

That is to say, as shown in Table F-4-4, to meet the above-mentioned annual demand for urban, irrigation and airport water, the respective initial costs of Rs.11,530.6 million, Rs.1,180.6 million and Rs.14.2 million, and the respective O/M costs of Rs.305.6 million, Rs.44.9 million and Rs.1.1 million in economic terms will be required.

Economic analysis reveals that urban, irrigation and airport water supply projects have the respective EIRR's of 3.7 percent, 8.1 percent and 16.0 percent.

The urban water supply project occupies a dominant position in the Project and consequently has an EIRR not too different from that of the whole project. It is lower than the opportunity cost of capital by 8.3 percent. However, for the reasons already described the project is judged to be economically feasible. The EIRR of the irrigation water supply project is by 3.9 points lower than the opportunity cost of capital. However, because of its highly social nature as described in 9.3.1, the project is judged to be economically feasible. The EIRR of the airport water supply project is higher than the opportunity cost of capital by 4 percent. Therefore, it is economically feasible without any additional explanation.

F.4.3. Sensitivity Analysis

The purpose of the sensitivity analysis is to know the degree of the influence upon internal rate of return changes/alternations of relevant factors will exert. In this study, the sensitivity test was conducted in such a way as shown in Table F-4-11. The results are shown in the same table.

As a general observation common to both FIRR and EIRR, one notices that ten percent change of benefits upward or downward will cause about one point corresponding upward or downward movement of the evaluation index. Similarly, ten percent change of costs downward or upward will cause about one point corresponding upward or downward movement of the evaluation index.

Thus, in Test I and III in the financial analysis FIRR is pushed up from the standard value of 5.4 percent to 7.2 percent and 9.2 percent, respectively. These values belong to rare instances in such a project as this one as already mentioned. While Test III may be somewhat an unrealistic assumption, efforts toward the realization of Test I situation are to be recommended. In Test II and IV in the same analysis FIRR is pushed down from 5.4 percent to 3.6 percent and 1.4 percent, respectively. In light of the peculiar nature of the Project, the Study Team regards even these two negative cases as acceptable.

EIRR's in the respective cases are about one point lower than the corresponding FIRR's. Otherwise, evaluation and conclusions parallel to the above can be applied to the results of the sensitivity test for economic analysis.

Table P-4-1 Incremental Urban Water Demand 1987 to 2030

Item	1987	1990	2000	2010	2020	2030
1. Islamabad Proper						
1) Population Served	284,000	341,000	621,000	760,000	885,000	1,006,000
2) Daily per Capita Demand (l)	707	628	584	570	563	560
3) Demand/Yr (MCM)	73.2	78.2	132.4	158.1	181.9	205.6
2. Rawalpindi Urban						
1) Population Served	678,000	760,000	1,114,000	1,445,000	1,770,000	2,095,000
2) Daily per Capita Demand (l)	263	280	332	379	409	441
3) Demand/Yr (MCM)	65.1	77.7	135.0	199.9	264.2	337.2
3. Rawalpindi Rural						
1) Population Served	-	-	36,000	65,000	111,000	166,000
2) Daily per Capita Demand (l)	-	-	261	312	342	391
3) Demand/Yr (MCM)	-	-	3.4	7.4	13.9	23.7
4. Total Demand/Yr (MCM)	138.3	155.9	270.8	365.4	460.0	566.5
5. Incremental Demand/Yr (MCM)	-	17.6	132.5	227.1	321.7	428.2
6. Yearly Increase of Incremental Demand (MCM)		5.87	11.49	9.45	9.47	10.7

Source: EC-1

Table F-4-2. Water Supply by Target Year

(unit: MCM)

Facility	2000	2010	2030	Total
1. Urban Water				
Kc-6	47.8	20.6	58.0	126.4
Expansion of Head Works	6.4	-	-	6.4
Expansion of Simly Dam	18.1	-	-	18.1
TW-ISLM	6.0	6.0	-	12.0
Kc-5	20.6	-	94.2	114.8
Rc-1	7.4	-	-	7.4
SLc-1	-	40.0	-	40.0
Rc-2	60.0	-	70.0	130.0
KLc-1	-	34.0	-	34.0
TW-RWL	7.0	7.0	-	14.0
<u>Total</u>	<u>173.3</u>	<u>107.6</u>	<u>222.2</u>	<u>503.1</u>
2. Irrigation Water				
Kc-8	-	-	14.2	14.2
Jc-1	70.8	-	-	70.8
Nc-1	-	17.3	-	17.3
Sip-1	6.4	-	-	6.4
Others	11.6	-	-	11.6
<u>Total</u>	<u>88.8</u>	<u>17.3</u>	<u>14.2</u>	<u>120.3</u>
3. Airport Water				
TW-ARP	0.8	0.9	0.8	2.5
4. Grand Total				
<u>Total</u>	<u>262.9</u>	<u>125.8</u>	<u>237.2</u>	<u>625.9</u>

Source: EC-1

Table F-4-3. Project Cost by Target Year
- for Financial Analysis -

(unit: Rs. million)

Item	Urban Water	Irrig. Water	Airport Water	Total
1. Up to 2010				
1) Initial Cost				
(1) Water Rscs	3,995.9	975.0	3.1	4,974.0
(2) Terminal	2,105.1	452.3	8.6	2,566.0
(3) <u>Total</u>	<u>6,101.0</u>	<u>1,427.3</u>	<u>11.7</u>	<u>7,540.0</u>
2) O/M Cost				
(1) Water Rscs	111.3	32.5	0.4	144.2
(2) Terminal	78.2	10.4	0.3	88.9
(3) <u>Total</u>	<u>189.5</u>	<u>42.9</u>	<u>0.7</u>	<u>233.1</u>
2. Up to 2030				
1) Initial Cost				
(1) Water Rscs	10,874.7	980.9	4.4	11,860.0
(2) Terminal	4,114.6	512.7	12.7	4,640.0
(3) <u>Total</u>	<u>14,989.3</u>	<u>1,493.6</u>	<u>17.1</u>	<u>16,500.0</u>
2) O/M Cost				
(1) Water Rscs	155.4	33.0	0.6	189.0
(2) Terminal	150.2	11.9	0.5	162.6
(3) <u>Total</u>	<u>305.6</u>	<u>44.9</u>	<u>1.1</u>	<u>351.6</u>

- Note: 1) Indirect cost is included.
2) Replacement cost is not included.
3) Water Rscs = Water Resources Development.
4) Terminal = Distribution and Others.

Source: EC-1

Table F-4-4. Project Cost by Target Year
- for Economic Analysis -

(unit: Rs. million)

Item	Urban Water	Irrig. Water	Airport Water	Total
1. Up to 2010				
1) Initial Cost				
(1) Water Rscs	3,112.0	748.3	2.5	3,862.8
(2) Terminal	1,751.0	376.2	7.2	2,134.4
(3) <u>Total</u>	<u>4,863.0</u>	<u>1,124.5</u>	<u>9.7</u>	<u>5,997.2</u>
2) O/M Cost				
(1) Water Rscs	111.3	32.5	0.4	144.2
(2) Terminal	78.2	10.4	0.3	88.9
(3) <u>Total</u>	<u>189.5</u>	<u>42.9</u>	<u>0.7</u>	<u>233.1</u>
2. Up to 2030				
1) Initial Cost				
(1) Water Rscs	8,108.0	754.2	3.6	8,865.8
(2) Terminal	3,422.6	426.4	10.6	3,859.6
(3) <u>Total</u>	<u>11,530.6</u>	<u>1,180.6</u>	<u>14.2</u>	<u>12,725.4</u>
2) O/M Cost				
(1) Water Rscs	155.4	33.0	0.6	189.0
(2) Terminal	150.2	11.9	0.5	162.6
(3) <u>Total</u>	<u>305.6</u>	<u>44.9</u>	<u>1.1</u>	<u>351.6</u>

- Note: 1) Indirect cost is included.
2) Replacement cost is not included.
3) Water Rscs = Water Resources Development.
4) Terminal = Distribution and Others.

Source: EC-1

Table F-4-5. Code Table for Cost Benefit Flow (I)

	<u>Code</u>	<u>Meaning</u>
1.	CC1	Investment Cost for Development & Supply of Urban Water
2.	CC2	Investment Cost for Development & Supply of Irrigation Water
3.	CC3	Investment Cost for Development & Supply of Airport Water
4.	OM1	O/M Cost for Development & Supply of Urban Water
5.	OM2	O/M Cost for Development & Supply of Irrigation Water
6.	OM3	O/M Cost for Development & Supply of Airport Water
7.	BF1	Benefits Accruing from Supply of Urban Water
8.	BF2	Benefits Accruing from Supply of Irrigation Water
9.	BF3	Benefits Accruing from Supply of Airport Water
10.	SCC	Investment Cost for Development & Supply of Urban, Irrigation & Airport Water
11.	SOM	O/M Cost for Development & Supply of Urban, Irrigation & Airport Water
12.	SBF	Benefits Accruing from Supply of Urban, Irrigation & Airport Water

- Note: 1) Investment cost includes initial and replacement cost for water resources development and distribution.
- 2) O/M Cost includes O/M cost for water resources development and distribution.

Table F-4-6 Cost Benefit Flow for Financial Analysis

- Target Year: 2030 -

Unit: Rs. Million

YEAR NO.	CCI	CC2	CC3	CM1	CM2	CM3	BF1	BF2	BF3	SCC	SOM	SBF
1986	1	178.5	0.0	3.5	0.0	0.0	10.6	0.0	0.0	178.5	3.5	10.6
1989	2	605.7	0.0	8.6	0.0	0.0	21.5	0.0	0.0	605.7	8.6	21.5
1990	3	682.4	0.0	14.4	1.4	0.0	32.7	0.0	0.0	715.8	15.8	32.7
1991	4	440.1	0.0	20.5	3.9	0.0	55.2	0.0	0.0	477.5	24.4	55.2
1992	5	140.8	0.0	86.0	5.0	0.0	78.6	6.7	0.0	140.8	97.0	85.3
1993	6	140.8	0.0	92.0	5.0	0.0	103.0	8.6	0.0	140.8	97.0	111.6
1994	7	264.6	0.0	96.5	5.0	0.0	128.3	9.6	0.0	264.6	101.5	137.9
1995	8	407.2	0.0	102.0	5.0	0.0	154.6	9.6	0.0	407.2	107.0	164.2
1996	9	328.2	109.8	107.2	6.9	0.0	181.8	9.6	0.0	438.7	114.1	191.4
1997	10	222.8	200.3	116.1	9.0	0.1	210.0	9.6	0.0	423.8	125.2	219.6
1998	11	222.8	257.2	124.3	13.3	0.2	239.2	9.6	0.0	482.0	137.8	248.8
1999	12	270.6	281.0	133.1	20.3	0.3	269.4	9.6	0.0	553.6	153.7	279.0
2000	13	390.1	216.1	142.5	27.8	0.3	300.6	93.9	1.5	606.2	170.6	386.0
2001	14	233.1	78.0	144.8	33.2	0.3	330.0	105.1	1.7	311.1	178.3	436.9
2002	15	289.0	119.9	147.2	37.4	0.3	360.5	115.8	1.9	408.9	184.9	478.2
2003	16	308.0	89.4	152.8	41.3	0.3	392.1	115.8	2.1	397.4	194.4	510.1
2004	17	249.5	0.0	156.7	42.9	0.3	424.9	146.1	2.3	250.2	199.9	573.4
2005	18	118.8	0.0	170.1	42.9	0.4	458.8	159.1	2.5	119.6	213.4	616.2
2006	19	308.2	0.0	175.1	42.9	0.5	493.8	159.1	2.8	309.3	218.5	655.8
2007	20	654.9	0.0	181.3	42.9	0.6	530.0	159.1	3.0	656.0	224.8	692.3
2008	21	821.2	0.0	187.9	42.9	0.7	567.4	159.1	3.3	822.3	231.4	729.9
2009	22	858.6	0.0	194.8	42.9	0.7	605.9	159.1	3.6	859.7	238.4	768.7
2010	23	660.5	14.9	202.0	42.9	0.7	645.7	159.1	3.8	675.4	245.6	808.7
2011	24	165.5	18.1	208.8	42.9	0.7	686.3	159.1	4.1	183.6	252.4	849.6
2012	25	73.5	0.0	211.3	42.9	0.7	728.1	159.1	4.3	73.5	254.9	891.6
2013	26	215.0	0.0	214.3	42.9	0.7	771.0	159.1	4.5	215.0	257.9	934.7
2014	27	417.3	0.0	217.8	42.9	0.7	815.2	159.1	4.8	417.3	261.4	979.7
2015	28	538.6	0.0	221.3	42.9	0.7	860.5	159.1	5.0	538.6	264.9	1,024.5
2016	29	538.6	0.0	224.9	42.9	0.7	907.0	159.1	5.2	539.2	268.5	1,071.2
2017	30	417.3	0.0	228.4	42.9	0.7	954.7	159.1	5.4	417.3	272.0	1,119.1
2018	31	336.3	27.9	231.9	42.9	0.7	1,003.6	159.1	5.6	364.2	275.5	1,168.2
2019	32	214.1	53.4	236.4	42.9	0.7	1,053.7	159.1	5.8	268.1	280.0	1,218.5
2020	33	420.4	34.8	240.1	42.9	0.8	1,105.0	159.1	6.0	455.9	283.8	1,270.0
2021	34	584.8	17.6	244.4	42.9	0.9	1,158.6	159.1	6.2	602.8	288.2	1,324.0
2022	35	697.4	33.7	249.2	42.9	0.9	1,213.6	159.1	6.4	731.5	293.0	1,379.2
2023	36	647.3	22.0	254.2	42.9	0.9	1,269.8	159.1	6.6	669.7	298.0	1,435.6
2024	37	514.9	35.0	259.5	43.8	0.9	1,327.4	159.1	6.8	550.9	304.2	1,493.4
2025	38	163.8	35.5	275.6	44.8	1.0	1,386.3	159.1	7.0	200.4	321.4	1,552.5
2026	39	201.9	0.0	281.6	44.9	1.0	1,446.5	174.0	7.2	202.3	327.5	1,627.9
2027	40	278.2	0.0	287.6	44.9	1.0	1,508.1	178.3	7.5	278.6	333.5	1,694.0
2028	41	396.1	0.0	293.6	44.9	1.0	1,571.1	180.4	7.7	396.5	339.5	1,759.3
2029	42	685.1	0.0	299.6	44.9	1.0	1,635.4	180.4	7.9	685.5	345.5	1,823.8
2030	43	709.6	29.4	305.6	44.9	1.1	1,701.1	180.4	8.2	739.0	351.6	1,889.8
2031	44	281.7	32.6	305.6	44.9	1.1	1,761.1	180.4	8.4	314.3	351.6	1,890.0
2032	45	0.0	0.0	305.6	44.9	1.1	1,761.1	180.4	8.4	0.0	351.6	1,890.0
2033	46	0.0	0.0	305.6	44.9	1.1	1,761.1	180.4	8.4	0.0	351.6	1,890.0
2034	47	17.1	0.0	305.6	44.9	1.1	1,761.1	180.4	8.4	17.1	351.6	1,890.0
2035	48	69.0	0.0	305.6	44.9	1.1	1,761.1	180.4	8.4	69.0	351.6	1,890.0
2036	49	65.7	0.0	305.6	44.9	1.1	1,761.1	180.4	8.4	65.7	351.6	1,890.0
2037	50	0.0	0.0	305.6	44.9	1.1	9,850.4	434.7	14.1	0.0	351.6	9,999.3

