Table 5-21 AVERAGE 10-DAYS DISCHARGE AT GUILLEMARD BRIDGE (WITHOUT PROJECT)

(Unit=m^3/s)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1958	1148.68	1005.58	521.10	243.13	261.11	348.41	165.25	244.13	227.77	539.58	1017.35	431.36
1958	675.02	720.76	541.20	255.45	438.54	360.95	179.55	534.69	401.02	722.17	913.34	427.36
1958	1273.27	499.50	407.37	234.21	475.79	452.49	165.87	582.31	394.64	637.60	659.80	491.68
1959	251.49	248.58	114.84	158.81	346.29	206.88	229.75	335.53	283.42	500.57	580.00	1067.40
1959	461.06	203.70	110.17	96.43	329.93	267.10	296.23	344.16	379.57	623.69	994.34	1194.63
1959	281.66	170.81	205.26	251.98	275.35	275.77	331.48	211.12	585.39	674.29	1492.64	766.71
1960	735.49	462.19	338.92	223.66	299.21	283.91	162.61	181.30	329.38	261.96	574.67	1075.56
1960	794.04	510.62	226.29	197.18	318.32	205.04	266.36	132.52	523.34	371.02	775.30	1004.01
1960	758.54	472.07	196.06	166.81	318.09	134.95	246.82	221.28	393.90	422.40	669.46	719.61
1961	1436.94	405.21	326.74	296.06	517.16	257.22	129.64	220.04	232.12	439.10	897.56	943.21
1961	1693.78	757.74	327.06	399.16	383.15	326.72	195.71	160.80	344.62	643.10	656.06	843.96
1961	608.92	474.87	271.43	447.03	213.11	195.64	263.99	131.79	351.00	463.81	725.65	1206.25
1962	1544.49	514.74	535.41	382.76	301.34	229.41	391.94	0.0	0.0	595.89	538.46	843.19
1962	875.46	360.52	431.53	266.91	432.56	235.67	260.08	0.0	0.0	513.52	636.72	1260.74
1962	1015.80	341.41	371.80	263.71	378.00	326.34	278.55	0.0	0.0	592.68	605.89	779.98
1963	1705.90	443.40	324.95	169.88	149.93	204.18	145.20	310.81	319.39	386.33	732.75	1441.14
1963	685.88	349.81	283.66	169.76	121.46	155.99	155.98	189.59	225.87	609.15	976.74	714.08
1963	518.05	325.02	245.99	101.02	206.82	151.69	212.96	262.43	306.22	542.77	1082.46	1065.23
1964	655.76	338.74	502.38	241.09	487.12	361.85	276.02	384.99	351.34	286.48	415.97	558.13
1964	500.16	607.70	387.71	264.88	464.04	389.59	360.07	300.27	617.05	396.41	462.25	624.98
1964	349.98	718.84	381.20	212.31	298.55	396.03	572.85	287.44	414.82	506.89	511.95	904.65
1965	460.56	248.33	198.64	261.01	358.11	281.23	357.32	255.68	508.21	524.55	734.15	2658.57
1965	299.90	239.76	163.95	221.49	304.88	188.94	261.18	389.19	464.23	992.99	916.39	1439.94
1965	225.41	277.34	135.88	220.06	337.12	273.59	207.48	401.04	587.91	730.10	916.73	1217.00
1966	1480.58	669.67	557.71	355.38	335.76	406.46	0.0	340.27	285.62	0.0	0.0	0.0
1966	973.80	531.41	417.63	305.60	359.63	316.55	0.0	326.74	386.15	0.0	0.0	0.0
1966	1485.25	574.21	507.72	417.38	375.39	417.90	0.0	568.87	645.64	0.0	0.0	0.0
1967	0.0	0.0	1416.40	540.17	608.20	327.25	388.67	295.30	310.23	331.82	554.40	0.0
1967	0.0	0.0	1760.30	462.61	635.71	340.69	458.84	427.46	384.73	490.22	739.25	0.0

1967	0.0	0.0	596.94	579.25	496.45	379.83	370.08	314.94	336.64	553.15	2727.42	0.0
1968	0.0	271.15	153.27	141.37	203.15	374.98	431.04	199.78	283.09	555.12	611.91	470.42
1968	0.0	219.38	183.33	132.48	241.19	394.43	295.45	164.52	442.59	651.63	369.79	674.84
1968	0.0	183.27	207.77	149.56	352.15	253.12	295.62	230.03	542.40	736.39	261.66	754.17
1969	897.08	284.67	160.79	148.14	139.10	195.94	243.28	126.70	312.72	274.40	573.50	2239.93
1969	605.87	240.78	146.13	90.03	168.16	218.73	185.77	186.05	161.79	395.04	875.04	1601.04
1969	379.66	179.27	122.87	73.07	300.89	280.23	137.10	378.81	212.76	566.75	1452.25	954.44
1970	1192.40	0.0	0.0	0.0	206.94	323.45	392.24	356.27	537.32	1080.12	727.38	682.32
1970	1413.60	0.0	0.0	0.0	320.53	193.52	269.68	466.20	451.94	949.81	896.07	666.20
1970	698.53	0.0	0.0	0.0	296.73	392.41	500.62	423.98	744.68	541.83	831.43	2022.83
1971	5592.68	742.35	744.71	409.81	256.75	373.32	0.0	0.0	459.19	255.63	561.48	1839.45
1971	1243.65	429.32	953.95	312.59	396.46	311.48	0.0	0.0	492.37	290.78	470.23	4475.46
1971	787.82	539.66	712.29	267.80	356.52	288.85	0.0	0.0	638.50	661.85	883.80	2458.85
1972	543.66	397.01	199.10	223.67	0.0	0.0	0.0	179.01	501.78	591.41	696.59	596.68
1972	354.49	347.11	182.57	256.29	0.0	0.0	198.70	226.40	624.97	556.39	875.52	4235.59
1972	340.44	332.91	186.10	0.0	0.0	0.0	193.39	337.87	749.68	420.50	825.50	1715.22
1973	1082.25	414.76	274.03	241.63	290.01	480.49	426.85	510.92	457.99	509.92	878.71	4740.50
1973	784.55	442.82	245.74	189.51	436.55	342.00	294.75	341.75	596.07	613.34	641.59	5112.69
1973	518.81	326.29	282.69	251.86	327.94	431.15	344.57	309.11	660.60	761.82	897.68	2230.96
1974	965.58	433.01	423.38	434.64	642.63	344.61	0.0	421.30	543.55	584.74	658.92	667.34
1974	642.46	493.17	323.76	419.70	563.46	399.76	411.89	304.40	534.80	749.15	747.31	612.05
1974	483.40	657.86	268.33	713.11	565.52	400.22	534.94	394.04	559.42	641.45	1288.01	1205.23
1975	2179.49	612.42	576.59	427.32	412.02	484.07	428.61	375.92	594.59	548.80	796.75	1166.62
1975	1705.26	444.72	384.30	335.59	537.25	395.45	382.22	311.93	521.03	496.89	748.67	1359.85
1975	812.14	941.59	383.69	333.42	661.36	329.33	0.0	366.04	837.00	667.89	2742.32	2055.68
1976	821.51	350.01	249.95	174.35	400.92	405.35	266.16	242.93	475.62	470.94	679.25	825.96
1976	553.70	300.91	237.39	254.78	443.83	426.52	417.89	312.69	399.66	848.17	777.39	854.34
1976	419.75	251.38	209.17	315.00	347.05	391.70	327.29	737.54	496.66	703.64	1637.66	1682.83
1977	1516.06	411.82	302.07	192.93	159.80	193.92	324.85	282.54	265.10	492.06	840.57	777.76
1977	644.16	524.21	249.50	180.28	203.24	222.11	323.73	426.85	289.78	968.23	1027.42	617.44
1977	435.43	390.69	234.43	158.50	174.11	204.30	216.26	467.95	244.33	688.93	857.20	606.53
1978	706.87	319.95	398.08	195.92	226.34	326.27	353.68	243.12	378.91	422.30	996.08	1650.48
1978	900.22	287.63	223.23	199.94	402.08	325.03	466.51	252.90	383.05	503.03	746.24	1131.50

1978	509.01	282.58	0.0	231.26	404.95	332.07	353.84	240.10	654.53	524.45	534.86	526.62
1979	647.91	383.03	296.53	227.11	340.94	336.72	192.66	209.08	292.39	279.48	863.84	1504.10
1979	361.53	300.89	238.71	220.20	308.38	449.44	261.04	207.49	543.75	405.35	1142.20	765.11
1979	387.08	334.42	191.18	369.27	270.57	258.83	397.41	267.24	458.00	457.32	4230.12	509.45
1980	441.76	280.54	262.87	155.18	224.48	274.36	171.07	501.97	330.28	709.78	795.32	1019.57
1980	338.44	206.62	287.51	189.09	388.40	267.90	251.82	524.47	340.29	803.22	600.59	907.80
1980	313.93	380.62	232.92	228.11	255.84	221.19	214.28	347.84	496.89	597.29	632.08	879.07
1981	586.03	306.38	197.26	214.47	249.84	280.10	147.01	156.57	229.12	292.38	710.44	877.92
1981	391.86	259.68	143.43	348.41	485.51	198.06	214.79	103.20	459.56	531.71	521.20	724.61
1981	267.92	213.08	133.90	201.11	465.19	162.57	309.43	130.63	168.56	508.37	410.04	365.15
1982	268.56	184.22	103.65	216.72	412.07	561.08	325.53	213.00	275.17	443.85	666.45	418.69
1982	0.0	144.81	121.92	291.00	186.87	498.66	296.59	316.72	390.58	597.17	701.95	2347.20
1982	0.0	104.00	116.95	458.58	457.08	268.75	286.36	396.41	562.55	585.78	524.53	1276.15
1983	673.54	296.50	173.30	125.81	150.95	191.76	225.64	450.68	447.71	336.33	460.17	4087.84
1983	528.26	241.94	158.61	107.50	186.89	216.99	312.36	215.36	0.0	354.18	621.93	3062.50
1983	395.26	205.20	162.74	102.92	184.05	178.11	327.76	418.05	376.56	472.36	335.87	1082.80
1984	674.08	0.0	1010.03	506.06	718.19	660.57	438.48	394.16	383.84	647.28	442.88	660.14
1984	548.33	934.09	625.94	535.23	649.81	535.05	457.53	312.07	435.49	440.52	396.04	461.35
1984	656.82	803.17	641.42	574.89	544.34	358.41	478.23	371.19	562.25	513.98	475.25	2952.03

Table 5-22 AVERAGE 10-DAYS DISCHARGE AT GUILLEMARD BRIDGE

(WITH LEBIR DAM BUT BEFORE WATER RELEASE OF 70 CMS OR 80 CMS)

(Unit=m^3/s)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1958	1148.68	1005.50	521.10	243.13	261.11	348.41	165.25	244.13	227.77	539.58	1017.35	431.36
TU	247.84	212.69	93.71	40.46	44.72	65.38	22.02	40.69	36.82	132.17	247.15	43.93
Q	900.84	792.89	427.39	202.67	216.40	283.03	143.23	203.43	190.95	407.41	750.19	387.44
1958	675.02	720.76	541.20	255.45	330.54	360.95	179.55	534.69	401.02	722.17	913.34	427.36
TU	131.51	142.74	98.64	43.37	56.72	68.35	25.40	109.49	77.84	154.71	227.53	42.40
Q	543.51	578.02	442.56	212.09	351.82	292.59	154.15	425.21	323.18	567.46	685.81	384.96
1958	1273.27	499.50	407.37	234.21	475.79	452.49	165.87	582.31	394.64	637.60	659.80	491.68
TU	278.44	88.40	65.77	38.34	95.54	90.03	22.16	120.76	76.33	122.49	130.95	84.56
Q	994.83	411.10	341.59	195.87	380.25	362.46	143.70	461.55	318.31	515.11	528.85	407.13
1959	251.49	248.58	114.84	158.81	346.29	206.88	229.75	335.53	283.42	500.57	580.00	1067.40
TU	27.49	26.78	3.11	20.49	64.88	31.87	37.29	62.33	50.00	70.29	100.55	286.22
Q	224.00	221.81	111.73	138.31	281.41	175.01	192.46	273.19	233.42	430.28	479.45	781.18
1959	461.06	203.70	110.17	96.43	329.93	267.10	296.23	344.16	379.57	623.69	994.34	1194.63
TU	78.96	15.75	0.50	5.72	61.01	46.13	53.03	64.38	72.76	117.19	258.39	334.69
Q	382.10	187.94	109.66	90.71	268.93	220.97	243.20	279.79	306.81	506.50	735.95	859.94
1959	281.66	170.81	205.26	251.98	275.35	275.77	331.48	211.12	585.39	674.29	1492.64	768.71
TU	34.90	7.68	20.58	42.55	48.09	48.19	61.38	32.88	121.49	136.47	448.21	172.44
Q	246.76	163.13	184.66	209.43	227.27	227.59	270.11	178.24	463.90	537.82	1044.42	596.27
1960	735.49	462.19	338.92	223.66	299.21	283.91	162.61	181.30	329.38	261.96	574.67	1075.56
TU	146.36	79.24	48.96	35.85	53.73	50.11	24.30	25.82	60.88	24.83	98.52	289.33
Q	589.13	382.95	289.96	187.81	245.47	233.80	138.31	155.48	268.50	237.13	476.15	786.23
1960	794.04	510.62	226.29	197.18	318.32	205.04	266.36	132.52	523.34	371.02	775.30	1004.01
TU	160.74	91.13	21.30	29.58	58.26	31.44	45.96	14.27	106.80	99.80	174.95	262.07
Q	633.30	419.49	204.99	167.61	260.06	173.60	220.40	118.25	416.54	271.22	600.35	741.94
1960	758.54	472.07	196.06	166.81	313.09	134.95	246.82	221.28	393.90	422.40	669.46	719.61
TU	152.02	81.66	13.88	22.39	58.21	14.84	41.33	35.28	76.15	45.02	134.63	153.73
Q	606.52	390.40	192.18	144.42	259.89	120.10	205.49	186.00	317.75	377.38	534.83	565.87
1961	1436.94	405.21	326.74	296.06	517.16	257.22	129.64	220.04	232.12	439.10	697.56	943.21
TU	318.63	65.24	45.97	52.99	105.34	43.79	13.59	34.99	37.85	59.90	221.52	238.91
Q	1118.30	339.96	280.77	243.07	411.82	213.43	116.05	185.05	194.27	379.20	676.03	704.30
1961	1693.78	757.74	327.06	399.16	383.15	326.72	195.71	160.90	344.62	643.10	656.06	843.96
TU	381.71	151.83	46.05	77.40	73.61	60.25	29.23	20.96	64.49	159.84	129.52	201.11
Q	1312.06	605.92	281.01	321.76	309.54	266.47	166.48	139.84	280.13	483.26	526.53	642.86
1961	608.92	474.87	271.43	447.03	213.11	195.64	263.99	131.79	351.00	463.81	725.65	1206.25
TU	115.27	82.35	32.39	88.73	33.35	29.21	45.40	14.10	66.00	56.29	156.03	339.12
Q	493.64	392.52	239.04	358.30	179.76	166.43	218.60	117.70	285.00	407.52	569.61	867.14
1962	1544.49	514.74	535.41	382.76	301.34	229.41	391.94	0.0	0.0	595.89	538.46	843.19
TU	345.05	92.14	97.22	73.52	54.24	37.21	75.69	0.0	0.0	106.60	84.72	200.81
Q	1199.44	422.59	438.19	309.25	247.10	192.20	316.25	0.0	0.0	489.29	453.73	642.38
1962	875.46	360.52	431.53	266.91	232.56	235.67	260.08	0.0	0.0	513.52	636.72	1260.74
TU	180.74	54.27	71.71	46.09	35.31	38.69	44.47	0.0	0.0	75.23	122.16	359.88
Q	694.72	306.25	359.32	220.83	197.25	196.98	215.61	0.0	0.0	438.30	514.57	900.87
1962	1015.80	341.41	371.80	263.71	378.00	326.34	278.55	0.0	0.0	592.68	605.89	779.98
TU	215.20	49.58	57.04	45.33	72.39	60.16	48.84	0.0	0.0	105.38	110.41	176.73
Q	800.60	291.84	314.76	218.38	315.61	266.18	229.71	0.0	0.0	487.30	495.48	603.25

TU	384.69	74.62	45.53	23.11	18.39	31.23	17.27	54.48	58.51	26.77	158.74	428.59
Q	1321.21	368.77	279.42	146.77	141.54	172.94	127.93	234.33	260.88	359.56	574.01	1012.54
1963	685.83	349.91	283.66	169.76	121.46	155.99	155.98	109.59	225.37	609.15	976.74	714.08
TU	134.18	51.64	35.39	23.09	11.65	19.83	19.82	27.78	36.37	111.66	251.69	151.63
Q	551.70	298.17	248.27	146.67	109.81	136.17	136.16	161.81	189.50	497.50	725.06	562.46
1963	518.05	325.02	245.99	101.02	206.82	151.69	212.96	262.43	306.22	542.77	1082.46	1065.23
TU	92.96	45.55	26.14	6.81	31.86	18.81	33.31	45.03	55.39	86.37	291.96	285.39
Q	425.09	279.47	219.85	94.21	174.96	132.88	179.65	217.40	250.83	456.40	790.50	779.83
1964	655.76	338.74	502.38	241.09	487.12	361.85	276.02	384.99	351.34	266.48	415.97	558.13
TU	126.78	48.92	89.11	39.97	98.22	68.56	48.25	74.04	66.06	22.02	38.07	92.22
Q	528.98	289.82	413.27	201.12	388.89	293.28	227.78	310.94	285.26	264.46	377.91	465.91
1964	500.16	607.70	387.71	264.88	464.04	389.59	360.07	300.27	617.05	396.41	462.25	624.98
TU	88.56	114.98	60.95	45.61	92.76	75.13	68.14	53.99	128.99	48.18	55.69	117.69
Q	411.60	492.72	326.77	219.28	371.28	314.45	291.93	246.28	488.06	348.23	406.56	507.30
1964	349.98	718.84	381.20	212.31	298.55	396.03	572.85	267.44	414.82	506.89	511.95	904.65
TU	51.68	142.27	59.35	33.14	53.58	76.66	118.52	50.95	81.11	72.70	74.63	224.22
Q	298.30	576.57	321.86	179.15	244.97	319.37	454.33	236.49	333.71	434.19	437.32	680.43
1965	460.56	248.33	198.64	261.01	358.11	281.23	357.32	255.68	508.21	524.55	734.15	2658.57
TU	78.84	26.72	14.51	44.69	47.68	49.48	67.49	43.43	103.22	79.43	159.27	892.37
Q	381.73	221.62	184.13	216.32	290.43	231.75	289.83	212.25	405.00	445.12	574.87	1766.20
1965	299.90	239.76	163.95	221.49	304.88	188.94	261.18	389.19	464.23	992.99	916.39	1439.94
TU	39.38	24.61	0.12	35.33	55.08	27.63	44.73	75.04	92.81	257.88	228.70	428.14
Q	260.52	215.15	155.83	186.16	249.80	161.31	216.45	314.15	371.43	735.11	687.70	1011.80
1965	225.41	277.34	135.88	220.06	337.12	273.59	207.48	401.04	587.91	730.10	918.73	1217.00
TU	21.09	33.84	2.84	34.99	62.71	47.67	32.02	77.84	122.09	157.73	229.59	343.21
Q	204.33	243.50	133.04	185.06	274.41	225.92	175.47	323.19	465.82	572.37	689.14	873.79
1966	1480.58	669.67	557.71	355.38	435.76	406.46	0.0	340.27	285.62	0.0	0.0	0.0
TU	329.35	130.19	102.70	67.03	82.39	79.13	0.0	63.46	50.52	0.0	0.0	0.0
Q	1151.23	539.48	455.01	288.35	353.37	327.34	0.0	276.82	235.10	0.0	0.0	0.0
1966	973.80	531.41	417.63	305.60	359.63	316.55	0.0	326.74	386.15	0.0	0.0	0.0
TU	204.89	96.24	68.30	55.25	68.04	57.84	0.0	60.25	74.32	0.0	0.0	0.0
Q	768.91	435.18	349.34	250.35	291.59	258.71	0.0	266.49	311.83	0.0	0.0	0.0
1966	1485.25	574.21	507.72	417.38	375.39	417.90	0.0	568.87	645.64	0.0	0.0	0.0
TU	330.50	106.75	90.42	81.71	71.77	81.84	0.0	117.58	135.76	0.0	0.0	0.0
Q	1154.75	467.46	417.30	335.66	303.62	336.07	0.0	451.29	509.88	0.0	0.0	0.0
1967	0.0	0.0	1416.40	540.17	608.20	327.25	388.67	295.30	310.23	331.82	554.40	0.0
TU	0.0	0.0	313.59	110.79	126.89	60.37	74.92	52.81	56.34	19.94	90.80	0.0
Q	0.0	0.0	1102.51	429.38	481.31	266.87	313.76	242.49	253.88	311.88	463.60	0.0
1967	0.0	0.0	1760.30	462.61	635.71	340.69	458.84	427.46	384.73	490.22	789.25	0.0
TU	0.0	0.0	398.05	92.42	133.41	63.56	91.53	84.10	73.98	66.35	180.26	0.0
Q	0.0	0.0	1362.25	370.19	502.30	277.14	367.31	343.36	310.75	423.87	608.98	0.0
1967	0.0	0.0	596.94	579.25	496.45	379.83	370.08	314.94	336.64	553.15	2727.42	0.0
TU	0.0	0.0	112.33	120.04	100.43	72.82	70.51	57.46	62.60	90.32	918.60	0.0
Q	0.0	0.0	484.60	459.22	396.01	307.01	299.57	257.48	274.04	462.83	1808.82	0.0
1968	0.0	271.15	153.27	141.37	203.15	374.96	431.04	199.78	283.09	555.12	611.91	470.42
TU	0.0	32.32	3.37	16.36	30.99	71.67	84.95	30.19	49.92	91.07	112.71	67.57
Q	0.0	238.83	149.90	125.01	172.16	303.30	346.10	169.59	233.17	464.05	499.20	402.85
1968	0.0	219.38	103.43	132.45	241.19	394.43	295.45	164.52	442.59	661.64	840.79	674.84

