

Table 14.2.5 Financial Statements (1)

PROFIT AND LOSS STATEMENT (UNIT: '000 US\$)								
	2007	2008	2009	2010	2011	2012	2013	2014
Operating Revenues	0.0	0.0	0.0	0.0	1,001.0	1,001.0	1,001.0	1,001.0
Operating Cost	0.0	5.9	0.5	230.8	244.0	244.0	244.0	244.0
Personnel	0.0	0.0	0.0	28.3	28.3	28.3	28.3	28.3
Operations, maintenance & repair	0.0	0.0	0.0	68.0	68.0	68.0	68.0	68.0
Administrations	0.0	0.0	0.0	5.7	5.7	5.7	5.7	5.7
Depreciation costs	0.0	5.9	0.5	128.8	142.0	142.0	142.0	142.0
Net Operating Income	0.0	-5.9	-0.5	-230.8	757.0	757.0	757.0	757.0
Non-operating Revenues	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest on deposit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-operating Expenses	0.0	18.8	22.9	435.7	510.0	459.5	402.3	337.8
Interest on long-term loans	0.0	9.6	9.8	219.5	206.1	190.3	174.4	158.6
Interest on short-term loans	0.0	9.1	13.1	216.1	303.9	269.2	227.9	179.2
Royalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income	0.0	-24.6	-23.4	-666.5	247.0	297.5	354.7	419.3
Retained Earnings	0.0	-24.6	-48.0	-714.5	-467.5	-170.0	184.7	604.0

CASH FLOW STATEMENT (Unit: '000US\$)								
	2007	2008	2009	2010	2011	2012	2013	2014
Cash Beginning		-70.3	-100.5	-1,662.6	-2,337.7	-2,070.8	-1,753.2	-1,378.5
Cash Inflow (excluding G. Funds)	210.8	18.8	4,600.5	-51.7	899.0	899.0	899.0	899.0
Net operating income	0.0	-5.9	-0.5	-230.8	757.0	757.0	757.0	757.0
Depreciation costs	0.0	5.9	0.5	128.8	142.0	142.0	142.0	142.0
Long-term loans	210.8	18.8	4,600.5	50.3	0.0	0.0	0.0	0.0
Interest on deposits	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cash Outflow (excluding G. Funds)	281.0	49.0	6,162.6	623.4	632.0	581.5	524.3	459.8
Investment	281.0	25.0	6,134.0	67.0	0.0	0.0	0.0	0.0
Repayment for long-term loans	0.0	5.3	5.7	120.7	122.0	122.0	122.0	122.0
Interest on long-term loans	0.0	9.6	9.8	219.5	206.1	190.3	174.4	158.6
Interest on short-term loans	0.0	9.1	13.1	216.1	303.9	269.2	227.9	179.2
Cash Inflow - Cash Outflow	-70.3	-30.3	-1,562.1	-675.1	267.0	317.6	374.7	439.3
Cash Ending	-70.3	-100.5	-1,662.6	-2,337.7	-2,070.8	-1,753.2	-1,378.5	-939.2
Cash excess	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cash shortage	-70.3	-100.5	-1,662.6	-2,337.7	-2,070.8	-1,753.2	-1,378.5	-939.2

BALANCE SHEET (UNIT: '000US\$)								
	2007	2008	2009	2010	2011	2012	2013	2014
(Assets)								
Current Assets	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cash & Deposit	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fixed Assets	281.0	300.1	6,433.6	6,371.8	6,229.7	6,087.7	5,945.7	5,803.7
Construction costs	281.0	306.0	6,440.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0
Accumulated depreciation	0.0	5.9	6.4	135.2	277.3	419.3	561.3	703.3
Net fixed assets	281.0	300.1	6,433.6	6,371.8	6,229.7	6,087.7	5,945.7	5,803.7
Total Assets	281.0	300.1	6,433.6	6,371.8	6,229.7	6,087.7	5,945.7	5,803.7
(Liabilities and capital)								
Liabilities	281.0	324.8	6,481.6	7,086.3	6,697.3	6,257.7	5,761.0	5,199.7
Current Liabilities (cross subsidy)	70.3	100.5	1,662.6	2,337.7	2,070.8	1,753.2	1,378.5	939.2
Fixed Liabilities (Long-term loan)	210.8	224.2	4,819.0	4,748.5	4,626.5	4,504.5	4,382.5	4,260.5
Capital	0.0	-24.6	-48.0	-714.5	-467.5	-170.0	184.7	604.0
Net Income After Tax	0.0	-24.6	-23.4	-666.5	247.0	297.5	354.7	419.3
Retained Earnings	0.0	-24.6	-48.0	-714.5	-467.5	-170.0	184.7	604.0
Total Liabilities and capital	281.0	300.1	6,433.6	6,371.8	6,229.7	6,087.7	5,945.7	5,803.7

FINANCIAL INDICATORS								
	2007	2008	2009	2010	2011	2012	2013	2014
Working Ratio (%)	-	-	-	-	10.2%	10.2%	10.2%	10.2%
Operating Ratio (%)	-	-	-	-	24.4%	24.4%	24.4%	24.4%
Rate of Return on Net Fixed Assets	-	-	-	-	12.2%	12.4%	12.7%	13.0%
Debt Service Coverage Ratio	-	-	-	-	2.7	2.9	3.0	3.2

2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0
244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0
28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3
68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0
0.0	0.0	16.8	85.1	161.4	247.0	335.7	433.7	541.8	661.2	792.9	938.2
0.0	0.0	16.8	85.1	161.4	247.0	335.7	433.7	541.8	661.2	792.9	938.2
264.8	182.3	111.0	95.6	80.3	76.2	72.1	68.1	64.1	60.1	56.0	52.0
142.7	126.8	111.0	95.6	80.3	76.2	72.1	68.1	64.1	60.1	56.0	52.0
122.1	55.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
492.2	574.7	662.8	746.5	838.1	927.8	1,020.6	1,122.6	1,234.8	1,358.2	1,493.9	1,643.2
1,096.2	1,670.9	2,333.7	3,080.1	3,918.3	4,846.1	5,866.7	6,989.3	8,224.0	9,582.2	11,076.1	12,719.3

2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
-939.2	-427.0	167.7	850.6	1,614.4	2,469.7	3,357.2	4,336.8	5,418.4	6,612.1	7,929.3	9,382.2
899.0	899.0	915.8	984.1	1,060.5	1,146.0	1,234.8	1,332.7	1,440.9	1,560.3	1,692.0	1,837.3
757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0
142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	16.8	85.1	161.4	247.0	335.7	433.7	541.8	661.2	792.9	938.2
386.8	304.3	233.0	220.3	205.2	258.5	255.2	251.1	247.1	243.1	239.0	235.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
122.0	122.0	122.0	124.6	124.9	182.4	183.0	183.0	183.0	183.0	183.0	183.0
142.7	126.8	111.0	95.6	80.3	76.2	72.1	68.1	64.1	60.1	56.0	52.0
122.1	55.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
512.2	594.7	682.8	763.8	855.3	887.5	979.6	1,081.6	1,193.8	1,317.2	1,452.9	1,602.2
-427.0	167.7	850.6	1,614.4	2,469.7	3,357.2	4,336.8	5,418.4	6,612.1	7,929.3	9,382.2	10,984.5
0.0	167.7	850.6	1,614.4	2,469.7	3,357.2	4,336.8	5,418.4	6,612.1	7,929.3	9,382.2	10,984.5
-427.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
0.0	167.7	850.6	1,614.4	2,469.7	3,357.2	4,336.8	5,418.4	6,612.1	7,929.3	9,382.2	10,984.5
0.0	167.7	850.6	1,614.4	2,469.7	3,357.2	4,336.8	5,418.4	6,612.1	7,929.3	9,382.2	10,984.5
5,661.7	5,519.7	5,377.6	5,235.6	5,093.6	4,951.6	4,809.6	4,667.5	4,525.5	4,383.5	4,241.5	4,099.5
6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0
845.3	987.3	1,129.4	1,271.4	1,413.4	1,555.4	1,697.4	1,839.5	1,981.5	2,123.5	2,265.5	2,407.5
5,661.7	5,519.7	5,377.6	5,235.6	5,093.6	4,951.6	4,809.6	4,667.5	4,525.5	4,383.5	4,241.5	4,099.5
5,661.7	5,687.4	6,228.2	6,850.0	7,563.3	8,308.7	9,146.3	10,085.9	11,137.6	12,312.8	13,623.7	15,083.9
4,565.5	4,016.5	3,894.5	3,769.9	3,645.0	3,462.6	3,279.6	3,096.6	2,913.6	2,730.6	2,547.6	2,364.6
427.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4,138.5	4,016.5	3,894.5	3,769.9	3,645.0	3,462.6	3,279.6	3,096.6	2,913.6	2,730.6	2,547.6	2,364.6
1,096.2	1,670.9	2,333.7	3,080.1	3,918.3	4,846.1	5,866.7	6,989.3	8,224.0	9,582.2	11,076.1	12,719.3
492.2	574.7	662.8	746.5	838.1	927.8	1,020.6	1,122.6	1,234.8	1,358.2	1,493.9	1,643.2
1,096.2	1,670.9	2,333.7	3,080.1	3,918.3	4,846.1	5,866.7	6,989.3	8,224.0	9,582.2	11,076.1	12,719.3
5,661.7	5,687.4	6,228.2	6,850.0	7,563.3	8,308.7	9,146.3	10,085.9	11,137.6	12,312.8	13,623.7	15,083.9

2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%
24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%
13.4%	13.7%	14.1%	14.5%	14.9%	15.3%	15.7%	16.2%	16.7%	17.3%	17.8%	18.5%
3.4	3.6	3.9	4.1	4.4	3.5	3.5	3.6	3.6	3.7	3.8	3.8

Table 14.2.5 Financial Statements (2)

PROFIT AND LOSS STATEMENT (UNIT: '000 US\$)								
	2027	2028	2029	2030	2031	2032	2033	2034
Operating Revenues	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0
Operating Cost	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0
Personnel	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3
Operations, maintenance & repair	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Administrations	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Depreciation costs	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Net Operating Income	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0
Non-operating Revenues	1,098.4	1,275.1	1,469.8	1,684.4	1,920.9	2,181.4	2,468.3	2,784.4
Interest on deposit	1,098.4	1,275.1	1,469.8	1,684.4	1,920.9	2,181.4	2,468.3	2,784.4
Non-operating Expenses	48.0	44.0	39.9	35.9	31.9	27.9	23.8	19.8
Interest on long-term loans	48.0	44.0	39.9	35.9	31.9	27.9	23.8	19.8
Interest on short-term loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Royalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income	1,807.5	1,988.2	2,186.9	2,405.5	2,646.0	2,910.5	3,201.5	3,521.6
Retained Earnings	14,526.8	16,515.0	18,701.9	21,107.4	23,753.4	26,663.9	29,865.4	33,387.0

CASH FLOW STATEMENT (Unit: '000US\$)								
	2027	2028	2029	2030	2031	2032	2033	2034
Cash Beginning	10,984.5	12,751.0	14,698.1	16,844.1	19,208.6	21,813.6	24,683.1	27,843.6
Cash Inflow (excluding G. Funds)	1,997.5	2,174.1	2,368.9	2,583.4	2,819.9	3,080.4	3,367.4	3,683.4
Net operating income	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0
Depreciation costs	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Long-term loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest on deposits	1,098.4	1,275.1	1,469.8	1,684.4	1,920.9	2,181.4	2,468.3	2,784.4
Cash Outflow (excluding G. Funds)	231.0	227.0	222.9	218.9	214.9	210.9	206.8	202.8
Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Repayment for long-term loans	183.0	183.0	183.0	183.0	183.0	183.0	183.0	183.0
Interest on long-term loans	48.0	44.0	39.9	35.9	31.9	27.9	23.8	19.8
Interest on short-term loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cash Inflow - Cash Outflow	1,766.5	1,947.2	2,145.9	2,364.5	2,605.0	2,869.5	3,160.5	3,480.6
Cash Ending	12,751.0	14,698.1	16,844.1	19,208.6	21,813.6	24,683.1	27,843.6	31,324.2
Cash excess	12,751.0	14,698.1	16,844.1	19,208.6	21,813.6	24,683.1	27,843.6	31,324.2
Cash shortage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

BALANCE SHEET (UNIT: '000US\$)								
	2027	2028	2029	2030	2031	2032	2033	2034
(Assets)								
Current Assets	12,751.0	14,698.1	16,844.1	19,208.6	21,813.6	24,683.1	27,843.6	31,324.2
Cash & Deposit	12,751.0	14,698.1	16,844.1	19,208.6	21,813.6	24,683.1	27,843.6	31,324.2
Fixed Assets	3,957.4	3,815.4	3,673.4	3,531.4	3,389.4	3,247.3	3,105.3	2,963.3
Construction costs	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0
Accumulated depreciation	2,549.6	2,691.6	2,833.6	2,975.6	3,117.6	3,259.7	3,401.7	3,543.7
Net fixed assets	3,957.4	3,815.4	3,673.4	3,531.4	3,389.4	3,247.3	3,105.3	2,963.3
Total Assets	16,708.4	18,513.6	20,517.5	22,740.0	25,203.0	27,930.5	30,949.0	34,287.5
(Liabilities and capital)								
Liabilities	2,181.6	1,998.6	1,815.6	1,632.6	1,449.6	1,266.6	1,083.6	900.6
Current Liabilities (cross subsidy)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fixed Liabilities (Long-term loan)	2,181.6	1,998.6	1,815.6	1,632.6	1,449.6	1,266.6	1,083.6	900.6
Capital	14,526.8	16,515.0	18,701.9	21,107.4	23,753.4	26,663.9	29,865.4	33,387.0
Net Income After Tax	1,807.5	1,988.2	2,186.9	2,405.5	2,646.0	2,910.5	3,201.5	3,521.6
Retained Earnings	14,526.8	16,515.0	18,701.9	21,107.4	23,753.4	26,663.9	29,865.4	33,387.0
Total Liabilities and capital	16,708.4	18,513.6	20,517.5	22,740.0	25,203.0	27,930.5	30,949.0	34,287.5

