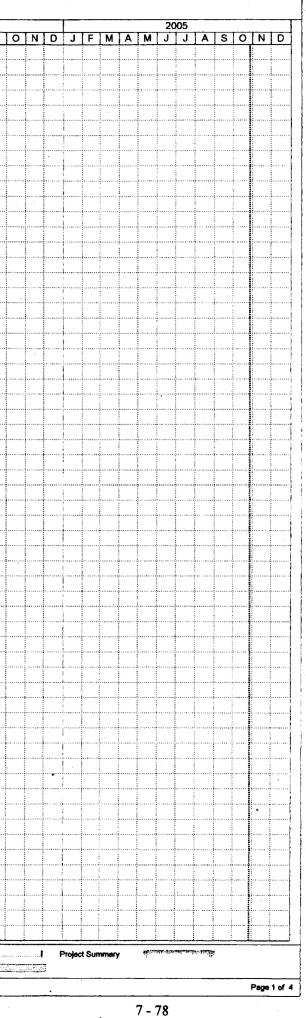
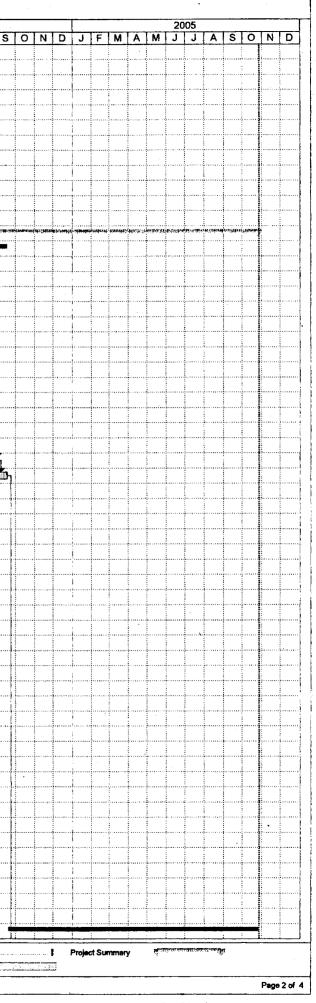
0	Task Name	Duration	Start	Finish	ONDJEMAN	2003 M J J A S O N	2004 D J F M A M J J A
1	TR. MAIN FROM AMBATALE TO GOTHTHATUWA	559 days	Fri 10/25/02	Fri 8/6/04			
1	Submit material approval forms	12 days	Fri 10/25/02	Thu 11/7/02	<b>□</b> ₁		
	Mobilize, Establish site offices	12 days	Fri 10/25/02	Thu 11/7/02			
	Identify borrow pits	6 days	Fri 10/25/02	Thu 10/31/02	b		
1	Identify dumping sites	6 days	Fri 10/25/02	Thu 10/31/02	<b>D</b>		
	Obtain Excavation Permits	12 days	Fri 11/8/02	Thu 11/21/02	1		
	Approve materials	12 days	Fri 11/8/02	Thu 11/21/02	<b>1</b>		
	Ordering & delivery of materials	250 days	Fri 11/22/02	Tue 9/9/03			
1	Arrange road closures	12 days	Wed 9/10/03	Tue 9/23/03		Ъ.	
1 .	Setout pipelines & prepare drawings	24 days	Wed 9/24/03	Tue 10/21/03		Č.	
1	Identify bed soil areas	1 day	Wed 10/22/03	Wed 10/22/03			
1	Procure and deliver materials at site	30 days	Wed 9/10/03	Tue 10/14/03		- <b>Č</b>	
· ·	Excavate trial pits & Identify existing utilities	48 days	Wed 10/15/03	Tue 12/9/03			3.
1	Obtain Engineers approval	12 days	Wed 10/22/03	Tue 11/4/03		Ъ.	
1	Finalize Detours	12 days	Wed 11/5/03	Tue 11/18/03	· · · · · · · · · · · · · · · · · · ·	Ľ,	
1	Inform Police & Public transport	12 days	Wed 11/19/03	Tue 12/2/03			
1	Excavate trenches & lay pipes	192 days	Wed 11/19/03	Tue 6/29/04			
1	Provide Anchor blocks	150 days	Wed 12/31/03	Tue 6/22/04		Ľ	
	Carryout Pressure tests	144 days	Wed 1/14/04	Tue 6/29/04			
1	Backfill and Construct chambers	144 days	Wed 1/28/04	Tue 7/13/04			
	Link to Goththatuwa Kolonnawa Pump House	6 days	Wed 7/14/04	Tue 7/20/04			
	Flush and diainfect the pipes	5 days	Wed 7/21/04	Mon 7/26/04			<b>_</b>
-	Testing & Commissioning Transmission Main	5 days	Tue 7/27/04	Sat 7/31/04			·····
	Handover Transmission Main to NWSDB						Γ'}
	GOTHATUWA-KOLONNAWA PUMP HOUSE	5 days	Mon 8/2/04	Fri 8/6/04			
<u>}</u>	CIVIL WORKS	370 days	Mon 5/28/03	Thu 7/29/04			
1		220 days	Tue \$/26/03	Fri 5/7/04	<b> </b>		
	Site Mobilization	6 days	Tue 8/26/03	Mon 9/1/03		<u> </u>	
<u> </u>	Site clearing & Demolishing works	6 days	Tue 9/2/03	Mon 9/8/03		ն	
1	Setting out works	3 days	Tue 9/9/03	Thu 9/11/03			
	Excevation works	5 days	Fri 9/12/03	Wed 9/17/03		<u> </u>	
-	Levelling & Compaction works	4 days	Thu 9/18/03	Mon 9/22/03		- Fj	
}	Blinding Concrete for Foundation	3 days	Tue 9/23/03	Thu 9/25/03		<u> </u>	
	Foundation Slab - Formwork, Reinforcement, Water Bar fixing & Concrete	28 days	Fri 9/26/03	Tue 10/28/03			
ļ	Foundation Stab Curing	6 days	Wed 10/29/03	Tue 11/4/03		<u>ф</u>	
	RC walls & Columns- Formwork, Reinforcement, Water Bar fixing & Concrete	28 days	Wed 11/5/03	Sat 12/6/03		Ľ	<u>ካ :            </u>
	Curing of Walls & Columns	6 days	Mon 12/8/03	Sat 12/13/03	ļ		б <u>і</u>
<u>.</u>	Connecting 1200 Dia. Water Main	6 days	Mon 12/15/03	Sat 12/20/03			Č_
<u> </u>	Filling Water, Testing the Sump & Pipes	28 days	Mon 12/22/03	Thu 1/22/04			
	Disinfecting the Pipes & Fittings	4 days	Fri 1/23/04	Tue 1/27/04			С <u>Й</u>
1	Back filling works & Compaction	6 days	Wed 1/28/04	Tue 2/3/04			<u>Б</u>
1	Staging area RC Slab - Formwork, Reinforcement & Concrete	12 days	Wed 2/4/04	Tue 2/17/04			Č,
	Curing Staging area slab	6 days	Wed 2/18/04	Tue 2/24/04			Č,
-	Sump Roof Slab - Formwork, Reinforcement & Concrete	12 days	Wed 2/25/04	Tue 3/9/04			Ъ,
	Curing Roof Slab of Reservoir	6 days	Wed 3/10/04	Tue 3/16/04			ι <b>ζ</b>
	RC Columns of Pump house - Formwork, Reinforcement & Concrete	12 days	Wed 2/25/04	Tue 3/9/04			Č,
1.	Curing RC Columns of Pump House	6 days	Wed 3/10/04	Tue 3/16/04			Ľ,
	RC Roof Frame - Formwork, Reinforcement & Concrete	12 days	Wed 3/17/04	Tue 3/30/04			Ľ₁
	Curing RC Roof Frame	6 days	Wed 3/31/04	Tue 4/6/04			Ē,
!	Pump House Roofing Works	12 days	Wed 4/7/04	Tue 4/20/04			Ť.
	Works on Pump House Block Walls	6 days	Wed 3/17/04	Tue 3/23/04			
1	Fixing Doors, Windows & Roller Doors	21 days	Wed 3/24/04	Fri 4/16/04			
1	Pump House Finishing works	12 days	Sat 4/17/04	Fri 4/30/04			
1	Sump Roof Waterproofing & laying of Pebbles	12 days	Wed 3/17/04	Tue 3/30/04			
<u> </u>	Construction of Thrust Blocks	6 days	Sat 5/1/04	Fri 5/7/04			
	MECHANICAL WORKS	341 days	Mon 5/26/03	Fri 6/25/04			
3	Ordering & Procuring Pumps, Pipes, Fittings & Gantry Crane	250 days	Mon 5/26/03	Thu 3/11/04			
1	Setting out of Internal Piping works	200 days 2 days	Frl 3/12/04	Sat 3/13/04		1	
1				Fri 5/14/04			
<b>\</b>	Installation of Gantry Crane	6 days	Sat 5/8/04				
+	Laving of Pipes & Fittings	12 days	Sat 5/15/04	Fri 5/28/04			Č,

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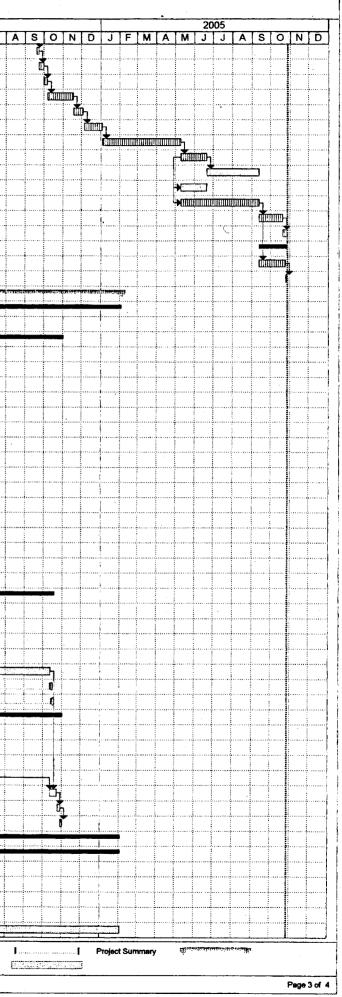


	1	To all blows	·	<b>.</b>	<b>P</b>	F	1	<u> </u>		-1	17.1	-	11.1	200			Te	-	T - 1	τ-	<del>_+</del>	<del>,</del>		1	- i	<del></del>		200			
2	0	n Task Name Installation of Pumps & Surge Tanks	Duration 12 days	Start Sat 5/29/04	Finish . Fri 6/11/04	0	N	D	J	F	M	A	M	J	2	A	S	0			2	1	F	M	4	<u> </u>	<u>4 – </u>	1	1	<u>A</u>	S
12		Construction of MS Platform, Cat ladders & Hand rails.	12 days	Sat 6/12/04	Fri 6/25/04																····						تب ر	1			
3		ELECTRICAL WORKS	178 days	Wed 10/29/03	Sat 5/22/04															:								<u>الما</u>			
4		Electrical Conduiting works	12 days	Wed 10/29/03	Tue 11/11/03											••••••			Ť					÷							
5		Electrical Wiring works	12 days	Sat 4/17/04	Fri 4/30/04	ł													 ;										-		
6		Electrical first fix	6 days	Sat 5/1/04	Fri 5/7/04														-					·	-						
7		Electrical final fatures	12 days	Sat 5/8/04	Fri 5/21/04																					- 7	<u>لية</u>				•••••
68	-	Testing of Electrical fixtures	1 day	Sat 5/22/04	Sat 5/22/04	1															····						T.				
69	1	EXTERNAL WORKS	104 days	Wed 3/31/04	Thu 7/29/04	•																		<u> </u>	-		_	÷	4		
70	i –	Construction of Roads, Pavings & Fencing works	21 days	Wed 3/31/04	Fri 4/23/04	f	· · ·																	1		3					
71		Testing & Commisioning the Pumps & Gantry Crane	2 days	Tue 7/27/04	Wed 7/28/04			•••••													·····			1		-			N,		•••••
2	1	Final Inspection, Snagging & handing over	1 day	Thu 7/29/04	Thu 7/29/04	•													-				•••••						Ť	,	
73	2	GOTHATUWA RESERVOIR, PUMP HOUSE & WATER TOWER	633 days	Tue 5/27/03	Wed 10/26/05					····			<b>1</b>	-	47 <b>1.44</b> 4	-	****		-		2019 H	-	***		and the second	ale		Barbirds,	-		Name and
1	1	CIVIL WORKS - RESERVOIR & PUMP HOUSE	291 days	Fri 8/8/03	Fri 9/17/04									1			-		-							÷			·[		-
2	3	Site Mobilization	6 days	Fri 8/8/03	Fri 8/15/03					·····		- h			}	ս													1	·····	• • • • •
3	-	Site clearing & Demotishing works	6 days	Mon 8/18/03	Mon 8/25/03			•••••				Ť				Ō	1		-		- j					-					•••••
4		Setting out works	5 days	Tue 8/26/03	Mon 9/1/03							1		Ť			<b>1</b>		1					1		Ī		-	1		
5	Ť	Excavation works & Protection of Embankments	12 days	Tue 9/2/03	Wed 9/17/03	1		•••••			1						Ľ,		-		i			1							
6	+	Levelling & Compaction works	3 days	Thu 9/18/03	Mon 9/22/03	i						····†					ľ							1	-						
7	i	Construction of Under Drains & Gravity drains	28 days	Tue 9/23/03	Thu 10/30/03	-				Ť	Ť	Ť		Ť			2	-	Ъ					1		Ť					••••
8		Blinding Concrete for Foundation	2 days	Fri 10/31/03	Mon 11/3/03	-										••••			ĥ					1				-			
9	İ	Foundation Slab - Formwork, Reinft, Water Bar fixing & Concrete	45 days	Tue 11/4/03	Mon 1/5/04	-													Ł		$\square$	h			-						
10	÷	Foundation Stab Curing	6 days	Tue 1/6/04	Tue 1/13/04	1		•••••		Ť	Ī	Ť		T			-		Ī		5	۲, E		İ				T			
11	<u>†</u>	RC walls & columns- Formwork, Reinft, Water Bar fixing & Concrete	28 days	Wed 1/14/04	Fri 2/20/04											••••••	<u>.</u>			1	•••••.]•• 	Ł	Ъ			1					••
12	<u>}</u>	Curing of Wells & columns	6 days	Mon 2/23/04	Mon 3/1/04	•																	Ľ	5							
13	÷	Yard piping & Connecting Supply Water Main	60 days ;	Tue 3/2/04	Mon 5/24/04					i		i			1		1				·····}··	1		Ł			<u>_</u>				
15	1	Filling Water, Testing the Reservoir & Pipes	24 days	Tue 7/27/04	Fri 8/27/04	ł											1		1	İ										TTT TTT TTT TTT TTT TTT TTT TTT TTT TT	
16	<u>.</u>	Disinfecting the Pipes & Fittings	3 days	Mon 8/30/04	Wed 9/1/04		• • • • • • • • •									•••••			-		••••• i		••••	1						Ť	,
17		Back filling works & Compaction	12 days	Thu 9/2/04	Fri 9/17/04	•••••					İ	Ī		Ī			1			1				1		1	T			Ĩ	<b>Ш</b> ,
18	i	Staging area RC Slab - Formwork, Reinforcement & Concrete	12 days	Tue 3/2/04	Wed 3/17/04					Î				1							•			Ъ	1						-
19		Curing Staging area slab	6 days	Thu 3/18/04	Thu 3/25/04	1																		-	с, С,						
20	1	Reservoir Roof Slab - Formwork, Reinforcement & Concrete	28 days	Tue 3/2/04	Thu 4/8/04	1						ĺ													Ξ. h	Î					
21		Curing Reservoir Roof Stab	6 days	Fri 4/9/04	Fri 4/16/04							1					1				1			Î	1	6		1			
22	-	RC Columns of Pump House - Formwork, Reinforcement & Concrete	12 days	Fri 3/26/04	Mon 4/12/04					Î		Î	1								ļ			1	Ď	1					
23		Curing RC Columns of Pump House	6 days	Tue 4/13/04	Tue 4/20/04																ļ			1	Ì	5					
24	;	RC Roof Frame - Formwork, Reinforcement & Concrete	12 days	Wed 4/21/04	Thu 5/6/04						Î			1							1			1		Čη	1				
25		Curing RC Roof Frame	6 days ;	Fri 5/7/04	Fri 5/14/04																			1		Ò	4				
26		Pump House & Generator Room Roofing Works	12 days	Mon 5/17/04	Tue 6/1/04	Ţ				Î		Ì		Ì							4 F			Ĩ							
27	1	Works on Pump House & Generator Room Block Walls	6 days	Wed 4/21/04	Wed 4/28/04																					6					
28	1	Fixing Doors, Windows & Roller Doors	30 days	Thu 4/29/04	Wed 6/9/04																1					Č	$\square$	η			
29		Pump House & Generator Room Finishing works	12 days	Thu 6/10/04	Fri 6/25/04					ĺ	ĺ		ĺ	Ì	1		Ì							1			ſ	Δŋ			
30		Reservoir Roof Waterproofing & laying of Pebbles	12 days	Mon 4/19/04	Tue 5/4/04																ţ.								ľ		
31		Construction of Thrust Blocks	6 days	Mon 5/24/04	Mon 5/31/04																						Q				
32		MECHANICAL WORKS	323 days	Tue 5/27/03	Wed 8/18/04																				<u> </u>	<u> </u>	<u> </u>			-	
33		Ordering & Procuring Pumps, Generator, Pipes, Fittings & Gantry Crane	250 days	Tue 5/27/03	Fri 5/7/04								Ć	<u> </u>	_	- 1					-				<del>. (</del>	<u> </u>	d –				
34	ŀ	Setting out of Internal Piping & Yard Piping works	10 days	Mon 5/10/04	Fri 5/21/04																 			1		ľ	5				
35	Ì	Installation of Gantry Crane	6 days	Mon 6/28/04	Mon 7/5/04	ļ																						Þ	1		
36	1	Laying of Pipes & Fittings	12 days	Tue 7/6/04	Wed 7/21/04	1															!			<u> </u>				ľ	Դ		
37	ł	Installation of Pumps	6 days	Thu 7/22/04	Thu 7/29/04	ł															1			<u>.</u>					đ		
38		Construction of MS Platform, Cat ladders & Hand rails.	12 days	Fri 7/30/04	Mon 8/16/04	į.													1		i								Č	5	
39	1	Testing & Commisioning the Pumps & Gantry Crane	2 days	Tue 8/17/04	Wed 8/18/04																			<u> </u>					Г	-ľ	
40	1	ELECTRICAL WORKS	166 days	Wed 1/14/04	Wed 8/18/04	<u> </u>															 						<u> </u>				
41	1	Electrical Conduiting works	12 days	Wed 1/14/04	Thu 1/29/04																	Ľ								•	
42	1	Electrical Wining works	12 days	Thu 4/29/04	Fri 5/14/04																1					ď	1				
13	1	Electrical first fix	6 days	Mon 6/28/04	Mon 7/5/04																							Ď	1		
44	1	Installation of Generator	3 days	Tue 7/6/04	Thu 7/8/04																							1	i		
45	1	Electrical final fixtures	12 days	Fri 7/9/04	Mon 7/26/04																l							i	ð		I
46	1	Testing of Electrical fixtures & Generator	2 days	Tue 8/17/04	Wed 8/18/04						1										i								L	¥	1
47	1	WORKS ON WATER TOWER	288 days	Mon 8/20/04	Wed 10/26/05	[				1	1		1	1		-				ł	1			-							-