TU	0.0	19.60	10.75	14.26	40.60	76.28	52.64	21.64	87.69	127.06	28.47	156.66
Q	0.0	199.77	172.58	118.22	201.19	318.15	242.60	142.67	354.91	523.79	349.32	538.16
1968	0.0	183.27	207.77	149.56	352.15	253.12	295.62	230.03	542.40	738.39	261.66	754.17
TU	0.0	10.74	16.75	18.30	66.27	42.82	52.89	37.36	111.31	160.99	10.96	166.90
Q	0.0	172.54	191.02	131.26	285.88	210.30	242.74	192.68	431.09	577.50	250.69	587.27
1969	897.08	284.67	160.79	148.14	139.10	195.94	243.28	126.70	312.72	274.40	573.50	2239.93
TU	186.05	35.64	5.82	17.97	15.83	29.28	40.49	12.89	56.93	6.99	98.08	732.89
Q	711.04	249.03	154.97	130.18	123.28	166.66	202.79	113.81	255.79	267.40	475.43	1507.04
1969	605.87	240.78	146.13	90.03	168.16	218.73	185.77	186.05	161.79	395.04	875.04	1601.04
TU	114.53	24.86	2.71	4.21	22.71	34.68	26.88	26.94	21.20	34.77	212.95	489.51
Q	491.34	215.92	143.42	85.82	145.46	184.05	158.89	159.11	140.59	360.27	662.10	1111.53
1969	379.66	179.27	122.87	73.07	300.89	260.23	137.10	378.81	212.76	566.75	1452.25	954.44
TU	58.97	9.75	2.18	2.21	34.15	49.24	15.35	72.58	33.27	95.50	432.83	243.19
Q	320.69	169.52	120.69	70.86	266.76	230.99	121.75	306.23	179.50	471.25	1019.42	711.25
1970	1192.40	0.0	0.0	0.0	286.94	323.45	392.24	356.27	537.32	1039.12	727.38	682.32
TU	258.58	0.0	0.0	0.0	50.83	59.47	75.76	67.24	110.11	294.50	156.70	139.53
Q	933.83	0.0	0.0	0.0	236.11	263.97	316.48	289.02	427.21	794.62	570.69	542.79
1970	1413.60	0.0	0.0	0.0	320.53	193.52	269.68	466.20	451.94	949.81	896.07	666.20
TU	312.90	0.0	0.0	0.0	50.78	28.71	46.74	93.27	89.90	241.43	220.96	133.39
Q	1100.70	0.0	0.0	0.0	261.75	164.81	222.94	372.93	362.04	708.39	675.11	532.81
1970	698.53	0.0	0.0	0.0	296.73	392.41	500.62	423.98	744.68	541.83	831.43	2022.83
TU	137.28	0.0	0.0	0.0	53.15	75.80	101.42	83.28	159.21	86.01	196.33	650.19
Q	561.25	0.0	0.0	0.0	243.58	316.61	399.20	340.70	585.47	455.82	635.10	1372.65
1971	5592.68	742.35	744.71	409.81	256.75	373.32	0.0	0.0	459.19	285.63	561.48	1839.45
TU	1339.27	148.05	148.62	79.92	43.68	71.26	0.0	0.0	91.61	8.37	93.50	580.33
Q	4253.41	594.31	596.09	329.89	213.07	302.04	0.0	0.0	367.58	277.26	467.98	1259.12
1971	1243.65	429.32	253.95	312.59	396.46	311.48	0.0	0.0	492.37	290.78	470.23	4475.46
TU	271.16	71.17	200.01	56.90	76.76	56.64	0.0	0.0	99.47	21.61	58.74	1584.50
Q	972.49	358.16	753.93	255.69	319.70	254.84	0.0	0.0	392.90	269.17	411.50	2890.96
1971	787.82	539.66	712.29	267.90	356.52	288.85	0.0	0.0	638.50	661.85	883.80	2458.85
TU	159.21	98.26	140.66	46.30	67.30	51.28	0.0	0.0	134.07	131.73	216.28	816.29
Q	628.61	441.39	571.63	221.50	289.22	237.57	0.0	0.0	504.43	530.12	667.52	1642.56
1972	543.66	397.01	199.10	223.67	0.0	0.0	0.0	179.01	501.78	591.41	696.59	596.68
TU	99.25	63.23	14.62	35.85	0.0	0.0	0.0	25.27	101.70	104.90	144.97	106.90
Q	444.41	333.78	184.47	187.82	0.0	0.0	0.0	153.73	400.08	486.52	551.63	489.78
1972	354.49	347.11	182.57	256.29	0.0	0.0	198.70	226.40	624.97	556.39	873.52	4235.59
TU	52.79	50.98	10.56	43.57	0.0	0.0	29.94	36.50	130.86	91.56	212.37	1493.12
Q	301.71	296.14	172.00	212.72	0.0	0.0	168.76	189.91	494.10	464.84	661.16	2742.47
1972	340.44	332.91	186.10	0.0	0.0	0.0	193.39	337.87	749.68	420.50	825.50	1715.22
TU	49.34	47.49	11.43	0.0	0.0	0.0	28.68	62.89	160.39	39.79	194.07	533.01
Q	291.10	285.42	174.67	0.0	0.0	0.0	164.71	274.98	589.29	380.71	631.43	1182.22
1973	1082.25	414.76	274.03	241.63	290.01	480.49	426.55	510.92	457.99	509.92	878.71	4740.50
TU	231.52	67.59	33.03	40.10	51.56	96.66	83.95	103.86	91.33	73.86	214.34	1685.47
Q	850.73	347.17	241.01	201.53	238.46	383.84	342.89	407.06	366.66	436.07	664.37	3055.04
1973	784.55	442.92	245.74	189.51	336.55	342.00	294.75	341.75	596.07	613.34	641.59	5112.69
TU	158.41	74.48	26.08	27.76	62.58	63.87	52.68	63.61	124.02	113.25	124.01	1827.25
Q	626.14	368.34	219.66	161.75	273.98	278.13	242.07	277.94	472.05	500.09	517.58	3285.44
1973	518.81	326.29	282.69	251.86	327.94	431.15	344.57	309.11	660.60	761.82	897.68	2230.96
TU	93.14	45.86	35.15	42.52	60.54	84.97	64.47	56.08	139.30	169.81	221.57	729.47
Q	425.66	280.43	247.53	209.34	267.40	346.18	280.10	253.03	521.30	592.00	676.11	1501.49

1974	965.58	433.01	423.38	434.64	342.63	344.61	0.0	421.30	543.55	504.74	658.92	667.34
TU	202.87	72.07	69.71	85.80	135.04	64.48	0.0	82.64	111.59	102.35	130.62	133.82
Q	762.71	360.94	353.67	348.84	507.59	280.13	0.0	338.66	431.97	482.38	528.31	533.52
1974	642.46	493.17	323.76	419.70	563.46	399.76	411.89	304.40	534.80	749.15	747.31	612.05
TU	123.51	86.85	45.24	82.26	116.30	77.54	80.41	54.96	109.51	164.99	164.29	112.76
Q	518.95	406.32	278.52	337.44	447.16	322.22	351.47	249.43	425.29	584.16	583.03	499.29
1974	483.40	657.86	268.33	713.11	565.52	400.22	534.94	394.04	559.42	641.45	1288.01	1205.23
TU	84.45	127.29	31.63	151.73	116.79	77.65	109.55	76.19	115.34	123.96	370.26	338.73
Q	398.96	530.56	236.70	561.38	448.73	322.57	425.39	317.85	444.08	517.49	917.75	866.50
1975	2179.49	612.42	576.59	427.32	412.02	484.07	426.61	375.92	584.59	548.80	796.75	1166.62
TU	501.00	116.13	107.33	84.07	80.44	97.50	84.37	71.90	121.30	86.67	183.12	324.02
Q	1678.49	496.28	469.25	343.25	331.58	386.57	344.24	304.03	463.29	460.14	613.63	842.60
1975	1705.26	444.72	304.30	335.59	337.25	395.45	382.22	311.93	521.03	496.89	748.67	1359.85
TU	384.53	74.95	60.11	62.35	110.09	76.52	73.39	56.75	106.25	68.89	164.80	397.63
Q	1320.73	369.77	324.19	273.24	427.16	318.93	308.84	255.18	414.78	428.00	583.87	962.22
1975	812.14	941.59	383.69	333.42	361.36	329.33	0.0	366.04	837.00	667.89	2742.32	2055.68
TU	165.18	196.98	59.96	61.85	139.48	60.87	0.0	69.56	181.07	134.03	924.27	662.70
Q	646.96	744.61	323.73	271.57	521.88	268.46	0.0	296.48	655.94	533.86	1818.05	1392.98
1976	821.51	350.01	249.95	174.35	400.92	405.35	266.16	242.93	475.62	470.94	679.25	825.96
TU	167.49	51.69	27.11	24.17	77.82	78.86	45.91	40.41	95.50	59.00	138.36	194.25
Q	654.03	298.33	222.84	150.18	323.10	326.49	220.25	202.52	380.11	411.94	540.89	631.71
1976	553.70	300.91	237.39	254.78	443.83	426.52	417.89	312.69	399.66	848.17	777.39	854.34
TU	101.71	39.63	24.03	43.22	87.97	83.88	81.83	56.93	77.52	202.71	175.74	205.06
Q	451.99	261.28	213.36	211.57	355.85	342.64	336.06	255.77	322.14	645.46	601.64	649.28
1976	419.75	251.38	209.17	315.00	547.05	391.70	327.29	737.54	496.66	703.84	1657.66	1682.83
TU	68.82	27.46	17.10	57.47	85.06	75.63	60.38	157.52	100.48	147.73	503.46	520.67
Q	350.94	223.92	192.07	257.53	231.99	316.06	266.91	580.03	396.17	556.11	1134.20	1162.17
1977	1516.06	411.82	302.07	192.93	159.80	193.92	324.85	282.54	265.10	492.06	840.57	777.76
TU	338.07	66.87	39.91	28.57	20.73	28.81	59.81	49.79	45.66	85.05	199.81	175.89
Q	1177.99	344.95	262.16	164.36	139.07	165.12	265.05	232.75	219.44	407.01	640.76	601.88
1977	644.16	524.21	249.50	180.28	203.24	222.11	323.73	426.85	289.78	968.23	1027.42	617.44
TU	123.93	94.47	27.00	25.58	31.01	35.48	59.54	83.96	51.50	248.45	270.99	114.81
Q	520.23	429.74	222.50	154.71	172.22	186.63	264.19	342.89	238.28	719.79	756.43	502.63
1977	435.43	390.69	234.43	158.50	174.11	204.30	216.26	467.95	244.33	688.93	857.20	606.53
TU	72.67	61.68	23.30	20.42	24.12	31.26	34.09	93.69	40.74	142.05	206.15	110.66
Q	362.77	329.01	211.13	138.08	149.99	173.04	182.16	374.27	203.59	546.89	651.05	495.87
1978	706.87	319.95	398.08	195.92	226.34	326.27	353.68	243.12	378.91	422.30	996.08	1650.48
TU	139.33	44.31	63.49	29.28	36.48	60.14	66.63	40.45	72.60	51.63	259.05	508.34
Q	567.54	275.65	334.59	166.64	189.86	266.13	287.05	202.66	306.31	370.67	737.03	1142.14
1978	900.22	287.63	223.23	199.94	302.08	325.03	466.51	252.90	383.05	503.03	746.24	1131.50
TU	186.82	36.37	20.55	30.23	54.41	59.85	93.35	42.77	73.59	71.23	163.88	310.64
Q	713.40	251.26	202.68	169.71	247.66	265.18	373.17	210.13	309.47	431.80	582.36	820.86
1978	509.01	282.58	0.0	231.28	404.95	332.07	353.84	240.10	654.53	524.45	534.86	526.82
TU	90.74	35.13	0.0	37.65	78.77	61.51	66.67	39.74	137.86	79.39	83.36	80.29
Q	418.27	247.45	0.0	193.63	326.18	270.56	287.17	200.36	516.67	445.06	451.51	446.53
1979	647.91	383.03	296.53	227.11	340.94	336.72	192.66	209.08	292.39	279.48	863.84	1504.10
TU	124.85	59.80	38.55	36.66	63.61	62.62	28.51	32.39	52.12	2.50	208.68	452.58
Q	523.06	323.23	257.98	190.45	277.32	274.11	164.15	176.68	240.27	276.99	655.17	1051.52
1979	361.53	300.89	240.71	220.20	308.38	449.44	261.04	202.49	543.75	405.35	1142.20	765.11

TU	54.52	39.62	24.35	35.03	55.91	39.30	44.70	32.02	111.53	38.56	314.72	171.07
Q	307.02	261.26	214.36	165.17	252.47	360.14	216.34	175.47	432.12	366.98	827.48	594.04
1979	387.08	334.42	191.18	369.27	270.57	258.83	397.41	267.24	458.00	457.32	4230.12	509.45
TU	60.79	47.86	12.68	70.32	46.95	44.17	76.98	46.17	91.33	53.82	1491.04	73.67
Q	326.29	286.56	178.50	298.95	223.62	214.66	320.42	221.07	366.67	403.50	2739.08	435.77
1980	441.76	280.54	262.87	155.18	224.48	274.36	171.07	501.97	330.28	709.78	795.32	1019.57
TU	74.22	34.63	30.29	19.63	36.04	47.85	23.39	101.74	61.09	149.99	182.57	268.00
Q	367.54	245.92	232.58	135.55	188.44	226.51	147.67	400.23	269.19	559.79	612.74	751.57
1980	338.44	206.62	287.51	189.09	388.40	267.90	251.82	524.47	340.29	803.22	600.59	907.80
TU	48.84	16.47	36.34	27.66	74.85	46.32	42.52	107.07	63.46	185.58	108.39	225.42
Q	289.59	190.15	251.18	161.43	313.55	221.58	209.31	417.41	276.83	617.64	492.20	682.38
1980	313.93	380.62	232.92	228.11	255.84	221.19	214.28	347.84	496.89	597.29	632.08	879.07
TU	42.83	59.20	22.93	36.90	43.47	35.26	33.63	65.25	100.54	107.14	120.39	214.48
Q	271.11	321.41	209.99	191.21	212.37	185.93	180.66	282.59	396.35	490.15	511.69	664.59
1981	586.03	306.38	197.26	214.47	249.84	250.10	147.01	156.57	229.12	292.38	710.44	877.92
TU	109.65	40.97	14.17	33.67	42.05	49.21	17.70	19.96	37.14	107.54	150.24	214.04
Q	476.38	265.41	183.09	180.80	207.80	230.89	129.31	136.61	191.98	184.84	560.20	663.83
1981	391.86	259.68	143.43	348.41	405.51	193.06	214.79	103.20	459.56	531.71	521.20	724.61
TU	61.96	29.50	1.94	65.38	97.84	29.79	33.75	7.33	91.70	82.15	78.15	155.64
Q	329.89	230.18	141.49	283.03	387.66	168.28	181.05	95.87	367.86	449.55	443.05	568.97
1981	267.92	213.08	133.90	201.11	465.19	162.57	309.43	130.63	168.56	508.37	410.04	365.15
TU	31.53	18.06	4.59	30.51	93.03	21.38	56.15	13.82	22.80	81.66	53.97	37.99
Q	236.39	195.02	129.31	170.61	372.16	141.19	253.28	116.81	145.76	426.71	356.08	327.16
1982	268.56	184.22	103.65	216.72	412.07	561.08	325.53	213.00	275.17	443.85	666.45	418.69
TU	31.68	18.26	0.0	34.20	80.46	115.74	59.97	33.32	48.04	48.69	133.48	39.10
Q	236.88	165.97	103.65	182.52	331.62	445.34	265.56	179.68	227.13	395.17	532.97	379.59
1982	0.0	144.81	121.92	291.00	186.87	498.66	296.59	316.72	390.58	597.17	701.95	2347.20
TU	0.0	15.09	7.29	51.79	27.14	100.96	53.12	57.88	75.37	107.09	147.01	773.75
Q	0.0	129.72	114.63	239.21	159.73	397.70	243.48	258.84	315.22	490.08	554.95	1573.45
1982	0.0	104.00	116.95	458.58	457.08	268.75	286.36	396.41	562.55	585.78	524.53	1276.15
TU	0.0	0.0	8.22	91.47	91.11	46.52	50.69	76.75	116.09	102.75	79.42	365.75
Q	0.0	104.00	108.73	367.11	365.96	222.22	235.67	319.66	446.47	483.03	445.11	910.41
1983	673.54	296.50	173.30	125.31	150.95	191.76	225.64	450.68	447.71	338.33	468.17	4087.84
TU	131.14	38.55	8.29	12.68	18.63	28.29	36.32	89.60	88.89	20.36	57.95	1436.84
Q	542.39	257.96	165.01	113.13	132.32	163.46	189.32	361.08	358.82	317.97	410.22	2651.00
1983	528.26	241.94	156.61	107.50	186.89	216.99	312.36	215.36	0.0	354.18	621.93	3062.50
TU	95.46	25.15	4.68	8.34	27.14	34.27	56.85	33.88	0.0	16.88	116.52	1046.24
Q	432.79	216.80	153.93	99.15	159.75	182.72	255.52	181.48	0.0	337.30	505.41	2016.26
1983	395.26	205.20	162.74	102.92	184.05	178.11	327.76	418.05	376.56	472.36	335.87	1082.80
TU	62.80	16.12	6.43	7.26	26.47	25.06	60.50	81.87	72.05	59.55	22.54	292.09
Q	332.46	189.08	156.32	95.66	157.58	153.05	267.27	336.18	304.51	412.82	313.33	790.71
1984	674.08	0.0	1010.03	506.06	713.19	660.57	438.48	394.16	383.84	647.28	442.88	660.14
TU	131.28	0.0	213.79	102.71	152.93	139.29	86.71	76.21	73.77	126.18	48.32	131.08
Q	542.80	0.0	796.24	403.35	565.26	521.28	351.77	317.94	310.07	521.10	394.56	529.06
1984	548.33	934.09	625.94	535.23	649.81	535.05	457.53	312.07	435.49	440.52	396.04	461.35
TU	100.39	195.14	119.46	109.62	136.74	109.57	91.22	56.78	86.00	52.97	30.47	55.35
Q	447.94	738.96	506.49	425.62	513.07	425.48	366.31	255.29	349.49	387.54	365.57	406.00
1984	656.82	803.17	641.42	574.89	544.34	358.41	478.23	371.19	562.25	513.98	475.25	2952.03
TU	127.04	162.98	123.26	119.01	111.77	67.75	96.12	70.78	116.01	75.40	60.65	1004.16
Q	529.78	640.19	518.16	455.88	432.57	290.66	382.11	300.41	446.24	438.58	414.60	1947.87