Table P-4-7 Cost Benefit Flow for Economic Analysis

- Target Year: 2030 -

Unit: Rs. Million

YEAR	NO.	CCI	CC2	CC3	OM1	OM2	OM3	BF1	BF2	BF3	SCC	SOM	SBF
1988	1	136.7	0.0	0.0	3.5	0.0	0.0	7.3	0.0	0.0	136.7	3.5	7.3
1989	2	452.1	0.0	0.0	8.6	0.0	0.0	14.8	0.0	0.0	452.1	8.6	14.8
1990	3	504.9	24.7	0.0	14.4	0.0	0.0	22.5	0.0	0.0	529.6	15.8	22.5
1991	4	327.9	27.3	0.0	20.5	3.9	0.0	38.0	0.0	0.0	355.2	24.4	38.0
1992	5	115.6	0.0	0.0	88.0	5.0	0.0	54.1	6.7	0.0	115.6	93.0	60.8
1993	6	115.6	0.0	0.0	92.0	5.0	0.0	70.9	8.6	0.0	115.6	97.0	79.6
1994	7	213.5	0.0	0.0	96.5	5.0	0.0	88.4	9.6	0.0	213.5	101.5	98.0
1995	8	336.1	0.0	0.0	102.0	5.0	0.0	106.5	9.6	0.0	336.1	107.0	116.1
1996	9	275.6	90.7	0.7	107.2	6.9	0.0	125.2	9.6	0.0	367.0	114.1	134.8
1997	10	185.3	144.8	0.7	116.1	9.0	0.1	144.6	9.6	0.0	350.8	125.2	154.2
1998	11	185.3	205.9	2.0	124.3	13.3	0.2	164.8	9.6	0.0	393.2	137.8	174.4
1999	12	218.6	221.5	2.0	133.1	20.3	0.3	185.5	9.6	0.0	442.1	153.7	195.1
2000	13	301.7	172.4	0.0	142.5	27.8	0.3	207.0	83.9	1.2	474.1	170.6	292.2
2001	14	165.0	58.7	0.0	144.8	33.2	0.3	227.3	105.1	1.4	223.7	178.3	333.9
2002	15	206.1	87.8	0.0	147.2	37.4	0.3	248.3	115.8	1.5	293.9	184.9	385.7
2003	16	220.5	66.6	0.0	152.8	41.3	0.3	270.1	115.8	1.7	287.1	194.4	387.6
2004	17	177.8	0.0	0.7	156.7	42.9	0.3	292.6	146.1	1.9	178.5	199.9	440.7
2005	18	102.0	0.0	0.8	170.1	42.9	0.4	316.0	154.8	2.1	102.8	213.4	472.9
2006	19	243.2	0.0	1.1	175.1	42.9	0.5	340.1	159.1	2.3	244.3	218.5	501.6
2007	20	492.8	0.0	1.1	181.3	42.9	0.6	365.0	159.1	2.5	493.9	224.8	526.7
2008	21	616.5	0.0	1.1	187.9	42.9	0.6	390.8	159.1	2.7	617.6	231.4	552.7
2009	22	639.7	0.0	1.1	194.8	42.9	0.7	417.3	159.1	2.9	640.8	238.4	579.4
2010	23	492.2	9.7	0.0	202.0	42.9	0.7	444.7	159.1	3.2	501.9	245.6	607.0
2011	24	123.9	11.9	0.0	208.8	42.9	0.7	472.6	159.1	3.4	135.8	252.4	635.3
2012	25	61.1	0.0	0.0	211.3	42.9	0.7	501.4	159.1	3.6	61.1	254.9	664.2
2013	26	163.8	0.0	0.0	214.3	42.9	0.7	531.0	159.1	3.7	163.8	257.9	693.9
2014	27	310.1	0.0	0.0	217.8	42.9	0.7	561.4	159.1	3.8	310.1	261.4	724.5
2015	28	398.0	0.0	0.0	221.3	42.9	0.7	592.6	159.1	4.0	398.0	264.9	755.8
2016	29	398.0	0.0	0.6	224.9	42.9	0.7	624.6	159.1	4.1	398.6	268.5	788.0
2017	30	310.1	0.0	0.6	228.4	42.9	0.7	657.5	159.1	4.3	310.7	272.0	821.0
2018	31	251.5	18.3	0.0	231.9	42.9	0.7	691.2	159.1	4.5	269.8	275.5	854.8
2019	32	162.0	35.0	0.6	236.4	42.9	0.7	725.7	159.1	4.6	197.6	280.0	889.5
2020	33	309.7	22.8	0.7	240.1	42.9	0.8	761.0	159.1	4.6	333.2	283.8	925.0
2021	34	424.8	11.5	0.4	244.4	42.9	0.9	798.0	159.1	5.1	436.7	288.2	962.3
2022	35	498.6	22.1	0.4	249.2	42.9	0.9	835.6	159.1	5.3	521.1	293.0	1,000.3
2023	36	473.7	14.4	0.4	254.2	42.9	0.9	874.5	159.1	5.5	488.5	298.0	1,039.2
2024	37	385.4	29.5	1.0	259.5	43.8	0.9	914.2	159.1	5.6	415.9	304.2	1,079.0
2025	38	136.2	30.0	1.1	275.6	44.8	1.0	954.8	159.1	5.8	167.3	321.4	1,119.8
2026	39	161.2	0.0	0.4	281.6	44.9	1.0	996.2	174.0	6.0	161.6	327.5	1,176.4
2027	40	211.2	0.0	0.4	287.6	44.9	1.0	1,038.7	178.3	6.2	211.6	333.5	1,223.2
2028	41	297.7	0.0	0.4	293.6	44.9	1.0	1,082.0	180.4	6.4	298.1	339.5	1,268.9
2029	42	510.2	0.0	0.4	299.6	44.9	1.0	1,126.3	180.4	6.6	345.5	1,313.4	1,313.4
2030	43	528.4	21.9	0.0	305.6	44.9	1.1	1,171.6	180.4	6.8	550.3	1,358.8	1,358.8
2031	44	205.6	24.0	0.0	305.6	44.9	1.1	1,171.6	180.4	7.0	229.6	1,359.1	1,359.1
2032	45	0.0	0.0	0.0	305.6	44.9	1.1	1,171.6	180.4	7.0	0.0	1,359.1	1,359.1
2033	46	0.0	0.0	0.0	305.6	44.9	1.1	1,171.6	180.4	7.0	0.0	1,359.1	1,359.1
2034	47	17.1	0.0	0.0	305.6	44.9	1.1	1,171.6	180.4	7.0	17.1	1,359.1	1,359.1
2035	48	69.0	0.0	0.0	305.6	44.9	1.1	1,171.6	180.4	7.0	69.0	1,359.1	1,359.1
2036	49	65.7	0.0	0.0	305.6	44.9	1.1	1,171.6	180.4	7.0	65.7	1,359.1	1,359.1
2037	50	0.0	0.0	0.0	305.6	44.9	1.1	7,125.3	373.1	12.7	0.0	351.6	7,511.2

Table F-4-8. Code Table for Cost Benefit Flow (II)

Code	Meaning
1. KURANG	Expansion of head works at Kurang, Shahdara, Nurpur, Saidpur, G.C. Old, G.C. New and G-10
2. SIMLY	Expansion related to Simly Dam
3. TW-ISL	New development of tubewells for Islamabad
4. RWAL	Expansion related to Rawal Dam
5. TW-RWL	New development of tubewells for Rawalpindi
6. D + Facility Code	Distribution and other facilities connected with a facility represented by a code
7. CC1A	Total investment cost for development and supply of urban water for the target year of 2010
8. CC1B	Total investment cost for development and supply of urban water for the target year of 2030
9. SHAHPUR	Heightening of Shahpur Dam
10. CC2	Total investment cost for development and supply of irrigation water for the target year of 2030
11. NIAP	Tubewell for the new international airport
12. CC3A	Total investment cost for development and supply of airport water for the target year of 2010
13. CC3B	Total investment cost for development and supply of airport water for the target year of 2030
14. OM1A	Total O/M cost for development and supply of urban water for the target year of 2010
15. OM1B	Total O/M cost for development and supply of urban water for the target year of 2030
16. OM2	Total O/M cost for development and supply of irrigation water for the target year of 2030
17. OM3A	Total O/M cost for development and supply of airport water for the target year of 2010
18. OM3B	Total O/M cost for development and supply of airport water for the target year of 2030

Note: 1) Total investment cost includes initial and replacement cost for water resources development and distribution.
2) Total O/M cost includes O/M cost for water resources development and distribution.

Table F-4-9 Cost Benefit Flow for Financial Analysis by Facility (1)

YEAR	NO.	Investment Cost										Unit: Rs. Million				
		D-1	Dw-1	Dc-1	H-4	Kc-2	Kc-4	Ki-2	Kp-1	Kp-1	Kc-6	KURANG	SIMLY	TW-ISL	Kcp-2	Kc-S
1988	1	0.0	0.0	0.0	0.0	0.0	14.7	0.0	0.0	23.8	0.0	7.7	49.4	2.2	22.8	50.0
1989	2	0.0	0.0	0.0	0.0	0.0	51.4	0.0	0.0	83.2	75.5	26.9	79.0	7.7	80.0	175.0
1990	3	0.0	0.0	0.0	0.0	0.0	51.4	0.0	0.0	83.2	144.7	26.9	79.0	7.7	80.0	175.0
1991	4	0.0	0.0	0.0	0.0	0.0	29.2	0.0	0.0	47.5	94.2	15.2	79.0	4.3	45.7	100.0
1992	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.4	0.0	0.0	0.0
1993	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.4	0.0	0.0	0.0
1994	7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.5	0.0	0.0	0.0
1995	8	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
1996	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
1997	10	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
1998	11	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
1999	12	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
2000	13	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
2001	14	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
2002	15	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
2003	16	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
2004	17	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
2005	18	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
2006	19	114.8	0.0	19.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2007	20	344.1	0.0	47.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2008	21	401.5	21.8	63.7	0.0	0.0	0.0	7.0	46.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2009	22	344.1	41.9	47.1	0.0	0.0	0.0	24.4	164.0	19.4	0.0	0.0	0.0	1.8	18.6	0.0
2010	23	229.1	27.2	36.1	0.0	0.0	0.0	13.8	140.5	67.7	0.0	0.0	0.0	6.3	65.1	0.0
2011	24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.7	67.7	0.0	0.0	0.0	6.3	65.1	0.0
2012	25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.7	0.0	0.0	0.0	3.5	37.2	0.0
2013	26	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
2014	27	0.0	0.0	0.0	141.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	28	0.0	0.0	0.0	343.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	29	0.0	0.0	0.0	465.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2017	30	0.0	0.0	0.0	465.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	31	0.0	0.0	0.0	343.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2019	32	0.0	0.0	0.0	262.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2020	33	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
2021	34	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
2022	35	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
2023	36	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
2024	37	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
2025	38	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
2026	39	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
2027	40	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
2028	41	0.0	0.0	0.0	0.0	0.0	12.0	0.0	38.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2029	42	0.0	0.0	0.0	0.0	0.0	41.9	0.0	114.4	19.4	0.0	0.0	0.0	1.8	18.6	40.7
2030	43	0.0	0.0	0.0	0.0	0.0	41.9	0.0	133.5	67.7	61.7	0.0	0.0	6.3	65.1	142.4
2031	44	0.0	0.0	0.0	0.0	0.0	23.8	0.0	76.3	67.7	118.2	0.0	0.0	6.3	65.1	142.4
2032	45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.7	77.0	0.0	0.0	3.5	37.2	8.1
2033	46	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
2034	47	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
2035	48	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
2036	49	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
2037	50	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

Table F-4-9 Cost Benefit Flow for Financial Analysis by Facility (2)

