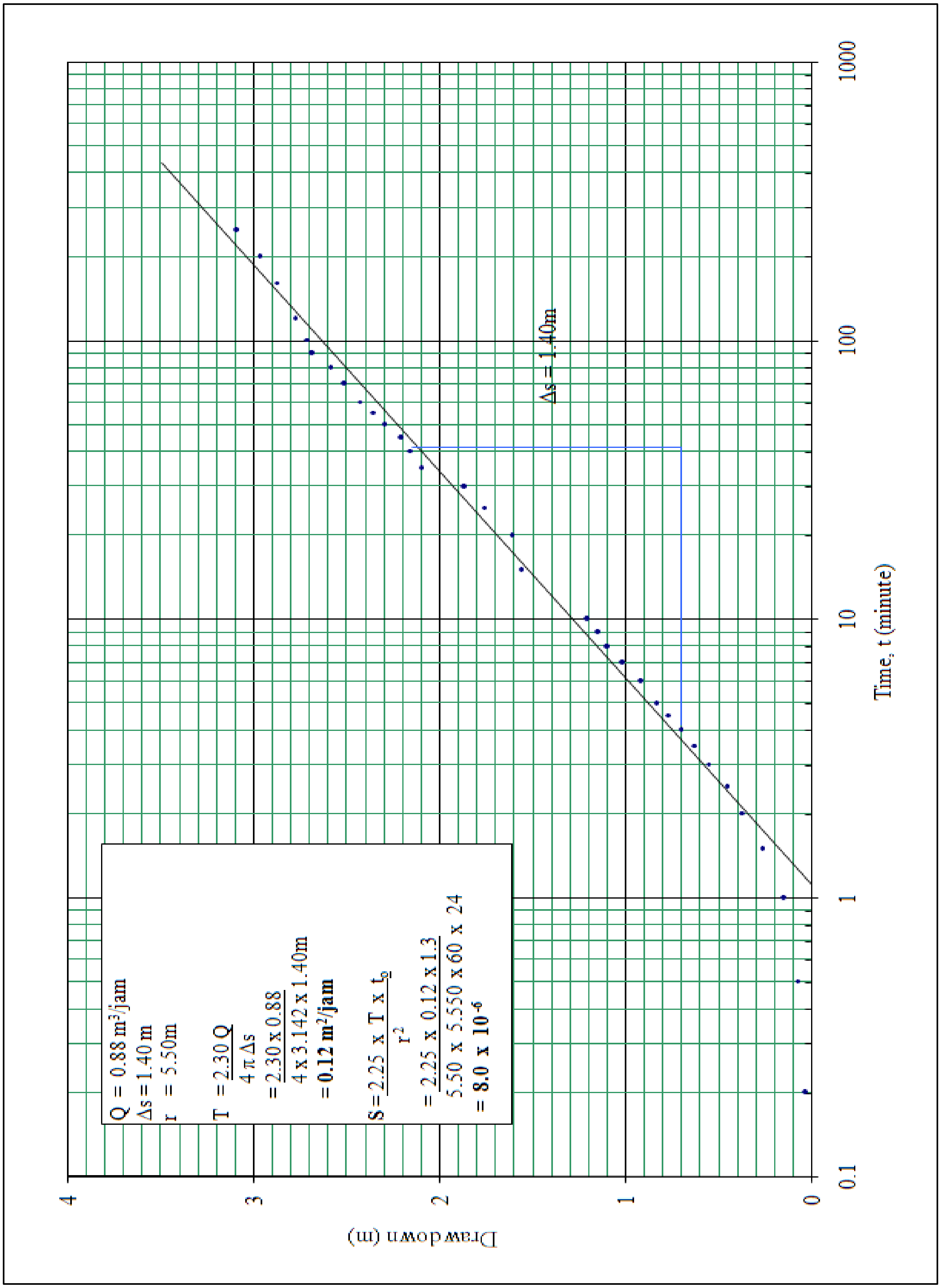


FIGURE J.2
Result of constant rate pumping test at Observation well PI1

TABLE J.2
Data of the Recovery Test at Observation Well PI1

Well No. : PI 1
Date & Time of Test Kick-Start : 17.03.2007 - 8.00 am
Location : : Paya Indah Wetlands, Selangor D.E.
Date & Time of Test Stopping : 17.03.2007 - 12.10 pm
Well Depth : 30 m
Static Water Level : 1.56 m
Screen Position :29 - 30 m
Well Collar Height : 0.12 m

