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1 Introduction

Bangladesh Water Development Board (BWDB) is implementing large number of projects each year through project offices and field divisions. Implementing offices are now supported centrally in Quality control of the works through Task Force Representative co-ordinated by Chief Monitoring. Initially starting with monitoring manufacturing of CC Block and Sand filled Geo-bag, it has now expanded its program in other types of work like river dredging, embankment construction / re-sectioning and re-excavation of drainage channel/ khals. BWDB has to complete works within much skewed time schedule due to climatic conditions of Bangladesh. Scope and duration of implementation activities is attenuated due to pre-monsoon early flood, expanded monsoon and post monsoon delayed drainage. Timely completion of the pre and post work survey (monitoring) is a huge challenge for task force representative. The representatives of task force teams often become highly stressed due to high volume of work within short period of time. So, to reduce the stress of taskforce and to ensure the quality control of field work, support from experience organization is required.

The Institute of Water Modelling (IWM) has long working experience with BWDB in different types of consultancy services including implementation support to BWDB for execution of the different dredging works with quality control and also to assess the impacts of dredging. So, BWDB has decided to engage IWM for the year 2019 (ref: Memo no: BWDB/Kishor/P-15/666, dated 13.05.2019).

2 Description of Survey Work

Post work survey has been carried out by IWM from chainage 1+500m to 3+350m of Atoplal river and chainage 11+330m to 13+830m of Berachapra river. During Survey Concerned IWM survey team and BWDB officials were present.

3 Design Section

Design section for Berachapra river & Atoplal river dredging has been designed by Design Circle-2, BWDB, Dhaka and provided through concern BWDB division office. The design bed level is (-) 1.72m PWD from Km 0.000 to Km 5.367 of Atoplal River and (-) 2.50m PWD from Km 0.000 to Km 3.809 of Berachapra River. Bed width of the section is 20 m and side slope is 1:1.5.

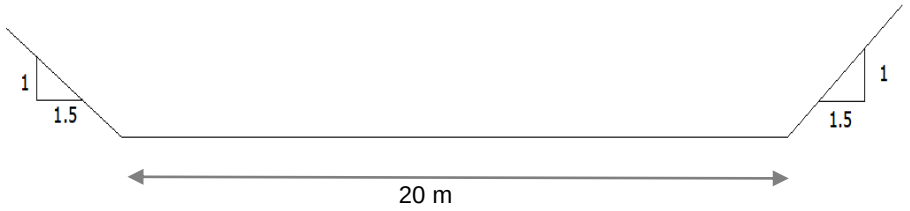

Figure 1: Design Section of Berachapra river & Atoplal river

Figure 2: Postwork Surveyed reach from Ch 1+550m to Ch. 3+350m (Atoplal river)

Figure 3: Postwork Surveyed reach from Ch 11+330m to Ch. 13+830m (Berachapra river)

4 Survey Methodology

4.1 Reference Bench Marks

The entire survey works has been conducted with reference to the existing TBM-27/A, TBM Y-27/A, kept on the top of pucca Drain wall, Gupdighi, UTM-X: 300962, UTM-Y: 2705998, RL (mPWD): 4.417 for Berachapra River and TBM-50, TBM-50 kept on the plinth level gate left side of Boro Hat kubla Jame Mosque, UTM-X: 301849, UTM-Y: 2708201, RL (mPWD): 6.872. The TBM has been used for vertical reference only.

4.2 Cross Section Survey

The post work survey has been conducted in presence of representative from IWM dated on 20/05/2019 of Atoplal river from Chainage 1+500m to 3+350m and Berachapra river from Chainage 11+330m to 13+830m respectively at 50 m interval which is shown in Table-01& Table-02. The Cross Survey has been done by using Echo-sounder and DGPS. The post work volume of the work is given in Table-01 and Table-02 and the summery of Volume is given in Table-03.