- Investment Cost -																Unit: Rs. Million			
YEAR	NO.	RAWAL	SL-1	SLP-1	SLC-1	S-1	SC-1	RC-2	L-1	LP-1	LC-1	KL-1	KLP-1	KLC-1	TW-RWL				
1988	1	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8				
1989	2	20.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1				
1990	3	20.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1				
1991	4	11.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6				
1992	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				
1993	6	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				
1994	7	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				
1995	8	0.0	0.0	0.0	0.0	0.0	21.0	44.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
1996	9	0.0	0.0	0.0	0.0	0.0	40.3	54.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
1997	10	0.0	0.0	0.0	0.0	0.0	26.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
1998	11	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				
1999	12	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				
2000	13	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				
2001	14	0.0	51.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
2002	15	0.0	178.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
2003	16	0.0	178.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
2004	17	0.0	102.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0				
2005	18	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				
2006	19	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				
2007	20	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				
2008	21	4.8	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				
2009	22	16.8	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				
2010	23	16.8	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				
2011	24	9.6	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				
2012	25	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				
2013	26	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				
2014	27	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				
2015	28	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				
2016	29	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				
2017	30	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				
2018	31	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				
2019	32	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				
2020	33	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				
2021	34	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				
2022	35	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				
2023	36	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				
2024	37	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				
2025	38	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				
2026	39	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				
2027	40	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				
2028	41	4.8	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				
2029	42	16.8	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				
2030	43	16.8	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				
2031	44	9.6	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				
2032	45	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				
2033	46	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				
2034	47	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				
2035	48	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				
2036	49	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				
2037	50	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				

Table F-4-9 Cost Benefit Flow for Financial Analysis by Facility (3)

- Investment Cost -													Unit: Rs. Million		
YEAR	NO.	DKC-6	DKURANG	DSIMLY	DTW-ISL	DKC-5	DRAWAL	DSLC-1	DRG-2	DKLC-1	DTW-RWL	CC1A	CC1B		
1988	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	176.5	178.5		
1989	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	605.7	605.7		
1990	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	682.4	682.4		
1991	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	440.1	440.1		
1992	5	54.5	3.6	0.0	6.3	17.7	6.3	0.0	0.0	0.0	2.8	140.8	140.8		
1993	6	54.5	3.6	0.0	6.3	17.7	6.3	0.0	0.0	0.0	2.8	140.8	140.8		
1994	7	54.5	3.6	0.0	6.3	17.7	6.3	0.0	0.0	0.0	2.8	264.6	264.6		
1995	8	54.5	3.6	15.3	6.3	17.7	6.3	0.0	0.0	0.0	2.8	407.2	407.2		
1996	9	54.5	3.6	15.3	6.3	17.7	6.3	0.0	0.0	0.0	2.8	328.2	328.2		
1997	10	54.5	3.6	15.3	6.3	17.7	6.3	0.0	116.1	0.0	2.8	222.8	222.8		
1998	11	54.5	3.6	15.3	6.3	17.7	6.3	0.0	116.1	0.0	2.8	222.8	222.8		
1999	12	54.5	3.6	15.3	6.3	17.7	6.3	0.0	116.1	0.0	2.8	270.6	270.6		
2000	13	54.5	3.6	15.3	6.3	17.7	6.3	0.0	116.1	0.0	2.8	390.1	390.1		
2001	14	6.5	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	2.5	233.1	233.1		
2002	15	6.5	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	2.5	289.0	289.0		
2003	16	6.5	0.0	0.0	5.7	0.0	0.0	0.0	0.0	32.9	2.5	308.0	308.0		
2004	17	6.5	0.0	0.0	5.7	0.0	0.0	0.0	0.0	32.9	2.5	249.5	249.5		
2005	18	6.5	0.0	0.0	5.7	0.0	0.0	51.6	0.0	32.9	2.5	99.3	118.8		
2006	19	6.5	0.0	0.0	5.7	0.0	0.0	51.6	0.0	32.9	2.5	99.3	308.2		
2007	20	6.5	0.0	0.0	5.7	0.0	0.0	51.6	0.0	32.9	2.5	99.3	654.9		
2008	21	6.5	0.0	0.0	5.7	0.0	0.0	51.6	0.0	32.9	2.5	145.4	821.2		
2009	22	6.5	0.0	0.0	5.7	0.0	0.0	51.6	0.0	32.9	2.5	260.2	858.6		
2010	23	6.5	0.0	0.0	5.7	0.0	0.0	51.6	0.0	32.9	2.5	260.2	660.5		
2011	24	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	92.0	165.5		
2012	25	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	0.0	73.5		
2013	26	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	0.0	215.0		
2014	27	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	0.0	417.3		
2015	28	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	0.0	538.6		
2016	29	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	0.0	538.6		
2017	30	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	0.0	417.3		
2018	31	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	0.0	336.3		
2019	32	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	5.1	214.1		
2020	33	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	17.7	420.4		
2021	34	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	17.7	584.8		
2022	35	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	10.0	697.4		
2023	36	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	31.7	647.3		
2024	37	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	38.8	514.9		
2025	38	37.0	0.0	0.0	0.0	36.4	0.0	0.0	0.0	0.0	0.0	0.0	163.8		
2026	39	37.0	0.0	0.0	0.0	36.4	0.0	0.0	90.3	0.0	0.0	0.0	201.9		
2027	40	37.0	0.0	0.0	0.0	36.4	0.0	0.0	90.3	0.0	0.0	0.0	278.2		
2028	41	37.0	0.0	0.0	0.0	36.4	0.0	0.0	90.3	0.0	0.0	98.8	396.1		
2029	42	37.0	0.0	0.0	0.0	36.4	0.0	0.0	90.3	0.0	0.0	406.9	685.1		
2030	43	37.0	0.0	0.0	0.0	36.4	0.0	0.0	90.3	0.0	0.0	469.5	709.6		
2031	44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	281.7	281.7		
2032	45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
2033	46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
2034	47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.1	17.1		
2035	48	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.0	69.0		
2036	49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.7	65.7		
2037	50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		

Table F-4-9 Cost Benefit Flow for Financial Analysis by Facility (4)

		Investment Cost											Unit: Rs. Million			
YEAR	NO.	KC-8	JW-1	JP-1	JC-1	SHAFUR NP-1	NC-1	SW-3	SIP-1	DKC-8	DJC-1	DNC-1	DSIP-1	CC2		
1988	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	0.0	0.0	0.0
1989	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	0.0	0.0	0.0
1990	3	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
1991	4	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
1992	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
1993	6	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
1994	7	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
1995	8	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
1996	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
1997	10	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
1998	11	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
1999	12	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
2000	13	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
2001	14	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
2002	15	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
2003	16	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
2004	17	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
2005	18	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
2006	19	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
2007	20	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
2008	21	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
2009	22	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
2010	23	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
2011	24	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
2012	25	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
2013	26	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
2014	27	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
2015	28	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
2016	29	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
2017	30	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
2018	31	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
2019	32	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
2020	33	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
2021	34	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
2022	35	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
2023	36	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
2024	37	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
2025	38	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
2026	39	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
2027	40	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
2028	41	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
2029	42	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
2030	43	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
2031	44	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
2032	45	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
2033	46	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
2034	47	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
2035	48	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
2036	49	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
2037	50	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

Table F-4-9 Cost Benefit Flow for Financial Analysis by Facility (5)

- Investment Cost -

Unit: Rs. Million				
YEAR	NO.	NIAP	DNIAP	CC3A CC3B
1988	1	0.0	0.0	0.0
1989	2	0.0	0.0	0.0
1990	3	0.0	0.0	0.0
1991	4	0.0	0.0	0.0
1992	5	0.0	0.0	0.0
1993	6	0.0	0.0	0.0
1994	7	0.0	0.0	0.0
1995	8	0.0	0.0	0.0
1996	9	0.7	0.0	0.7
1997	10	0.7	0.0	0.7
1998	11	0.0	2.0	2.0
1999	12	0.0	2.0	2.0
2000	13	0.0	0.0	0.0
2001	14	0.0	0.0	0.0
2002	15	0.0	0.0	0.0
2003	16	0.0	0.0	0.0
2004	17	0.7	0.0	0.7
2005	18	0.8	0.0	0.8
2006	19	0.0	1.1	1.1
2007	20	0.0	1.1	1.1
2008	21	0.0	1.1	1.1
2009	22	0.0	1.1	1.1
2010	23	0.0	0.0	0.0
2011	24	0.0	0.0	0.0
2012	25	0.0	0.0	0.0
2013	26	0.0	0.0	0.0
2014	27	0.0	0.0	0.0
2015	28	0.0	0.0	0.0
2016	29	0.6	0.0	0.6
2017	30	0.6	0.0	0.6
2018	31	0.0	0.0	0.0
2019	32	0.6	0.0	0.6
2020	33	0.7	0.0	0.7
2021	34	0.0	0.4	0.4
2022	35	0.0	0.4	0.4
2023	36	0.0	0.4	0.4
2024	37	0.6	0.4	1.0
2025	38	0.7	0.4	1.1
2026	39	0.0	0.4	0.4
2027	40	0.0	0.4	0.4
2028	41	0.0	0.4	0.4
2029	42	0.0	0.4	0.4
2030	43	0.0	0.0	0.0
2031	44	0.0	0.0	0.0
2032	45	0.0	0.0	0.0
2033	46	0.0	0.0	0.0
2034	47	0.0	0.0	0.0
2035	48	0.0	0.0	0.0
2036	49	0.0	0.0	0.0
2037	50	0.0	0.0	0.0

Table F-4-10 Cost Benefit Flow for Financial Analysis by Facility (1)

- O/M Cost -

Unit: Rs. Million

YEAR	NO.	D-1	Dw-1	DC-1	H-4	KC-2	KC-4	KI-2	KP-1	KCP-1	KC-6	KURANG SIMLY	TW-ISL	KCP-2	KC-5
1988	1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.3	0.4	0.1	0.5	0.3	0.5
1989	2	0.0	0.0	0.0	0.0	0.3	0.5	0.0	0.0	0.8	0.4	0.4	1.4	0.8	1.5
1990	3	0.0	0.0	0.0	0.0	0.8	0.8	0.0	0.0	1.3	1.3	0.6	2.3	1.3	2.6
1991	4	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	3.2	1.8	3.6
1992	5	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	4.1	24.9	4.1
1993	6	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	5.0	24.9	4.1
1994	7	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	5.9	24.9	4.1
1995	8	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
1996	9	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
1997	10	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
1998	11	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
1999	12	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
2000	13	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
2001	14	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
2002	15	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
2003	16	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
2004	17	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
2005	18	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
2006	19	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
2007	20	0.0	0.0	0.0	0.0	1.0	1.2	0.0	0.0	40.2	2.6	1.0	6.3	24.9	4.1
2008	21	0.4	0.4	1.3	0.0	1.0	1.2	0.8	1.0	40.2	2.6	1.0	6.3	24.9	4.1
2009	22	1.6	1.6	2.1	0.0	1.0	1.2	1.3	1.8	40.2	2.6	1.0	6.3	24.9	4.1
2010	23	5.0	5.0	2.3	0.0	1.0	1.2	1.8	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2011	24	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2012	25	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2013	26	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2014	27	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2015	28	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2016	29	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2017	30	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2018	31	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2019	32	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2020	33	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2021	34	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2022	35	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2023	36	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2024	37	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2025	38	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2026	39	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2027	40	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2028	41	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2029	42	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2030	43	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2031	44	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2032	45	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2033	46	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2034	47	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2035	48	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2036	49	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1
2037	50	5.5	5.5	2.3	0.0	1.0	1.2	2.0	4.8	40.2	2.6	1.0	6.3	24.9	4.1

Table F-4-10

Cost Benefit Flow for Financial Analysis by Facility (2)

Unit: \$/yr															
YEAR	NO.	RAWAL	SL-1	SLP-1	SLC-1	S-1	SC-1	RC-2	L-1	LP-1	LC-1	KL-1	KLP-1	KLC-1	TW-RWL
1988	1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
1989	2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7
1990	3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1
1991	4	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6
1992	5	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
1993	6	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
1994	7	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
1995	8	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
1996	9	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
1997	10	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
1998	11	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
1999	12	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2000	13	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2001	14	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2002	15	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2003	16	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2004	17	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2005	18	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2006	19	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2007	20	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2008	21	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2009	22	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2010	23	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2011	24	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2012	25	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2013	26	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2014	27	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2015	28	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2016	29	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2017	30	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2018	31	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2019	32	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2020	33	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2021	34	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2022	35	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2023	36	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2024	37	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2025	38	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2026	39	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2027	40	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2028	41	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2029	42	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2030	43	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2031	44	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2032	45	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2033	46	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2034	47	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2035	48	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2036	49	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8
2037	50	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8

Table P-4-10 Cost Benefit Flow for Financial Analysis by Facility (3)