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0	Task Name	Duration	Start	Finish	O N	D	JF	M	A	M	lll	A	S	0	N	D.	JF	M	AM		
-	Setting out works	3 days	Mon 9/20/04	Wed 9/22/04	T																-
	Excavation for Foundation	6 days	Thu 9/23/04	Thu 9/30/04	I																T
	Compaction & Bilnding Concrete	4 days	Fri 10/1/04	Wed 10/6/04								1	-							i	÷
	Foundation Concrete - Formwork, Reinforcement & Concrete	30 days	Thu 10/7/04	Wed 11/17/04	1					<u>-</u>		-				·····					÷
	Shaft Ring Beam concrete - Formwork, Reinforcement & Concrete	12 days													·						ļ.
			Thu 11/18/04	Fri 12/3/04										ļ		ļ					ļ.
	Concrete RC Shaft using Slip Form - Formwork, Reinft & Concrete	21 deys	Mon 12/6/04	Mon 1/3/05												ĺ					1
	Bottom Ring Beam & Conical Tank - Formwork, Reinit & Concrete	90 days	Tue 1/4/05	Mon 5/9/05						-											Ĩ
;	Water Tank Walls - Formwork, Reinforcement & Concrete	30 days	Tue 5/10/05	Mon 6/20/05				1	1		1	1	1	1	1					1	Î
	Top Dome - Formwork, Reinforcement & Concrete	60 days	Tue 6/21/05	Mon 9/12/05					-			1	1	÷		·····				1	÷
	Construct Platforms & Stairs	30 days	Tue 5/10/05	Mon 6/20/05								+									÷
	All the piping works	······												ļ							ļ.
		90 days	Tue 5/10/05	Mon 9/12/05																	Į.
	Water Filling & Testing the Water Tank	28 days	Tue 9/13/05	Thu 10/20/05																	1
	Dsinfecting the Pipes & Water tank	4 days	Fri 10/21/05	Wed 10/26/05																	
i	EXTERNAL WORKS	32 days	Tue 9/13/05	Wed 10/26/06	l		1	1			1	1		1						1	Ĩ
-	Construction of Roads, Pavings & Fencing works	30 days	Tue 9/13/05	Mon 10/24/05		-					····à·····				·	·····					Ť
	Final Inspection, Snagging & handing over	2 days	Tue 10/25/05	Wed 10/26/05																<u>.</u> /	ļ.
8			1																	<u> </u>	ļ.
		712 days	Mon 10/28/02	Thu 2/3/06				100 371 11	diameter	-AUTO			100 TO 100 TO 100	-	1.000	310-10-03	COLUMN STREET			73 <b>007</b> 11	
	Gothatuwa Water Distribution Mains	712 days	Mon 10/28/02	Thu 2/3/05		1						:		:		i	-		-		1
	Ordering & delivery of materials	250 days	Mon 10/28/02	Thu 8/14/03	<b>U</b> IRI				ntumut	mmulm	UNION	۵ س	1	[					Î	1	Ĩ
	Crew 1 - ductile iron (6,611 m)	381 days	Fri 8/15/03	Mon 11/1/04	1	· · · · ·			•		1	1									÷
	600 mm dia 322 m	56 days	Fri 8/15/03	Sat 10/18/03																	÷
-	Obtain Permits and arrange road closure				-									<u> </u>						ļ!	ļ.
<u> </u>		10 days	Fri 8/15/03	Tue 8/26/03								φ	1								ļ.
	excavate trial pits (@ 25 m)	3 days	Wed 8/27/03	Fri 8/29/03	1		<u> </u>					1	<u>f</u>								1
_1 .	shop drawings	10 days	Sat 8/30/03	Wed 9/10/03									Ŭ,								Ĩ
	approval	6 days	Thu 9/11/03	Wed 9/17/03					1. 1			11	Ğ							1	i-
-	install main (trench, pipe laying, backfill)	20 days	Thu 9/18/03	Fri 10/10/03		-			1			++++	Ŧ	<u> </u>				•		1	t
+-	pressure test 1 segments	5 days	Set 10/11/03	Thu 10/16/03			·		· • · · · •					ך ק							<b>!</b>
-	disinfect - 1 segments		<u>_</u>										- <b> </b>	. 'J	ļļ.					<b>.</b>	ļ
_		2 daya	Fri 10/17/03	Sat 10/18/03											<u> </u>						<u> </u>
	400 mm dia 1764 m	162 days	Thu 9/18/03	Fri 3/12/04									-			-					
L.	Obtain Permits and arrange road closure	10 days	Thu 9/18/03	Mon 9/29/03	Į.								Ď	<b>η</b>							
	excavate trial pits (@ 25 m)	10 days	Tue 9/30/03	Fri 10/10/03	1			Ì			1		1	Ъ,					1	1	Î
:	shop drawings	10 days	Sat 10/11/03	Wed 10/22/03	1				1					Ď						÷	h
1	approval	6 days	Thu 10/23/03	Wed 10/29/03					++		·	+-+			÷						÷
-	install main (trench, pipe laying, backfill)																			ļ	÷
		107 days	Thu 10/30/03	Tue 3/2/04					. <b>.</b>					Щ	<u></u>	<u>73,400</u> ;		ካ		ļ]	ļ
<u> </u>	pressure test 2 segments	10 days	Fri 1/2/04	Tue 3/9/04											<u></u> +			0			<u> </u>
	disinfect - 2 segments	5 days	Thu 1/8/04	Fri 3/12/04										4	<u> </u>			1			
	300 mm dia 4,230 m	304 days	Thu 10/30/03	Mon 10/18/04	1				<b>*</b>					1					·····		È
-	Obtain Permits and arrange road closure	10 days	Thu 10/30/03	Mon 11/10/03					-			1	·····		Съ						÷
	excavate trial pits (@ 25 m)	34 days	Tue 11/11/03	Fri 12/19/03								+								ļļ	÷
		<u></u>	· · · · · · · · · · · · · · · · · · ·						ļļ					ļ	غيتنا إ	- <u>1</u> -				ļļ	į.,
1 .	shop drawings	18 days	Sat 12/20/03	Fri 1/9/04												Ť	L				
	approval	12 days	Sat 1/10/04	Fri 1/23/04												Ľ	بُظِرْ				ſ
	install main (trench, pipe laying, backfill)	192 days	Wed 3/3/04	Tue 10/12/04		1						T				!	7				Ŧ
	pressure test 4 segments	20 days	Mon 4/19/04	Sat 10/16/04	1					1	1	$\uparrow$	1			·····					
de	disinfect - 4 segments	10 days	Sat 4/24/04	Mon 10/18/04						·····		· • · · · • •		<u></u>		·····			10		÷
÷	250 mm dia 213 m												ļļ	[]					<b>N</b>		
_		149 days	Wed 5/12/04	Mon 11/1/04					ļļ			. <b>.</b>			ļļ.						
į	Obtain Permits and arrange road closure	10 days	Wed 5/12/04	Sat 5/22/04	1											1	ų,		- <b>H</b> D	Ė.	ĺ.
i 	excavate trial pits (@ 25 m)	2 days	Mon 5/24/04	Tue 5/25/04	1			•			1					1			Ĩ	í	ſ
1	shop drawings	6 days	Wed 5/26/04	Tue 6/1/04	1			1		ļ	Ī								Ì	ĥ	
1	approval	6 days	Wed 6/2/04	Tue 6/8/04	1				1			$\left  \frac{1}{2} \right $						-		1	
1	install main (trench, pipe laying, backfill)	10 days	Wed 10/13/04	Sat 10/23/04		· [· · · · · ]·			-				<u> </u>					· · · · ·		<u>ل</u> هه 	-
-									ļ				ļ	ļ			_			ļļ	ļ
_	pressure test 1 segments	5 days	Mon 10/25/04	Fri 10/29/04		ļ, I							ļ)	<u> </u>	L						<u>.</u>
	disinfect - 1 segments	2 days	Sat 10/30/04	Mon 11/1/04				-								į					1
Í	Crew 2 - ductile iron (8,350 m)	461 days	Fri 8/15/03	Wed 2/2/08	1	1						-	÷	<b></b>			÷	1		<u> </u>	
	300 mm dia 6,350 m	461 days	Fri 8/16/03	Wed 2/2/05	1	1				···· •		÷.	÷ i i i i i i i i i i i i i i i i i i i	<u> </u>					سبغد	÷	
<u>-</u>	Obtain Permits and arrange road closure	10 days	Fri 8/15/03	Tue 8/26/03	1	÷			1			ð	<u> </u>					1			<u>.</u>
					-							+Ψ		<u> </u>		·····		-		ļļ	i
	excavate trial pits (@ 25 m)	51 days	Wed 8/27/03	Fri 10/24/03		ļļ.			ļļ			<u> </u> [		<u> </u>							į
	shop drawings	18 days	Sat 10/25/03	Fri 11/14/03	l									Ľ	<u>_</u>	1			1		
	approval	12 days	Set 11/15/03	Fri 11/28/03	1			1							Ď-				Ī		
	install main (trench, pipe laying, backfill)	289 days	Wed 3/3/04	Wed 2/2/05	1	1			1 1				1							<u>i</u> i	<u></u>
			1		<b>2</b> :					-		: 1	: :		. :		- i 12º			_	ļ



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	Task Name	Duration	Check	Einste h		<b>.</b>	-	1.00	1 14			200	-			~	r	T =	+						200		<del></del>	1.0.7
43	pressure test 7 segments	Duration 35 days	Start Sat 4/24/04	Finish Thu 6/3/04		N	DJ	1-	M		M	1	2	<del>^</del>	8	0	<u>I</u> N	D	<u> </u> .	1	╞┼	M	A	M	3	2	<u> </u>	S
44	disinfect - 7 segments	14 days	Mon 6/28/04	Tue 7/13/04	<b> </b>  -	•••••			<u>.</u>	<u>}     </u>																		
45	Crew 3 - PVC (9.904 m)	462 days	Fri 8/16/03	Thu 2/3/05			ļ																					
46	225 mm dia 9904 m	462 days	Fri 8/15/03	Thu 2/3/05											:													
47	Obtain Permits and arrange road closure	10 days	Fri 8/15/03	Tue 8/26/03	<b> </b>					·				-														
48	excavate trial pits (Ø) 25 m)	79 days	Wed 8/27/03	Wed 11/26/03		•••••										1111111	Î	n.										
49	shop drawings	18 days	Thu 11/27/03	Wed 12/17/03				-								unac			·									
50	approval	12 days	Thu 12/18/03	Wed 12/31/03															1; 25									
51	install main (trench, pipe laying, backfill)	330 davs	Thu 1/1/04	Wed 1/19/05			·····							···· <b>··</b> ·						INHA			mana		चेत्राच्याच	in the second		
52	pressure test 10 segments	50 days	Wed 1/7/04	Fri 1/28/05					<u>.</u>	++	<u>-</u>					····		·	1.			Intitu			mon	nuin	ama	100000
53	disinfect - 10 segments	22 days	Tue 1/13/04	Thu 2/3/05				-												шил ШВ								
54	Crew 4 - PVC (13,418)	377 days	Wed 8/27/03	Mon 11/8/04	<b>-</b>																							
55	160 mm dia 3932 m	179 days	Wed 8/27/03	Mon 3/22/04					<u>.</u>										<b>ļ</b>									
56	Obtain Permits and arrange road closure	10 days	Wed 8/27/03	Sat 9/6/03											5													
57	excavate trial pits (@ 25 m)	31 days	Mon 9/8/03	Mon 10/13/03	-		····			·	·····			<u>ن</u>	1	7	·····							· · · · · · · ·				
58	shop drawings	12 days ,	Tue 10/14/03	Mon 10/27/03			i					····			<u> </u>	ð		-										
59	approval	6 days	Tue 10/28/03	Mon 11/3/03													<u>.</u>											
50	install main (trench, pipe laying, backfili)	* 109 days ,	Tue 11/4/03	Tue 3/9/04			<u>i</u>					· · · ·	····•				¥.		<u>_</u>	_		Ъ.						
81	pressure test 5 segments	25 days	Wed 12/3/03	Tue 3/16/04			····											N	1	T	<u> </u>							
62	disinfect - 5 segments	10 days	Tue 12/9/03	Mon 3/22/04						1								-	- (			п						
63	110 mm dia, - 9486 m	324 days	Tue 10/28/03	Mon 11/8/04			····-			·····		••••					1							;				
64	Obtain Permits and arrange road closure	10 days	Tue 10/28/03	Fri 11/7/03												5	τ.		-									i d
65	excavate trial pits (@ 25 m)	76 days	Set 11/8/03	Wed 2/4/04			·····	-	<u>.</u>	1							Ł		÷		<u>ь</u>							
56	shop drawings	18 days	Thu 2/5/04	Wed 2/25/04			/ 	-					-		-		-	1		-	5	-						
57	approval	12 days	Thu 2/26/04	Wed 3/10/04														·				1						
58	install main (trench, pipe laying, backfill)	198 days	Thu 3/11/04	Wed 10/27/04				1		1									1						<u></u>		<u> </u>	
69	pressure test 10 segments	50 days	Sat 4/3/04	Thu 11/4/04				-					-								····	)						
70	disinfect - 10 segments	22 days	Fri 4/9/04	Mon 11/8/04	t i	••••••	·····			·								· • • • • • • • • • • • • • • • • • • •				{:						

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Pro <del>ject:</del> KMU-P1 Date: Sun 1/7/01	Task Task Progress		Critical Task Critical Task Progress	Milestone Summary	<ul> <li>♦</li> <li>•</li> </ul>	Rolled Up Task	Rolled Up Milestone Rolled Up Progress	<u>ک</u>	Split External Tasks	1
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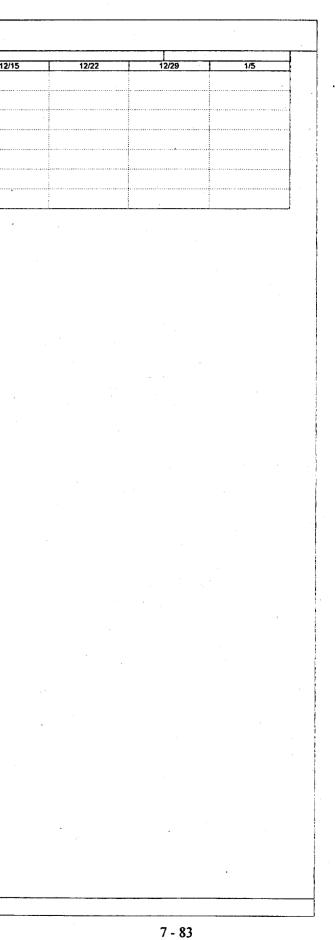
	ask Name	Duration	Start	Finish	10/20	10/27	11/3	11/10		11/17	11/24	12/1	12/8	12
	ypical 200 m section of road	36 days	Mon 10/28/02											
	Obtain permits and arrange road closure		Mon 10/28/02			A. 1. 314 ( . 3. 4		alan yara						
	Excevate trial pits (minimum 10)	2 days				ատ				-				
	Shop drawings and approvals	10 days	Wed 10/30/02			( IIIIIIII								
	Road type 1 (night work)	24 days	Tue 11/12/02	Mon 12/16/02										
	Mobilization in the field	0 days	Tue 11/12/02					€ <u>1</u>			-			
	first 100 m section	20.5 days	Wed 11/13/02	Wed 12/11/02										
	Identify by pass arrangements	2 days	Wed 11/13/02	Thu 11/14/02				(IIII)	ի					
	Implement detours	1 day	Fri 11/15/02	. Fri 11/15/02			·		<b>й</b> —	1				
	Excavate access pits (minimum 3, i.e. @ 50 m)	2 days	Mon 11/18/02	Tue 11/19/02						<b>Նար</b> լ				1
	Install Bypass and temporary service connections	5 days	Wed 11/20/02	Tue 11/26/02										
	Scrape and reline main	3.5 days	Wed 11/27/02	Mon 12/2/02								ար	:	
	Pressure / Quality test.	1 day	Mon 12/2/02	Tue 12/3/02					1		-	Φį		
7	Flushing and Disinfection	1 day	Tue 12/3/02	Wed 12/4/02				-	}			Ь. Б		
	Transfer connections	3 days	Wed 12/4/02	Mon 12/9/02							-	. Contract		
	Backfill access pits	2 days	Mon 12/9/02	Wed 12/11/02										
	Second 100 m section	22 days	Fri 11/15/02	Mon 12/18/02										
	Identify by pass arrangements	2 days	Fri 11/15/02	Mon 11/18/02						h				
	Implement detours	1 day	Tue 11/19/02	Tue 11/19/02						Ďŋ				
	Excevate access pits (minimum 3, i.e. @ 50 m)	2 days	Wed 11/20/02	Thu 11/21/02						<u>i</u> si j				
	Install Bypass and temporary service connections	5 days	Fri 11/22/02	Thu 11/28/02										
	Scrape and reline main	3.5 days	Mon 12/2/02	Thu 12/5/02						•		THURWARD		1
	Pressure / Quality test.	1 day	Fri 12/6/02	Fri 12/8/02								. <b>Ū</b> -	7	
	Flushing and Disinfection	1 day	Mon 12/9/02	Mon 12/9/02			1.						Τη	
	Transfer connections	3 days	Tue 12/10/02	Thu 12/12/02									ίππη,	
	Backfill access pits	2 days	Fri 12/13/02	Mon 12/16/02									All	
	Road type 2 (day work)	22 days	Tue 11/12/02	Thu 12/12/02										
-[	Mobilization in the field	0 days	Tue 11/12/02	Tue 11/12/02				<b>♦</b> 1						
	first 100 m section	19 days	Wed 11/13/02	Mon 12/9/02	<u>.</u>									
i	Identify by pass arrangements	2 days	Wed 11/13/02	Thu 11/14/02					հ					
	Implement detours	1 day	Fri 11/15/02	Fri 11/15/02					Č–	7			•	
-i	Excevate access pits (minimum 3, i.e. @ 50 m)	2 days	Mon 11/18/02	Tue 11/19/02									<u>.</u>	
	Install Bypess and temporary service connections	5 days	Wed 11/20/02	Tue 11/26/02							<u>}</u>			
	Scrape and reline main	3 days	Wed 11/27/02	Fri 11/29/02	· ·						-	7	<u>`</u>	
1	Pressure / Quality test.	- 1 day	Mon 12/2/02	Mon 12/2/02				·				Ъ		
	Flushing and Disinfection	1 day	Tue 12/3/02	Tue 12/3/02					1			Č,		
	Transfer connections	2 days	Wed 12/4/02	Thu 12/5/02							· · · · · · · · · · · · · · · · · · ·	L L		
	Backfill access pits	2 days	Fri 12/6/02	Mon 12/9/02				·	-					
-	second 100 m section	20 days	Fri 11/15/02	Thu 12/12/02			-							
$\neg$	identify by pass arrangements	2 days	Fri 11/15/02	Mon 11/18/02				•	¥	<b>\</b>				
-	Implement detours	1 day	Tue 11/19/02	Tue 11/19/02						 				

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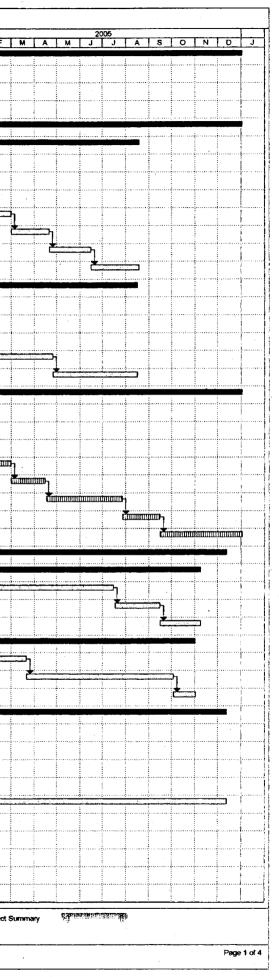
Figure 7-4 REHABILITATION OF MEDIUM AND LARGE DIAMETER PIPELINES (Typical crew output)

D	Task Name	Duration	Start	Finish	10/20	10/27	11/3	11/10	11/17	11/24	12/1	12/8	12/1
42	Excavate access pits (minimum 3, i.e. @ 50 m	) 2 days	Wed 11/20/02	Thu 11/21/02									
43	Install Bypass and temporary service connections	5 days	Fri 11/22/02	Thu 11/28/02									
44	Scrape and reline main	3 days	Mon 12/2/02	Wed 12/4/02							<b>Less</b> h		
45	Pressure / Quality test.	1 day	Thu 12/5/02	Thu 12/5/02							L. L.		
46	Flushing and Disinfection	1 day	Fri 12/6/02	Fri 12/6/02							<b>b</b>	-1	
47	Transfer connections	2 days	Mon 12/9/02	Tue 12/10/02								<b>4</b>	
48	Backfill access pits	2 days	Wed 12/11/02	Thu 12/12/02					•			and a	