Date/ Time	Time when Pumping Started t (minute)	Time after Pumping Stopped t' (minute)	t / t'	Water Level (m)	Residual Drawdown (m)	Time when Pumping Started t (minute)	Time after Pumping Stopped t' (minute)	t / t'	Water Level (m)	Residual Drawdown (m)
17.03.2007	0	250.0	Σ	4.54	2.98	70	320.0	4.6	2.95	1.39
8.00 am	0.5	250.5	501.0	4.30	2.74	80	330.0	4.1	2.87	1.31
	1.0	251.0	251.0	4.23	2.67	90	340.0	3.8	2.81	1.25
	1.5	251.5	167.7	4.18	2.62	100	350.0	3.5	2.75	1.19
	2.0	252.0	126.0	4.17	2.61	120	370.0	3.1	2.65	1.09
	2.5	252.5	101.0	4.15	2.59	140	390.0	2.8	2.56	1.00
	3.0	253.0	84.3	4.14	2.58	160	410.0	2.6	2.49	0.93
	3.5	253.5	72.4	4.13	2.57	180	430.0	2.4	2.40	0.84
	4.0	254.0	63.5	4.12	2.56	210	460.0	2.2	2.30	0.74
	4.5	254.5	56.6	4.09	2.53	240	490.0	2.0	2.22	0.66
	5.0	255.0	51.0	4.05	2.49	270	520.0	1.9	2.15	0.59
	6.0	256.0	42.7	4.03	2.47	300	550.0	1.8		
	7.0	257.0	36.7	4.00	2.44	360	610.0	1.7		
	8.0	258.0	32.3	3.93	2.37	420	670.0	1.6		
	9.0	259.0	28.8	3.89	2.33	480	730.0	1.5		
	10	260.0	26.0	3.85	2.29	540	790.0	1.5		
	15	265.0	17.7	3.66	2.10	600	850.0	1.4		
	20	270.0	13.5	3.54	1.98	660	910.0	1.4		
	25	275.0	11.0	3.45	1.89	720	970.0	1.3		
	30	280.0	9.3	3.36	1.80	780	1030.0	1.3		
	35	285.0	8.1	3.28	1.72	840	1090.0	1.3		
	40	290.0	7.3	3.20	1.64	900	1150.0	1.3		
	45	295.0	6.6	3.11	1.55	960	1210.0	1.3		
	50	300.0	6.0	3.07	1.51	1020	1270.0	1.2		
	55	305.0	5.5	3.03	1.47	1080	1330.0	1.2		
	60	310.0	5.2	2.99	1.43	1140	1390.0	1.2		

