FAP24

Government of the People's Republic of Bangladesh

Water Resources Planning Organization

European Commission

Delft Hydraulics

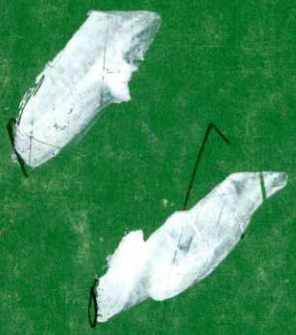
Danish Hydraulic Institute

Hydroland

Approtech

Osiris

RIVER SURVEY PROJECT



Special Report No.22

River Data Book January 1993 - March 1995

Part B.4: Hardinge Bridge

October 1996

Special Report 22

River Data Book
January 1993 - March 1995

Part B.4: Hardinge Bridge

October 1996

Contents of entire Data Book

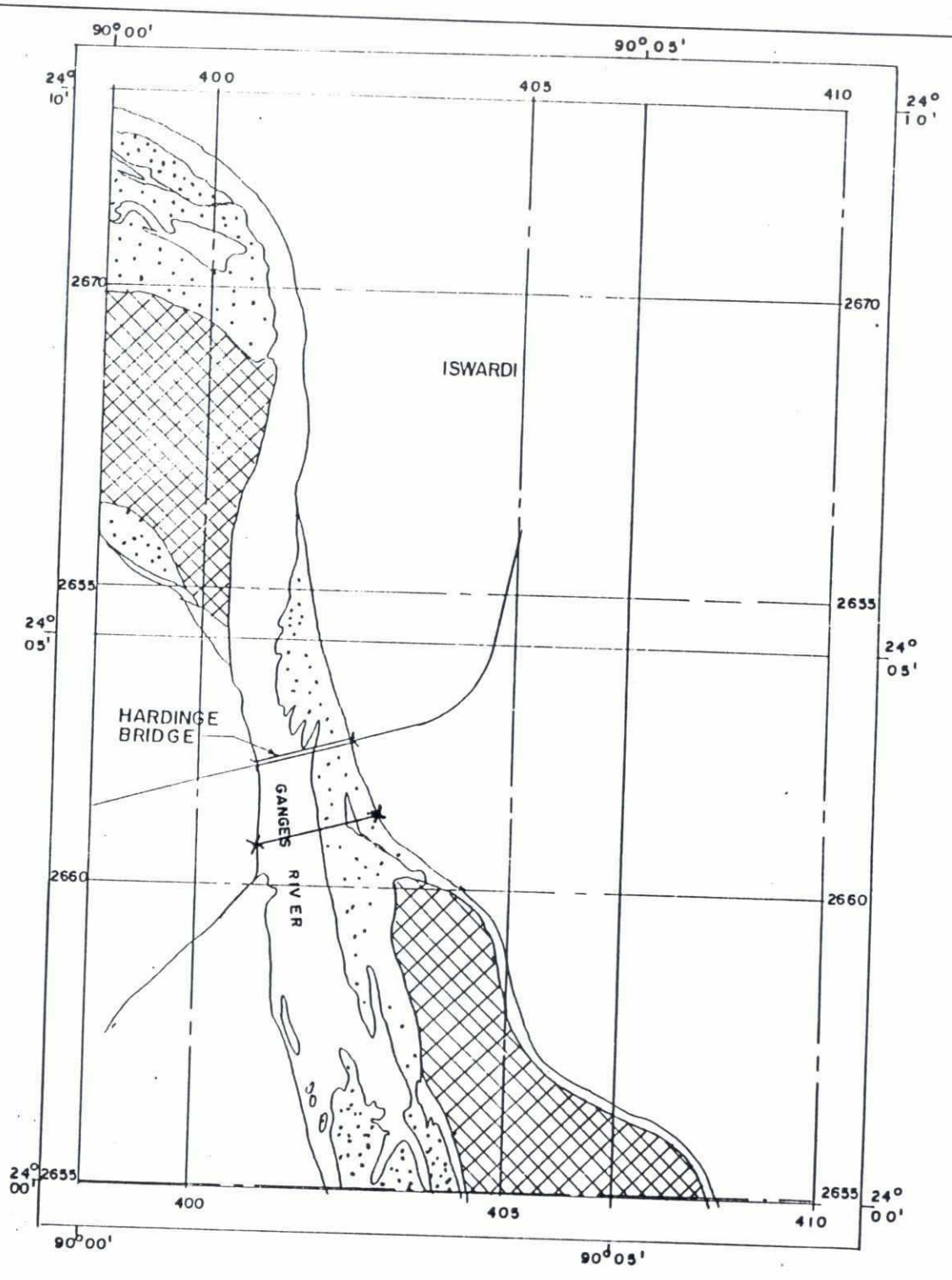
Part A: Text volume

Part B: Routine gauging January 1993 - March 1995

Part C: Special surveys June 1994 - March 1995

8

Contents of Part B.4



LEGEND:

- Measurement cross section
- Highland
- Unstable / low char
- BWDB Embankment

N

2500m 1000m 0 2.5 Km

Map is based on most recent satellite images of March, 1993.

FAP 24 DELFT-DHI RIVER SURVEY PROJECT Delft Hydraulics/Danish Hydraulic Institute in association with Osiris/Approtech/Hydroland	Survey Bulletin No. 15 - Sep , 1993	
	Location No.4 : Ganges River at Hardinge Bridge	
File:	Date:	KEY PLAN — Fig.
Scale:	Init:	

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	**Survey Bulletin 15 : Setember 1993**
		Location 4 : Ganges River, Hardinge Bridge
	Date : Init :	**Location of Measurments**

River : Ganges
ADCP/EMF Discharge

Date of Survey : 26-29 September 1993
Location : Ganges River at Hardinge Bridge
Station No. 4

Date	Transect	Bank		Water Level	Total Width	Area	Discharge
		From	To	(m+PWD)	(m)	(sq.m)	(cumec)
26/09/93	H39Q1T02	Left	Right	13.66	1849	15277	38056
26/09/93	H39Q1T03	Right	Left	13.66	1852	15174	36668
26/09/93	H39Q1T05	Left	Right	13.66	1868	15274	39334
26/09/93	H39Q1T06	Right	Left	13.66	1865	15163	42415
26/09/93	H39Q1T07	Right	Left	13.66	1851	15019	42597
26/09/93	H39Q1T08	Left	Right	13.66	1849	15472	39945
27/09/93	H39R1T01	Right	Left	13.65	1842	15483	38491
27/09/93	H39R1T02	Left	Right	13.65	1845	16125	43445
27/09/93	H39R1T03	Right	Left	13.65	1856	15646	42560
28/09/93	H39S1T01	Right	Left	13.71	1845	15596	43670
28/09/93	H39S1T02	Left	Right	13.71	1842	15986	40795
28/09/93	H39S1T03	Right	Left	13.71	1825	15100	41294
28/09/93	H39S1T04	Left	Right	13.71	1838	15733	40370
29/09/93	H39T1T01	Right	Left	13.74	1844	15590	44677
29/09/93	H39T1T02	Left	Right	13.74	1842	16760	41309
29/09/93	H39T1T03	Right	Left	13.74	1850	16107	45299
29/09/93	H39T1T04	Left	Right	13.74	1891	16617	40634

Table 3.1 SUMMARY OF RESULTS (ADCP/EMF-discharge)

River : Ganges
S4 Velocity

Date of survey : 26 - 29 September 1993
Location : Ganges River at Hardinge Bridge
Station No. 4

Vertical 1	
Total depth = 7.40 m	
Depth [m]	Velocity [m/s]
1.30	2.06
2.81	2.11
4.11	2.25
5.58	1.95
6.73	1.83

Vertical 2	
Total depth = 12.00 m	
Depth [m]	Velocity [m/s]
2.38	3.07
4.73	3.26
7.13	3.14
10.78	2.31

Vertical 3	
Total depth = 13.10 m	
Depth [m]	Velocity [m/s]
0.50	3.69
2.55	3.84
5.18	3.77
7.93	3.65
11.47	2.74
12.49	2.48

Vertical 4	
Total depth = 14.60 m	
Depth [m]	Velocity [m/s]
2.82	3.72
6.02	3.55
8.24	3.63
11.24	3.56
12.03	3.30

Vertical 5	
Total depth = 15.40 m	
Depth [m]	Velocity [m/s]
0.50	3.95
2.86	3.84
5.99	3.94
8.86	3.81

Vertical 6	
Total depth = 14.70 m	
Depth [m]	Velocity [m/s]
2.87	3.65
5.58	3.76
6.40	3.70

Vertical 7	
Total depth = 12.85 m	
Depth [m]	Velocity [m/s]
1.87	3.78
2.67	3.76
5.13	3.52
7.99	3.38
10.57	2.97
10.82	2.62

Vertical 8	
Total depth = 10.20 m	
Depth [m]	Velocity [m/s]
0.50	3.43
2.16	3.59
4.05	3.47
5.70	3.45
7.98	3.22
9.75	2.65

Vertical 9	
Total depth = 9.40 m	
Depth [m]	Velocity [m/s]
0.50	3.17
1.77	3.34
3.58	3.43
5.40	3.47
7.13	3.12
9.01	2.27

Vertical 10	
Total depth = 7.50	
Depth [m]	Velocity [m/s]
1.63	3.05
3.31	3.05
4.99	2.95
6.40	2.73
7.44	2.14

Vertical 11	
Total depth = 8.20 m	
Depth [m]	Velocity [m/s]
0.50	2.56
2.03	2.62
3.10	2.63
5.00	2.52
6.63	2.33
7.03	2.38

Vertical 12	
Total depth = 6.60 m	
Depth [m]	Velocity [m/s]
0.97	1.55
1.34	1.74
2.66	1.70
3.92	1.66
5.22	1.44
5.58	1.50

Vertical 13	
Total depth = 5.50 m	
Depth [m]	Velocity [m/s]
1.24	1.30
2.00	1.50
3.14	1.52
4.36	1.45
4.92	1.27

Vertical 14	
Total depth = 3.70 m	
Depth [m]	Velocity [m/s]
1.09	1.16
2.11	1.23
3.31	1.09

Vertical 15	
Total depth = 4.80 m	
Depth [m]	Velocity [m/s]
1.01	0.92
1.90	0.91
2.89	1.06
3.04	1.04

Vertical 16	
Total depth = 5.42 m	
Depth [m]	Velocity [m/s]
1.31	1.15
2.16	1.31
3.22	1.21
4.32	1.13
5.40	1.02

Qw = 44,684 (m3/s)

Table 3.2 SUMMARY OF RESULTS (S4 Current)

River : ganges
Concentration

Date of survey : 26 -29 September 1993
Location : Ganges River at Hardinge Bridge
Station No. 4

Vertical 1	
Total depth = 7.40 m	
Depth	Conc.
[m]	[mg/l]
0.50	1524.50
1.30	1580.25
2.81	1511.63
4.11	1547.83
5.58	1720.00
6.73	1851.52

Vertical 2	
Total depth = 12.00 m	
Depth	Conc.
[m]	[mg/l]
0.50	1947.19
2.38	1710.67
4.73	2099.35
7.13	2152.17
10.78	4917.04

Vertical 3	
Total depth = 13.10 m	
Depth	Conc.
[m]	[mg/l]
0.50	1397.33
2.55	1336.51
5.18	1384.72
7.93	1468.53
11.47	1622.22
12.49	2506.27

Vertical 4	
Total depth = 14.60 m	
Depth	Conc.
[m]	[mg/l]
0.50	2666.67
2.82	2734.84
6.02	3766.43
8.24	4274.66
11.24	5302.48
12.03	6518.06

Vertical 5	
Total depth = 15.40 m	
Depth	Conc.
[m]	[mg/l]
0.50	1670.67
2.86	1960.31
5.99	1912.66
8.86	3062.18

Vertical 6	
Total depth = 14.70 m	
Depth	Conc.
[m]	[mg/l]
0.50	1427.34
2.87	1468.46
5.58	1719.05
6.40	2347.58

Vertical 7	
Total depth = 12.85 m	
Depth	Conc.
[m]	[mg/l]
1.87	1119.46
2.67	1460.99
5.13	1494.52
7.99	1623.61
10.57	1623.07
10.82	3201.55

Vertical 8	
Total depth = 10.20 m	
Depth	Conc.
[m]	[mg/l]
0.50	1233.33
2.16	1551.95
4.05	1529.81
5.70	2026.15
7.98	2998.76
9.75	5061.54

Vertical 9	
Total depth = 9.40 m	
Depth	Conc.
[m]	[mg/l]
0.50	1519.05
1.77	1617.65
3.58	1618.63
5.40	1833.33
7.13	2301.61
9.01	2536.92

Vertical 10	
Total depth = 7.50	
Depth	Conc.
[m]	[mg/l]
0.50	1493.43
1.63	1595.27
3.31	1620.00
4.99	1635.94
6.40	1700.00
7.44	1933.33

Vertical 11	
Total depth = 8.20 m	
Depth	Conc.
[m]	[mg/l]
0.50	1161.70
2.03	1497.08
3.10	1654.67
5.00	1686.90
6.63	1788.14
7.03	1909.09

Vertical 12	
Total depth = 6.60 m	
Depth	Conc.
[m]	[mg/l]
0.97	1443.36
1.34	1564.96
2.66	1568.35
3.92	1591.18
5.22	1658.99
5.58	1733.85

Vertical 13	
Total depth = 5.50 m	
Depth	Conc.
[m]	[mg/l]
1.24	1480.00
2.00	1468.97
3.14	1600.00
4.36	1663.93
4.92	1712.50

Vertical 14	
Total depth = 3.70 m	
Depth	Conc.
[m]	[mg/l]
1.09	1661.74
2.11	2084.21
3.31	2248.12

Vertical 15	
Total depth = 4.80 m	
Depth	Conc.
[m]	[mg/l]
1.01	1725.71
1.90	1661.90
2.89	1913.85
3.04	2265.89

Vertical 16	
Total depth = 5.42 m	
Depth	Conc.
[m]	[mg/l]
1.31	1594.41
2.16	1576.58
3.22	1810.53
4.32	1872.34
5.40	2210.69

Ss = 86,323 (Kg/s)

Table 3.3 SUMMARY OF RESULTS (Suspended Sediment concentration)

River : Ganges
Bed load

Helley-Smith samples		
Vertical no.	Bed load sb in Kg/ms	
	1	2
1	0.281469	0.174452
9	0.457456	0.318640
11	0.173574	0.554230
12	0.058179	0.068640
14	0.013377	0.187060
16	0.014945	0.047971
18	0.008662	0.004989

Table 3.4 SUMMARY of RESULTS (Sediment transport, bed load)

River : Ganges
Grain size of bed material

Date of Survey : 26 - 28 September 1993
Location : Ganges River at Hardinge Bridge
Station No. 4

Sample No	Date	Time	D16 (mm)	D35 (mm)	D50 (mm)	D90 (mm)	Standard Deviation
DHA-1	26/09/93	16:20	0.132	0.154	0.173	0.243	1.314
DHA-1	27/09/93	15:37	0.135	0.159	0.180	0.253	1.333
DHA-1	28/09/93	10:00	0.134	0.157	0.179	0.251	1.333

Table 3.5 SUMMARY of RESULTS (grain size bed material)

River : Ganges
Grain size suspended sediment

Date of Survey : 26-29 September 1993
Location : Ganges River at Hardinge Bridge
Station No. 4

Sample No	Date	Time	D16 (mm)	D35 (mm)	D50 (mm)	D90 (mm)	Standard Deviation
A456	26/09/93	16:15	0.008	0.019	0.028	0.125	3.359
A470	29/09/93	10:05	0.007	0.018	0.029	0.321	6.451
A12	28/09/93	14:45	0.007	0.019	0.030	0.178	4.376
A455	27/09/93	15:30	0.006	0.014	0.022	0.178	4.811
A14	28/09/93	09:55	0.004	0.012	0.018	0.047	3.341
A471	27/09/93	12:00	0.004	0.011	0.018	0.041	3.000
A468	27/09/93	09:30	0.009	0.022	0.034	0.201	4.506
A11	26/09/93	17:25	0.009	0.025	0.036	0.151	3.673
A3	26/09/93	15:30	0.008	0.018	0.028	0.097	3.180

Table 3.6 SUMMARY OF RESULTS (Grain size suspended sediment)