Table 11-1 Area of Each Crop in Kesedar Land Scheme

Location	Rubber	Oil Palm	Total
	ha	ha	ha
Palo Ⅰ	97	1,148	1,245
	(8%)	(92%)	
Palo Ⅱ	381	1,059	1,440
	(26%)	(74%)	
Palo Ⅲ	997	1,397	2,394
	(42%)	(58%)	
Lebir Ⅰ	1,105	0	1,105
	(100%)	(0%)	
Chalil Ⅰ	532	1,066	1,598
	(33%)	(67%)	
Total	3,112	4,670	7,782
	(40%)	(60%)	(100%)

Source : Pembangunan Kawasan Kelantan Selatan
(Penekanan Kepada Aktiviti Sosial)
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Table 11-2 Area of Each Crop in Felda Land Scheme

Location	Gross Area	Rubber	Oil Palm	Net Total
	ha	ha	ha	ha
Aring 1	1,958.2	98.3	1,664.1	1,762.4
Aring 2	2,120.8	185.0	1,617.8	1,802.8
Aring 3	—	269.3	1,663.7	1,933.0
Aring 4	2,570	0	2,313	2,313
Aring 5	2,020	0	1,676	1,676
Aring 6	1,550	0	1,039	1,039
Aring Timur 1	—	454	1,059	1,513
Aring Timur 2	1,603	466	1,056	1,522
Aring Timur 3	1,870	442	1,031	1,473
Aring Timur 4	2,100	0	1,890	1,890
Aring Timur 5	2,400	0	2,160	2,160
Aring Timur 6	1,820	0	1,473	1,473
Total		1,914.6 (9.3%)	18,642.6 (90.7%)	20,557.2 (100%)

Source : Material Lampiran A Obtained from Felda in March 1987

Table 11-3 Status of Logging in Lebir Forest Area

Hutan Simpan Lebir (Right Bank)

	Logged	Unlogged	Total
	2,460.24 ha	655.02 ha	3,115.26 ha
	761.47	1,522.88	2,284.35
	0	1,623.97	1,623.97
Total	3,221.71	3,801.87	7,023.58
	(45.9%)	(54.1%)	(100%)

Hutan Simpan Relai (Left Bank)

	Logged	Unlogged	Total
	1,377.74 ha	1,248.30 ha	2,626.04 ha
	2,488.80	181.30	2,670.10
Total	3,866.54	1,429.60	5,296.14
	(73.0%)	(27.0%)	(100%)

Source : Forest Department Kota Bharu 1987 March

Table 11-4 Breakdown of Plantation Area to be Compensated for Lebir Dam

unit : Ha

Location	Item	Total	WL 60m	WL 70m	WL 80m	WL 90m
Kesedar	Rubber	11,050	898	1,789	2,566	4,149
	Oil Palm	16,576	1,348	2,683	3,848	6,223
	Total	27,626	2,246	4,472	6,414	10,372
Felda	Rubber	7,190	38	117	303	688
	Oil Palm	16,775	372	1,142	2,953	6,715
	Total	23,965	410	1,259	3,256	7,403
Total	Rubber	18,240	936	1,906	2,869	4,837
	Oil Palm	33,351	1,720	3,825	6,801	12,938
	Total	51,591	2,656	5,731	9,670	17,775

Nota : Proportions of rubber and Oil Palm are assumed at 4 : 6 in Kesedar and 0.093 : 0.907 in Felda

Table 11-5 Breakdown of Forestry Area to be Inundated by Lebir Dam with regard to status of Logging

unit : Ha

Iossification	Location	WL 60m	WL 70m	WL 80m	WL 90m
Total	Right Bank	1,691	3,324	5,776	8,378
	Left Bank	253	497	863	1,252
	Total	1,944	3,821	6,639	9,630
Logged	Right Bank	778	1,529	2,657	3,854
	Left bank	185	363	630	914
	SubTotal	963	1,892	3,287	4,768
Unlogged	Right Bank	913	1,795	3,119	4,524
	Left Bank	68	134	233	338
	Sub Total	981	1,929	3,352	4,862

Note : Proportions of logged and unlogged assumed at 45 : 54 on the Right Bank and 73 : 27 on the Left Bank.

Table. 11-6 Felda Agricultural Development Cost Per Hectare For Rubber Schemes :Collected in March 1987

(unit;M$)

Year	0	1	2	3	4	5	6	7	8	Total
A. LAND CLEARING & PLANTING										
1. Clearing & Arrangement	0	1,121	149	21	77	0	0	0	0	1,368
2. Survey/Premium, Rent/CAC	85	5	11	11	11	10	10	17	16	175
3. Seeding	-	153	57	4	15	0	0	0	0	228
4. Planting	-	541	292	6	22	0	0	0	0	861
5. Interplanting	-	0	168	0	0	0	0	0	0	168
6. Agriculture Roads	-	66	9	1	6	0	203	196	0	481
7. Water Channel	-	39	1	4	0	0	0	0	0	44
8. Fence	-	22	0	0	0	0	0	0	0	22
9. Insurance	-	97	0	0	0	0	0	0	0	97
Subtotal	85	2,045	688	46	131	10	213	212	16	3,447
B. MAINTENANCE										
1. Insurance	-	-	13	12	12	11	11	10	10	79
2. Weeding	-	184	443	302	181	117	112	108	104	1,552
3. Manuring	-	372	362	146	140	137	132	127	122	1,539
4. Pest & Diseases	-	14	27	32	30	29	28	27	26	213
5. Mempotong Tunas	-	133	151	85	43	11	8	5	0	136
6. Agriculture Roads	-	12	11	11	11	10	6	9	9	80
7. Water Channel	-	0	13	12	12	11	11	10	10	79
8. Fence	-	0	19	18	18	17	16	16	15	113
9. Terracing & Erosion Control	-	0	56	54	51	49	40	38	37	326
10. Membanci Pokok	-	5	5	5	5	4	4	4	4	37
11. Soil & Foliar Analysis	-	0	0	7	7	7	6	6	6	40
12. PHG Building	-	0	0	0	0	0	0	0	55	55
13. Miscellaneous	-	5	10	7	7	7	5	5	5	52
Subtotal	0	726	1,108	691	517	412	381	367	403	4,605
Total	85	2,771	1,797	737	648	422	594	579	419	8,052

Table. 11-7

FELDA Agricultural Development Cost per Acre For Oil Palm Schemes
(From Felling to Break - Even Point)
(unit : M$)

: Collected in March 1987

Year	1 (Oct-Dec)	2	3	4	5	6	7 (Jan-Sept)	Total
A. Land Clearing & Planting								
1. Felling	61.88	42.97	-	2.47	9.88	-	-	123.5
2. Burning	-	7.72	-	0.17	0.69	-	-	8.58
3. Pruning Stacking & Reburning	-	99.45	-	2.21	8.84	-	-	110.5
4. Lining	-	8.89	-	0.20	0.79	-	-	9.88
5. Agricultural Road(1.5 chains/acre)	-	25.16	2.79	-	-	-	-	27.95
6. Establishment of covers	-	65.52	-	1.46	5.82	-	-	72.8
7. Planting Plantforms(8 @ $1.85 each)	-	19.49	-	0.43	1.73	-	-	21.65
8. Maintenance of Pruned Areas (4 rounds @ 4.5/round)	-	21.06	-	0.47	1.87	-	-	23.4
9. Palm Planting(58¢/Palm)(Labour)	-	26.47	14.25	0.91	3.61	-	-	45.24
10. Cover Crops Maintenance(24 rounds)	-	46.80	135.20	83.20	-	-	-	265.2
11. Planting Points Clearing	-	6.67	15.56	0.49	1.98	-	-	24.7
12. Harvesting Paths Clearing	-	6.67	15.56	0.49	1.98	-	-	24.7
13. Terracing-Mechanical(+0.2 chain/acre)	-	1.87	-	0.04	0.17	-	-	2.08
Sub-total:	61.88	385.04	183.36	92.54	37.36	-	-	760.18
B. Planting Materials								
1. Polybagged Palm for planting	-	93.80	50.51	-	-	-	-	144.31
2. Supplying	-	-	10.14	10.14	10.14	-	-	30.42
Sub-total:	-	93.80	60.65	10.14	10.14	-	-	174.73
C. Fertilisers and Pesticides								
1. Manuring of covers	-	16.89	10.87	0.04	0.17	-	-	27.97
2. Manuring of Palms	-	-	46.92	79.18	105.20	120.93	148.67	500.9
3. Pest and Diseases	-	2.18	13.00	13.00	13.00	13.00	13.0	67.18
Sub-total:	-	19.07	70.79	92.22	118.37	133.93	161.67	596.05
D. Lateriting of Roads & Culverts	-	19.07	70.79	83.07	147.68	-	-	230.75
E. Other Expenditures								
1. Drains	-	-	11.87	1.31	-	-	-	13.18
2. Weeding	-	-	-	37.19	69.45	88.69	127.69	323.02
3. Maintenance of Agricultural Roads, Bridges, Drains, Terraces, Platforms & Other erosion control.	-	0.65	6.76	11.21	10.15	10.14	10.14	49.05
4. Castration, Pollination & Frond Pruning	-	-	-	23.09	23.54	-	-	46.63
5. Crop Insurance	-	-	2.6	2.6	2.6	2.6	2.6	13.0
6. Soil & Foliar Analysis	-	-	-	4.55	4.55	4.55	4.55	18.2
7. Assisted Pollination	-	-	-	-	16.90	59.93	61.23	138.06
8. Palm Sanitation	-	-	-	7.8	7.8	7.8	7.8	31.2
9. Harvesting	-	-	-	-	11.70	70.21	95.84	177.75
10. Transportation	-	-	-	-	4.55	32.76	57.33	94.64
11. Miscellaneous	-	18.20	6.31	11.84	13.66	5.49	14.3	69.8
Sub-total:	-	18.85	27.54	99.59	164.9	282.17	381.48	974.53
TOTAL:	61.88	516.76	342.34	377.56	478.45	416.10	543.15	2736.24

Table. 11-8

KESEDAR FARM BUDGET - RUBBER CULTIVATION (PER HECTARE)

(unit : Malaysian dollar) ; Collected in March 1987

Cost Items \ Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Land Clearing and Planting	776.00	17.00	17.00	17.00	90.00	90.00	60.00	60.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Land Tax	6.00	6.00	6.00	6.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Planting Material	300.00	30.00	30.00	30.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Agricultural Road	52.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5. Construction of Drains	13.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Miscellaneous Construction	-	-	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7. Maintenance:																									
(1) Weeding	64.00	192.00	180.00	174.00	90.00	90.00	90.00	60.00	60.00	60.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00	45.00
(2) Manuring	-	71.00	85.22	79.90	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00	85.00
(3) Pest and Disease Control	-	6.00	10.00	10.50	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
(4) Planting	-	8.00	16.00	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40	8.40
(5) Road and Bridges	-	11.50	11.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
(6) Soil and Foliar Analysis	-	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
(7) Maintenance of Drain	-	-	0.85	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
(8) Terracing and Erosion Control	-	5.00	5.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
(9) Miscellaneous	-	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
(10) Contingency 10%	120.00	38.00	37.13	34.90	21.40	18.00	16.00	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90	16.90
Total Cost ($)	1,332.00	441.00	405.00	382.00	326.00	326.00	252.60	252.60	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50	186.50
Yield (kg./ha)																									
a) Latex	-	-	-	-	-	-	616.00	896.00	1,121.00	1,345.00	1,457.00	1,513.00	1,569.00	1,569.00	1,569.00	1,569.00	1,569.00	1,569.00	1,569.00	1,569.00	1,540.00	1,513.00	1,485.00	1,457.00	1,429.00
b) Scrap	-	-	-	-	-	-	109.00	158.00	197.00	237.00	258.00	267.00	267.00	267.00	267.00	267.00	267.00	267.00	267.00	267.00	272.00	269.00	262.00	258.00	252.00
Income ($/ha.)	-	-	-	-	-	-	1,056.00	1,536.00	1,922.00	2,306.00	2,499.00	2,594.00	2,684.00	2,684.00	2,684.00	2,684.00	2,684.00	2,684.00	2,684.00	2,684.00	2,641.00	2,595.00	2,546.00	2,499.00	2,450.00
Net Revenue ($/ha.)	(1,332.00)	(441.00)	(405.00)	(382.00)	(326.00)	(326.00)	793.40	1,273.40	1,735.50	2,119.50	2,312.50	2,407.50	2,497.50	2,497.50	2,497.50	2,497.50	2,497.50	2,497.50	2,497.50	2,497.50	2,454.50	2,408.50	2,359.50	2,312.50	2,263.50

Note.

Price of latex @ $1.50/kg.

Price of scrap @ 65 c/kg.

Table. 11-9

KESEDAR FARM BUDGET - OIL PALM CULTIVATION (PER HECTARE)

(unit ; Malaysian dollar)

; Collected in March 1987

Cost Items \ Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Land Clearing	791	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Construction & Upgrade Road	59	-	-	-	371	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3. Terraces	237	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Planting/Rows/Points/ Paths	206	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5. Drainage	35	30	25	25	25	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6. Lining	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7. Cover Crop & Shade	198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8. Field Planting & Supplying	430	59	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9. Manuring	-	185	251	296	373	373	373	373	373	373	373	373	373	373	373	373	373	373	373	373	373	373	373	373	373
10. Crop Upkeep	178	297	297	269	208	148	148	148	148	148	148	148	148	148	148	148	148	148	148	148	148	148	148	148	148
11. Pest & Disease Control	-	50	50	80	80	85	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59
12. Field Upkeep (Roads, etc).	-	20	15	15	15	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
13. Pollination & Castration	-	-	74	181	181	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
14. Ramps/Collection Centre	-	-	-	300	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15. Tools	-	-	-	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16. Tapping/Harvest/ Transport	-	-	-	55	282	351	421	520	555	601	620	627	627	596	596	578	536	524	512	500	462	451	439	428	422
17. Soil & Leaf Analysis	-	-	-	15	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18. Miscellaneous	-	-	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-Total	2,159	641	740	1,256	1,544	1,086	1,105	1,204	1,239	1,285	1,304	1,311	1,311	1,280	1,280	1,262	1,220	1,208	1,196	1,184	1,146	1,135	1,123	1,112	1,106
Contingencies 10%	216	64	74	126	154	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Deveropment Cost	2,375	705	814	1,382	1,686	1,195	1,105	1,204	1,239	1,285	1,304	1,311	1,311	1,280	1,280	1,262	1,220	1,208	1,196	1,184	1,146	1,135	1,123	1,112	1,106
FFB Yield	-	-	-	-	3.57	7.49	13.51	18.07	22.36	24.21	25.00	25.50	25.50	24.72	24.72	23.94	23.16	22.64	22.11	21.59	20.81	20.29	19.77	19.25	18.99
Income ($ per hectare)	-	-	-	-	940	1,970	3,553	4,752	5,880	6,367	6,575	6,706	6,706	6,501	6,501	6,296	6,091	5,954	5,815	5,678	5,473	5,336	5,200	5,063	4,994
Net Revenue ($/ha.)	(2,375)	(705)	(814)	(1,382)	(745)	775	2,448	3,548	4,641	5,082	5,271	5,395	5,395	5,221	5,221	5,034	4,871	4,746	4,619	4,494	4,327	4,201	4,077	3,951	3,888

Note

Price of ffb at $263/tonne

Table.11-10

Felda Farm Budget of a Typical Settler on 10 Acre Rubber Holding :Collected in March 1987

(unit:M$)

Year	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
PRODUCTION																	
Kg Kering per 1 hectare	163	949	1,186	1,424	1,544	1,602	1,652	1,652	1,652	1,652	1,652	1,652	1,652	1,652	1,631	1,203	22,920
Kg Kering per 10 acre	660	3,839	4,800	5,762	6,246	6,483	6,687	6,687	6,687	6,687	6,687	6,687	6,687	6,687	6,600	4,860	92,753
Value $2.00/kg($1.68net)	1,109	6,449	8,065	9,680	10,494	10,891	11,234	11,234	11,234	11,234	11,234	11,234	11,234	11,234	11,087	8,178	155,825
LESS:FELDA CHARGES																	
Fertilizer $338.0/month	114	456	456	456	456	456	456	456	456	456	456	456	456	456	456	342	6,840
Collecting Centre of Latex																	
-Building $35.0/month	15	60	60	60	60	60	60	60	60	60	60	60	60	60	60	45	900
-Maintenance $0.05/kg	33	192	240	288	312	324	334	334	334	334	334	334	334	334	330	243	4,638
Insurance $39.88/ha/year	10	40	40	40	40	40	40	40	40	40	40	40	40	40	40	30	601
Development Fund $0.0063/kg	4	24	30	36	39	41	42	42	42	42	42	42	42	42	42	31	584
Wages $2.47/ha/month	30	120	120	120	120	120	120	120	120	120	120	120	120	120	120	90	1,799
Subtotal	206	892	946	1,000	1,028	1,041	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,052	1,048	781	15,357
Loan Repayment $350/month	1,050	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	3,150	63,000
Net Income (Annual)	(147)	1,357	2,918	4,479	5,266	5,650	5,982	5,982	5,982	5,982	5,982	5,982	5,982	5,982	5,840	4,243	77,483
Nilai Kini Bersih 8%	(147)	1,305	2,699	3,984	4,505	4,653	4,734	4,558	4,384	4,220	4,061	3,909	3,762	3,622	3,405	2,385	56,040

Table.11-11

FELDA Farm Budget of a Typical Settler on 10 Acre Oil Palm Holding

(unit : M$)

: Collected in March 1987

Year	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26-30
Production																				
Tons FFB	14.0	74.0	79.0	83.0	86.0	87.0	85.0	83.0	81.0	79.0	77.0	75.0	73.0	72.0	70.0	68.0	67.0	65.0	62.0	62.0
Tons Kernel	2.5	14.1	16.2	17.4	18.1	18.3	17.9	17.4	17.0	16.6	16.2	15.8	15.3	15.1	14.7	14.3	14.1	13.7	13.0	13.0
Tons Oil	0.45	2.7	3.2	3.5	3.6	3.7	3.6	3.5	3.4	3.3	3.2	3.2	3.1	3.0	2.9	2.9	2.8	2.7	2.6	2.6
Ex Mill Value Per Holding																				
Oil	1230	6937	7970	8561	8965	9004	8807	8561	8364	8167	7970	7774	7528	7429	7232	7036	6937	6740	6396	6396
Kernel	135	810	960	1050	1080	1110	1080	1050	1020	990	960	960	930	900	870	870	840	810	780	780
Total:	1365	7747	8930	9611	9985	10114	9887	9611	9384	9157	8930	8734	8458	8329	8102	7906	7777	7550	7176	7176
Less:Felda Charges																				
Processing and transport a/	315	1665	1778	1868	1935	1958	1913	1868	1823	1778	1733	1688	1643	1620	1575	1530	1508	1463	1395	1395
Fertilizer, Pest and Disease Control b/	259	1160	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110	1110
Agriculture Insurance	5	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Foliar Analysis Charge	5	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Contribution to settler development fund	4	22	24	25	26	26	26	25	24	24	23	23	22	22	21	20	20	20	19	19
Replanting Cess	100	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
State Land Premium & Quit Rent	28	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110	110
Loan Repayment	243*	2850	3517	3517	3517	3517	3517	3517	3517	3517	3517	3517	3517	3517	3346	3196	553			
Net Income (Annual)	375*	1500	1951	2541	2847	2953	2771	2541	2360	2178	1997	1846	1616	1510	1500	1500	4056	4407	4102	4102
Net Income (Monthly)	125	125	163	212	237	246	231	212	197	182	166	154	135	126	125	125	338	367	342	342

a / Overhead factory cost M$2.50/ton FFB
Variable production cost M$4.00/ton FFB
Mill Amortization charge M$10.00/ton FFB
Scheme to Mill transport M$6.00/ton FFB
M$22.50/ton FFB

b / For fertiliser $106/acre from 7th-8th year and $101/acre for 9th year and onwards
for Pest Control $10/acre

* Repayment Assessed to allow Incomes of M$1500 per year.