- O/M Cost -

Unit: Rs. Million

YEAR	NO.	DKC-6	DKURANG	DSIMLY	DTW-ISL	DKC-5	DRAWAL	DSLQ-1	DRC-2	DKLC-1	DTW-RWL	OMIA	OMIB
1988	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5	3.5
1989	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	8.6
1990	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.4	14.4
1991	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.5	20.5
1992	5	1.5	0.1	0.0	0.2	0.6	0.4	0.0	0.0	0.0	0.2	88.0	88.0
1993	6	3.1	0.2	0.0	0.4	1.3	0.7	0.0	0.0	0.0	0.4	92.0	92.0
1994	7	4.7	0.4	0.0	0.7	2.0	0.9	0.0	0.0	0.0	0.6	96.5	96.5
1995	8	6.3	0.5	0.6	0.9	2.7	1.2	0.0	0.0	0.0	0.8	102.0	102.0
1996	9	7.9	0.7	1.2	1.2	3.3	1.4	0.0	0.0	0.0	1.1	107.2	107.2
1997	10	9.5	0.8	1.6	1.4	4.0	1.7	0.0	4.5	0.0	1.3	116.1	116.1
1998	11	11.1	1.0	2.4	1.7	4.7	1.9	0.0	9.0	0.0	1.5	124.3	124.3
1999	12	12.7	1.1	3.0	1.9	5.4	2.1	0.0	13.5	0.0	1.7	133.1	133.1
2000	13	14.2	1.2	3.6	2.1	6.0	2.2	0.0	18.0	0.0	1.9	142.5	142.5
2001	14	14.4	1.3	3.6	2.4	6.1	2.2	0.0	18.0	0.0	2.2	144.8	144.8
2002	15	14.6	1.3	3.6	2.6	6.1	2.2	0.0	18.0	0.0	2.4	147.2	147.2
2003	16	14.8	1.3	3.6	2.8	6.1	2.2	0.0	18.0	1.2	2.6	152.8	152.8
2004	17	15.0	1.3	3.6	3.1	6.1	2.2	0.0	18.0	2.5	2.8	156.7	156.7
2005	18	15.2	1.3	3.6	3.3	6.1	2.2	2.0	18.0	3.8	3.0	169.9	170.1
2006	19	15.4	1.3	3.6	3.5	6.1	2.2	4.0	18.0	5.1	3.2	173.8	175.1
2007	20	15.6	1.3	3.6	3.8	6.1	2.2	6.0	18.0	6.3	3.4	177.7	181.3
2008	21	15.8	1.3	3.6	4.0	6.1	2.2	8.0	18.0	7.6	3.6	181.6	187.9
2009	22	16.0	1.3	3.6	4.2	6.1	2.2	10.0	18.0	8.9	3.8	185.5	194.8
2010	23	16.2	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	202.0
2011	24	16.4	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	211.3
2012	25	16.5	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	214.3
2013	26	16.7	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	217.9
2014	27	16.9	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	221.3
2015	28	17.1	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	224.9
2016	29	17.3	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	228.4
2017	30	17.5	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	231.9
2018	31	17.7	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	236.4
2019	32	17.9	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	240.1
2020	33	18.1	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	244.4
2021	34	18.3	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	249.2
2022	35	18.5	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	254.2
2023	36	18.7	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	259.5
2024	37	18.9	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	264.6
2025	38	19.1	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	269.6
2026	39	19.3	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	275.6
2027	40	19.5	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	281.6
2028	41	19.7	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	287.6
2029	42	19.9	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	293.6
2030	43	20.1	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	299.6
2031	44	20.3	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	305.6
2032	45	20.5	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	305.6
2033	46	20.7	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	305.6
2034	47	20.9	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	305.6
2035	48	21.1	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	305.6
2036	49	21.3	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	305.6
2037	50	21.5	1.3	3.6	4.5	6.1	2.2	12.0	18.0	10.2	4.1	189.5	305.6

Table F-4-10 Cost Benefit Flow for Financial Analysis by Facility (4)

- O/M Cost -														Unit: Rs. Million			
YEAR	NO.	KC-8	JW-1	JP-1	JC-1	SHAHUR NP-1	NC-1	SW-3	SIP-1	DKC-8	DJC-1	DNC-1	DSIP-1	OMZ			
1988	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	0.0	0.0	0.0	0.0
1989	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	0.0	0.0	0.0	0.0
1990	3	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
1991	4	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
1992	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
1993	6	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
1994	7	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
1995	8	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
1996	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
1997	10	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
1998	11	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
1999	12	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
2000	13	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
2001	14	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
2002	15	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
2003	16	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
2004	17	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
2005	18	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
2006	19	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
2007	20	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
2008	21	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
2009	22	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
2010	23	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
2011	24	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
2012	25	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
2013	26	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
2014	27	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
2015	28	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
2016	29	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
2017	30	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
2018	31	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
2019	32	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
2020	33	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
2021	34	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
2022	35	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
2023	36	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
2024	37	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
2025	38	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
2026	39	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
2027	40	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
2028	41	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
2029	42	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
2030	43	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
2031	44	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
2032	45	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
2033	46	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
2034	47	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
2035	48	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
2036	49	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
2037	50	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

Table F-4-10 Cost Benefit Flow for Financial Analysis by Facility (5)

- O/M Cost -

Unit: Rs. Million					
YEAR	NO.	NIAP	DNIAP	OM3A	OM3B
1988	1	0.0	0.0	0.0	0.0
1989	2	0.0	0.0	0.0	0.0
1990	3	0.0	0.0	0.0	0.0
1991	4	0.0	0.0	0.0	0.0
1992	5	0.0	0.0	0.0	0.0
1993	6	0.0	0.0	0.0	0.0
1994	7	0.0	0.0	0.0	0.0
1995	8	0.0	0.0	0.0	0.0
1996	9	0.0	0.0	0.0	0.0
1997	10	0.1	0.0	0.1	0.1
1998	11	0.2	0.0	0.2	0.2
1999	12	0.2	0.1	0.3	0.3
2000	13	0.2	0.1	0.3	0.3
2001	14	0.2	0.1	0.3	0.3
2002	15	0.2	0.1	0.3	0.3
2003	16	0.2	0.1	0.3	0.3
2004	17	0.2	0.1	0.4	0.4
2005	18	0.3	0.1	0.5	0.5
2006	19	0.4	0.1	0.6	0.6
2007	20	0.4	0.2	0.7	0.7
2008	21	0.4	0.2	0.7	0.7
2009	22	0.4	0.3	0.7	0.7
2010	23	0.4	0.3	0.7	0.7
2011	24	0.4	0.3	0.7	0.7
2012	25	0.4	0.3	0.7	0.7
2013	26	0.4	0.3	0.7	0.7
2014	27	0.4	0.3	0.7	0.7
2015	28	0.4	0.3	0.7	0.7
2016	29	0.4	0.3	0.7	0.7
2017	30	0.4	0.3	0.7	0.7
2018	31	0.4	0.3	0.7	0.7
2019	32	0.4	0.3	0.7	0.8
2020	33	0.5	0.3	0.7	0.9
2021	34	0.6	0.3	0.7	0.9
2022	35	0.6	0.3	0.7	0.9
2023	36	0.6	0.3	0.7	1.0
2024	37	0.6	0.3	0.7	1.0
2025	38	0.6	0.4	0.7	1.0
2026	39	0.6	0.4	0.7	1.0
2027	40	0.6	0.4	0.7	1.0
2028	41	0.6	0.4	0.7	1.0
2029	42	0.6	0.4	0.7	1.1
2030	43	0.6	0.5	0.7	1.1
2031	44	0.6	0.5	0.7	1.1
2032	45	0.6	0.5	0.7	1.1
2033	46	0.6	0.5	0.7	1.1
2034	47	0.6	0.5	0.7	1.1
2035	48	0.6	0.5	0.7	1.1
2036	49	0.6	0.5	0.7	1.1
2037	50	0.6	0.5	0.7	1.1

Table F-4-11. Cases and Results of Sensitivity Test

1. Cases of Test

<u>Item</u>	<u>Benefits</u>	<u>Costs</u>
Test I	+ 10%	- 10%
Test II	- 10%	+ 10%
Test III	+ 20%	- 20%
Test IV	- 20%	+ 20%

2. Results

1) Financial Analysis

<u>Item</u>	<u>FIRR</u>	<u>Comparison with Standard Value (5.4%)</u>
Test I	7.2%	+ 1.8%
Test II	3.6%	- 1.8%
Test III	9.2%	+ 3.8%
Test IV	1.4%	- 4.0%

2) Economic Analysis

<u>Item</u>	<u>FIRR</u>	<u>Comparison with Standard Value (4.2%)</u>
Test I	6.1%	+ 1.9%
Test II	2.4%	- 1.8%
Test III	8.1%	+ 3.9%
Test IV	0.5%	- 3.7%

Source: EC-1

F.5. Financial Support

F.5.1. Development Budget of Water Sector and Initial Cost

The gross domestic product (GDP) of Pakistan in 1985-86 was Rs.527,792 million at market prices. The Annual Development Programme (ADP), which is the development budget of the nation was Rs.39,398 million in the same year. Consequently, ADP as percentage of GDP comes to 7.5 percent.

ADP at Federal level was Rs.28,416 million, comprising 72.5 percent of national ADP and the balance of Rs.10,982 million or 27.9 percent was earmarked for Provincial ADP in 1985-86. The share of Provincial ADP is growing for the last seven years and conversely that of Federal ADP has dropped by more than 10 percent during that period. ADP for the Province of the Punjab was Rs.5,009 million, occupying 45.6 percent and 12.7 percent of Provincial and national ADP's, respectively in the same year. Average shares of the Punjab ADP in Provincial and national ADP's during the past seven years were 49.9 percent and 10.8 percent, respectively.

Out of the total amount of ADP, Rs.5,197 million or 13.2 percent was appropriated for water sector. In terms of sectoral share, water was accorded the third place following power (22.6%) and transport and communications (14.8%). When one think of the fact that developing countries on average allocate 4 to 5 percent of national budget for the development of water sector, one gets aware of a great extent of emphasis the country places on the development of this sector.

The average ratio of ADP to GDP for the last 7 years from 1979-80 to 1985-86 was 8.2 percent. Also, during the last 10 years from 1976-77 to 1985-86 water sector on average accounted for 10.4 percent of ADP. In other words, the country has consistently pursued the policy of "high priority to water sector" in the past.

Federal ADP for water sector was Rs.4,001 million in 1985-86, which comprised 77.0 percent of national ADP for the same sector. Of the remaining Rs.1,196 million or 23.0 percent appropriated for Provincial ADP for water sector, Rs.636 million or 53.2 percent was accounted for by the Province of the Punjab.

On conditions that the above relationships continue in the future and the average annual growth rate of GDP during the project implementation period 1988 to 2030 is 4.88 percent the cumulative amount of water sector development budget for the same period works out at Rs.715,289 million. At Federal level it is roughly estimated at Rs.550,678 million. On the other hand, initial cost for the water resources development project during the same period is estimated at Rs.11,860.0 million. Also initial cost for the construction of distribution and other facilities is preliminarily estimated at Rs.4,640.0 million. They add up to Rs.16,500.0 million. Thus, the share of the total initial cost in the corresponding water sector development budget works out at 3.0 percent.

Population and GDP of the Project Region as the administrative region encompassing beneficiary areas in 1981 occupied 4.3 percent and 4.5 percent of national population and GDP, respectively. The above share is, therefore, considered to be reasonable and realistic. Thus, the Project is judged to be an undertaking the country can sufficiently cater for in budgetary/financial terms.

F.5.2. Financing Term for Executing Agency

So far the Federal Government has provided CDA with financial resources for the development of bulk water resources in the shape of grants. It is only a quarter of a century since the capital of the country was moved to Islamabad and under such circumstances it is appropriate as well as necessary that the financing terms for the development of the capital should be as soft as possible. However,

it is proposed that under the Project where the ultimate target year is set at 2030 a centralized execution and O/M organization for water resources development, water supply and irrigation unifying Islamabad and Rawalpindi will be established at an appropriate time. And, it is reasonable as well as normal to assume that such an organization will be ultimately managed on self-financing basis.

The Government of the Punjab at times finances a water supply project of a city under its jurisdiction at the interest rate of 11 to 14 percent. Long-term lending rate in the country is estimated at 14 percent, and if a project is to be financially oriented such interest rate will be unavoidable. However, a water supply project involves basic human need and can not be left undone if people are to enjoy hygienic, healthy and modern lives. Actually, World Bank says out of its consultation experiences that such a project rarely has an internal rate of return equal to or exceeding 6 percent.

Analysis reveals that when households spend 2 percent, 2.5 percent and 3 percent of their income on water supply, the urban water supply project under the Project will have the respective FIRR's of 3.3 percent, 5.2 percent and 6.8 percent. Spending 3 percent of their income on water supply is considered to be the maximum borderline households can practically bear.

The Study Team recommend 2.5 percent of income as the Metropolitan households' ability to pay for water supply service under the Project. The team thus proposes that the Federal Government will provide the executing agency of the Project with the development funds at the annual interest rate of 5 percent or less.

Table F-5-1 Comparative Study of Annual Development Programme

Unit: Rs. million							
Item	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85 (Rev.)	1985-86 (Bud.)
Annual Development Programme							
Total (A)	21,970	26,137	28,588	28,255	29,148	34,082	39,398
Federal (B)	18,346	21,501	22,788	22,130	21,736	26,498	28,416
Provincial (C)	3,624	4,634	5,800	6,125	7,412	7,584	10,982
Punjab (D)	1,724	2,403	3,100	3,193	3,670	3,750	5,009
GDP (E)	234,528	277,961	321,840	362,165	418,201	469,911	527,792
F=A/E	9.4%	9.4%	8.9%	7.8%	7.0%	7.3%	7.5%
G=B/A	83.5%	82.3%	79.7%	78.3%	74.6%	77.7%	72.1%
H=C/A	16.5%	17.7%	20.3%	21.7%	25.4%	22.3%	27.9%
I=D/C	47.6%	51.8%	53.4%	52.1%	49.5%	49.4%	45.6%
J=D/A	7.8%	9.2%	10.8%	11.3%	12.6%	11.0%	12.7%

Not: Rev.= Revised, Bud.= Budget. These qualifications are applied to Annual Development Budget only and not to GDP. GDP = GDP at current market prices.