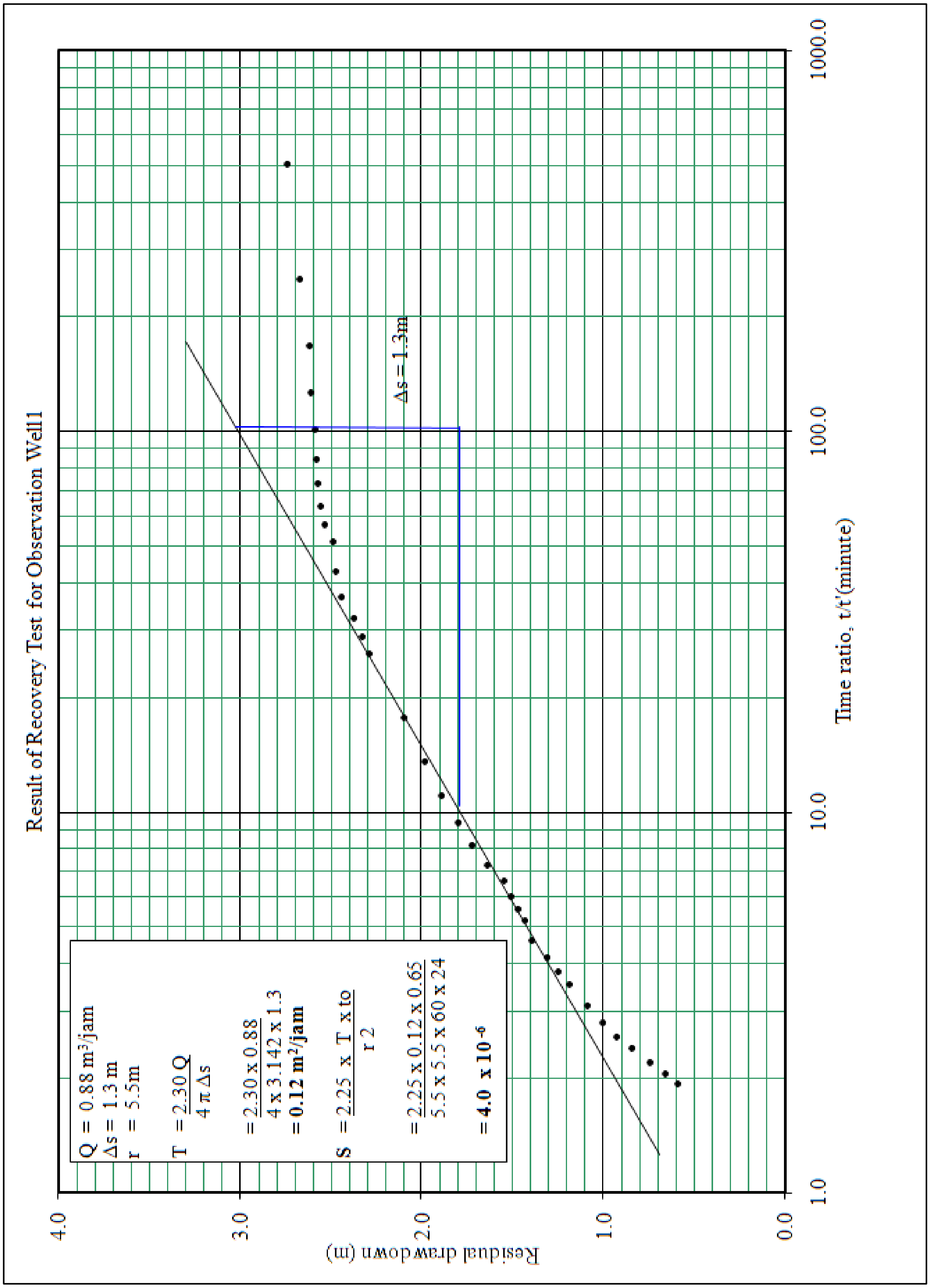


FIGURE J.3
Result of constant discharge pumping test at Observation well PI1

TABLE J.3

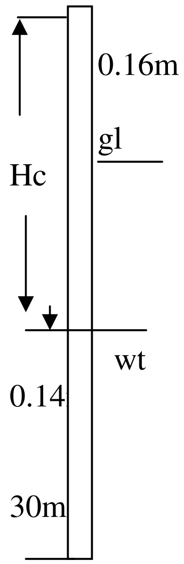
Determination of Hydraulic Conductivity for the Deep Aquifer Constant Head Permeability Test at Borehole PI1

FIELD PERMEABILITY TEST

Project : Paya Indah Wetland Modelling
Location : Paya Indah Wetland, Selangor D. E.
Borehole : PI1
Date : 28/2/07

CONSTANT HEAD PERMEABILITY TEST

Test No
Water table 0.14 m.b.g.l
Ground elevation m.b.g.l
Depth of borehole 30.0 m.b.g.l
Test depth 30.0 m
Top of casing 0.17 m b.g.l
Diameter of casing 11.43 cm

Time	Time intervel (sec)	Total head Hc (cm)	Meter reading (litre)	Volume water (cc)	Q cc/sec	K=Q/FH cm/sec	
	0	31		0	0	0	
	60	31		0	0	0	
	120	31		0	0	0	
	180	31		0	0	0	
	240	31		30	0.5	9.941 x10^{-4}	
	360	31		25	0.208	4.135x10^{-4}	
	480	31		10	0.083	1.650 x10^{-4}	
	600	31		15	0.125	2.485 x10^{-4}	
	720	31		20	0.168	3.340 x10^{-4}	
	840	31		15	0.125	2.485 x10^{-4}	
	960	31		10	0.083	1.650 x10^{-4}	
	1080	31		15	0.125	2.485 x10^{-4}	
	1200	31		10	0.083	1.650 x10^{-4}	
	1500	31		30	0.100	1.988x10^{-4}	
	1800	31		10	0.033	6.560 x10^{-5}	
	2100	31		20	0.067	1.332 x10^{-4}	
	2400	31		20	0.067	1.332 x10^{-4}	
	2700	31		10	0.033	6.560 x10^{-5}	
	3000	31		15	0.050	9.940 x10^{-5}	
	3300	31		5	0.017	3.380 x10^{-5}	
	3600	31		15	0.050	9.940 x10^{-5}	
	3900	31		15	0.050	9.940 x10^{-5}	

F = 2.75D = 31.4325

K = Q/FHc

TABLE J.4

Determination of Hydraulic Conductivity for the Second Layer using Constant Head Permeability Test at Borehole PI2

FIELD PERMEABILITY TEST

Project : Paya Indah Wetland Modelling

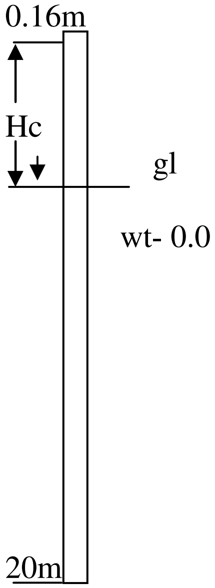
Location : Paya Indah Wetland, Selangor D. E.