FINANCIAL INDICATORS								
	2027	2028	2029	2030	2031	2032	2033	2034
Working Ratio (%)	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%
Operating Ratio (%)	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%
Rate of Return on Net Fixed Assets	19.1%	19.8%	20.6%	21.4%	22.3%	23.3%	24.4%	25.5%
Debt Service Coverage Ratio	3.9	4.0	4.0	4.1	4.2	4.3	4.3	4.4

2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0
244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0
28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3
68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0
3,132.4	3,515.7	3,937.7	4,402.3	4,914.5	5,478.4	6,116.0	6,817.5	7,589.1	8,438.0	9,371.7	10,398.7
3,132.4	3,515.7	3,937.7	4,402.3	4,914.5	5,478.4	6,116.0	6,817.5	7,589.1	8,438.0	9,371.7	10,398.7
15.8	11.8	7.7	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.8	11.8	7.7	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3,873.7	4,261.0	4,687.0	5,155.4	5,671.5	6,235.5	6,873.0	7,574.5	8,346.2	9,195.0	10,128.7	11,155.8
37,260.6	41,521.6	46,208.5	51,364.0	57,035.5	63,270.9	70,143.9	77,718.5	86,064.6	95,259.6	105,388.3	116,544.1

2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
31,324.2	35,156.9	39,376.9	44,022.9	49,145.2	54,784.3	61,159.9	68,174.9	75,891.5	84,379.7	93,716.7	103,987.4
4,031.5	4,414.7	4,836.7	5,301.3	5,813.6	6,377.5	7,015.0	7,716.5	8,488.2	9,337.0	10,270.7	11,297.8
757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0
142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3,132.4	3,515.7	3,937.7	4,402.3	4,914.5	5,478.4	6,116.0	6,817.5	7,589.1	8,438.0	9,371.7	10,398.7
198.8	194.8	190.7	179.0	174.5	1.9	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183.0	183.0	183.0	175.1	174.4	1.9	0.0	0.0	0.0	0.0	0.0	0.0
15.8	11.8	7.7	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3,832.7	4,220.0	4,646.0	5,122.3	5,639.1	6,375.6	7,015.0	7,716.5	8,488.2	9,337.0	10,270.7	11,297.8
35,156.9	39,376.9	44,022.9	49,145.2	54,784.3	61,159.9	68,174.9	75,891.5	84,379.7	93,716.7	103,987.4	115,285.1
35,156.9	39,376.9	44,022.9	49,145.2	54,784.3	61,159.9	68,174.9	75,891.5	84,379.7	93,716.7	103,987.4	115,285.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
35,156.9	39,376.9	44,022.9	49,145.2	54,784.3	61,159.9	68,174.9	75,891.5	84,379.7	93,716.7	103,987.4	115,285.1
35,156.9	39,376.9	44,022.9	49,145.2	54,784.3	61,159.9	68,174.9	75,891.5	84,379.7	93,716.7	103,987.4	115,285.1
2,821.3	2,679.3	2,537.2	2,395.2	2,253.2	2,111.2	1,969.2	1,827.2	1,685.1	1,543.1	1,401.1	1,259.1
6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0
3,685.7	3,827.7	3,969.8	4,111.8	4,253.8	4,395.8	4,537.8	4,679.8	4,821.9	4,963.9	5,105.9	5,247.9
2,821.3	2,679.3	2,537.2	2,395.2	2,253.2	2,111.2	1,969.2	1,827.2	1,685.1	1,543.1	1,401.1	1,259.1
37,978.2	42,056.1	46,560.1	51,540.4	57,037.5	63,271.1	70,144.1	77,718.6	86,064.8	95,259.8	105,388.5	116,544.2
717.6	534.6	351.6	176.5	2.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
717.6	534.6	351.6	176.5	2.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
37,260.6	41,521.6	46,208.5	51,364.0	57,035.5	63,270.9	70,143.9	77,718.5	86,064.6	95,259.6	105,388.3	116,544.1
3,873.7	4,261.0	4,687.0	5,155.4	5,671.5	6,235.5	6,873.0	7,574.5	8,346.2	9,195.0	10,128.7	11,155.8
37,260.6	41,521.6	46,208.5	51,364.0	57,035.5	63,270.9	70,143.9	77,718.5	86,064.6	95,259.6	105,388.3	116,544.1
37,978.2	42,056.1	46,560.1	51,540.4	57,037.5	63,271.1	70,144.1	77,718.6	86,064.8	95,259.8	105,388.5	116,544.2

2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046
10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%	10.2%
24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%
26.8%	28.3%	29.8%	31.6%	33.6%	35.9%	38.4%	41.4%	44.9%	49.1%	54.0%	60.1%
4.5	4.6	4.7	5.0	5.2	476.6	-	-	-	-	-	-

Table 14.2.5 Financial Statements (3)

PROFIT AND LOSS STATEMENT (UNIT: '000 US\$)								
	2047	2048	2049	2050	2051	2052	2053	2054
Operating Revenues	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0	1,001.0
Operating Cost	244.0	244.0	244.0	244.0	244.0	244.0	244.0	244.0
Personnel	28.3	28.3	28.3	28.3	28.3	28.3	28.3	28.3
Operations, maintenance & repair	68.0	68.0	68.0	68.0	68.0	68.0	68.0	68.0
Administrations	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
Depreciation costs	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Net Operating Income	757.0	757.0	757.0	757.0	757.0	757.0	757.0	757.0
Non-operating Revenues	11,528.5	12,771.3	14,138.3	15,642.0	17,296.1	19,075.0	21,031.7	23,184.1
Interest on deposit	11,528.5	12,771.3	14,138.3	15,642.0	17,296.1	19,075.0	21,031.7	23,184.1
Non-operating Expenses	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest on long-term loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest on short-term loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Royalty	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Income	12,285.5	13,528.3	14,895.3	16,399.1	17,646.5	19,425.4	21,382.1	23,534.5
Retained Earnings	128,829.6	142,357.9	157,253.2	173,652.3	191,298.8	210,724.1	232,106.2	255,640.8

CASH FLOW STATEMENT (Unit: '000US\$)								
	2047	2048	2049	2050	2051	2052	2053	2054
Cash Beginning	115,285.1	127,712.7	141,383.0	156,420.4	172,961.4	190,750.0	210,317.3	231,841.5
Cash Inflow (excluding G. Funds)	12,427.6	13,670.3	15,037.3	16,541.1	17,788.5	19,567.4	21,524.1	23,676.5
Net operating income	757.0	757.0	757.0	757.0	350.4	350.4	350.4	350.4
Depreciation costs	142.0	142.0	142.0	142.0	142.0	142.0	142.0	142.0
Long-term loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest on deposits	11,528.5	12,771.3	14,138.3	15,642.0	17,296.1	19,075.0	21,031.7	23,184.1
Cash Outflow (excluding G. Funds)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Repayment for long-term loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest on long-term loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Interest on short-term loans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cash Inflow - Cash Outflow	12,427.6	13,670.3	15,037.3	16,541.1	17,788.5	19,567.4	21,524.1	23,676.5
Cash Ending	127,712.7	141,383.0	156,420.4	172,961.4	190,750.0	210,317.3	231,841.5	255,518.0
Cash excess	127,712.7	141,383.0	156,420.4	172,961.4	190,750.0	210,317.3	231,841.5	255,518.0
Cash shortage	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

BALANCE SHEET (UNIT: '000US\$)								
	2047	2048	2049	2050	2051	2052	2053	2054
(Assets)								
Current Assets	127,712.7	141,383.0	156,420.4	172,961.4	190,750.0	210,317.3	231,841.5	255,518.0
Cash & Deposit	127,712.7	141,383.0	156,420.4	172,961.4	190,750.0	210,317.3	231,841.5	255,518.0
Fixed Assets	1,117.1	975.0	833.0	691.0	549.0	407.0	264.9	122.9
Construction costs	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0	6,507.0
Accumulated depreciation	5,389.9	5,532.0	5,674.0	5,816.0	5,958.0	6,100.0	6,242.1	6,384.1
Net fixed assets	1,117.1	975.0	833.0	691.0	549.0	407.0	264.9	122.9
Total Assets	128,829.8	142,358.0	157,253.4	173,652.4	191,298.9	210,724.3	232,106.4	255,640.9
(Liabilities and capital)								
Liabilities	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Current Liabilities (cross subsidy)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fixed Liabilities (Long-term loan)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Capital	128,829.6	142,357.9	157,253.2	173,652.3	191,298.8	210,724.1	232,106.2	255,640.8
Net Income After Tax	12,285.5	13,528.3	14,895.3	16,399.1	17,646.5	19,425.4	21,382.1	23,534.5
Retained Earnings	128,829.6	142,357.9	157,253.2	173,652.3	191,298.8	210,724.1	232,106.2	255,640.8
Total Liabilities and capital	128,829.8	142,358.0	157,253.4	173,652.4	191,298.9	210,724.3	232,106.4	255,640.9

FINANCIAL INDICATORS								
	2047	2048	2049	2050	2051	2052	2053	2054
Working Ratio (%)	10.2%	10.2%	10.2%	10.2%	17.2%	17.2%	17.2%	17.2%
Operating Ratio (%)	24.4%	24.4%	24.4%	24.4%	41.0%	41.0%	41.0%	41.0%
Rate of Return on Net Fixed Assets	67.8%	77.6%	90.9%	-	-	-	-	-
Debt Service Coverage Ratio	-	-	-	-	-	-	-	-

2055	2056	2057	2058	2059
1,001.0	1,001.0	1,001.0	1,001.0	1,001.0
244.0	244.0	244.0	244.0	244.0
28.3	28.3	28.3	28.3	28.3
68.0	68.0	68.0	68.0	68.0
5.7	5.7	5.7	5.7	5.7
142.0	142.0	142.0	142.0	142.0
757.0	757.0	757.0	757.0	757.0
25,551.8	28,156.2	31,021.1	34,172.4	37,638.9
25,551.8	28,156.2	31,021.1	34,172.4	37,638.9
0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
25,902.2	28,506.6	31,371.5	34,522.8	37,989.3
281,542.9	310,049.5	341,421.0	375,943.8	413,933.1

2055	2056	2057	2058	2059
255,518.0	281,562.2	310,210.8	341,724.3	376,389.1
26,044.2	28,648.6	31,513.5	34,664.8	38,131.3
350.4	350.4	350.4	350.4	350.4
142.0	142.0	142.0	142.0	142.0
0.0	0.0	0.0	0.0	0.0
25,551.8	28,156.2	31,021.1	34,172.4	37,638.9
0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0
26,044.2	28,648.6	31,513.5	34,664.8	38,131.3
281,562.2	310,210.8	341,724.3	376,389.1	414,520.4
281,562.2	310,210.8	341,724.3	376,389.1	414,520.4
0.0	0.0	0.0	0.0	0.0

2055	2056	2057	2058	2059
281,562.2	310,210.8	341,724.3	376,389.1	414,520.4
281,562.2	310,210.8	341,724.3	376,389.1	414,520.4
-19.1	-161.1	-303.1	-445.2	-587.2
6,507.0	6,507.0	6,507.0	6,507.0	6,507.0
6,526.1	6,668.1	6,810.1	6,952.2	7,094.2
-19.1	-161.1	-303.1	-445.2	-587.2
281,543.1	310,049.7	341,421.1	375,943.9	413,933.2
0.2	0.2	0.2	0.2	0.2
0.0	0.0	0.0	0.0	0.0
0.2	0.2	0.2	0.2	0.2
281,542.9	310,049.5	341,421.0	375,943.8	413,933.1
25,902.2	28,506.6	31,371.5	34,522.8	37,989.3
281,542.9	310,049.5	341,421.0	375,943.8	413,933.1
281,543.1	310,049.7	341,421.1	375,943.9	413,933.2

2055	2056	2057	2058	2059
17.2%	17.2%	17.2%	17.2%	17.2%
41.0%	41.0%	41.0%	41.0%	41.0%
-	-	-	-	-
-	-	-	-	-

Table 14.2.6 Financial Indicators

Year	Working Ratio	Operating Ratio	Rate of Return on Net Fixed Assets	Debt Service Coverage Ratio
2010	—	—	—	—
2011	10.2%	24.4%	12.2%	2.7
2012	10.2%	24.4%	12.4%	2.9
2013	10.2%	24.4%	12.7%	3.0
2014	10.2%	24.4%	13.0%	3.2
2015	10.2%	24.4%	13.4%	3.4
2016	10.2%	24.4%	13.7%	3.6
2017	10.2%	24.4%	14.1%	3.9
2018	10.2%	24.4%	14.5%	4.1
2019	10.2%	24.4%	14.9%	4.4
2020	10.2%	24.4%	15.3%	3.5

Table 14.2.7 Expenditure of Terminal Operator

(1000US\$)

Year	Investment	Operation & maintenance	Loan re-payment	Concession fee	Total
2007	172				171
2008	4,926		37		4,963
2009	8,615		1,104		9,719
2010	700	1,606	2,907	1001	6,214
2011	0	1,606	2,881	1001	5,487
2012	0	1,606	2,694	1001	5,300
2013	0	1,606	2,506	1001	5,113
2014	10	1,606	2,319	1001	4,935
2015	487	1,606	2,131	1001	5,225
2016	720	1,606	1,944	1001	5,271
2017	63	1,606	1,757	1001	4,426
2018	0	1,606	1,554	1001	4,161
2019	24	1,606	941	1001	3,571
2020	1,147	1,606	79	1001	3,833

Table 14.2.8 Revenue of Terminal Operator

Year	Container(1000US\$)	Break Bulk(1000US\$)	Wharfage(1000US\$)	Total(1000US\$)
2010	3,818	1,040	31	4,889
2011	4,200	1,142	37	5,379
2012	4,582	1,243	42	5,867
2013	4,964	1,344	47	6,355
2014	5,345	1,446	53	6,844
2015	5,750	1,547	58	7,355
2016	5,750	1,547	58	7,355
2017	5,750	1,547	58	7,355
2018	5,750	1,547	58	7,355
2019	5,750	1,547	58	7,355
2020	5,750	1,547	58	7,355

Note: Container handling charge: 1 TEU: 50US\$

Break bulk cargo handling charge: 31US\$/MT

Wharfage for barge: Capacity * 10PT

Table 14.2.9 Calculation of FIRR

Year	Total Revenue	Total Expenditur	Difference	Present value	Discount rate
2007		171	-171	-171	1.000
2008		4,963	-4,963	-4,407	0.888
2009		9,719	-9,719	-7,662	0.788
2010	4,889	6,214	-1,325	-927	0.700
2011	5,379	5,487	-108	-67	0.622
2012	5,867	5,290	577	318	0.552
2013	6,355	5,113	1,242	609	0.490
2014	6,844	4,935	1,909	831	0.435
2015	7,355	5,220	2,135	825	0.386
2016	7,355	5,240	2,115	725	0.343
2017	7,355	4,420	2,935	894	0.305
2018	7,355	4,161	3,194	864	0.270
2019	7,355	3,571	3,784	908	0.240
2020	7,355	3,825	3,530	752	0.213
2051	7,355	9,498	-2,143	-11	0.005
2052	7,355	3,202	4,153	20	0.005
2053	7,355	2,607	4,748	20	0.004
2054	7,355	2,617	4,738	18	0.004
2055	7,355	3,094	4,261	14	0.003
2056	7,355	3,327	4,028	12	0.003
2057	7,355	2,670	4,685	12	0.003
2058	7,355	2,607	4,748	11	0.002
2059	7,355	2,607	4,748	10	0.002
Total =				0.00	

FIRR = 12.6%

Chapter 15 Environmental Impact Assessment (EIA)

15.1 Introduction

National environmental law of Egypt, known as Law No. 4 of 1994 (Law No.4/1994) and its executive regulations and other annexes, comprehensively defines the environmental impact assessment (EIA) and environmental authorization process of development projects in Egypt. Moreover, this law (No.4/1994) established EEAA (Egyptian Environmental Affairs Agency), under the Prime Ministers` cabinet, as the governmental authority for evaluation and approval of EIA studies. Also this law specifies the project activities subjected to mandatory EIA, which include development projects located along the Nile River, its branches and main canals. Accordingly, EIA studies were conducted for the 2 significant new project components of the short-term development plan, with the target year of 2010, of this master plan (2020) conforming the EIA Guidelines of EEAA.