Source: EC-9

Table F-5-2 Sector-Wise Annual Development Programme 1976-77 to 1985-86

Unit: Rs. Million										
Item	1976- 77	1977- 78	1978- 79	1979- 80	1980- 81	1981- 82	1982- 83	1983- 84	1984- 85 (Rev.)	1985- 86 (Bud.)
1. Agriculture	1,347	1,421	2,445	3,297	3,879	3,427	3,203	2,798	2,920	3,106
2. Water (A)	1,852	1,556	1,747	1,610	2,146	2,337	3,727	3,862	3,905	5,197
3. Power	2,422	2,646	2,935	3,239	4,020	4,592	4,908	5,115	8,025	8,923
4. Industry	3,466	4,593	4,575	4,057	4,074	2,657	3,065	2,286	1,597	837
5. Fuels and Minerals	429	587	664	835	1,596	1,400	1,710	2,003	3,117	3,293
6. Transport and Communications	3,175	3,158	3,760	3,822	4,868	5,438	4,772	5,024	5,542	5,850
7. Physical Planning and Housing	1,277	1,273	1,534	1,427	1,831	1,887	2,103	2,612	2,748	3,119
8. Education	566	647	772	891	1,292	1,337	1,475	1,548	1,976	2,355
9. Health	540	512	569	717	942	1,037	1,183	1,563	1,700	1,941
10. Population Planning	183	105	114	169	160	174	176	202	346	484
11. Social Welfare	18	17	17	32	38	44	56	58	59	143
12. Manpower	23	18	39	59	45	102	186	322	206	149
13. Works Programme/Rural Development	181	123	214	203	507	709	791	952	1,042	1,162
14. Indus Basin/Tarbela	619	436	1,031	1,052	1,007	1,324	652	-	-	-
15. Miscellaneous	141	58	59	90	258	517	273	437	372	986
16. Sub-Total	16,239	17,150	20,485	21,500	26,663	27,000	28,280	28,782	33,555	37,545
17. Special Programmes	-	-	-	-	-	-	150	366	527	2,635
18. Operational Shortfall	-	-	-	-	-	-	-	-	-	-782
19. Total (B)	16,239	17,150	20,485	21,500	26,663	27,000	28,430	29,148	34,082	39,398
20. C=A/B	11.4%	9.1%	8.5%	7.5%	8.0%	8.7%	13.1%	13.2%	11.5%	13.2%

Note: Rev.= Revised, Bud.= Budget.

Source: EC-9

Table F-5-3

Sector-Wise, Government-Wise Annual Development Program in 1985-86

Unit: Rs. million

Sector	Total	Federal	Total Provincial	Punjab	Sind	NWFP	Baluchistan
A. Normal ADP							
1. Agriculture	1,666	866	800	371	170	113	146
2. Fertilizer Subsidy	1,440	1,440	-	-	-	-	-
3. Industry	837	672	165	53	45	49	18
4. Minerals	242	179	63	7	7	42	7
5. Water	5,197	4,001	1,196	636	260	178	122
6. Power	8,923	8,867	56	40	-	16	-
7. Fuels	3,051	3,047	4	3	-	1	-
8. Transport and Communications	5,850	4,882	968	320	330	195	123
9. Physical Planning and Housing	3,119	1,252	1,867	1,042	401	256	168
10. Mass Media	154	154	-	-	-	-	-
11. Rural Development	1,162	139	1,023	789	73	105	56
12. Science and Technology	142	142	-	-	-	-	-
13. Education and Training	2,355	921	1,434	697	285	314	138
14. Health and Nutrition	1,941	799	1,142	680	223	186	53
15. Culture, Sports and Tourism	143	109	34	19	8	1	6
16. Manpower and Employment	149	81	68	35	5	7	21
17. Spl. Development Programme for Women	97	97	-	-	-	-	-
18. Population Welfare Programme	484	484	-	-	-	-	-
19. Social Welfare	143	70	73	46	10	12	5
20. Spl. Programme for Women and Youth	214	214	-	-	-	-	-
21. Miscellaneous	236	-	236	182	-	-	54
22. Operational Shortfall	-782	-	-782	-565	-63	-52	-102
Sub-Total	36,763	28,416	8,347	4,355	1,754	1,423	815
Special Programmes	2,635	1,380	1,255	654	264	214	123
Total	39,398	29,796	9,602	5,009	2,018	1,637	938
B.							

Source: EC-9

Table F-5-4. Water Payment and FIRR

Water Payment as Percentage of Income (%)	Unit Price of Domestic Water (Rs./1000 lit.)	Unit Price of Raw Water (Rs./1000 lit.)	FIRR ^{1/} (%)
1	0.83	0.40	-
2	1.67	0.80	3.3
2.5	2.09	1.00	5.2
3	2.50	1.19	6.8

Note: ^{1/} FIRR for urban water supply project.

Source: EC-1

APPENDIX G.

**MINUTES OF MEETINGS
AND
COUNTERPART PERSONNEL**

TABLE OF CONTENTS

G.1. Minutes of Meetings

- (1) Scope of Work G-1
- (2) Presentation of the Inception Report G-14
- (3) Presentation of the Progress Report G-18
- (4) Presentation of the Interim Report
(The Working Committee) G-22
- (5) Presentation of the Interim Report
(The Coordination Committee) G-25
- (6) Explanation on the Findings of the Phase II Study . G-29
- (7) Presentation of the Draft Final Report
(The Working Committee) G-33
- (8) Presentation of the Draft Final Report
(The Coordination Committee) G-38

G.2. Counterpart Personnel G-42

G.1 Minutes of Meetings

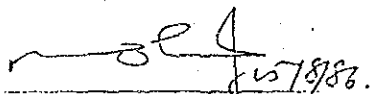
(1) Scope of Work

Scope of work
for
The Regional Study
for
Water Resources Development Potential
for
the Metropolitan Area of Islamabad-Rawalpindi

Agreed upon between
Capital Development Authority
and
Japan International Cooperation Agency

Islamabad, August 25, 1986

For the Government of the
Islamic Republic of Pakistan
(Cabinet Division)



Mr. Mazhar RAFI

Chairman
Capital Development Authority

For the Japan International
Cooperation Agency,
the Government of Japan



Mr. Shiro ICHIHARA

Leader of the Preliminary Study Team
Japan International Cooperation Agency

(1) INTRODUCTION

In response to the request of the Government of the Islamic Republic of Pakistan (hereinafter referred to as "Pakistan"), the Government of Japan has decided to conduct the Regional Study for Water Resources Development Potential for the Metropolitan area of Islamabad-Rawalpindi (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as " JICA "), the official agency responsible for implementation of technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of Pakistan .

The present document sets forth the Scope of Work with regard to the Study .

(2) OBJECTIVE OF THE STUDY

The objective of the Study shall be :

1. to estimate future water demand in the Metropolitan Area of Islamabad-Rawalpindi.
2. to evaluate, comprehensively, water resources development potential in the Study Area.

The Target year of the Study shall be 2010 , making recommendations for water resources development potential beyond 2010 upto 2030 .

(3) STUDY AREA

The Study Area shall consist of the following:

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1. the Metropolitan Area (map attached) : the Islamabad urban area and Rawalpindi both as the area primarily for municipal water demand estimation and as the area for water resources development potential evaluation
2. Inclusions:
 - (1) Left Bank Canal Area
 - (2) Irrigation Area (map attached) in close vicinity of the Metropolitan Area excluding area covered by Master Plan Study for the Integrated Rural Development Project
 - (3) Proposed International Airport Area
3. Vicinity of the Metropolitan Area as the area for water resources development potential evaluation

(4) OUTLINE OF THE STUDY

JICA will conduct the Study in close cooperation with the Pakistani counterpart personnel.

The Study shall include the following :

1. Data collection and review
 - (1) socio-economic background
 - (2) development plans
 - (3) physical condition
topography, geology, hydrology and meteorology, river condition
 - (4) water supply and demand
supply system, water use, demand forecast
 - (5) dams
 - (6) others
groundwater, organization

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2. Field reconnaissance

- (1) topography , geology
- (2) river condition
- (3) land use
- (4) water use
- (5) water supply facilities
- (6) groundwater

3. Analyses and evaluation

- (1) hydrological and hydraulic analysis
- (2) water demand forecast
- (3) water balance analysis
- (4) regional planning of water resources development
- (5) rough cost estimation and evaluation
- (6) recommendation

(5) STUDY SCHEDULE

The Study, in principle, shall be carried out in accordance with the tentative schedule in the attached sheet.

(6) REPORTS

JICA shall prepare and submit the following reports in English to the Government of Pakistan.

1. Inception Report

Thirty (30) copies at the commencement of the work in Pakistan

2. Progress Report

Thirty (30) copies within four (4) months after the commencement of the Study

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3. Interim Report

Thirty (30) copies within nine (9) months after the commencement of the Study

4. Draft Final Report

Thirty (30) copies within thirteen (13) months after the commencement of the Study

The Government of Pakistan shall submit their comments within forty-five (45) days after receipt of the Draft Final Report.

5. Final Report

Fifty (50) copies within forty-five (45) days after the receipt of the comments on the Draft Final Report

(7) UNDERTAKING OF THE GOVERNMENT OF PAKISTAN

1. To facilitate smooth conduct of the Study, the Government of Pakistan shall take necessary measures :

(1) to secure the safety of the Japanese Study Team.

(2) to permit the member of the Japanese Study Team to enter, leave and sojourn in Pakistan for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees.

(3) to exempt the members of the Japanese Study Team from taxes, duties and any other charges on equipment, machinery and other materials brought into Pakistan for the conduct of the Study.

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- (4) to exempt the members of the Japanese Study Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Japanese Study Team for their services in connection with the implementation of the Study,
- (5) to provide necessary facilities to the Japanese Study Team for the remittances as well as utilization of funds introduced into Pakistan from Japan in connection with the implementation of the Study,
- (6) to secure permission for entry into private properties or restricted area for the conduct of the Study,
- (7) to secure permission for the Japanese Study Team to take all data and documents (including unrestricted photographs) related to the Study out of Pakistan to Japan,
- (8) to provide medical services as needed in the Capital Hospital, Islamabad.

Its expenses will be chargeable on members of the Japanese Study Team.

2. The Government of Pakistan shall bear claims, if any arises, against members of the Japanese Study Team resulting from, occurring in course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arises from gross negligence or wilful misconduct on the part of the members of the Japanese Study Team.
3. Capital Development Authority (hereinafter referred to as "CDA") shall act as counterpart agency to the Japanese Study Team in close cooperation with Coordination Committee, headed by a chairman from the Cabinet Division, in order to support smooth and appropriate

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Implementation of the Study.

4. CDA shall , at its own expense, provide the Japanese Study Team with the following, in cooperation with relevant organizations , if necessary.

(1) available data and informations related to the Study.

(2) counterpart personnel.

(3) suitable air-conditioned office with necessary equipment, furniture and its running cost in Islamabad.

(4) credentials or identification cards.

(8) UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures:

1. to dispatch, at its own expense, study teams to Pakistan,

2. to pursue technology transfer to the Pakistan counterpart personnel in the course of the Study.

(9) CONSULTATION

JICA and CDA shall consult with each other in respect of any matter that may arise from or in connection with the Study.

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TENTATIVE STUDY SCHEDULE

	1st	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Work in Pakistan																				
Work in Japan																				
Submission of Report																				

REMARKS: IC/R : Inception Report IT/R : Interim Report F/R : Final Report
P/R : Progress Report DF/R : Draft Final Report

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Minutes of Discussion
on
The Regional Study
for
Water Resources Development Potential
for
the Metropolitan Area of Islamabad-Rawalpindi

The Japanese Preliminary Study Team (hereinafter referred to as "the Team"), organized by the Japan International Cooperation Agency (JICA), headed by Mr. ICHIHARA, visited Islamabad between August 20th and 26th, 1986, to finalize the Scope of Work.

During their stay in Islamabad, the Team had discussions with Capital Development Authority and the authorities concerned of the Government of Pakistan on the draft of Scope of Work.

Participants are shown in Annex I

The main items which were understood by both parties are as follows:-

1. The draft of Scope of Work proposed by the Team was discussed and agreed, with modifications.
2. The Pakistani side informed that the first meeting of the Coordination Committee has been held on August 25th, 1986, and has approved the draft of Scope of Work.

The members of the Coordination Committee are shown in Annex II

3. The municipal water demand shall include demand for domestic, public, commercial and green areas.
4. The Left Bank Canal Area is the irrigation area, approximately 16,000 ha, which had been included in the original Khanpur dam plan but was left out of the present plan.

This area shall be indicated to the Study Team by the Pakistani side before arrival of the

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Team.

5. The water requirement for the proposed international airport which will be constructed in the vicinities of the Metropolitan area of Islamabad-Rawalpindi, shall be indicated by the Pakistani side.

6. Groundwater potential shall be assessed by using existing data and field reconnaissance, supplemented by electric prospecting survey.

The extent of electric prospecting survey shall be judged by the Study Team.

7. Regional planning of water resources development shall include preparation of schematic design for various facilities.

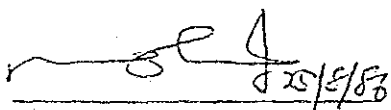
8. Recommendation shall include sedimentation control and telemetric system.

9. The Preliminary Study Team stated that tentative date for the dispatch of the Study Team shall be indicated by JICA by December 1986.

10. Pakistani side stated that concession or exemption shall be made as admissible under the rules.

Islamabad , August 25 , 1986.

