APPENDIX 14-2 – WATER BUDGET

MARSH HABITAT WATER BUDGET BASED ON MEAN MONTHLY RAINFALL OVER 1990-1999
SOURCE: HONG KONG OBSERVATORY DATA REFER TO KING'S PARK MONITORING STATION, KOWLOON.
Version 3.1: Prepared by T. Norman 7/6/2002 - (Based on Lok Ma Chau Station Budget Ver 3.3 - G. Tucker 17/9/2001)

***Cumulative balance is calculated by setting the water level to 0 at the end of the wet season**
and at the end of the period when soil is at field capacity (i.e after which monthly balances are in continual deficit for the dry season)
Water levels refer to above ground open water levels

Assumptions
Rainfall in at Lok Ma Chau is 65% of that at King's Park (according to Hong Kong Observatory isohyet data for 1961-90).
Evaporation rates do not significantly differ between King's Park Monitoring Station and Lok Ma Chau
Under wetland conditions evapotranspiration rates from open water, bare soil/mud and wetland vegetation are approximately equal and equal to observed monthly evaporation rates.
Predicted balances are based on potential evaporation rates and do not take into account reduced evaporation when soil water tables are low.
Wetland area is constant
Seepage rates are minimal
Storage pond is full at the end of the wet season
Water level changes below the soil surface have negligable effects (therefore specific yields when water levels drop below ground level are not taken into account)

Catchment area (ha.) =	**32.25**	
PM Area of permanent marsh (ha) =	**8**	
Catchment run-off coefficient =	**0.8**	
Storage pond area (ha)	**3.20**	**Approx**
Storage max water level set by sluice (mPD)	**3.75**	**Approx**
Storage pond volume (when full) (l)	**90,000,000**	**Approx**
Storage pond base level (mPD)	**1.80**	
Targets relative to max operating water level of Permanent marsh (mPD)	**3.75**	
Sluice level for seasonal marsh input	**3.40**	
SM Area of seasonal marsh (ha)	**2.00**	

A. Permanent marshland requirements

Month	King's Park Rainfall mm	Corrected Rainfall mm	Evaporation mm	Balance mm	Potential cumulative balance mm	Requirement to maintain level l	Requirement to maintain level l/day	Requirement to maintain level l/sec	Target level (below max) mm	Yield from change mm	Requirement for target mm	Requirement for target l	Requirement for target l/day	Requirement for target l/sec	Target water level mPD
Jul	437	284	151	134	0	-	-	-	**-50**	-100	0	-	-	-	**3.700**
Aug	466	303	147	156	156	-	-	-	**0**	-50	0	-	-	-	**3.750**
Sep	329	214	135	79	235	-	-	-	**0**	0	0	-	-	-	**3.750**
Oct	136	89	144	-55	179	4,427,520	147,584	1.71	**-50**	50	5	427,520	14,251	0.16	**3.700**
Nov	25	16	110	-94	86	7,495,960	241,805	2.80	**-100**	50	44	3,495,960	112,773	1.31	**3.650**
Dec	28	18	69	-50	35	4,028,240	129,943	1.50	**-150**	50	0.35	28,240	911	0.01	**3.600**
Jan	25	16	59	-42	-7	3,384,760	120,884	1.40	**-200**	50	0	-	-	-	**3.550**
Feb	73	47	65	-17	-24	1,371,280	44,235	0.51	**-250**	50	0	-	-	-	**3.500**
Mar	59	38	68	-30	-54	2,362,880	76,763	0.91	**-275**	25	5	362,880	12,096	0.14	**3.475**
Apr	168	109	66	44	-10	-	-	-	**-300**	25	0	-	-	-	**3.450**
May	240	156	111	45	35	-	-	-	**-300**	0	0	-	-	-	**3.450**
Jun	477	310	97	213	248	-	-	-	**-150**	-150	0	-	-	-	**3.600**
Total	2463.6	1601.3	1219.6			23,070,640					54	4,314,600			

B. Water available from Catchments

Month	FLW rainfall mm/month	Monthly balance mm/month	Runoff volume l
Jul	284	227	43,103,415.00
Aug	303	242	50,222,925.00
Sep	214	171	25,493,625.00
Oct	89	71	-
Nov	16	13	-
Dec	18	15	-
Jan	16	13	-
Feb	47	38	-
Mar	38	30	-
Apr	109	87	14,092,443.75
May	156	125	14,521,207.50
Jun	310	248	68,681,051.25
Total	**1,601**	**1,281**	**216,114,668**

C. Additional supply from storage pond

Month	Volume reqd to meet PM target l	Inputs Rainfall l	Runoff l	Losses evaporation l	Volume in storage pond l	Relative capcity	Approx. level below MOL m
Jul	-	9,092,928	43,103,415	4,816,000	**90,000,000**	100	-
Aug	-	9,696,960	50,222,925	4,713,600	90,000,000	100	-
Sep	-	6,843,200	25,493,625	4,313,600	90,000,000	100	-
Oct	427,520	2,833,792	-	4,604,800	90,000,000	100	-
Nov	3,495,960	515,216	-	3,513,600	87,601,472	98	0.1
Dec	28,240	590,304	-	2,201,600	81,307,128	90	0.3
Jan	-	527,696	-	1,881,600	79,667,592	89	0.3
Feb	-	1,515,488	-	2,064,000	78,313,688	87	0.4
Mar	362,880	1,218,048	-	2,163,200	77,765,176	86	0.4
Apr	-	3,497,520	14,092,444	2,099,200	76,457,144	85	0.4
May	-	4,983,264	14,521,208	3,542,400	90,000,000	100	-
Jun	-	9,928,464	58,681,051	3,113,600	90,000,000	100	-
Total	**4,314,600**	**51,242,880**	**216,114,668**	**39,027,200**			