Table 11-12-1(1) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF KELANTAN RIVER

(HYDRAULIC RADIUS R = C1 + C2·h) (m)

STATION	C1	C2	MODIFIED DEEPEST RIVERBED LEVEL Z(m)	DISTANCE BETWEEN CROSS SECTIONS(m)
1	0.189286	0.405231	-2.933	0
1-05	0.042726	0.517523	-2.667	1480
1-1	-0.103835	0.629814	-2.499	1480
1-15	-0.250396	0.742105	-2.282	1480
2	-0.396956	0.854396	-2.065	1480
2-05	-0.284792	0.812700	-1.530	1190
2-1	-0.172628	0.771004	-0.995	1190
2-15	-0.060464	0.729308	-0.460	1190
3	0.051700	0.687611	0.075	1190
3-05	0.038211	0.713544	0.306	1092
3-1	0.024721	0.739477	0.536	1092
3-15	0.011232	0.765410	0.767	1092
4	-0.002258	0.791342	0.997	1092
4-05	-0.000824	0.818947	1.000	1212
4-1	-0.221391	0.846552	1.004	1212
4-15	-0.330722	0.874156	1.008	1212
5	-0.440524	0.901761	1.011	1212
5-05	-0.437743	0.901760	1.239	1210
5-1	-0.434962	0.901760	1.467	1210
5-15	-0.432181	0.901760	1.696	1210
6	-0.429400	0.901760	1.924	1210
6-05	-0.403863	0.902891	2.179	1140
6-1	-0.378325	0.904022	2.433	1140
6-15	-0.351025	0.905153	2.688	1140
7	-0.323725	0.906284	2.943	1140
7-05	-0.267361	0.852210	3.072	1045
7-1	-0.210997	0.798136	3.201	1045
7-15	-0.154633	0.744061	3.330	1045
8	-0.098269	0.689987	3.458	1045
8-05	-0.153999	0.743755	3.755	1425
8-1	-0.209730	0.797524	4.052	1425
8-15	-0.265460	0.851292	4.348	1425

Table 11-12-1(2) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF KELANTAN RIVER

(HYDRAULIC RADIUS R = C1 + C2·h) (m)

STATION	C1	C2	MODIFIED DEEPEST RIVERBED LEVEL Z(m)	DISTANCE BETWEEN CROSS SECTIONS(m)
9	-0.321190	0.905060	4.645	1425
9-05	-0.221498	0.785451	4.206	1130
9-1	-0.121806	0.665841	3.766	1130
9-15	-0.022114	0.538804	3.327	1130
10	0.077578	0.411767	2.888	1130
10-05	0.131306	0.433715	3.718	1218
10-1	0.185034	0.455663	4.186	1218
10-15	0.238764	0.477611	4.834	1218
11	0.292494	0.499558	5.485	1218
11-05	0.106928	0.536293	5.140	1000
11-1	-0.078639	0.573027	4.795	1000
11-15	-0.264206	0.609761	4.449	1000
12	-0.449772	0.646495	4.104	1000
12-05	-0.435349	0.674939	4.789	1345
12-1	-0.420925	0.703384	5.475	1345
12-15	-0.406502	0.731828	6.160	1345
13	-0.392078	0.760273	6.845	1345
13-05	-0.440447	0.760180	6.716	1330
13-1	-0.488816	0.760087	6.587	1330
13-15	-0.536857	0.759994	6.458	1330
14	-0.585554	0.759901	6.329	1330
14-05	-0.611176	0.751788	6.635	903
14-1	-0.636798	0.743675	6.942	903
14-15	-0.662427	0.735562	7.248	903
15	-0.688056	0.727449	7.554	903
15-05	-0.625857	0.7561355	8.110	1075
15-1	-0.563658	0.784822	8.666	1075
15-15	-0.501459	0.813508	9.222	1075
16	-0.439260	0.842195	9.778	1075
16-05	-0.450417	0.858385	10.025	1330
16-1	-0.461574	0.874575	10.273	1330
16-15	-0.472731	0.890765	10.520	1330

Table 11-12-1(3) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF KELANTAN RIVER

(HYDRAULIC RADIUS R = C1 + C2·h) (m)

STATION	C1	C2	MODIFIED DEEPEST RIVERBED LEVEL Z(m)	DISTANCE BETWEEN CROSS SECTIONS(m)
17	-0.483887	0.906955	10.767	1330
17-05	-0.520529	0.895066	10.992	1375
17-1	-0.557271	0.883177	11.217	1375
17-15	-0.593963	0.871288	11.441	1375
18	-0.630654	0.859398	11.666	1375
1-05	-0.655572	0.864584	11.902	1480
18-1	-0.680503	0.869769	12.137	1480
18-15	-0.705543	0.874955	12.372	1480
19	-0.730351	0.888014	12.608	1480

Note:Section No.19 is located immediately downstream of the confluence of the Galas river

Table 11-12-1(4) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF KELANTAN RIVER

(SECTIONAL AREA $A = K \cdot h^m$) (m^2)

	K	m	MODIFIED DEEPEST RIVERBED LEVEL Z(m)
1	27.84990	2.04614	-3.400
1-05	45.192025	1.88395	-2.950
1-1	62.53415	1.72176	-2.500
1-15	79.876275	1.55956	-2.050
2	97.21840	1.39737	-1.600
2-05	112.67030	1.43905	-1.200
2-1	128.12220	1.48072	-0.800
2-15	143.57410	1.52239	-0.400
3	159.02600	1.56407	0.000
3-05	186.76262	1.495815	0.250
3-1	214.49925	1.42756	0.500
3-15	242.72912	1.35931	0.750
4	270.95900	1.29105	1.000
4-05	253.98775	1.31661	1.125
4-1	237.01650	1.34216	1.250
4-15	220.04525	1.36772	1.375
5	203.07400	1.39327	1.500
5-05	195.38800	1.39896	1.725
5-1	187.72200	1.40465	1.950
5-15	180.46000	1.41035	2.175
6	172.37000	1.41605	2.400
6-05	184.01150	1.401135	2.625
6-1	195.65300	1.38622	2.850
6-15	207.29450	1.37130	3.075
7	218.93600	1.35639	3.300
7-05	193.39450	1.40427	3.375
7-1	167.85300	1.45214	3.450
7-15	142.31150	1.50002	3.525
8	116.77000	1.54789	3.600
8-05	154.67950	1.47345	3.950
8-1	192.58900	1.39900	4.300
8-15	230.49850	1.32455	4.650

Table 11-12-1(5) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF KELANTAN RIVER

(SECTIONAL AREA A =K • h^m) (m^2)

STATION	K	m	MODIFIED DEEPEST RIVERBED LEVEL Z(m)
9	268.40800	1.25010	5.000
9-05	202.84558	1.49596	4.425
9-1	137.28316	1.74181	3.850
9-15	71.72074	1.98866	3.275
10	6.15832	2.23551	2.700
10-05	19.73649	2.08146	2.520
10-1	33.31466	1.92741	3.800
10-15	46.89283	1.77336	4.350
11	60.47100	1.61930	4.900
11-05	45.8291	2.21267	4.875
11-1	31.17882	2.80604	4.850
11-15	6.53273	3.39941	4.825
12	1.88663	3.99278	4.800
12-05	22.76615	3.41313	5.450
12-1	43.64567	2.83348	6.100
12-15	64.52519	2.25383	6.750
13	85.40470	1.67418	7.400
13-05	72.60607	1.73618	7.325
13-1	59.80745	1.79817	7.250
13-15	47.00883	1.86017	7.175
14	34.21020	1.92216	7.100
14-05	27.80476	2.16137	7.450
14-1	21.39931	2.40058	7.800
14-15	14.99387	2.63978	8.150
15	8.58842	2.87899	8.500
15-05	29.17682	2.54855	8.950
15-1	49.76521	2.21810	9.400
15-15	70.35351	1.88691	9.850
16	90.94200	1.55572	10.300
16-05	93.93900	1.53348	10.550
16-1	96.93600	1.51124	10.800
16-15	99.93300	1.48899	11.050

Table 11-12-1(6) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF KELANTAN RIVER

(SECTIONAL AREA $A = K \cdot h^m$) (m^2)

STATION	K	m	
17	102.93000	1.46675	11.300
17-05	103.14175	1.48168	11.575
17-1	103.35350	1.49661	11.850
17-15	103.56525	1.51154	12.125
18	103.77700	1.52646	12.400
18-05	105.65500	1.51421	12.650
18-1	107.53300	1.50196	12.900
18-15	109.41100	1.48971	13.150
19	111.28900	1.47746	13.400

Table 11-12-1(7) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF LEBIR RIVER

(HYDRAULIC RADIUS R = C1 + C2·h) (m)

STATION	C1	C2	MODIFIED DEEPEST RIVERBED LEVEL Z(m)	DISTANCE BETWEEN CROSS SECTIONS(m)
RS-01	-0.396806	0.713618	22.994	370
01-1	-0.139386	0.705653	22.527	370
02	0.118034	0.697688	22.060	400
02-1	-0.069325	0.6659636	20.303	400
03	-0.256684	0.621584	18.545	250
03-1	-0.332983	0.643015	18.545	250
04	-0.409281	0.664447	18.545	300
04-1	-0.312030	0.674816	17.761	300
05	-0.214779	0.685184	16.976	175
05-1	-0.106241	0.57800	17.059	175
06	0.005597	0.470823	17.142	175
06-1	-0.160737	0.509452	17.444	175
07	-0.327070	0.548081	17.745	220
07-1	-0.297940	0.631941	18.803	220
08	-0.268810	0.715800	19.860	330
08-1	-0.247035	0.692183	19.712	330
09	-0.22726	0.668566	19.573	810
09-1	-0.189197	0.617887	17.042	810
10	-0.151134	0.567208	14.511	600
10-05	-0.154756	0.627124	16.358	600
10-1	-0.158377	0.689704	16.638	600
10-15	-0.161998	0.750952	17.701	600
11	-0.165619	0.812200	18.764	640
11-05	-0.124743	0.796896	18.884	640
11-1	-0.083866	0.781592	18.718	640
11-15	-0.040877	0.766288	18.695	640
12	-0.002113	0.750984	18.672	553
12-05	-0.065997	0.765264	18.961	552
12-1	-0.129881	0.779543	18.249	553
12-15	-0.193765	0.793822	18.037	552
13	-0.257649	0.808101	17.826	565
13-1	-0.251881	0.747657	17.079	565

Table 11-12-1(8) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF LEBIR RIVER

(HYDRAULIC RADIUS $R = C1 + C2 \cdot h$) (m)

	C1	C2	MODIFIED DEEPEST RIVERBED LEVEL Z(m)	DISTANCE BETWEEN CROSS SECTIONS(m)
14	-0.246113	0.687213	16.333	770
14-1	-0.194383	0.704934	16.683	770
15	-0.142653	0.722654	17.033	500
15-05	-0.139037	0.719859	16.732	500
15-1	-0.135420	0.717064	16.431	500
15-15	-0.131803	0.714270	16.129	500
16	-0.128186	0.711475	15.828	850
16-1	0.238186	0.735588	15.880	850
17	-0.348186	0.759700	15.931	500
17-05	-0.327922	0.778446	15.919	500
17-1	-0.307658	0.797192	15.907	500
17-15	-0.287395	0.815938	15.895	500
18	-0.267131	0.834683	15.883	700
18-05	-0.259734	0.788216	15.579	700
18-1	-0.252336	0.741748	15.276	700
18-15	-0.244939	0.695281	14.973	700
19	-0.237541	0.648813	14.670	525
19-1	-0.270496	0.715076	14.555	525
20	-0.303450	0.781338	14.440	950
20-1	-0.250350	0.725705	14.580	950
21	-0.197250	0.670071	14.720	700
21-1	-0.072852	0.648724	13.567	700
22	0.051546	0.627377	12.414	785
22-1	0.120185	0.728073	13.806	785
23	0.188823	0.828769	15.197	800
23-1	0.057787	0.734813	13.642	800
24	-0.073250	0.640857	12.087	545
24-05	-0.145832	0.682724	12.869	545
24-1	-0.218413	0.724591	13.866	545
24-15	-0.290995	0.766458	13.256	545
25	-0.363576	0.808325	13.645	575
25-1	-0.329723	0.806635	13.662	575

Table 11-12-1(9) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF LEBIR RIVER

(HYDRAULIC RADIUS R = C1 + C2·h) (m)

26	-0.295869	0.804945	13.680	0

Note: Section RS-26 is located immediately upstream of the confluence of the Galas river

Table 11-12-1(10) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF LEBIR RIVER

(SECTIONAL AREA $A = K \cdot h^m$) (m^2)

STATION	K	m	MODIFIED DEEPEST RIVERBED LEVEL Z(m)
RS-01	6.77678	2.45976	23.550
01-1	17.07549	1.89371	22.720
02	27.37420	1.32766	21.891
02-1	17.26827	1.68288	20.424
03	7.16234	2.03809	18.958
03-1	7.09769	1.99784	19.059
04	7.03304	1.96258	19.161
04-1	9.74452	1.80499	18.225
05	12.45600	1.64741	17.289
05-1	7.69457	1.86922	17.222
06	2.93313	2.09103	17.154
06-1	2.07187	2.56031	17.748
07	1.21060	3.02958	18.342
07-1	13.87165	2.29928	19.253
08	26.53270	1.56898	20.163
08-1	20.57990	1.79934	20.038
09	14.62710	2.02969	19.913
09-1	10.62527	1.99538	17.345
10	6.62344	1.96106	14.777
10-05	14.878655	1.82651	15.825
10-1	23.13387	1.69196	16.873
10-15	31.38909	1.55741	17.921
11	39.64430	1.42286	18.968
11-05	41.35635	1.39819	18.895
11-1	43.06840	1.37353	18.822
11-15	44.78045	1.34886	18.748
12	46.49250	1.32419	18.675
12-05	46.24030	1.34076	18.542
12-1	45.98810	1.35732	18.410
12-15	45.74090	1.37389	18.228
13	45.48370	1.39045	18.145
13-1	30.77555	1.52751	17.418

Table 11-12-1(11) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF LEBIR RIVER

(SECTIONAL AREA $A = K \cdot h^m$) (m^2)

STATION	K	m	MODIFIED DEEPEST RIVERBED LEVEL Z(m)
14	16.06740	1.66456	16.691
14-1	25.94190	1.62832	19.960
15	35.81640	1.59208	17.230
15-05	34.27873	1.56943	16.925
15-1	32.74105	1.54678	16.619
15-15	31.20337	1.52413	16.313
16	29.66570	1.50148	16.008
16-1	27.34020	1.61195	16.199
17	25.01470	1.72241	16.389
17-05	27.63613	1.66227	16.343
17-1	30.25755	1.60213	16.296
17-15	32.87898	1.54198	16.250
18	35.50040	1.48184	16.203
18-05	28.99734	1.61616	15.912
18-1	22.49428	1.75048	15.620
18-15	15.99122	1.88479	15.328
19	9.48816	2.01911	15.036
19-1	22.42263	1.75190	14.932
20	35.35710	1.48468	14.828
20-1	28.33045	1.67386	14.921
21	21.30380	1.86303	15.014
21-1	24.59865	1.68394	13.673
22	27.89350	1.50484	12.332
22-1	39.91280	1.43420	13.651
23	51.93210	1.36356	14.969
23-1	33.38280	1.55944	13.586
24	14.83350	1.75532	12.201
24-05	20.48150	1.70061	12.675
24-1	26.12950	1.64590	13.148
24-15	31.77750	1.59119	13.622
25	37.42550	1.53648	14.095
25-1	46.6583	1.49067	14.072

Table 11-12-1(12) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF LEBIR RIVER

(SECTIONAL AREA $A = K \cdot h^m$) (m^2)

26	55.89110	1.45685	14.048

Note: section RS-26 is located immediately upstream of the confluence of the Galas river

The distance between RS-26 and No.19 is 1500m

Table 11-12-1(13) COEFFICIENT FOR FORMULAS OF HYDRAULIC PARAMETERS OF CROSS SECTION OF GALAS RIVER

(SECTIONAL AREA $A = K \cdot h^m$ (m^2)

(HYDRAULIC RADIUS $R = C1 + C2 \cdot h$ (m)

STATION	MODIFIED DEEPEST RIVERBED LEVEL(m)	k	m	C1	C2	DISTANCE BETWEEN CROSS SECTIONS(m)
1	14.35	360.0	1.00	0.040309	0.962407	1000
2	15.30	280.0	1.00	0.050909	0.952236	1000
3	16.20	265.0	1.00	0.053892	0.949593	1000
4	17.10	250.0	1.00	0.056725	0.946764	1000
5	18.00	250.0	1.00	0.056725	0.946764	1000
6	18.90	250.0	1.00	0.056725	0.946764	1000
7	19.80	250.0	1.00	0.056725	0.946764	1000
8	20.70	250.0	1.00	0.056725	0.946764	1000
9	21.60	190.0	1.00	0.073025	0.931021	1000
10	22.50	130.0	1.00	0.102567	0.902028	1000
11	23.40	190.0	1.00	0.073025	0.931021	1000
12	24.30	250.0	1.00	0.056725	0.946764	1000
13	25.2	165.0	1.00	0.083008	0.921293	1000
14	26.10	180.0	1.00	0.076617	0.927443	1000

Table 11-12-2(1) PARAMETERS OF CROSS SECTION

** KELATAN RIVER **

(MODIFIED BED EL.)