For the Government of the
Islamic Republic of Pakistan
(Cabinet Division)



Mr. Mazhar RAFI

Chairman
Capital Development Authority

For the Japan International
Cooperation Agency,
The Government of Japan



Mr. Shiro ICHIHARA

Leader of the Preliminary Study Team
Japan International Cooperation Agency

ANNEX I

LIST OF PARTICIPANTS IN THE MEETING WITH JICA PRELIMINARY STUDY TEAM HELD ON 21ST, 23RD, 24TH AUGUST, 1986 REGARDING THE REGIONAL STUDY FOR WATER RESOURCES DEVELOPMENT POTENTIAL FOR THE METROPOLITAN AREA OF ISLAMABAD-RAWALPINDI

- A EMBASSY OF JAPAN
Mr. S. KARIMATA First Secretary <21st, 23rd only>
- B JAPAN INTERNATIONAL COOPERATION AGENCY
1 Mr. K. WADA Resident Representative <21st, 24th only>
2 Mr. S. ICHIHARA Team Leader
3 Mr. S. TSUBOKA Team
4 Mr. H. TSUNEMATSU Team
5 Mr. T. MIYAZAKI Team
6 Mr. H. KUTSUNA Team
- C CABINET DIVISION, Government of Pakistan
Mr. Aftab AHMED Deputy Chief <24th only>
- D PLANNING AND DEVELOPMENT DIVISION, Government of Pakistan
Mr. Mustansar KHAN Deputy Chief <24th only>
- E CAPITAL DEVELOPMENT AUTHORITY
1 Mr. Mazhar RAFI Chairman <21st only>
2 Brig. Manzoor AHMAD Member Engineering <21st only>
3 Mr. A.Q. NOMANI Director (Water Supply)
4 Mr. Muhammad ASLAM Director (Water and Sewerage) <21st only>
5 Mr. M. A. Mohammad AZAM Deputy Director (Geology)
- F Public Health Engineering Department, Government of Punjab
Mr. Malik Mubarak AHMED Superintending Engineer <21st, 24th only>
- G WATER AND POWER DEVELOPMENT AUTHORITY (WAPDA)
Mr. M. Aslam RAJA Chief Resident Engineer <21st, 24th only>

(3)

Mr.
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LIST OF MEMBERS OF THE COORDINATION COMMITTEE
REGARDING THE REGIONAL STUDY FOR WATER RESOURCES DEVELOPMENT POTENTIAL
FOR THE METROPOLITAN AREA OF ISLAMABAD-RAWALPINDI

1. Cabinet Division
Additional Secretary ; Mr. Abdul Hamid (CHAIRMAN)
2. Capital Development Authority (CDA)
Deputy Director General ; Mr. A.R. Javaid
3. Planning & Development Division, Government of Pakistan
Chief (PP&H) ; Mr. Aijaz Akhtar
4. Ministry of Water & Power , Government of Pakistan
Joint Secretary ; Mr. S. Navid Ali Nasri
5. Water and Power Development Authority (WAPDA)
Project Director, Khanpur Dam Project; Mr. Ataullah Khan
6. Islamabad Capital Territory Administration (ICTA)
Deputy Commissioner ; Kh. Zaheer Ahmed
7. Economic Affairs Division (EAD) , Government of Pakistan
Deputy Secretary (Consortium) ; Mr. Mohammad Faheem
8. Civil Aviation Authority (CAA)
Project Director (North) ; Brig.(Rtd) Mr. Mohammad Akram
9. Housing Physical & Environmental Planning Depttment, Government of Punjab
Superintending Engineer, PHE Circle; Mr. Malik Mubarak Ahmed
10. Central Irrigation Circle, Government of N.W.F.P.
Superintending Engineer ; Mr. Mohammad Jalil Khan
11. Cantonment Board , Rawalpindi
Senior Engineer ; Mr. Fazle-Amin
12. Rawalpindi Division
Commissioner ; Mr. Muhammad Pervez Masud
(4)

Mr. Masud *17/1/80*

(2) Presentation of the Inception Report

Minutes of the Meeting
for
The Inception Report
on
The Regional Study
for
Water Resources Development Potential
for
The Metropolitan Area of Islamabad - Rawalpindi

In accordance with the Scope of Work agreed by both the Governments, the JICA Study Team (hereinafter referred to as 'The Study Team') submitted the Inception Report and Mr. Satoshi Kadowaki, Team Leader of the Study Team, explained the contents of the report. The attendants of the meeting are listed in the sheet attached.

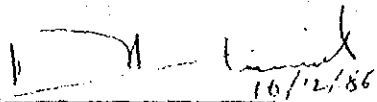
In the course of the meeting, fruitful views were exchanged on all aspects of the Inception Report including irrigable areas and water demand for the proposed International Airport.


In the meeting, followings have been mutually agreed by both parties :-

- i) The contents of Inception Report were accepted by Pakistani side for proceeding with the Study.
- ii) The Study Team was requested to convey to the Government of Japan to train the Pakistani counterpart personnel in the course of home works in Japan.

- iii) Counterpart personnel for Institution and Construction Planning and cost estimate shall be designated from Small Dams Organization in addition to CDA and PHED.

Islamabad, December 15, 1986


16/12/86
Brig. Manzoor AHMAD
Member, Engineering
Capital Development Authority


Mr. Satoshi KADOWAKI
Team Leader,
JICA Study Team

List of Attendant

A. Pakistan Government Officials

Mr. Manzoor Ahmad (Brig. Rtd.)	Member (Engg)/D.G.W. Capital Development Authority
Mr. A.R. Javaid	Dy. Director General (Services) Capital Development Authority
Mr. M. Akram (Brig. Rtd.)	Project Director Civil Aviation Authority
Mr. M. Mustansar Khan	Deputy Chief Planning and Development Division
Mr. A.Q. Nomani	Director (Water Supply) Capital Development Authority
Mr. Muhammad Aslam	Director (Water and Sewerage) Capital Development Authority
Mr. Iftikhar Ahmad Bhutta	Executive Engineer Small Dams Organization
Mr. Iqbal Shah	Executive Engineer Public Health Engineering Department
Mr. Aslam Sabzwari	Assistant Engineer Public Health Engineering Department
Mr. Muhammad Iqbal	Junior Engineer Water and Power Development Authority



B. Study Team Member

Mr. Satoshi Kadowaki	Team Leader
Mr. Hiroyuki Kutsuna	Coordinator JICA
Mr. Murao Tohyama	Co-Team Leader River, Watershed Management Engineer
Mr. Tadao Inaba.	Member Water Resources Planner
Mr. Yasuo Matsubara	Member Hydrologist/Hydraulic Eng.
Mr. Yoosuke Sasaki	Member Geologist/Hydrogeologist
Mr. Masaru Matsuyama	Member Urban Water Planner
Mr. Eiji Goto	Member Irrigation Engineer

(3) Presentation of the Progress Report

Minutes of the Coordination Committee Meeting
of the Regional Study for Water Resources Development
Potential for Metropolitan Area of Islamabad-Rawalpindi
held on 24.2.1987 at Cabinet Division.

The meeting was held at 11. am under the chairmanship of Additional Secretary, Cabinet Division, Government of Pakistan to discuss the agenda already circulated. The participants were as per the Annex.

The Chairman welcomed the Chairman and members of the Advisory Committee JICA and the JICA Study Team members.

The progress report submitted by the JICA Study Team had already been discussed in the Working Committee meeting held on 23.2.1987 and was distributed amongst the participants. The contents of the progress report were accepted in principle and the following were confirmed.

i) Effective Utilization of Water Resources in Kurang River Basin.

The Coordination Committee requested the JICA Study Team to consider the optimum utilization of Kurang river water on the following two alternatives.

(i) On the basis of existing production capacity of facilities of CDA, PHED and Small Dams Organization (Irrigation).

(ii) On the basis of existing and future extension proposals of CDA and PHED



ii) Allocation of Dor River Water Resources

The Study Team was requested to work on the two alternatives, i.e. (i) utilization of Dor river water as proposed in the progress report and (ii) the assumption that Dor river water will not be available.

iii) Water Demand for New International Airport

Recommendations of the Working Committee that the final requirement of water upto the year 2030 will be taken as 1.5 mgd (daily average), were approved.

iv) Determination of Minimum Regulated River Flow

Recommendations of the Working Committee that 355 days discharge may be taken as the minimum regulated flow for the downstream areas of proposed dam sites, were approved.

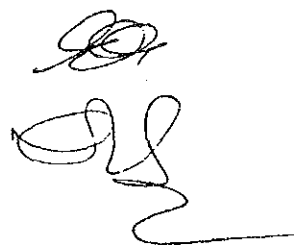
v) Design Drought Year

Recommendations of the Working Committee that drought years for drinking water supply as well as irrigation be taken as one in ten years and no shortage for New International Airport, were approved.

vi) Projection of Water Demand

(a) Urban Water supply

The projected population of Islamabad and Rawalpindi to be served in the year 2030, which is 1,006,000 and 2,261,000 respectively as indicated in the progress report was approved for the purposes of the present study.



(b) Irrigation Water Requirements

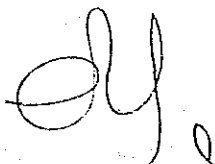
The recommendations of the Working Committee were approved.

(vii) Survey & Investigation of Ling River Basin

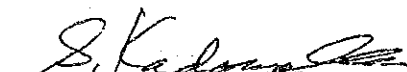
The recommendations of the Working Committee to the effect that detailed survey of the selected site shall be carried out by Pakistan side through CDA's Land Survey Department and shall be furnished to the study team for finalization of the proposal, were approved.

(viii) Training of Pakistan Counterpart Personnel in Japan

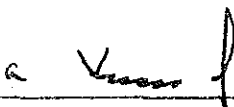
The need for training of counterpart personnel in Japan was stressed by the Chairman of the Coordination Committee.



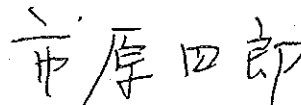
Mr. A.R. JAVAID
Deputy Director General (Services)
CDA (Project Coordinator)



Mr. Satoshi KADOWAKI
Leader
JICA Study Team



Mr. Abdul HAMEED
Chairman, Coordination Committee
(Additional Secretary, Cabinet
Division)



Mr. Shiro ICHIHARA
Chairman
JICA Advisory Committee

Annex

Name List of Participants

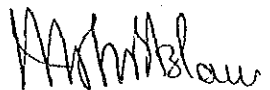
Name	Official Position
<u>1. Coordination Committee</u>	
(1) Abdul Hameed	Additional Secretary, Cabinet Division Chairman Coordination Committee
(2) L.D Janjua	Joint Secretary, Cabinet Division
(3) M. Saeed Mehdi	Commissioner, Rawalpindi Division
(4) A.R Javaid	Dy. D.G CDA
(5) A.Q Namani	Director W&S CDA
(6) Muhammad Aslam	Director W&S (Division) CDA
(7) Saleem Maqsood	Deputy Secretary Ministry of Water and Power
(8) Aftab Ahmed	Deputy Chief (CDA) Cabinet Division
(9) KH. Zaheer Ahmed	Deputy Commissioner ICT Islamabad - I.A
(10) Mubarak Ahmed	S.E. P.H.E. Dept. Rawalpindi
(11) Hafeez Ullah	Project Director Small Dams
(12) Ataullah Khan	Project Director Khanpur Dam WAPDA
(13) Jamshed Feroze	Civil Aviation Authority Office of Project Director(North)
(14) Akhtar Ali Ismaili	Superintending Engineer Central Irrigation Circle Peshawar
(15) M. Mustansar Khan	Deputy Director Chief (PP&H) P&D
<u>2. Embassy of Japan</u>	
(1) Shigeo Karimata	First Secretary, Embassy of Japan
<u>3. JICA Advisory Committee</u>	
(1) Shiro Ichihara	Chairman of Advisory Committee JICA
(2) Hiroshi Tsunematsu	Member of Advisory Committee JICA
(3) Hiroyuki Kutsuna	Coordinator JICA
<u>4. JICA Study Team</u>	
(1) S. Kadowaki	Team Leader
(2) I. Inaba	Water Resources Planner
(3) N. Ishibashi	Economist
(4) M. Matsuyama	Urban Water Planner

(4) Presentation of the Interim Report (The Working Committee)

Minutes of the Working Committee Meeting
Held at 10.00 am in CDA Conference Room
on August 3, 1987.

1. The list of the participants is attached herewith.
2. The meeting was chaired by Mr. A.R. Javaid, Deputy Director General (Services), CDA.
3. The Chair welcomed Dr. K. ISHIZAKI, the Chairman of the Advisory Committee from JICA and the Members of the Advisory Committee. He also welcomed the Study Team and the Members of the Working Committee.
4. Dr. K. ISHIZAKI, while addressing the meeting, appreciated the work done by the study team and cooperation extended by the Pakistani counterparts in the preparation of Interim Report. He also commented on salient feature of the report and expressed full confidence that the remaining work on the Project shall also be completed with the same spirit of cooperation.
5. Mr. S. KADOWAKI the Leader of the Study Team was then requested by the Chair to give brief on the Interim Report.
6. The Interim Report was accordingly explained to the Working Committee. A brief resume of activities and work done so far was made. Future programme of the Study Team as contained in the Interim Report was also explained.
7. Comments were invited from the members of the Working Committee which were clarified by the Study Team Leader and his members of the team to the satisfaction of the concerned.
8. The Study Team was requested to consider the following points in their present stage of study to incorporate in the Final Report.
 - i) Government has asked CDA to develop sixteen new sectors during the next four years. Accordingly, a review of phasing of the project implementation programme might be necessary.
 - ii) In the Interim Report it has been suggested that losses and wastages in the distribution system shall be reduced from 30% in the year 1987 to 20% in the year 2030. The study team may recommend the steps to be taken to achieve the suggested improvement.
 - iii) The economic life of various facilities mentioned in the Interim Report may be reviewed by the Study Team in the light of existing local conditions.
 - iv) Usage of ground water potential may also be considered in the overall assessment of water resources in the study area as mentioned in the Scope of Work.
9. With the observations made in paragraph No. 8, the Interim Report was accepted in principle by the Working Committee. If there is any further comment it will be provided by August 20, 1987.