Borehole : PI2

Date : 26/2/07

CONSTANT HEAD PERMEABILITY TEST

Test No
Test depth 20.0 m
Water table 0.0 m.b.g.l
Top of casing 0.16 m b.g.l
Ground elevation m.b.g.l
Diameter of casing 11.43 cm
Depth of borehole 20.0 m.b.g.l

Time	Time intervel (sec)	Total head Hc (cm)	Meter reading (litre)	Volume water (cc)	Q cc/sec	K=Q/FH cm/sec	
	0	16		0	0	0	
	60	16		45	0.750	1.49210^{-3}	
	120	16		45	0.750	1.492×10^{-3}	
	180	16		35	0.583	1.160×10^{-3}	
	240	16		15	0.250	4.978×10^{-4}	
	300	16		25	0.416	8.283×10^{-4}	
	360	16		10	0.166	3.305×10^{-4}	
	420	16		10	0.166	3.305×10^{-4}	
	480	16		20	0.333	6.630×10^{-4}	
	540	16		20	0.033	6.570×10^{-5}	
	600	16		20	0.033	6.570×10^{-5}	
	6300	16		20	0.0006	1.314×10^{-6}	
	6600	16		15	0.0005	9.950×10^{-7}	
	7200	16		15	0.0005	9.950×10^{-7}	
	7800	16		15	0.0005	9.950×10^{-7}	
	8400	16		15	0. 0005	9.950×10^{-7}	
	9000	16		15	0. 0005	9.950×10^{-7}	

F = 2.75D = 31.4325
K = Q/FHc

FHc= 502.92

TABLE J.5

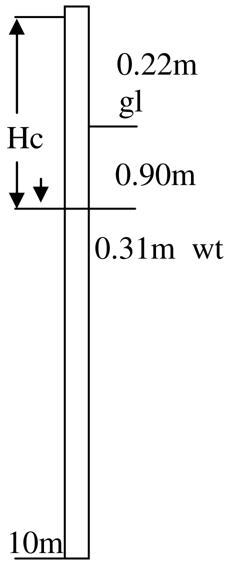
Determination of Hydraulic Conductivity for the Shallow Aquifer using Constant Head Permeability Test at Borehole PI3

Project : Paya Indah Wetland Modelling
Location : Paya Indah Wetland, Selangor D. E.
Borehole : PI3
Date : 21/2/07

CONSTANT HEAD PERMEABILITY TEST

Test No			Test depth	10.0	m
Water table	0.0	m.b.g.l	Top of casing	0.22	m b.g.l
Ground elevation		m.b.g.l	Diameter of casing	11.43	cm
Depth of borehole	10.0	m.b.g.l			

Time	Time intervel (sec)	Total head Hc (cm)	Meter reading (litre)	Volume water (cc)	Q cc/sec	K=Q/FH cm/sec
	0	31		0	0	0
	60	31		135	2.250	2.31 x 10^{-3}
	120	31		175	2.917	2.99 x 10^{-3}
	180	31		165	2.750	2.82 x10^{-3}
	240	31		85	1.417	1.45 x10^{-3}
	300	31		184	3.067	3.15 x10^{-3}
	360	31		136	2.267	2.33 x10^{-3}
	420	31		95	1.583	1.62 x10^{-3}
	480	31		25	0.417	4.28 x 10^{-4}
	540	31		140	2.333	2.39 x10^{-3}
	600	31		115	1.917	1.97 x10^{-3}
	6300	31		205	0.683	7.01 x10^{-4}
	6600	31		225	0.075	7.70 x10^{-5}
	7200	31		215	0.071	7.36 x10^{-5}
	7800	31		200	0.067	6.85 x10^{-5}
	8400	31		195	0.065	6.67 x10^{-5}



F = 2.75D = 31.4325
K = Q/FHc

FHc= 974.40

TABLE J.6

Measurements of Ground Subsidence at Megasteel Co. Ltd. Area for the period 2001 – 2006 [a]

Bill	**DP/BM Number** [b]	**Location**	**DP 2001** (m)	**BM 2001** (m)	**BM 2006** (m)	**Ground Subsidence** [c] (m)
1	4	Kg. Olak Lempit	4.92062	4.77087	4.73562	-0.185
2	6	JBA Olak Lempit	6.10016	5.67916	5.67916	-0.481
3	15	Penghujung Jalan Dahlia	3.29037	3.28042	3.15837	-0.132
4	16	Tadika Labohan Dagang	3.50590	3.54858	3.49690	-0.009
5	17	Ladang Felcra	4.42807	4.13413	4.12107	-0.307

[a] Source: Mineral and Geoscience Department of Malaysia (2007)

[b] DP: datum point; BM: benchmark

[c] value is obtained by subtracting BM 2006 column from DP 2001 column; Negative sign represents ground subsidence

TABLE J.7
Measurements of Ground Subsidence at Megasteel Co. Ltd. Area for the period 2000 – 2007 [a]