Page 2 of 2



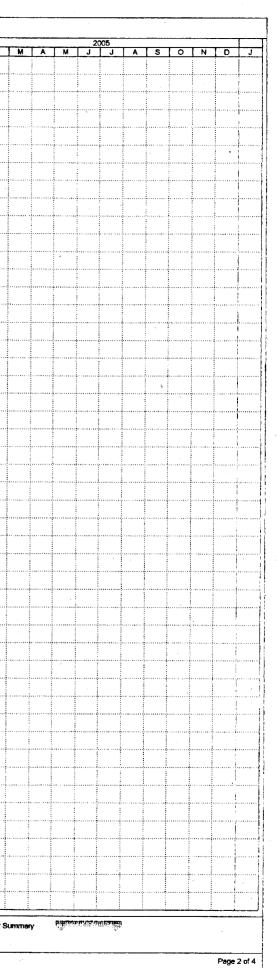
Task N		Duration	Start	Finish	2003 O N D J F M A M J J A S O N D J F M A M J J A S O N D
	ABILITATION	•	Mon 10/28/02	Mon 1/2/06	
1	Ordering & delivery of materials	250 days	Mon 10/28/02	Fri 10/10/03	
	ixcavate trial pits	279 days	Mon 10/13/03	Thu 11/4/04	
	hop drawings	310 days	Mon 10/27/03	Fri 12/31/04	
R	toad Type 1 - night work (12,865 m)	581 days	Mon 10/13/03	Mon 1/2/08	
	Crew 1	484 days	Mon 10/13/03	Thu 8/18/05	S A A A A A A A A A A A A A A A A A A A
	Mattakkuliya Centre Road - 660 m	79 days	Mon 10/13/03	Thu 1/29/04	
	Aluthmawatha Road -1200 m	144 days	Fri 1/30/04	Wed 8/18/04	۹ <b>کست میں میں میں دو</b> ال ا
	St. Andrew's Road - 457 m	55 days	Thu 8/19/04	Wed 11/3/04	4 <b>E</b>
	Muthuwella Mawatha - 690 m	83 days	Thu 11/4/04	Mon 2/28/05	5
	Ellie House Road - 310 m	37 days	Tue 3/1/05	Wed 4/20/05	5
İ .	Lawer St. Andrew's Place - 330 m	40 days	Thu 4/21/05	Wed 6/15/05	5
	Sumanatissa Mawatha - 385 m	46 days	Thu 6/16/05	Thu 8/18/05	5
	Crew 2	482 days	Mon 10/13/03	Tue 8/16/06	
	Collage Street - 1100 m	132 days	Mon 10/13/03	Tue 4/13/04	
	Kotahena Street - 480 m	58 days	Wed 4/14/04	Fri 7/2/04	
1	George R. De Silve Mawatha - 1106 m	133 days	Mon 7/5/04	Wed 1/5/05	
	Sangaraja Mawatha - 649 m	78 days	Thu 1/6/05	Mon 4/25/05	
	Sangaraja wawatna - 649 m Panchikawatta Road - 675 m	70 days 81 days	Tue 4/26/05	Tue 8/16/05	
1					
1	Crew 3	581 days	Mon 10/13/03	Mon 1/2/06	
	Grandpass Road - 930 m	112 days	Mon 10/13/03	Tue 3/16/04	
	Union Place - 1285 m	154 days	Wed 3/17/04	Mon 10/18/04	
	Foster Lane - 285 m	34 days	Tue 10/19/04	Frl 12/3/04	
	Bridge Street - 511 m	61 days	Mon 12/6/04	Mon 2/28/05	
	Sir Macan Marker Street - 280 m	34 days	Tue 3/1/05	Fri 4/15/05	5
	Sea Street - 607 m	73 days	Mon 4/18/05	Wed 7/27/05	5
	St. Anthony's Mawatha - 301 m	36 days	Thu 7/28/05	Thu 9/15/05	5
	Sri Ramanathan Mawatha - 643 m	77 days	Fri 9/16/05	Mon 1/2/08	8
F	Road Type 2 - day work (14,951 m)	566 days	Mon 10/13/03	Mon 12/12/06	
	Crew 1	542 days	Mon 10/13/03	Tue 11/8/05	<b>5</b>
	Galle Road - 4189 m	460 days	Mon 10/13/03	Fri 7/15/05	5
	Quarry Road - 396 m	44 days	Mon 7/18/05	Thu 9/15/05	5
	Allan Mewathe - 340 m	38 days	Fri 9/16/05	Tue 11/8/05	5
	Crew 2	537 days	Mon 10/13/03	Tue 11/1/05	<b>6</b>
	Dharmapala Mawatha - 3427 m	376 days	Mon 10/13/03	Mon 3/21/05	5 <b></b>
	Elvitigala Mawatha - 1275 m	140 days	Tue 3/22/05	Mon 10/3/05	5
	Serpentine Road - 190 m	21 days	Tue 10/4/05	Tue 11/1/05	
	Crew 3	566 days	Mon 10/13/03	Mon 12/12/05	
ļ	Kiriliapone Avenue - 775 m	85 days	Mon 10/13/03	Fri 2/6/04	
	•		Mon 2/9/04	Fri 4/23/04	
	High Level Road - 503 m	55 days			
	Dickman's Road - 733 m	B1 days	Mon 4/26/04	Mon 8/16/04	
ļ	Kumarathunga Munidasa Mawatha - 555 m	61 days	Tue 8/17/04	Tue 11/9/04	
	Havelock Road - 2584 m		Wed 11/10/04	Mon 12/12/05	
REIN	FORCEMENT	575 days	Mon 10/28/02	Fri 1/7/06	
0	Ordering & delivery of materials	250 days	Mon 10/28/02	Fri 10/10/03	
1	Topographic Survey	21 days	Mon 10/13/03	Mon 11/10/03	3
į	Crew 1 - congested & night work (3298 m)	234 days	Tue 11/11/03	Fri 10/1/04	
	Prince Of Wales Avenue - 1200 m	114 days	Tue 11/11/03	Fri 4/16/04	



Tas	Neme	Duration	<u></u>	Finish		2003	2004
1.00	Obtain Permits and arrange road closure	10 days	Start 11/11/03	Finish Mon 11/24/03	ONDJFMAM		JFMAMJJASONDJF
	excevate trial pits (@ 25 m)	10 days	Tue 11/11/03	Mon 11/24/03			
	shop drawings	10 days	Tue 11/25/03	Mon 12/8/03		E,	
	approval	6 days	Tue 12/9/03	Tue 12/16/03		<u> </u>	
	install main (trench, pipe laying, backfill)	73 days	Wed 12/17/03	Fri 3/26/04			
	pressure test 2 segments	10 days	Mon 3/29/04	Fri 4/9/04			
	disinfect - 2 segments	5 days	Mon 4/12/04	Fri 4/16/04			
	Stace Road - 810 m	133 days	Wed 12/17/03	Fri 6/18/04	-		
	Obtain Permits and arrange road closure	10 days	Wed 12/17/03	Tue 12/30/03			
	excavate trial pits (@ 25 m)	6 days	Wed 12/17/03	Wed 12/24/03			
	shop drawings	10 days	Thu 12/25/03	Wed 1/7/04			лана на на на на на на на на на на на на
	approval	6 days	Thu 1/8/04	Thu 1/15/04			B
	install main (trench, pipe laying, backfill)	45 days	Mon 3/29/04	Fri 5/28/04			
	pressure test 2 segments	10 days	Mon 5/31/04	Fri 6/11/04			
	disinfect - 2 segments	5 days	Mon 6/14/04	Fri 6/18/04			
	Bloemandhal Road - 237 m	117 days	Fri 1/16/04	Mon 6/28/04			
	Obtain Permits and arrange road closure	10 days	Fri 1/16/04	Thu 1/29/04			
	excevate trial pits (@ 25 m)	6 days	Fri 1/16/04	Fri 1/23/04			PG
	shop drawings	6 days	Mon 1/26/04	Mon 2/2/04			
	approval	6 days	Tue 2/3/04	Tue 2/10/04			
	install mein (trench, pipe laying, backfill)	14 days	Mon 5/31/04	Thu 6/17/04			
	pressure test 1 segments	5 days	Fri 6/18/04	Thu 6/24/04			
	disinfect - 1 segments	2 days	Fri 6/25/04	Mon 6/28/04			
	Port Access Road - 1001 m	168 days	Wed 2/11/04	Fri 10/1/04			
	Obtain Permits and errange road closure	10 days	Wed 2/11/04	Tue 2/24/04			
	excavate trial pits (@ 25 m)	6 days	Wed 2/11/04	Wed 2/18/04			
	shop drawings	10 days	Thu 2/19/04	Wed 3/3/04			
	approval	6 days	Thu 3/4/04	Thu 3/11/04			
	install main (trench, pipe laying, backfill)	61 days	Fri 6/18/04	Fri 9/10/04			
	pressure test 2 segments		Mon 9/13/04	Fri 9/24/04			
		10 days					
	disinfect - 2 segments	5 days	Mon 9/27/04	Fri 10/1/04			
	Crew 2 - day work (5975 m)	304 days	Tue 11/11/03	Fri 1/7/06			
	Dematagoda Road - 660 m	54 days	Tue 11/11/03	Fri 1/23/04			
	Obtain Permits and arrange road closure	10 days	Tue 11/11/03	Mon 11/24/03		ſ	
	excavate trial pits (@ 25 m)	5 days	Tue 11/11/03	Mon 11/17/03		100 - 100 -	
	shop drawings	6 days	Tue 11/18/03	Tue 11/25/03		Ľ.	
	approval	6 days	Wed 11/26/03	Wed 12/3/03			
	install main (trench, pipe laying, backfill)	30 days	Thu 12/4/03	Wed 1/14/04		Č.	
	pressure test 1 segments	5 days	Thu 1/15/04	Wed 1/21/04			5 Contraction of the second se
	disinfect - 1 segments	2 days	Thu 1/22/04	Fri 1/23/04			f i i i i i i i i i i i i i i i i i i i
	Dematagoda Road/Reservoir road - 336 m	67 days	Thu 12/4/03	Fri 3/6/04			
	Obtain Permits and arrange road closure	10 days	Thu 12/4/03	Wed 12/17/03		<b>č</b> 1	
	excavate trial pits (@ 25 m)	5 deys	Thu 12/4/03	Wed 12/10/03		*°1	
	shop drawings	6 days	Thu 12/11/03	Thu 12/18/03		Ď,	
	approval	6 days	Frl 12/19/03	Fri 12/26/03		Č-	
	install main (trench, pipe laying, backfill)	30 days	Thu 1/15/04	Wed 2/25/04	4		
	pressure test 1 segments	5 days	Thu 2/26/04	Wed 3/3/04	r .		<b>Å</b>
	disinfect - 1 segments	2 days	Thu 3/4/04	Fri 3/5/04			

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Task	Name	Duration	Start	Finish	0	ND	J	F	MA	M	2003	JA	ST	OIN		JF	M	ALA	i T J T	204 JJT	A	sto	N	D	J
	School Lane - 207 m	60 days	Mon 12/29/03	Fri 3/19/04			1								-	-									
]	Obtain Permits and arrange road closure	10 days	Mon 12/29/03	Fri 1/9/04											ГĻ	1	1								
1	excevate trial pits (@ 25 m)	5 days	Mon 12/29/03	Fri 1/2/04			1								40										
	shop drawings	6 days	Mon 1/5/04	Mon 1/12/04			-								l	5								······}	
	approval	6 days	Tue 1/13/04	Tue 1/20/04												Δ	1						-		
	instali main (trench, pipe laying, backfill)	10 days	Thu 2/26/04	Wed 3/10/04													μ Diana ana ana ana ana ana ana ana ana ana								
-	pressure test 1 segments	5 days	Thu 3/11/04	Wed 3/17/04			l										Ъ,						-		•••••
1	disinfect - 1 segments	2 days	Thu 3/18/04	Fri 3/19/04		·									-		r i								
-	Sir Jeims Peiris Mawatha/Nawam Mawatha - 632 m	72 days	Wed 1/21/04	Thu 4/29/04																			-		
1	Obtain Permits and errange road closure	10 days	Wed 1/21/04	Tue 2/3/04								•				- <b>Č</b>									
	excavate trial pits (@ 25 m)	5 days	Wed 1/21/04	Tue 1/27/04											-	401							-	·····	
1	shop drawings	6 days	Wed 1/28/04	Wed 2/4/04			4				•				-	5							-		•
-	approval	6 days	Thu 2/5/04	Thu 2/12/04	I																		-	ļ	
1	install main (trench, pipe laying, backfill)	29 days	Thu 3/11/04	Tue 4/20/04			<u>.</u>								_			17TL							
1	pressure test 1 segments	5 days	Wed 4/21/04	Tue 4/27/04																				·····-	
+	disinfect - 1 segments	2 days	Wed 4/28/04	Thu 4/29/04			·											1						{	
-	RA De Mell Mawatha/Pehara Mawatha- 510 m	78 days	Fri 2/13/04	Tue 6/1/04			. <u>í</u>																		
-	Obtain Permits and arrange road closure	10 days	Fri 2/13/04	Thu 2/26/04																					
-	excavate trial pits (@ 25 m)	4 days	Fri 2/13/04	Wed 2/18/04	ļ												ļ							{	
1	shop drawings	6 days	Thu 2/19/04	Thu 2/26/04	L											40									•••••
ł	approval	-		Fri 3/5/04			:									2	1								
1		6 days	Fri 2/27/04				<u>.</u>										Ō								
	install main (trench, pipe laying, backfill)	23 days	Wed 4/21/04	Fri 5/21/04														<u>Cana</u>	1						:
1	pressure test 1 segments	5 days	Mon 5/24/04	Fri 5/28/04															1				_		
1	disinfect - 1 segments	2 days	Mon 5/31/04	Tue 6/1/04			÷	ļļ.											ſ					Í	
-	Alwis Place - 176 m	70 days	Mon 3/8/04	Fri 6/11/04	l																				
4	Obtain Permits and arrange road closure	10 days	Mon 3/8/04	Fri 3/19/04	l												Ъ								
i i	excavate trial pits (@ 25 m)	5 days	Mon 3/8/04	Fri 3/12/04													Ъ							+	
1	shop drawings	6 days	Mon 3/15/04	Mon 3/22/04	[												- Čj								1
1	approval	6 days	Tue 3/23/04	Tue 3/30/04													ð		ו						
ļ	install main (trench, pipe laying, backfill)	8 days	Mon 5/24/04	Wed 6/2/04			1												<b>D</b>					1	
l L	pressure test 1 segments	5 days	Thu 6/3/04	Wed 6/9/04			1												ĥ					-	
	disinfect - 1 segments	2 days	Thu 6/10/04	Fri 6/11/04															ľ						
	Saranapata Himi Mawatha - 903 m	103 days	Wed 3/31/04	Fri 8/20/04													Ì	:			-				• • • • • •
	Obtain Permits and arrange road closure	10 days	Wed 3/31/04	Tue 4/13/04			!								1		Ч	5						j 	
-	excavate trial pits (@ 25 m)	10 deys	Wed 3/31/04	Tue 4/13/04			1										4	⊐₁							***
1	shop drawings	10 days	Wed 4/14/04	Tue 4/27/04											-			Ξ,							
ì	approval	6 days	Wed 4/28/04	Wed 5/5/04			i								+			т. Б	-					···· ···i··	
į.	install main (trench, pipe laying, backfill)	42 days	Thu 6/3/04	Fri 7/30/04															Caunun		-				
	pressure test 2 segments	10 days	Mon 8/2/04	Fri 8/13/04			Ţ													Ē	5,				
1	disinfect - 2 segments	5 days	Mon 8/16/04	Fri 8/20/04											-					+	8		-		
-	Ward Place - 1446 m	143 days	Thu 5/6/04	Mon 11/22/04			·}																		• • • • • • •
-	Obtain Permits and arrange road closure	10 days	Thu 5/6/04	Wed 5/19/04			·••·····																	·····	
1	excavate trial pits (@ 25 m)	10 days	Thu 5/6/04	Wed 5/19/04																					•••••
7	shop drawings	10 days	Thu 5/20/04	Wed 6/2/04			-				<u>i</u>								2,						••••
ļ.	shop oraymuga approval	6 days	Thu 6/3/04	Thu 6/10/04			1										ļļ						-		• • • • •
	spproval Install main (trench, pipe laying, backfill)	66 days	Mon 8/2/04	Mon 11/1/04			1			-									- T	1			mi.		
					ļ		1										<u> </u>			لك:	<u></u>				
4	pressure test 2 segments	. 10 days	Tue 11/2/04	Mon 11/15/04	[]		<u>.</u>										ļ,						₽Ţ.		
	disinfect - 2 segments	5 days	Tue 11/16/04	Mon 11/22/04			i																ð		
: PRJ4	Task	Critical T	ask 💷		Milesto	ne	4	•		Rolled	Up Task		7.c.		Rolled U	o Milestone	$\diamond$		s	<b>Spl</b> it		t	<u> </u>	1	
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# Figure 7-5 IMPLEMENTATION SCHEDULE FOR REHABILITATION & REINFORCEMENT of MEDIUM and LARGE DIAMETER MAINS IN CMC

												2003													20	04							
Ю	Task Name	Duration	Start	Finish	0	NC	5	JF	M	M	J	J	A	5			N	D	J	F	M	A		M	J	J	A	S	0	N	D	JJ	F
101	Thimbirigasyaya Road - 290 m	122 days	Fri 6/11/04	Mon 11/29/04																							:			:	ł	Ī	
102	Obtain Permits and arrange road closure	10 days	Fri 6/11/04	Thu 6/24/04								1		Ī							Ī	1		Г	Ċ					1	1		
103	excevate trial pits (@ 25 m)	5 days	Fri 6/11/04	Thu 6/17/04			1			 			1					• • • • • • •						1	юı	f							
104	shop drawings	6 days	Fri 6/18/04	Fri 6/25/04			1				-	Ť									Ī				ð							1	
105	approval	6 days	Mon 6/28/04	Mon 7/5/04								-													Ľ	5				1		1	
106	install main (trench, pipe laying, backfill)	13 days	Tue 11/2/04	Thu 11/16/04								1							•											<u>مس</u>			
107	pressure test 1 segments	5 days	Fri 11/19/04	Thu 11/25/04			····	•		•											1									đ	1	1	
108	disinfect - 1 segments	2 days	Fri 11/26/04	Mon 11/29/04			į		-			-										1									đ	-	-
109	Mahakumarage Mawatha - 627 m	134 days	Tue 7/6/04	Fri 1/7/05								1				-					1	1				-					<u> </u>		1
110	Obtain Permits and arrange road closure	10 days	Tue 7/6/04	Mon 7/19/04			1																		Г	ð						-	
111	excavate trial pits (@ 25 m)	5 days	Tue 7/6/04	Mon 7/12/04								1								1	İ	Ī		1	4	D j			1			1	
112	shop drawings	6 days	Tue 7/13/04	Tue 7/20/04								-						-				Ì				Ъ						1	
113	approval	6 days	Wed 7/21/04	Wed 7/28/04								1		1				••••			İ	1				đ				-	1		-
114	install main (trench, pipe laying, backfill)	29 days	Fri 11/19/04	Wed 12/29/04																		1	•						1		innun	 	-
115	pressure test 1 segments	5 days	Thu 12/30/04	Wed 1/5/05								1			-								1									¢,	-
116	disinfect - 1 segments	2 days	Thu 1/6/05	Fri 1/7/05			··· ··				-	İ				-						1									-	ľ	

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Project: PRJ4	Task	[]	Critical Task	Contraction of the State of Contraction of Contract	Miestone	•	Rolled Up Task	- Andrew Roberts	Rolled Up Milestone	$\diamond$	Split	1	Project S
Project: PRJ4 Date: Sun 1/7/01	Task Progress		Critical Task Progress		Summery		Rolled Up Critical T	ask	Rolled Up Progress		External Tasks		
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Task Name	Duration	Stert	Finish	10/20	10/27	11/3	11/10	11/17	11/24	12/1	12/8	12/15	12/22	 12/29
Typical 200 m section of road	33 days	Mon 10/28/02	Wed 12/11/02											 
Obtain permits and arrange road closure	12 days	Mon 10/28/02	Tue 11/12/02		1999 - Barton									 
Excavate trial pits (minimum 10)	2 days	Mon 10/28/02	Tue 10/29/02		/////h									 
Shop drawings and approvals	10 days	Wed 10/30/02	Tue 11/12/02				in the second se							 
Road type 1 (day work)	21 days	Tue 11/12/02	Wed 12/11/02											 
Mobilization in the field	0 days	Tue 11/12/02	Tue 11/12/02	· · · .			<b>•</b> 1							 
first 100 m section	19 days	Wed 11/13/02	Mon 12/9/02			·	<b></b>							 
Identify by pass arrangements	2 days	Wed 11/13/02	Thu 11/14/02				<b>600</b> h	•						 
Implement detours	1 day	Fri 11/15/02	Fri 11/15/02				<b>D</b> -	٦						
Excavate access pits (minimum 3, i.e. @ 5	2 days	Mon 11/18/02	Tue 11/19/02					<b>T</b> ime h						 
Install Bypass and temporary service conne	5 days	Wed 11/20/02	Tue 11/26/02					(1000000	HILLIND)	· · · ·				
Scrape and reline main	2 days	Wed 11/27/02	Thu 11/28/02		·				Čω					
Pressure / Quality test.	1 day	Fri 11/29/02	Fri 11/29/02			-			Ď-	-			-	
Flushing and Disinfection	1 day	Mon 12/2/02	Mon 12/2/02							ել				
Transfer connections	3 days	Tue 12/3/02	Thu 12/5/02							trefails.				
Backfill access pits	2 days	Fri 12/6/02	Mon 12/9/02				-			Ľ	sei l			 
Second 100 m section	19 days	Fri 11/15/02	Wed 12/11/02		· · · · ·									
Identify by pass arrangements	2 days	Fri 11/15/02	Mon 11/18/02				Č.	TTTD,						
Implement detours	1 day	Tue 11/19/02	Tue 11/19/02					մդ						
Excavate access pits (minimum 3, i.e. @ 5	2 days	Wed 11/20/02	Thu 11/21/02					ľш <u>۲</u>						
Install Bypass and temporary service conne	5 days	Fri 11/22/02	Thu 11/28/02			•			ucauanaano-					 
Scrape and reline main	2 days	Fri 11/29/02	Mon 12/2/02						Ŭ	ատ				
Pressure / Quality test.	1 day	Tue 12/3/02	Tue 12/3/02	· · ·		,				Ū.				 
Flushing and Disinfection	1 day	Wed 12/4/02	Wed 12/4/02							ش <u>ا</u>				 
Transfer connections	3 days	Thu 12/5/02	Mon 12/9/02											