10. The meeting ended with the word of thanks to the Chair.



Mr. Muhammad Aslam
Director (W&S) Dev.
CDA

04/8/87

Distribution:

All participants.

A t t e n d a n t s ' L i s t

<u>Attendants' Name</u>	<u>Name of Office</u>
1. Working Committee	
1) A.R. Javaid	Dy. Director General (Services), CDA
2) A.Q. Nomani	Director Water Supply, CDA
3) Mohammad Aslam	Director W&S (Dev.), CDA
4) Aftab Ahmad	Cabinet Division
5) M. Mustansar Khan	Planning & Development Division
6) Malik Ahmad Khan	Small Dams Organization.
7) M. Iqbal Shah	Public Health Engineering Deptt.
2. Embassy of Japan	
1) Shigeo Karimata	First Secretary, Embassy of Japan.
3. JICA, Islamabad	
1) Kazuo Tanigawa	Resident Representative of JICA Pakistan Office..
4. JICA Advisory Committee	
1) Katsuyoshi Ishizaki	Chairman of Advisory Committee JICA.
2) Hiroshi Tsunematsu	Member of Advisory Committee, JICA.
3) Hidetoshi Takama	Coordinator, JICA.
5. JICA Study Team	
1) S. Kadowaki	Team Leader
2) M. Tohyama	Water Shed Management Engineer.
3) I. Inaba	Water Resources Planner
4) N. Ishibashi	Economist
5) M. Matsuyama	Urban Water Planner
6) M. Hiratsuka	Dam Designer
7) S. Konishi	Canal Designer
8) Y. Matsubara	Hydrologist
9) Y. Sasaki	Geologist
10) E. Goto	Irrigation Engineer

(5) Presentation of the Interim Report (The Coordination Committee)

Agenda for Committee Meeting Schedule
to be held at 10 A.M. on 4.8.1987
at Cabinet Division, Rawalpindi

Meeting of the Coordination Committee has been convened to consider the interim report prepared by JICA Study Team in connection with water resources development potential for Rawalpindi/Islamabad.

The Interim Report was presented by the Study Team in the Working Committee Meeting held on 3.8.1987. Brief was done by the team leader and comments had been invited from the participants. Necessary clarifications were given by the Study Team to the satisfaction of the members concerned. A copy of minutes of the meeting of the working committee is enclosed for perusal.

The following may be considered by the Coordination Committee:

- i) Minutes of the Working Committee meeting held on 3.8.1987.
- ii) Suggestions may be made by the members of the Coordination Committee for consideration in the present phase of study.
- iii) Acceptance of the Interim Report by the Coordination Committee

An Advisory Committee of JICA headed by Dr. K. ISHIZAKI is currently in Islamabad since 2.8.1987. The Committee had discussion on the Interim Report with CDA and also participated in the Working Committee meeting held on 3.8.1987. The Advisory Committee alongwith the Study Team desired to meet the Coordination Committee on 4.8.1987, for which they have been invited to attend at 10.30 A.M.

Minutes of the Coordination Committee Meeting
of the Regional Study for Water Resources
Development Potential for Metropolitan Area
of Islamabad-Rawalpindi held on 4-8-1987 at
Cabinet Division.

The meeting was held at 10.30 A.M. under the Chairmanship of Additional Secretary, Cabinet Division, Govt. of Pakistan to discuss the agenda already circulated. List of participants is annexed herewith.

2. The Chairman welcomed the Chairman and members of the Advisory Committee of JICA and the JICA Study Team members.

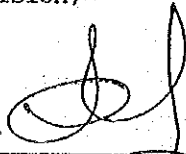
3. The interim report submitted by the JICA Study Team had been discussed in the Working Committee meeting held on 3-8-1987 which was earlier distributed amongst the participants. The contents of the interim report were accepted in principle and the following were confirmed:

- i) The Government has asked CDA to develop sixteen new sectors during the next four years. Accordingly, a review of phasing of the project implementation programme might be necessary.
- ii) In the Interim Report it has been suggested that losses and wastages in the distribution system shall be reduced from 30% in the year 1987 to 20% in the year 2030. The study team may recommend the steps to be taken to achieve the suggested improvement.
- iii) The economic life of various facilities mentioned in the Interim Report may be reviewed by the Study Team in the light of existing local conditions.
- iv) Usage of ground water potential may also be considered in the overall assessment of water resources in the study area within the framework of Scope of Work and the Minutes already agreed upon by both sides.
- v) Data used in the study may be reverified and source thereof indicated in the final report.
- vi) Organizational set up for implementation, operation and maintenance of the project should be suggested and incorporated in the final report.

- vii) The need for training more pakistani counterparts in Japan was again stressed.
- viii) Use of latest facility of satellite photographs for determining ground water potential if available shall be mentioned in the final report.



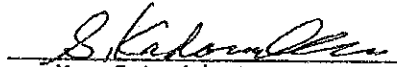
Mr. Abdul Hameed
Chairman, Coordination Committee
(Additional Secretary, Cabinet
Division)



Mr. A.R. Javald
Project Director,
Dy. Director General (Services)
Capital Development Authority.

石崎 勝義

Dr. Katsuyoshi ISHIZAKI
Chairman
JICA Advisory Committee



Mr. Satoshi KADOWAKI
Leader
JICA Study Team

LIST OF PARTICIPANTS

Name	Official Position
<u>Coördination Committee</u>	
1) Abdul Hameed	Additional Secretary, Cabinet Division, Chairman Coordination Committee.
2) S.M.H. Farooqi	Joint Secretary, Cabinet Division.
3) Aijaz Akhtar	Chief, (PP&H), P&D Division, Government of Pakistan.
4) Khalid Mehmood	Engineering Adviser, Ministry of Water and Power.
5) A.R. Javaid	Dy. D.G. (S) CDA.
6) A.Q. Nomani	Director W&S, CDA.
7) Muhammad Aslam	Director W&S (Dev), CDA.
8) Aftab Ahmad	Dy. Chief(CDA), Cabinet Division.
9) Muhammad Karim	Project Director Khanpur Dam, WAPDA.
10) Akhtar Ali Ismaili	Superintending Engineer Central Irrigation Circle Peshawar.
11) M. Mustansar Khan	Dy. Chief (PP&H), P&D.
12) Raja Abdul Hameed	Asstt. Director, Local Govt. ICT, Islamabad.
13) Muhammad Iqbal	XEN P.H.E. Deptt. Rawalpindi.
14) Malik Ahmad Khan	Dy. Director Small Dams Organizations.
<u>JICA Advisory Committee.</u>	
1) Katsuyoshi ISHIZAKI	Chairman of Advisory Committee, JICA.
2) Hiroshi Tsunematsu	Member of Advisory Committee, JICA.
3) Hidetoshi Takama	Coordinator, JICA.
<u>Embassy of Japan.</u>	
1) Shigeo Karimata	First Secretary, Embassy of Japan.
<u>JICA Pakistan Office</u>	
Kazuo Tanigawa	Resident Representative of JICA.
<u>JICA Study Team</u>	
1) S. Kadowaki	Team Leader
2) I. Inaba	Water Resources Planner
3) Y. Matsubara	Hydrologist.
4) N. Ishibashi	Economist.

(6) Explanation on the Findings of the Phase II Study

CAPITAL DEVELOPMENT AUTHORITY

ISLAMABAD

MINUTES OF THE WORKING COMMITTEE MEETING FOR
REGIONAL STUDY ON WATER RESOURCES DEVELOPMENT
POTENTIAL FOR METROPOLITAN AREA OF ISLAMABAD/
RAWALPINDI.

A meeting was held on 7th September, 1987 at 10.00 AM in the Conference Room to discuss the agenda circulated vide No.CDA/DDGS-5(129)/87/6142 dated 29th August, 1987.

List of participants is as per Annexure 'A'.

Deputy Director General (Services), CDA, welcomed the participants and briefed the background of the study to the General Manager/Deputy General Manager, H.M.C. Taxila as they had participated in the meeting for the first time.

1. Review of Phasing of Sixteen New Sectors Implementation Programme.

As per directive of the Federal Minister for Planning, CDA is required to develop sixteen new sectors during the next 4/5 years. As such JICA study team was requested to re-schedule the development programme of water resources development plan. The JICA Study Team replied that it will not officially revise population and demand for Islamabad already agree upon, although reference will be made on the request in the final report. The team considers it possible to unofficially work out water development plan in accordance with the request. It has been agreed that further discussions will be held on the matter between CDA and the team.

2. Counter Measures on the Reduction of Wastage and Leakage Losses from Water Supply System.

Suggestions made by the JICA study team in the material for discussion-papers were agreed in principle. The study team will incorporate them in the draft final report.

3. The Standard Durable Life of Proposed facilities.

The standard durable life of various facilities proposed by the JICA study team were agreed to.

4. Background and Basic Approach of New Organization Set-up for Both Project Implementation and Operation and Maintenance.

JICA Study Team has proposed an organizational set up for the implementation and operation and maintenance of the water resources development works.

It was basically accepted. An organizational chart of a new organization set-up for the Project will be drawn up and discussions be held by the time the team leader leaves for Japan.

5. Effectiveness of Landsat (Satellite) Imagery Data.

JICA Study Team stressed that use of satellite photographs will not be accurate for the determination of ground water comparing with existing data collected. The electric resistivity survey being conducted will give a fair idea about the ground water resources.

It was stressed that the survey being carried out should be as accurate as possible so as to develop these sources, being the most economical.

6. Water Allocation from Khanpur.

Allocation of water from Khanpur for various agencies/areas should be reconsidered keeping in view the available water from springs and underground resources in Wah and Taxila areas. Water requirements for POF and PIDC for the years 2000 to 2030 shall be furnished by Pakistan side by Sep.20 1987.

7. Revised Comprehensive Water Resources Development Plan Based on Additional Field Survey and Study.

Keeping in view the detailed survey and study the originally proposed dam sites on M.1 and N.1 have been dropped and new sites proposed as KL1 and Shahpur Dam.

It was pointed out by the representative of Small Dams Organization that raising of dam, lifting of water by about 200' and then utilizing the same for irrigation purposes would be very expensive.

JICA Study Team informed that they have considered all the possible sources and found the proposed one to be most economical.

It was suggested that if Small Dams Organization has any other proposal, the same may be given to JICA Study Team by 20th of September, 1987, for its consideration. Water resources availability on upper Kurang River was also discussed. Possible utilization of excess water after irrigation water is considered will be discussed with other JICA team.

8. Review of Water Shed Management for Existing Dam;
(Khanpur, Simly Dam, Rawal).

At present, monitoring of all the dams is being done by concerned agencies. JICA study team was requested to propose recommendations in the draft final report.

9. Preliminary Study of the Future Dam Control System for
Existing Dams (Khanpur, Simly and Rawal).

Pakistan side asked the team to provide specific recommendation for the item in draft final report.

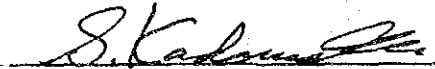
10. Financial Proposals.

These were explained and agreed in principle for their incorporation in the draft final report.

The meeting ended with words of thanks to the chair.



(A. R. JAVAID 09/09/87
Deputy Director General (Services)
Capital Development Authority
Islamabad.



(SATOSHI KADOWAKI)
Leader
JICA Study Team.

Annexure 'A'

LIST OF PARTICIPANTS

<u>Name</u>	<u>Official Position.</u>
1. <u>WORKING COMMITTEE</u>	
1. A. R. Javaid	Deputy Director General (Services), C.D.A.
2. A. Q. Nomani	Director (Water Supply), C.D.A.
3. Mohammad Aslam	Director (Water & Sewerage), (Development), C.D.A.
4. Aftab Ahmed	Deputy Chief (C.D.A.) Cabinet Division.
5. M. Mustansar Khan	Planning & Development Division
6. Malik Ahmed Khan	Deputy Director, Small Dams Organization
7. Mubarak Ahmed Malik	Superintending Engineer, Public Health Engineering Department
8. M. Iqbal Shah	Executive Engineer, Public Health Engineering Department
9. Neseem Ahmed Bhatti	General Manager, Heavy Mechanical Complex, Taxila
10. S. M. Shibli Khan	Deputy General Manager, Heavy Mechanical Complex, Taxila
2. <u>EMBASSY OF JAPAN.</u>	
1. Shigeo Karimata	First Secretary, Embassy of Japan.
3. <u>JICA STUDY TEAM.</u>	
1. S. Kadowaki	Team Leader, JICA Study Team.
2. T. Inaba	Water Resources Planner, JICA Study Team.
3. N. Ishibashi	Economist, JICA Study Team.
4. S. Konishi	Canal Designer, JICA Study Team.
5. Y. Sasaki	Geologist, JICA Study Team.
6. M. Hiratsuka	Dam Designer, JICA Study Team.
7. Y. Matsubara	Hydrologist, JICA Study Team.
8. E. Goto	Irrigation Engineer, JICA Study Team.

(7) Presentation of the Draft Final Report (The Working Committee)

Minutes of the Working Committee Meeting
Held at 10:00 a.m. in CDA Conference Room
on Dec. 7, 1987.

1. The list of the participants is attached herewith.
2. The meeting was chaired by Mr. A.R. Javaid, Deputy Director General (Services), CDA.
3. The chair welcomed Mr. S. Kadowaki, the leader of the JICA Study Team, its members and the members of the Working Committee.
4. Mr. S. Kadowaki was requested by the chair to give brief on the Draft Final Report.
5. The report was accordingly explained to the Working Committee.
6. Comments were invited from the members of the Working Committee, which were clarified by the leader and members of the Study Team to the satisfaction of the concerned.
7. The following is the summary of major points discussed and confirmed between the Working Committee and the Study Team.