A = K · h^m (m^2) R = C1 + C2 · h (m)

SECTION NO.	DISTANCE L(m)	BED EL. (m)	K	m	C1	C2
1	0	-2.933	27.8499	2.046140	0.189286	0.405231
2	1000	-2.786	39.5676	1.936550	0.090259	0.481103
3	1000	-2.640	51.2852	1.826960	-0.008769	0.556976
4	1000	-2.493	63.0029	1.717370	-0.107796	0.632848
5	1000	-2.347	74.7205	1.607780	-0.206823	0.708721
6	1000	-2.200	86.4382	1.498190	-0.305851	0.784593
7	1000	-2.029	98.2568	1.400170	-0.389416	0.851593
8	1000	-1.579	111.2420	1.435190	-0.295160	0.816554
9	1000	-1.130	124.2270	1.470210	-0.200905	0.781515
10	1000	-0.680	137.2110	1.505230	-0.106649	0.746476
11	1000	-0.231	150.1960	1.540260	-0.012394	0.711437
12	1000	0.143	167.2260	1.544070	0.047747	0.695210
13	1000	0.354	192.8520	1.481560	0.035394	0.718958
14	1000	0.565	218.4780	1.419060	0.023041	0.742706
15	1000	0.776	244.1030	1.356550	0.010688	0.766454
16	1000	0.987	269.7290	1.294050	-0.001665	0.790202
17	1000	1.000	257.6280	1.311120	-0.088320	0.813025
18	1000	1.003	243.6260	1.332210	-0.178722	0.835801
19	1000	1.006	229.6230	1.353290	-0.269123	0.858577
20	1000	1.008	215.6200	1.374380	-0.359524	0.881354
21	1000	1.031	202.4140	1.393760	-0.440285	0.901761
22	1000	1.219	196.0700	1.398470	-0.437987	0.901761
23	1000	1.408	189.7270	1.403170	-0.435688	0.901761
24	1000	1.597	183.3830	1.407880	-0.433390	0.901760
25	1000	1.785	177.0390	1.412590	-0.431062	0.901760
26	1000	1.984	175.1230	1.412520	-0.423152	0.902027
27	1000	2.212	185.5520	1.399160	-0.399484	0.903041
28	1000	2.441	195.9820	1.385800	-0.375817	0.904054
29	1000	2.669	206.4110	1.372440	-0.352150	0.905067
30	1000	2.897	216.8400	1.359080	-0.328482	0.906080
31	1000	3.041	199.4070	1.392990	-0.280629	0.864939
32	1000	3.165	174.9660	1.438810	-0.226693	0.813194
33	1000	3.288	150.5240	1.484620	-0.172756	0.761448
34	1000	3.411	126.0820	1.530440	-0.118819	0.709702
35	1000	3.587	133.2370	1.515550	-0.122477	0.713343
36	1000	3.795	159.8400	1.463310	-0.161586	0.751075
37	1000	4.003	186.4440	1.411060	-0.200695	0.788807
38	1000	4.212	213.0470	1.358820	-0.239804	0.826539
39	1000	4.420	239.6500	1.306580	-0.278913	0.864272
40	1000	4.628	266.2530	1.254330	-0.318022	0.902004

Pump Station	Section No.
PASIR MAS.	No.16
LEMAL	No.21
SALOR	No.23
KEMUBU	No.34

Table 11-12-2(2) PARAMETERS OF CROSS SECTION

** KELATAN RIVER **

(MODIFIED BED EL.)

A = K · h^m (m^2) R = C1 + C2 · h (m)

SECTION NO.	DISTANCE L(m)	BED EL. (m)	K	m	C1	C2
41	1000	4.288	215.0880	1.450450	-0.240113	0.804765
42	1000	3.899	157.0680	1.668460	-0.151890	0.695629
43	1000	3.510	99.0482	1.886470	-0.063667	0.586493
44	1000	3.122	41.0284	2.104490	0.024556	0.477358
45	1000	3.101	10.6063	2.185040	0.095179	0.418957
46	1000	3.634	21.7543	2.058560	0.139291	0.436976
47	1000	4.167	32.9022	1.932080	0.183404	0.454996
48	1000	4.700	44.0501	1.805600	0.227516	0.473015
49	1000	5.233	55.1980	1.679120	0.271629	0.491035
50	1000	5.303	52.7525	1.932010	0.194700	0.518917
51	1000	4.958	38.1064	2.525380	0.009134	0.555651
52	1000	4.613	23.4603	3.118750	-0.176433	0.592385
53	1000	4.267	8.8142	3.712120	-0.361999	0.629120
54	1000	4.373	10.0677	3.765660	-0.444121	0.657640
55	1000	4.882	25.5915	3.334690	-0.433397	0.678788
56	1000	5.391	41.1153	2.903730	-0.422673	0.699937
57	1000	5.901	56.6391	2.472760	-0.411949	0.721085
58	1000	6.410	72.1629	2.041790	-0.401225	0.742233
59	1000	6.831	83.9901	1.681030	-0.397424	0.760263
60	1000	6.734	74.3671	1.727640	-0.433789	0.760193
61	1000	6.637	64.7441	1.774260	-0.470154	0.760123
62	1000	6.540	55.1210	1.820870	-0.506519	0.760053
63	1000	6.443	45.4980	1.867480	-0.542884	0.759983
64	1000	6.346	35.8750	1.914100	-0.579249	0.759913
65	1000	6.609	28.3430	2.141230	-0.609023	0.752471
66	1000	6.949	21.2504	2.406140	-0.637401	0.743486
67	1000	7.288	14.1569	2.671040	-0.665779	0.734502
68	1000	7.665	12.7060	2.812830	-0.675616	0.733186
69	1000	8.182	31.8581	2.505090	-0.617757	0.759871
70	1000	8.700	51.0101	2.197350	-0.559897	0.786556
71	1000	9.217	70.1621	1.889610	-0.502033	0.813242
72	1000	9.734	89.3141	1.581880	-0.444178	0.839927
73	1000	9.948	93.0039	1.540420	-0.446936	0.853333
74	1000	10.134	95.2572	1.523690	-0.455324	0.865506
75	1000	10.320	97.5106	1.506970	-0.463713	0.877679
76	1000	10.506	99.7640	1.490250	-0.472101	0.888985
77	1000	10.692	102.0170	1.473520	-0.480490	0.902025
78	1000	10.864	103.0220	1.473210	-0.499765	0.901810
79	1000	11.028	103.1760	1.484070	-0.526449	0.893163
80	1000	11.191	103.3300	1.494920	-0.553134	0.884517

Table 11-12-2(3) PARAMETERS OF CROSS SECTION

** KELATAN RIVER **

(MODIFIED BED EL.)

A = K · h^m (m^2) R = C1 + C2 · h (m)

SECTION NO.	DISTANCE L(m)	BED EL. (m)	K	m	C1	C2
81	1000	11.355	103.4840	1.505780	-0.579819	0.875870
82	1000	11.518	103.6380	1.516640	-0.606504	0.867223
83	1000	11.681	103.8980	1.525670	-0.632254	0.859857
84	1000	11.840	105.1660	1.517400	-0.649095	0.864691
85	1000	11.990	106.4350	1.509120	-0.665935	0.869525
86	1000	12.159	107.7040	1.500840	-0.682775	0.874359
87	1000	12.318	108.9730	1.495700	-0.699617	0.879192
88	1000	12.477	110.2420	1.484290	-0.716457	0.884026
89	1000	12.601	111.8950	1.477590	-0.733050	0.888530

Table 11-12-2(4) PARAMETERS OF CROSS SECTION
** LEBIR RIVER **
(MODIFIED BED ELEVATION)
A = K · h^m (m^2) R = C1 + C2 · h (m)

SECTION NO.	DISTANCE (m)	BED EL. (m)	K	m	C1	C2
1	0	12.601	81.5819	1.47274	-0.598118	0.86273
2	1000	13.267	51.2687	1.46479	-0.463186	0.83693
3	1000	13.668	49.4683	1.48455	-0.319419	0.80630
4	1000	13.466	34.8347	1.56158	-0.330282	0.78912
5	1000	12.752	24.4714	1.66196	-0.197105	0.71230
6	1000	12.223	14.4566	1.73818	-0.061784	0.64908
7	1000	14.167	39.6432	1.49333	0.122011	0.76652
8	1000	14.364	44.7358	1.40585	0.147727	0.06029
9	1000	12.591	29.4246	1.49584	0.060290	0.64020
10	1000	13.896	23.6573	1.73510	-0.108394	0.65482
11	1000	14.646	25.0020	1.76346	-0.225197	0.69935
12	1000	14.499	32.3985	1.56433	-0.281092	0.75791
13	1000	14.571	20.5748	1.79007	-0.265788	0.70561
14	1000	14.908	14.5977	1.91357	-0.243353	0.68532
15	1000	15.342	23.8878	1.72169	-0.253921	0.75171
16	1000	15.775	33.1779	1.52981	-0.264489	0.81809
17	1000	15.901	31.5683	1.57205	-0.297527	0.80656
18	1000	15.925	26.3254	1.69234	-0.338054	0.76907
19	1000	15.886	27.0666	1.62494	-0.251127	0.73842
20	1000	15.858	29.8195	1.50375	-0.128548	0.71176
21	1000	16.461	32.8948	1.54905	-0.135781	0.71734
22	1000	17.010	35.1752	1.59443	-0.146012	0.72150
23	1000	16.556	22.3511	1.64150	-0.213194	0.69849
24	1000	17.007	29.3438	1.54085	-0.251320	0.74177
25	1000	17.972	45.6572	1.37906	-0.213711	0.79828
26	1000	18.354	46.1136	1.34908	-0.098084	0.77244
27	1000	18.678	46.0377	1.33074	-0.012971	0.75505
28	1000	18.714	43.3627	1.36929	-0.076840	0.77896
29	1000	18.750	40.6876	1.40783	-0.140710	0.80287
30	1000	17.683	31.2515	1.55965	-0.161937	0.74993
31	1000	15.911	17.4928	1.78390	-0.155902	0.64785
32	1000	15.167	7.6610	1.96996	-0.161002	0.58035
33	1000	18.292	12.6015	2.01232	-0.207993	0.64291
34	1000	18.830	25.2700	1.61784	-0.264403	0.71079
35	1000	17.507	15.0491	1.63296	-0.224732	0.69082
36	1000	18.103	8.6542	1.92799	-0.123816	0.63951
37	1000	19.538	6.9896	2.22702	-0.319466	0.66282

Table 11-12-2(5) PARAMETERS OF CROSS SECTION

** GALAS RIVER **

(MODIFIED BED EL.)

A = K · h^m (m^2) R = C1 + C2 · h (m)

SECTION NO.	DISTANCE L(m)	BED EL. (m)	K	m	C1	C2
1	0	12.601	360.0000	1.000000	0.006821	0.983643
2	1000	13.300	360.0000	1.000000	0.040309	0.962407
3	1000	14.350	360.0000	1.000000	0.040309	0.962407
4	1000	15.300	280.0000	1.000000	0.008643	0.979000
5	1000	16.200	265.0000	1.000000	0.000925	0.977929
6	1000	17.100	250.0000	1.000000	0.056725	0.946764
7	1000	18.000	250.0000	1.000000	0.056725	0.946764
8	1000	18.900	250.0000	1.000000	0.056725	0.946764
9	1000	19.800	250.0000	1.000000	0.056725	0.946764
10	1000	20.700	250.0000	1.000000	0.056725	0.946764
11	1000	21.600	190.0000	1.000000	0.012679	0.969357
12	1000	22.500	130.0000	1.000000	0.012238	0.962743
13	1000	23.400	190.0000	1.000000	0.012679	0.969357
14	1000	24.300	250.0000	1.000000	0.009607	0.976643
15	1000	25.200	215.0000	1.000000	0.011250	0.972786
16	1000	26.100	180.0000	1.000000	0.013250	0.967643

Table 11-12-3(1) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 1
TIDAL LEVEL AT ESTUARY : =0.WL=1.524m(H.H.W.L)
(Consecutive Periodcal Discharge) (Data on the 6th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m 3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.358	145.494	2.876	143.885	3.100	142.807	5.160	139.356
1	2.361	143.745	2.871	142.662	3.095	141.750	5.162	140.027
2	2.363	142.736	2.867	141.666	3.091	140.981	5.166	141.142
3	2.361	142.442	2.864	141.046	3.088	140.595	5.172	142.584
4	2.356	142.496	2.862	140.862	3.087	140.638	5.180	144.215
5	2.349	142.630	2.860	141.089	3.087	141.096	5.188	145.897
6	2.342	142.775	2.860	141.664	3.089	141.911	5.196	147.508
7	2.337	142.975	2.861	142.516	3.902	142.996	5.203	148.946
8	2.333	143.286	2.863	143.569	3.096	144.255	5.210	150.134
9	2.332	143.726	2.867	144.743	3.100	145.586	5.215	151.023
10	2.333	144.231	2.871	145.953	3.106	146.893	5.218	151.582
11	2.337	144.595	2.876	147.110	3.111	148.091	5.220	151.799
12	2.347	144.683	2.881	148.118	3.116	149.103	5.221	151.679
13	2.359	144.989	2.886	148.912	3.121	149.871	5.219	151.234
14	2.370	145.956	2.891	149.507	3.125	150.372	5.217	150.486
15	2.376	147.403	2.896	149.939	3.128	150.609	5.213	149.460
16	2.379	148.854	2.899	150.198	3.130	150.590	5.207	148.189
17	2.378	149.957	2.901	150.235	3.131	150.314	5.201	146.715
18	2.375	150.584	2.901	150.006	3.130	149.776	5.193	145.105
19	2.372	150.745	2.899	149.497	3.127	148.986	5.185	143.455
20	2.368	150.497	2.896	148.723	3.124	147.970	5.177	141.900
21	2.364	149.891	2.892	147.723	3.119	146.774	5.170	140.595
22	2.360	148.928	2.887	146.553	3.113	145.470	5.165	139.687
23	2.358	147.508	2.882	145.284	3.107	144.145	5.161	139.282

Table 11-12-3(2) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 1
TIDAL LEVEL AT ESTUARY : =0.WL=1.524m(H.H.W.L)
(Consecutive Periodcal Discharge) (Data on the 7th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.359	145.618	2.876	144.990	3.101	142.901	5.160	139.425
1	2.362	143.861	2.871	142.757	3.096	141.838	5.162	140.091
2	2.364	142.844	2.867	141.755	3.091	141.064	5.167	141.203
3	2.362	142.542	2.864	141.130	3.089	140.673	5.173	142.641
4	2.357	142.590	2.862	140.941	3.087	140.711	5.180	144.268
5	2.350	142.719	2.861	141.163	3.087	141.165	5.188	145.946
6	2.343	142.859	2.861	141.734	3.089	141.976	5.196	147.553
7	2.337	143.053	2.862	142.582	3.092	143.057	5.203	148.988
8	2.334	143.360	2.864	143.631	3.096	144.312	5.210	150.174
9	2.332	143.796	2.867	144.801	3.101	145.639	5.215	151.059
10	2.333	144.297	2.871	146.007	3.106	146.943	5.218	151.615
11	2.338	144.656	2.876	147.160	3.111	148.137	5.220	151.830
12	2.347	144.740	2.881	148.164	3.116	149.145	5.222	151.707
13	2.359	145.042	2.886	148.955	3.121	149.911	5.220	151.261
14	2.370	146.005	2.892	149.546	3.125	150.408	5.217	150.510
15	2.377	147.449	2.896	149.975	3.128	150.642	5.213	149.483
16	2.379	148.896	2.900	150.232	3.130	150.621	5.207	148.210
17	2.378	149.996	2.901	150.266	3.131	150.342	5.201	146.735
18	2.375	150.620	2.901	150.035	3.130	149.802	5.193	145.123
19	2.372	150.779	2.900	149.524	3.128	149.011	5.185	143.472
20	2.368	150.528	2.897	148.784	3.124	147.992	5.177	141.916
21	2.364	149.919	2.892	147.746	3.119	146.795	5.170	140.610
22	2.360	148.954	2.887	146.575	3.113	145.489	5.165	139.701
23	2.358	147.532	2.882	145.304	3.107	144.164	5.161	139.296
0	2.359	145.641	2.876	144.005	3.101	142.918	5.161	139.437

Table 11-12-3(3) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 1
TIDAL LEVEL AT ESTUARY : =0.WL=0.762m(L.I.W.L)
(Consecutive Periodcal Discharge) (Data on the 6th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.365	147.255	2.879	143.876	3.102	142.761	5.160	139.356
1	2.356	146.397	2.873	142.872	3.097	141.781	5.162	140.027
2	2.348	145.375	2.868	142.042	3.092	141.086	5.166	141.142
3	2.340	144.315	2.863	141.470	3.088	140.740	5.172	142.584
4	2.335	143.274	2.859	141.213	3.086	140.780	5.180	144.215
5	2.332	142.181	2.857	141.290	3.085	141.200	5.188	145.897
6	2.335	141.010	2.857	141.672	3.087	141.955	5.196	147.508
7	2.342	140.337	2.859	142.314	3.090	142.967	5.203	148.946
8	2.349	140.685	2.863	143.207	3.095	144.157	5.210	150.135
9	2.353	141.899	2.868	144.335	3.100	145.448	5.215	151.023
10	2.354	143.487	2.874	145.614	3.107	146.757	5.218	151.582
11	2.354	145.063	2.879	146.913	3.113	147.989	5.220	151.799
12	2.354	146.454	2.884	148.109	3.118	149.058	5.221	151.679
13	2.354	147.618	2.889	149.113	3.122	149.900	5.219	151.234
14	2.354	148.549	2.892	149.870	3.126	150.471	5.217	150.485
15	2.355	149.235	2.895	150.352	3.128	150.751	5.213	149.460
16	2.357	149.609	2.897	150.545	3.129	150.732	5.207	148.189
17	2.361	149.495	2.898	150.437	3.129	150.420	5.201	146.715
18	2.368	148.814	2.898	150.014	3.128	149.822	5.193	145.105
19	2.377	148.100	2.897	149.288	3.126	148.955	5.185	143.455
20	2.383	147.866	2.896	148.346	3.123	147.864	5.177	141.900
21	2.384	148.017	2.894	147.294	3.119	146.626	5.170	140.595
22	2.381	148.141	2.890	146.195	3.114	145.322	5.165	139.687
23	2.374	147.950	2.885	145.077	3.109	144.036	5.161	139.282

Table 11-12-3(4) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 1
TIDAL LEVEL AT ESTUARY : =0.WL=0.762m(L.L.W.L)
(Consecutive Periodcal Discharge) (Data on the 7th Day)