Two separate EIA studies for each project components were conducted during the short-term development plan study stage of June–Oct. 2002 in consideration to their distinct geographic locations of Alexandria (Mediterranean coastal area) and Boulin (Nile Delta area). Both EIA studies were carried out with the assistance of 2 separate multi-disciplinary study teams organized under the leadership of Environment and Climate Research Institute (ECRI) of the National Water Research Center (NWRC).

15.2 Project Components of EIA Study

There are three major project components envisaged in the short-term development plan to improve the inland waterway transport system in the Nile Delta area. They are improvement of the Maritime Lock of the Nubaria canal link to the Alexandria port (Alexandria Project), construction of a public river port (container cum break-bulk cargo terminal) at Arther El Nabi in Cairo and provision of new connection navigation canal in Boulin to facilitate direct navigation between Nubaria canal and Rosetta branch of Nile River (Boulin Project). These projects are described in details in Chapter 13.

Of these 3 projects only 2 projects, namely, Alexandria Project and Boulin Project are targeted for the EIA Study as new projects. The public river port project at Arther El Nabi is considered as an on-going project since it is only an improvement to the already planned container terminal at the same location by RTA. RTA has already carried out the EIA study for this container terminal project very recently in 2000. Accordingly, this project is not targeted for the conduct of EIA as also noted in Section 12.4 of Chapter 12.

15.3 Contents of EIA Reports

EIA Reports of both EIA Studies of Alexandria Project and Boulin Project are organized having similar formats with 10 chapters followed with list of references and appendices. The appendices contain, among others, detailed data, analytical methods and curriculum vitae of experts conducted the EIA studies. The 10 chapters of both EIA reports are given below.

1. Introduction (Chapter 1)
2. Executive Summary (Chapter 2)
3. Legal, Policy and Administrative Framework (Chapter 3)
4. Project Description (Chapter 4)
5. Baseline Environmental Condition (Chapter 5)
6. Assessment of Environmental Impacts (Chapter 6)
7. Environmental Impact Statement (Chapter 7)
8. Mitigation Management Plan (Chapter 8)
9. Monitoring Plan (Chapter 9)
10. Conclusion (Chapter 10)

15.4 Findings of EIA Studies

The most significant long-term environmental benefit of the waterway transport system development with barges that would be realized consequent to the implementation of both projects is the reduction in the emission of GHG (greenhouse gas) and other air pollutants in comparison to that of road-based trucks due to the high energy efficiency of water transport as also pointed out in Section 12.1 of Chapter 12. Still, as described in details in Section 12.3.2 of Chapter 12, the potential long-term adverse effects consequent to the implementation of both projects also include navigational safety concern and proper management of wastes arising from barge operation. Navigational safety measures are principally composed of restriction on the transport of dangerous cargo and regular conduct of bathymetric survey, while the most significant aspect of waste management is proper handling of oily (bilge) wastes and solid wastes of barge operation. All these measures need to be regulated and implemented by RTA. Moreover, the proposed environmental mitigation management plans of Alexandria Project and Boulin Project as identified by the EIA Studies are given in APPENDIX 15-I. Finally, the other most significant aspects on the findings of EIA studies of each project are summarized below.

(1) Alexandria Project

The most significant construction activity related environmental issue of the project is the management of potentially contaminated dredged material derived in the port waters of Maritime Lock. It is noted that in overall, based on the sampling and analysis results

of sediment quality as illustrated in Section 5.4.2 of Chapter 5, the seabed material of this Maritime Lock area is evaluated as potentially contaminated with respect to the 3 heavy metallic elements of copper (Cu), nickel (Ni) and mercury (Hg).

Even though the total quantity of dredged material is about 10,000 m³, quantity accounting for about 50% is derived from deeper layers at depth of more than 3.5 m, which is composed of hard stone deposits. This deeper hard stone deposits is classified as non-contaminated and hence need not be subjected to any controlled management measures. The mostly top seabed surface layer dredged materials of about 5000 m³ is the maximum quantity that should be classified as contaminated and hence subjected to controlled management measures. Still the quantity involved is not that high. Accordingly it is proposed to store this contaminated dredged material permanently in a controlled manner in a designated nearby desert area.

It is also noted that potential encounter with archeological treasures in the process of this dredging work is considered as highly improbable. This is in consideration to no historical records on past encounter with archeological treasures in the Nubaria Canal area of the Maritime Lock and also the limited extent of area targeted for dredging (maximum of 100m length and 50m width). Even though Alexandria area is well known for its archeological treasures most past offshore encounters were in the fishing port coastal waters adjacent to the city center of Alexandria.

(2) Boulin Project

1) Pre-construction and construction stages

The most significant pre-construction activity related environmental issue of the project is the social aspects of inherent acquisition of agricultural lands. In this respect the required minimum lands for the widening of the Boulin Canal is determined as 25,000m² or about 6 Feddans (1 Feddan, a conventional Egyptian land area measurement unit, is 4200m²). This agricultural land area though in itself is not that large, still the number of affected farmers is identified as quite significant since most farmers cultivate very small plots. In this respect assuming that a land width of 100m to both sides of the Boulin Canal would be the maximum land area either directly or indirectly affected at least during the construction stage of the project, the number of potentially affected farmers is estimated at about 85 farmland owners and about 50 farmland renters. Still it is noted that this total number of 135 affected farmers cultivate a total land area of about 240,000m² or about 60 Feddans, which is 10 times the required minimum permanent land acquisition area of 6 Feddans. Nevertheless, it is recommended that farmers permanently disposed of their land be provided with alternative farmland in newly developed agricultural land in addition to reasonable monetary compensation, while those temporarily disposed of their land during the construction period be given adequate compensation for lost production determined

based on the annual agricultural production value and land sale value as customary in Egypt.

The dredged material and excavated surplus soil due to the construction works of canal widening and deepening, even though evaluated as not contaminated (ref. Section 5.4.2 of Chapter 5) and hence not subjected to any controlled management measures, in consideration to the favorable property of silt clay, is amenable for beneficial uses such as brick making and as soil conditioner for the development of new agricultural lands in desert areas. Accordingly, beneficial use for the dredged material and surplus soil is recommended.

Moreover, in consideration to past non-encounter with any archeological treasures in Boulin area and its surroundings and also to the long history of anthropogenic agricultural interference of this Nile Delta area, it is postulated as highly improbable to encounter with any archeological treasures consequent to the dredging and excavation works.

2) Operation (post construction) stage

The current average discharge through the Boulin Canal is estimated at about 30 m³/sec (ref. Section 13.5.2 of Chapter 13). With the conversion of this canal as navigation canal consequent to this project, discharge through the canal would occur both via the navigation lock (New Boulin Lock), only when the lock is open to facilitate passage of a barge but the discharge could not be regulated (unregulated discharge), and via the new barrage adjacent to the navigation lock, the discharge of which could be regulated (regulated discharge).

It is considered that consequent to the navigation of barges through this New Boulin Lock as long as the average discharge through the canal could be maintained as of the current discharge of 30 m³/sec, then the project has no long-term operational interference with irrigation water use. In fact the maximum total unregulated discharge with the maximum possible barge passage through the new lock is determined at about 3.6 m³/sec that accounts for only 12% of the current average discharge (ref. Section 13.5.2 of Chapter 13). Accordingly, it is concluded that the total discharge through the canal could be regulated so as not to exceed the current discharge using the new barrage even under the condition of maximum operational capacity of the New Boulin Lock.

15.5 Conclusion and Recommendation

15.5.1 Conclusion

It is evident that the implementation of both of the projects that facilitates modal shift in cargo transport from that of currently predominant road trucks to that of waterway

barges of Nile River system, would result in long-term environmental benefit of reduced emission of GHG (greenhouse gas) and other air pollutants, consequent to the high-energy efficiency of waterway transport. This long-term environmental benefit amply justifies the implementation of the projects.

Still, it is imperative to take utmost care by RTA in ensuring navigational safety of barge transport and proper management of wastes arising from barge operation. Important navigational safety measures include regular conduct of bathymetric survey and restriction on the transport of dangerous cargo. While, concerning waste management, proper management of waste oil (bilge waste) and solid waste so as to conform to the Annex-I and Annex-V requirements of MARPOL, as dealt with in Section 12.3.2 of Chapter 12, shall be ensured. These precautionary measures are required so as not to impair the lifeline beneficial uses of Nile River consequent to increased barge operational frequency.

Finally, it is concluded that all conceived potential adverse environmental effects of the projects are manageable while generating long-term environmental benefit due to reduced emission of GHG and other air pollutants, as quantified in Table 12.3.3 of Chapter 12 that justifies the implementation of the master plan, and hence these projects as well.

15.5.2 Recommendations

(1) Dredged and excavated material

The potentially contaminated dredged material of about 5000m³ derived from the surface seabed layer of the maritime lock area (Alexandria Project), requiring controlled management measures, is recommended to be stored permanently in a designated nearby desert area. Other than for this contaminated dredged material, beneficial uses are recommended for the rest of the surplus dredged material and excavated soil. In particular, the surplus material derived in the Boulin area (Boulin Project) is amenable for the beneficial uses of brick making and new agricultural land development.

(2) Further modal shift with railway transport

In effect from the viewpoint of increased energy efficiency related environmental benefit realization, both waterway and railway are preferred cargo transport modes in comparison to road trucks. In general, even though waterway is the most energy efficient mode, in this case of Nile waterway transport the difference in energy efficiency between waterway and railway is determined as only marginal. Accordingly, further modal shift in cargo transport with development of railway is recommended to complement the modal shift in cargo transport with waterway as per this master plan.

(3) Independent environmental improvement measures

The water environment of the Nubaria Canal reaches of Alexandria Port area (Alexandria Project Area) is severely deteriorated. The principal cause of this environmental degradation is the disposal of improperly treated (and untreated) wastes of domestic, industrial and others of Alexandria City origin into the Lake Maryut. It is imperative to undertake the necessary corrective measures to control runoff of these land based pollution sources as the first priority to improve the water environment of Lake Maryut as well as the Nubaria canal reaches of Alexandria.

Moreover, in the inner Nile Delta river reaches, including the Boulin Project Area, the water environmental quality is assessed as only marginally meets the requirements for water having multiple lifeline beneficial uses. Accordingly, it is recommended of undertaking the required action programs to control any further increase in pollution load runoff into the Nile waters due to land based miscellaneous anthropogenic activities so as to mitigate any further water quality degradation.

The required improvement measures to ameliorate these issues of water environmental degradation need to be undertaken independently irrespective of the implementation of the projects envisaged by this Inland Waterway Transport Development Master Plan.

**Appendix-11.1 Examination of a New IW to connect Port Said and Damietta Branch across
Manzara Lake**

Appendix-11.2 Estimation of Cross-sectional sounding survey along Alexandria/Cairo IW

Appendix-11.3 Alignment of Alexandria/Cairo IW - Major Bends-

Appendix-11.4 Obstacles on Navigation in Alexandria/Cairo IW

Appendix-11.5 Requirements of IW (Width and Depth)

Appendix-11.6 Estimation of Lock Capacity

Appendix-11.7 Width of Damietta/Cairo IW

Appendix- 11.8 (Long-Term Plan) Required Facilities and Equipments at a New River Port

Appendix 11-9 Rough Estimate of Dredging Volume along the Upper River Nile

Appendix-13.1 Rough Estimation of Required Number of Aid to Navigation

Appendix-13.2 Rough Estimation of Number of Barges through Maritime Lock in 2010

**Appendix -13.3 (Short-Term Plan) Required Facilities and Equipments at a New River
Port**

Appendix 13-4 Capital Dredging Volume along Beheiry/Nobarria Canal

Appendix-14.1 Economic Benefits of the Projects

Appendix-14.2 Component of annual concession fee

APPENDIX 15-I MITIGATION MANAGEMENT PLAN

Appendix-11.1 Examination of a New IW to connect Port Said and Damietta Branch across Manzara Lake

(1) General

1. A canal to connect Port Said and Damietta Branch has been examined from the physical and navigational aspects. Based on rough estimates, the investment required to improve this IW would be large. Moreover, according to preliminary forecast, only 0.5 million MT for 2020 will be shifted to this route. The study has examined on the assumption that existing canal network could be improved in order to avoid excessive investment.
2. Consequently, this connection IW seems to be questionable in view of cost-benefit effectiveness of only transportation uses, due to above cargo volume and investment for improvements within the target period of the master plan. Moreover, this IWT may not be suitable for the fairway of barges due to its physical conditions such as unstable water depth and sedimentation. It is necessary to continuously further examine such trunk IWT route in the East Delta beyond 2020.
3. On the other hand, in Al Anania Canal, irrigation sector has another opinion that one waterway and two drainage canals would be constructed, and existing lock on the west side be removed. Purposes of its plan are to secure agricultural and fresh water, flood control and to improve environmental conditions in the lake.
4. Therefore, this project has a possibility of increasing its cost-benefit effectiveness in light of transportation and irrigation aspects.