Category [b]	**Bill**	**Point** [c]	**Epoch 3**	**Epoch 8**	**Epoch 12**	**Epoch 17**	**Epoch 23**	**Epoch 29**	**Epoch 35**	**Epoch40**	**GS** [d]
			20/10/00	**16/11/01**	**16/11/02**	**20/11/03**	**10/12/04**	**30/11/05**	**21/12/06**	**31/10/07**	
DP/BM Number	1	BM No.1	-	6.003	6.003	6.003	6.003	6.003	6.003	6.003	
	2	Station JAI	4.764	4.764	4.764	-	-	-	-		
		Station SSCI	-	-	-	4.764	5.121	7.017	-		
		Station 100	-	-	-	-	-	-	5.670	4.570	-0.179
Well Reduced Level	3	PWM1	5.041	5.055	5.040	5.052	5.037	4.938	5.234	5.220	0.117
	4	PWM2	5.224	5.204	5.235	5.227	5.230	5.145	5.113	5.107	0.019
	5	PWM3	5.373	5.370	5.409	5.416	5.417	5.323	5.349	5.354	-0.156
	6	PWM4	4.974	4.987	4.990	5.054	5.028	4.937	5.159	5.130	-0.588
	7	MW1	-	4.869	4.904	4.929	4.911	4.811	5.642	5.457	-0.179 [e]

[a] Source: Smart Survey Consultant (2007); each epoch represents the last measured reduce level in the specified year for the specified point; all units are in meters

[b] DP: datum point
BM: benchmark

[c] There is uncertainties associated with the survey stations

[d] GS: ground subsidence; values for ground subsidence are obtained by subtracting Epoch 40 column from Epoch 3 column

[e] value is obtained by subtracting Epoch 40 column from Epoch 8 column; Negative sign represents ground subsidence

APPENDIX

K

ALBUM

PHOTO K.1
Kick-start Site Visit1:
We were at the Bridge crossing the Channel Visitor-Main-Connection.
“First day was a special day to me and to Ir. Miss Azizah too, I guess! (04/3/2006)”