P.S.	PASIR MAS. (15.0km)		LENAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.366	147.379	2.880	143.978	3.103	142.854	5.160	139.425
1	2.357	146.512	2.874	142.967	3.097	141.870	5.162	140.091
2	2.348	145.484	2.868	142.131	3.092	141.169	5.167	141.203
3	2.341	144.416	2.863	141.554	3.089	140.819	5.173	142.641
4	2.335	143.369	2.859	141.292	3.086	140.854	5.180	144.268
5	2.333	142.270	2.857	141.365	3.086	141.270	5.188	145.946
6	2.336	141.094	2.857	141.742	3.087	142.020	5.196	147.554
7	2.343	140.416	2.859	142.380	3.090	143.028	5.203	148.988
8	2.349	140.759	2.863	143.269	3.095	144.214	5.210	150.174
9	2.353	141.968	2.868	144.393	3.101	145.501	5.215	151.059
10	2.355	143.552	2.874	145.668	3.107	146.806	5.218	151.615
11	2.354	145.123	2.897	146.963	3.113	148.034	5.220	151.830
12	2.354	146.511	2.884	148.155	3.118	149.101	5.221	151.707
13	2.354	147.670	2.889	149.156	3.123	149.939	5.220	151.260
14	2.354	148.598	2.892	149.910	3.126	150.507	5.217	150.510
15	2.356	149.280	2.895	150.389	3.128	150.784	5.213	149.482
16	2.358	149.651	2.897	150.579	3.129	150.763	5.207	148.210
17	2.361	149.534	2.898	150.468	3.129	150.449	5.201	146.735
18	2.368	148.850	2.898	150.043	3.128	149.848	5.193	145.123
19	2.377	148.133	2.897	149.315	3.126	148.979	5.185	143.472
20	2.383	147.897	2.896	148.370	3.123	147.887	5.177	141.916
21	2.384	148.045	2.894	147.317	3.119	146.646	5.170	140.610
22	2.381	148.168	2.890	146.217	3.114	145.341	5.165	139.701
23	2.374	147.974	2.886	145.096	3.109	144.054	5.161	139.296
0	2.366	147.402	2.880	143.996	3.103	142.872	5.161	139.437

Table 11-12-3(5) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 2
TIDAL LEVEL AT ESTUARY : =0,WL=1.524m(H.H.W.L)
(Consecutive Periodcal Discharge) (Data on the 6th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.364	147.066	2.885	146.233	3.111	145.304	5.164	139.499
1	2.368	145.563	2.881	144.904	3.106	143.963	5.160	138.960
2	2.371	144.644	2.877	143.583	3.101	142.680	5.158	138.953
3	2.370	144.264	2.872	142.436	3.096	141.585	5.160	139.473
4	2.364	144.060	2.868	141.566	3.091	140.789	5.163	141.458
5	2.356	143.779	2.864	141.010	3.088	140.361	5.169	141.800
6	2.347	143.384	2.861	140.778	3.086	140.325	5.176	143.368
7	2.339	142.960	2.858	140.872	3.085	140.675	5.184	145.024
8	2.333	142.619	2.857	141.283	3.086	141.371	5.191	146.644
9	2.328	142.434	2.857	141.978	3.088	142.350	5.199	148.121
10	2.327	142.390	2.859	142.901	3.092	143.528	5.206	149.371
11	2.329	142.326	2.862	143.972	3.096	144.807	5.211	150.337
12	2.336	142.130	2.867	145.083	3.101	146.086	5.215	150.984
13	2.348	142.312	2.872	146.147	3.107	147.272	5.218	151.296
14	2.358	143.316	2.879	147.145	3.113	148.301	5.218	151.272
15	2.365	144.945	2.885	148.079	3.118	149.139	5.218	150.921
16	2.368	146.695	2.890	148.904	3.123	149.759	5.215	150.263
17	2.368	148.191	2.894	149.542	3.126	150.132	5.212	149.323
18	2.367	149.280	2.897	149.923	3.128	150.230	5.207	148.129
19	2.366	149.951	2.898	150.011	3.128	150.042	5.200	146.723
20	2.364	150.236	2.898	149.800	3.127	149.572	5.193	145.162
21	2.362	150.163	2.896	149.304	3.125	148.837	5.185	143.533
22	2.361	149.708	2.893	148.544	3.122	147.867	5.178	141.959
23	2.361	148.739	2.890	147.550	3.117	146.706	5.170	140.591

Table 11-12-3(6) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 2
TIDAL LEVEL AT ESTUARY : =0, WL=1.524m(H.H.W.L)
(Consecutive Periodcal Discharge) (Data on the 7th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.364	147.213	2.886	146.351	3.112	145.412	5.164	139.577
1	2.369	145.699	2.881	145.014	3.106	144.064	5.160	139.033
2	2.372	144.769	2.877	143.685	3.101	142.775	5.159	139.022
3	2.370	144.380	2.873	142.532	3.096	141.674	5.160	139.539
4	2.365	144.168	2.869	141.656	3.092	140.873	5.163	140.519
5	2.356	143.881	2.865	141.094	3.088	140.440	5.169	141.857
6	2.348	143.479	2.861	140.857	3.086	140.400	5.176	143.421
7	2.340	143.050	2.859	140.947	3.085	140.745	5.184	145.074
8	2.333	142.704	2.857	141.353	3.086	141.437	5.192	146.691
9	2.329	142.513	2.858	142.044	3.088	142.412	5.199	148.163
10	2.327	142.465	2.859	142.964	3.092	143.585	5.206	149.410
11	2.329	142.396	2.863	144.030	3.096	144.860	5.211	150.374
12	2.337	142.196	2.867	145.137	3.102	146.136	5.215	151.018
13	2.348	142.374	2.873	146.198	3.107	147.319	5.218	151.327
14	2.358	143.374	2.879	147.192	3.113	148.344	5.219	151.301
15	2.365	144.998	2.885	148.122	3.119	149.179	5.218	150.948
16	2.368	146.745	2.890	148.944	3.123	149.796	5.216	150.288
17	2.368	148.237	2.894	149.579	3.126	150.166	5.212	149.346
18	2.368	149.323	2.897	149.957	3.128	150.261	5.207	148.151
19	2.366	149.990	2.898	150.043	3.129	150.071	5.201	146.743
20	2.364	150.273	2.898	149.830	3.128	149.599	5.193	144.932
21	2.363	150.197	2.896	149.331	3.125	148.862	5.186	143.550
22	2.361	149.739	2.894	148.569	3.122	147.890	5.178	141.976
23	2.361	148.768	2.890	147.573	3.117	146.727	5.170	140.606
0	2.364	147.240	2.886	146.372	3.112	145.432	5.164	139.591

Table 11-12-3(7) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 2
TIDAL LEVEL AT ESTUARY : =0.WL=0.762m(L.L.W.L)
(Consecutive Periodcal Discharge) (Data on the 6th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.371	148.832	2.889	146.224	3.113	145.257	5.164	139.499
1	2.363	148.215	2.883	145.114	3.108	143.995	5.160	138.960
2	2.356	147.284	2.877	143.961	3.101	142.785	5.153	138.952
3	2.349	146.143	2.871	142.864	3.096	141.733	5.160	139.473
4	2.343	144.846	2.865	141.921	3.090	140.935	5.163	140.458
5	2.339	143.336	2.860	141.214	3.086	140.467	5.169	141.800
6	2.340	141.621	2.857	140.786	3.084	140.370	5.176	143.368
7	2.344	140.316	2.855	140.667	3.083	140.645	5.184	145.025
8	2.348	140.003	2.856	140.916	3.085	141.271	5.191	146.644
9	2.350	140.592	2.858	141.566	3.088	142.211	5.199	148.121
10	2.348	141.637	2.862	142.560	3.092	143.390	5.206	149.371
11	2.346	142.789	2.866	143.775	3.098	144.705	5.211	150.337
12	2.343	143.901	2.870	145.075	3.103	146.042	5.215	150.984
13	2.342	144.940	2.875	146.346	3.109	147.300	5.218	151.296
14	2.342	145.903	2.879	147.505	3.114	148.398	5.218	151.272
15	2.344	146.764	2.884	148.487	3.118	149.277	5.218	150.921
16	2.346	147.438	2.887	149.246	3.122	149.898	5.215	150.263
17	2.352	147.722	2.891	149.741	3.125	150.236	5.212	149.323
18	2.360	147.507	2.893	149.931	3.126	150.275	5.207	148.129
19	2.371	147.312	2.895	149.805	3.127	150.012	5.200	146.723
20	2.380	147.621	2.897	149.428	3.127	149.469	5.193	145.162
21	2.383	148.306	2.897	148.880	3.125	148.690	5.185	143.533
22	2.382	148.934	2.896	148.190	3.123	147.721	5.179	141.959
23	2.378	149.189	2.894	147.344	3.119	146.597	5.170	140.591

Table 11-12-3(8) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 2
TIDAL LEVEL AT ESTUARY : =0, WL=0.672m(L.L.W.L)
(Consecutive Periodcal Discharge) (Data on the 7th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.371	148.978	2.889	146.342	3.114	145.366	5.164	139.577
1	2.364	148.350	2.884	145.224	3.108	144.096	5.160	139.033
2	2.357	147.410	2.878	144.064	3.102	142.880	5.159	139.022
3	2.349	146.260	2.872	142.960	3.096	141.822	5.160	139.538
4	2.343	144.955	2.866	142.012	3.091	141.018	5.163	140.519
5	2.340	143.438	2.861	141.299	3.087	140.546	5.169	141.857
6	2.341	141.716	2.857	140.866	3.084	140.444	5.176	143.421
7	2.345	140.405	2.856	140.742	3.084	140.715	5.184	145.074
8	2.349	140.087	2.856	140.986	3.095	141.337	5.192	146.691
9	2.305	140.671	2.859	141.632	3.088	142.273	5.199	148.164
10	2.349	141.711	2.862	142.622	3.093	143.448	5.206	149.410
11	2.346	142.859	2.866	143.833	3.098	144.759	5.211	150.374
12	2.051	144.100	2.871	145.129	3.104	146.092	5.125	151.018
13	2.342	145.002	2.875	146.397	3.109	147.347	5.218	151.327
14	2.342	145.961	2.880	147.552	3.114	148.441	5.219	151.301
15	2.344	146.818	2.884	148.530	3.118	149.317	5.218	150.948
16	2.347	147.488	2.888	149.286	3.122	149.935	5.216	150.288
17	2.352	147.768	2.891	149.778	3.125	150.270	5.212	149.346
18	2.361	147.550	2.893	149.965	3.126	150.307	5.207	148.151
19	2.371	147.352	2.895	149.837	3.127	150.041	5.201	146.743
20	2.380	147.657	2.897	149.458	3.127	149.496	5.193	145.180
21	2.384	148.340	2.897	148.907	3.125	148.715	5.186	143.550
22	2.382	148.965	2.896	148.215	3.123	147.744	5.178	141.976
23	2.378	149.218	2.894	147.367	3.119	146.619	5.170	140.606
0	2.372	149.004	2.889	146.364	3.114	145.386	5.164	139.591

Table 11-12-3(9) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 3
TIDAL LEVEL AT ESTUARY :t=0,WL=1.524m(H.H.W.L)
(Consecutive Periodcal Discharge) (Data on the 6th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.349	143.371	2.864	141.687	3.089	140.689	5.157	139.180
1	2.352	141.639	2.860	140.706	3.085	139.970	5.162	140.367
2	2.354	140.741	2.857	140.042	3.082	139.618	5.168	141.860
3	2.352	140.641	2.855	139.815	3.081	139.687	5.176	143.520
4	2.348	140.956	2.855	140.046	3.082	140.178	5.184	145.209
5	2.342	141.396	2.855	140.673	3.084	141.035	5.192	146.806
6	2.337	141.870	2.857	141.597	3.087	142.165	5.200	148.213
7	2.333	142.392	2.860	142.717	3.092	143.460	5.206	149.360
8	2.330	142.994	2.863	143.942	3.097	144.813	5.211	150.198
9	2.330	143.670	2.867	145.185	3.102	146.126	5.214	150.702
10	2.332	144.339	2.872	146.364	3.107	147.317	5.216	150.864
11	2.338	144.785	2.877	147.401	3.112	148.315	5.216	150.690
12	2.347	144.873	2.882	148.216	3.117	149.067	5.215	150.196
13	2.630	145.106	2.886	148.763	3.120	149.535	5.212	149.402
14	2.370	145.933	2.891	149.074	3.123	149.711	5.207	148.337
15	2.376	147.189	2.894	149.203	3.125	149.618	5.202	147.033
16	2.377	148.410	2.896	149.153	3.126	149.276	5.195	145.532
17	2.376	149.260	2.896	148.886	3.125	148.690	5.187	143.902
18	2.372	149.619	2.895	148.369	3.122	147.870	5.179	142.246
19	2.367	149.512	2.892	147.598	3.119	146.835	5.171	140.704
20	2.362	149.005	2.888	146.602	3.114	145.629	5.164	139.437
21	2.357	148.163	2.883	145.440	3.108	144.321	5.159	138.590
22	2.352	147.004	2.877	144.192	3.102	143.006	5.156	138.263
23	2.349	145.443	2.871	142.944	3.095	141.789	5.155	138.492

Table 11-12-3(10) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 3
TIDAL LEVEL AT ESTUARY :t=0,WL=1.524m(H.H.W.L)
(Consecutive Periodcal Discharge) (Data on the 7th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KENUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.349	143.483	2.865	141.779	3.090	140.774	5.158	139.242
1	2.352	141.744	2.860	140.792	3.085	140.050	5.162	140.425
2	2.354	140.838	2.857	140.123	3.082	139.693	5.169	141.915
3	2.353	140.732	2.856	139.891	3.081	139.758	5.176	143.571
4	2.348	141.041	2.855	140.118	3.082	140.245	5.184	145.256
5	2.343	141.477	2.856	140.741	3.084	141.098	5.192	146.850
6	2.337	141.946	2.857	141.660	3.088	142.224	5.200	148.254
7	2.333	142.464	2.860	142.777	3.092	143.505	5.206	149.397
8	2.331	143.062	2.863	143.998	3.097	144.864	5.211	150.232
9	2.331	143.734	2.868	145.237	3.102	146.174	5.214	150.734
10	2.333	144.399	2.872	146.412	3.107	147.361	5.216	150.894
11	2.338	144.840	2.877	147.446	3.112	148.356	5.216	150.718
12	2.348	144.924	2.882	148.257	3.117	149.105	5.215	150.221
13	2.660	145.154	2.886	148.801	3.120	149.569	5.212	149.426
14	2.370	145.977	2.891	149.110	3.123	149.910	5.207	148.359
15	2.376	147.229	2.894	149.235	3.125	149.648	5.202	147.053
16	2.378	148.448	2.896	149.183	3.126	149.303	5.195	145.551
17	2.376	149.294	2.897	148.914	3.125	148.716	5.187	143.920
18	2.372	149.651	2.895	148.394	3.123	147.894	5.179	142.263
19	2.367	149.541	2.892	147.621	3.119	146.857	5.171	140.720
20	2.362	149.032	2.888	146.624	3.114	145.649	5.164	139.451
21	2.357	148.188	2.883	145.461	3.108	144.340	5.159	138.603
22	2.352	147.027	2.877	144.211	3.102	143.024	5.156	138.276
23	2.349	145.465	2.871	142.962	3.096	141.806	5.156	138.504
0	2.349	143.504	2.865	141.796	3.090	140.790	5.158	139.254

Table 11-12-3(11) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 3
TIDAL LEVEL AT ESTUARY :t=0,WL=0.762m(L.L.W.L)
(Consecutive Periodcal Discharge) (Data on the 6th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.356	145.134	2.868	141.678	3.091	140.643	5.157	139.180
1	2.347	144.290	2.863	140.914	3.087	140.001	5.162	140.366
2	2.338	143.372	2.858	140.414	3.083	139.720	5.168	141.860
3	2.331	142.501	2.854	140.233	3.081	139.829	5.176	143.520
4	2.326	141.723	2.852	140.393	3.081	140.318	5.184	145.209
5	2.325	140.941	2.852	140.872	3.082	141.138	5.192	146.806
6	2.330	140.101	2.853	141.605	3.085	142.209	5.200	148.214
7	2.338	139.758	2.857	142.518	3.090	143.432	5.206	149.360
8	2.346	140.403	2.862	143.584	3.096	144.717	5.211	150.198
9	2.352	141.853	2.868	144.780	3.102	144.780	5.214	150.702
10	2.354	143.601	2.875	146.026	3.108	146.181	5.216	150.864
11	2.354	145.257	2.880	147.205	3.114	148.213	5.216	150.690
12	2.354	146.648	2.885	148.208	3.118	149.022	5.215	150.196
13	2.354	147.737	2.889	148.965	3.122	149.563	5.212	149.402
14	2.354	148.529	2.891	149.439	3.124	149.811	5.207	148.337
15	2.355	149.023	2.893	149.618	3.125	149.761	5.202	147.033
16	2.356	149.167	2.893	149.501	3.125	149.418	5.195	145.532
17	2.359	148.798	2.893	149.089	3.123	148.797	5.187	143.902
18	2.365	147.848	2.891	148.377	3.121	147.916	5.179	142.246
19	2.372	146.863	2.889	147.388	3.117	146.804	5.171	140.704
20	2.377	146.371	2.887	146.225	3.113	145.523	5.164	139.437
21	2.377	146.288	2.884	145.012	3.108	144.173	5.159	138.590
22	2.373	146.218	2.879	143.835	3.103	142.859	5.156	138.263
23	2.365	145.886	2.874	142.737	3.097	141.681	5.155	138.492

Table 11-12-3(12) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION

LEBIR DAM DISCHARGE PATTERN CASE 3

TIDAL LEVEL AT ESTUARY :t=0,WL=0.762m(L.L.W.L)

(Consecutive Periodcal Discharge) (Data on the 7th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.356	145.246	2.869	141.770	3.092	140.729	5.158	139.242
1	2.347	144.394	2.863	141.000	3.087	140.081	5.162	140.425
2	2.339	143.470	2.858	140.495	3.083	139.796	5.169	141.915
3	2.332	142.593	2.855	140.310	3.081	139.901	5.176	143.571
4	2.327	141.810	2.853	140.465	3.081	140.385	5.184	145.256
5	2.326	141.022	2.852	140.940	3.083	141.201	5.192	146.850
6	2.330	140.177	2.854	141.668	3.086	142.268	5.200	148.254
7	2.338	139.830	2.857	142.577	3.090	143.487	5.206	149.397
8	2.347	140.470	2.863	143.639	3.096	144.768	5.211	150.233
9	2.352	141.916	2.869	144.832	3.102	146.038	5.214	150.734
10	2.354	143.660	2.875	146.074	3.108	147.225	5.216	150.894
11	2.355	145.311	2.881	147.249	3.114	148.254	5.216	150.718
12	2.354	146.699	2.885	148.249	3.119	149.060	5.125	150.221
13	2.354	147.784	2.889	149.003	3.122	149.598	5.212	149.426
14	2.355	148.573	2.892	149.474	3.124	149.843	5.207	148.359
15	2.355	149.064	2.893	149.651	3.125	149.791	5.202	147.053
16	2.356	149.205	2.894	149.531	3.125	149.446	5.195	145.551
17	2.359	148.833	2.893	149.117	3.123	148.823	5.187	143.920
18	2.365	147.881	2.892	148.402	3.121	147.940	5.179	142.263
19	2.372	146.893	2.890	147.412	3.117	146.825	5.171	140.720
20	2.377	146.399	2.887	146.247	3.113	145.544	5.164	139.451
21	2.378	146.313	2.884	145.033	3.108	144.192	5.159	138.603
22	2.373	146.241	2.880	143.854	3.103	142.877	5.156	138.276
23	2.366	145.908	2.874	142.755	3.097	141.697	5.156	138.504
0	2.356	145.266	2.869	141.787	3.092	140.744	5.158	139.254