Table 01: Volume calculation of Atoplal River from Chainage 1+550m to 3+350m

SL No	Chainage	Actual Post Dredge Section Area	Actual Post Dredge Volume	Design Section Area	Design Volume	Dredge Section Area within Design	Dredged Volume within Design
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
	m	**m^2**	**m^3**	**m^2**	**m^3**	**m^2**	**m^3**
1	1450	10.68	0.00	0.00	0.00	0.00	0.00
2	1500	46.34	1425.57	69.49	1737.25	39.26	981.50
3	1550	29.06	1885.03	69.30	3469.64	23.83	1577.31
4	1600	70.12	2479.50	65.70	3374.90	61.33	2129.03
5	1650	45.22	2883.36	52.86	2963.94	44.36	2642.15
6	1700	68.59	2845.04	65.70	2963.96	52.12	2411.91
7	1750	66.25	3370.82	75.87	3539.36	63.15	2881.75
8	1800	77.71	3598.81	79.09	3874.18	71.11	3356.44
9	1850	69.63	3683.45	75.72	3870.35	65.48	3414.71
10	1900	76.09	3643.10	78.67	3859.72	66.81	3307.24
11	1950	64.93	3525.53	57.20	3396.70	48.06	2871.73
12	2000	84.69	3740.54	80.58	3444.49	71.10	2978.99
13	2050	65.86	3763.88	100.20	4519.48	65.86	3424.06
14	2100	75.62	3537.00	85.29	4637.19	72.07	3448.32
15	2150	85.94	4038.86	70.80	3902.12	65.89	3448.92
16	2200	29.32	2881.56	47.23	2950.58	25.15	2275.86
17	2250	77.94	2681.64	42.14	2234.14	40.32	1636.71
18	2300	69.94	3696.98	58.49	2515.67	54.54	2371.58
19	2350	66.69	3415.65	65.85	3108.49	59.04	2839.60
20	2400	74.34	3525.78	75.38	3530.77	62.72	3044.04
21	2450	87.30	4041.19	82.51	3947.17	75.58	3457.41
22	2500	86.26	4339.12	88.42	4273.19	72.28	3696.37

SL No	Chainage	Actual Post Dredge Section Area	Actual Post Dredge Volume	Design Section Area	Design Volume	Dredge Section Area within Design	Dredged Volume within Design
23	2550	82.89	4228.64	77.52	4148.45	67.73	3500.16
24	2600	70.96	3846.13	71.46	3724.36	64.00	3293.19
25	2650	68.85	3495.21	73.16	3615.46	58.46	3061.46
26	2700	51.73	3014.52	63.18	3408.63	44.71	2579.13
27	2750	50.61	2558.61	57.24	3010.49	40.40	2127.55
28	2800	53.96	2614.31	51.26	2712.30	39.48	1996.91
29	2850	55.41	2734.14	54.43	2642.24	45.88	2133.90
30	2900	44.06	2486.64	56.11	2763.64	40.26	2153.38
31	2950	50.40	2361.62	49.91	2650.60	40.38	2016.02
32	3000	45.38	2394.67	57.45	2683.93	44.88	2131.55
33	3050	50.39	2394.41	55.13	2814.45	43.56	2210.90
34	3100	96.65	3676.16	105.87	4025.10	92.64	3404.85
35	3150	40.54	3429.94	54.65	4012.95	35.75	3209.71
36	3200	24.91	1636.27	49.52	2604.27	24.91	1516.41
37	3250	49.45	1858.88	70.63	3003.97	45.42	1758.14
38	3300	66.89	2908.60	73.22	3596.37	56.53	2548.71
39	3350	35.60	2562.49	65.11	3458.24	31.58	2202.62
		Total=	**117203.59**		**126988.70**		**100040.21**

Table 02: Volume calculation of Berachapra River from Chainage 11+330m to 13+830m