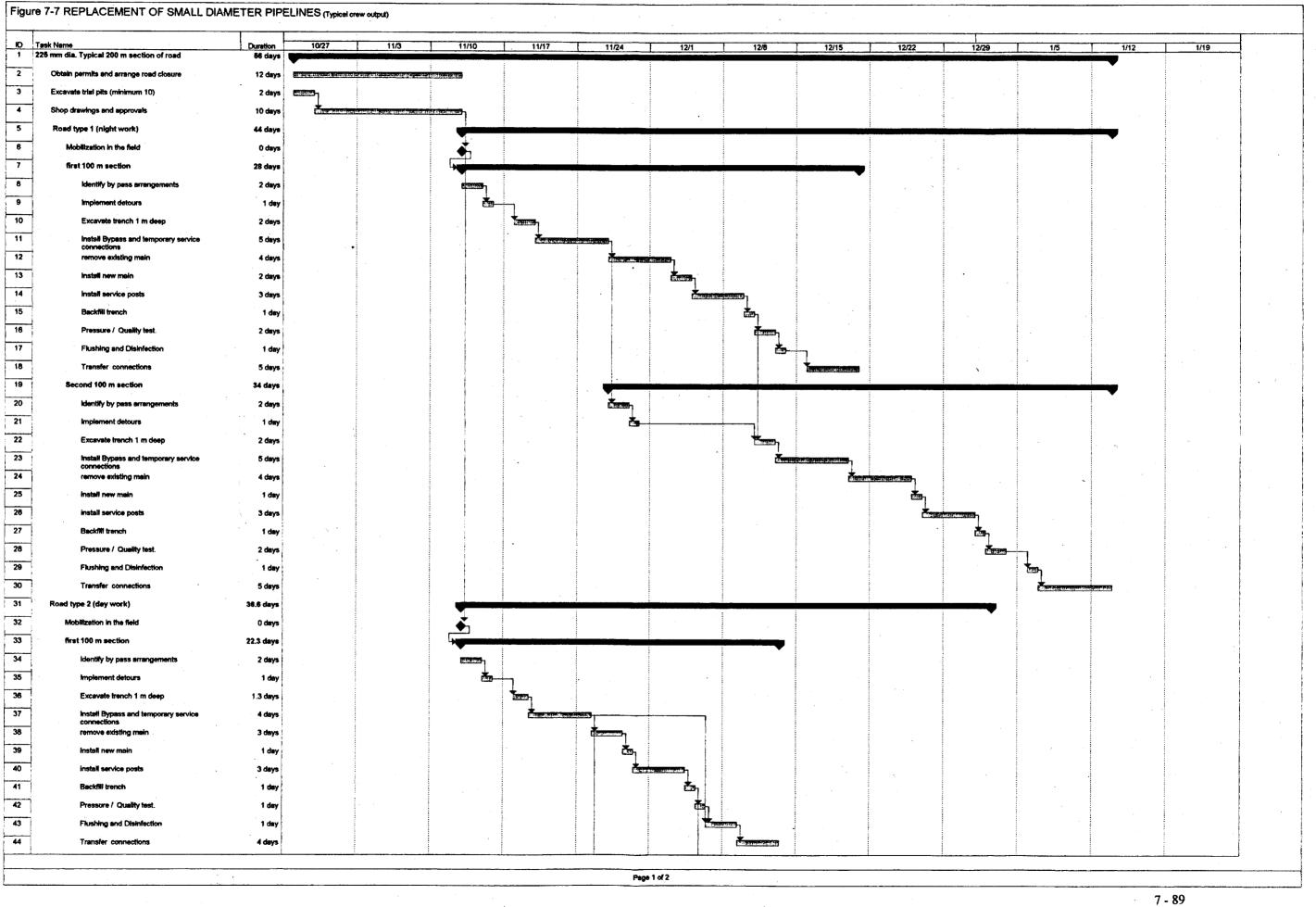
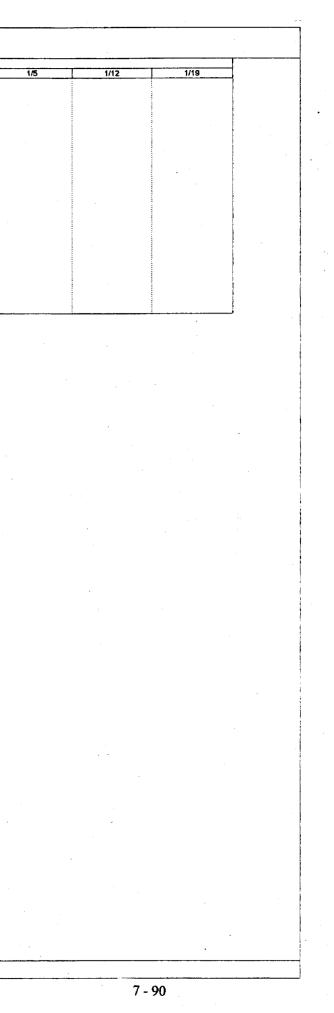


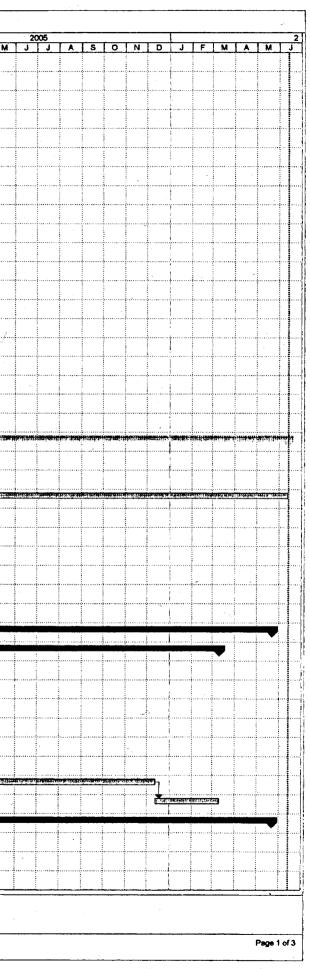
Figure 7-7 REPLACEMENT OF SMALL DIAMETER PIPELINES (Typical crew output)

		·····										
	*		10/27	140	1		1					
10	Task Name	Duration	10/2/	11/3	11/10	11/17	11/24	12/1	12/8	12/15	12/22	12/29
45	Second 100 m section	28.3 days	-									
	4						1					•
46	Identify by pass arrangements	2 days					Restand 1					
47	Implement detours	t day			:		i č					
									· · ·			
48	Excavate trench 1 m deep	1.3 days						<b>1</b>				
								1 · L1				
49	Install Bypass and temporary service	4 days						E autor	CLI CALINEY			
	connections								1			
-50	remove existing main	· 3 days							Being	121-11-1-1-1		
										1		
51	Install new main	1 day			1					Ē.		
										-		
52	instali service posts	3 days						•		State and State of State		
	······································	,-										
53	Backfill trench	1 day	· · · · · · · · · · · · · · · · · · ·								En	
											_	
54	Pressure / Quality test.	2 days						1				
		2 00,0										
55	Flushing and Disinfection	1 day									Шал	
		, coay									607	
56	Transfer connections	4 days						1				
- 20		4 0ays									<u> </u>	and the second sec
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	•				-									~						
igur	7-8 IMPLEMENTATION SCHEDULE F	OR REH	ABILITATIC	N AND RE	PLACEME	NT OF	SMALL	DIAMETE	R DIST	RIBUTIC	DN MAI	NS	-	· (						,
DT	isk Name	Duration	Start	Finish	OND	- 1	FIMIA		003	TSTO	TNT		FM		2004		101	NID		
	EHABILITATION	648 days	Mon 10/28/02	Wed 4/20/05																
2	Ordering & delivery of materials	250 days	Mon 10/28/02	Fri 10/10/03			Citical Contraction	1. // <b></b>		THE REAL PROPERTY.										-
2	Obtain permits and arrange road closures	156 days	Mon 10/13/03	Mon 5/17/04						h				1.59 <u>8.69</u> 81						
•	Excavate trial pits	55 days	Wed 10/29/03	Tue 1/13/04						Ц	1									
	shop drawings	78 days	Wed 11/12/03	Fri 2/27/04		-														-
3	Crew 1 - day work (3413 m)	378 days	Mon 10/13/03	Wed 3/23/05		1									ļ				<u>}</u>	
7	Srl Wickrema Mawatha - 340 m	36 days	Mon 10/13/03	Mon 12/1/03					-											•
3	Vystwyke Road - 650 m	69 days	Tue 12/2/03	Fri 3/5/04							E									
•	Bloemendhal Road - 2240 m	235 days	Mon 3/8/04	Fri 1/28/05									l Trea				7.002 52			
0	Walls lane - 365 m	38 days	Mon 1/31/05	Wed 3/23/05										· ·						
1	Crew 2 - day work (3494)	398 days	Mon 10/13/03	Wed 4/20/05		-														
2	Upper St.Andrew's Place - 165 m	17 days	Mon 10/13/03	Tue 11/4/03						Ţ	<b>2</b> 5								i	
3	Paramananda Mawatha - 130 m	14 days	Wed 11/5/03	Mon 11/24/03		-														-
4	Bloemendhai Lane 160 m	17 days	Tue 11/25/03									_							ļ	
5	Prince of Wales Avenue - 1588 m		Thu 12/18/03	Fri 8/6/04					ļļ		<u> </u>									
6	<u></u>	167 days	1												S. 6 2000 00	<u> </u>				
	Hultsdorf Street - 460 m	48 days		Wed 10/13/04					ļļ							St Localities				
	Silversmith Street - 30 m	6 days	Thu 10/14/04	Thu 10/21/04													ð			
3	Elle House Lane 185 m	20 days	Fri 10/22/04	Thu 11/18/04					ļ								Č.	<b>*</b> 1		
9	Mayfield Road - 518 m	55 days	Fri 11/19/04	Thu 2/3/05														85-31/Guk	لوحمد	
0	Mattakkuliya Church Road - 515 m	54 days	Fri 2/4/05	Wed 4/20/05															2	and the second
1 R	EPLACEMENT	946 days	Mon 10/28/02	Mon 6/12/06	i gan an sa			H)D(C)Blanks		<b>11</b> 12 12 12 12 12 12 12 12 12 12 12 12 12	<b>ik Crist</b> ia		and to be de							
• 1	Ordering & delivery of materials	250 days	Mon 10/28/02	Fri 10/10/03	51. 2513 (1997) -	<u>Piner Tak</u>	SANGONED AND	un socialită dân la												,
1	Topographic survey	48 days	Mon 10/13/03	Wed 12/17/03		į				ľ										
3	Obtain permits and arrange road closures	696 days	Mon 10/13/03	Mon 6/12/06						ľ		200								THE PHOT
•	Excavate trial pits	279 days	Wed 10/29/03	Mon 11/22/04						4	N				<b></b>	137541811310		5		-
3	shop drawings	310 days	Wed 11/12/03	Tue 1/18/05		-					- Marine	5 ( <b>36 1</b> 2 ( <b>17</b> 6 3 (	i za ne izani ina				1.504.0.279		(12012)	
3	Identify bad soil areas and imported backfill requireme	48 days	Mon 10/28/02	Wed 1/1/03	251010510520	E)														
-	Identify borrow pits	48 days	Mon 10/28/02	Wed 1/1/03		5														
5	Identify dumping sites	48 days	Mon 10/28/02	Wed 1/1/03		5					•									
-	transport pipes to nearby locations		Mon 10/28/02	Wed 1/1/03		2								,			-			
0	Road Type 1 - night work (14,838 m)	681 days	Mon 10/13/03	Mon 5/22/06		-														
1	Crew 1	630 days	;	Fri 3/10/06						ľ		1								
2	1 st Cross Street - 160 mm dia x 405 m	81 days	Mon 10/13/03	Mon 2/2/04						Y		K Tel Dis Bart								
3	2 nd Cross street - 160 mm dia x 440 m		Tue 2/3/04	Mon 5/24/04			·			4										
4		80 days											-TI-TEF (red)							
	3 rd Cross street - 110 mm dia x 220 m	37 days	Tue 5/25/04	Wed 7/14/04										0						
5	4 th Cross street - 160mm dia x 425 m	85 days	į	Wed 11/10/04											Ē			<u>ነ</u>		
\$	5 th Cross street - 110 mm dia x 450 m	82 days	Thu 11/11/04	Fri 3/4/05		1		•												<u></u>
	Keysor street -110 mm die x 145 m	26 days	Mon 3/7/05	Mon 4/11/05																C.280-2
3	Main street - 160 mm dia x875 m	175 days	Tue 4/12/05	Mon 12/12/05	ļ															
•	Malwatta Road - 160 mm dia x 320 m	64 days	Tue 12/13/05	Fri 3/10/06																
2	Crew 2	681 days	Mon 10/13/03	Mon 5/22/06						V					:					
- (····	Olcott Mawatha - 225 mm dia x 420 m	93 days	Mon 10/13/03	Wed 2/18/04						t	th the state of	Stille Dentinue (	۲							1
2	Maliban Street - 160 mm dia x 400 m	80 deys	Thu 2/19/04	Wed 6/9/04									angle I rea	1955-01 V (APR) -	<b>⊡</b> 1				}	
,   ···	Prince Street - 110 mm dia x 288 m	52 days	Thu 6/10/04	Fri 8/20/04											Completerer	10299 <sub>1</sub>			ŀ	



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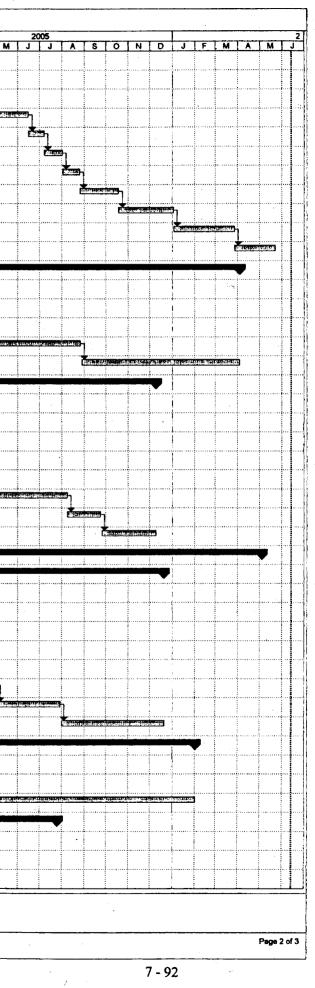
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Ð	Task Name	Duration	Start	Finish	0	ND	JF	MA	MJ	1	AS	0	I D	JF	MA	M	JJ	AS	OND	JF	MA	M
24	Prince Street - 160 mm dia x 128 m	26 days	Mon 8/23/04	Mon 9/27/04								Т						Carter				
25	Sameera's lane,Market St.China Lane, - 110	68 days	Tue 9/28/04	Thu 12/30/04			•											Ě	1 31 3 30 1 K K	<b>ا</b> رد		
26	Gabos Lane - 160 mm dia x 85 m	17 days	Fri 12/31/04	Mon 1/24/05	1								1							È -		
27	Kadiration Road - 160 mm dia x 510 m	102 days	Tue 1/25/05	Wed 6/15/05										-		T					12.010.000	-
28	1 st Rohini Lane - 110 mm dia x 90 m	16 days	Thu 6/16/05	Thu 7/7/05																		
29	2 nd Rohini Lane - 110 mm dia x 95 m	17 days	Fri 7/8/05	Mon 8/1/05			1							·		Î		•				
30	Mayuri Lane - 110 mm dia x 100 m	18 days	Tue 8/2/05	Thu 8/25/05																		
31	Cafferman's Lane - 110 mm dia x 210m	38 days	Fri 8/26/05	Tue 10/18/05																		
32	Sea Street - 110 mm dia x 295 m	54 days	Wed 10/19/05	Mon 1/2/08							·					1				ľ		-
33	Sea Street - 160 mm dia x 300 m	60 days	Tue 1/3/06	Mon 3/27/06			-									•						
34	Hospital Road - 110 mm dia x 220 m	40 days	Tue 3/28/06	Mon 5/22/06	ĺ		-									Ť						
35	Crew 3	646 days	Mon 10/13/03	Mon 4/3/06								-										
36	Messenger Street - 110 mm die x 1120 m	204 days	Mon 10/13/03	Thu 7/22/04		,								- 161 - 111-								
37	Quarry Road - 110 mm dia x 455 m	83 days	Fri 7/23/04	Tue 11/16/04													2		<b></b>			
38	College Street - 110 mm dia x 510 m	93 days	Wed 11/17/04	Fri 3/25/05	-															an an an an an an an an an an an an an a	a victoria	
39	New Moor Street - 150 mm dia x 549m	110 days	Mon 3/28/05	Fri 8/26/05			1															
40	Dam Street - 110 mm dia x856 m	156 days	Mon 8/29/05	Mon 4/3/06												1				-		
41	Crew 4	665 days	Mon 10/13/03	Fri 12/9/05																		
42	Hultsdorf Street - 110 mm dia x 300 m	55 days	Mon 10/13/03	Fri 12/26/03		•••••						24164										
43	Hultsdorf Street - 160 mm dia x 285 m	57 days	Mon 12/29/03	Tue 3/16/04						-				-	a n							-
44	Silversmith Street - 110 mm dia x 560 m	102 days	Wed 3/17/04	Thu 8/5/04												-	Sentilization of the	<b>5</b> h				
45	Mirenia Street - 110 mm dia x 350 m	63 days ,	Fri 8/6/04	Tue 11/2/04							•								1958)-ı			
46	Mirania Street - 160 mm dia x 215 m	43 days	Wed 11/3/04	Fri 12/31/04							· · · · ·					<u> </u>				7 <b>1</b> -		
47	Sri Sangaraja Mawatha - 110 mm dia x 855 n		Mon 1/3/05	Mon 8/8/05			-															र संसरम्बन्ध
48	Abdul Jabbar Mawatha - 110 mm dia x 187 m ;	·····	Tue 8/9/05	Fri 9/23/05																		
49	Kelaniganga Milit Road - 110 mm dia x 300 m		Mon 9/26/05	Fri 12/9/05																		
50	Road Type 2 - day work (17,778 m)	669 days	Mon 10/13/03	Thu 5/4/06						_												
51	Crew 1	572 days	Mon 10/13/03	Tue 12/20/05						-		<u> </u>								1		
52	Recalamation/Sea Beach Rd - 160 mm dia x		Mon 10/13/03	Mon 2/9/04								-										
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	Lotus Road - 160 mm dia x 490 m	75 days	Tue 2/10/04											13								
54	Sri Wickrema Mawatha - 110 mm dia x 665 r	97 days	Tue 5/25/04	Wed 10/6/04													in na ionaid					
55	Sri Wickrema Mawatha - 160 mm dia x 190 r	30 days		Wed 11/17/04														E				
56	Francewatta Road - 110 mm dia x 400 m	58 days	Thu 11/18/04	Mon 2/7/05															the second			
57	Mattakkuliya Farm Road - 110 mm dia x 400	60 days	Tue 2/8/05	Mon 5/2/05																62		
58	Mattakkuliya Farm Road - 160 mm dia x 400	64 days	Tue 5/3/05	Fri 7/29/05	,															.,		<u> </u>
59	Muthuwella Mawatha -110 mm dia x 690 m	102 days	Mon 8/1/05																			
60	Crew 2	603 days	Mon 10/13/03	Wed 2/1/06								<b>Y</b>										
61	Aluthmewatha Road - 160 mm dia x 1200 m	192 days	Mon 10/13/03	Tue 7/6/04								(Pressing)		9-200-550K			1					
62	Modara Street -110 mm dia x 840 m	125 days	Wed 7/7/04	Tue 12/28/04													A.S. State	d a na sea a l'efi	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.			
63	Bloemendhai Road - 110 mm dia x 1745 m	286 days	Wed 12/29/04	Wed 2/1/06																WHILE SOLLIE	ngan talah karangan	inder dest
64	Crew 3	465 days	Mon 10/13/03	Mon 7/25/05	Ì						·	-										
65	Vivekananda Hill - 110 mm dia x 544 m	81 days	Mon 10/13/03	Mon 2/2/04									an barrangal	رهم		Î						
66	Madempitiya Road - 110 mm dia x 240 m	36 days	Tue 2/3/04	Tue 3/23/04										270	رديين							
67	Mattakkuliya Centre Road -110 mm dia x 26!	40 days	Wed 3/24/04	Tue 5/18/04												لعينا				1		
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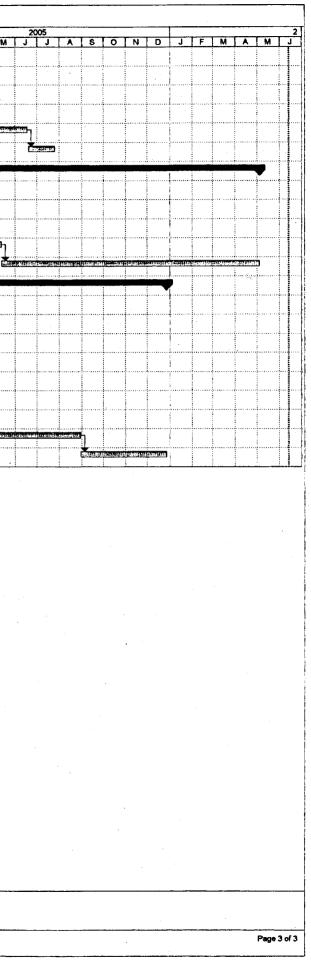
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75	Arthur De Silva Mawatha - 110 mm dia x 230	34 days	Mon 10/13/03	Thu 11/27/03				.(									Ť	(	3 <sub>7</sub>										1	-	<b>.</b>			1	-	-		
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86	Lower St. Andrew's Place - 110 mm dia x 321	48 days	Fri 9/24/04	Tue 11/30/04														-		1									l	Hereiter		<b>5</b> 7	1	Ì				
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# CHAPTER 8

# 8 PROJECT COST

# 8.1 METHODOLOGIES AND ASSUMPTIONS USED FOR COST ESTIMATE

Methodologies, currency conversion rates and other basic assumptions used for estimating the project cost have been compiled in Appendix 8A.

# 8.2 PROJECT COST

The project cost has been estimated as shown in Table 8-1.