River : Ganges
Grain size of bed load

Date of Survey : 26-29 September 1993
Locaflon : Ganges River at Hardinge Bridge
Station No. 4

Sample No	Date	Time	D35 (mm)	D50 (mm)	D65 (mm)	Standard Deviation
A34	26/09/93	16:20	0.158	0.181	0.208	1.363
A41	26/09/93	16:28	0.156	0.179	0.204	1.354
A37	27/09/93	15:25	0.166	0.190	0.217	1.421
A42	27/09/93	15:35	0.162	0.185	0.212	1.370
A51	28/09/93	09:45	0.162	0.186	0.214	1.423
A126	28/09/93	10:00	0.168	0.193	0.222	1.480
A40	27/09/93	11:55	0.176	0.211	0.253	1.627
A54	27/09/93	12:05	0.169	0.198	0.233	1.584
A50	27/09/93	09:25	0.294	0.333	0.378	1.331
A52	27/09/93	09:35	0.203	0.252	0.310	1.613
A44	26/09/93	17:20	0.135	0.165	0.200	1.885
A45	26/09/93	17:30	0.148	0.172	0.200	1.474
A35	26/09/93	15:35	0.167	0.226	0.293	2.074
A36	26/09/93	15:40	0.269	0.311	0.360	1.585

Table 3.7 SUMMARY OF RESULTS (grain size bed load)

Type	Time		File Name	Ver. No.	Easting (meter)	Northing (meter)	DISCHARGE GAUGING					SEDIMENT TRANSPORT GAUGING				
	From	To					ADCP	HYDRO	EMF	S4	MEX	Suspended Sediment Samples	Andreasen Tube Samples	Helley Smith Samples	Integrated Sediment Samples	Bottom Samples
Transect	11:49:41	12:08:53	H39Q1T02*				T	T	T	T						
Transect	12:12:06	12:28:43	H39Q1T03				T	T	T	T						
Transect	12:45:57	13:03:05	H39Q1T05				T	T	T	T						
Transect	13:07:17	13:21:21	H39Q1T06				T	T	T	T						
Transect	17:41:02	17:57:04	H39Q1T07				T	T	T	T						
Transect	18:00:04	18:17:43	H39Q1T08				T	T	T	T						
Profile			H39Q2P01	18				P		P						
Profile	15:54:06	16:39:12	H39Q1P01	1	400942	660708	P	P	P	P		6	1	2	-	1
Profile			H39Q2P02	17												
Profile	17:12:57	17:43:31	H39Q2P04	16	402401	661130	P	P		P		5	1	2	-	-

* transect in PSD 24 data base

Date of Survey : 26 September 1993
Location : Ganges River at Hardinge Bridge

Type	Time		File Name	Ver. No.	Easting (meter)	Northing (meter)	DISCHARGE GAUGING					SEDIMENT TRANSPORT GAUGING				
	From	To					ADCP	HYDRO	EMF	S4	MEX	Suspended Sediment Samples	Andreasen Tube Samples	Helley Smith Samples	Integrated Sediment Samples	Bottom Samples
Transect	08:59:09	09:13:52	H39R1T01				T	T	T							
Transect	09:21:41	09:39:43	H39R1T02				T	T	T							
Transect	17:16:58	13:31:21	H39R1T03				T	T	T							
Profile	08:46:10	09:12:02	H39R2P01	15	402302	661098		P		P		4	-	-	-	-
Profile	10:05:31	10:27:53	H39R2P03	14	402199	661061		P		P		3	1	2	-	-
Profile	10:08:17	11:00:22	H39R1P01	2	401071	660736	P	P	P	P		5	-	-	-	-
Profile	10:44:04	11:17:26	H39R2P04	13	402096	661035		P		P		5	-	-	-	-
Profile	11:33:31	12:16:32	H39R2P05	12	402022	661011		P		P		6	1	2	-	-
Profile	12:23:57	13:09:02	H39R1P02	8	401681	660727	P	P	P	P		6	-	-	-	-
Profile	14:58:35	15:56:37	H39R1P03	9	401702	660932	P	P	P	P		6	1	2	-	1

Date of Survey : 27 September 1993
Location : Ganges River at Hardinge Bridge
Station No . 4

Table 2.1 SURVEY PROGRAMME AS MADE

Type	Time		File Name	Ver. No.	Easting (meter)	Northing (meter)	DISCHARGE GAUGING					SEDIMENT TRANSPORT GAUGING				
	From	To					ADCP	HYDRO	EMF	S4	MEX	Suspended Sediment Samples	Andreasen Tube Samples	Helley Smith Samples	Integrated Sediment Samples	Bottom Samples
Transect	08:13:20	08:29:01	H39S1T01				T	T	T							
Transect	08:39:26	08:56:10	H39S1T02				T	T	T							
Transect	16:53:38	17:08:47	H39S1T03				T	T	T							
Transect	17:11:01	17:27:54	H39S1T04				T	T	T							
Profile	09:26:50	10:14:48	H39S1P01	11	401910.5	660988.1	P	P	P	P		6	1	2	-	1
Profile	12:21:37	13:26:22	H39S2P01	10	401820.0	660974.0		P		P		6	-	-	-	-
Profile	14:02:49	15:08:15	H39S1P02	7	401533.4	660866.1	P	P	P	P		6	1	-	-	-
Profile	14:41:00	15:14:42	H39S2P04	6	401435.0	660835.0		P		P		4	-	-	-	-
Profile	15:59:33	16:42:35	H39S1P04	5	401328.0	660884.3	P	P	P	P		4	-	-	-	-

Date of Survey : **28 September 1993**
Location : **Ganges River at Hardinge Bridge**

Type	Time		File Name	Ver. No.	Easting (meter)	Northing (meter)	DISCHARGE GAUGING					SEDIMENT TRANSPORT GAUGING				
	From	To					ADCP	HYDRO	EMF	S4	MEX	Suspended Sediment Samples	Andreasen Tube Samples	Helley Smith Samples	Integrated Sediment Samples	Bottom Samples
Transect	08:10:47	08:27:05	H39T1T01				T	T	T							
Transect	08:31:25	08:48:57	H39T1T02				T	T	T							
Transect	12:27:00	12:42:16	H39T1T03				T	T	T							
Transect	12:45:50	13:02:32	H39T1T04				T	T	T							
Profile	09:27:33	10:24:35	H39T1P01	3	401152.7	660749.1	P	P	P	P		6	1	-	-	-
Profile	11:07:45	12:05:29	H39T1P02	4	401243.5	660801.1		P		P		6	-	-	-	-

Date of Survey : **29 September 1993**
Location : **Ganges River at Hardinge Bridge**
Station No . **4**

Table 2.2 SURVEY PROGRAMME AS MADE

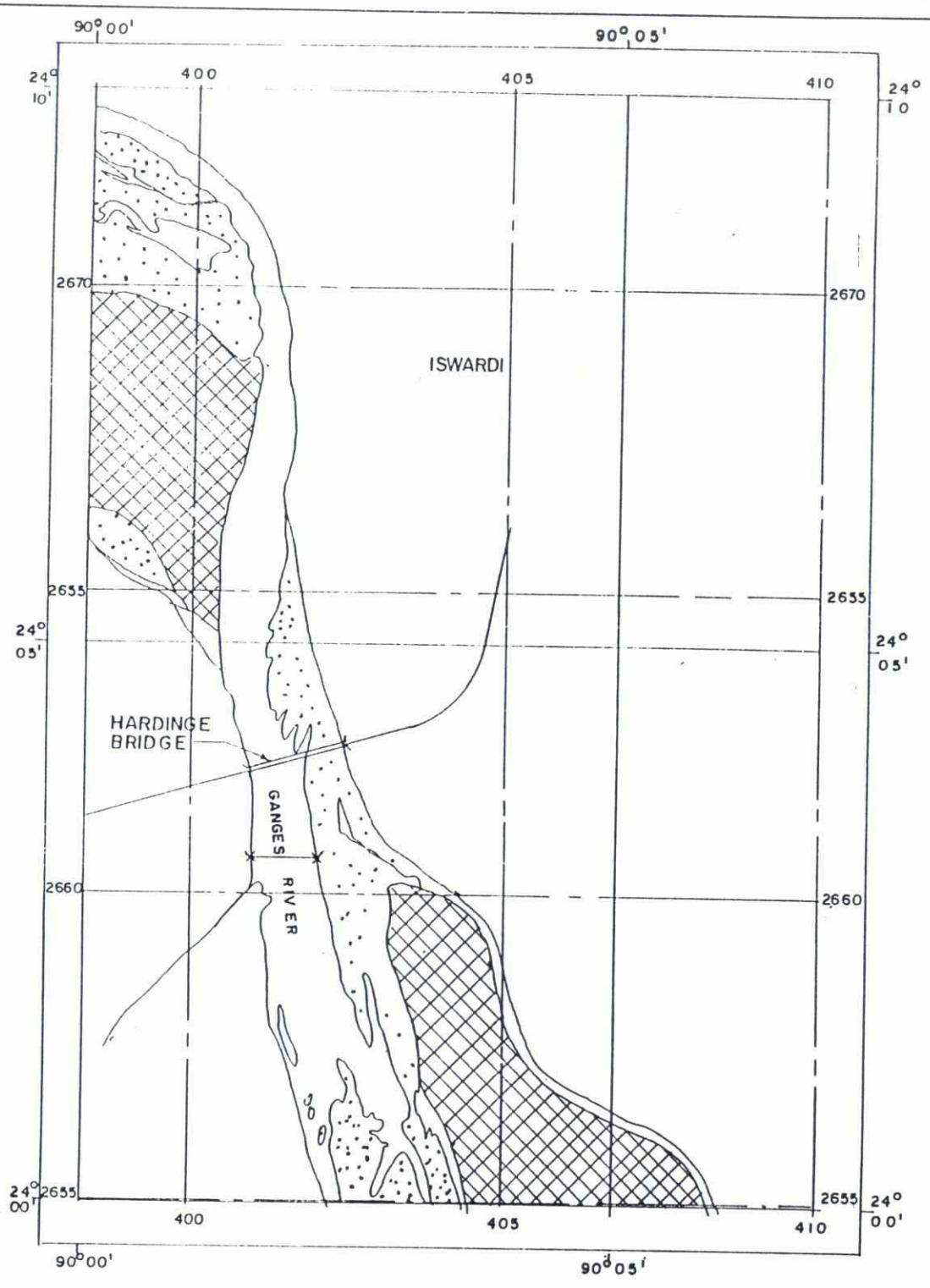
Type Of Samples	Sample Nos.	Total Sample Nos.	Vertical No.
Point Integrated Samples	A159,A160,A161,A162,A163,A164	6	1
	A448,A449,A450,A506,A502	5	2
	A547,A548,A549,A550,A551,A552	6	3
	A553,A554,A555,A556,A558,A559	6	4
	A543,A544,A545,A546	4	5
	A224,A223,A232,A217	4	6
	A561,A562,A563,A564,A541,A542	6	7
	A505,A511,A514,A509,A236,A237	6	8
	A437,A440,A441,A445,A490,A508	6	9
	A221,A218,A225,A227,A231,A235	6	10
	A518,A422,A423,A421,A560,A557	6	11
	A214,A210,A206,A202,A198,A194	6	12
	A199,A203,A207,A211,A215	5	13
	A526,A492,A521	3	14
	A520,A525,A515,A524	4	15
	A509,A497,A517,A494,A510	5	16
	A516,A513,A529,A504,A493	5	17
	A521,A489,A507,A527	4	18
Andreasen Tube Samples	A456	1	1
	A470	1	3
	A12	1	7
	A455	1	9
	A14	1	11
	A471	1	12
	A468	1	14
	A11	1	16
	A3	1	18
Helley-Smith Samples	A34,A41	2	1
	A37,A42	2	9
	A51,A126	2	11
	A40,A54	2	12
	A50,A52	2	14
	A44,A45	2	16
	A35,A36	2	18
Vanveen Samples	DHA-1	1	1
	DHA-1	1	9
	DHA-1	1	11

Date of Survey : 26 - 29 September 1993
Location : Ganges River at Hardinge Bridge
Station No. 4

Table 2.3 List of Sediment Samples

Types of Data	Channel	Format	Filename
ADCP/S4/EMF	1	QUATTRO	H39Q1T02 .ase
Echosounder	1	QUATTRO	H39Q1T02 .ech
Sediment transport data	1	QUATTRO	H39Q1T02 .sed
Bed load sediment analysis	1	QUATTRO	H39Q1T02 .bdl
Suspended sed. conc. analysis	1	QUATTRO	H39Q1T02 .ssc
Transect plot data	1	QUATTRO	H39Q1T02 .trs
Iso-velocity plot data	1	MIKE 21	H39Q1T02 .ct2 H39Q1T02 .dt2

Table 5.1 PSD 24 Database file description



LEGEND:

- Measurement cross section
- Highland
- Unstable / low char
- BWDB Embankment

N

2500m 1000m 0 2.5 Km

Map is based on most recent satellite images of March, 1993.

FAP 24 DELFT-DHI RIVER SURVEY PROJECT Delft Hydraulics/Danish Hydraulic Institute in association with Osmo/Approtech/Hydroland		Survey Bulletin No.36 - Feb, 1994	
		Location No.4 : Ganges River at Hardinge Bridge	
File:	Date:	KEY PLAN	Fig.
Scale:	Init:		

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 36 : February 1994
		Location 4 : Ganges River, Hardinge Bridge
	Date Init	Location of Measurments

River : Ganges
S4 Discharge

Date of Survey : 16 - 17 February 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Date	Profile File	Bathy File	Water Level (m+PWD)	Total Width (m)	Area (sq.m)	Discharge (cumec)	Sediment Transport (Kg/s)
16/02/94	H42G0P01	H42G0T01	5.94	1001	8334	936	8.92
16/02/94	H42G0P02	H42G0T02	5.94	1002	8905	1057	11.05
16/02/94	H42G0P03						
17/02/94	H42H0P01						
17/02/94	H42H0P02						
17/02/94	H42H0P03						
17/02/94	H42H0P04						
17/02/94	H42H0P05						
17/02/94	H42H0P06						

Table 3.1 SUMMARY OF RESULTS (S4-discharge)

20

River : Ganges
S4 Velocity

Date of Survey : 16 - 17 February 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Vertical 1	
Total Depth = 4.00 m	
Depth	Velocity
[m]	[m/s]
0.80	0.12
2.40	0.05
3.20	0.09

Vertical 2	
Total Depth = 7.50 m	
Depth	Velocity
[m]	[m/s]
0.50	0.17
1.50	0.09
3.00	0.12
4.50	0.07
6.00	0.03
6.57	0.04

Vertical 3	
Total Depth = 11.10 m	
Depth	Velocity
[m]	[m/s]
0.50	0.29
2.20	0.17
4.44	0.15
6.66	0.06
8.88	0.06
10.44	0.07

Vertical 4	
Total Depth = 11.90 m	
Depth	Velocity
[m]	[m/s]
0.54	0.16
2.38	0.12
4.76	0.16
7.14	0.12
9.52	0.12
11.16	0.07

Vertical 5	
Total Depth = 13.00 m	
Depth	Velocity
[m]	[m/s]
0.50	0.10
2.60	0.13
5.20	0.22
7.80	0.16
10.40	0.14
12.48	0.16

Vertical 6	
Total Depth = 10.60 m	
Depth	Velocity
[m]	[m/s]
0.50	0.16
2.12	0.20
4.24	0.11
6.36	0.16
8.64	0.09
10.06	0.09

Vertical 7	
Total Depth = 5.10 m	
Depth	Velocity
[m]	[m/s]
0.50	0.19
1.02	0.15
2.04	0.17
3.06	0.18
4.08	0.17
4.23	0.08

Vertical 8	
Total Depth = 3.40 m	
Depth	Velocity
[m]	[m/s]
0.68	0.15
2.04	0.15
2.72	0.12

Vertical 9	
Total Depth = 1.90 m	
Depth	Velocity
[m]	[m/s]
0.36	0.14
1.08	0.08
1.44	0.09

Table 3.2 SUMMARY OF RESULTS (S4 Current)

River : Ganges
Concentration

Date of Survey : 16 - 17 February 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Vertical 1	
Total Depth = 4.00 m	
Depth [m]	Conc. [mg/l]
0.80	10.13
2.40	12.50
3.20	15.50