Table 11-12-3(13) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 4
TIDAL LEVEL AT ESTUARY :t=0,WL=1.524m(H.H.W.L)
(Consecutive Periodcal Discharge) (Data on the 6th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.341	141.751	2.856	140.156	3.081	139.245	5.154	138.712
1	2.344	140.077	2.852	139.332	3.077	138.719	5.160	140.058
2	2.347	139.277	2.850	138.849	3.075	138.575	5.167	141.634
3	2.346	139.302	2.849	138.811	3.075	138.844	5.175	143.302
4	2.342	139.760	2.849	139.220	3.077	139.510	5.183	144.934
5	2.336	140.347	2.851	139.997	3.080	140.499	5.190	146.421
6	2.332	140.961	2.853	141.031	3.084	141.712	5.197	147.681
7	2.328	141.607	2.856	142.217	3.089	143.035	5.203	148.656
8	2.327	142.305	2.860	143.459	3.094	144.366	5.207	149.312
9	2.327	143.045	2.864	144.675	3.099	145.613	5.209	149.632
10	2.329	143.741	2.869	145.788	3.104	146.702	5.210	149.617
11	2.335	144.176	2.873	146.728	3.109	147.574	5.210	149.277
12	2.344	144.219	2.878	147.425	3.113	148.184	5.207	148.631
13	2.356	144.381	2.882	147.839	3.116	148.503	5.204	147.705
14	2.366	145.117	2.886	148.012	3.118	148.531	5.199	146.525
15	2.372	146.267	2.889	148.002	3.119	148.295	5.192	145.130
16	2.373	147.372	2.890	147.818	3.119	147.819	5.185	143.572
17	2.371	148.101	2.890	147.427	3.118	147.114	5.177	141.935
18	2.366	148.342	2.888	146.800	3.115	146.193	5.169	140.340
19	2.361	148.122	2.884	145.938	3.110	145.083	5.162	138.942
20	2.355	147.516	2.880	144.880	3.105	143.837	5.156	137.895
21	2.349	146.595	2.874	143.694	3.099	142.537	5.152	137.321
22	2.344	145.382	2.868	142.466	3.093	141.282	5.150	137.288
23	2.341	143.801	2.862	141.289	3.087	140.179	5.151	137.793

Table 11-12-3(14) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION
LEBIR DAM DISCHARGE PATTERN CASE 4
TIDAL LEVEL AT ESTUARY :t=0,WL=1.524m(H.H.W.L)
(Consecutive Periodcal Discharge) (Data on the 7th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL. (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.342	141.856	2.857	140.243	3.082	139.325	5.155	138.771
1	2.345	140.176	2.853	139.413	3.078	138.795	5.160	140.113
2	2.347	139.368	2.850	138.926	3.076	138.646	5.167	141.686
3	2.346	139.388	2.849	138.883	3.076	138.912	5.175	143.350
4	2.342	139.840	2.850	139.288	3.077	139.573	5.183	144.978
5	2.337	140.423	2.851	140.060	3.080	140.559	5.191	146.462
6	2.332	141.033	2.853	141.091	3.084	141.767	5.197	147.719
7	2.329	141.674	2.856	142.273	3.089	143.087	5.203	148.691
8	2.327	142.369	2.860	143.512	3.094	144.414	5.207	149.344
9	2.327	143.105	2.865	144.724	3.099	145.658	5.209	149.662
10	2.329	143.797	2.869	145.833	3.104	146.743	5.210	149.645
11	2.335	144.228	2.874	146.779	3.109	147.612	5.210	149.303
12	2.344	144.267	2.878	147.463	3.113	148.219	5.207	148.655
13	2.357	144.426	2.882	147.875	3.116	148.535	5.204	147.727
14	2.367	145.158	2.886	148.045	3.118	148.561	5.199	146.546
15	2.372	146.304	2.889	148.032	3.119	148.323	5.193	145.149
16	2.373	147.407	2.890	147.846	3.119	147.844	5.185	143.590
17	2.371	148.133	2.890	147.453	3.118	147.138	5.177	141.951
18	2.366	148.372	2.888	146.823	3.115	146.215	5.169	140.356
19	2.361	148.150	2.885	145.960	3.111	145.103	5.162	138.957
20	2.355	147.542	2.880	144.901	3.105	143.856	5.156	137.908
21	2.350	146.618	2.874	143.713	3.099	142.555	5.152	137.334
22	2.344	145.405	2.868	142.484	3.093	141.298	5.150	137.300
23	2.341	143.822	2.862	141.306	3.087	140.195	5.151	137.804
0	2.342	141.876	2.857	140.259	3.082	139.340	5.155	138.781

Table 11-12-3(15) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION

LEBIR DAM DISCHARGE PATTERN CASE 1

TIDAL LEVEL AT ESTUARY :t=0, WL=0.762m(L.L.W.L)

(Consecutive Periodcal Discharge) (Data on the 6th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.348	143.517	2.860	140.147	3.083	139.199	5.154	138.712
1	2.339	142.727	2.855	139.537	3.079	138.749	5.160	140.058
2	2.331	141.902	2.851	139.218	3.076	138.675	5.559	141.898
3	2.324	141.145	2.848	139.226	3.075	138.985	5.175	143.302
4	2.320	140.519	2.847	139.563	3.076	139.647	5.183	144.934
5	2.320	139.886	2.847	140.194	3.078	140.601	5.190	146.421
6	2.325	139.187	2.849	141.039	3.082	141.755	5.197	147.681
7	2.334	138.974	2.854	142.019	3.087	143.008	5.203	148.656
8	2.342	139.720	2.859	143.103	3.093	144.271	5.207	149.312
9	2.348	141.235	2.865	144.272	3.099	145.478	5.209	149.632
10	2.351	143.008	2.872	145.452	3.105	146.567	5.210	149.617
11	2.351	144.651	2.877	146.533	3.110	147.473	5.210	149.277
12	2.351	145.997	2.881	147.416	3.114	148.140	5.207	148.631
13	2.351	147.014	2.885	148.040	3.117	148.531	5.204	147.704
14	2.351	147.713	2.887	148.376	3.119	148.630	5.199	146.525
15	2.351	148.099	2.888	148.416	3.119	148.437	5.192	145.130
16	2.532	148.127	2.888	148.165	3.118	147.961	5.185	143.572
17	2.354	147.638	2.886	147.629	3.116	147.221	5.177	141.935
18	2.359	146.569	2.884	146.808	3.113	146.239	5.169	140.341
19	2.366	145.473	2.882	145.730	3.109	145.052	5.162	138.942
20	2.371	144.885	2.879	144.505	3.104	143.733	5.156	137.895
21	2.370	144.724	2.875	143.268	3.099	142.390	5.152	137.322
22	2.366	144.660	2.871	142.111	3.094	141.137	5.150	137.288
23	2.358	144.247	2.866	141.084	3.089	140.072	5.151	137.792

Table 11-12-3(16) RESULT OF UNSTEADY FLOW ANALYSIS OF PUMPING STATION

LEBIR DAM DISCHARGE PATTERN CASE 4

TIDAL LEVEL AT ESTUARY :t=0.WL=0.672m(L.L.W.L)

(Consecutive Periodcal Discharge) (Data on the 7th Day)

P.S.	PASIR MAS. (15.0km)		LEMAL (20.0km)		SALOR (22.0km)		KEMUBU (33.0km)	
(HR)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)	W.L. (m)	Q (m^3/s)
0	2.349	143.622	2.860	140.234	3.084	139.280	5.155	138.771
1	2.340	142.825	2.855	139.619	3.080	138.825	5.160	140.113
2	2.331	141.994	2.851	139.295	3.077	138.747	5.167	141.686
3	2.325	141.240	2.848	139.298	3.076	139.052	5.175	143.350
4	2.320	140.601	2.847	139.631	3.076	139.711	5.183	144.978
5	2.320	139.963	2.847	140.258	3.079	140.660	5.191	146.462
6	2.325	139.260	2.850	141.099	3.082	141.811	5.197	147.719
7	2.334	139.041	2.854	142.075	3.087	143.059	5.203	148.692
8	2.343	139.783	2.859	143.155	3.093	144.319	5.207	149.344
9	2.348	141.294	2.866	144.321	3.099	145.523	5.209	149.662
10	2.351	143.063	2.872	145.497	3.105	146.608	5.210	149.645
11	2.352	144.703	2.877	146.575	3.111	147.511	5.210	149.303
12	2.351	146.045	2.882	147.455	3.115	148.175	5.207	148.655
13	2.351	147.058	2.885	148.076	3.118	148.564	5.204	147.727
14	2.351	147.754	2.887	148.409	3.119	148.660	5.199	146.546
15	2.351	148.138	2.888	148.446	3.119	148.465	5.193	145.149
16	2.352	148.162	2.888	148.194	3.118	147.987	5.185	143.590
17	2.354	147.671	2.887	147.655	3.116	147.244	5.177	141.951
18	2.359	146.599	2.885	146.832	3.113	146.261	5.169	140.356
19	2.366	145.501	2.882	145.752	3.109	145.073	5.162	138.957
20	2.371	144.910	2.879	144.525	3.104	143.752	5.156	137.908
21	2.371	144.747	2.875	143.287	3.099	142.408	5.152	137.334
22	2.366	144.622	2.871	142.129	3.094	141.153	5.150	137.300
23	2.358	144.267	2.866	141.101	3.089	140.088	5.151	137.804
0	2.349	143.641	2.860	140.250	3.084	139.295	5.155	138.781

TECHNICAL SPECIFICATION FOR TOPOGRAPHIC SURVEY

Technical Specification

Objective of the Works

The objective of the Works is to produce topographic maps required for the Feasibility Study. The location of the Site is shown in Exhibit - 1.

1. Scope of the Works

The Works comprise the following items:-

(1) to execute datum point surveys as horizontal control survey for each proposed mapping site which include determination of coordinates of datum points to be newly constructed and construction of monuments for the datum points.

(2) to execute main traversing in each proposed mapping site as horizontal control survey.

(3) to execute levelling as vertical control survey in each proposed mapping site for the new datum points, and the existing temporary bench marks.

(4) to execute filling in details or situation survey in each proposed mapping site.

(5) to carry out plotting and produce maps for each mapping site

(6) to carry out tracing of maps and prepare reports

(7) to execute river cross section survey in the river course downstream of the main dam.

(8) to execute determination of coordinates and ground heights of all the boring holes.

The Works comprise mapping for three (3) areas whose locations and estimated areas are shown in Exhibit 2. The locations of the river cross section survey are shown in the Exhibit-1. It should be understood, however, that the locations of the proposed mapping sites and river cross sections are shown approximately in the Exhibits and exact locations of them will be indicated by the Employer on the spot.

2. Datum Point Surveying & Construction of Monuments

2.1. Existing Datum Points to be referred to

The coordinates and elevations of the existing datum points and bench marks are shown in Tables-1 and 2 attached hereto.

2.2. Datum Points to be newly Constructed

Datum points to be newly constructed at each proposed mapping site are shown in Exhibit-2.

Monuments shall be made of concrete piles with a square cross-section of 15 cm x 15 cm or more and an appropriate length, and shall be driven in the ground and fixed with concrete to prevent movement. Foundations of the monuments shall be made from by cobble stone, etc. Special care should be taken for construction at the points of weak foundation.

2.3. Datum Point Surveying

Datum point surveying shall be executed by the Contractor in order to determine coordinates of newly constructed datum points. Methods of the surveying shall be traversing with use of transit and electro optical distance meter.

3. Main Traversing

3.1. The Contractor shall set out and measure a main traverse which will provide a basic skeleton for further surveying works in each proposed mapping site. The above mentioned datum points shall be determined of its coordinates by this main traversing.

3.2. North star or solar observation as the direction of reference shall be carried out at the starting point (known point: G060) and other adequate point in main traverse route.

3.3. Measuring the horizontal angle shall be by the two-pair observation. Ratio of closure of coordinates value shall be less than 1 : 20,000.

4. Primary, Secondary & Tertiary Traversing

4.1. The Contractor shall set out and measure primary, secondary and tertiary traversing from control point of the main traverse in accordance with local conditions for controls of further detailed surveying.

4.2. Nodal point in these travers route shall be selected as the supplementary control point for the topographical detail surveys. The supplementary control points shall be included more than one in a sheet (map scale: 1 : 500, sheet size 40 x 30 cm).

4.3. Marker of nodal point shall be made of wooden pillar with a square cross-section of 10 cm x 10 cm on more and an appropriate length, and shall be driven in the ground.

4.4. Measuring the horizontal angle and ratio of closure of coordinates value is to be made as follows.

Primary Traverse	Horizontal	2 pair	1/5,000
	Vertical	2 pair	
Secondary Traverse	Horizontal	2 pair	1/3,000
	Vertical	2 pair	
Tertiary Traverse	Horizontal	1 pair	1/2,000
	Vertical	1 pair	

5. Levelling

5.1. Reference shall be made to the existing datum points in direct levelling for vertical control of all the datum points to be newly constructed.

5.2. Levelling shall also be made in order to define height of each control points in the primary traverse and vertical control shall be made referring to the new datum points.

5.3. Levelling shall be made by reciprocating observations. The accuracy of levelling shall be made within 20 mm $\sqrt{S\ (km)}$.

5.4. Instruments to be used for levelling shall be Wild NKA 2 or equal.

5.5. Reading distance of levelling staff shall be within 70 m and reading unit shall be one (1) milimeter.

5.6. If a course of levelling (a streach between one datum point and another) becomes longer than 1 km, the Contractor shall construct a temporary bench mark(s) made of concrete at every 500 m interval.

6. River Cross Section Survey

6.1. The width of a cross section shall be principally 100 m from the river shore line on each bank, or upto 30 m high above the river bed, whichever smaller. However, the exact width shall be determined by the Employer's field supervisor on the spot.

6.2. The Contractor shall establish a bench mark at an appropriate location on both bank at every survey section as a control point. The Contractor shall execute levelling to define the height of the bench mark with reference to the existing bench mark.

6.3. The Contractor shall execute river cross section survey with due care of changes in slopes of the ground. The river shore lines should be defined. Sounding shall be taken with a sound rod or line on the stream.

The water level at the time of sounding shall be determined in relation to the graduated staff gauge at the Tualang gauging station. The date and time of the sounding shall be recorded and reported.

7. Topographic Detail Surveys

7.1. The Contractor shall carry out topographic detail surveys based on the above control points by longitudinal and cross-sectional survey, plane-table survey, etc. in accordance with the actual conditions of the site.

7.2. Contour line interval shall be 2 m distance at mapping scale 1:500. Necessary supplemental contour (1 m) shall not be omitted especially in case of very flat area.

7.3. Soundings shall be taken in surveying at the proposed mapping site of Dam area with a sounding rod or line.

The water level at the time of sounding shall be determined in relation to the graduated staff gauge at the Tualang gauging station. The date and time of the sounding shall be recorded and reported.

8. Plotting of Maps and River Cross Section

8.1. The Contractor shall describe the following matters into each maps.

(1) North direction

(2) Longitudinal and horizontal mesh (A tick shall be entered per every 50 m (10 cm on the map) on the neat line and cross mark shall be entered at every intersection of the 50 m grid lines).

(3) Location and height of the datum points and bench marks.

(4) Location and height of control points in main and supplemental traverses.

(5) Planimetric features such as, creek, stream, road, foot path, dry field, sand deposit, houses, etc. with adequate symbols.

8.2. The Contractor shall describe the following matters into each river cross section.

(1) Bench marks
(2) River profile (including river bottom) at the scales of 1:500 in horizontal and 1:100 in vertical directions.

(3) Water surface

(4) Boring holes, where exist (3 holes at Section No.9-d)

(5) Heights and horizontal distances of all surveyed points in the river cross sections.

9. Tracing of Maps and River Cross Sections

9.1. The Contractor shall carry out tracing, in ink, of maps and sections originally plotted, on polyester tracing film which shall be free from expansion and shirinkage in changes of humidity and temperature to an allowable extent.

10. Contractor's Working Program

The Contractor shall submit to the Employer, for his approval, his Working Program including descriptions of the sequence of Work, equipment, personnel and operator/labour to be employed, and rate of progress of the survey work well in advance min. two weeks before he starts his field operation.

11. Supervision of Work by the Employer

An Employer's field supervisor will supervise the Works. The supervision shall include inspection and examination of method of Works, workmanship and progress of Works.

12. Data to be submitted by the Contractor

12.1. Datum Point Survey including Levelling

(1) Survey net-work and route map

(2) Observation records
(distance, horizontal/vertical angle, levelling)

(3) Computation notes

(4) Final result table

(5) Point descriptions
This shall include the following information:
- name of point
- date of construction
- nade of azimuth point and angle
- sketch map of access to the point
- photos of the monument

(6) Working report

12.2. Topo Mapping

(1) Survey net-work and route map

(2) Observation records

(3) Computation notes

(4) Final results table

(5) Point descriptions of monument with photo

(6) The coordinate, heights of all boring holes

a. Main dam site	7
b. Saddle dam site	6
c. Quarry site	4
Total	17 holes

(7) Topographic Mapping (Scale 1:500)

a. Main dam site	1.9 km^2
b. Saddle dam site	0.4 km^2
c. Quarry site	0.9 km^2
Total	3.2 km^2

All on polyester tracing film.

(8) Original map drawings

(9) Working report

12.3. River Cross Section

(1) Survey net-work and route map

(2) Observation records
(distance, horizontal/vertical angle, levelling)

(3) Computation notes

(4) Final result table

(5) Point descriptions
This shall include the following information:
- name of point
- date of construction

- name of azimuth point and angle
- sketch map of access to the point
- photos of the monumenr

(6) Working report

(7) River cross section
- No.1 to No.26, No.9a to No.9d 30 sections
- scale vertical 1:100
  horizontal 1:500
- all on polyester tracing film

(8) Plan showing location of surveyed section on a 1/50,000 scale topo map

(9) Original section drawings

TECHNICAL SPECIFICATION FOR CORE DRILLING

Technical Specification of Core Drilling

(1) Location

The work sites are at the main dam site, two saddle dam sites, quarry site, borrow area and reregulating pondage site, as shown on the Location Maps attached hereto.

(2) Access to the Sites

The means of access from Tualang Bridge to the Main Dam Site and its surroundings is by motorized river boat along the Lebir River. The access from Kg. Lalok to the Saddle Dam (I), (II) Sites, Quarry Site and Borrow Area (A) is an existing logging road.

(3) Geologic Conditions of the Sites

Main Dam Site

Rocks underlying this site are "Green Rock Group" i.e. alternations of Shalstein, lapilli-tuff with andesitic lava, sandstone (quartzite) and clay-slate.

Saddle Dam Site (I) & (II)

Rocks underlying these sites are mainly tuff-breccia.

Quarry Site

Rocks beneath the site are "Green Rock Group" as observed at the Main Dam Site.

Borrow Area (A)

Rocks underlying the area are disintegrated granite.

Re-regulating Pondage

Rocks beneath the site are "Green Rock Group" as found at the Main Dam Site and the Quarry Site.