(2) Present Conditions

The connection route is assumed to consist of the following IWs:

a) Al Fabouty IW (length of 4 km):

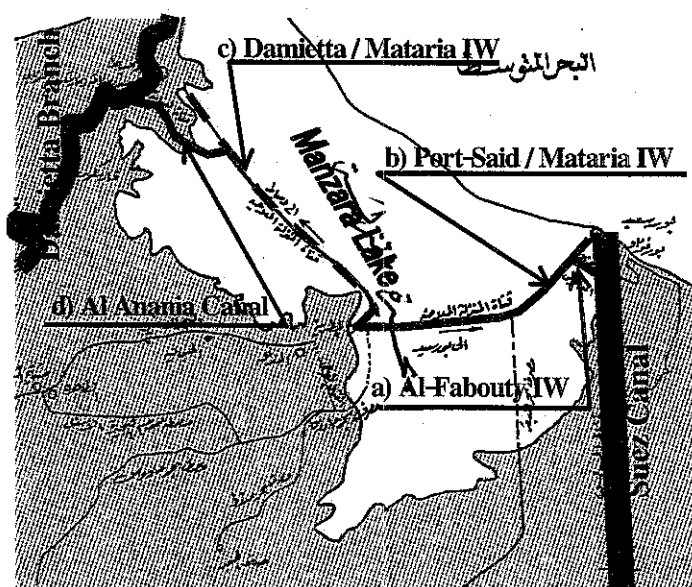
This IW connects Port Said(via Suez Canal)and Manzara Lake.

b) Port-Said / Mataria IW (length of 28 km):

When RTA carried out dredging works from 94 to 2000, the designed depth of this IW was planned as 2.1-2.3 m, while width was 30 m.

c) Mataria / Damietta IW (length of 23 km):

RTA designated this IW as a 3rd class IW. Standard water depth is 1.25 m, while width is 8 m.



d) Al Anania Canal (length of 13 km):

This irrigation canal controls the water flow from Damietta Branch to the lake.

(3) Consideration for Required Improvement Measures

In order to realize barges' navigation through this route, it is minimally required that the following improvement works be executed.

i) Initial dredging works

In Manzara Lake, Damietta / Mataria / Port Said, IWs need to be deepened and widened in order to meet the standards of a 1st class IW.

ii) Improvement of small lock

Small lock (width of 9.25 m x length of 116 m) in Al Anania Canal should be expanded to accommodate the new wider barges.

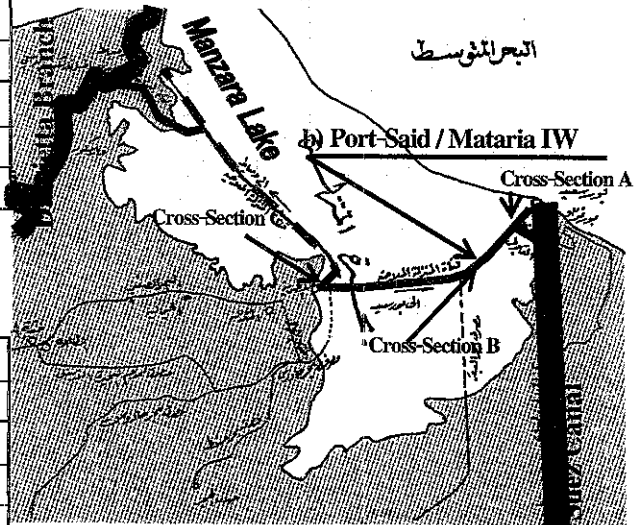
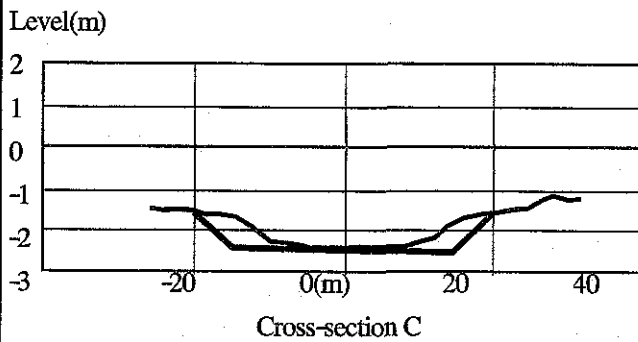
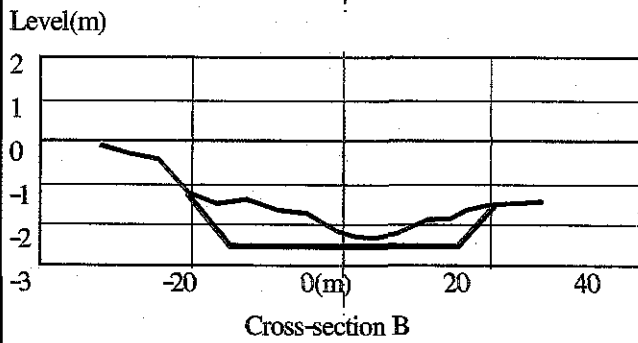
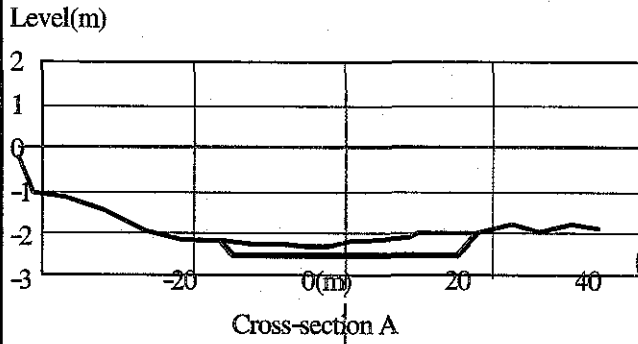
iii) Re-erection of bridges

With the introduction of the new wider barges, it will be necessary to re-erect bridges across this route to increase their span.

iv) Maintenance dredging

Maintenance dredging in Manzara Lake will be needed at an interval of several years, because existence of sedimentation is suggested in the past surveys conducted in IWs in the Lake.

- ⚡ Water level in Manzara Lake : 0.0 m (CDL) to 0.45 m (mean level)
- ⚡ Bed level in the vicinity of IWs : about -1 m to -2 m
- ⚡ Bed condition : muddy sand or silty sand



the following cross-sections are based on Port Said/Mataria IW dredging project.

Appendix-11.2 Estimation of Cross-sectional sounding survey along Alexandria/Cairo IW

1. General

In the study, the cross sectional sounding survey was conducted along Alexandria/Cairo IW in February to March, 2002. The sounding survey carried out at an interval of approximately 1 km along Baheira and Noubaria Canals. As a result, 200 cross-sections are obtained by this survey, and provide useful data for estimation of problems in Alexandria/Cairo IW.

In this appendix, Section 2 firstly describes determination of Low Water Level (LWL), and all cross-sections are attached in Section 3. Regarding estimations of cross-sections in view of navigation, this section 3 summarizes dimension of IW such as width and depth.

2. Water-Level

It is important to determine LWL (Low Water Level) in order to estimate each cross-section, and water-levels in this IW have patterns with seasonal fluctuations. Moreover, six stretches to be divided by locks, indicate different and its own fluctuations.

So that LWL in each stretches are determined from the available past water level records at gauges, gauge stations have measured these water-level records and are located at downstream- and upstream-side of each lock (see figure right-side).

In the study, records of water-level are examined for 5 years period from 1996 to 2000, concretely; LWLs are determined by monthly records for 60 months.

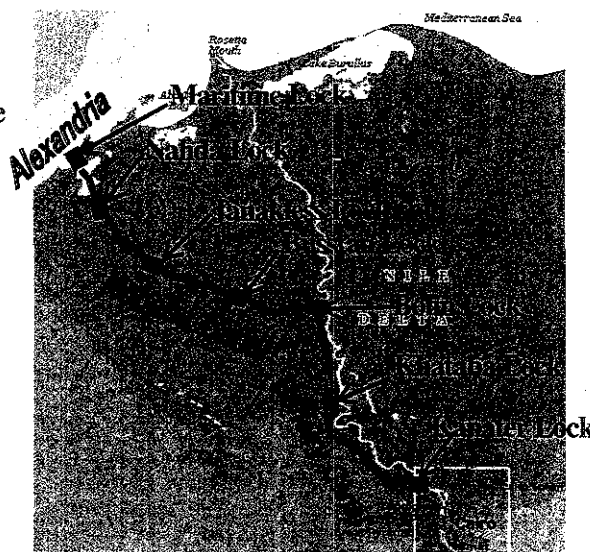


Figure Locations of each Lock

2-1. Fluctuations of Water-Level

In generally, IWs in the Delta tend to have two types of fluctuations of water-level

First one is seasonal fluctuation which mainly depends on the period of high or low water discharge seasons.

Second one is daily fluctuation due to large amount of discharge/intake for a temporary local use, and due to repair/maintenance of irrigational facilities, impermanently (see following figure).

In generally, LWL or HWL means lowest or highest water level under some conditions.

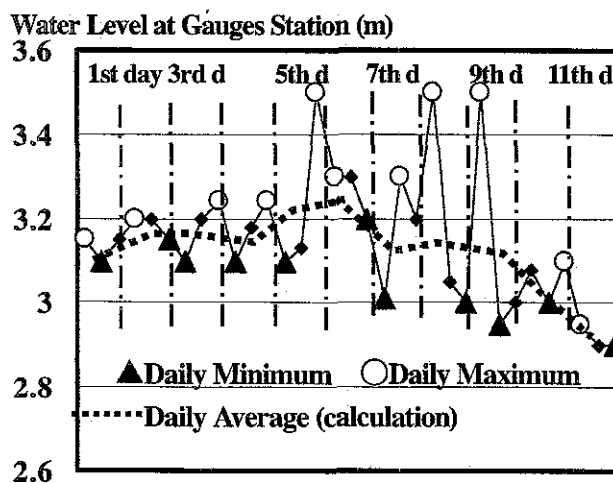


Figure Example of Record of WL

However, LWLs in the study are estimated based on “Daily Average WLs”. Because “Daily Minimum WLs” and “Daily Maximum WLs” are likely to be impermanent as shown above figure, “singular values” are not appropriate for the study to use as design conditions for navigation such as barge size, navigable depth and width of IW.

2-2. Determination of LWLs

As above-mentioned, the study adopts “Monthly Average WLs” which get the average of “Daily Average” for a month. These “Monthly Average WLs” can represent seasonal fluctuation. Based on “Monthly Average WLs” for 60 months, monthly fluctuations of WLs are shown in figures in next page, and these patterns of change in WLs are indicated by locks.

Among these WLs, minimums are determined as LWLs at each lock. (see figures in next page) , the following table indicates determined LWLs at down- and up-stream sides of each locks, respectively.

Table LWLs in Alexandria/Cairo IW (Baheira and Noubaria Canals)

Lock	LWL at Upstream side	LWL at Downstream side
Nahda Lock	2.81 m	-2.50 m (constant)
Janaklees Lock	4.91 m	4.55 m
Busstan Lock	7.10 m	6.66 m
Bolim Lock	8.77 m	8.16 m
Khataba Lock	12.27 m	11.37 m
Kanater Lock	15.75 m	14.46 m

Secondly, the study assumed that water surface slope (LWL) of this IW is liner slope with drawing lines between each LWLs at up/downstream of locks. Bed levels are obtained by the cross-sectional sounding survey.

In next Section 3, difference of such LWL surface and bed levels is estimated as water-depth at each cross-section (see Figure below). As a result, minimum water depth of 1.8 m is estimated among 200 cross-sections in next Section 3.