Vertical 2	
Total Depth = 7.50 m	
Depth [m]	Conc. [mg/l]
0.50	1.42
1.50	2.91
3.00	
4.50	2.68
6.00	
6.57	4.41

Vertical 3	
Total Depth = 11.10 m	
Depth [m]	Conc. [mg/l]
0.50	1.50
2.20	1.57
4.44	5.17
6.66	6.63
8.88	7.04
10.44	

Vertical 4	
Total Depth = 11.90 m	
Depth [m]	Conc. [mg/l]
0.54	6.84
2.38	9.97
4.76	10.74
7.14	10.82
9.52	12.54
11.16	13.47

Vertical 5	
Total Depth = 13.00 m	
Depth [m]	Conc. [mg/l]
0.50	8.91
2.60	12.63
5.20	12.69
7.80	13.66
10.40	17.53
12.48	22.24

Vertical 6	
Total Depth = 10.60 m	
Depth [m]	Conc. [mg/l]
0.50	2.79
2.12	2.91
4.24	8.58
6.36	8.81
8.64	23.13
10.06	29.42

Vertical 7	
Total Depth = 5.10 m	
Depth [m]	Conc. [mg/l]
0.50	4.39
1.02	10.31
2.04	11.78
3.06	13.61
4.08	14.12
4.23	23.13

Vertical 8	
Total Depth = 3.40 m	
Depth [m]	Conc. [mg/l]
0.68	10.46
2.04	
2.72	11.56

Vertical 9	
Total Depth = 1.90 m	
Depth [m]	Conc. [mg/l]
0.36	1.43
1.08	
1.44	7.09

Table 3.3 SUMMARY OF RESULTS (Sespended Sediment Concentration)

Type	Time		File Name	Ver. No.	Easting (meter)	Northing (meter)	DISCHARGE GAUGING					SEDIMENT TRANSPORT GAUGING				
	From	To					ADCP	HYDRO	EMF	S4	MEX	Suspended Sediment Samples	Andreasen Tube Samples	Helley Smith Samples	Integrated Sediment Samples	Bottom Samples
Transect	10:34:00	10:42:00	H42G0T01*					T								
Transect	10:43:00	10:52:00	H42G0T02					T								
Profile	15:06:00	15:21:00	H42G0P01	1	401028	660675	P	P	P	P		3	-	-	-	-
Profile	15:39:00	16:00:00	H42G0P02	2	401131	660674	P	P	P	P		6	-	-	-	-
Profile	16:18:00	16:45:00	H42G0P03	3	401215	660654	P	P	P	P		6	-	-	-	-
Profile	08:29:00	09:02:00	H42H0P01	4	401296	660654	P	P	P	P		6	-	-	-	-
Profile	09:11:00	09:36:00	H42H0P02	5	401398	660650	P	P	P	P		6	-	-	-	-
Profile	09:47:00	10:53:00	H42H0P03	6	401500	660671	P	P	P	P		6	-	-	-	-
Profile	11:27:00	12:30:00	H42H0P04	7	401601	660652	P	P	P	P		6	-	-	-	-
Profile	13:03:00	13:31:00	H42H0P05	8	401703	660669	P	P	P	P		3	-	-	-	-
Profile	13:39:00	13:55:00	H42H0P06	9	401806	660669	P	P	P	P		3	-	-	-	-

* transect in PSD 24 data base

Date of Survey : 16 - 17 February 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Table 2.1 (SURVEY PROGRAMME AS MADE)

Type Of Samples	Sample Nos.	Total Sample Nos.	Vertical No.
Point Integrated Samples	A1264,A1309,A1284	3	1
	A1342,A1343,A1274,A1288,A1313,A1320	6	2
	A1307,A1276,A1294,A1295,A1241,A1316	6	3
	A1357,A1259,A1344,A1239,A1257,A1261	6	4
	A1383,A1379,A1375,A1369,A1365,A363	6	5
	A1238,A1361,A35,A1380,A1367,A1358	6	6
	A1378,A1374,A1376,A40,A1373,A1367	6	7
	A1270,A1301,A1265	3	8
	E1001,E1003,A1364	3	9

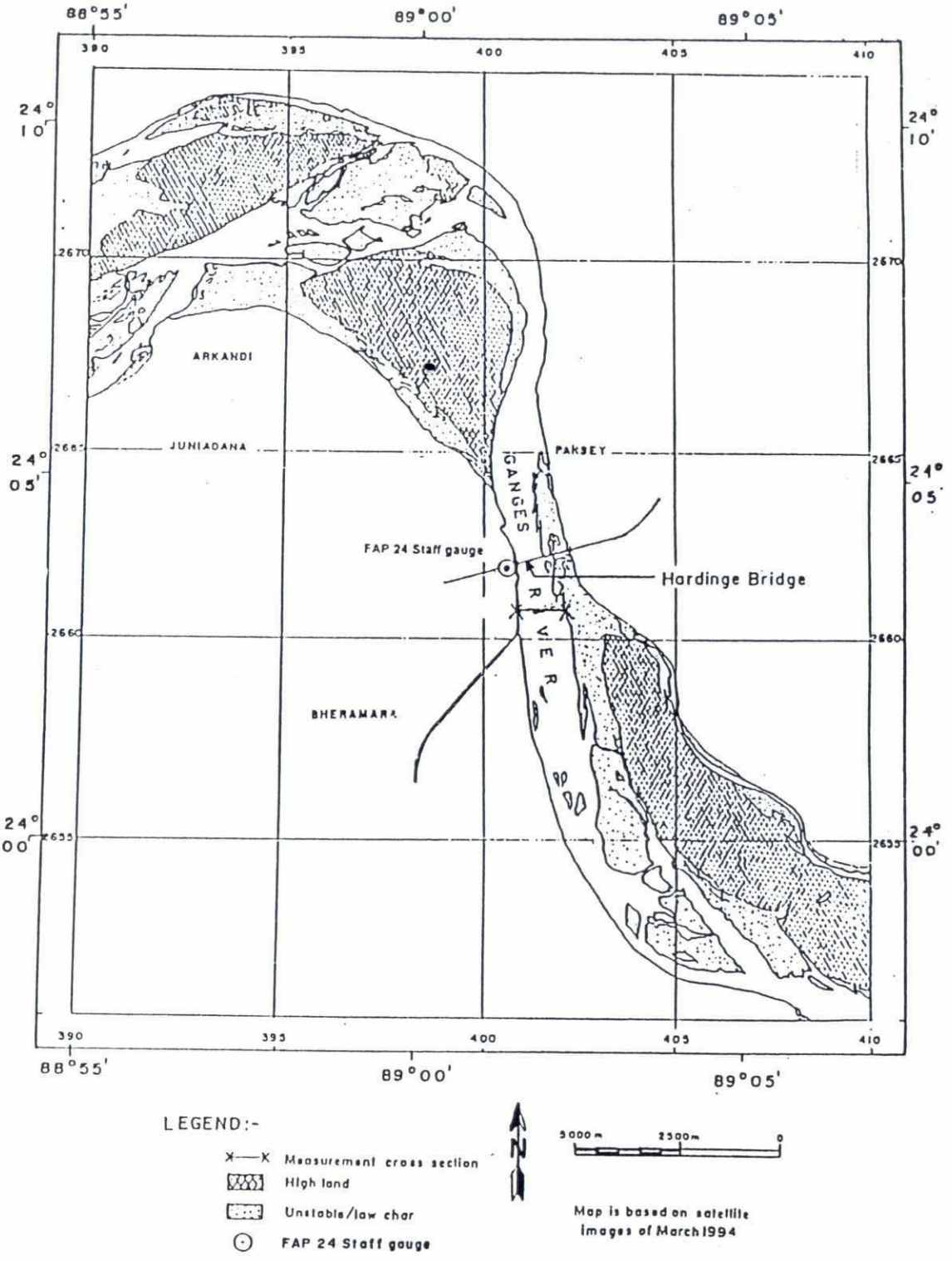
Date of Survey : 16 - 17 February 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Table 2.2 List of Sediment Samples

28

Types of Data	Channel	Format	Filename
ADCP/S4/EMF	1	QUATTRO	H42G0T01 .ase
Echosounder	1	QUATTRO	H42G0T01 .ech
Sediment transport data	1	QUATTRO	H42G0T01 .sed
Bed load sediment analysis	1	QUATTRO	H42G0T01 .bdl
Suspended sed. conc. analysis	1	QUATTRO	H42G0T01 .ssc
Transect plot data	1	QUATTRO	H42G0T01 .trs
Iso-velocity plot data	1	MIKE 21	H42G0T01 .ct2 H42G0T01 .dt2

Table 5.1 PSD 24 Database file description



FAP 24 DELFT-DHI RIVER SURVEY PROJECT Delft Hydraulics/Danish Hydraulic Institute in association with Osiris/Approtech/Hydroland		Survey Bulletin No.39 - 07 March, 1994	
		Location No.4 : Ganges River at Hardinge Bridge	
File:	Date:	KEY PLAN	Fig.
Scale:	Init:		

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	**Survey Bulletin 39 : March 1994**
		Location 4 : Ganges River, Hardinge Bridge
	Date Init	**Location of Measurments**

River : Ganges
S4 Discharge

Date of Survey : 7 March 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Date	Profile Files	Transect Files	Bank		Water Level	Total Width	Area	Discharge	Sediment Transport
			From	To	(m+PWD)	(m)	(sq.m)	(cumec)	(Kg/s)
07/03/94	H4370P01	H4370T02	Left	Right	5.58	920	9327	754	9.41
07/03/94	H4370P02	H4370T03	Right	Left	5.58	885	9568	793	9.80
07/03/94	H4370P03								
07/03/94	H4370P04								
07/03/94	H4370P05								
07/03/94	H4370P06								
07/03/94	H4370P07								
07/03/94	H4370P08								
07/03/94	H4370P09								

Table 3.1 SUMMARY OF RESULTS (S4 discharge)

River : Ganges
S4 Velocity

Date of Survey : 7 March 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Vertical 1	
Total Depth = 4.60 m	
Depth	Velocity
[m]	[m/s]
0.50	0.16
0.92	0.09
1.44	0.06
2.76	0.10
3.61	0.05

Vertical 2	
Total Depth = 8.30 m	
Depth	Velocity
[m]	[m/s]
0.50	0.12
1.66	0.11
3.31	0.10
4.98	0.07
6.66	0.05
7.79	0.07

Vertical 3	
Total Depth = 11.10 m	
Depth	Velocity
[m]	[m/s]
0.50	0.16
2.21	0.07
4.44	0.09

Vertical 4	
Total Depth = 11.70 m	
Depth	Velocity
[m]	[m/s]
0.49	0.17
2.31	0.16
4.67	0.10
7.03	0.09
9.38	0.10
10.98	0.06

Vertical 5	
Total Depth = 11.80 m	
Depth	Velocity
[m]	[m/s]
0.50	0.13
2.34	0.14
4.71	0.10
7.08	0.07
9.45	0.08
11.29	0.06

Vertical 6	
Total Depth = 9.10 m	
Depth	Velocity
[m]	[m/s]
0.51	0.23
1.82	0.14
3.64	0.08
5.48	0.12
7.28	0.07
8.29	0.03

Vertical 7	
Total Depth = 4.30 m	
Depth	Velocity
[m]	[m/s]
0.86	0.19
2.58	0.03
3.41	0.07

Vertical 8	
Total Depth = 3.10 m	
Depth	Velocity
[m]	[m/s]
0.62	0.15
1.85	0.12
2.14	0.09

Vertical 9	
Total Depth = 1.40 m	
Depth	Velocity
[m]	[m/s]
0.72	0.11

Table 3.2 SUMMARY OF RESULTS (S4 Current)

River : Ganges
Concentration

Date of Survey : 7 March 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Vertical 1	
Total Depth = 4.60 m	
Depth [m]	Conc. [mg/l]
0.50	5.84
0.92	8.77
1.44	9.05
2.76	9.50
3.61	10.16

Vertical 2	
Total Depth = 8.30 m	
Depth [m]	Conc. [mg/l]
0.50	Cancelled
1.66	8.03
3.31	9.48
4.98	12.02
6.66	11.85
7.79	13.09

Vertical 3	
Total Depth = 11.10 m	
Depth [m]	Conc. [mg/l]
0.50	7.97
2.21	11.84
4.44	14.83
6.67	16.17
8.88	16.94
10.31	17.35

Vertical 4	
Total Depth = 11.70 m	
Depth [m]	Conc. [mg/l]
0.49	7.86
2.31	12.61
4.67	14.60
7.03	15.51
9.38	16.17
10.98	17.28

Vertical 5	
Total Depth = 11.80 m	
Depth [m]	Conc. [mg/l]
0.50	12.44
2.34	13.12
4.71	Cancelled
7.08	17.86
9.45	25.30
11.29	28.89

Vertical 6	
Total Depth = 9.10 m	
Depth [m]	Conc. [mg/l]
0.51	7.79
1.82	12.25
3.64	13.11
5.48	15.32
7.28	16.57
8.29	20.56

Vertical 7	
Total Depth = 4.30 m	
Depth [m]	Conc. [mg/l]
0.86	1.14
2.58	15.51
3.41	16.74

Vertical 8	
Total Depth = 3.10 m	
Depth [m]	Conc. [mg/l]
0.62	7.85
1.85	7.16
2.14	8.75

Vertical 9	
Total Depth = 1.40 m	
Depth [m]	Conc. [mg/l]
0.72	26.46

Table 3.3 SUMMARY OF RESULTS (Suspended Sediment Concentration)

Type	Time		File Name	Ver. No.	Easting (meter)	Northing (meter)	DISCHARGE GAUGING					SEDIMENT TRANSPORT GAUGING				
	From	To					ADCP	HYDRO	EMF	S4	MEX	Suspended Sediment Samples	Andreasen Tube Samples	Helley Smith Samples	Integrated Sediment Samples	Bottom Samples
Transect	10:05:00	10:14:00	H4370T02*					T								
Transect	10:17:00	10:27:00	H4370T03					T								
Profile	10:49:00	11:15:00	H4370P01	1	401025	660675	P	P	P	P		5	-	-	-	-
Profile	11:24:00	11:50:00	H4370P02	2	401136	660673	P	P	P	P		6	-	-	-	-
Profile	12:08:00	12:41:00	H4370P03	3	401229	660672	P	P	P	P		6	-	-	-	-
Profile	12:56:00	13:24:00	H4370P04	4	401347	660670	P	P	P	P		6	-	-	-	-
Profile	13:38:00	14:09:00	H4370P05	5	401440	660652	P	P	P	P		6	-	-	-	-
Profile	14:30:00	14:56:00	H4370P06	6	401518	660670	P	P	P	P		6	-	-	-	-
Profile	15:07:00	15:19:00	H4370P07	7	401619	660680	P	P	P	P		3	-	-	-	-
Profile	15:31:00	15:45:00	H4370P08	8	401721	660670	P	P	P	P		3	-	-	-	-
Profile	15:55:00	15:58:00	H4370P09	9	401806	660670	P	P	P	P		1	-	-	-	-

* transect in PSD 24 data base

Date of Survey : 7 March 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Table 2.1 (SURVEY PROGRAMME AS MADE)

Type Of Samples	Sample Nos.	Total Sample Nos.	Vertical No.
Depth Integrated samples	A1293,A1175,A1200,A1268,A1192	5	1
	A1212,A1201,A1179,A1214,A1181,A1	6	2
	A1173,A1310,A1168,A1211,A1187,A1	6	3
	A1327,A1336,A1313,A1206,A1345,A1	6	4
	A1252,A1254,A1302,A1350,A1205,A1	6	5
	A1321,A1314,A1335,A1317,A1195,A1	6	6
	A1331,A1326,A1213	3	7
	A1316,A1341,A1287	3	8
	A1184	1	9