1) Estimation of Firm Yield of Water Resources

The Working Committee pointed out that in the study of water resources development plan in Pakistan, firm yield of water resources is usually for the drought year and not for the average year. They asked what consideration in this connection has been given to this study.

The Study Team clarified that

in this study, safe water utilization ratio has been set to allow shortage to occur once in 10 years. For examining this fact, water balance has been studied by computer simulation on 10 days basis using the runoff data for 21 years from 1960 to 1980. Concerning this matter, explanations are detailed in item 6.2.1. (page VI-18 to VI-20) of the Main Report.

2) Need for Comprehensive Study on Groundwater Resources

The Working Committee was of the opinion that the Study Team should have made a comprehensive evaluation on development potential of groundwater resources in accordance with the Scope of Work.

The Study Team replied that the team considers that it made an overall assessment of groundwater resources development potential based on the existing data and field reconnaissance supplemented by electric prospective survey in pursuance of the S/W and the ensuing Minutes of Discussion.

The Study Team stated that they have recommended that further study on the matter be conducted in accordance with the guidelines set forth in item 606 (page 30 to 31) of the Executive Summary or in item 6.3.4. to 6.3.5. (page VI-36 to VI-52) of the Main Report. Especially, the team in this connection stressed the need for the recording of hydrographs of groundwater level correlated to daily precipitation at least for one year.

It was agreed that detailed discussion may be held between CDA and JICA on arrival of Dr. K. Ishizaki, the chairman of the JICA Advisory Committee on 8-12-1987.

3) Review of Items Confirmed in the Last Coordination Committee Meeting.

- i) Government had asked CDA to develop sixteen new sectors during the next four years. Accordingly, a review of phasing of the project implementation programme might be necessary.

Status: The review was not possible in the absence of required information on detailed development programme of CDA.

- ii) In the Interim Report it was suggested that losses and wastages in the distribution system shall be reduced from 30% in the year 1987 to 20% in the year 2030. The study team was to recommend the steps to be taken to achieve the suggested improvement.

Status: Recommended steps to be taken are described in page IV-12 to IV-13 of the Main Report.

- iii) The economic life of various facilities mentioned in the Interim Report may be reviewed by the Study Team in the light of existing local conditions.

Status: Revised economic life of facilities which was agreed upon in the last Working Committee meeting is adopted and used in the Draft Final Report as shown in page VII-9 of the Main Report.

- iv) Usage of ground water potential may also be considered in the overall assessment of water resources in the study area within the framework of Scop of Work and the Minutes already agreed upon by both sides.

Status: Refer to item 2) above.

- v) Data used in the study may be reverified and source thereof indicated in the final report.

Status: List of Reference is shown in page XV to XVI of the Main Report. Sources for tables and figures are indicated where necessary and the said list is the list of sources to be referred to.

- vi) Organizational set up for implementation, operation and maintenance of the project should be suggested and incorporated in the final report.

Status: Organizational set up for implementation, operation and maintenance of the project is suggested and incorporated in item 8.3.2. (page XIII-6 to XIII-9) of the Main Report.

- vii) The need for training more Pakistani counterparts in Japan was again stressed.

Status: No discussion was made on this item.

- viii) Use of latest facility of satellite photographs for determining ground water potential if available shall be mentioned in the final report.

Status: It is mentioned in item 6.3.5. (page VI-52) of the Main Report. The point is that in a highly developed area like the study area, the Landsat imagery techniques are not so effective or useful.

8. It was agreed that if there is any further comment it will be provided by the end of December, 1987.
9. The meeting ended with the word of thanks to the chair.



Mr. A.R. Javaid
Dy. Director General (Services)
Capital Development Authority



Mr. Satoshi KADOWAKI
Leader
JICA Study Team

List of Participants

Name	Official Position
<u>1. Coordination Committee</u>	
(1) A.R. Javaid	Dy. D.G. (Services) CDA
(2) A.Q. Nomani	Director W&S CDA
(3) Muhammad Aslam	Director W&S (Dev.) CDA
(4) Aftab Ahmed	Deputy Chief (CDA) Cabinet Div.
(5) Malik Ahmed Khan	Deputy Director, SDO
(6) Aftab Ahmed	Superintending Engineer, PHED
(7) M. Iqbal Shah	Executive Engineer, PHED
(8) S.M. Shibli Khan	Deputy General Manager, Heavy Mechanical Complex, Taxila
<u>2. JICA Study Team</u>	
(1) S. Kadowaki	Team Leader, JICA Study Team
(2) Y. Matsubara	Hydrologist, JICA Study Team
(3) N. Ishibashi	Economist, JICA Study Team

(8) Presentation of the Draft Final Report (The Coordination Committee)

Minutes of the Coordination Committee
Meeting of the Regional Study for Water
Resources Development Potential for
Metropolitan Area of Islamabad-Rawalpindi
Held on 9.12.1987 at Cabinet Division.

The meeting of the Coordination Committee was held in the Conference Room of Cabinet Division at 10:30 a.m. on 9.12.1987. The meeting was chaired by Mr. Abdul Hameed Additional Secretary of Cabinet Division, Government of Pakistan. The list of participants is attached herewith.

The agenda for the meeting and copies of the Draft Final Report had been circulated amongst all the members earlier.

The Chairman welcomed the members of the Coordination Committee and requested Mr. A.R. Javaid, Deputy Director General (Services), CDA to explain briefly the Draft Final Report submitted by JICA.

The report was accordingly explained by Mr. A.R. Javaid, after which comments were invited by the Chairman from the participants of the meeting.

Certain observations were made by some members, which were clarified by Mr. A.R. Javaid.

The progress on the previous minutes of the last Coordination Committee meeting held on 4.8.1987 was also reported in the meeting. It was noted that all points raised in the last Coordination Committee meeting had been taken care of in the preparation of the Draft Final Report.

The Working Committee meeting was held on 7.12.1987 and minutes of the said meeting were put up before

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the Coordination Committee. It was explained to the Committee that according to the minutes of the said meeting, the matter regarding assessment of groundwater potential was discussed with Dr. K. Ishizaki, the Chairman of the JICA Advisory Committee on 8.12.1987, who expressed that the assessment of groundwater potential was carried out quite in accordance with the scope of work.

Thereafter, the JICA Advisory Committee and Study Team delegations were invited to join.

The Chairman, while welcoming Dr. K. Ishizaki, Mr. S. Kadowaki, the leader of the JICA Study Team and Members of the Japanese delegations expressed his satisfaction and appreciated the work done by JICA in the preparation of the Draft Final Report.

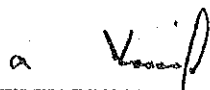
Dr. K. Ishizaki delivered a speech thanking for the efforts made by all the concerned for the preparation of the report, and expressed his hope that this Study would be successfully completed.

Mr. S. Kadowaki explained in brief the salient features of the report and expressed his gratitude for the cooperation extended by all the Pakistani officials concerned.

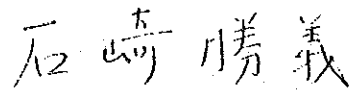
The Draft Final Report was observed to be exhaustive containing all required details as demanded of a masterplan study. The report was therefore accepted.

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The meeting ended with a word of thanks
from Mr. K. Tanigawa, the Resident Representative of
JICA Pakistan Office.



Mr. Abdul Hameed
Chairman, Coordination Committee
(Additional Secretary, Cabinet
Division)



Dr. Katsuyoshi ISHIZAKI
Chairman
JICA Advisory Committee



Mr. A.R. Javaid
Project Director
Dy. Director General (Services)
Capital Development Authority



Mr. Satoshi KADOWAKI
Leader
JICA Study Team

LIST OF PARTICIPANTS

<u>Name</u>	<u>Official Position</u>
<u>Coordination Committee</u>	
1) Mr. Abdul Hameed	Additional Secretary, Cabinet Division, Chairman Coordination Committee.
2) Mr. S.M.H. Farooqi	Joint Secretary, Cabinet Division.
3) Mr. A.R. Javaid	Dy. Director General (Services) CDA.
4) Mr. A.Q. Nomani	Director, W&S, CDA.
5) Mr. Muhammad Aslam	Director, W&S, (Dev), CDA.
6) Mr. Aftab Ahmad	Dy. Chief (CDA), Cabinet Division.
7) Mr. Latif Ahmad	Dy. Engineering Adviser, Ministry of Water and Power.
8) Mr. Amjad Nazir	Director, Local Government, Rawalpindi.
9) Malik Ahmad Khan	Dy. Director, Small Dams Organization.
10) Mr. Tahir Mohmood	Technical Officer, WAPDA, Khanpur Dam.
11) Mr. Aftab Ahmed	Superintending Engineer, PHED.
12) Mr. M. Iqbal Shah	Executive Engineer, PHED.
13) Raja Abdul Hameed	Asstt: Director, Local Govt. ICT, Islamabad.
<u>JICA Advisery Committee</u>	
1) Dr. Katsuyoshi ISHIZAKI	Chairman of Advisery Committee, JICA.
2) Mr. Atsuo MATSUDA	Coordinator, JICA.
<u>JICA Pakistan Office</u>	
1. Kazuo TANIGAWA	Resident Representative of JICA
<u>JICA Study Team</u>	
1) Mr. S. KADOWAKI	Team Leader
2) Mr. Y. MATSUBARA	Hydrologist
3) Mr. N. ISHIBASHI	Economist

G.2. Counterpart Personnel

(1) Federal Government Officials Concerned

Mr. Abdul Hameed (Chairman of C.C.)	Additional Chief Secretary, Cabinet Division.
Mr. S. Navid Ali Nasri	Joint Secretary, Ministry of Water & Power
Mr. Aijaz Akhtar	Chief, Physical Planning & Housing Planning and Development Division.
Mr. Mohammad Akram	Project Director (North) Civil Aviation Authority.
Mr. Mohammad P. Masud	Commissioner, Rawalpindi Division
Mr. Fazal Amin	Senior Engineer, Cantonment Board, Ministry of Defence.
Mr. Mohammad Faheem	Deputy Secretary (Consortium) Economic Affairs Division
Mr. Zaheer Ahmad	Deputy Commissioner, Islamabad Capital Territory Administrator
Mr. Mustansar Khan	Deputy Chief Planning and Development Division
Mr. Aftab Ahmed	Deputy Chief, Cabinet Division
Mr. Main M. M. Alam	Chief Engineer Federal Flood Commission

(2) Capital Development Authority (CDA)

Mr. Mazhar Rafi	Chairman
Mr. Manzoor Ahmad	Member, Engineering
Mr. A.R. Javid	Deputy Director General (Service)

Mr. A.Q. Nomani	Director, Water Supply
Mr. Muhammad Aslam	Director, Water & Sewage (Development)
Mr. Abdul Wahid Shahid	Director, P & ENC
Mr. Shafiq Ali Siddiqui	Director, Survey & Research
Mr. K.A. Hasan	Director, Master Plan
Mr. Rafiq Khattak	Director, Environment
Mr. Aulia Khan	Director, Soil Conservation
Mr. Agha Mohammad Azam	Deputy Director, Geology
Mr. Sana-Ulah Awan	Deputy Director, Land Survey
Mr. Ikram Ullah	Deputy Director, Water Service
Mr. Syed Mohamood Ahmad	Assistant Director, Water Service

(3) Water and Power Development Authority (WAPDA)

Mr. M.A. Qureshi	Chief Engineer, CDO (Water)
Mr. L.H. Siddiqui	Chief Engineer, Hydrology and Water Management
Mr. Muhammad Jabbar	Project Director, Planning & Investigation
Mr. M. Saleem Warsi	Project Director, Surface Water Hydrology
Mr. Ataullah Khan	Project Director, Khanpur Dam Project
Mr. Raja M. Aslam	Chief Resident Engineer
Mr. Fida Hussain	Executive Engineer, Hydrology Division
Mr. Hafeez ullah Shinwari	Executive Engineer, Khanpur Dam

(4) Punjab Provincial Government

Mr. Malik Mubarak Ahmed	Superintending Engineer, PHED
Mr. Y.A. Gauhar	Executive Engineer, PHED
Mr. Iqbal Shah	Executive Engineer, PHED
Mr. M. Aslam Ali Sabzwari	Assistant Engineer, PHED

Mr. Raja M. Afzal Khan	Chief Engineer (Drainage & Flood) Irrigation and Power Department, (IPD)
Mr. Hafiz Ullah	Project Director, SDO (IPD)
Mr. Iftikhar Ahmad Bhutta	Executive Engineer, SDO (IPD)
Mr. Malik Ahamad Khan	Deputy Director SDO (IPD)
Mr. Mohammad Aslam	Deputy Director, SDO (IPD)
Mr. B. Bashir Ahmed	Economist, SDO (IPD)
Mr. Mian M. Aslam	Agronomist, SDO (IPD)
Mr. Mueen-nd-Din Dewood	Assistant Design Engineer, SDO (IPD)
Mr. Mohammed Monsher	Sub Engineer, SDO (IPD)

(5) N.W.F. Provincial Government

Mr. Mohammad Jalik Khan	Chief Engineer, Irrigation Department (ID)
Mr. Abdur Rahman Khan	Chief Conservator of Forest, Forest Department
Mr. Hussain Shar	Executive Engineer, Hydrology Division (ID)

(6) Other Agencies Concerned

Mr. Tariq Iqbal Khan	Municipal Engineer, RMC
Mr. Makhdum Jamil Ahmed	Commander, MES (Army)
Mr. Monzoor Ahmed butt	Deputy Commander, MES (Army)
Mr. Rashid Hashmi	Senior Engineer, CB.
Mr. Ihsan Ali Nasir	Assistant Secretary, CB.
Mr. Mumtaz Akbar	Town Planner, RMC

JICA