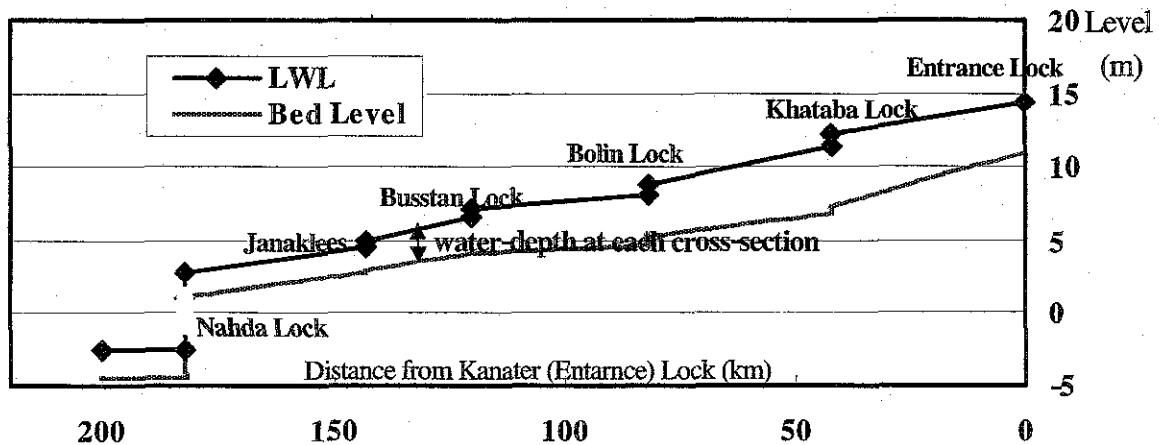
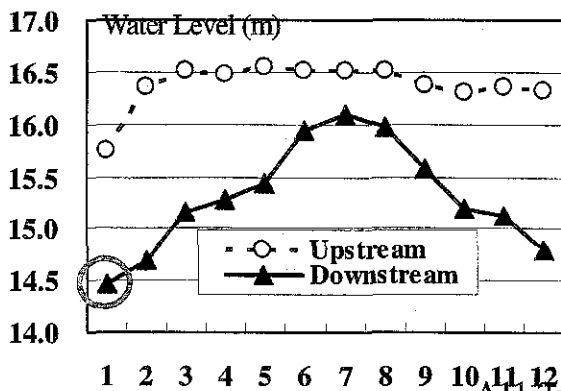
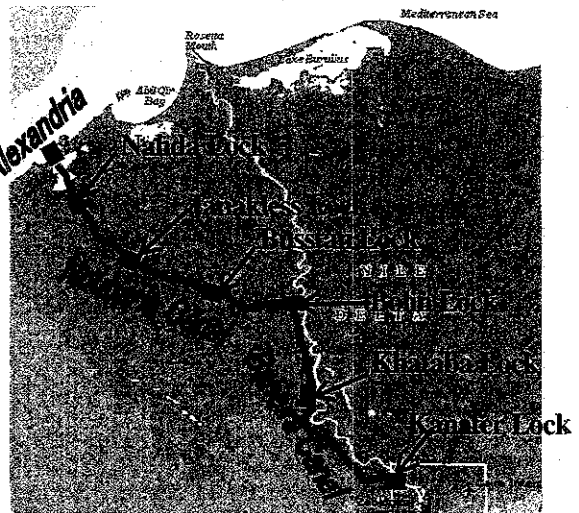
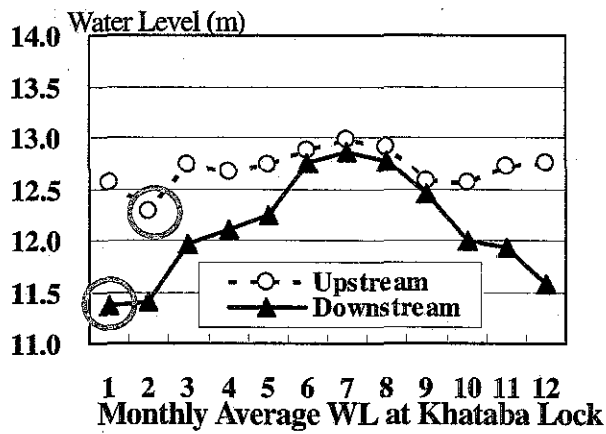
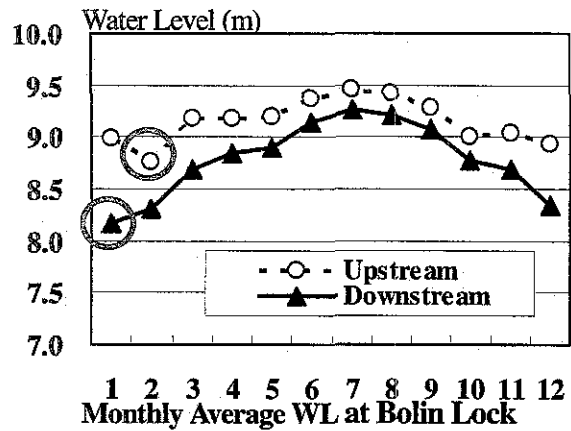
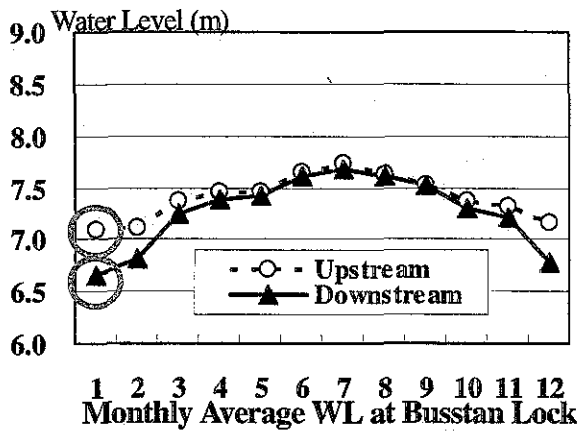
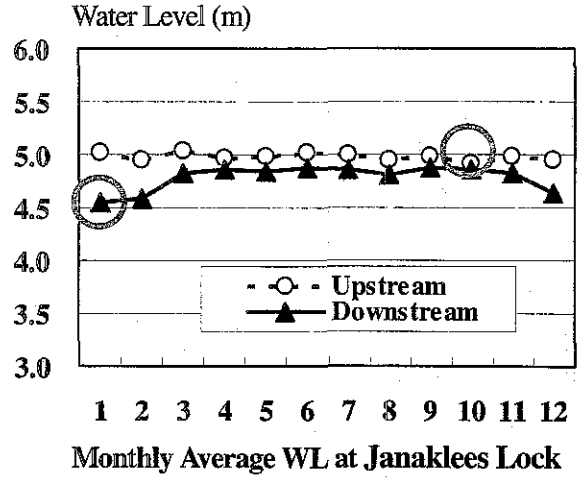
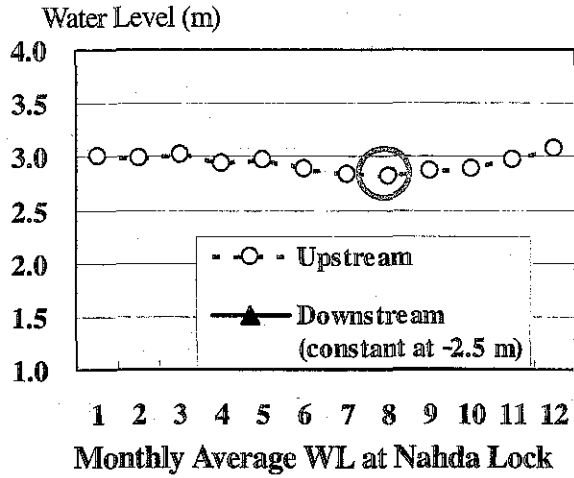


Figure Sketch of Estimation of water-depth at each section



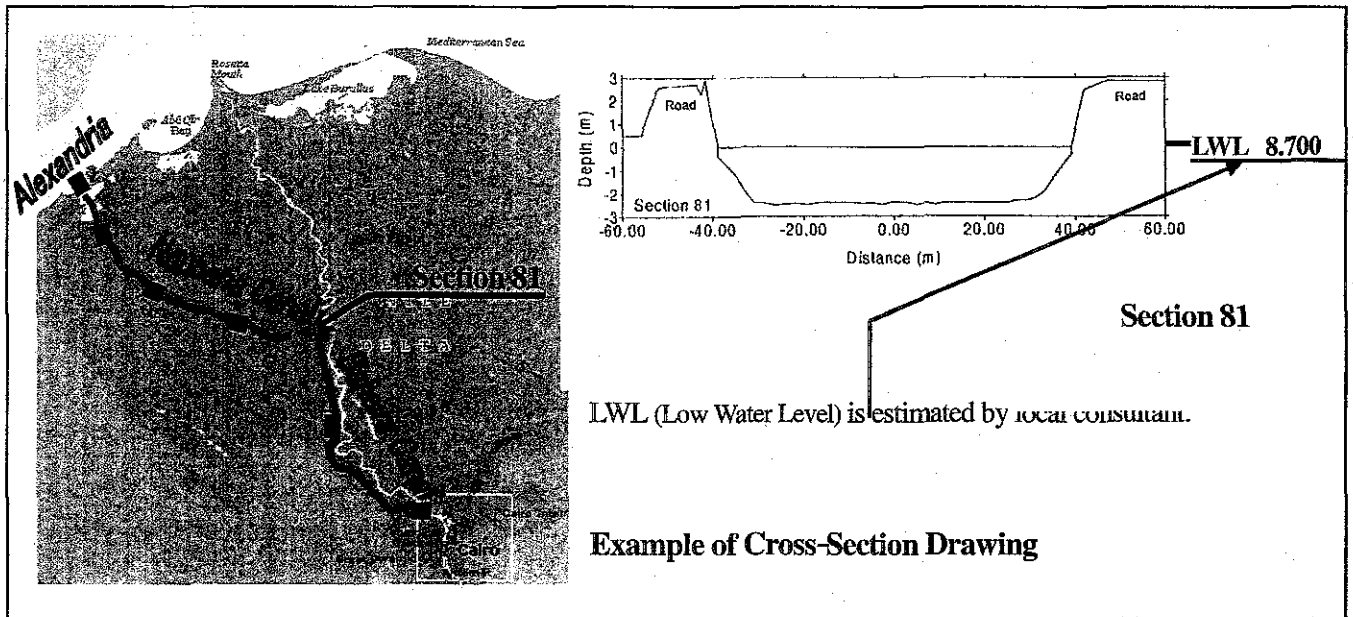
Monthly Average WL at Kanater Lock

○ LWLs are determined in the Study

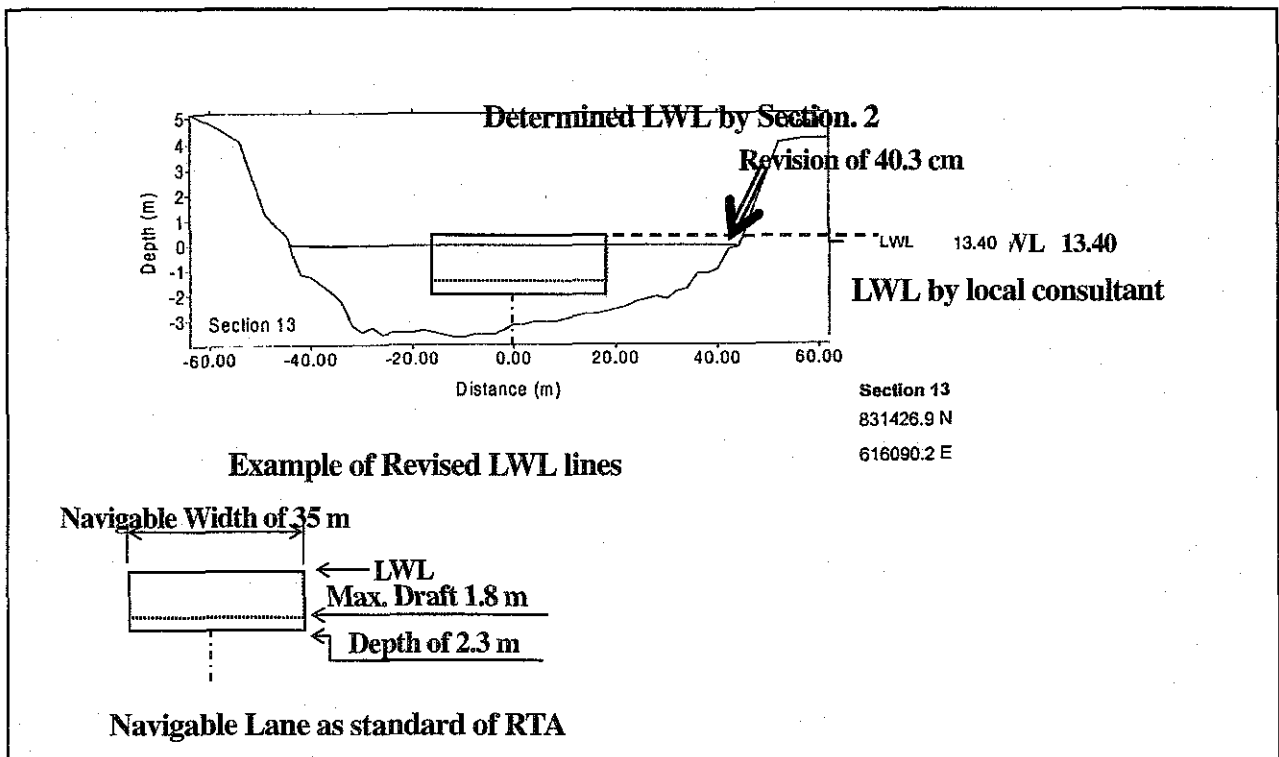
Figure Seasonal Fluctuations of WLs at each Lock

3. Estimation of each cross-section

As afore-mentioned section, total 200 cross-sections are drawn in an approximately 1 km interval. Below figure is one of results by this cross-section survey. Below drawing indicates LWL which is different from LWL surface determined in above Section 2.

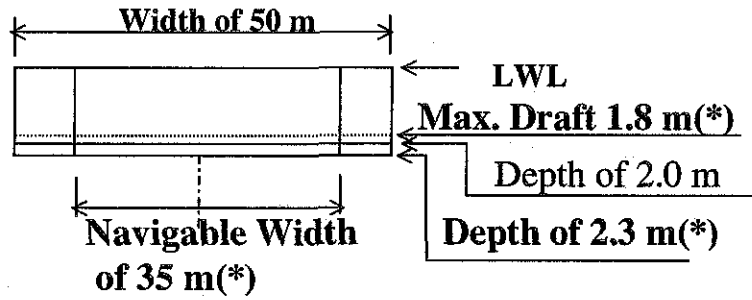


Therefore, in this Appendix, drawings are revised based on determined LWLs. Below figure indicates an example of these revisions.