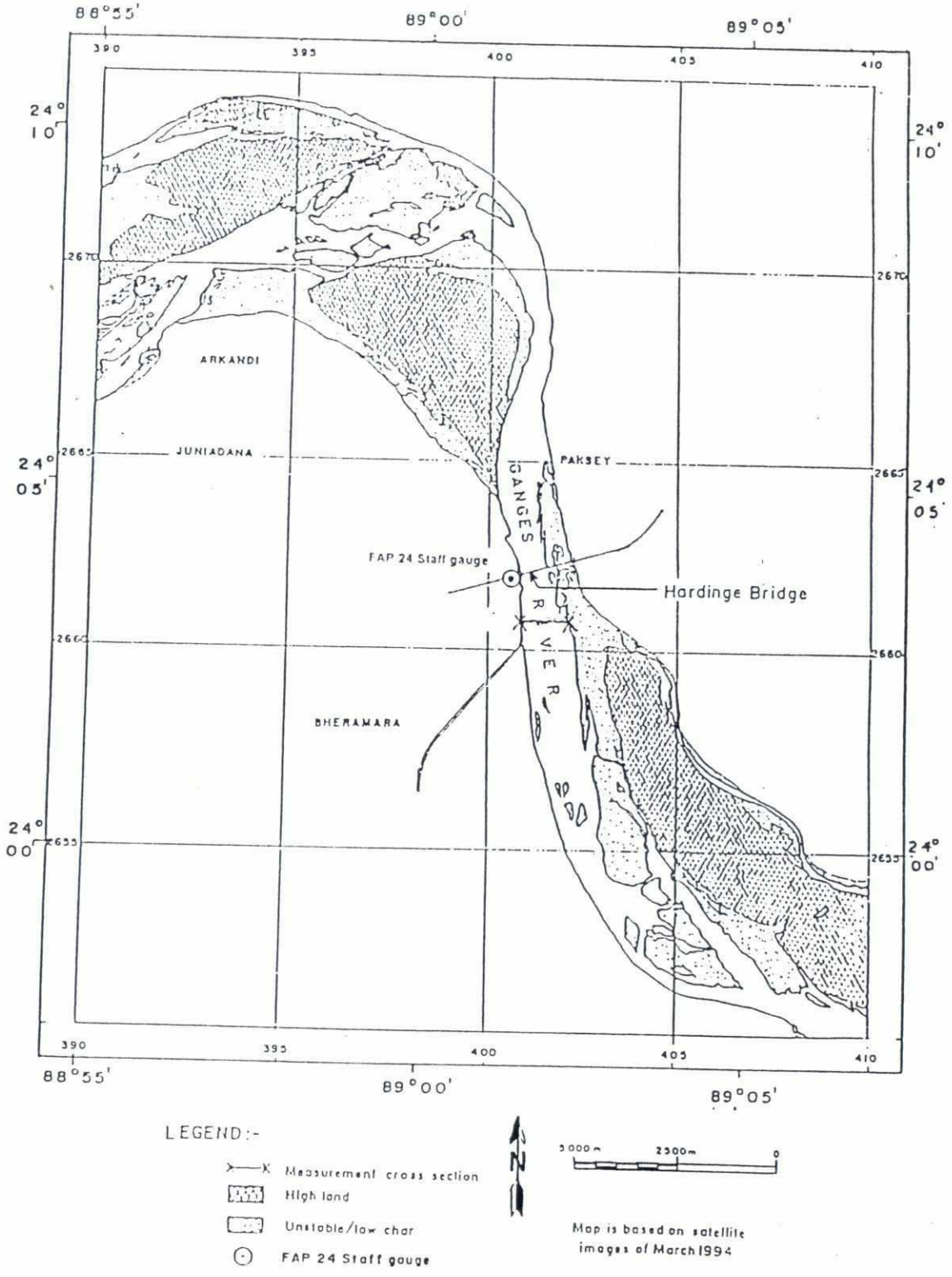
Date of Survey : 7 March 1994
Location : Ganges River at Hardinge Bridge
Location No : 4

Table 2.2 List of Sediment Samples

02

Types of Data	Channel	Format	Filename
ADCP/S4/EMF	1	QUATTRO	H4370T02 .ase
Echosounder	1	QUATTRO	H4370T02 .ech
Sediment transport data	1	QUATTRO	H4370T02 .sed
Bed load sediment analysis	1	QUATTRO	H4370T02 .bdl
Suspended sed conc analysis	1	QUATTRO	H4370T02 .ssc
Transect plot data	1	QUATTRO	H4370T02 .trs
Iso-velocity plot data	1	MIKE 21	H4370T02 .ct2 H4370T02 .dt2

Table 5.1 PSD 24 Database file description



FAP 24 DELFT-DHI RIVER SURVEY PROJECT Delft Hydraulics/Danish Hydraulic Institute in association with Osiris/Approtech/Hydroland		Survey Bulletin No. 47 - March 1994	
		Location No.4 : Ganges River at Hardinge Bridge	
File:	Date:	KEY PLAN	Fig.
Scale:	Init:		

08

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	**Survey Bulletin 47 : March 1994**
		Location 4 :Ganges River, Hardinge Bridge
	Date : Init :	**Location of Measurments**

River : Ganges
S4 Discharge

Date of Survey : 28 - 29 March 1994
Location : Ganges River, Hardinge Bridge
Station No. 4

Date	Profile Files	Transect File	Bank		Water Level	Total Width	Area	Discharge	Sediment Transport
			From	To	(m+PWD)	(m)	(sq.m)	(cumec)	(Kg/s)
28/03/94	H43S0P01	H43S0T01	Right	Left	4.95	908	7192	156	1.50
28/03/94	H43S0P02								
28/03/94	H43S0P03								
28/03/94	H43S0P04								
28/03/94	H43S0P05								
28/03/94	H43S0P06								
29/03/94	H43S0P07								
29/03/94	H43S0P08								
29/03/94	H43S0P09								

Table 3.1 SUMMARY OF RESULTS (S4-discharge)

River : Ganges
S4 Velocity

Date of Survey : 28 - 29 March 1994
Location : Ganges River, Hardinge Bridge
Station No. 4

Vertical 1	
Total Depth = 3.60 m	
Depth [m]	Velocity [m/s]
0.58	0.06
0.69	0.02
1.43	0.03
2.14	0.01
2.85	0.03
3.13	0.04

Vertical 2	
Total Depth = 7.60 m	
Depth [m]	Velocity [m/s]
0.51	0.07
1.51	0.06
3.06	0.05
4.55	0.02
6.08	0.08
7.03	0.07

Vertical 3	
Total Depth = 10.40 m	
Depth [m]	Velocity [m/s]
0.50	0.11
2.06	0.02
4.13	0.00
4.37	0.03
6.23	0.03
8.30	0.02

Vertical 4	
Total Depth = 11.50 m	
Depth [m]	Velocity [m/s]
0.51	0.09
2.30	0.05
4.56	0.04
6.91	0.01
9.20	0.01
10.55	0.01

Vertical 5	
Total Depth = 11.80 m	
Depth [m]	Velocity [m/s]
0.53	0.33
2.35	0.05
4.72	0.06
7.09	0.04
9.46	0.05
10.83	0.03

Vertical 6	
Total Depth = 6.70 m	
Depth [m]	Velocity [m/s]
0.49	0.06
1.33	0.05
2.72	0.03
4.03	0.05
5.37	0.04
5.90	0.04

Vertical 7	
Total Depth = 3.90 m	
Depth [m]	Velocity [m/s]
0.65	0.07
0.79	0.07
1.54	0.03
2.34	0.06
3.10	0.05
3.40	0.04

Vertical 8	
Total Depth = 2.40 m	
Depth [m]	Velocity [m/s]
0.50	0.15
1.42	0.12
1.90	0.11

Vertical 9	
Total Depth = 1.00 m	
Depth [m]	Velocity [m/s]
0.50	0.02
0.60	0.05

Table 3.2 SUMMARY OF RESULTS (S4 Current)

River : Ganges
Concentration

Date of Survey : 28 - 29 March 1994
Location : Ganges River, Hardinge Bridge
Station No. 4

Vertical 1	
Total Depth = 3.60 m	
Depth [m]	Conc. [mg/l]
0.58	10.74
0.69	10.77
1.43	12.45
2.14	13.73
2.85	14.07
3.13	16.57

Vertical 2	
Total Depth = 7.60 m	
Depth [m]	Conc. [mg/l]
0.51	5.51
1.51	Cancelled
3.06	7.40
4.55	8.63
6.08	11.23
7.03	13.70

Vertical 3	
Total Depth = 10.40 m	
Depth [m]	Conc. [mg/l]
0.50	6.98
2.06	7.49
4.13	8.31
4.37	9.42
6.23	16.04
8.30	18.54

Vertical 4	
Total Depth = 11.50 m	
Depth [m]	Conc. [mg/l]
0.51	11.42
2.30	12.60
4.56	12.18
6.91	13.55
9.20	13.81
10.55	15.22

Vertical 5	
Total Depth = 11.80 m	
Depth [m]	Conc. [mg/l]
0.50	11.50
2.35	13.38
4.72	12.40
7.09	14.12
9.45	14.79
10.86	17.23

Vertical 6	
Total Depth = 6.70 m	
Depth [m]	Conc. [mg/l]
0.49	8.69
1.33	11.79
2.72	11.91
4.03	12.02
5.37	14.23
5.90	17.60

Vertical 7	
Total Depth = 3.90 m	
Depth [m]	Conc. [mg/l]
0.65	4.18
0.79	6.56
1.54	6.42
2.34	6.82
3.10	7.69
3.40	11.97

Vertical 8	
Total Depth = 2.40 m	
Depth [m]	Conc. [mg/l]
0.50	5.17
1.42	Cancelled
1.90	10.81

Vertical 9	
Total Depth = 1.00 m	
Depth [m]	Conc. [mg/l]
0.50	8.70
0.60	8.45

Table 3.3 SUMMARY OF RESULTS (Suspended Sediment Concentration)

Type	Time		File Name	Ver. No.	Easting (meter)	Northing (meter)	DISCHARGE GAUGING					SEDIMENT TRANSPORT GAUGING				
	From	To					ADCP	HYDRO	EMF	S4	MEX	Suspended Sediment Samples	Andreasen Tube Samples	Helley Smith Samples	Integrated Sediment Samples	Bottom Samples
Transect	10:56:52	11:05:58	H43S0T01*					B								
Profile	11:43:00	12:21:00	H43S0P01	1	401025	660675		P		P		6	-	-	-	-
Profile	12:42:00	13:39:00	H43S0P02	2	401125	660674		P		P		6	-	-	-	-
Profile	13:49:00	14:15:00	H43S0P03	3	401212	660673		P		P		6	-	-	-	-
Profile	14:51:00	15:29:00	H43S0P04	4	401330	660673		P		P		6	-	-	-	-
Profile	15:58:00	16:26:00	H43S0P05	5	401432	660672		P		P		6	-	-	-	-
Profile	16:34:00	17:00:00	H43S0P06	6	401534	660671		P		P		6	-	-	-	-
Profile	08:23:00	08:55:00	H43S0P07	7	401618	660670		P		P		6	-	-	-	-
Profile	09:09:00	09:35:00	H43S0P08	8	401720	660672		P		P		6	-	-	-	-
Profile	09:52:00	09:58:00	H43S0P09	9	401805	660669		P		P		3	-	-	-	-
												2	-	-	-	-

* transect in PSD 24 data base

Date of Survey : 28 - 29 March 1994
Location : Ganges River, Hardinge Bridge
Station No. 4

Table 2.1 (SURVEY PROGRAMME AS MADE)

Type Of Samples	Sample Nos.	Total Sample Nos.	Vertical No.
Point Integrated Samples	A1492,A1579,A1546,A1507,A1505,A1535	6	1
	A1542,A1498,A1514,A1540,A1530,A1488	6	2
	A1510,A1532,A1534,A1408,A1190,A1180	6	3
	A1259,A1462,A1479,A1337,A1485,A1301	6	4
	A1447,A1446,A1483,A1466,A1475,A1294	6	5
	A1566,A1568,A1549,A1288,A1482,A1477	6	6
	A1519,A1508,A1284,A1528,A1563,A1513	6	7
	A1548,A1529,A1516	3	8
	A1500,A1182	2	9

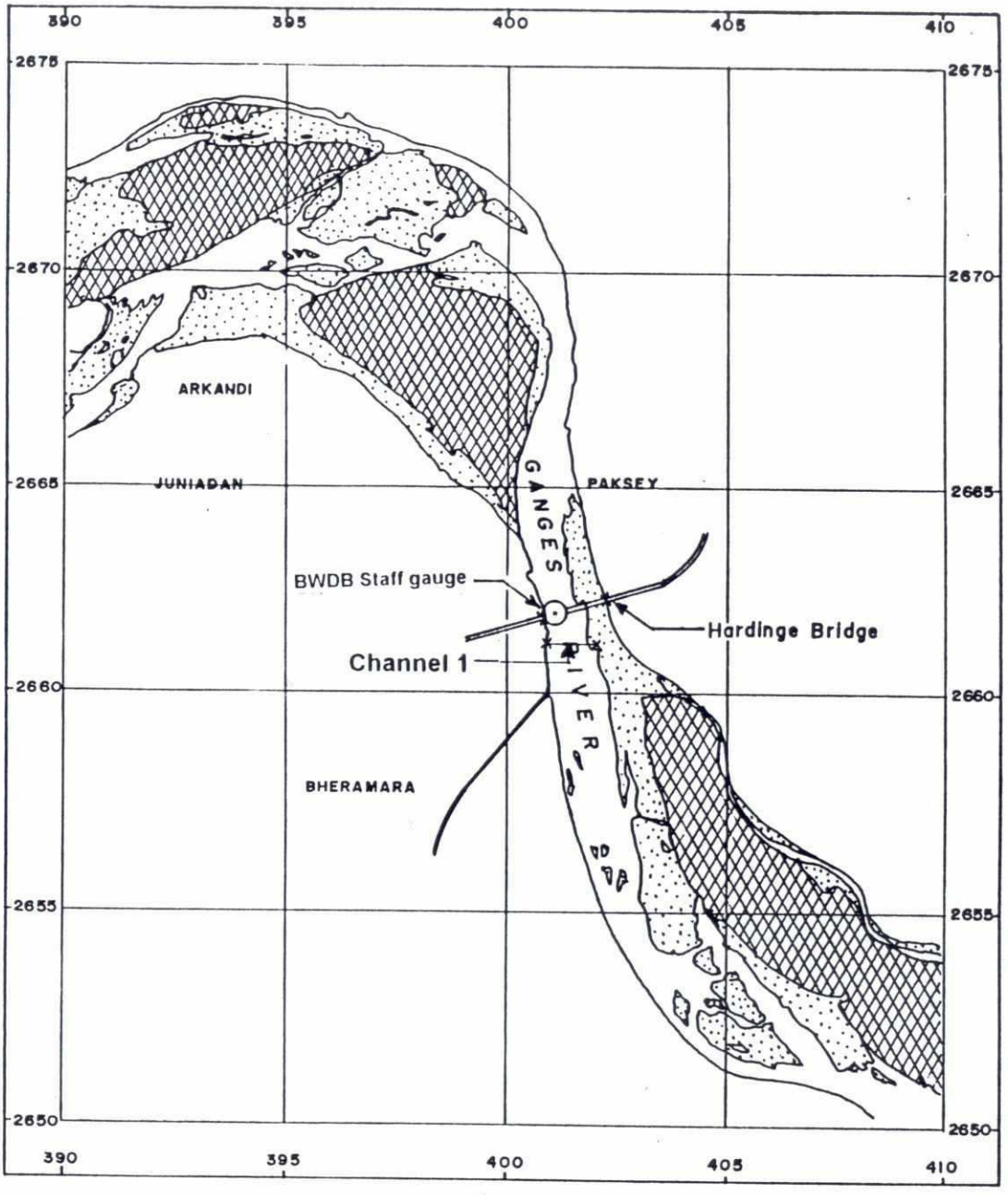
Date of Survey : 28 - 29 March 1994
Location : Ganges River, Hardinge Bridge
Station No. 4

Table 2.2 List of Sediment Samples

80

Types of Data	Channel	Format	Filename
ADCP/S4/EMF	1	QUATTRO	H43S0T01 .ase
Echosounder	1	QUATTRO	H43S0T01 .ech
Sediment transport data	1	QUATTRO	H43S0T01 .sed
Bed load sediment analysis	1	QUATTRO	H43S0T01 .bdl
Suspended sed. conc. analysis	1	QUATTRO	H43S0T01 .ssc
Transect plot data	1	QUATTRO	H43S0T01 .trs
Iso-velocity plot data	1	MIKE 21	H43S0T01 .ct2 H43S0T01 .dt2

Table 5.1 PSD 24 Database file description



LEGEND:

- Cross section
- Highland
- Unstable / low char
- BWDB Staff gauge

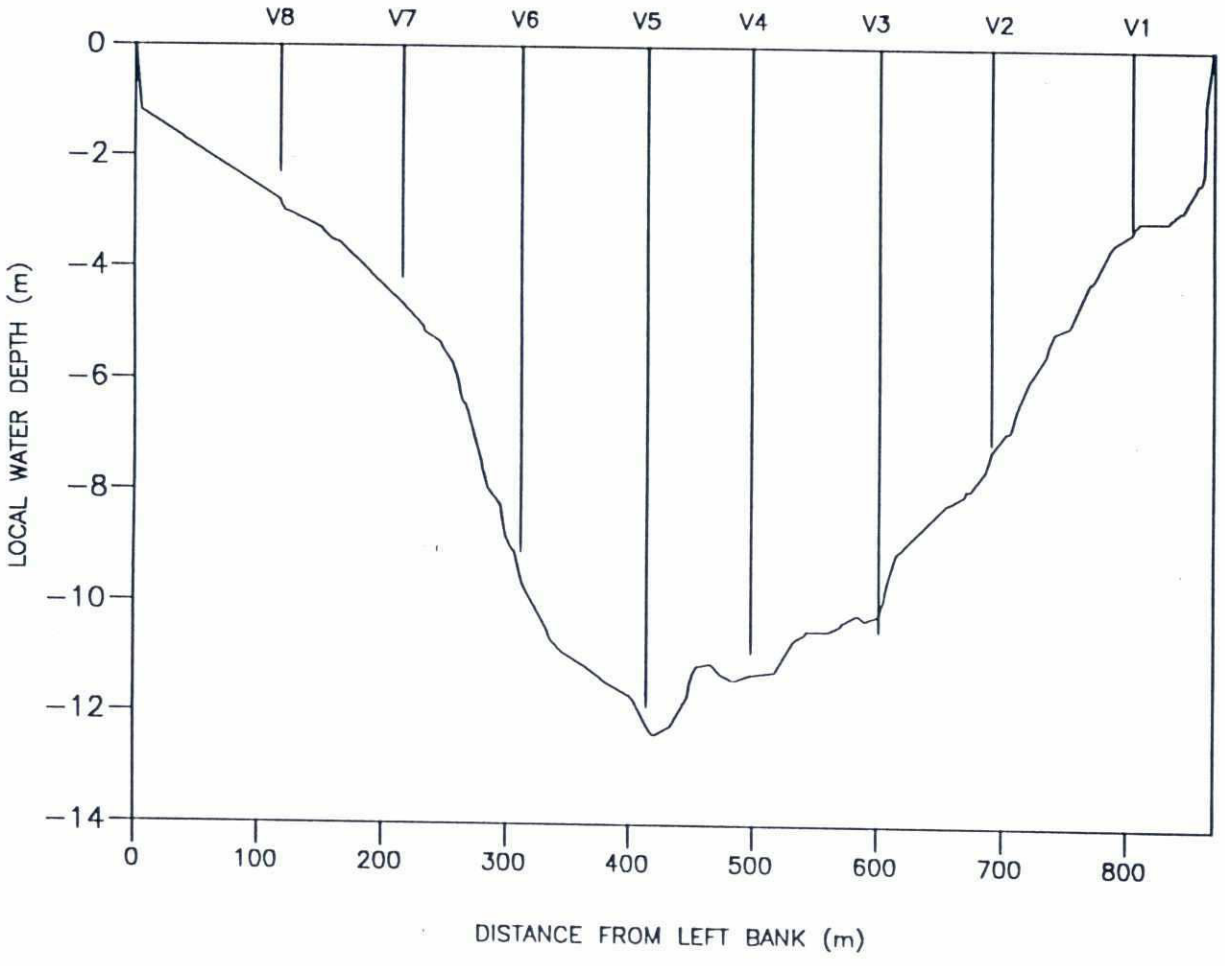
N

5000 m 2500m 0

Map is based on satellite images of March 1994

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 50 : 08 April, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
	Date : 10 Aug 1994	Location map	page 1.1
	Init : mzh		

82



Water level : 5.02 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 50 : 08 April, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4480T02	Date : 10 Aug 1994 Init : mzh	Cross-sections and measured verticals Channel 1	page 1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	-	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	1	-	-	-
Vertical current profile	No of verticals in channel	8	-	-	-
	ADCP	-	-	-	-
	S4 current meter	8	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	45	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	-	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

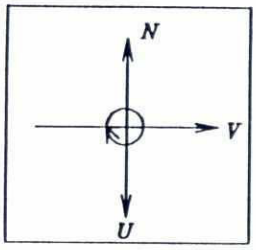
Table 2.1: Survey programme as made

	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	869	5951	5.02	272	-	1.68

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Hardinge Bridge	Channel 1	08 Apr 94	5.02	BWDB

Table 2.3: Water-levels

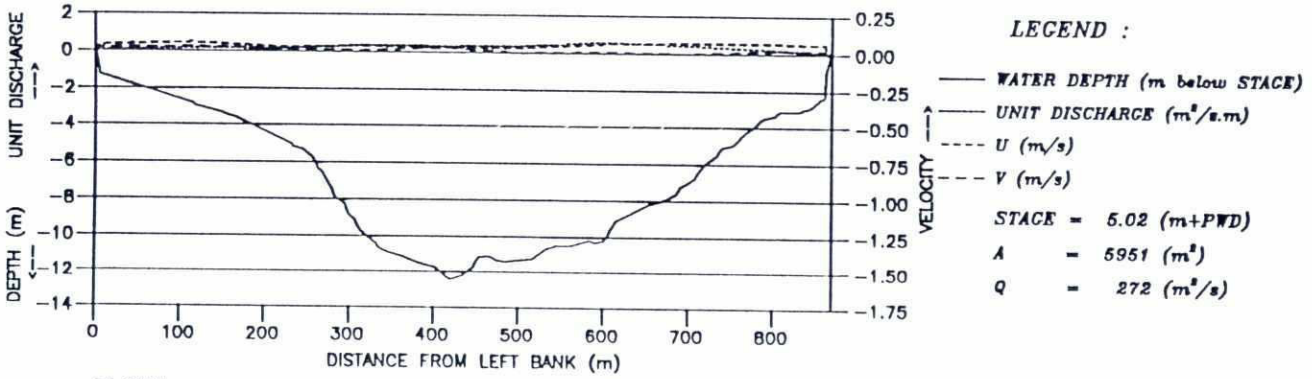


TRANSECT AZIMUTH = 270°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE (m²/s.m)

U (m/s)

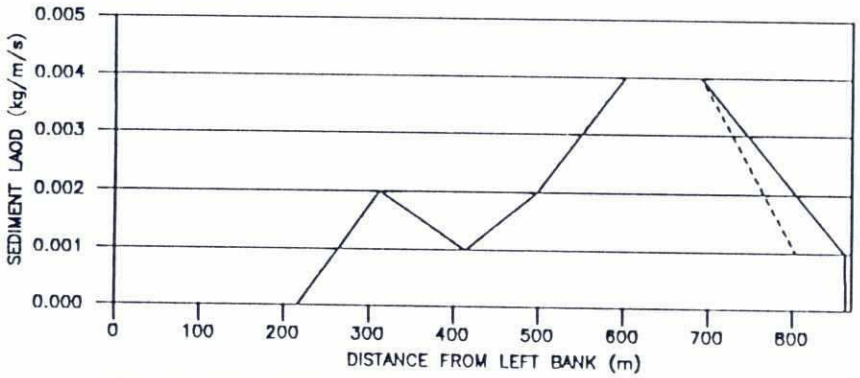
V (m/s)

STAGE = 5.02 (m+PWD)

A = 5951 (m²)

Q = 272 (m³/s)

FLOW



LEGEND :

S_{TOTAL} 1.68 (kg/s)

$S_{WASH\ LOAD}$ 1.56 (kg/s)

$S_{SUSP.\ BED}$ 0.12 (kg/s)

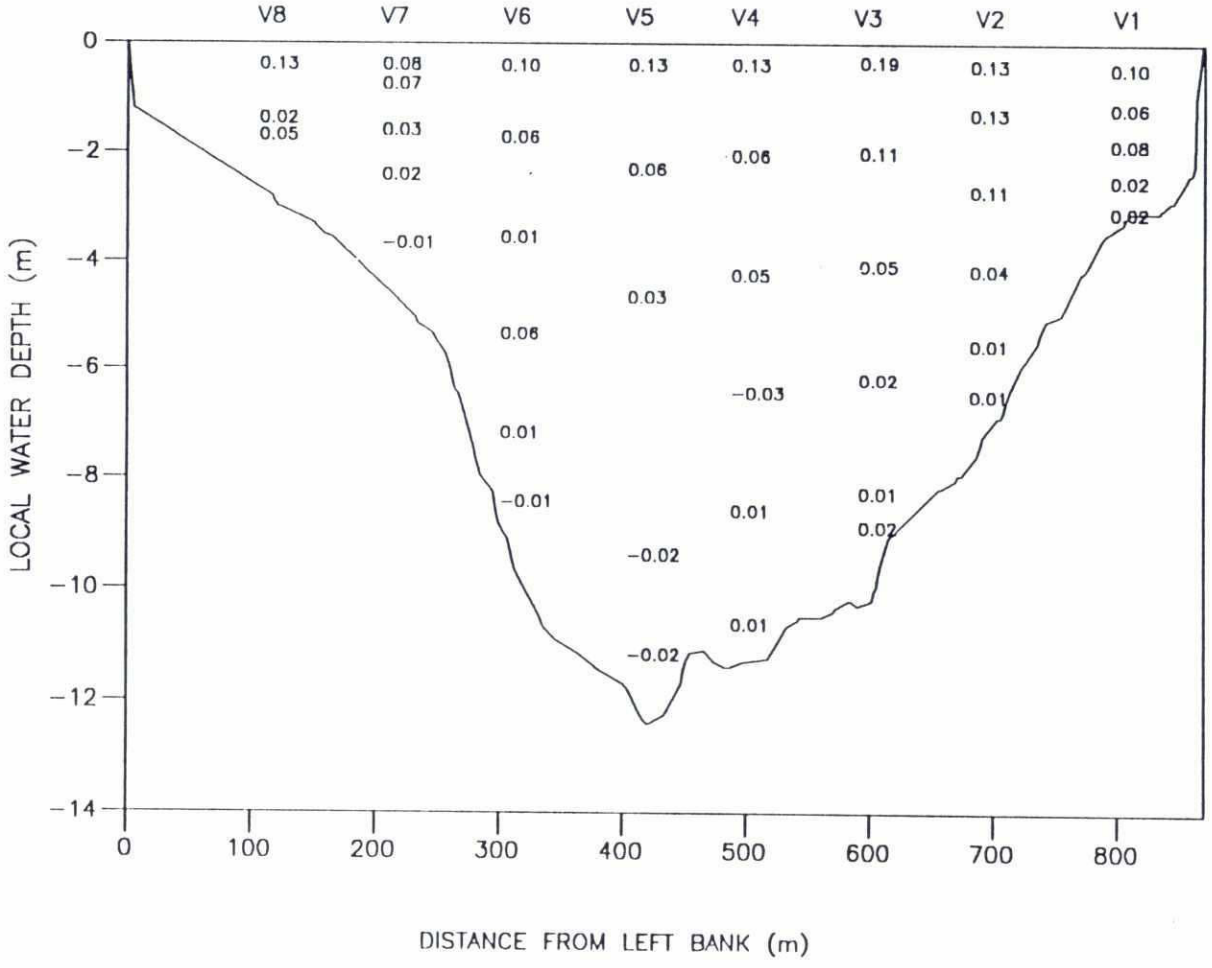
$S_{BED\ LOAD}$ – (kg/s)

SEDIMENT TRANSPORT

Sample not collected

GRAIN SIZE

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 50 : 08 April, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4480T02	Date : 10 Aug 1994	Horizontal distribution of flow and sediments	page
	Init : mzh	Channel 1	3.1



Water level : 5.02 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		**Survey Bulletin 50 : 08 April, 1994**	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4480T02	Date : 10 Aug 1994 Init : mzh	**Cross-sectional distribution of flow velocity** **Channel 1**	page 4.1

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	9404081012-1021	H4480T02 *

Table 6.1: Echo-sounding

* : echo-sounding in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9404081047-1112	401008	660675	3.30	H4480P01 *
		2	9404081118-1142	401110	660674	7.10	H4480P02 *
		3	9404081154-1221	401211	660673	10.50	H4480P03 *
		4	9404081231-1256	401313	660673	10.90	H4480P04 *
		5	9404081304-1333	401398	660672	11.90	H4480P05 *
		6	9404081442-1507	401500	660671	9.10	H4480P06 *
		7	9404081522-1546	401601	660671	4.20	H4480P07 *
		8	9404081550-1604	401720	660670	2.30	H4480P08 *

Table 6.2: Vertical profiles

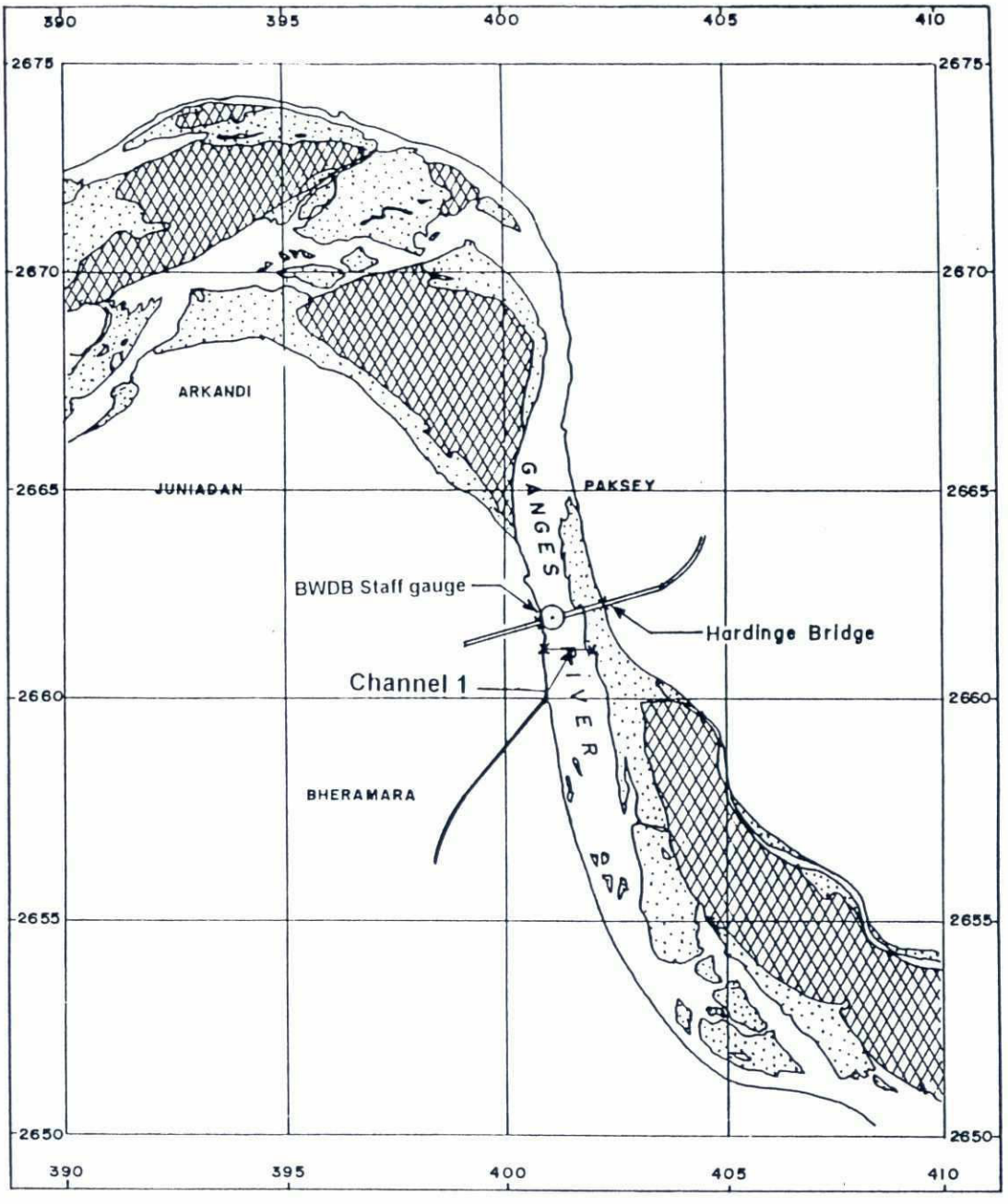
* ADCP & MEX not available

Method	Channel	Vertical	No of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	6	9404081047-1112	401008	660675	3.30
		2	6	9404081118-1142	401110	660674	7.10
		3	6	9404081154-1221	401211	660673	10.50
		4	6	9404081231-1256	401313	660673	10.90
		5	6	9404081304-1333	401398	660672	11.90
		6	6	9404081442-1507	401500	660671	9.10
		7	6	9404081522-1546	401601	660671	4.20
		8	3	9404081550-1604	401720	660670	2.30