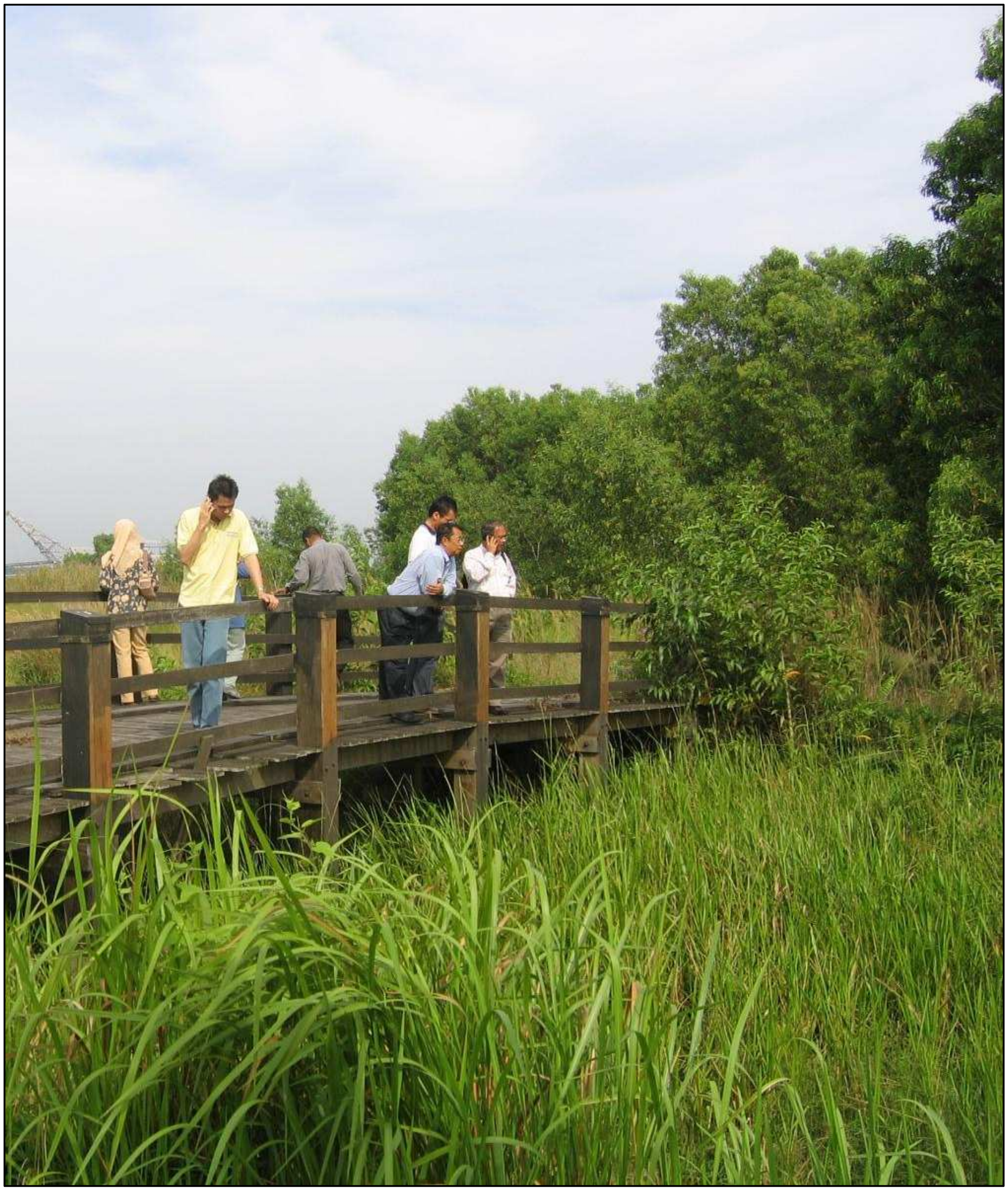


PHOTO K.2
Kick-start Site Visit2:
Mr. Hj. Azmi Jeffri (Head of DID), Dr Zainudin, Ir. Miss Azizah (again) and the Suppliers (04/3/2006)”

PHOTO K.3
Peat Big Days:Dr Ismail and I were looking for any portion of peat within the area of Paya Indah lakes during soil survey fieldworks; but there was a big “none” waiting for us right there! (13/1/2007)

PHOTO K.4
Infiltration Test at the Village of Mangostine River (Kg. Sg. Manggis) although the river appears on the background was (and still) the Langat River! (14/4/2007)

PHOTO K.5
Infiltration Test near to the Marsh Lake where Dr. Zainudin jointed at that day as a teammate and referee at the same time! And yet it worked (21/4/2007)

PHOTO K.6
Retrieving of Groundwater Level Data from the Automatic Logger at BH3 Well Site.
This is one of the most easily accessible locations. Photos are telling (14/1/2007)

PHOTO K.7
Checking the Coordinates of BH6 before Retrieving the Groundwater Level Data from the Automatic Logger.
This is one of the most uneasy locations to access. (21/2/2007)

PHOTO K.8
Heading towards BH6 across the Langat River: The Stony Bridge (Jambatan Batu) disappeared in a sudden!
Many Thanks to Brother Mohammad who made that possible many times by offering a precious ride. (21/2/2007)

PHOTO K.9
Gauging at SWL1.
Everything was just nice except that we (DID staff and I) could not help thinking of crocodiles. (10/7/2006)

PHOTO K.10
Gauging at SWL2.
Rains can always give a surprise despite it is a pleasant one or not. (14/9/2006)

PHOTO K.11
Automatic Logger at SWL1 (18/5/2006).
(This logger has been smashed together with nine months Data of 15-minute intervals!)

PHOTO K.12
Automatic Logger at SWL2 (18/5/2006)

PHOTO K.13
Automatic Logger at Main-Visitor Connection (18/5/2006)