SL No	Chainage	Actual Post Dredge Section Area	Actual Post Dredge Volume	Design Section Area	Design Volume	Dredge Section Area within Design	Dredged Volume within Design
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
	m	**m^2**	**m^3**	**m^2**	**m^3**	**m^2**	**m^3**
8	11280	4.80	0.00	41.75	0.00	4.80	0.00
9	11330	11.34	403.53	23.06	1620.18	9.39	354.70
10	11380	34.04	1134.62	36.69	1493.64	30.52	997.85
11	11430	13.49	1188.25	37.00	1842.23	13.49	1100.30
12	11480	37.91	1285.08	32.16	1729.00	29.12	1065.19
13	11530	15.14	1326.30	30.22	1559.55	15.14	1106.41
14	11580	69.35	2112.31	68.86	2477.18	59.39	1863.17
15	11630	42.83	2804.69	45.81	2866.71	36.54	2398.30
16	11680	12.68	1387.71	35.68	2037.02	11.90	1210.97
17	11730	13.57	656.04	14.56	1255.86	8.78	517.00
18	11780	13.78	683.75	25.26	995.45	13.78	564.22
19	11830	1.33	377.89	23.15	1210.22	1.33	377.91
20	11880	0.95	57.14	4.76	697.69	0.96	57.25
21	11930	15.77	418.08	24.83	739.75	14.98	398.56
22	11980	18.31	851.95	33.28	1452.76	17.34	808.14

SL No	Chainage	Actual Post Dredge Section Area	Actual Post Dredge Volume	Design Section Area	Design Volume	Dredge Section Area within Design	Dredged Volume within Design
23	12030	24.43	1068.48	37.05	1758.12	23.80	1028.58
24	12080	6.86	782.29	44.39	2035.85	6.86	766.59
25	12130	35.19	1051.29	40.13	2112.89	31.31	954.28
26	12180	50.47	2141.48	42.44	2064.22	39.98	1782.30
27	12230	53.18	2591.18	40.93	2084.35	39.10	1977.06
28	12280	34.86	2200.91	44.16	2127.46	34.38	1836.95
29	12330	34.48	1733.36	39.40	2089.12	32.02	1659.87
30	12380	32.34	1670.47	40.92	2008.07	30.13	1553.58
31	12430	31.99	1608.22	36.98	1947.60	25.82	1398.79
32	12480	27.44	1485.75	40.96	1948.55	27.01	1320.78
33	12530	52.38	1995.70	42.35	2082.69	40.75	1693.95
34	12580	31.45	2095.86	40.75	2077.31	30.23	1774.42
35	12630	31.00	1561.29	47.32	2201.54	27.44	1441.50
36	12680	38.12	1727.98	49.79	2427.71	34.61	1551.13
37	12730	47.07	2129.77	46.37	2403.94	42.42	1925.70
38	12780	52.43	2487.61	48.75	2377.77	37.99	2010.29
39	12830	5.21	1441.05	50.00	2468.63	1.50	987.37
40	12880	39.95	1128.96	49.31	2482.75	35.70	929.96
41	12930	33.39	1833.47	51.67	2524.40	22.09	1444.67
42	12980	32.07	1636.48	46.60	2456.52	31.97	1351.49
43	13030	79.84	2797.76	58.54	2628.36	55.65	2190.44
44	13080	115.74	4889.52	56.64	2879.55	56.64	2807.25
45	13130	86.43	5054.16	56.04	2817.12	51.00	2691.18
46	13180	48.41	3370.85	54.38	2760.51	45.85	2421.31
47	13230	27.04	1886.19	54.41	2719.72	26.89	1818.50
48	13280	52.31	1983.78	50.23	2616.01	44.89	1794.54
49	13330	113.15	4136.48	106.35	3914.55	98.61	3587.38
50	13380	86.41	4988.96	69.72	4401.76	67.25	4146.42
51	13430	69.74	3903.77	49.53	2981.31	45.83	2827.04
52	13480	97.82	4189.00	67.05	2914.52	65.72	2788.78
53	13530	19.05	2921.58	43.23	2757.00	18.09	2095.20
54	13580	63.79	2070.98	45.54	2219.34	41.82	1497.75
55	13630	44.23	2700.68	36.33	2046.83	32.73	1863.84
56	13680	36.96	2029.89	43.83	2004.10	33.86	1664.66
57	13730	37.58	1863.65	47.30	2278.27	30.41	1606.73
58	13780	63.11	2517.34	51.20	2462.50	25.49	1397.52
59	13830	16.49	1990.00	1.58	1319.43	0.00	637.19
		Total=	**102353.46**		**111377.56**		**80044.94**