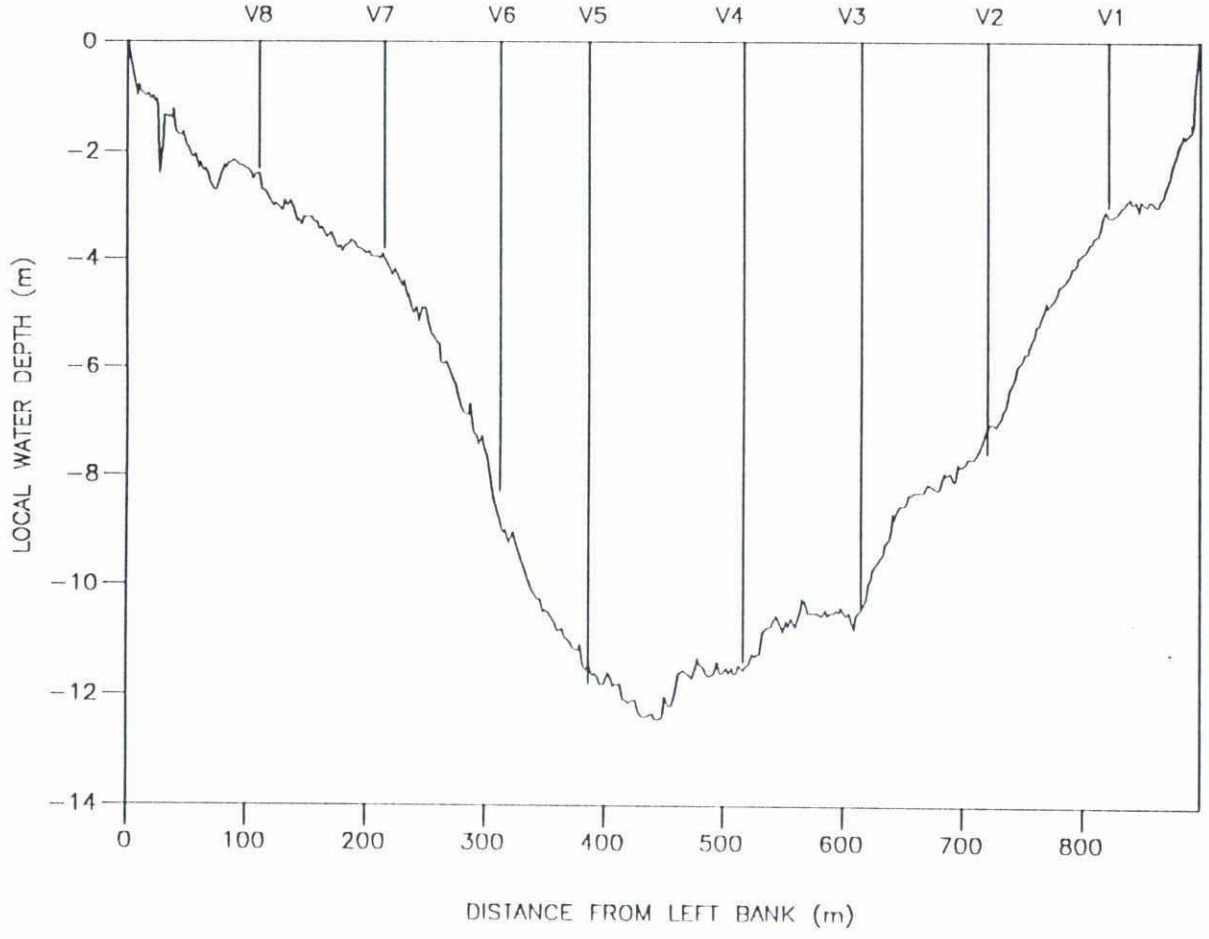
Table 6.3: Suspended sediment - point sampled

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H4480T02 .ase
Echosounder data	1	QUATTRO	H4480T02 .ech
Sediment transport data	1	QUATTRO	H4480T02 .sed
Bed load sediment analysis	1	QUATTRO	H4480T02 .bdl
Susp. sed. conc. analysis	1	QUATTRO	H4480T02 .ssc
Transect plot data	1	QUATTRO	H4480T02 .trs

Table 7.1 PSD 24 Database file description



FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 58 : 12 May, 1994	
	Location 4 : Ganges River, Hardinge Bridge	
Date : 15 Aug 1994 Init : mzh	Location map	page 1.1



Water level : 5.09 m+PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 58 : 12 May, 1994	
		Location 4 : Ganges river, Hardinge Bridge	
File : H45C0T01	Date : 18 August 1994 Init : mzh	Cross-sections and measured verticals Channel 1	page 1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	-	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	3	-	-	-
Vertical current profile	No.of verticals in channel	8	-	-	-
	ADCP	-	-	-	-
	S4 current meter	8	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	42	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-		
	Helley-Smith sampler	-	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

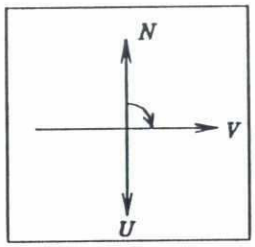
Table 2.1: Survey programme as made

	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	897	6088	5.09	167	-	2.24

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Hardinge Bridge	Channel 1	12 May 94	5.09	BWDB

Table 2.3: Water-levels

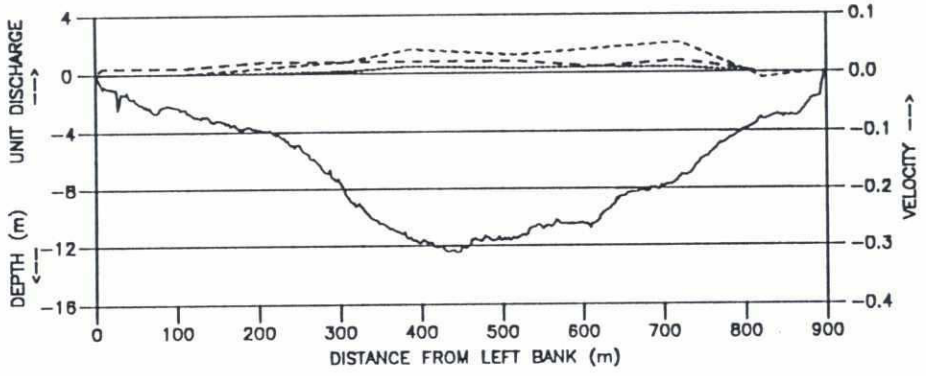


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



LEGEND :

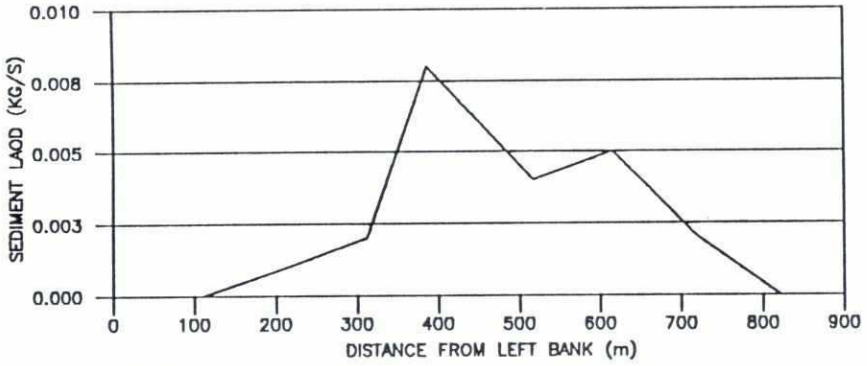
- *WATER DEPTH (m below STAGE)*
- *UNIT DISCHARGE ($m^2/s/m$)*
- *U (m/s)*
- *V (m/s)*

STAGE = 5.09 (m+PWD)

A = 6088 (m^2)

Q = 167 (m^3/s)

FLOW



LEGEND :

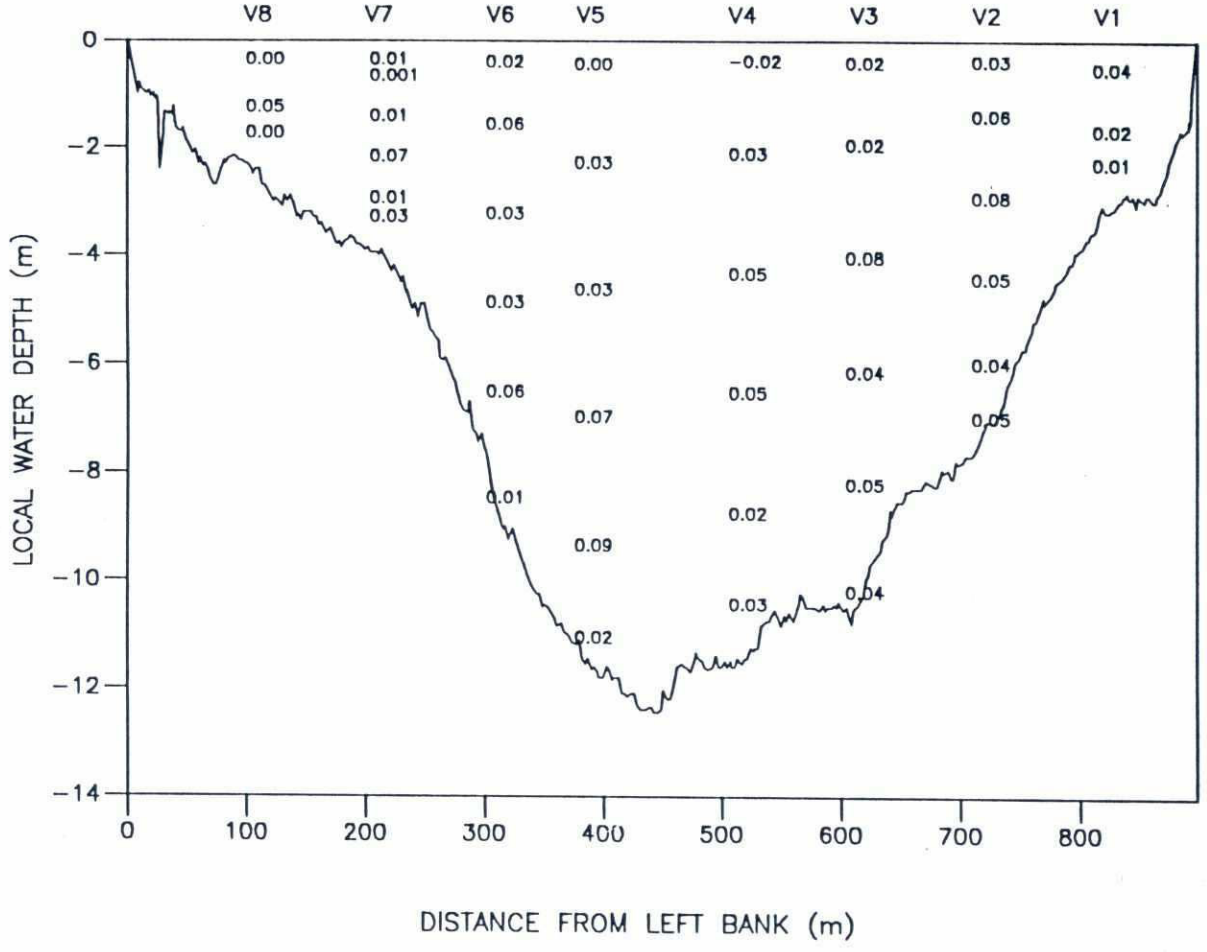
- *S_{TOTAL} 2.24 (kg/s)*
- *$S_{WASH\ LOAD}$ 2.13 (kg/s)*
- *$S_{SUSP.\ BED}$ 0.11 (kg/s)*
- *$S_{BED\ LOAD}$ – (kg/s)*

SEDIMENT TRANSPORT

Sample not collected

GRAIN SIZE

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 58 : 12 May, 1994	
		Location 4 : Ganges river, Hardinge Bridge	
File : H45C0T01	Date : 18 August 1994 Init : mzh	Horizontal distribution of flow and sediments Channel 1	page 3.1



Water level : 5.09 m+PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 58 : 12 May, 1994 Location 4 : Ganges river, Hardinge Bridge	
File : H45C0T01	Date : 18 August 1994 Init : mzh	Cross-sectional distribution of flow velocity Channel 1	page 4.1

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	9405120815-0823 9405120825-0832 9405120835-0841	H45C0T01 * H45C0T02 H45C0T03

Table 6.1: Echo-sounding

* echo-sounding in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9405121006-1017	401007	660669	3.00	H45C0P01 *
		2	9405121028-1053	401108	660678	7.60	H45C0P02 *
		3	9405121100-1135	401215	660676	10.40	H45C0P03 *
		4	9405121142-1211	401316	660670	11.40	H45C0P04 *
		5	9405121222-1250	401420	660673	11.80	H45C0P05 *
		6	9405121301-1326	401511	660672	8.30	H45C0P06 *
		7	9405121332-1356	401623	660668	3.80	H45C0P07 *
		8	9405121405-1417	401718	660665	2.30	H45C0P08 *

Table 6.2: Vertical profiles

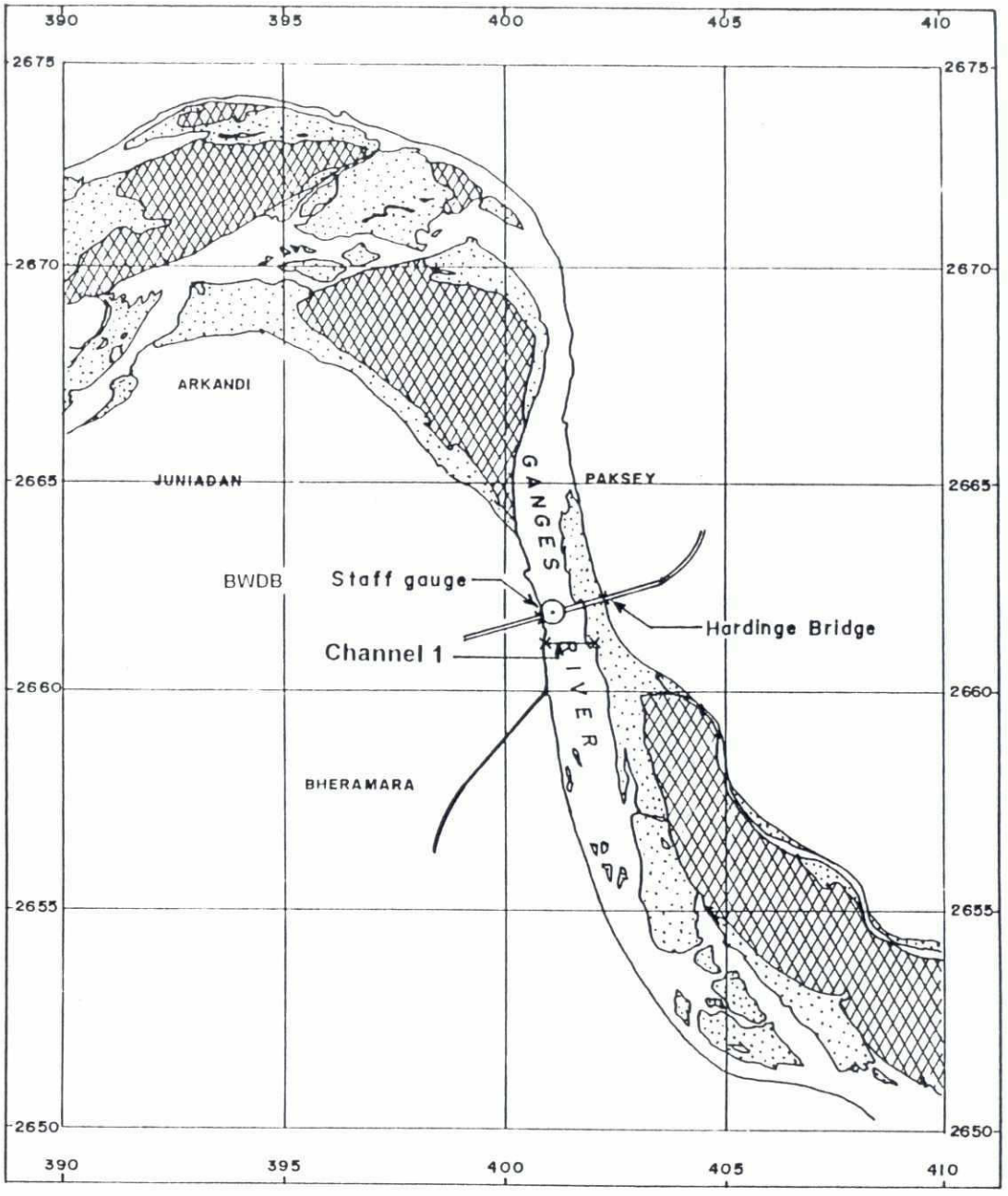
* ADCP & MEX not available

Method	Channel	Vertical	No of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	3	9405121006-1017	401007	660669	3.00
		2	6	9405121028-1053	401108	660678	7.60
		3	6	9405121100-1135	401215	660676	10.40
		4	6	9405121142-1211	401316	660670	11.40
		5	6	9405121222-1250	401420	660673	11.80
		6	6	9405121301-1326	401511	660672	8.30
		7	6	9405121332-1356	401623	660668	3.80
		8	3	9405121405-1417	401718	660665	2.30