(4) Number of Core Drilling

	Location	No. of holes	Length (m)	Sub Total (m)
Main Dam site	Along dam center line	3	60, 70, 60	
	Along spillway line	3	60, 40, 30	
	Power-house site	1	20	340
Saddle Dam (I) site	Along dam center line	4	40, 40, 45, 40	165
Saddle Dam (II) site	Along dam center line	2	25, 25	50
Quarry site		4	40, 40, 40, 40	160
Borrow Area (A)		2	20, 20	40
Reregulating pondage	Along dam center line	3	10, 10, 10	30
Total		22		785

(5) Drilling bits to be used

Drilling bits of 66 mm size or NX type should be used for all rock portions. The Contractor shall attain as much a good core recovery as possible.

(6) Permeability Tests (Water Pressure Tests)

Permeability tests will be carried out in all drilled holes except the holes on the Quarry Sites and Borrow Area. An interval of testing should be five (5) meters as a rule. Water pressure for the testing should be regulated as follows:-

$$(kgf/cm^2)$$

$$0 \rightleftarrows 1 \rightleftarrows 2 \rightleftarrows 4 \rightleftarrows 6 \rightleftarrows 8 \rightleftarrows 10$$

Water levels in all drilled holes should be recorded every day before the start of daily work.

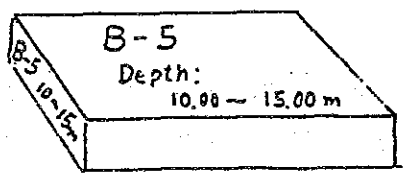
(7) Standard Penetration Tests

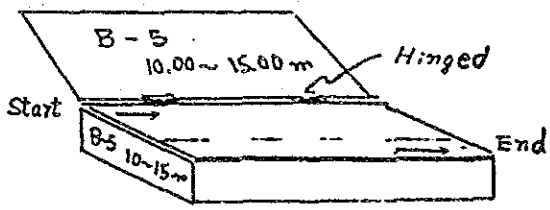
Standard penetration tests (S.P.T.) should be done every two (2) meters of depth in drilled holes at the Borrow Area (A).

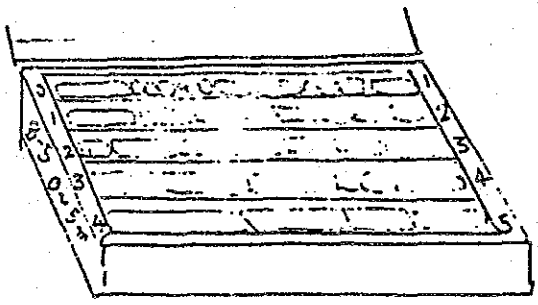
(8) Arrangement of drilled core

Drilled cores should be carefully arranged in core cases immediately after they are lifted from the underground.

The name (Number) of hole and depth should be described on the cover, back and both sides of case.







(9) Interface with seismic refraction works

Another contractor will carry out seismic refraction work at the Main Dam Site, Saddle Dam (I) and Quarry Site during the period from September 1987 to October 1987.

The drilling holes of D-1, D-4, Q-1, Q-2, Q-3, Q-4, S-1, S-2, S-3 and S-4 will be affected by the seismic refraction work.

The Contractor should establish his working program to avoid interface with the seismic refraction works problems as far as possible.

(10) Transportation of core boxes

The Contractor shall transport core boxes filled with drilled cores from time to time as instructed by the Employer to a core storage designated by the Employer.

(11) Contractor's working program

The Contractor shall submit to the Employer for his approval his working program including descriptions of the sequence of works, equipment, personnel and operator/labour to be employed, and rate of progress of the works well in advance before he starts his field operation.

(12) Supervision of works by the Employer

An Employer's field supervisor will supervise the works. The supervision shall include inspection and examination of method, qualities, workmanship and progress of works.

(13) Documents to be submitted by the Contractor

The Contractor shall submit to the Employer the following documents during and/or upon completion of the works;

(i) Geological log

The geological logs of drilled holes should be prepared in the following form.

Hole No.	Date
Location	Length (m)
Coordinates	Elevation of water level
Operator	Core inspector

Drilling and casing progress	Depth (m)	Graphic log	Geologic name	Rock grade	Core recovery (%) RQD	Water level	Description (Rock condition)	Permeability (Lugeon) test/ S.P.T.

(ii) Record of water level measurements in drill holes

The Contractor shall submit five (5) copies of report containing (i) and (ii) above upon the Completion of the Works.The report shall include photographs of drilling sites and of all core boxes filled with drilled cores, and records of the permeability test and S.T.P.

Attachment11-0-1 CHECK LIST OF JICA STUDY TEAM'S REACTION RE DOE'S COMMENT ON EIS FEB. 1988

DOE'S COMMENT	JICA STUDY TEAM'S REACTION
1.0 Effect on downstream water uses	
(a) Discharge of deoxygenated water from the dam will have detrimental effect on aquatic life.	Deoxygenated water, even if released from the dam, will be alleviated soon through aeration during flowing H_2S would be more detrimental on aquatic life, which should be obviated.
(b) Water discharged during power generation (70-80 cumecs) is not continuous throughout the day, and the nearest tributary which is Sg. Galas is some distance away. Sg. Lebir downstream of the proposed dam up to the confluence with Sg. Galas will not function like a normal river.	A re-regulating dam has been proposed to be provided at the site 3.3 km downstream from the dam to mitigate this effect. (refer to Section 11.12.3. of the Main Report)
(c) Increase in silt during the period of construction has not been predicted. Silt load increase in the river may have adverse impacts on fisheries and other aquatic life. Further studies should be done to find a solution to overcome these impacts.	A discussion has been made in Section 11.10. of the Main Report.
2.0 Relocation of settlers affected by dam impoundment	
(a) No definite plan for relocation of settlers have been mentioned in preliminary EIA. Hence, detail study should be carried out to outline the relocation and compensation plan/schedule.	This problem seems to be outwith of the scope of study by the JICA Study Team. A brief discussion has been made in Section 11.13.3. of the Main Report.
3.0 Forestry	
(a) Ample time should be allocated for Jabatan Hutan Negeri Kelantan to exploit the remaining forest resources based on the methods recommended (clear cutting and removal) in the preliminary EIA.	7 years will be allocated for this purpose.

DOE'S COMMENT	JICA STUDY TEAM'S REACTION
(b) Forest activities in watershed area after impoundment should be controlled/minimised to protect water quality in the lake. A map to mark the areas affected should be produced and made available to the parties concerned.	A discussion has been made in Section 12.6. of the Main Report.
(c) Further study should be carried out to formulate mitigating measures which could reduce eutrophication.	Refer to Section 12.6. of the Main Report.
4.0 Agriculture	
(a) Activities in the remaining 70% of existing agricultural land should be controlled to avoid surface runoff (chemicals/ fertilisers/silt). Farmers should be educated by the relevant authorities on proper farming methods to minimise the above impacts.	Environment training programmes of personnel concerned have been proposed in Section 12.6. of the Main Report.
(b) Vegetation surrounding the lake should be preserved as a buffer strip. The width of the strip should take into consideration of the surrounding terrain and in any case should not be less than 20 meter. This buffer can help filter eroded materials from entering the lake.	Refer to Section 12.6. of the Main Report.
(c) Sediment traps should be provided at all tributaries leading to the lake.	Refer to Section 12.6. of the Main Report.
(d) Future land development outside the gazetted area (if any) should also incorporate land preservation measures.	This will be an institutional problem.

DOE'S COMMENT	JICA STUDY TEAM'S REACTION
(e) For land development under FELCRA compensation are due to FELCRA and the individual landowners.	Refer to Section 12.6. of the Main Report.
5.0 Flora	
(a) A detailed scientific survey should be carried out prior to impoundment to identify /rescue species which may be of medicinal/commercial potential.	Refer to Section 12.6. of the Main Report.
6.0 Fauna	
(a) Proposed location of new habitats should be identified prior to impoundment.	Refer to Section 12.6. of the Main Report.
(b) Translocation cost must be included in the overall dam cost.	Refer to Section 11.14. of the Main Report.
(c) Adequate time should be allowed for wild animals to escape as the lake water level is rising. If necessary, animals should be driven towards the 'safe' area before impoundment takes place.	In a wet cycle year, the impoundment will be completed (upto EL. 80m) in 5 weeks.
7.0 Conclusion	
(a) JICA study team has not made it clear whether the project should go ahead based on the impacts predicted, or whether detail studies should be carried out before any recommendation is made.	JICA Study Team recommends this project be implemented. Please refer to Section 2.2. of the Main Report for the concluding remark.

DOE'S COMMENT	JICA STUDY TEAM'S REACTION
(b) There is a mention of flood mitigation programme in the lower reaches but details on impacts brought about by the Lebir Dam Proejct has not been analysed. Economic analysis alone is not sufficient to show that flood mitigation prospects will make the overall project more viable. Resettlement, destruction to surrounding environment and loss of habitat to wildlife are some of the issues which should also be considered.	Several studies have been made in Section 11.12.2., and counter-measures have been worked out in the Main Report.

DATA ON MEDICAL-ECOLOGY STUIED BY IMR

(at briefing in March 1988)

L.L.M. PROJECT - LEBIR DAM, KELANTAN

Summary - 17.8.87 - 27.8.87

Mosquito species	KESEDAR Lebir 1 (HBT - 4 nights)							KESEDAR Lebir 1 (RLC - 5 nights)							Remarks
	No. caught	No. dissected	Dilation				Infections	No. caught	No. dissected	Dilation				Infections	
			N	1	2	3				N	1	2	3		
Anopheles															
donaldi	3	3	2	1	-	-	-	2	2	1	1	-	-	-	
Mansonia															
dives	-	-	-	-	-	-	-	3	3	2	1	-	-	-	
Culex															
fuscocephalus	2	2	2	-	-	-	-	-	-	-	-	-	-	-	
gelidus	-	-	-	-	-	-	-	4	4	3	1	-	-	-	
quinquefasciatus	17	17	9	7	1	-	-	19	19	17	2	-	-	-	
sinensis	-	-	-	-	-	-	-	3	3	1	1	1	-	-	
tritaeniorhynchus	6	6	3	3	-	-	-	-	-	-	-	-	-	-	
Aedes															
albopictus	12	12	5	5	2	-	-	19	19	12	7	-	-	-	
lineatopennis	1	1	-	1	-	-	-	-	-	-	-	-	-	-	
niveus	1	1	1	-	-	-	-	10	10	4	6	-	-	-	
vexans	4	4	3	1	-	-	-	24	24	13	9	2	-	-	
Armigeres															
durhami	2	2	1	1	-	-	-	6	6	6	-	-	-	-	
Uranotenia sp.	1	1	-	1	-	-	-	-	-	-	-	-	-	-	
TOTAL:	49	49	26	20	3	-	-	90	90	59	28	3	-	-	

AAG/Tak.
10.9.1987

L.L.N. PROJECT - LEBIR DAM, KELANTAN

Summary - 17.8.87 - 27.8.87

Mosquito species	Kg. Jerusa Panjang (HBT - 2 nights)							Kg. Jerusa Panjang (HLC - 3 nights)							Remarks
	No. caught	No. dissected	Dilation				Infections	No. caught	No. dissected	Dilation				Infections	
			N	1	2	3				N	1	2	3		
Anopheles															
maculatus	2	2	-	1	1	-	-	11		1[illegible]	1	-	-	-	
donaldi	2	2	-	2	-	-	-	9	9	7	2	-	-	-	
Mansonia															
bonneae	1	1	-	1	-	-	-	4	4	2	1	1	-	-	
Armigeres															
durhami	1	1	1	-	-	-	-	-	-	-	-	-	-	-	
subalbatus	1	1	-	-	1	-	-	1	1	1	-	-	-	-	
Culex															
annulus	-	-	-	-	-	-	-	3	3	1	1	1	-	-	
golildus	1	1	-	1	-	-	-	5	5	2	3	-	-	-	
pseudovishnui	-	-	-	-	-	-	-	1	1	1	-	-	-	-	
quinquefasciatus	-	-	-	-	-	-	-	3	3	3	-	-	-	-	
tritaeniorhynchus	-	-	-	-	-	-	-	5	5	3	2	-	-	-	
Aedes															
albopictus	-	-	-	-	-	-	-	2	2	-	2	-	-	-	
niveus	-	-	-	-	-	-	-	1	-	-	-	-	-	-	
TOTAL:	8	8	1	5	2	-	-	45	[illegible]	[illegible]	1	2	-	-	

AAC/Tak.
10.9.87

Ae. aegypti larval survey at Kampongs in the Dam Project A
at Sg. Lebir, Kuala Krai, Kelantan (17.8.67-27.8.67)

Locality	No. of houses		No. of houses with					Indices				
	Examined	With collections	Aedes aegypti	Aedes albopictus	Culex quinquefasciatus	Armigeres spp.	Toxorhynchites spp.	Aedes aegypti	Aedes albopictus	Culex quinquefasciatus	Armigeres spp.	Toxorhynchites spp.
KESEDAR Lebir 1	170	46	-	30	5	2	2	-	17.6	2.8	1.2	1.2
Kg. Jeram Panjang	22	16	-	9	1	1	-	-	40.9	4.5	4.5	-
TOTAL:	192	62	-	39	4	3	2	-	58.5	6.3	5.7	1.2

AAG/Tak.

Intestinal Helminth Infections in Sg.Lebir Area, Kelantan - 17hb - 27hb Aug. 1987

	Total samples	Infections		
		ALO	TTO	HWO
No	503	246	310	170
%	-	48.9	61.6	33.8

Intestinal Protosoan Infections in Sg.Lebir Area, Kelantan - 17hb - 27hb Aug. 1987*

	Total samples	Infections	
		Amoebiasis	Giardiasis
No	160 *	26	15
%	-	16.3	9.4

* Not completed, Total samples ~ 500

LIST OF STREAMS SURVEYED FOR SNAIL INTERMEDIATE HOSTS OF SCHISTOSOMIASIS BY THE IMR AT SUNGAI LEBIR, KELANTAN FOR THE HYDROELECTRIC DAM PROJECT
17TH - 27TH AUGUST, 1987

Tributaries of Sg.Lebir, left upstream

1. Anak Sg. Dedah
2. Sg. Depak and tributary
3. Sg. Ma
4. Sg. Terong
5. Sg. Anak Miak
6. Sg. Lebir kecil
7. Anak Sg. Lebir Kecil
8. Sg. Kelinsar
9. Sg. Relak
10. Sg. Kecil
11. Sg. Antia

Tributaries of Sg.Lebir, right up stream

12. Sg. Cera
13-14 small streams, unnamed ~~anting~~, Sg.Lebir
15. Sg. Kelah
16. Sg. Lenggi-3 tributaries
17. Sg. Telon
18. Sg. Labut
19. Sg. Chalil - 3 tributaries
20. Sg. Lakit, tributary of Sg. Chalil
21. Sg. Anak Narong
22. Sg. Paloh
*23 Unnamed stream, above Sg.Paloh } tributaries of Sg.Relai

24. Sg. Jemlak
25. Sg. Pupot } tributaries of Sg. Aring

* Robertsiella sp. found in this stream.

Schistosome Infections in Sg.Lebir Area, Kelantan
17th - 27th Aug. 1987

	Stool for ova observation	Blood for ELISA	Blood for COPT
No of samples	503	273	40
No positive (%)	3 (0.6)	22 (8.1)	7
No borderline (%)	-	19 (7.0)	-

Villages in which there is Evidence of Schistosomasis Infections

Village	No of cases
Lebir (Malay)	9 (2 parasitologically confirmed)
Kg. Lenggi (Orang Asli)	13 (1 parasitologically confirmed)
Kg. Jeram Panjang (Malay)	1
Kg. Depak (Malay)	1
Kijang Bahagia (Malay)	1

Sungei Lebir Hydroelectric Scheme: Malaria and Filariasis Studies

A survey for malaria and filariasis was carried out among inhabitants of villages in the locality of the proposed Sungei Lebir Hydroelectric Dam Project in Kuala Krai, Kelantan, in August 1987. A total of 406 inhabitants (189 males and 217 females) from eight villages (Kampongs Sg. Lebir, Sg. Pandan, Miak, Betong, Jeram Panjang, Depak, Kijang Bahagia and Kpg. Orang Asli) were examined. The mean±S.D. age of the inhabitants was 20.53± 17.06 years. Only one (0.25%) person had malaria parasitaemia (*Plasmodium vivax* infection), with asexual and sexual counts of 2,960 and 40 per ul blood respectively. This subject was a 40 year old female from Kampong Jeram Panjang.

Serological studies using the enzyme-linked immunosorbent assay (ELISA) and indirect fluorescent antibody assay (IFA) with schizont antigens of *P.falciparum* (Gombak isolate 'A') were carried out on sera samples obtained from capillary blood. The IFA geometric mean titres (GMTs) were very low in all age-groups, the lowest (1.61±3.33) being in the youngest age-group, 0-4 years, and the highest (7.97±9.45) in those >= 40 years old. The mean GMT was 2.95±5.99 (Table 1). Only 26 out of 283 (9.19%) tested had a GMT > 1:40 (cut-off point for positive titre as determined from tests on 44 normal controls). The mean IFA GMT in Kampong Jeram Panjang (with the malaria subject) was 13.14±11.95 compared to 2.60±5.29 in the other seven villages. This difference is statistically significant ($t = 7.86$, $df = 281$, $P < 0.01$). ELISA optical density readings at 492 nm (OD492) were also very low in all age-groups, the lowest (0.21±0.10) being in the youngest age-group (0-4 years) and the highest (0.34±0.19) being in the age-group 35-39 years. The mean OD492 was 0.28±0.15. There were very few subjects with an OD492 reading >= 0.44 (mean ±3 SD OD492 readings of 44 normal controls), this being seen only in 37 out of 296 (12.5%) tested.

These serological findings are consistent with the low malaria endemicity in the area, as reflected in the low parasite rate (0.25%) and the low spleen rate in the age-group 2-9 years, this being 4.55% (2 out of 44). In view of the low transmission of the disease in the area, malaria will not be a problem if preventive measures like chemoprophylaxis of the labour force, residual spraying of houses, and personal protective measures like sleeping under mosquito nets are carried out. It will also be necessary to carry out periodic parasitological, seroepidemiological and entomological surveys at regular intervals to monitor the situation.

No filariasis infection was detected in the survey, and this disease is not expected to be a problem in the area.

Table 1

Results of the indirect fluorescent antibody assay (IFA) and enzyme-linked immunosorbent assay (ELISA) by age-groups, Lebir, Kuala Krai, Kelantan, 17-27 August 1987

Age-group (years)	IFA No. exam.	IFA No. Pos. (%)*	IFA GMT ±SD#	ELISA No. exam.	ELISA No. Pos. (%)+	ELISA Mean ±SD@
0-4	32	1(3.13)	1.61±3.33	31	0	0.21±0.10
5-9	49	0	1.35±2.50	54	1(1.85)	0.24±0.11
10-14	35	0	1.24±2.40	36	4(11.11)	0.24±0.14
15-19	9	0	2.28±5.14	10	2(20.0)	0.22±0.20
20-24	20	3(15.0)	4.16±6.53	20	1(5.0)	0.21±0.13
25-29	25	2(8.0)	4.04±5.39	26	8(30.77)	0.31±0.16
30-34	36	2(5.56)	2.98±5.97	40	5(12.50)	0.31±0.16
35-39	30	7(23.33)	7.72±9.32	31	7(22.58)	0.34±0.19
>= 40	47	11(23.40)	7.97±9.45	48	9(18.75)	0.32±0.15
Combined	283	26(9.19)	2.95±5.99	296	37(12.50)	0.28±0.15

* Titre > 1:40
# Geometric mean titre ± standard deviation
+ Optical density reading at 492 nm > 0.44
@ Meanc± standard deviation optical density reading at 492 nm

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