Table 03: Volume Summary of Post-work Survey

River Name	Start Chainage	End Chainage	Length	Actual Post Dredge Volume	Design Volume	Dredge Volume within Design	Remarks
	(i) **m**	(ii) **m**	(iii) **m**	(iv) **m^3**	(v) **m^3**	(vi) **m^3**	
Atoplal River	1500.00	3350.00	1850.00	117203.59	126988.70	100040.21	
Berachapra River	11330.00	13830.00	2500.00	102353.46	111377.56	80044.94	
		Total=	**4350.00**	**219557.05**	**238366.25**	**180085.15**	

5. Positions at Cross Sections

Centre Lines of the cross-section's chainage of Atoplal river from Chainage 1+500m to 3+350m and chainage of Berachapra river Chainage 11+330m to 13+830m is given below.

Table 04: **Centre Line Positions of Atoplal river from Chainage 1+500m to 3+350m**

Sl	Chainage (m)	Easting (m)	Northing (m)	Sl	Chainage (m)	Easting (m)	Northing (m)
1	1450	302586	2707837	21	2450	301807	2708412
2	1500	302578	2707887	22	2500	301768	2708437
3	1550	302573	2707944	23	2550	301722	2708461
4	1600	302527	2707965	24	2600	301683	2708486
5	1650	302489	2707997	25	2650	301644	2708517
6	1700	302450	2708034	26	2700	301599	2708546
7	1750	302410	2708061	27	2750	301560	2708576
8	1800	302361	2708089	28	2800	301518	2708603
9	1850	302318	2708106	29	2850	301478	2708632
10	1900	302273	2708129	30	2900	301438	2708664
11	1950	302230	2708157	31	2950	301397	2708692
12	2000	302189	2708181	32	3000	301355	2708719
13	2050	302153	2708217	33	3050	301313	2708747
14	2100	302103	2708232	34	3100	301270	2708772
15	2150	302063	2708256	35	3150	301233	2708808
16	2200	302019	2708281	36	3200	301189	2708831
17	2250	301978	2708311	37	3250	301145	2708853
18	2300	301935	2708332	38	3300	301103	2708880
19	2350	301891	2708357	39	3350	301057	2708901
20	2400	301849	2708385				

Table 05: **Centre Line Positions of Berachapra river from Chainage 11+330m to 13+830m**

SL	Chainage (m)	Easting (m)	Northing (m)	SL	Chainage (m)	Easting (m)	Northing (m)
1	11330	300170	2705016	27	12630	301016	2705914
2	11380	300216	2705039	28	12680	301043	2705957
3	11430	300263	2705062	29	12730	301069	2705998
4	11480	300310	2705078	30	12780	301097	2706044
5	11530	300354	2705094	31	12830	301117	2706082
6	11580	300404	2705109	32	12880	301142	2706128
7	11630	300452	2705121	33	12930	301165	2706172
8	11680	300500	2705139	34	12980	301189	2706216
9	11730	300545	2705161	35	13030	301214	2706260
10	11780	300575	2705201	36	13080	301234	2706305
11	11830	300596	2705245	37	13130	301256	2706348
12	11880	300614	2705288	38	13180	301280	2706396
13	11930	300626	2705338	39	13230	301302	2706439
14	11980	300642	2705384	40	13280	301325	2706485
15	12030	300674	2705425	41	13330	301349	2706530
16	12080	300702	2705469	42	13380	301369	2706575
17	12130	300732	2705508	43	13430	301387	2706624
18	12180	300758	2705548	44	13480	301412	2706660
19	12230	300786	2705593	45	13530	301437	2706711
20	12280	300819	2705630	46	13580	301461	2706751
21	12330	300846	2705671	47	13630	301489	2706795
22	12380	300870	2705710	48	13680	301519	2706834
23	12430	300908	2705750	49	13730	301549	2706875
24	12480	300936	2705788	50	13780	301573	2706918
25	12530	300961	2705832	51	13830	301601	2706961
26	12580	300989	2705873				

6 Remarks

From the Post-Work survey, Summery volume of Atoplal river from Chainage 1+500m to 3+350m and Berachapra river Chainage from 11+330m to 13+830m is provided in Table: 03**.** Volume is computed on the basis of Pre, Post-work level and design section considering over dredged volume plotted in AutoCAD.