No.	Item	Cost (Yen)
А	Civil Works Contract	3,573,164,788
A1	Preliminary and General Works	539,584,706
A2	Rehabilitation of Maligakanda Reservoir and Ellie House Reservoir	1,318,680,956
A3	Water Supply Enhancement in Kotikawatte and Mulleriyawa Area	846,292,757
A4	Rehabilitation and Reinforcement of Medium and Large Diameter Pipe	470,188,753
	Network in CMC Area	
A5	Rehabilitation of Small Diameter Distribution Mains in CB1 Area	274,924,852
A6	Supply of Materials and Equipment for Reduction of NRW	123,492,764
В	Leak Repair Works Contract	154,849,512
С	Low Income Settlement Environmental Improvement Contract	20,257,613
	Sub-Total for Three Contracts (A+B+C)	3,748,271,912
D	Consulting Service	389,177,139
E	Interest During Construction and Service Charge	177,049,549
	Sub-Total for JBIC Loan Part	4,314,498,601
F	Project Administration Cost	64,717,555
G	Land Acquisition Cost	27,400,358
Н	Custom Duties	244,736,783
Ι	GST (Goods and Services Tax)	446,646,072
	Sub-Total for NWSDB Part	783,500,767
	Total Project Cost	5,097,999,368

# Table 8-1 Project Cost

# **CHAPTER 9**

# 9.1 CONTRACT PACKAGES

The project has been divided into three separate contracts as agreed between JBIC and the Sri Lankan Government

(1) Tender Package No.1 - Contract for Civil Works

The contract for civil works will be open to International Competitive Bidding (ICB) and contractors will be screened through a pre-qualification process.

The contract will include construction of all major civil/structural components, supply and installation of equipment and pipelines:

- a) Rehabilitation/Reinforcement of Medium and large diameter pipe network in CMC area
- Scraping and re-lining existing distribution mains
- Laying of new distribution mains to reinforce the existing netwrok
- Replacement of valves
- b) Rehabilitation/Replacement of smaller diameter distribution mains in CB1 area
- Scraping and re-lining existing distribution mains
- Replacement of deteriorated distribution mains
- Replacement of service connection pipes
- Replacement of valves

c) Construction/Rehabilitation of Reservoir

- Construction of new reservoir at Ellie House
- Construction of new office building at Maligakanda
- Construction of new reservoir at Maligakanda
- Rehabilitation of old reservoir roof at Maligakanda
- d) Water Supply Enhancement in Kotikawatte-Mulleriyawa Area
- Construction of new pumping station at Ambatale Treatment Plant
- Laying a new transmission main from Ambatale TP to Gothatuwa
- Construction of a new ground reservoir and pumping station at Gothatuwa
- Construction of a new water tower at Gothatuwa

- Laying of new distribution mains
- (2) Tender package no.2 Contract for Leak Repair Works

This contract is open to Local Competitive Bidding (LCB) and contractors will be screened through a pre-qualification process. The contract is for the installation only of materials supplied by NWSDB to repair leaks in distribution mains and service connections in CMC area.

(3) Tender package no. 3 - Contract for Low Income Settlement Environmental Improvements in

This contract is open to Local Competitive Bidding (LCB) and contractors will be screened through a pre-qualification process. The contract is for the installation only of materials supplied by NWSDB to provide individual service connections and disconnect common outlets in low-income settlements in CB1 area.

#### 9.2 PROJECT IMPLEMENTATION SCHEDULE

The implementation schedule for the whole project is presented in Figure 9-1.

The Contract for Civil Works will be subject to international competitive bidding (ICB). The pre-qualification of international contractors should be finished by end of December 2001. The tender process is expected to take 301 working days from December 2001 to October 2002. The earliest possible construction start date for all components of the civil works contract is last week of October 2002. Construction will proceed on several job sites simultaneously and finish in November 2006.

		Working Days	<u>Finish</u>
•	Maligakanda Office Building	:528	Aug, 2004
•	Maligakanda Reservoir	:469	Dec, 2004
•	Maligakanda Roof Rehabilitation	:461	Nov, 2006
•	Ellie House Reservoir	:1,258	Oct, 2006
•	Kolonnawa-Gothatuwa pump house	: 370	July, 2004
•	Gothatuwa reservoir, pump house and water tower	: 633	Oct, 2005
•	Gothatuwa Transmission main	: 559	Aug, 2004
•	Gothatuwa distribution mains	: 712	Feb, 2005
•	Large and medium mains scrapping and re-lining	: 831	Jan, 2006

•	Large and medium mains reinforcement	: 575	Jan, 2005
•	Small mains scrapping and re-lining	: 656	Apr, 2005
•	Small mains replacement	: 946	Jun, 2006

Contracts for leak repair works are subject to local competitive bidding and will take less time to pre-qualify and tender than the civil works contract. The LCB contract will be re-tendered after one year. Pre-qualification is only required once at the beginning and is not necessary for subsequent tender calls. The contract for low-income settlements is arranged in the same way and has the same schedule as the leak repair contract. The earliest start date for both contracts is January 2002.

#### 9.3 PROJECT IMPLEMENTATION UNIT

#### 9.3.1 Roles and Responsibilities for Project Implementation

The project is one of several large development projects being simultaneously implemented by the NWSDB. The need for consulting services has therefore been identified by the NWSDB to assist with tendering, project management and construction supervision. The project will also require CMC Water Works Department and coordination with several other authorities (e.g. road authorities, utilities, port authority). The project implementation team will consist of three key members:

- (1) NWSDB
- (2) CMC Water Works
- (3) Consultant

The roles of the team members as foreseen at the pre-tender stage are presented in Table 9-1. The apparent duplication of roles between NWSDB and CMC on some components is necessary to ensure the smooth implementation of the project since there are several authorities involved.

#### 9.3.2 Organization of the Project Implementation Unit (PIU)

The NWSDB Project Implementation Unit assembled for the Detailed Designed Study will be re-structured for the construction stage. The PIU will be responsible for project management and coordination within NWSDB and with other authorities. Figure 9-2 shows the location of the PIU within the NWSDB Organization as well as internal and external relationships. The

PIU will remain under the principal direction of the Additional GM for Colombo Metropolitan Region.

The Construction Division and the Distribution Sections will support the PIU for the implementation of the civil works contract. The NRW section will continue to be involved with identification of leaks and implementation of the Leak Repair Contract and the contract for Improvements to Low Income settlements. The Regional Support Centre for Greater Colombo, RSC(GC), will provide coordination with CMC and monitor input from the NRW and Distribution Sections.

The Japan Project Unit will continue to provide liaison between the PIU and JBIC on matters regarding scope of work, processing payments and loan disbursement.

Figure 9-3 indicates the organizational structure and staffing needs of the PIU. The PIU will be divided into 4 major sub teams: 3 for the major construction components of the project and 1 for NRW reduction activities:

- (1) Pipeline Rehabilitation
- (2) Reservoir Rehabilitation
- (3) Kotikawatta-Mulleriyawa Enhancements
- (4) Non-revenue Water Reduction

Each sub-team will be staffed by NWSDB and supported by consultant services. For simplicity and effective management the organizational structure for the consultant mirrors that proposed for the NWSDB. Staffing levels will vary for each project component depending on the stage of completion. Duration of inputs and resources for consulting services are described in Section 9.4 Engineering Services.

#### 9.4 ENGINEERING SERVICES FOR IMPLEMENTATION

#### 9.4.1 Scope of works to be implemented

(1) Rehabilitation Component

Execution of ICB contract for scraping, re-lining and installing reinforcement mains:

- Rehabilitation/reinforcement of Medium and large diameter pipe network in CMC area
- Rehabilitation/replacement of smaller diameter distribution mains in CB1 area

- Construction and Rehabilitation of Reservoirs
- (2) Water Supply Enhancement in Kotikawatte-Mulleriyawa Area

Execution of ICB contract for water supply development scheme:

- Construction of new pumping station at Ambatale Treatment Plant
- Laying a new transmission main from Ambatale TP to Gothatuwa
- Construction of a new ground reservoir and pumping station at Gothatuwa
- Construction of a new water tower at Gothatuwa
- Laying of new distribution mains
- (3) NRW Reduction Component

# Execution of LCB contracts for:

- Repair of leaks in distribution mains and service connections in CMC area
- Provision of individual service connections and disconnection of common outlets in low-income settlements in CB1 area.

# 9.4.2 Consulting Services

- (1) Assistance with Tendering
- Assistance in evaluation of pre-qualification applications
- Assistance with evaluation of bids and
- Assistance with contract negotiations
- (2) Services required during construction (rehabilitation works)
- Assist in handing over of sites to the contractor
- Review the construction schedule proposed by the contractor
- Monitor the progress of work and instruct the contractor to update the schedule when required
- Assist NWSDB with progress meetings
- Prepare monthly and quarterly summary reports
- Advise the contractor on the interpretation of drawings and specifications and issue supplementary details and instructions during the construction period
- Review shop drawings submitted for general compliance with the design requirements
- Maintain a log of all shop drawings received for review and ensure that all required "final" shop drawings are submitted by the contractor

- Consider and advise on alternate methods, equipment and materials proposed by the contractor and permitted by the contract.
- Advise on the validity of charges for additions or deletions to the contract and issue change orders
- Process contractor's progress and final payment requisitions and issue progress certificates for NWSDB/JBIC approval
- Prepare operation and maintenance manual
- Assist with testing and commissioning
- Issue certificate of substantial completion in accordance with tender documents
- Ensure that "Final" as-built drawings are submitted by the contractor

# (3) Resident Staff Services (civil works)

- Provide quality assurance and quality control during construction
- Maintain adequate data and records related to construction contracts to determine progress of work
- Maintain a "marked-up" set of drawings to show "as-built" works.
- Review shop drawings to verify that contractual requirements are met for materials and equipment
- Review contractor's request for payments as to progress, quantities of work and materials delivered to the site
- Provide reference lines and elevations to the contractor. Check contractor's line and grade as work progresses, at least once a week.
- Arrange for all necessary field testing, inspections or verification by specialist consulting or inspection firms to determine that materials and work conforms to design requirements and specifications
- Ensure that the contractor does not injure, jeopardize or upset the operation of existing production, storage and distribution facilities during the course of construction works
- Carry out site inspections to verify that the construction works and installation of equipment are in accordance with the contract documents
- Monitor environmental impact during construction and issue directives to the contractor to control
- Report to the project manager and make recommendations if the contractor is not carrying out his work in accordance with the contract documents
- Prior to substantial completion carry out and inspection of the facility with the contractor and NWSDB and prepare a master deficiency list

#### (4) Training for operation and maintenance (civil works)

- Prior to commissioning of any equipment, arrange with the supplier to instruct operating staff in the proper care, operation and maintenance of the equipment
- Prepare the operation and maintenance manuals for each facility at least one month before commissioning the works. Maintenance of equipment is related to the maintenance manual submitted by the Contractor. The manual shall include detailed specifications and operating procedures for all supplied equipment. Provide a process control narrative describing step-by-step procedures for proper operation of the facilities under various conditions and control modes.
- Instruct the operating staff in the proper monitoring, control and operation of the facilities. This will include response to abnormal conditions, alarms and equipment failures.
- Provide technical assistance with operation for a period of 2 months after commissioning the facilities
- Organize a post-mortem workshop to review lessons learned during construction and commissioning of the facilities

# (5) Counterpart Training

In-house and overseas training for the following topics:

- NRW Reduction/ Leak Detection
- Billing and Collection Activities
- Planning and Design
- (6) Services required during implementation of NRW program

The consultant will provide advisory/ management services on the NRW reduction activities as follows:

- Supervise LCB contracts for leak reduction and low-income settlement improvements.
- Assist NWSDB in establishing waste districts and measurement/monitoring of NRW ratio in CB1 area on a monthly basis
- Review NRW reduction programmes in CB1 area implemented by NWSDB, guide and advise NWSDB staff in formulating work plans and strategies towards achieving the project goal of 30% NRW ratio by the year 2005. NWSDB activities include:
  - Rectification of defective meters
  - Metering un-metered consumers

- Leakage detection and correction
- NRW reduction in low-income settlements and public stand posts by promoting individual service connections and closing common outlets
- NRW reduction in public housing schemes
- Deduction and remedial action for illegal connections
- Measurement of NRW ratio on a regular basis

#### 9.4.3 Allocation of Resources and Inputs

Allocation of resources and inputs for consultant services during construction is presented in Figure 9-4. Duration of inputs is based on the estimated construction schedule.

Services during construction are required for a period of approximately 69 months (5.75 years). Consultant services should start September 2001 to coincide with the evaluation of prequalification submissions.

Local consultants can provide most of the services during construction however it is recommended that some of the key project management functions be carried out by foreign consultants with international experience in construction and commissioning of water supply systems:

- Overall project team leader
- Sub-team leader for Maligakanda and Ellie House reservoirs
- Structural engineer for appraisal of old Maligakanda reservoir
- Sub-team leader for water supply enhancements in Kotikawatte-Mulleriyawa (KMU) area
- Mechanical engineer for pump houses in KMU area
- Electrical engineer for KMU pump houses in KMU area
- Technical advisor for implementation of NRW program

#### 9.5 **RECOMMENDATIONS ON THE WAY FORWARD**

#### 9.5.1 Land acquisition and easements

(1) Office building

The new office building is designed for the site at Maligakanda that was selected by mutual agreement between NWSDB and CMC. NWSDB is in the process of negotiating land

acquisition with CMC (the owner). Unfortunately CMC appears to be reversing its initial consent to use the land and NWSDB is now considering another site unless the terms of land acquisition can be settled with CMC.

Depending on the configuration and the geotechnical parameters at the final site, relocation could involve complete or partial re-design. Site selection and land acquisition must be resolved before the project can be tendered and sufficient time must be allowed for re-design or adjustment to the design drawings if required.

(2) Temporary easement for reservoir at Maligakanda

A temporary easement is required for the construction of the reservoir at Maligakanda. The proposed easement is to the S/W of the reservoir on land owned by CMC. The property has a large yard and is occupied by a bungalow. NWSDB will need to temporarily acquire part of the yard for the construction of the reservoir only and the land can be restored and returned to the owners afterwards.

The easement must be obtained before the project can be tendered.

(3) Land acquisition for Gothatuwa reservoir and tower

Part of the site for the reservoir, pump house and water tower is owned by the NWSDB and occupied by a 227 m3 water tower which will be kept in service. The remaining land, which is vacant except for one small bungalow, must be acquired from the Fever Hospital.

The N/E corner of the new reservoir will be located 3.5 m from the wall of a building owned by Fever Hospital. NWSDB has entered negotiations land acquisition but no decisions have been taken yet. The Fever Hospital has requested that the wall of the reservoir be moved to provide a minimum of 5 m from the building to the reservoir structure. Moving the wall would result in a reduced volume and would require an adjustment to the design drawings.

Land must be acquired before the project is tendered and sufficient time must be allowed for any adjustments to the design drawings if required.

# 9.5.2 Temporary relocation of CMC offices at Maligakanda

The new reservoir at Maligakanda is required in order to proceed with rehabilitation of the old reservoir. Since the new reservoir will be constructed in the space occupied by the CMC water works and drainage offices, CMC staff must be relocated elsewhere before work on the reservoir can begin.

In the initial planning concept the staff from CMC offices are to be relocated to the new office building before starting the construction of the reservoir. This sequence must be revised because construction scheduling indicates that the rehabilitation of old reservoir could not be finished until mid-2007 thereby exceeding the JBIC loan period.

Construction of the new reservoir must start before the new office building is finished. Therefore the staff from CMC offices will need temporary accommodations from approximately March 2003 to June 2004 until the new office building is ready for occupancy.

# 9.5.3 Assessment of Old Maligakanda Reservoir

A structural appraisal of the old reservoir is required before starting construction of the new roof to determine if the reservoir can in fact provide another 40 to 50 years of trouble free, water tight service. If the reservoir is deemed unsound or near the end of its service life then there will be no financial benefit for replacing the roof and the reservoir should be replaced entirely or abandoned.

A thorough inspection and appraisal of the structure will require a 4 to 5 month study period consisting of:

# Before dewatering

- Geotechnical investigation
- Leakage test

# After dewatering

- Initial visual inspection and appraisal
- Initial non-destructive testing
- Preliminary structural/geotechnical analysis and modelling
- Establish the cause of failure/deterioration
- Further testing as identified by results of preliminary analysis, destructive testing if required
- Identify remedial measures if required.
- Report

#### 9.5.4 Confirmation of Geotechnical conditions at Gothatuwa

A complete geotechnical investigation was not possible during the detailed design because permission to access the property was not granted by the owners. Design of the reservoir foundations and walls is based on parameters obtained from nearby boreholes.

The NWSDB must carry out a Geotechnical investigation and assessment of the reservoir site to confirm the foundation design parameters and sufficient time must be allowed to make adjustments to the design.

# 9.5.5 Timing for Construction of a 600 mm Transmission Main to Kolonnawa New Reservoir

Route of the above main which is to be constructed by NWSDB under another contract passes through Angoda Road and Delgahawatta Road along which laying of distribution mains under this project will be carried out. Provision has been made for the 600 main in the canal crossing in Delgahawatta Road. There is also an existing 600 mm main along Delgahawatta the position of which has been taken into account in the this Study. NWSDB should coordinate the detailed design of 600 mm main in these roads and the timing of its construction to reduce inconvenience to the public.

#### 9.5.6 As-built drawings and construction records

NWSDB is presently coping with a large number of water supply development projects around Colombo and in other major cities across the country. NWSDB is aware of the need to plan rigorous O&M programs to protect the significant investment in new infrastructure. The present documentation system is completely inadequate. Effective operations and maintenance of the water supply system requires accurate records and drawings of the distribution network, and these documents must be available to the operators and kept up to date for future reference.

A workable document management system needs to be implemented on an priority basis to ensure the sustainability of investments.

Table 9.1 Roles and Responsibilities for Implementation of the Project

Project component	Sub-component	Consultant	NWSDB	CMC	Contractors
	Leak Repair Works in CMC Area	<ul> <li>Evaluation of Bids</li> <li>Assistance in contract negotiations</li> <li>Inspect site to confirm leak and repair method</li> <li>Supervise repairs</li> <li>Approve as-built drawings and certify monthly progress billings</li> </ul>	<ul> <li>Identify location and type of leak</li> <li>Site inspection to confirm the leak and repair method</li> <li>Provide materials to the contractors</li> <li>Supervise the repair</li> </ul>	<ul> <li>Assist with location of leaks</li> <li>Coordinate planed service interruptions and provide public relations during construction</li> </ul>	<ul> <li>Excavate and repair 2,340 leaks in distribution mains and 9,000 leaks in service mains</li> <li>Obtain excavation permits</li> <li>Provide monthly as-built drawings</li> </ul>
Implementation of NRW reduction plan	Low Income Settlement Environmental Improvements	<ul> <li>Employ NGO to carry out baseline survey</li> <li>Recommend initial selection of tenement gardens for improvement improvement</li> <li>Finalize tender documents</li> <li>Evaluation of Bids</li> <li>Assistance in contract negotiations</li> <li>Construction supervision</li> <li>Approval of shop drawings and certification of monthly progress billings</li> </ul>	<ul> <li>discuss initial selection of tenement gardens and confirm with other agencies final decision of tenement gardens for improvement prepare designs for piping layouts and cost estimates supply of materials</li> <li>Coordination with community leaders</li> </ul>	<ul> <li>Assist with location of leaks</li> <li>Design of drainage improvements to coordinate with NWSDB water supply improvements</li> </ul>	<ul> <li>Implement improvements to approx. 30 TGs</li> <li>Excavate/backfill pipe trench to boundary of settlement (residents are responsible for carrying out excavation/backfill activities within settlement boundaries)</li> <li>Lay distribution pipe materials and fittings throughout the settlement and make connection to existing distribution mains</li> </ul>
	Supply of materials and equipment for implementation of NRW reduction plan	<ul> <li>Evaluation of pre-qualification applications</li> <li>Evaluation of Bids</li> <li>Assistance in contract negotiations</li> </ul>	<ul> <li>Tender and award of supply contract</li> <li>Receive training</li> </ul>	itract	<ul> <li>Supply equipment and materials in accordance with specification documents</li> </ul>