Estimation of each cross-sections

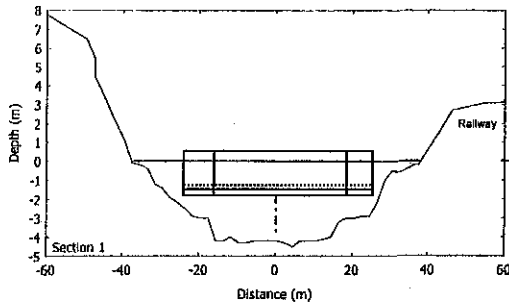
Requirements of IW



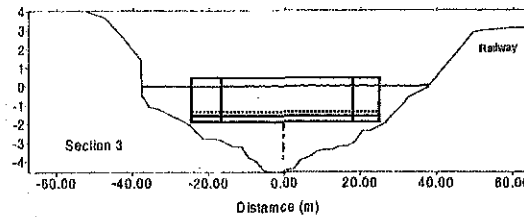
(*) RTA's Standard of First Class IW



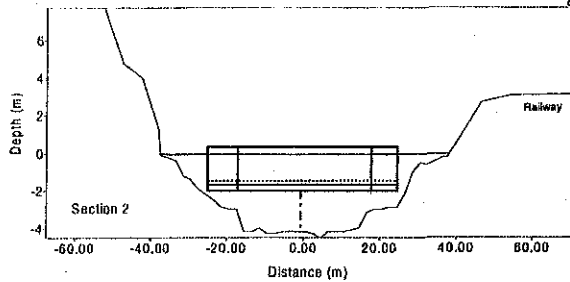
A11.2-5



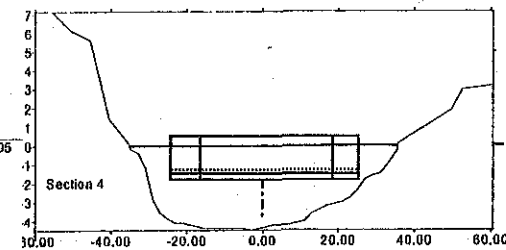
Section 1
82977.8 N
82977.8 E



Section 3
829700.4 N
822880.6 E



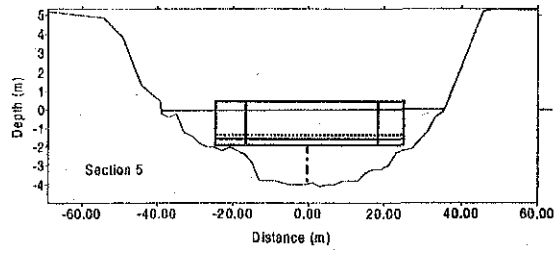
Section 2
829823.7 N
823840.8 E



Section 4
829546.3 N
822001.8 E

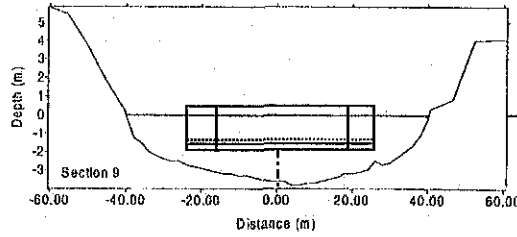
Appendix-11.2 Figure A11.2-1 Cross Sections between Entrance Lock and Khataba Lock & Comparing with Requirement of Waterway

A11.2-6



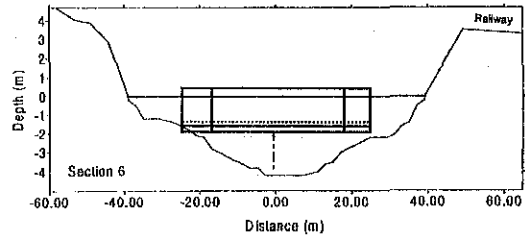
LWL 13.80

Section 5
820453.8 N
621059.3 E



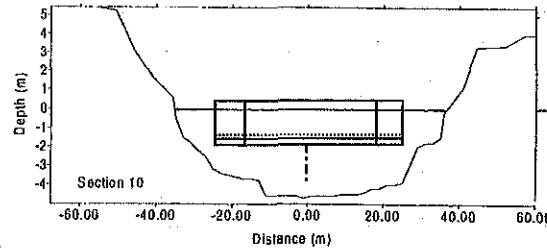
LWL 13.60

Section 9
828837.1 N
617127.5 E



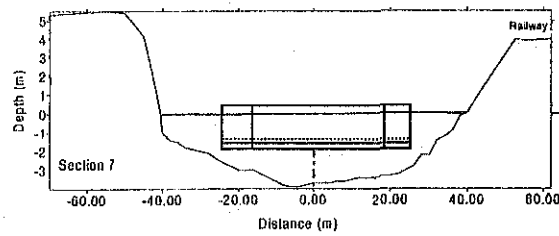
LWL 13.75

Section 6
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620089.6 E



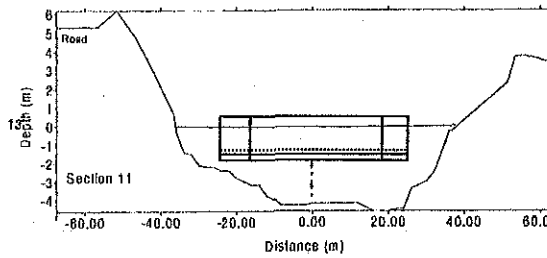
LWL 13.55

Section 10
828960.4 N
616184.9 E



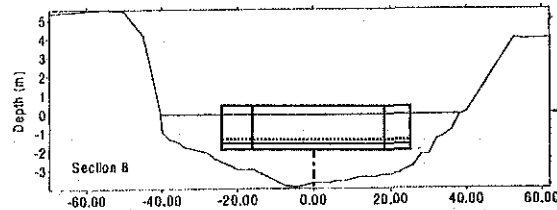
LWL 13.70

Section 7
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619003.4 E



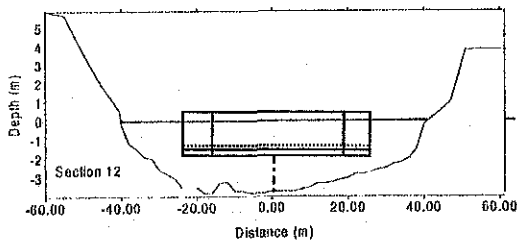
LWL 13.50

Section 11
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615538.0 E



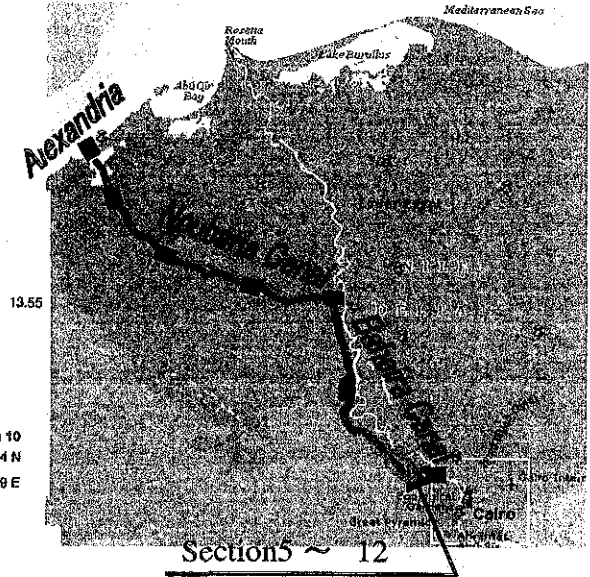
LWL 13.65

Section 8
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618123.9 E



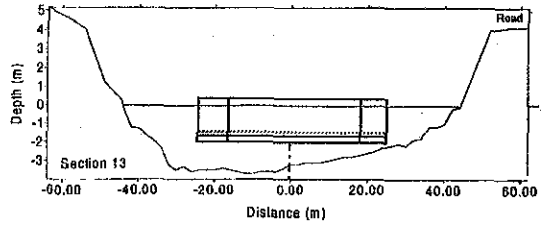
LWL 13.45

Section 12
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615187.8 E

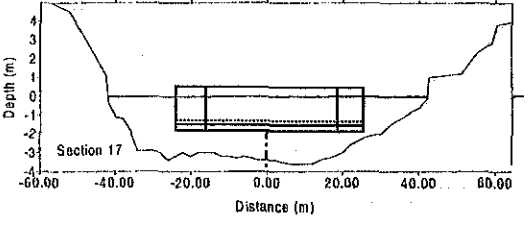


Appendix-11.2 Figure A11.2-2 Cross Sections between Entrance Lock and Khataba Lock & Comparing with Requirement of Waterway

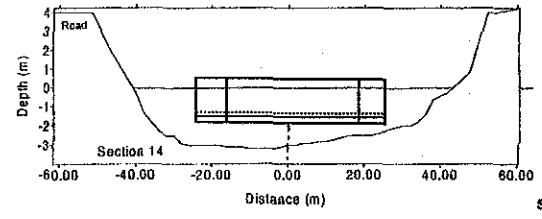
A11.2-7



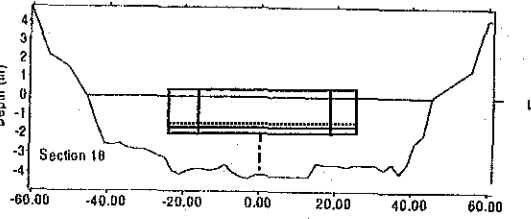
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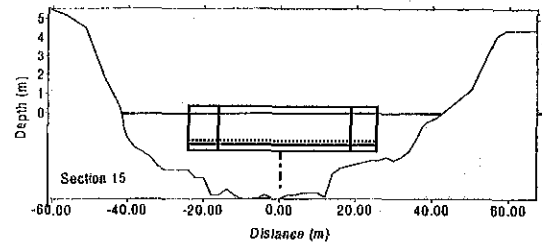
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 612912.4 E



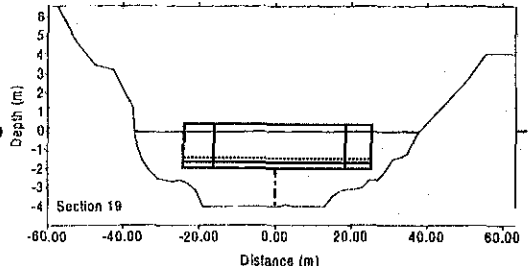
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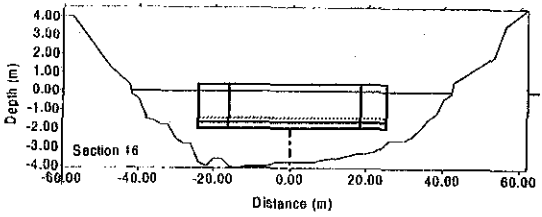
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 612400.8 E



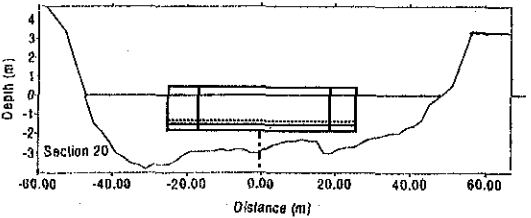
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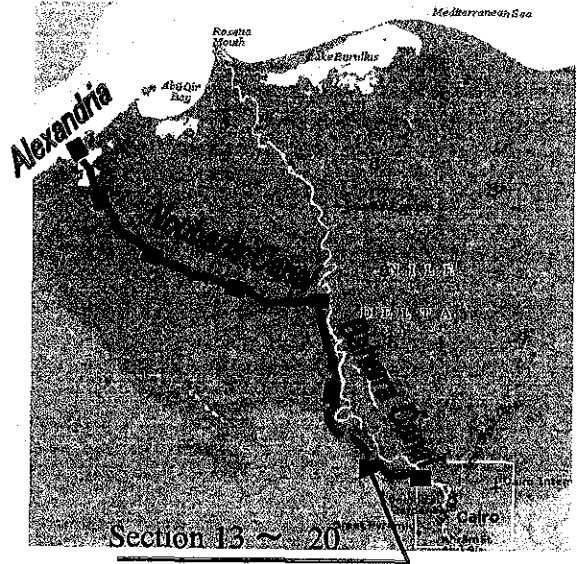
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LWL 13.25
Section 16
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 613935.8 E

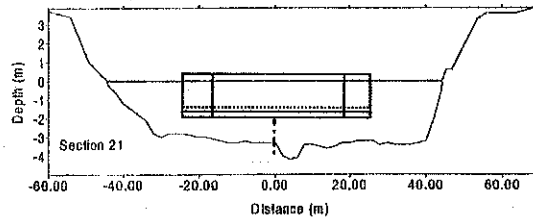


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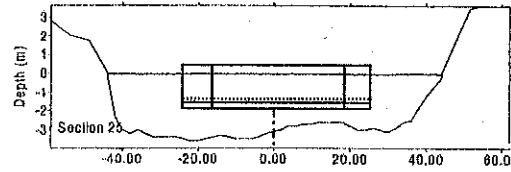
Appendix-11.2 Figure A11.2-3 Cross Sections between Entrance Lock and Khataba Lock & Comparing with Requirement of Waterway