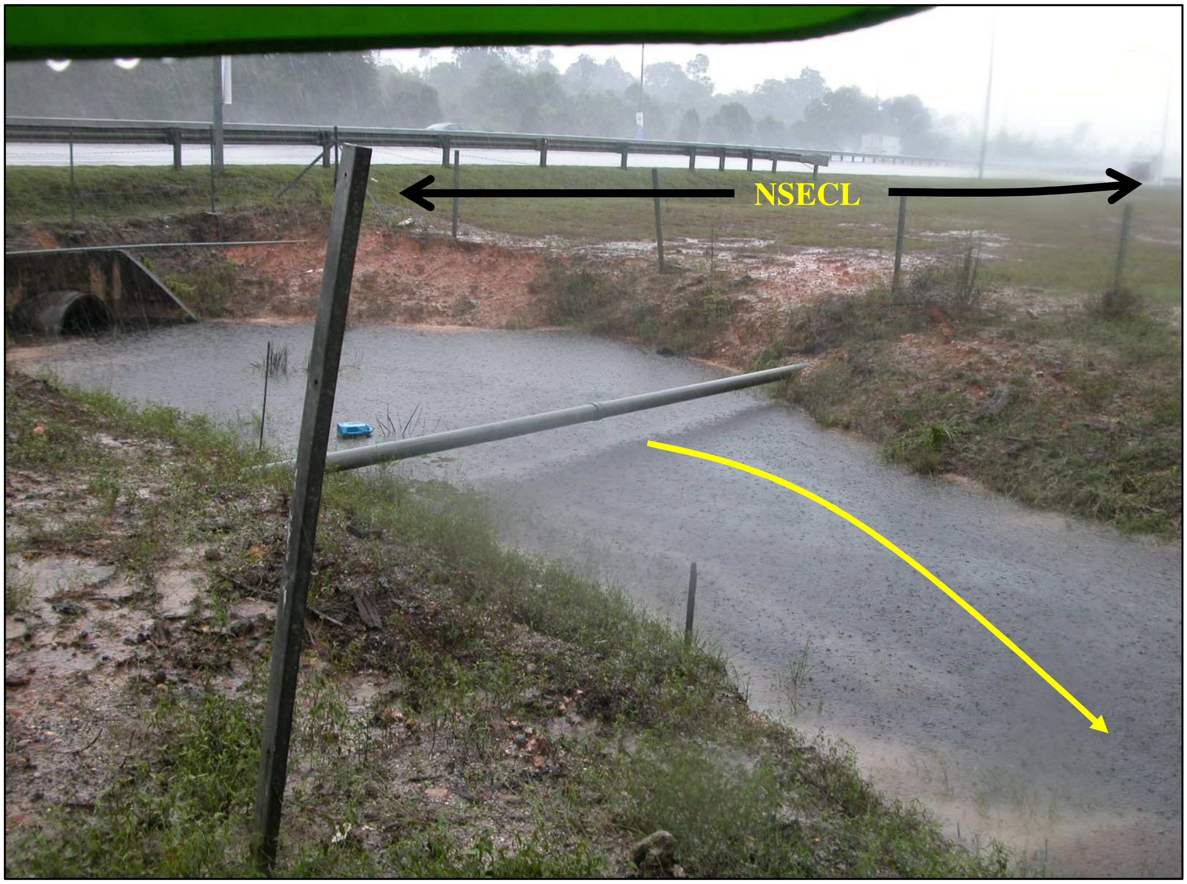


PHOTO K.14
Inflow from Cyberjaya City on a Rainy Day heading towards the Paya Indah lakes system. The North South Expressway Central Link (NSECL) also appears on the picture (14/9/2006)

PHOTO K.15
Visitor Lake Overview (26/3/2007)

PHOTO K.16
Main Lake Overview (19/8/2007)

PHOTO K.17
Culvert of Main-Palm-Connection (19/8/2007)

PHOTO K.18
Main Palm Connection heading towards Lotus Lake (19/8/2007)

PHOTO K.19
Overview of the Main and Driftwood Lakes: No Connection between Driftwood Lake (left) and Main Lake (right). Apparently Driftwood water level was higher than the Main Lake (26/3/2007)

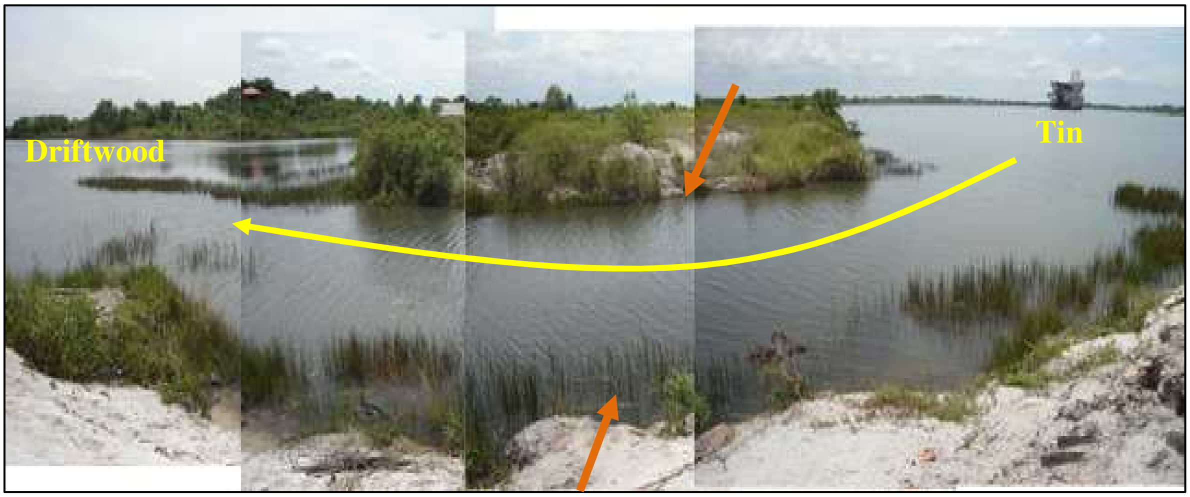


PHOTO K.20
Tin-Driftwood Connection (red arrows): Driftwood Lake (left) connects to Tin Lake (right) via a Channel of a ~10 m width (26/3/2007)

PHOTO K.21
Padi (ex-) Lake and Its Functionless Culvert (white arrow) (26/3/2007)