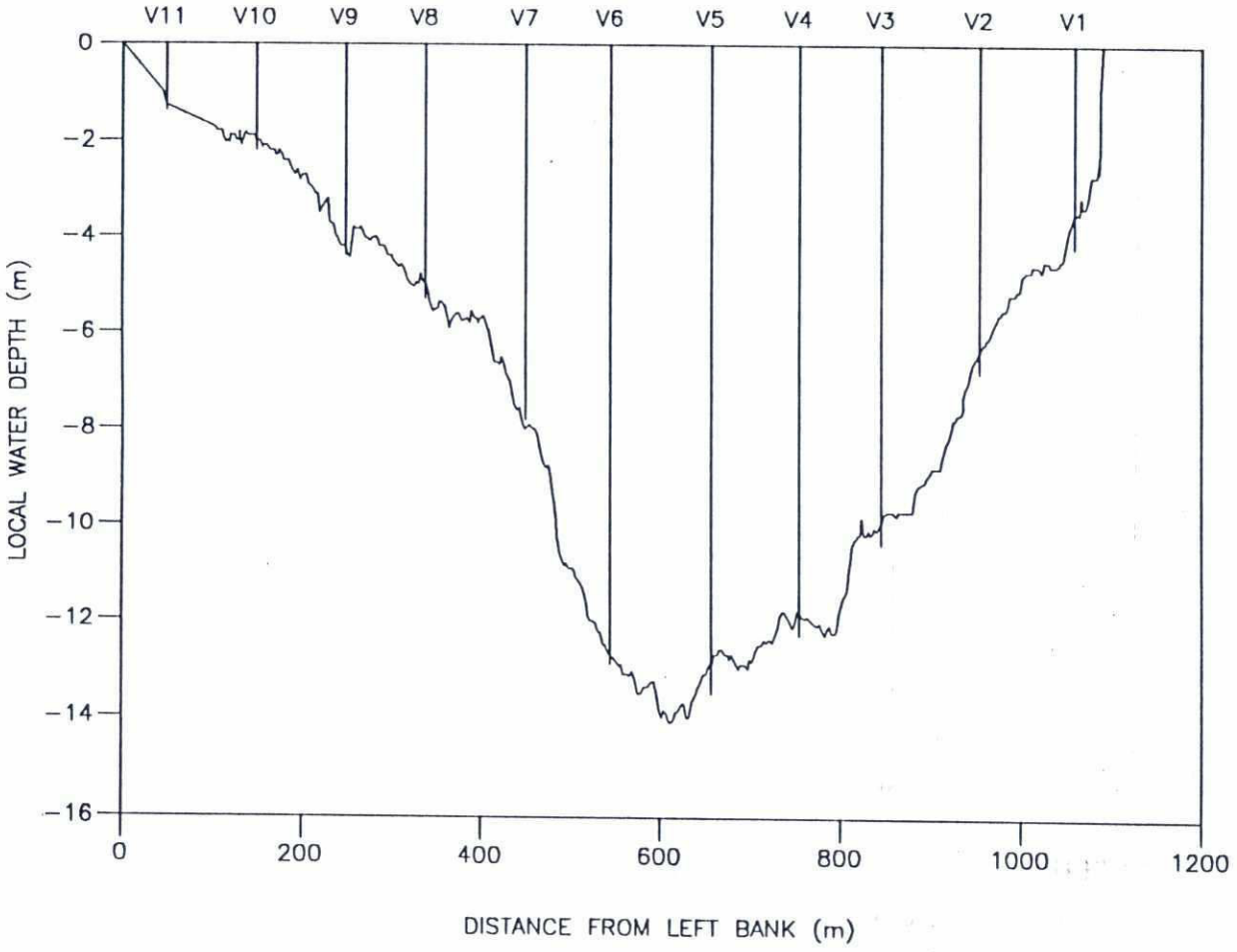
Table 6.3: Suspended sediment - point sampled

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H45C0T01 .ase
Echosounder data	1	QUATTRO	H45C0T01 .ech
Sediment transport data	1	QUATTRO	H45C0T01 .sed
Bed load sediment analysis	1	QUATTRO	H45C0T01 .bdl
Susp. sed. conc. analysis	1	QUATTRO	H45C0T01 .ssc
Transect plot data	1	QUATTRO	H45C0T01 .trs

Table 7.1 PSD 24 Database file description



FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 61 : 05 - 06 June, 1994	
	Location 4 : Ganges River, Hardinge Bridge	
Date : 06 Sep 1994 Init : mua	Location map	page 1.1



Water-level : 6.91 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	**Survey Bulletin 61 : 05-06 June, 1994**	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4650T03	Date : 06 Sep 1994	**Cross-sections and measured verticals**	page 1.2
	Init : mk/mua	**Channel 1**	

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	-	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	1	-	-	-
Vertical current profile	No of verticals in channel	11	-	-	-
	ADCP	-	-	-	-
	S4 current meter	11	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	58	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	-	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

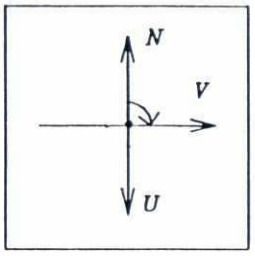
Table 2.1: Survey programme as made

	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	1090	7858	6.91	448	0.00	7.1

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Hardinge Bridge	Channel 1	05 June 94 06 June 94	6.91 7.16	BWDB

Table 2.3: Water-levels

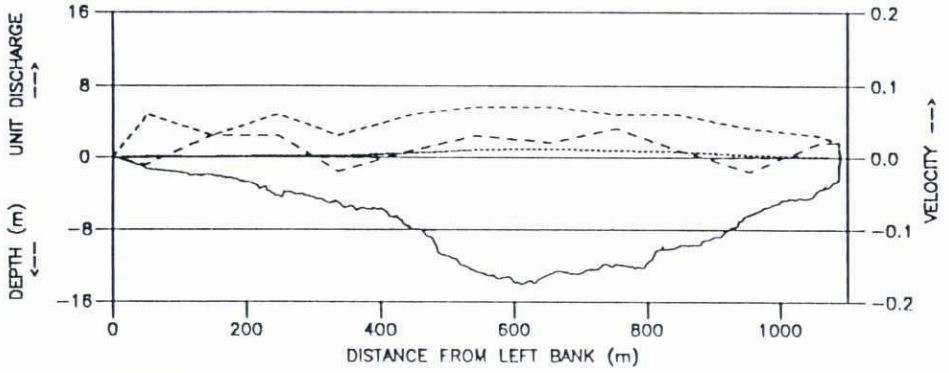


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE (m^2/s.m)

U – (m/s)

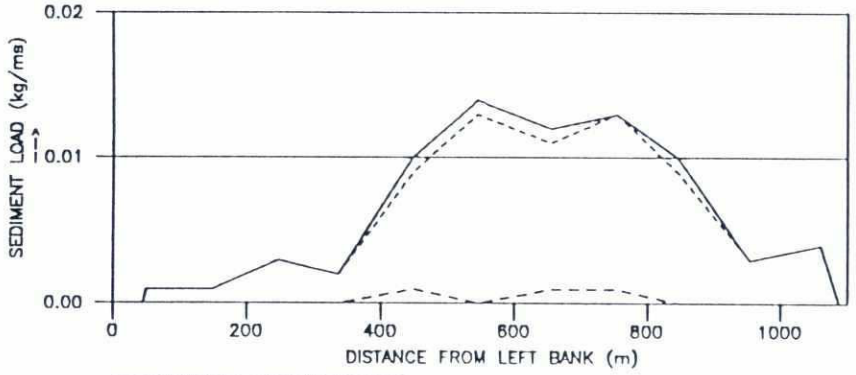
V – (m/s)

STAGE = 6.91 (m+PWD)

A = 7858 (m^2)

Q = 448 (m^2/s)

FLOW



LEGEND :

S_{TOTAL} 7.1 (kg/s)

$S_{WASH\ LOAD}$ 6.8 (kg/s)

$S_{SUSP.\ BED}$ 0.3 (kg/s)

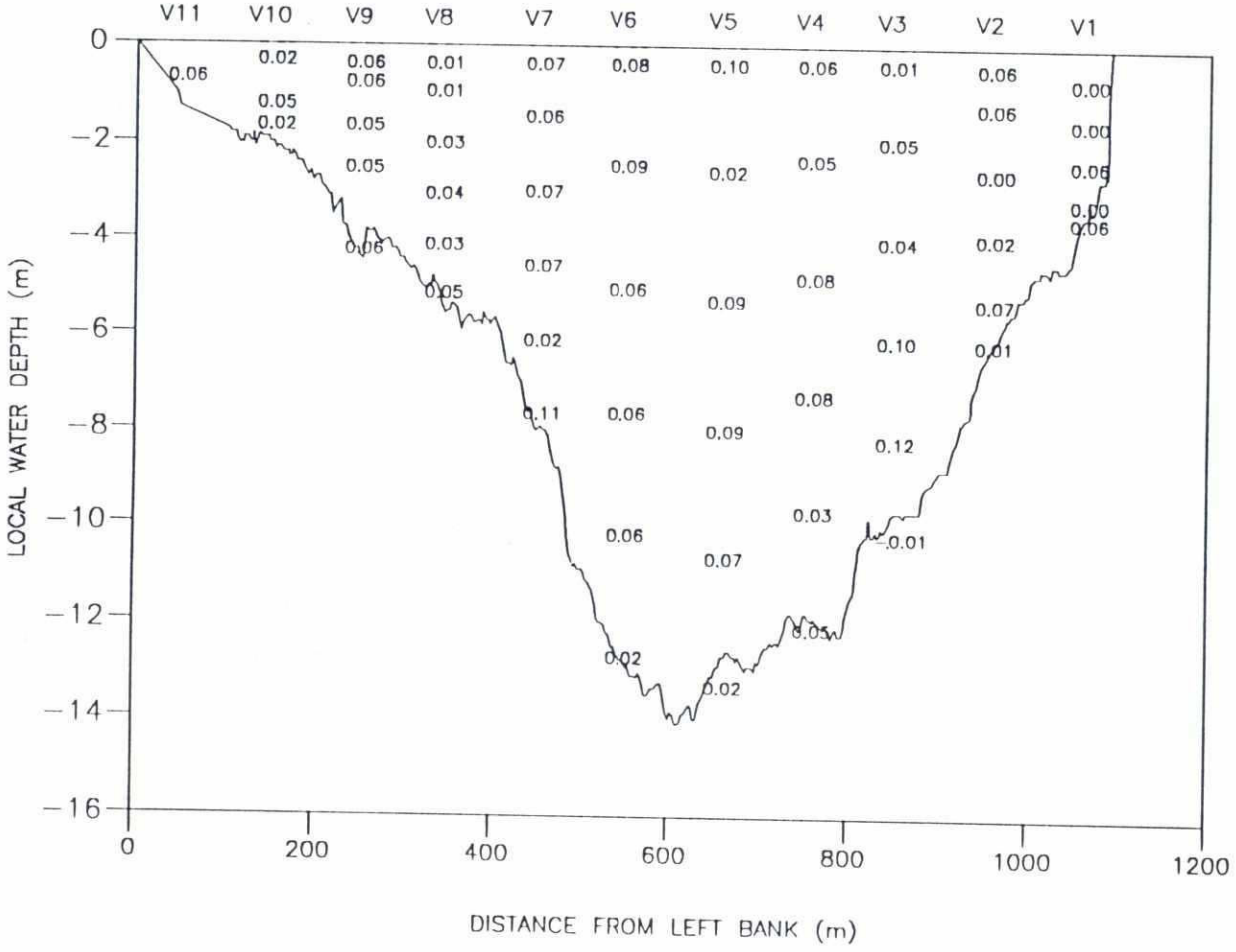
$S_{BED\ LOAD}$ 0.00 (kg/s)

SEDIMENT TRANSPORT

Sample not collected

GRAIN SIZE

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 61 : 05-06 June, 1994
		Location 4 : Ganges River, Hardinge Bridge
File : H4650T03	Date : 06 Sep 1994 Init : mk/mua	Horizontal distribution of flow and sediments Channel 1
		page 3.1



Water-level : 6.91 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 61 : 05-06 June, 1994
		Location 4 : Ganges River, Hardinge Bridge
File : H4650T03	Date : 06 Sep 1994 Init : mk/mua	Cross-sectional distribution of flow velocity Channel 1
		page 4.1

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	199406051144-1151	H4650T03*

Table 6.1: Echo-sounding

* : echo-sounding in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	199406051431-1438	400954	660668	4.20	H4650P01*
		2	199406060836-0901	401058	660667	6.80	H4660P01*
		3	199406060910-0935	401164	660664	10.4	H4660P02*
		4	199406060945-0951	401256	660668	12.3	H4660P03*
		5	199406061018-1032	401352	660672	13.5	H4660P04*
		6	199406061102-1128	401466	660675	12.9	H4660P05*
		7	199406061134-1159	401561	660676	7.80	H4660P06*
		8	199406061208-1216	401678	660681	5.30	H4660P07*
		9	199406061239-1301	401764	660677	4.40	H4660P08*
		10	199406061306-1307	401864	660670	2.20	H4660P09*
		11	199406061323-1326	401965	660669	1.40	H4660P10*