Table 9.1 F	.1 Roles and Responsibilities for Implementation of the Project	
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Project component	Sub-component	Consultant	NWSDB	cwc	Contractors
	Maligakanda Office Building		<ul> <li>Acquire land</li> <li>Obtain permits and approvals</li> <li>Review of shop drawings and final selection of materials, finishes, fittings, colors etc</li> <li>Supply and install all office fittings and furniture</li> <li>Supply and install telecom system.</li> </ul>	ial selection of materials, gs and furniture m.	<ul> <li>Demolition of existing buildings and removal of tress and services</li> <li>Construction of new office building: coordinating all civil, structural, mechanical and electrical trades</li> </ul>
Construction and Rehabilitation of Reservoirs	Maligakanda New Reservoir	<ul> <li>Evaluation of pre-qualification applications</li> <li>Evaluation of Bids</li> <li>Assistance in contract negotiations</li> <li>Services during construction</li> <li>Technical assistance for training period</li> </ul>	<ul> <li>Improve water supply to Maligakanda site to fill existing and new tank</li> <li>Coordinate planed service interruptions and provide public relations during construction</li> <li>Formulation of risk management plan for safe handling of chlorine and emergency response to chlorine leak</li> </ul>	<ul> <li>Relocate staff and equipment to new building prior to construction of reservoir</li> <li>Coordinate reservoir operations during construction</li> <li>Implementation of risk management plan for chlorine safety</li> <li>Receive training on operation and maintenance</li> </ul>	<ul> <li>Demolition of existing buildings and removal or relocation of services</li> <li>Construction of a post tensioned concrete water retaining structure, testing and commissioning</li> <li>Modification to existing yard piping, supply and installation of new yard piping</li> <li>Construction of new valve house</li> <li>Rehabilitation of existing chlorination facility and supply and installation of chlorine equipments</li> <li>Coordination in services</li> </ul>
	Rehabilitation of the existing reservoir roof structure at Maligakanda	<ul> <li>Evaluation of pre-qualification applications</li> <li>Evaluation of Bids</li> <li>Assistance in contract negotiations</li> <li>Services during construction</li> <li>Prepare operation and maintenance manual</li> <li>Technical assistance for training</li> </ul>	<ul> <li>Inspection and evaluation of existing reservoir structure to determine stability and water tightness prior to construction of new roof Rehabilitation of walls if necessary (sealing cracks and applying protective bituminous coating)</li> </ul>	<ul> <li>Emptying and cleaning out the existing reservoir prior to inspection and evaluation</li> </ul>	<ul> <li>Demolition of existing roof structure and removal of debris</li> <li>Construction of new roof</li> <li>Cleaning, disinfection and commissioning</li> </ul>

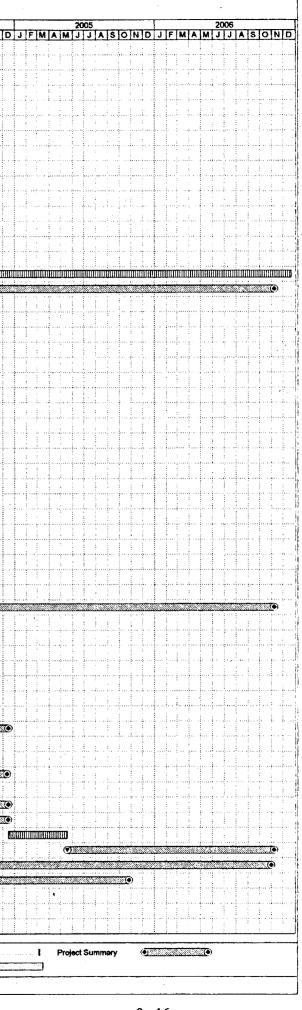
Table 9.1 Roles and Responsibilities for Implementation of the Project

Construction and Rehabilitation of Reservoirs	Ellie House New Reservoir	<ul> <li>Evaluation of pre-qualification applications</li> <li>Evaluation of Bids</li> <li>Assistance in contract negotiations</li> <li>Services during construction</li> <li>Technical assistance for training period</li> </ul>	<ul> <li>Coordinate planed service interruptions and provide public relations during construction</li> <li>Formulation of risk management plan for safe handling of chlorine and emergency response to chlorine leak</li> </ul>	<ul> <li>Coordinate reservoir operations during construction limplementation of risk management plan for chlorine safety</li> <li>Receive training on operation and maintenance</li> </ul>	oir for	Demolition of existing reservoir and removal of debris Construction of a new concrete water retaining structure, testing and commissioning Modification to existing yard piping, supply and installation of new yard piping Construction of new valve house and office building New chlorination facility and supply and installation of chlorine equipments Coordination of activities to minimize
	Gothatuwa- Kolonnawa Pump House		<ul> <li>Upgrade treatment plant</li> <li>electrical distribution and provide service connection point</li> <li>Planned shutdown of treatment process for connection to treated water main</li> </ul>	None •	••	Construction, testing and commissioning of pump house Coordination of activities to minimize disruption in services
Water Supply Enhancement in Kotikawatte and Mulleriyawa Area	Gothatuwa Transmission Main	<ul> <li>Evaluation of pre-qualification applications</li> <li>Evaluation of Bids</li> <li>Assistance in contract negotiations</li> <li>Services during construction</li> <li>Prepare operation and maintenance manual</li> <li>Technical assistance for training</li> </ul>	<ul> <li>Coordinate traffic disruptions with appropriate authorities and provide public relations during construction</li> <li>Obtain approvals and easements</li> <li>Coordinate with other authorities and utilities</li> </ul>	• None	•••	Supply and installation of transmission main Testing and disinfection, coordinated with completion of pump house and reservoir Traffic control and coordination of road closures
	Gothatuwa Ground Reservoir and Pump House Gothatuwa New	репод	<ul> <li>Acquire land</li> <li>Provide operating staff</li> <li>Receive training on</li> </ul>	• None	••	Sequential construction, testing and commissioning of reservoir, pump house and water tower Coordination of activities to minimize
	Water Tower Distribution Mains in Kotikawatte and Mulleriyawa Area		operation and maintenance <ul> <li>Obtain approvals and <ul> <li>easements</li> <li>Coordinate with other</li> <li>authorities and utilities</li> </ul> </li> </ul>	• • •	••	disruption in services Supply and installation of distribution mains Traffic control and coordination of road closures

Table 9.1 Roles and Responsibilities for Implementation of the Project

Rehabilitation/ Reinforcement of Medium and Large Diameter Pipe Network in CMC	Scrapping and lining of Medium and Large Diameter Mains Installation of reinforcement mains Rehabilitation of valves	• • • •	Evaluation of pre-qualification applications Evaluation of Bids Assistance in contract negotiations Services during construction	<ul> <li>Public relations during service interruptions</li> <li>Coordinate authorities and utility services concerned to facilitate the work</li> </ul>	• • 8550≋⊈0	Coordination of temporary by-pass water supply Coordination of road closures and traffic control	• • • • •	Scraping and cement mortar lining of distribution mains (250 to 450mm ND) Supply and install new ductile iron distribution mains (300 to 500mm ND) Replace valves attached to the mains tramporary by-pass and service connections As-built plan and profile drawings
Rehabilitation/Repla cement of Small Diameter Distribution Mains in CB1	Replacement of Small Diameter Distribution Mains Scraping and lining of Small Diameter Distribution Mains Replacement of service connections Replacement of valves	• • • •	Evaluation of pre-qualification applications Evaluation of Bids Assistance in contract negotiations Services during construction	<ul> <li>Public relations during service interruptions</li> <li>Coordinate authorities and utility services concerned to facilitate the work</li> </ul>	• • • • 6 • 5 • 6 • 6	Coordination of temporary by-pass water supply Coordination of road closures and traffic control	• • • •	Replace existing cast iron mains with PVC mains (75 to 150mm ND) Supply and installation of materials Temporary by-pass and service connections As-built plan and profile drawings
Project Management	Implementation and construction	• • • •	Provide services during construction Provide technical advice during implementation Contract administration and cost control Monitor performance and progress of contractor	<ul> <li>Coordinate implementation</li> <li>of programs</li> <li>Coordination with other authorities</li> </ul>	• • 0,720,265	Coordinate implementation of programs Coordinate operation of reservoirs and mains during rehabilitation	• •	Submit documentation for approval in accordance with specifications Coordinate construction activities and schedules

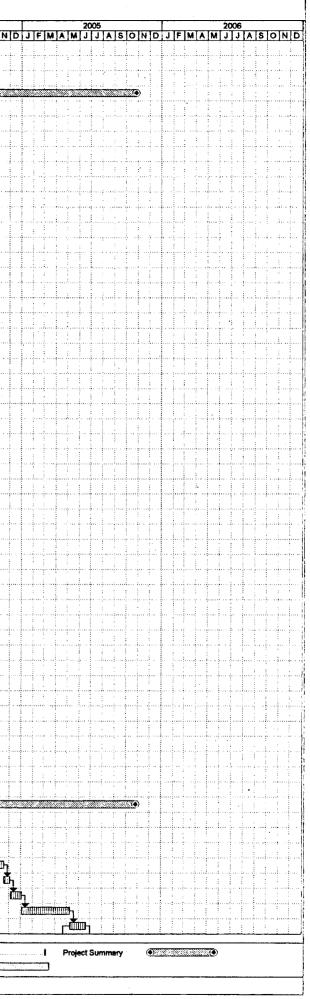
Task Name	Duration	Start	Sintab	2001 2002 2003 JFMAMJJJASONDJFMAMJJJASONDJFMAMJJJASONDJFMAMJJJASONDJFMAM
JICA DETAILED DESIGN	Duration 1 day	Start Fri 3/16/01		]   F   M   A   M   J   J   A   S   O   N   D   J   F   M   A   M   J   J   A   S   O   N   D   J   F   M   A   M   
Submission of Final Report	1 day	Fri 3/16/01	1	
I-1. SELECTION OF CONSULTANT FOR CONSTRUCTION SUPERVISION	221 days	Mon 1/1/01	Fri 9/14/01	
Approval of TOR, Short List & Inv. Ltr by JBIC	25 days	Mon 1/1/01	Mon 1/29/01	
issuance of Invitation Letter	7 days	Tue 1/30/01	Tue 2/6/01	
Briefing	7 days	Sat 2/24/01	Sat 3/3/01	
Receipt of Proposals	1 day	Mon 3/26/01	Mon 3/26/01	
Evaluation of Proposals	45 days	Mon 4/2/01	Wed 5/23/01	
Internal Approval of Evaluation Results	45 days	Thu 5/24/01	Set 7/14/01	
Approval of Evaluation Results by JBIC	20 days	Mon 7/16/01		
Issuance of NOITAC	· 7 days	Wed 8/8/01		
Preparation of Contract	10 days	Tue 8/14/01		
Signing of Contract	10 days	Sat 8/25/01		
Issuance of NTP	7 days	Thu 9/6/01		
Mobilization by Consultant	1 day	Fri 9/14/01	Ļ	
I-2. SERVICES DURING CONSTRUCTION	1650 days	Fri 9/14/01	1	
H. CIVIL WORKS	1640 days	Mon 8/13/01		
II. CIVIL WORKS	125 days	Mon 8/13/01 Mon 8/13/01	· · ·	
H-1. PREVOLUTION Approval of PQ Documents by JBIC		Mon 8/13/01 Mon 8/13/01	.1	
	10 days			
PQ Announcement	10 days	Wed 9/5/01	-	
Receipt of Applications	10 days	Mon 10/22/01	Ļ	
Evaluation of Applications	30 days	Fri 11/2/01		
Approval of Evaluation Results by JBIC	20 days	Fri 12/7/01	1	
Notice of Evaluation Results to Applicants	5 days	Mon 12/31/01	· · · •	
I-2. TENDERING (ICB)	301 days	Mon 11/26/01		
Approval of Tender Documents by JBIC	50 days	Mon 11/26/01		
Tender Announcement	5 days	Sat 2/9/02	1	▋ <mark>┊┊╞┊┙╡┊╡┊╶┊┊┊╷╴┊╝╴┥╹┡┿┓</mark> ╴╡┊╡╸┙╴╧╧┊╴╡╴╡╴╡╴╡╴╡╴╸╴╸╶╴╴╴╴╴╴
Pre-Bid Meeting	5 days	Thu 3/28/02	ŀ	
Reciept & Opening of Tenders	10 days	Thu 5/2/02		<u> </u>
Evaluation of Tenders	55 days	Tue 5/14/02		
Internal Approval of Evaluation Results	45 days	Wed 7/17/02		
Approval of Evaluation Results by JBIC	20 days	Sat 9/7/02		E Contraction of the second second second second second second second second second second second second second
Issuance of NOITAC	5 days	Tue 10/1/02		<u> </u>
Preparation of Contract	15 days	Mon 10/7/02	Wed 10/23/02	<u> </u>
Signing of Contract	1 day	Thu 10/24/02		
Issuance of NTP	1 day	Frl 10/25/02	1	
Approval of Contract by JBIC	15 days	Fri 10/25/02	Mon 11/11/02	<b>I</b>
H-3. MALIGAKANDA RESERVOIR SITE	1264 days	Fri 10/25/02	Tue 11/7/06	
CONSTRUCT NEW OFFICE BUILDING	571 days	Frl 10/25/02	Fri 8/20/04	<u>Ontri de la contribució de la</u>
Demolish Court House	45 days	Fri 10/25/02	Mon 12/16/02	
Foundations	62 days	Tue 12/17/02	Wed 2/26/03	
Structure	252 days	Tue 12/17/02	Mon 10/6/03	
Architectural	340 days	Fri 4/11/03	Tue 6/11/04	<u>The second second second second second second second second second second second second second second second s</u>
Systems and Services	478 days	Fri 10/26/02	Tue 5/4/04	
Substantial completion	87 days	Wed 5/12/04	Fri 8/20/04	
NEW RESERVOIR	469 days	Wed 6/16/03	Wed 12/15/04	Cineria and a cineria and a cineria and a cineria and a cineria and a cineria and a cineria and a cineria and a
Moving existing office to Temperory office	12 days	Wed 8/18/03	Tue 7/1/03	
Building demolition and services relocation	42 days	Thu 7/3/03	Wed 8/20/03	
Construction of New Gr Res	411 days	Thu 8/21/03		
VALVE HOUSE	181 days	Thu 8/21/03		
YARD PIPING	138 days	Thu 7/8/04		
REHABILITATE CHLORINATION BUILDING	125 days	Thu 7/22/04		
STRUCTURAL APPRAISAL OF EXISTING RESERVOIR	132 days	Thu 12/16/04		
REHABILITATE ROOF ON EXISTING RESERVOIR	461 days	Thu 5/19/05	i.	∎╶╆╴┱╍╘╌╤╌╩╍╼┲╶╪╌╧┉╕┉╞╸┠╌╬╌╏╶╍╴╤┉╤╖╏╴┠┅╏╶╅┉┼┉╅┉┠╸┥┉┠┉┯┉╅╸╄┉╂╖╞╌╅┉╡┉┧┅┇┉╂┉╋╸┷╺╉╶╕┈
II-4. ELLIE HOUSE RESERVOIR	1258 days	Fri 10/25/02	- 1	
	941 days	Fri 10/25/02		
1-5. KOTIKAWATTE-MULLERIYAWA				
TR. MAIN FROM AMBATALE TO GOTHTHATUWA	559 days	Fri 10/25/02		
GOTHATUWA-KOLONNAWA PUMP HOUSE	370 days	Mon 5/26/03		
CIVIL WORKS	220 days	Tue 8/26/03	Fri 5/7/04	
construction Task Critical	Task		Milestone	♦ Rolled Up Task Rolled Up Milestone ◇ Split
e-construction lask Construction Critical	1.00A (1111111)	and a subsection of the second second second second second second second second second second second second se	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	



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D 🗢 Task Name		Duration	Start	Finish D		2003 D J F M A M J J A S O N D J F M A M J J A S O N I
- I HOK MILLE	MECHANICAL WORKS	341 days	Mon 5/26/03	Fri 6/25/04		
	ELECTRICAL WORKS	178 days	Wed 10/29/03	Sat 5/22/04		
	EXTERNAL WORKS	104 days	Wed 3/31/04	Thu 7/29/04		<u> </u>
ළි 60	THATUWA RESERVOIR, PUMP HOUSE & WATER TOWER	633 days	Tue 5/27/03	Wed 10/26/05		
	CIVIL WORKS - RESERVOIR & PUMP HOUSE	291 days	Fri 8/8/03	Fri 9/17/04		
	Site Mobilization	6 days	Fri 8/6/03	Fri 8/15/03		стана на стана на стана на стана на стана на стана на стана на стана на стана на стана на стана на стана на ст Съ
	Site clearing & Demolishing works	6 days	Mon 8/18/03	Mon 8/25/03		s i statu i statu i statu i statu i statu i statu i statu i statu i statu i statu i statu i statu i statu i st
	Setting out works	5 days	Tue 8/26/03	Mon 9/1/03		Ğ.
	Excevation works & Protection of Embankments	12 days	Tue 9/2/03	Wed 9/17/03		Ğ,
	Levelling & Compaction works	3 days	Thu 9/18/03	Mon 9/22/03		the second second second second second second second second second second second second second second second s
	Construction of Under Drains & Gravity drains	28 days	Tue 9/23/03	Thu 10/30/03		<b>Č</b> .,
	Blinding Concrete for Foundation	2 days	Fri 10/31/03	Mon 11/3/03		ξ
	Foundation Stab - Formwork, Reinft, Water Bar fixing & Concrete	45 days	Tue 11/4/03	Mon 1/5/04		Č.,
	Foundation Stab Curing	6 days	Tue 1/6/04	Tue 1/13/04		Č – – – – – – – – – – – – – – – – – – –
	RC walls & columns- Formwork, Reinit, Water Ber fixing & Concrete	28 days	Wed 1/14/04	Fri 2/20/04		Т. С. С. С. С. С. С. С. С. С. С. С. С. С.
	Curing of Walls & columns	6 days	Mon 2/23/04	Mon 3/1/04		ξ
	Yard piping & Connecting Supply Water Main	60 days	Tue 3/2/04	Mon 5/24/04		
-	Losting & Commissioning Transmission Main	S days	Tee 7/27/04	Sat 7/31/04		
	Filling Water, Testing the Reservoir & Pipes	24 days	Tue 7/27/04	Fri 8/27/04		
	Disinfecting the Pipes & Fittings	3 days	Mon 8/30/04	Wed 9/1/04		<b>Š</b>
	Back filling works & Compaction	12 days	Thu 9/2/04	Fri 9/17/04		· · · · · · · · · · · · · · · · · · ·
	Staging area RC Stab - Formwork, Reinforcement & Concrete	12 days	Tue 3/2/04	Wed 3/17/04		<b>Š</b>
	Curing Staging area slab	6 days	Thu 3/18/04	Thu 3/25/04		i i i i i i i i i i i i i i i i i i i
	Reservoir Roof Stab - Formwork, Reinforcement & Concrete	28 days	Tue 3/2/04	Thu 4/8/04		
	Curing Reservoir Roof Slab	6 days	Fri 4/9/04	Fri 4/16/04		
-	RC Columns of Pump House - Formwork, Reinforcement & Concrete	12 days	Fri 3/26/04	Mon 4/12/04		<b>Č</b> ,
	Curing RC Columns of Pump House	6 days	Tue 4/13/04	Tue 4/20/04		
	RC Roof Frame - Formwork, Reinforcement & Concrete	12 deys	Wed 4/21/04	Thu 5/6/04		ф —
	Curing RC Roof Frame	6 days	Fri 5/7/04	Fri 5/14/04		Ğ
	Pump House & Generator Room Roofing Works	12 days	Mon 5/17/04	Tue 6/1/04		
	Works on Pump House & Generator Room Block Walls	6 days	Wed 4/21/04	Wed 4/28/04		t i i i i i i i i i i i i i i i i i i i
	Fixing Doors, Windows & Roller Doors	30 days	Thu 4/29/04	Wed 6/9/04		t
	Pump House & Generator Room Finishing works	12 days	Thu 6/10/04	Fri 6/25/04		Č,
	Reservoir Roof Waterproofing & laying of Pebbles	12 days	Mon 4/19/04	Tue 5/4/04		ă 🔰
	Construction of Thrust Blocks	6 days	Mon 5/24/04	Mon 5/31/04		1
	MECHANICAL WORKS	323 days	Tue 5/27/03	Wed 8/18/04		
	Ordering & Procuring Pumps, Generator, Pipes, Fittings & Gantry Crane	250 days	Tue 5/27/03	Fri 5/7/04		
-	Setting out of Internal Piping & Yard Piping works	10 days	Mon 5/10/04	Fri 5/21/04		
	Installation of Gantry Crane	6 days	Mon 6/28/04	Mon 7/5/04		
	Laying of Pipes & Fittings	12 days	Tue 7/6/04	Wed 7/21/04		
	Installation of Pumps	6 days	Thu 7/22/04	Thu 7/29/04		t i i i i i i i i i i i i i i i i i i i
	Construction of MS Platform, Cat ladders & Hand rails.	12 days	Fri 7/30/04	Mon 8/16/04		Ď,
	Testing & Commisioning the Pumps & Gantry Crane	2 days	Tue 8/17/04	Wed 8/18/04		
	ELECTRICAL WORKS	156 days	Wed 1/14/04	Wed 8/18/04		Canada and a second sec
	Electrical Conduiting works	12 days	Wed 1/14/04	Thu 1/29/04		t i i i i i i i i i i i i i i i i i i i
	Electrical Wiring works	12 days	Thu 4/29/04	Fri 5/14/04		The second second second second second second second second second second second second second second second s
	Electrical first fix	6 days	Mon 6/28/04	Mon 7/5/04		Č.
	Installation of Generator	3 days	Tue 7/6/04	Thu 7/8/04		h i i i i i i i i i i i i i i i i i i i
	Electrical final fixtures	12 days	Fri 7/9/04	Mon 7/26/04		Č I
· · ·	Testing of Electrical fixtures & Generator	2 days	Tue 8/17/04	Wed 8/18/04		Ч –
	WORKS ON WATER TOWER	288 days	Mon 9/20/04	Wed 10/26/05		
	Setting out works	3 days	Mon 9/20/04	Wed 9/22/04		K K
	Excevation for Foundation	6 days	Thu 9/23/04	Thu 9/30/04		
	Compaction & Blinding Concrete	4 days	Fri 10/1/04	Wed 10/6/04		
	Foundation Concrete - Formwork, Reinforcement & Concrete	30 days	Thu 10/7/04	Wed 11/17/04		
	Shaft Ring Beam concrete - Formwork, Reinforcement & Concrete	12 days	Thu 11/18/04	Fri 12/3/04		i i i i i i i i i i i i i i i i i i i
	Concrete RC Shaft using Slip Form - Formwork, Reinit & Concrete	21 days	Mon 12/6/04	Mon 1/3/05		
•	Bottom Ring Beam & Conicel Tank - Formwork, Reinit & Concrete	90 days	Tue 1/4/05	Mon 5/9/05		
	Water Tank Walls - Formwork, Reinforcement & Concrete	30 days	Tue 5/10/05	Mon 8/20/05		
construction	Task Critical Task			Milestone		Rolled Up Milestone 💠 Split i
				-		
m 1/7/01	Task Progress Critical Task Pro	ogress		Summary	Rolled Up Critical Task	Rolled Up Progress External Tasks