PHOTO K.22
Swamp-hen (semi-) Lake Overview (19/8/2007)

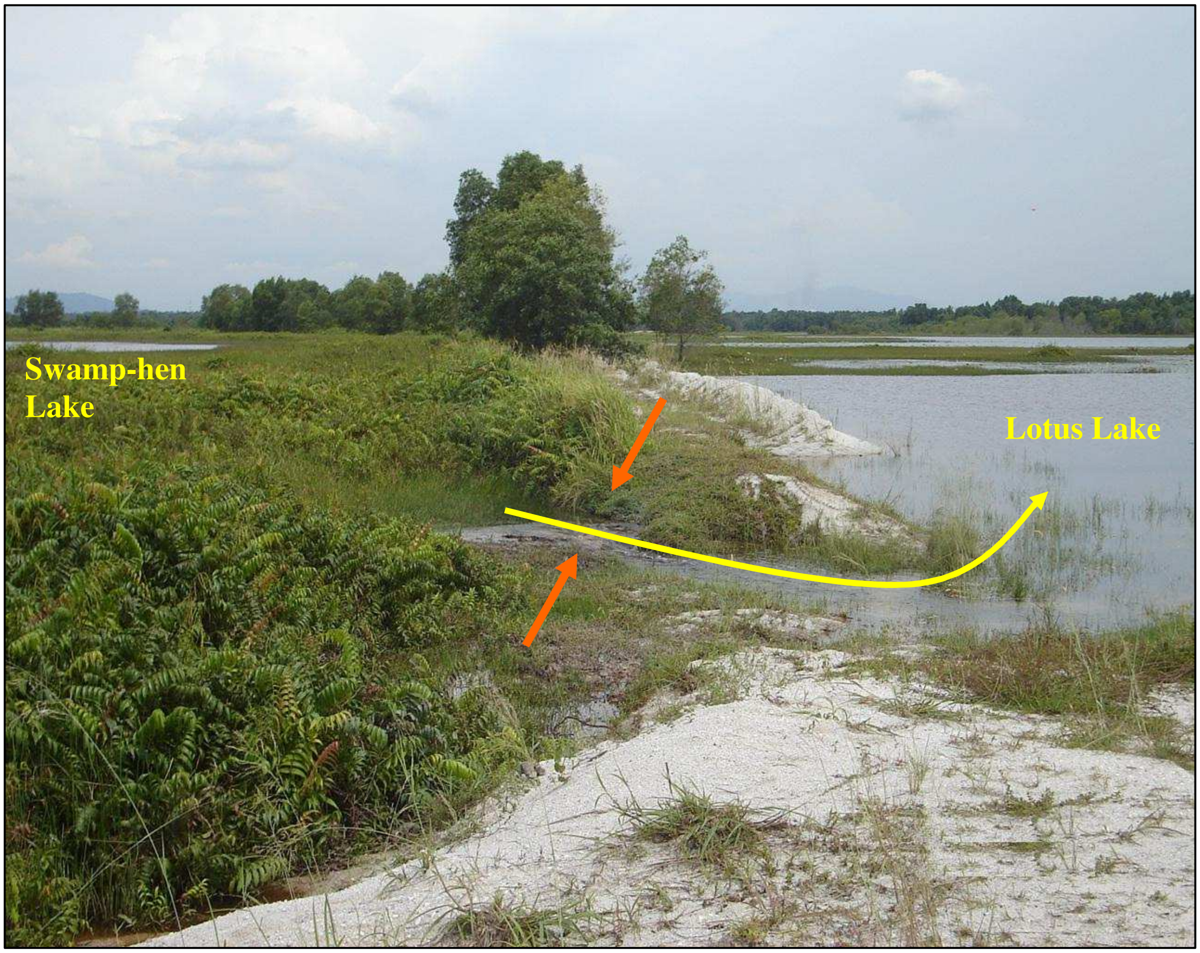


PHOTO K.23
Connection Point (between red arrows) of Lotus-Swamp-hen Connection and Lotus Lake (19/8/2007).
Thus, at very last the migrated water reached its semi-final destination at the Lotus Lake before resuming the journey towards Langat River.

PHOTO K.24
Typha Lake Overview (19/8/2007)

PHOTO K.25
Lotus Lake Overview (19/8/2007)

PHOTO K.26
Lotus-Outlet Control Gate: Front View (8/4/2007)

PHOTO K.27
Lotus-Outlet Control Gate: Back View (8/4/2007)

PHOTO K.28
Outflow heading towards Langat River (8/4/2007)

PHOTO K.29
Wildlife habitat. A group of buffalos were hanging around (8/4/2007)

PHOTO K.30
Deep inside Peat Blanket.
Location: Peat Paradise area some 3km SW Lotus Lake (15/4/2007)