A11.2-8



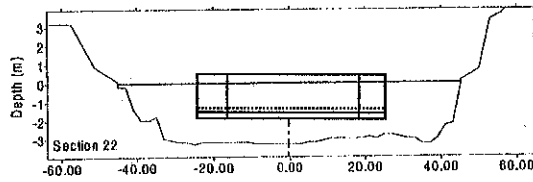
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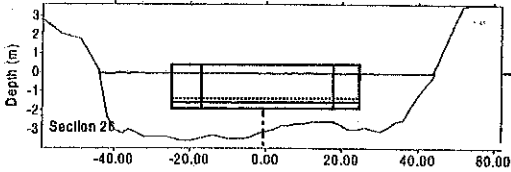
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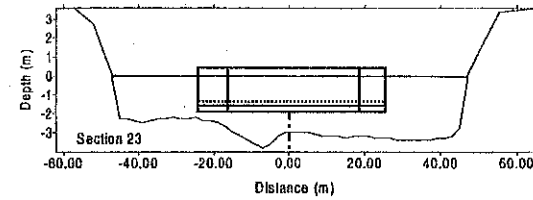
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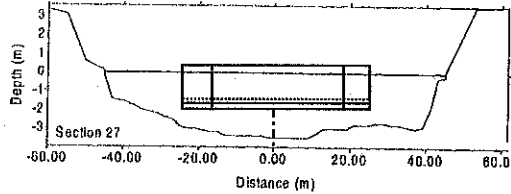
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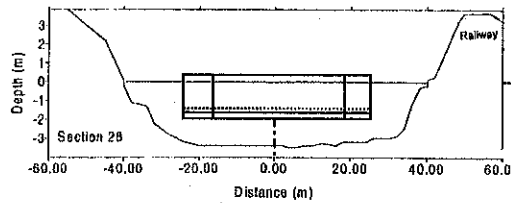
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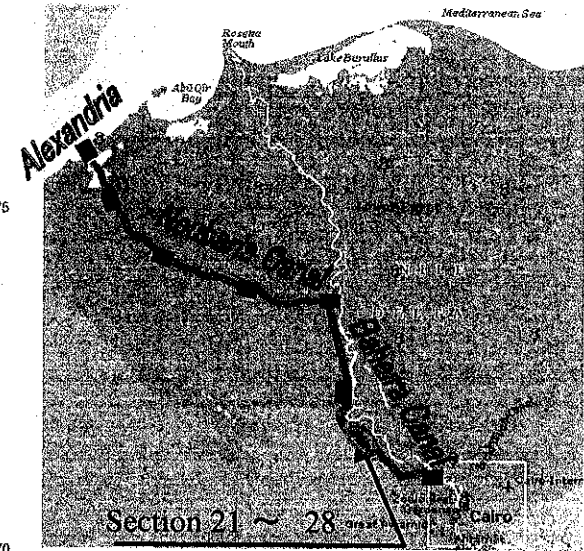
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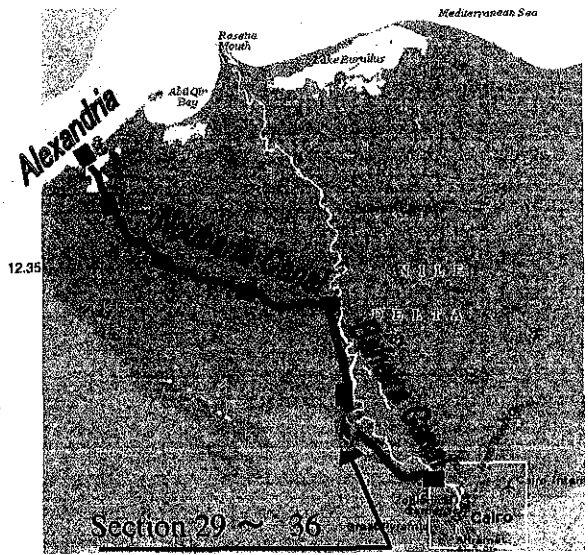
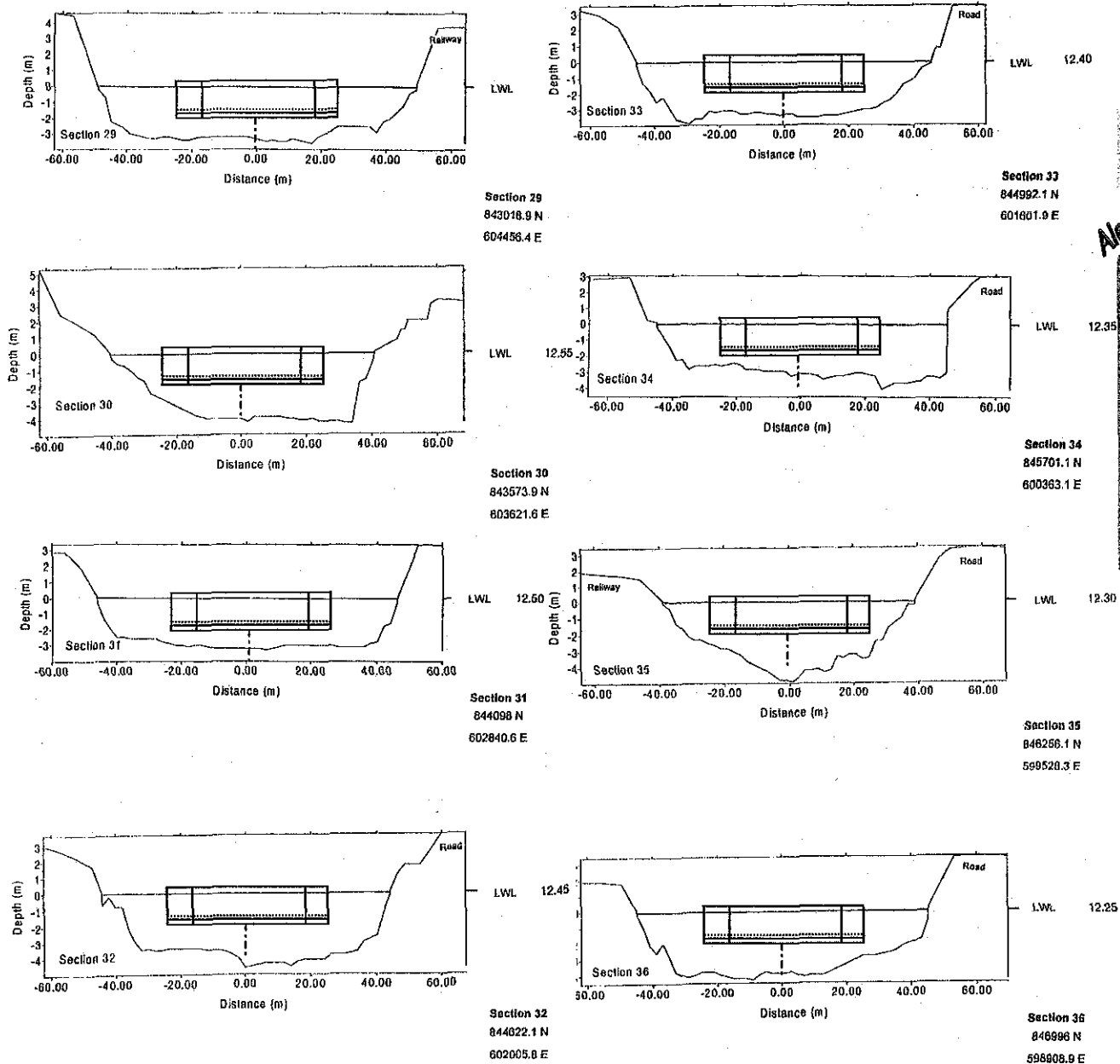
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842433.2 N
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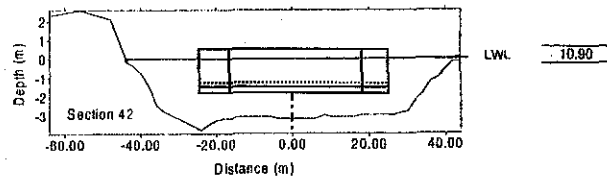


Appendix-11.2 Figure A11.2-4 Cross Sections between Entrance Lock and Khataba Lock & Comparing with Requirement of Waterway

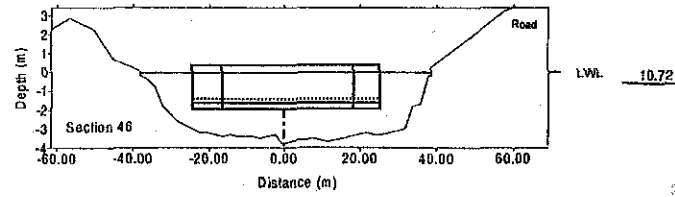
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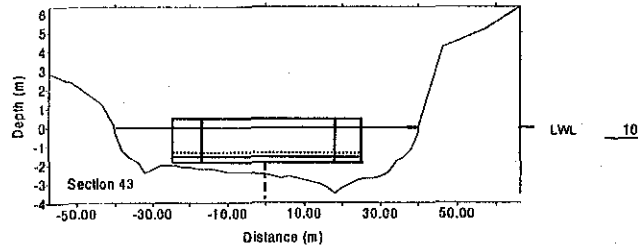
Appendix-11.2 Figure A11.2-5 Cross Sections between Entrance Lock and Khataba Lock & Comparing with Requirement of Waterway



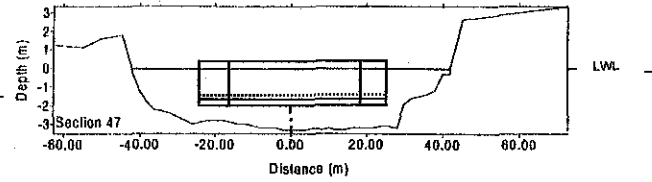
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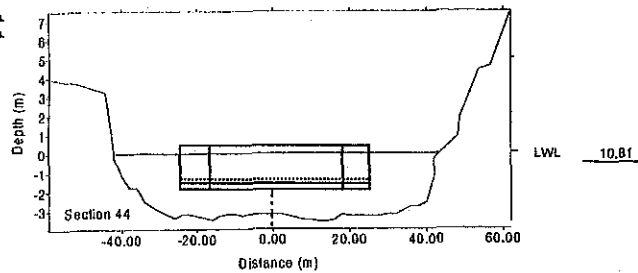
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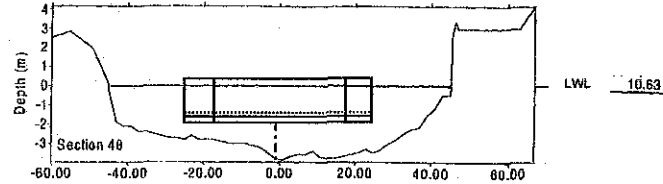
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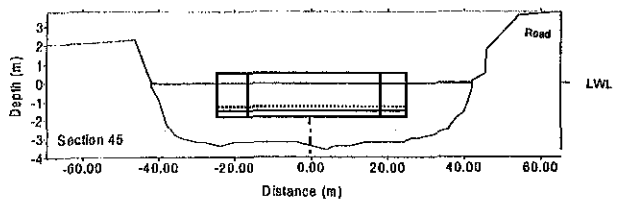
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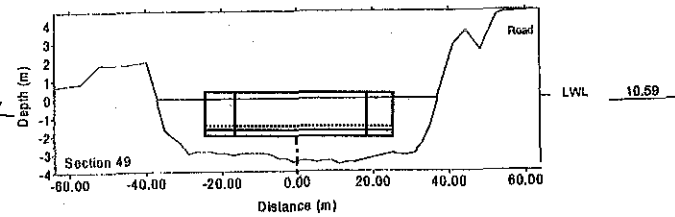
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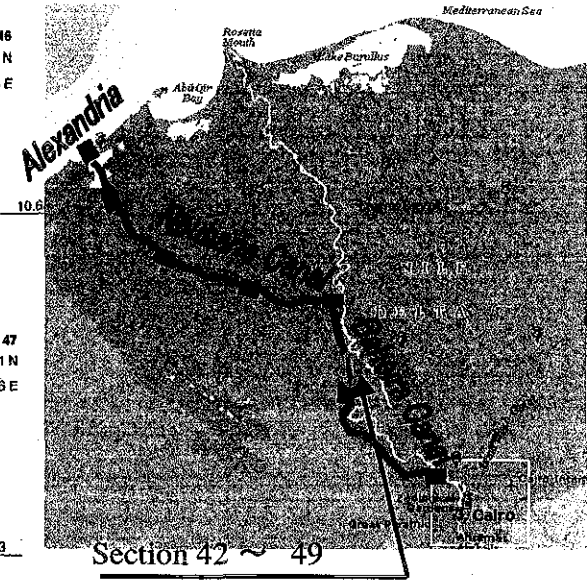
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Section 45
856553.3 N
600201.6 E

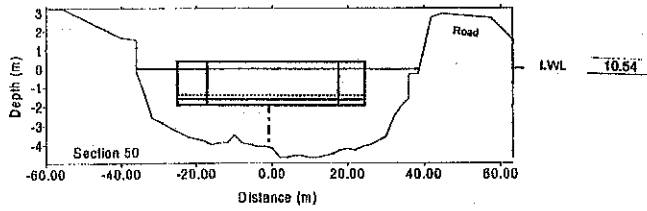


Section 49
860314.3 N
599878.3 E

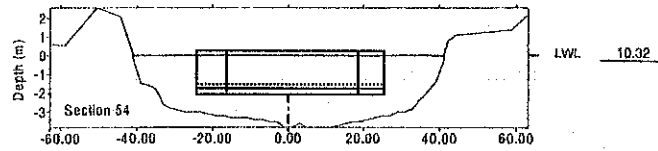


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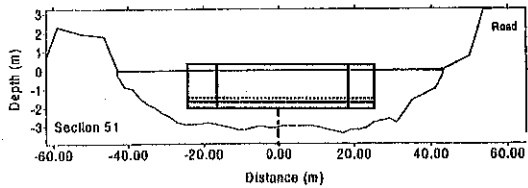
Appendix-11.2 Figure A11.2-7 Cross Sections between Khataba Lock and Bolin Lock & Comparing with Requirement of Waterway



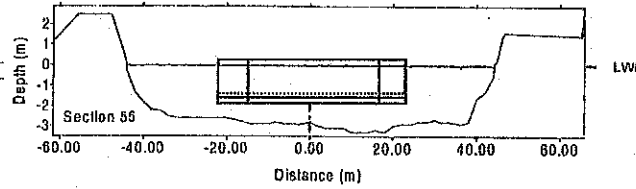
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599582.1 E



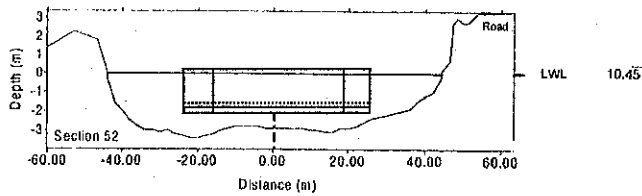
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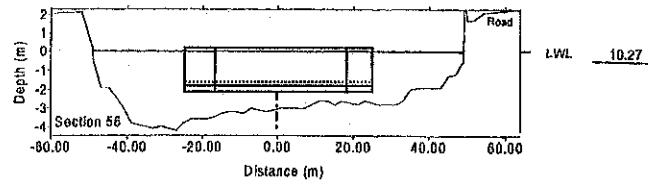
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599368.8 E



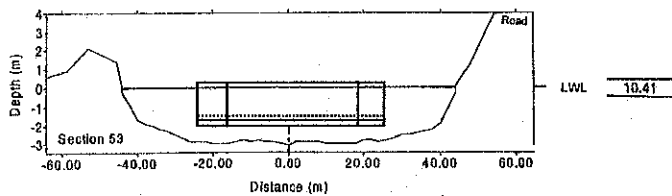
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598747.3 E



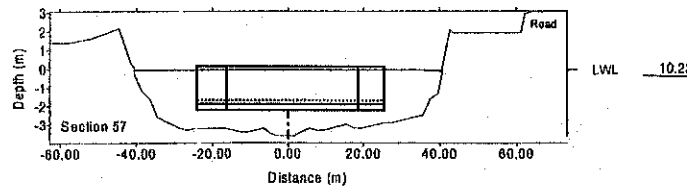
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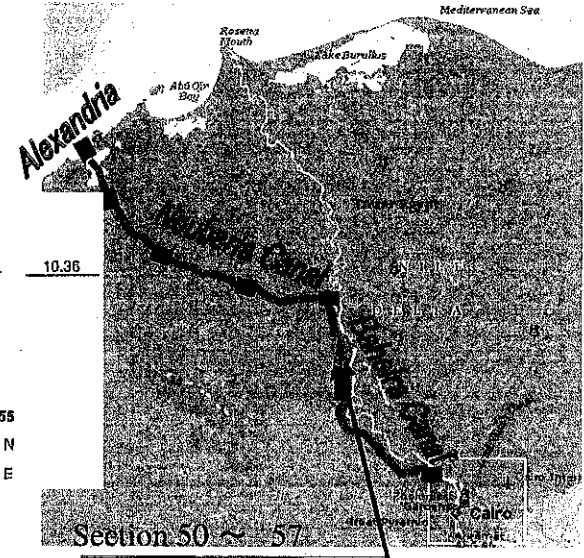
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Section 53
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599896 E