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Task I	lame	Duration	Start	Finish D	2001 2 J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M
	Top Dome - Formwork, Reinforcement & Concrete	60 days	Tue 6/21/05	Mon 9/12/05	
	Construct Platforms & Stairs	30 days	Tue 5/10/05	Mon 6/20/05	
	All the piping works	90 days	Tue 5/10/05	Mon 9/12/05	
	Water Filling & Testing the Water Tank	28 days	Tue 9/13/05	Thu 10/20/05	
	Dsinfecting the Pipes & Water tank	4 days	Fri 10/21/05	Wed 10/28/05	
	EXTERNAL WORKS	32 days	Tue 9/13/05	Wed 10/26/05	
	Construction of Roads, Pavings & Fencing works	30 days	Tue 9/13/05	Mon 10/24/05	<b>համարտանությունը տարին է համարտերի է համարտերի համարտերի համարտերի համարտերի համարտերի հետ համարտերի համարտերի</b>
	Final Inspection, Snagging & handing over	2 days	Tue 10/25/05	Wed 10/26/05	
2	GOTHATUWA DISTRIBUTION MAINS	712 days	Mon 10/28/02	Thu 2/3/05	
e) 1	6. MEDIUM/LARGE MAINS REHABILITATION	831 days	Mon 10/28/02	Mon 1/2/08	
	REHABILITATION	831 days	Mon 10/28/02	Mon 1/2/06	
Ð	REINFORCEMENT	575 days	Mon 10/28/02	Fri 1/7/05	
4	-7. SMALL MAINS REHABILITATION	946 days	Mon 10/28/02	Mon 6/12/06	
1	REHABILITATION	658 days	Mon 10/28/02	Mon 5/2/05	
<b>6</b>	REPLACEMENT	946 days	Mon 10/28/02	Mon 6/12/06	
W.LE	AK REPAIR WORKS	779 days	Mon 7/2/01	Fri 12/26/03	
	-1. PREQUALIFICATION	48 days	Mon 7/2/01	Sat 8/25/01	
3	PQ Announcement	2 days	Mon 7/2/01	Tue 7/3/01	
-	Receipt of Applications	3 days	Fri 7/27/01	Mon 7/30/01	
	Evaluation of Applications	20 days	Tue 7/31/01	Wed 8/22/01	
-	Notice of Evaluation Results to Applicants	-	Thu 8/23/01	Sat 8/25/01	
	-2. TENDERING (LCB)*	3 days 400 days	Wed 9/19/01	Sat 12/28/02	
1 7	Tender service contract for year 1		Wed 9/19/01	Sat 12/28/02 Sat 12/29/01	
-  .	Tender Announcement	88 days 3 days	Wed 9/19/01 Wed 9/19/01	Sart 12/29/01 Fri 9/21/01	
-	Reciept & Opening of Tenders	-		·	
	Evaluation of Tenders	3 days	Tue 10/16/01	Thu 10/18/01	<b>,</b>
	Internal Approval of Evaluation Results	20 days	Fri 10/19/01	Set 11/10/01	
	Internal Approvator Evaluation Results	25 days	Mon 11/12/01		
		5 days	Tue 12/11/01	Sat 12/15/01	
-	Preparation of Contract	5 days	Mon 12/17/01	Fri 12/21/01	
-	Signing of Contract	5 days	Sat 12/22/01	Thu 12/27/01	
-	Issuance of NTP	1 day	Fri 12/28/01	Fri 12/26/01	
i.	Notification of Contract to JBIC	1 dey	Set 12/29/01	Set 12/29/01	
-	Tender service contract for year 2	88 days	Wed 9/18/02		
-	Tender Announcement	3 days	Wed 9/18/02	Fri 9/20/02	
	Reciept & Opening of Tenders	3 days	Tue 10/15/02		[ ]
	Evaluation of Tenders	20 days	Fri 10/18/02	·	$\Box_{i} = \Box_{i$
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	Signing of Contract	5 days	Sat 12/21/02		
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-	Notification of Contract to JBIC	1 day	Sat 12/28/02	Sat 12/28/02	
N	-3. SERVICE CONTRACTS	624 days	Set 12/29/01	Fri 12/26/03	
-	contract for year 1	312 days	Sat 12/29/01	Fri 12/27/02	
	contract for year 2	312 days	Sat 12/28/02	Fri 12/26/03	
1	W-INCOME SETTLEMENT ENVIRONMENTAL IMPROVEMENT	779 days	Mon 7/2/01	Fri 12/26/03	
d .	-1. PREQUALIFICATION	48 days	Mon 7/2/01	Sat 8/25/01	
	PQ Announcement	2 days	Mon 7/2/01	Tue 7/3/01	
1	Receipt of Applications	3 days	Fri 7/27/01	Mon 7/30/01	$\mathbf{h}$
1	Evaluation of Applications	20 days	Tue 7/31/01	Wed 8/22/01	$\mathbf{b}_{\mathbf{b}}$
	Notice of Evaluation Results to Applicants	3 days	Thu 8/23/01	Sat 8/25/01	$\mathbf{F}_{\mathbf{r}}$
n l	-2. TENDERING (LCB)*	399 days	Wed 9/19/01	Fri 12/27/02	
	Tender service contract for year 1	87 days	Wed 9/19/01	Fri 12/28/01	
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1 :	Reclept & Opening of Tenders	3 days	Tue 10/16/01	Thu 10/18/01	
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	Preparation of Contract	5 days	Mon 12/17/01	Fri 12/21/01	
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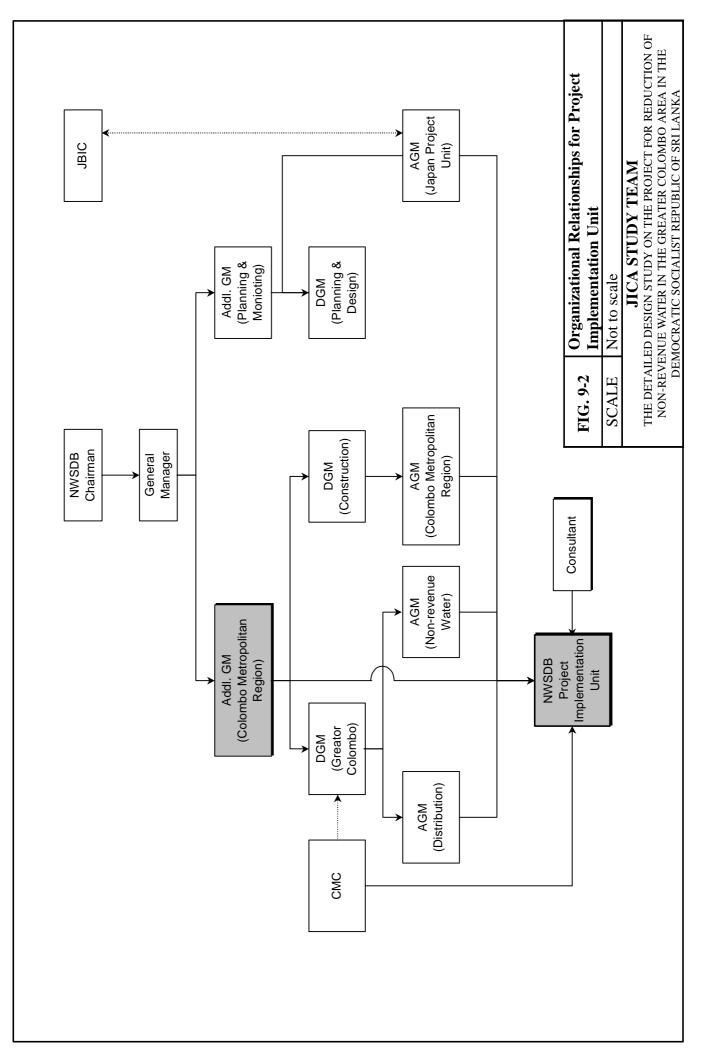
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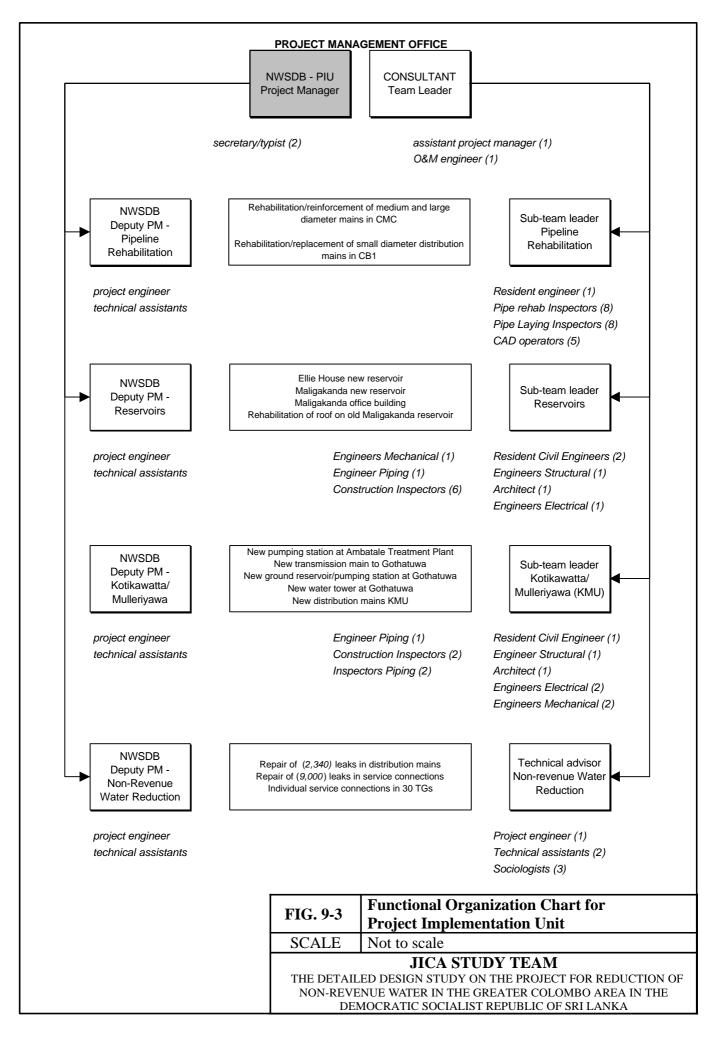
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88	]	Issuance of NTP	1 day	Fri 12/28/01	Fri 12/28/01		<b>N</b> 1 1 1 1 1 1 1 1 1 1 1 1 1		
89		Notification of Contract to JBIC	1 day	Fri 12/28/01	Fri 12/28/01				
90	]	Tender service contract for year 2	87 days	Wed 9/18/02	Fri 12/27/02			3	
91		Tender Announcement	3 days	Wed 9/18/02	Fri 9/20/02		H 1		
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95	1	Issuance of NOITAC	5 days	Tue 12/10/02	Sat 12/14/02				
96	1	Preparation of Contract	5 days	Mon 12/16/02	Fri 12/20/02				-
97	1	Signing of Contract	5 days	Sat 12/21/02	Thu 12/26/02			6	
98	1	issuance of NTP	1 day	Fri 12/27/02	Fri 12/27/02				
99	1	Notification of Contract to JBIC	1 dey	Fri 12/27/02	Fri 12/27/02		· · · · · · · · · · · · · · · · · · ·		
100	1	IV-3. SERVICE CONTRACTS	624 days	Sat 12/29/01	Fri 12/26/03				)
101	1.	contract for year 1	312 days	Set 12/29/01	Fri 12/27/02				
102	1	contract for year 2	312 days	Sat 12/28/02	Fri 12/26/03				

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	Service provider					Required	man m	onths							Total	Man-Mor	iths
1) PROJECT MANAGEMENT OFFICE		2001	2002	20	03		2004		500	2		2006		2007	Forei	Ju Fo	<u>a</u>
1-1 Tendering Civil Works (ICB) 1-2 Tendering (LCB)																	
Consultant Services - Team Leader Assistant Team Leader - scheduling, documentation, cost control	Foreign Consultant local consultant	1 3	1.5 1.5 1.5	2 1.5 1.5	2 2 1.5 1.5	5 1.5 1.	2 2 1.5 1.5	1.5 1.5	2 1.5	1.5	2 2 1.5 1.5	1.5 1	1 3 .5 1.5			28	31.5
O&M Engineer - manuals, and training Secretary/typist (2)	Foreign Consultant local consultant	2 6	9 9 9	6 6	6 6	9	9	2 6 6	9	9	6 6	9	6 6			5	122
office boy per diems F/C	local consultant		с			e										33	61
car rentals (1)																	
2) MALIGAKANDA and ELLIE HOUSE RESERVOIRS Sub-team leader - civil/structural engineer 	Foreign Consultant		5	2	з	~		2		~			5			23	
per diems car rentals (1)																	
2-1 Maligakanda Office Building 2-2 Maligakanda New Reservoir			3	Ø													
2-3a Maligekanda roof rehabilitation Resident - civilistructural engineer	Local Consultant		2			2		N	8 -	2	5	2	2 2				31
structural engineer architect	Local Consultant Local Consultant		1.5	1.5 1.5 1 1	1.5 1.5 1 2	1.5 2	1.5 1.5 2 2	1.5	-	-	1.5	1.5 1	.5 1.5				22.5 12
electrical engineer	Local Consultant					~ ~ ~											9 9
mechanical engineer piping engineer	Local Consultant Local Consultant					4	_	- (	~ ~	~ ~	0 10						0 0
construction inspectors - structural (1) construction inspector - electrical	Local Consultant Local Consultant		10			м и	5 3 5 3	e + 3	-		_	_	9				44 9
construction inspector - mechanical construction inspector - building trades	Local Consultant			1.5	1.5 1.5	5 1.5 1.	5 1.5	-									7
voriae contrain mapaceur - contante construction inspector - piping	Local Consultant					:		e									6
2-3b Structural appraisal old Maligakanda reservoir structural engineer - appraisal and rehabilitation specialist	Foreign Consultant							3								4	
structural engineer geotechrical engineer	Local Consultant Local Consultant							0 3	7								2
car rentals (1)																	
per diems 2-4 Ellie House Reservoir			8	-12-	-12			- 0 -	-0-	-0-	-12-	-0-	-0-			4	
Resident - civil/structural engineer pipe engineer	Local Consultant Local Consultant		5	2 2	2 2	2 2 5 1.5 1.5	2 5 1.5	2 2 1.5	2	~	1 2	- 10	2 2				34 11.5
structural engineer architect	Local Consultant			1.5	1.5 1.5 1.5 1.5	5 1.5		1	5 1.5	1.5 1.	5		1.5				10.5
electronic	Local Consultant																8
mechanical engineer construction inspector - structural (1)	Local Consultant Local Consultant		2	3 3	3		3	3	e	e e	-						32
construction inspector - electrical/mechanical construction inspector - piping	Local Consultant Local Consultant				3	- 0 - 0					2	2	2				17
3) WATER SLIPPLY ENHANCEMENT IN KOTIKAWATTE and MILLI ERIYAW	VA AREA			_													
9. VATEN SOFTEL LEVENCEMENT IN NOTINATION TO WOLLENT AVAILABLE AND WOLLENT AVAILABLE AND WOLLENT AVAILABLE AV							8										
<ol> <li>Gothatuwa-Kolonnawa Pump House</li> <li>Gothatuwa Reservoir, Pump House and New Water Tower</li> </ol>																_	
3-4 Gothatuwa Distribution mains Sub-team leader - civil/structural engineer	Foreign Consultant				3		2	5	e							13	
Resident - civil/structural engineer mechanical environer	Local Consultant Foreign Consultant		-	1 2	2 2	2 2	2	2 2	2							e	20
mechanical engineer elervirical onviroaer	Local Consultant Foreign Consultant				7	2 2										~	7
electrical engineer	Local Consultant		-	7	1 1	~ ~	c	~									7
pperine engineer architect	Local Consultant Local Consultant		-		- <del>-</del>		n	- >									5
construction inspector - structural (1) construction inspector - electrical/mechanical	Local Consultant Local Consultant			2		6 Q 6 Q	3	3	2								24 8
construction inspectors - piping (2)	Local Consultant				2 6	9	9	6 2									34
per denta F/C car rentals (2)																2	
4) REHABILITATION AND REINFORCEMENT OF MEDIUM AND LARGE DIAMETER PIPI	AMETER PIPE NETWORK																
rehabilitation reinforcement																	
Sub-team leader - water supply/pipeline engineer Assistant Resident Engineer	Local Consultant Local Consultant				- 1 2 3	ო ო	ლ ლ										28
pipe scrapping and relining inspectors (4)	Local Consultant				4 12	12	12 12 12 12	12 12 12 12	12	12 1	12						112 80
pipe auging improvises (*) CAD Operators (2)	Local Consultant					9				9							54
per diems r/C car rentals																>	
5) REHABILITATIONREPLACEMENT OF SMALL DIAMETER DISTRIBUTION MAINS	N MAINS																
rehabilitation reinforcement								<u>a a</u>									
pipe scrapping and relining inspectors (4)	Local Consultant				4 12 12	12 12 12 12 12	2 12	12 12 12 12	4	12	12 12	12	2 12				80
proventing mapped of the Control of	Local Consultant					ი	_						е С			-	84
per diems F/C car rentals																5	
6) IMPLEMENTATION of NRW REDUCTION																	
6-1 Leak Repair Works 6-2 Low Income Sattlement Environmental Improvements						_ 0											
6-3 Supply of materials and equipment						E											
64 Advisory and management services on NRW Program Technical advisor - NRW/Water supply engineer	Foreign			2												œ	
Project Engineer Technical assistants (2)	local consultant local consultants	2 6 3	9 3 3 9 9 9	3 3 6 6	9 9 3												25 50
Sociologists (3) per diems F/C	Local Consultant/NGO	б 		6												8	18
car rentals (1)																	
TOTAL															₹	51 1,	346

# Figure 9-4 Engineering and Personnel Input Breakdowns for Implementation

# **CHAPTER 10**

# **10 PROJECT EVALUATION**

### **10.1 TECHNICAL EVALUATION**

### **10.1.1 Operation and Maintenance of Project Facilities**

### (1) General

The new water supply facilities must be properly maintained and operated to ensure efficient delivery of safe potable water in sufficient quantities and adequate pressure.

The facilities have been designed to simplify operations and to minimize the amount of preventive maintenance required. Nevertheless operations staff will require training and a preventive maintenance program will need to be implemented to ensure reliable delivery of water.

(2) Work Program for operation and maintenance

Operation activities can normally be classified into daily or periodical functions. Maintenance is classified as preventive or corrective. Most operation and maintenance activities can be planned for and scheduled however there will occasionally be a need to carry out corrective maintenance when equipment fails. Planned operation and maintenance activities for the new facilities are described in Table 10-1.

Facility	Operations	Maintenance
Pump Houses	<ul> <li>Reading and recording instruments</li> <li>Operation of electrical and mechanical systems</li> <li>Responding to alarm conditions</li> <li>Manual override of automatic systems (periodic)</li> <li>Adjusting start and stop schedule and sequence</li> </ul>	<ul> <li>Visual inspection of M&amp;E equipment</li> <li>Weekly test of diesel generator</li> <li>Preventive maintenance to M&amp;E equipment</li> </ul>
Transmission Main	Adjust flow control to match reservoir operations	<ul> <li>visual inspection of valves, and pipe bridges (monthly)</li> <li>air valve maintenance (monthly)</li> </ul>
Ground Reservoirs	<ul> <li>Check residual chlorine at outlet (daily)</li> <li>Adjust chlorine dosage (weekly)</li> <li>Water quality examination in reservoir (weekly)</li> <li>Adjust position of inlet valves</li> <li>Adjust position of distribution valves</li> </ul>	<ul> <li>Operate inlet valves (weekly)</li> <li>Operate sluice gates (weekly)</li> <li>Visual inspection (annual)</li> <li>Cleaning (annual)</li> <li>Grass cutting etc</li> </ul>
Elevated Tank	Check residual chlorine at outlet (daily)	<ul> <li>Visual inspection (annual)</li> <li>Cleaning (annual)</li> <li>Operate by-pass valve (monthly)</li> </ul>
Distribution Mains	<ul> <li>Water quality examination at end points (monthly)</li> <li>Flush mains (annually)</li> <li>Operate valves (semi-annually)</li> </ul>	<ul> <li>Leakage detection and correction</li> <li>Repair and replacement of pipe and meters</li> <li>Repair covers and clean out valve chambers (annual)</li> </ul>

 Table 10-1
 Operation and Maintenance Requirements of New Facilities

### (3) Organization for Operation and maintenance

Although the water board is ultimately responsible for all aspects of water supply in Metropolitan Colombo, some aspects of service delivery and maintenance within CMC are contracted out to CMC Water Works Department. Responsibility for operation and maintenance of the new facilities will be as follows:

 Table 10-2
 Organizations Responsible for Operation and Maintenance

usie i v 2 of guilizations Responsible		
Facility	Organization Responsible	Organizational Unit
Kolonnawa-Gothatuwa Pump House	• NWSDB	AGM Production
Gothatuwa Pump House & Ground Reservoir	NWSDB	AGM Distribution Section 1     Manager Towns East
Gothatuwa Elevated Water Tower	NWDSB	<ul> <li>AGM Distribution Section 1</li> <li>Manager Towns East</li> </ul>
Kolonnawa-Gothatuwa Transmission Main	NWSDB	<ul> <li>AGM Distribution Section 1</li> <li>Manager Towns East</li> </ul>
Distribution mains in Kotikawatte-Muleriyawa	NWSDB	Manager Towns East
Maligakanda Ground Reservoir	• CMC	Water works office
Ellie House Ground Reservoir	• CMC	Water works office
Distribution Mains (CB1, CB2, CB3)	NWSDB     CMC	AGM Distribution Section 2     Manager Colombo City

Facility	Staff position	No. of persons	O&M Functions
	Operators	2	Operation of pumping     system
	Superintendent		Planning and scheduling     maintenance works
Kolonnawa-Gothatuwa Pump House Maintenance	Mechanic	Use existing	
	Electrician	treatment plant staff	Preventive and corrective     maintenance
	Laborers		
	Operators	2	Operation of pumping     system and reservoir
	Superintendent		Planning and scheduling     maintenance works
Gothatuwa Pump House, Ground Reservoir and Elevated Tower	Mechanic	Use existing	Preventive and corrective
	Electrician	treatment plant staff	<ul> <li>Reservoir cleaning</li> </ul>
	Laborers		
Kolonnawa-Gothatuwa Transmission	Foreman	1	Visual inspections
Main Maintenance	Pipe fitters	1	Preventive and corrective maintenance
Walkenance	Laborers	2	maintenance
	Foremen	2	
Kottikawatte-Muleriyawa distribution	Pipe fitters	2	Operation & Maintenance of valves
mains	Drivers	2	<ul><li>repair of leaks</li><li>Connection of new services</li></ul>
	Laborers	4	
	Operator		Operation of reservoir and distribution valves
Maligakanda Ground Reservoir	Mechanic	Use existing CMC staff	Preventive and corrective maintenance
	Laborers		Reservoir cleaning
	Operator		Operation of reservoir and distribution valves
Ellie House Ground Reservoir	Mechanic	Use existing CMC staff	Preventive and corrective maintenance
	Laborers		Reservoir cleaning
	Foremen		
Distribution Mains (CB1, CB2, CB3)	Drivers	Use existing CMC	Maintenance of valves and repair of leaks
	Pipe fitters	staff	Connection of new services
	Laborers		

Table 10-3 Staffing Required for Operation and Maintenance of New Facilities

### (4) Training

Pump operation and flow control Pump maintenance Chlorination system operation and Emergency response to chlorine leakage Reservoir operations

(5) O&M costs

Power Chemicals Staffing Equipment

### 10.1.2 Roles and Responsibilities of NWSDB and CMC

(1) Present Situation

Maintenance and operation of the water supply system in Colombo lacks clear definition of roles and responsibilities. Maintenance of the distribution mains is predominantly carried out by CMC Water Works Department under a service contract to the NWSDB. Maintenance and repair of service connections is carried out by both CMC and NWSDB (Area offices/NRW unit).

(2) Problems noted during the study

Problems noted during the study indicate that duplication of roles and responsibility will be a significant impediment to the successful implementation of leakage detection and correction:

- There is inadequate sharing of information between the two organizations and record keeping is poor
- There is no systematic leakage detection or correction program in either CMC or NWSDB. Repair teams are dispatched in response to public complaints or reports.
- There is no single agency to receive complaints or reports on leakage from the public. The confusion leads to non-reporting.

(3) Recommendations for future NRW efforts

As long as NRW remains high, NWSDB should be the sole agency responsible for operation and maintenance of the water supply system including leakage detection and correction.

### **10.2 FINANCIAL EVALUATION**

### 10.2.1 Quantifiability of Project

Costs and benefits of each component can be identified in comparison between "With Project" and "Without Project" situations as shown in Table 10-4.

Component	Cost	Benefit
Rehabilitation of reservoirs	Zero for rehabilitation of existing reservoirs Capital expenditure	Avoidance of opportunity loss due to water supply cut that will occur if no preventive rehabilitation is made now (quantifiable) Profit increase from newly constructed
	of a new reservoir (quantifiable)	reservoir (quantifiable)
Rehabilitation and strengthening of distribution facilities	Capital expenditure (quantifiable)	Profit increase from newly supplied water (quantifiable)
NRW Action Plan	Equipment cost, mass media campaign cost, etc. (quantifiable)	Decrease of variable cost incurred at WTPs attributable to production decrease caused be NRW reduction (unquantifiable) Profit increase from newly billed water (unquantifiable)
Rehabilitation of distribution pipe network	Capital expenditure (quantifiable)	Ditto

 Table 10-4
 Costs and Benefits of Components

## **10.2.2 Financial Evaluation**

The financial viability of each component will be evaluated by three indicators, which are the Net Present Value (NPV), the Benefit Cost Ratio (B/C) and the Internal Rate of Return (IRR). The results of computation of NPV, B/C, and IRR and NPV are summarized in Table 10-5. Detailed computations are shown in Appendix 10A.

NPV is computable for " Rehabilitation of reservoirs component", and " Rehabilitation and strengthening of distribution facilities component". B/C and IRR are computable only for " Rehabilitation and strengthening of distribution facilities component".

"Rehabilitation of reservoirs component" is regarded financially viable because of its positive NPV. "Rehabilitation and strengthening of distribution facilities component" is not financially viable if it is implemented alone. However if "Rehabilitation of reservoirs component" and "Rehabilitation and strengthening of distribution facilities component" are implemented together, or all of the four components are combined, the overall NPV would exceed Rs. 911 million. Therefore the financial viability is justifiable.

Component	NPV	B/C	IRR
Rehabilitation of reservoirs	Rs. 1,091 M	Incomputable	Incomputable
Rehabilitation and strengthening of distribution facilities	- Rs. 180 M	0.5	6.4 %
NRW Action Plan Rehabilitation of distribution pipe network	Incomputable	Incomputable	Incomputable
Total Project	Over Rs. 911 M	Incomputable	Incomputable

 Table 10-5
 Summary of Financial Indicators

" NRW Action Plan component" and " Rehabilitation of distribution pipe network component" cannot be judged as financially sound from NPV, B/C, or IRR. However they must have more benefits than costs. Those unquantifiable benefits are, for example:

- Reduction of road maintenance cost
- Reduction of fire loss
- Alleviation of household chores
- Improvement of health condition

- Increase of land prices
- Ripple effect on local and national economy

### **10.3 SOCIOECONOMIC EVALUATION**

### 10.3.1 Affordability and Willingness of Low Income Settlements

The report on Pilot Projects in Low Income Settlements adequately demonstrates the affordability of the householders to pay for an individual water connection and to pay the monthly water bill at a reasonable level of consumption. The minimum charge for  $10 \text{ m}^3$  per month is Rs 35. The average monthly income of families in the pilot sites at Rs 7,858 is well above the perceived poverty line of Rs 1,500 and indeed above the government minimum monthly salary of Rs 6,000 quoted at mid 2000.

Over the last few years NWSDB has reduced the concessionary connection fee to Rs 4,160 (including application form costs and stamp duties), and it allows payment of Rs 3,000 of this amount to be made over 30 months at the rate of Rs 100 per month. To some extent this has been achieved by the requirement that the communities provide all labour for excavation and backfilling free of charge for the reticulation system and the household connections.

The householders are willing to pay this amount for individual connections, particularly when NGO intervention is able to strengthen existing CDCs and gain the confidence of the community in general.

Householders are also willing to pay for the monthly charges, but this will only be successful over time when NWSDB are able to organise the regular and accurate reading of water meters and the timely distribution of monthly bills. Of particular importance is the timely receipt of the first monthly bill for two reasons. Firstly, there is a tendency for new customers to over use the facility resulting in too high a payment. Secondly, if the first bill is received late and is for several months of supply, it is likely that the family will not have the cash to cover such a large bill. In communities such as those found in settlements, families live on a monthly, weekly or even a daily basis when it comes to ready cash and there are rarely any savings to finance sudden, unexpected demands such as a high water bill.

NWSDB would also be well advised to educate these new consumers on the economic use of water or possibly face a greater NRW problem than originally existed. This may also occur if

the disconnection powers of NWSDB for none payment are not exercised. This situation exists at the moment due to external interventions.

Communities were also found to be willing to contribute cash as well as labour for sanitation and drainage improvements, although this was not put to the test on these projects since these improvements were not carried out for the reasons stated in Section 4.6 of this report. In the Community Attitude Survey over 85% of the households stated that they could assist the project by giving cash contributions for both construction activities and for maintenance of completed infrastructure facilities.

Should such works become necessary to avoid environmental damage by the installation of individual water connections, NWSDB should recognise that is in its best interest as well as that of the community to combine environmental improvement works with the water supply installation.

For the planned forthcoming projects in the northern part of CMC, most environmental improvements will have to be of a low cost, short-term nature in settlements designated for relocation, and implementation by the community will reduce costs to a minimum. This should guarantee the health and hygiene situation until such times as settlements are subject to relocation. The variety of conditions likely to be met in the settlements makes it impossible to estimate with any accuracy, the likely cost. However, with the goodwill of NWSDB and the communities this should not be considered an obstacle, and both parties will benefit from the improved conditions, increased revenue and reduction in NRW.

### 10.3.2 Increase in Public Awareness

Public awareness of most aspects of water supply was found to be lacking by the questionnaire survey carried out on a representative sample of 1,000 customers. However, the survey also found that the public was eager to learn more about the subject hence there is a large audience which is both ready and willing to be educated on the subject of water supply.

Implementation of the Water Awareness Mass Media Campaign should go a long way to increasing the public awareness regarding the water supply to Colombo. It is specifically designed to raise the profile of NWSDB and to develop co-operation between NWSDB and the public. Conservation of water resources is to be introduced early in the campaign to set the scene for the need to avoid misuse of water and the need to pay for the provision of water.

The mass media campaign will be able to reach all sections of the public, as it comprises of television and radio broadcasts, information booklets and a variety of posters and stickers. Also, the campaign is designed to be an ongoing procedure, since this is the only way to maintain a high level of awareness and hence sustain the interest, involvement and co-operation of the public.

In addition, the pilot projects in low-income settlement have made an initial start on raising the awareness of this very large group of people to the plan by NWSDB to install individual household connections. These projects have raised awareness on the procedures required to obtain a connection, the concessionary connection cost and the monthly charges for water. The use of an NGO to facilitate the communities has proved successful in raising the awareness of communities to the benefits of household connections, the need to remove standpost supplies and the need to maintain the remaining toilet taps and to ensure they are used for the correct purpose.

By the continuation of these projects by NWSDB, through the current JBIC loan, and by means of further loans, the awareness of the settlement communities will continue to be enhanced, to the benefit of NWSDB in resolving the issue of non-revenue water from settlement standposts.

### **10.3.3** Necessity for Eliminating External Interventions

Perhaps the most pressing problem faced by NWSDB today is the high level of NRW. This Study seeks to assist NWSDB in its endeavours to reduce considerably the NRW, particularly in the CB1 area of CMC.

Many of the NRW components are linked to consumers; illegal connections and non-payment of monthly water bills are clear examples of this. In its 1999 annual Report, NWSDB recognised that the problem of illegal connections was much more serious than previously thought. This Study has confirmed the seriousness of the situation in both the general housing areas and in the Tenement Gardens (settlements). The pilot projects in the settlements showed a high number of illegal connections, but also a willingness of these households to have their connections legalised. This conversion process did not create any problems and has been a success in the one settlement completed so far.

There are a great number of domestic customers, who have not paid their water bills, and are still connected. The NWSDB senior management holds an extensive list of such defaulters.

There appears to be a reluctance to resolve the matter of defaulters, particularly in low- income groups due to external interventions.

A case in point was mentioned in the NWSDB 1999 report involving the Mahawatta Housing Scheme where NWSDB instituted legal proceedings as only 87 out of 222 customers were paying their bills. Court action was successful on a trial case of four customers, but this was never extended to the remaining defaulters on the intervention of a higher authority who suggested discussion to resolve the issue. Discussions duly agreed on a reduced penalty with payment by instalments but the defaulters never fulfilled their undertaking. This is not an isolated case and there are other examples of external intervention in the day to day running of NWSDB.

The National Water Supply and Drainage Board (Amendment) Act, No 13 of 1992, details the composition of the Board and lays down the requirement that board members shall have wide experience and capability in engineering, finance, public health, and administration and law, and these members will be supported by officers from several related ministries. The Board's powers and duties are clearly defined and intervention by the Minister is, quite rightly, allowed for matters that affect the national interest.

Clearly such a Board, supported by competent senior staff within NWSDB should have no problem in handling all matters related the functions of the organisation. NWSDB need a powerful legal right to combat malpractice's such as non-payment of water bills, and this is provided for under the Act, although some revision is needed to allow for a one stop decision through the courts.

In reality, the staff of NWSDB has shown that in the majority of cases of non-payment, illegal connections etc. such matters can be resolved quickly and quietly without recourse to legal action, which is exactly as it should be.

This Study recommends a Mass Media Campaign on water awareness and seeks to improve the relationship between NWSDB and the public it serves. The acceptance by the Board and the staff of NWSDB of this policy will enable the co-operation of the customers to become a reality, and an atmosphere created to attend to many outstanding issues. The campaign also needs the support of government at all levels, and if this is obtained then the acceptance of the need to pay for water will be confirmed.

Accordingly, it will no longer be necessary for external interventions in matters such as payment of water bills and disconnection of illegal connections, since the general public, including politicians and government officials at all levels, will have been sensitised to the need to pay for water to ensure the future of NWSDB.

As a result of this project, and the direct labour works of NWSDB, thousands of new customers in low-income areas will be created in the next few years. In addition, the re-location of lowincome earners to High Rise Buildings will also increase the customer base. It would be a catastrophe of massive proportions if these new customers, with enhanced living conditions, were to revert to a policy of not paying for water, particularly since the affordability and willingness to pay has already been established.

Therefore there must be a political consensus on the policy of payment for the provision of water by individual connections, and no intervention in the due process of disconnection of defaulters. The very existence of NWSDB as a viable agency depends on this.

It is very much in the hands of the Board and its senior staff to ensure that, by creating awareness in the general public, including government officials and politicians, particularly on the need to pay for water, there would be no reason for intervention by ministers and others in the political arena.

### **10.4 ENVIRONMENTAL EVALUATION**

### 10.4.1 General

The project is exempt from a formal Environmental Impact Assessment by agreement between GOJ and GOSL. The project will have no major environmental impacts since there is no new water abstraction or treatment process. Nevertheless, identification of potential environmental impacts during construction and recommended countermeasures is a requirement of the JICA TOR for the detailed design study. To meet the requirements the JST has prepared an Environmental checklist presented in Table 10-6 at the end of this Chapter.

The construction and operation of works planned under this project will involve some minor impacts that can be mitigated:

- High noise and vibration levels during construction caused by engine operation, power generators and pumps
- Dust generated by demolition and construction activities
- Transport and Disposal of demolition and construction waste
- Impacts on air quality caused by emissions from construction equipment
- Impact on surface drainage during construction, and discharge of chlorinated water during disinfections of water mains
- Disruption to pedestrian and vehicular traffic during construction
- Health and safety of the public during construction
- Potential health and safety risk from chlorination facilities during operations

### 10.4.2 Traffic and Safety

The proposed project involves additional vehicle movements to the various construction sites, and the closure of roads for pipe laying activities. These activities will obstruct traffic movement causing some delays and inconvenience.

In all cases, disruptions to traffic and road closures will be coordinated with the appropriate authorities to obtain approval before proceeding. Suitable routes will be identified for traffic diversions where possible.

Safety should be the primary concern at all job sites. Improved safety conditions will help ease traffic movement. Safety during construction can be improved in the following ways:

- Properly barricading the construction site
- Proper fencing along trenches

- Illumination at night for all barricades and safety fences
- Direction signs and flagmen for traffic control and pedestrian safety
- Flagmen to assist drivers of construction vehicles

Details of service lines should be made available for contractors to avoid possible damage. Where details are not available the contractor is required to carry out field surveys and trial pits to locate water mains and services.

### 10.4.3 Removal, Transport and Disposal of Demolition and Construction Waste

Materials generated during construction will have a temporary impact. Most of the material remove from excavation site can be safely disposed of at municipal dumpsites or used as fill. Construction debris and excavated materials should not be allowed to accumulate in public places (in the case of trenching in CMC area).

Demolition debris, consisting mainly of broken concrete, will need to be hauled to an approved dumpsite where there will be no negative environmental impact.

Construction activities such as demolition, excavation and hauling of materials will result in some dust. The impact will be small and the contractor can control dust by the following measures:

- Keeping exposed earth surfaces moist with water
- Covering dusty materials during transit or when stockpiling

### 10.4.4 Noise and Vibration

During normal operation of the pump houses, noise impacts will be minimal and will not be detectable outside the property boundary. The only exception will be at Gothatuwa pump house during periods when the emergency power generator is operated. Considering the relatively isolated location of the pump house, noise during operation of the generator is not expected to represent a problem for neighbouring communities.

Noise impacts may be relatively important and unavoidable during the construction period at the reservoir and pump house sites, and during laying of the transmission and distribution mains. Most of the sites are located in urban residential areas. Noise during construction should be limited to 70 dB during the day and 50 dB at night by using low noise emission equipment.

The following actions can be taken to avoid public nuisance:

- Inform the community about the work to be done, period of execution and noise inconvenience
- Avoid operation of highly noisy equipment (like jack hammers) in particularly sensitive areas during specific hours (i.e. school hours is working close to school)
- Avoid the use of highly noisy equipment in hospital zones even for short periods of time
- Do not use highly noisy equipment in residential areas at night
- Limit the period of time during which highly noisy works are carried out

### 10.4.5 Discharge of Chlorinated Water Used to Disinfect Mains and Reservoirs

Water mains and reservoirs will be disinfected using strongly chlorinated water (10 mg/L). After successful disinfection the chlorinated water must be drained off to a nearby surface drain or sewer. The contractor must take special measures when discharge chlorinated water since it may be toxic to the natural environment at high concentrations. The discharge of chlorinated water used for disinfecting should not be discharged until it has lost some of its strength (about 2 mg/L) or until it can be diluted during wet weather periods.

### **10.4.6 Operation of Chlorination Facilities**

Water is chlorinated at the water treatment plants and transmitted to service reservoirs throughout Greater Colombo. NWSDB adds chlorine to the water in service reservoirs at Maligakanda and Ellie House to maintain water quality within the reservoir and boost free residual in the distribution system. Existing chlorine installations lack any safety standards and pose a significant threat to neighbouring communities in close proximity to the reservoirs. The 900 kg cylinders are stored outdoors, unprotected from damage and impossible to contain in case of a leak. Furthermore there are no established procedures for dealing with an emergency or evacuating the public.

A comparison of safer chlorination options and costs was presented to the NWSDB. The study team recommended the use of sodium hypochlorite instead of chlorine, however, Sodium hypochlorite would be about 3.4 times more expensive than 900 kg cylinders.

The NWSDB has instructed the study team to design a gas chlorination system because there is no experience in Sri Lanka with sodium hypochlorite and because commercial availability of hypochlorite may be unreliable. Therefore in order to reduce the risk to the public, the study team has designed chlorination facilities for improved safety by:

- using smaller 68 kg chlorine gas cylinders to reduce the amount of gas released if a cylinder leaks
- storing a smaller quantity of chlorine at the reservoir site, 680 kg instead of 900 kg
- providing gas detection and alarm system
- providing safety equipment and means to neutralize a chlorine leak

Checklist
Environmental
Table 10-6

AREA OF CONCERN	ITEMS	MAJOR	SMALL	NONE	NOT CLEAR	PROBLEM	PROPOSED COUNTERMEASURE
	1. Air pollution resulting from chlorination operations						
	<ol> <li>Soil erosion following tree removal or re- grading as a result of constructing the facility and consequent deterioration of water quality downstream</li> </ol>						
POLLUTION	<ol> <li>Noise and vibration around pumping stations during operations</li> </ol>					<ul> <li>Gothatuwa pumping station</li> </ul>	
	4. Ground subsidence						
	5. Treatment of sludge from water treatment plant						
NATURAL	1. Impact of the facility on ecology						
RESOURCES	2. Impact on the landscape						
	1. Impact the facility will have on the cultural and historical assets						
HUMAN ENVIRONMENT	2. Impact on existing infrastructure					<ul> <li>Potential damage to other utilities</li> </ul>	
	3. Effect on other water uses						
OTHERS	1. Effect on the environment during construction period					<ul> <li>Noise, vibration and dust during construction</li> <li>Disposal of chlorinated water during construction</li> <li>Disposal of demolition and construction waste</li> <li>Disruption to Traffic</li> <li>Disruption to water supply</li> </ul>	
	2. Environmental Monitoring						