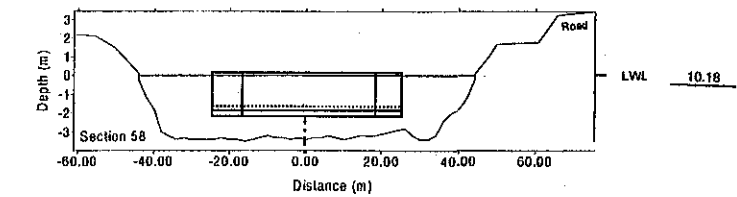


Section 57
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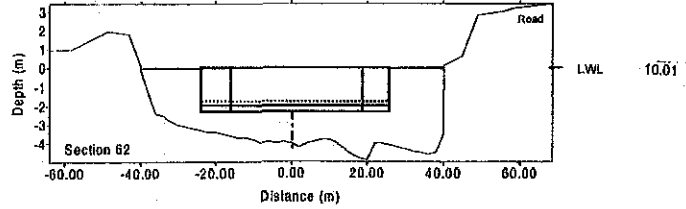


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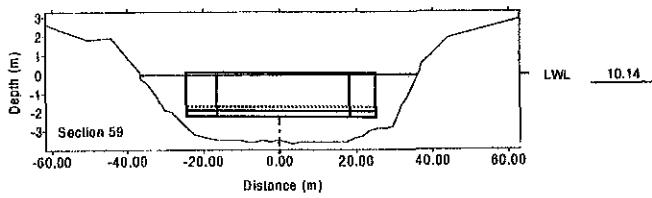
Appendix-11.2 Figure A11.2-8 Cross Sections between Khataba Lock and Bolin Lock & Comparing with Requirement of Waterway



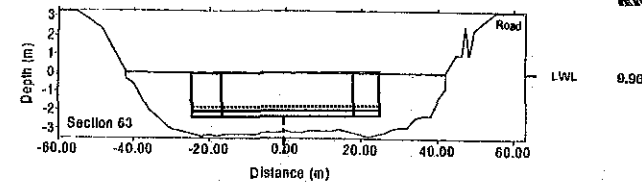
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599176.1 E



Section 62
872564.9 N
598397.2 E

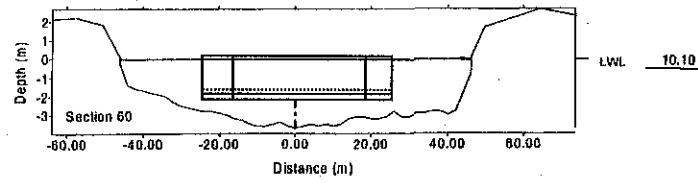


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598631.8 E

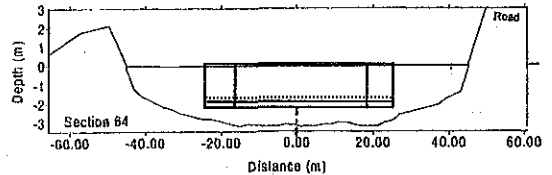


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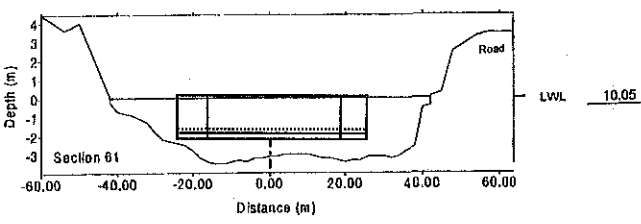
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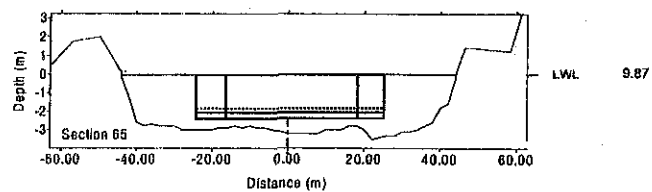
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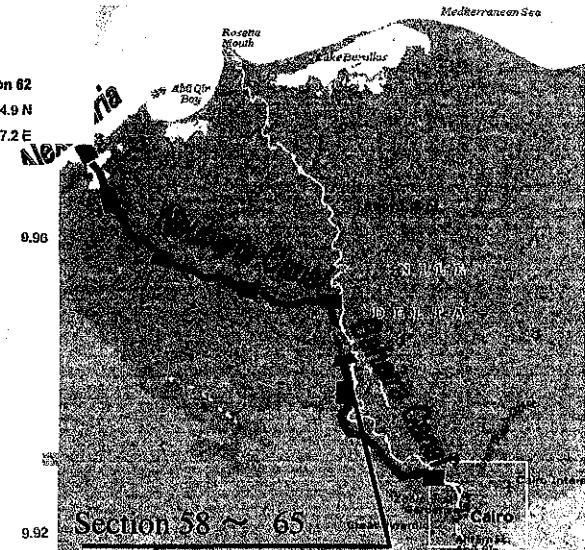
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Section 61
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598047.1 E

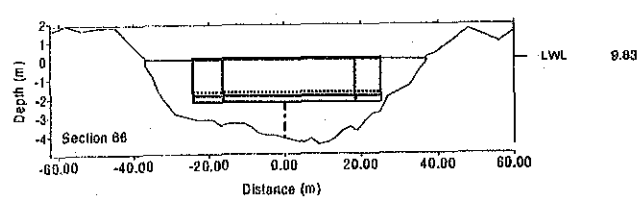


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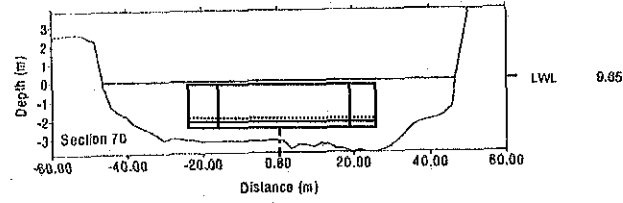


Appendix-11.2 Figure A11.2-9 Cross Sections between Khataba Lock and Bolin Lock & Comparing with Requirement of Waterway

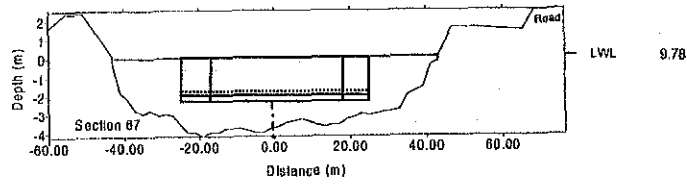
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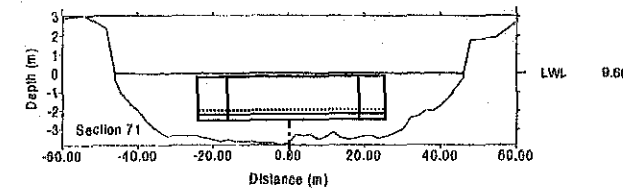
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597582.4 E



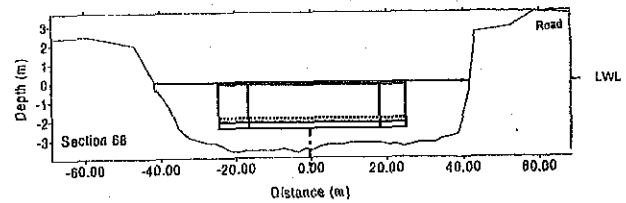
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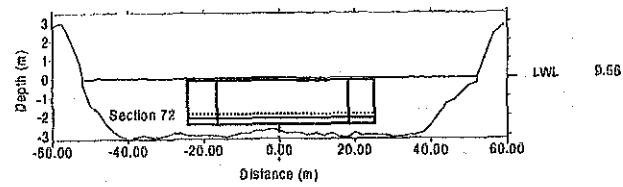
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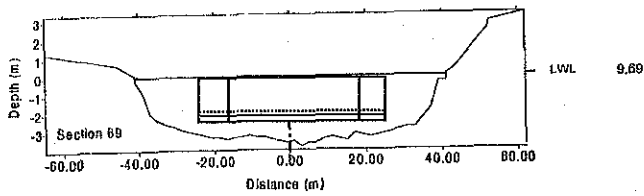
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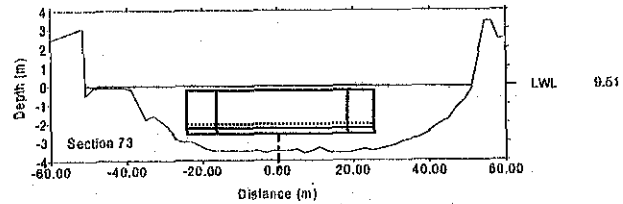
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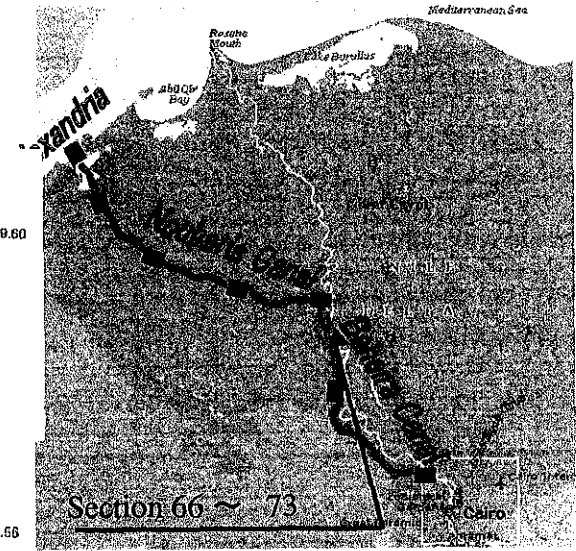
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Section 69
879565.9 N
596000.4 E

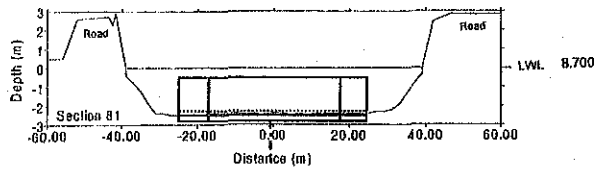


Section 73
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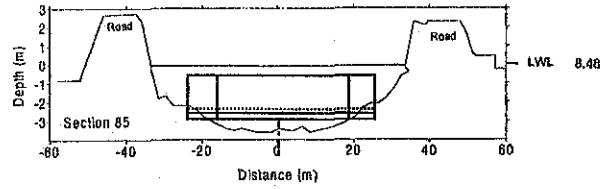


Appendix-11.2 Figure A11.2-10 Cross Sections between Khataba Lock and Bolin Lock & Comparing with Requirement of Waterway

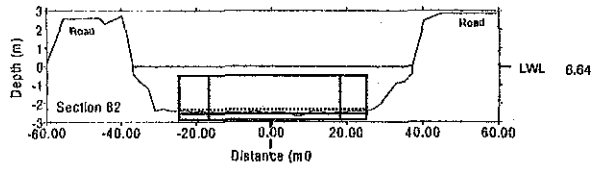
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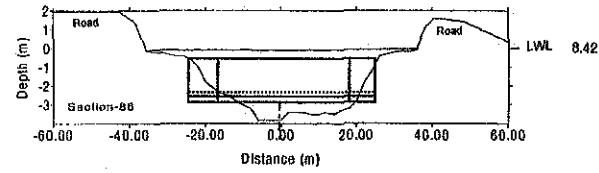
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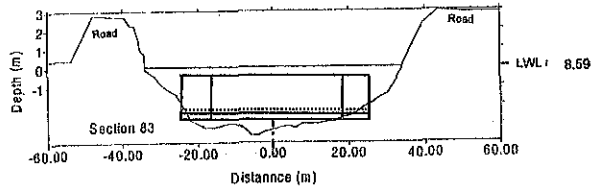
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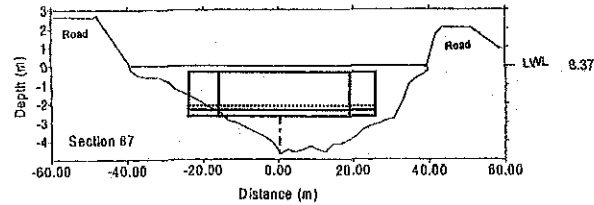
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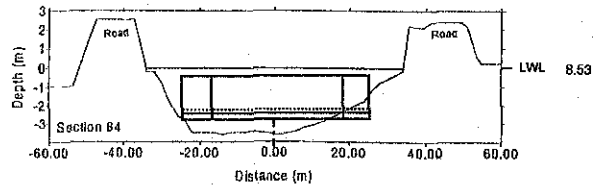
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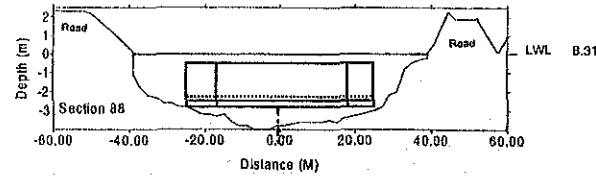
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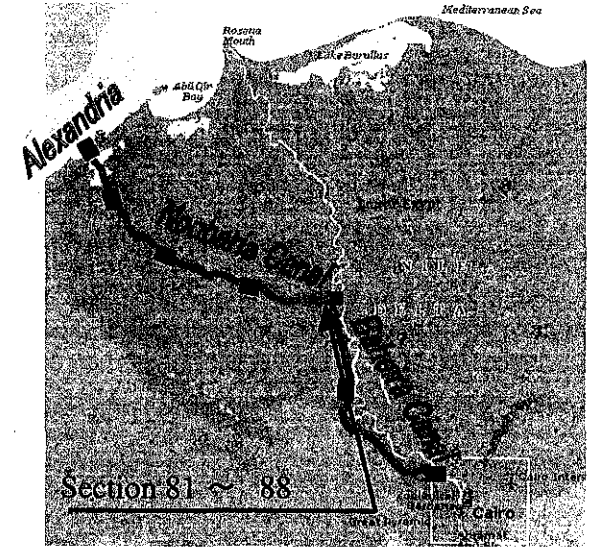
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584474.4 E



Section 84
889017.3 N
589411.8 E



Section 88
889541.4 N
589411.8 E



Appendix-11.2 Figure A11.2-12 Cross Sections between Bolin Lock and Busstan Lock & Comparing with Requirement of Waterway