Table 6.2: Vertical profiles

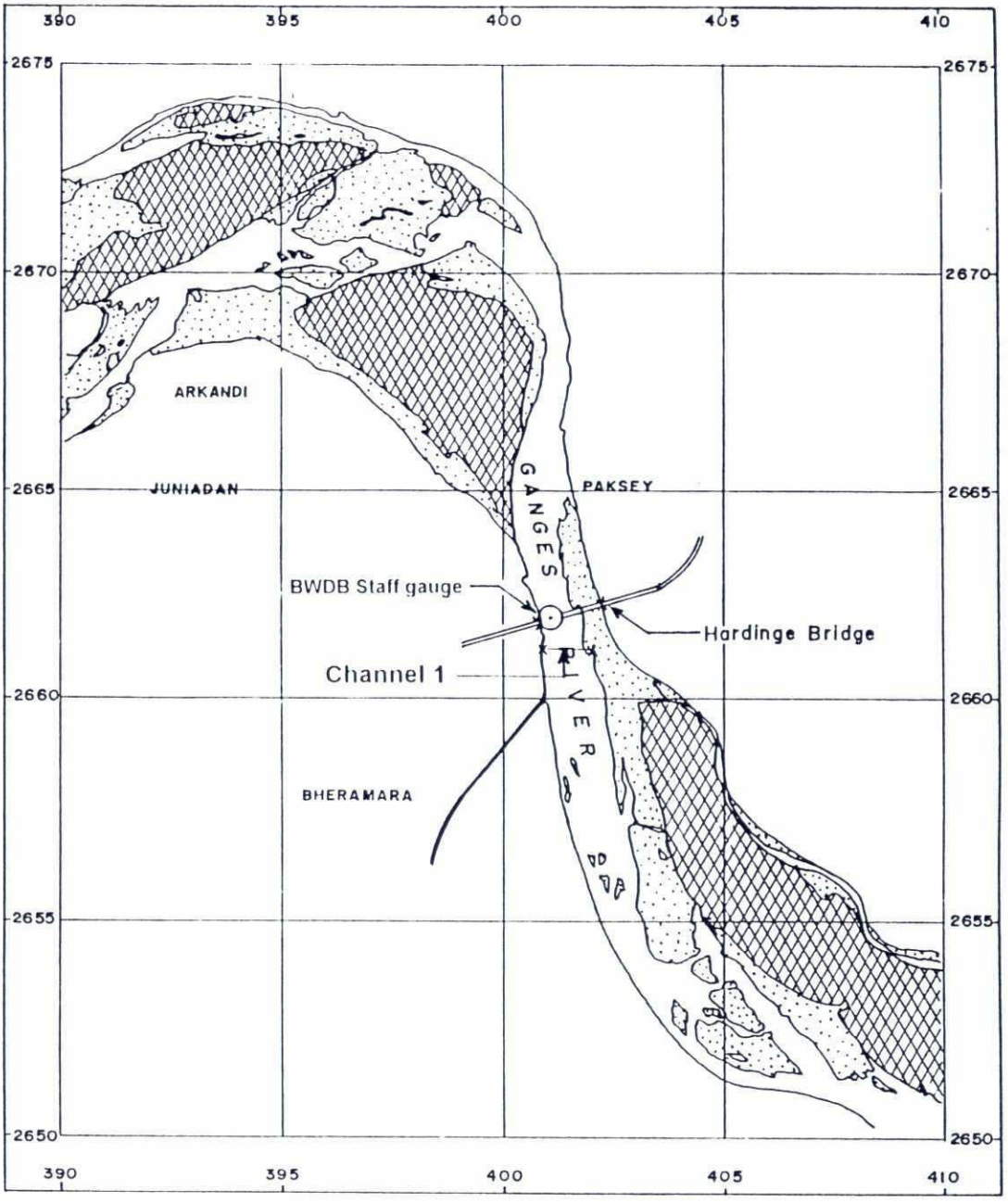
* ADCP & MEX not available

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	6	199406051431-1438	400954	660668	4.20
		2	6	199406060836-0901	401058	660667	6.80
		3	6	199406060910-0935	401164	660664	10.4
		4	6	199406060945-0951	401256	660668	12.3
		5	6	199406061018-1032	401352	660672	13.5
		6	6	199406061102-1128	401466	660675	12.9
		7	6	199406061134-1159	401561	660676	7.80
		8	6	199406061208-1216	401678	660681	5.30
		9	6	199406061239-1301	401764	660677	4.40
		10	3	199406061306-1307	401864	660670	2.20
		11	1	199406061323-1326	401965	660669	1.40

Table 6.3: Suspended sediment - point sampled

Types of Data	Channel	Format	Filename
ADCP/S4/EMF	1	QUATTRO	H4650T03 .ase
Echosounder	1	QUATTRO	H4650T03 .ech
Sediment transport	1	QUATTRO	H4650T03 .sed
Suspended sediment conc.	1	QUATTRO	H4650T03 .ssc
Transect plot data	1	QUATTRO	H4650T03 .trs

Table 7.1 PSD 24 Database file description



LEGEND:

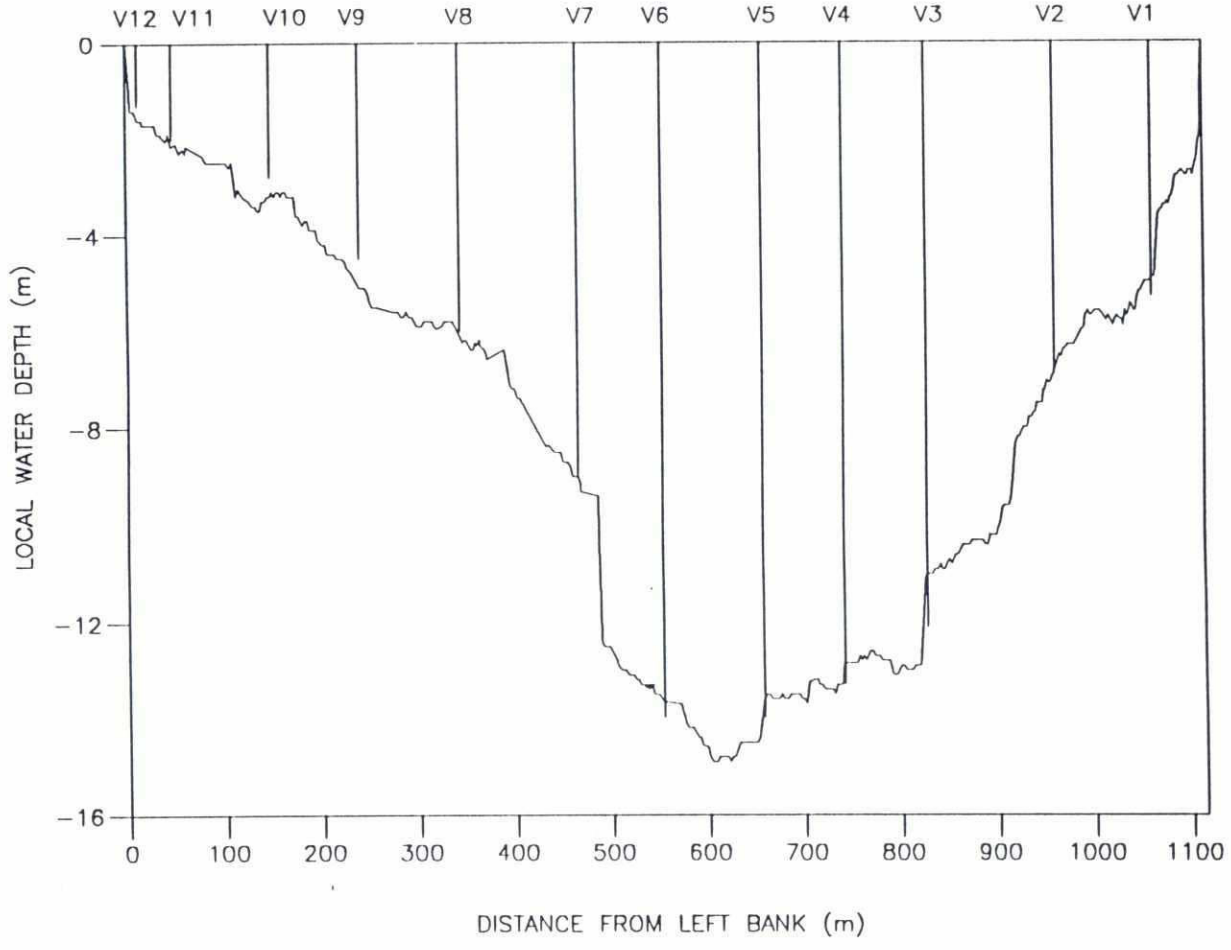
- Cross section
- Highland
- Unstable / low char
- BWDB Staff gauge

N

5000 m 2500m 0

Map is based on satellite images of March 1994

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 67 : 20 - 21 June, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
	Date : 03 Aug 1994	Location map	page 1.1
	Init : mzh		



Water level : 7.88 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 67 : 20 - 21 June, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H46K0T02	Date : 03 Aug 1994	Cross-sections and measured verticals	page
	Init : mzh	Channel 1	1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	-	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	2	-	-	-
Vertical current profile	No of verticals in channel	12	-	-	-
	ADCP	-	-	-	-
	S4 current meter	12	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	61	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	-	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

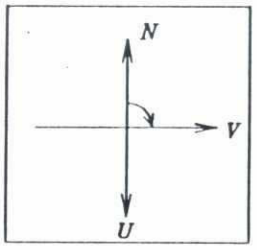
Table 2.1: Survey programme as made

	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	1114	9002	7.88	1326	-	85.33

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Hardinge Bridge	Channel 1	20 Jun 94 21 Jun 94	7.88 8.05	BWDB

Table 2.3: Water-levels

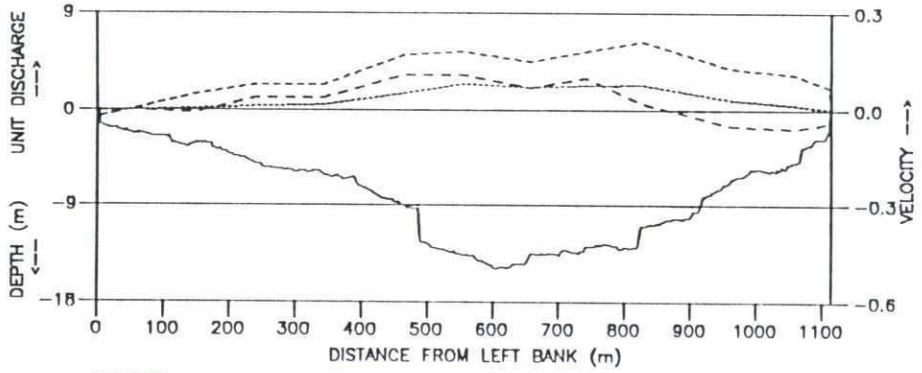


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



FLOW

LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE (m²/s.m)

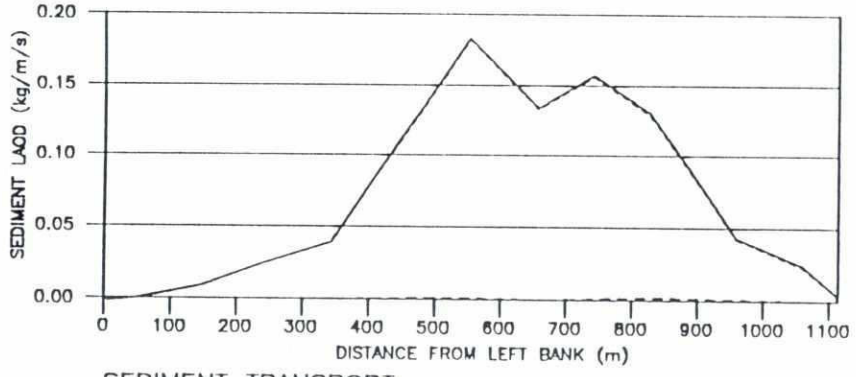
U (m/s)

V (m/s)

STAGE = 7.88 (m+PWD)

A = 9002 (m²)

Q = 1326 (m³/s)



SEDIMENT TRANSPORT

LEGEND :

S_{TOTAL} 85.33 (kg/s)

$S_{WASH\ LOAD}$ 84.68 (kg/s)

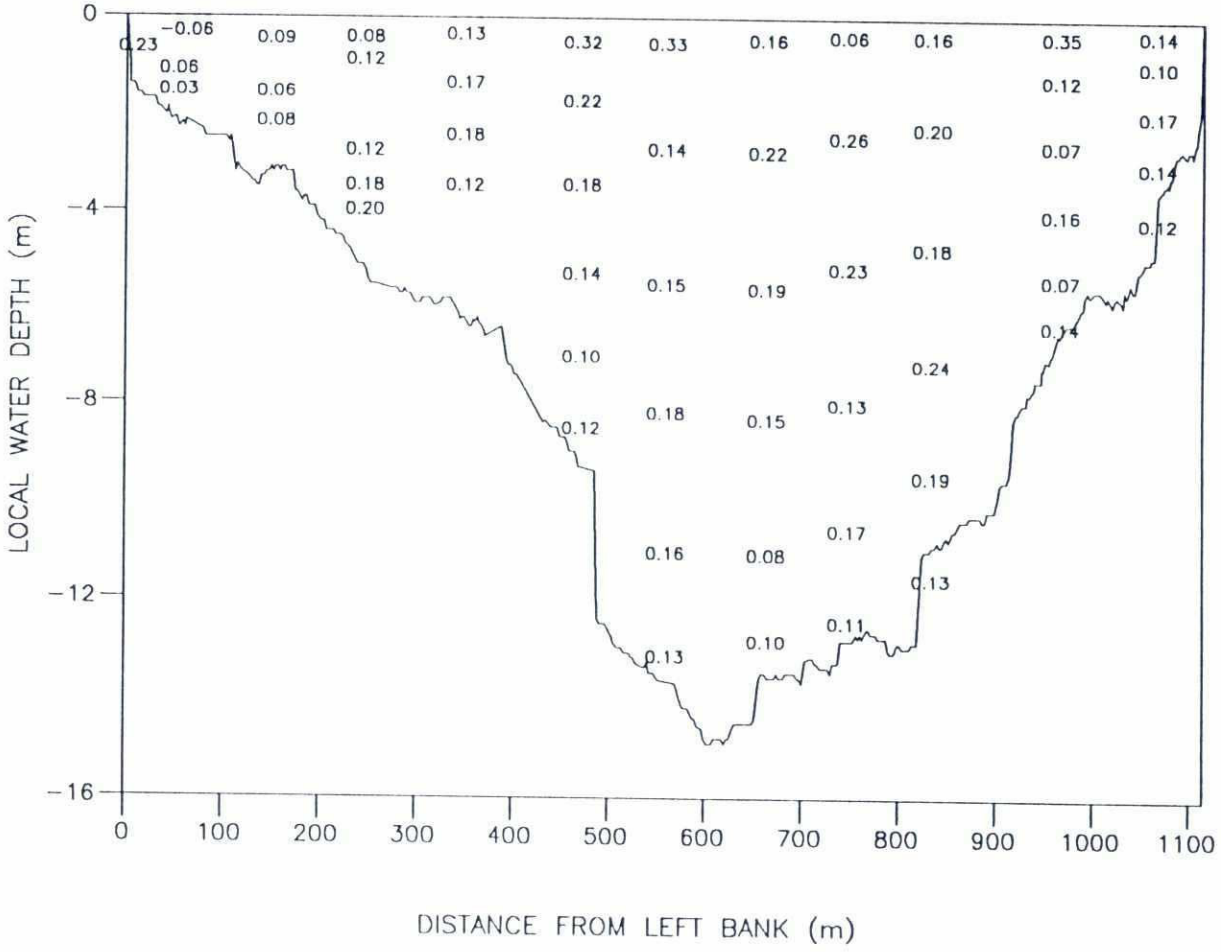
$S_{SUSP.\ BED}$ 0.66 (kg/s)

$S_{BED\ LOAD}$ – (kg/s)

Sample not collected

GRAIN SIZE

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 67 : 20 - 21 June, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H46K0T02	Date : 03 Aug 1994 Init : mzh	Horizontal distribution of flow and sediments Channel 1	page 3.1



Water level : 7.88 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 67 : 20 - 21 June, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H46K0T02	Date : 03 Aug 1994	Cross-sectional distribution of flow velocity	page 4.1
	Init : mzh	Channel 1	

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echosounding	1	9406200853-0905 9406200945-0955	H46K0T02 * H46K0T03

Table 6.1: Echosoundings

* : echosounding in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9406201112-1137	400966	660673	5.30	H46K0P01 *
		2	9406201146-1209	401055	660659	6.90	H46K0P02 *
		3	9406201222-1248	401188	660662	12.10	H46K0P03 *
		4	9406210851-0917	401265	660674	13.30	H46L0P01 *
		5	9406210926-0950	401358	660661	14.00	H46L0P02 *
		6	9406210959-1022	401456	660674	14.00	H46L0P03 *
		7	9406211032-1054	401547	660680	9.00	H46L0P04 *
		8	9406211104-1127	401672	660681	6.00	H46L0P05 *
		9	9406211134-1156	401776	660670	4.50	H46L0P06 *
		10	9406211204-1213	401868	660666	2.80	H46L0P07 *
		11	9406211219-1229	401972	660673	2.00	H46L0P08 *
		12	9406211235-1240	402074	660679	1.30	H46L0P09 *

Table 6.2: Vertical profiles

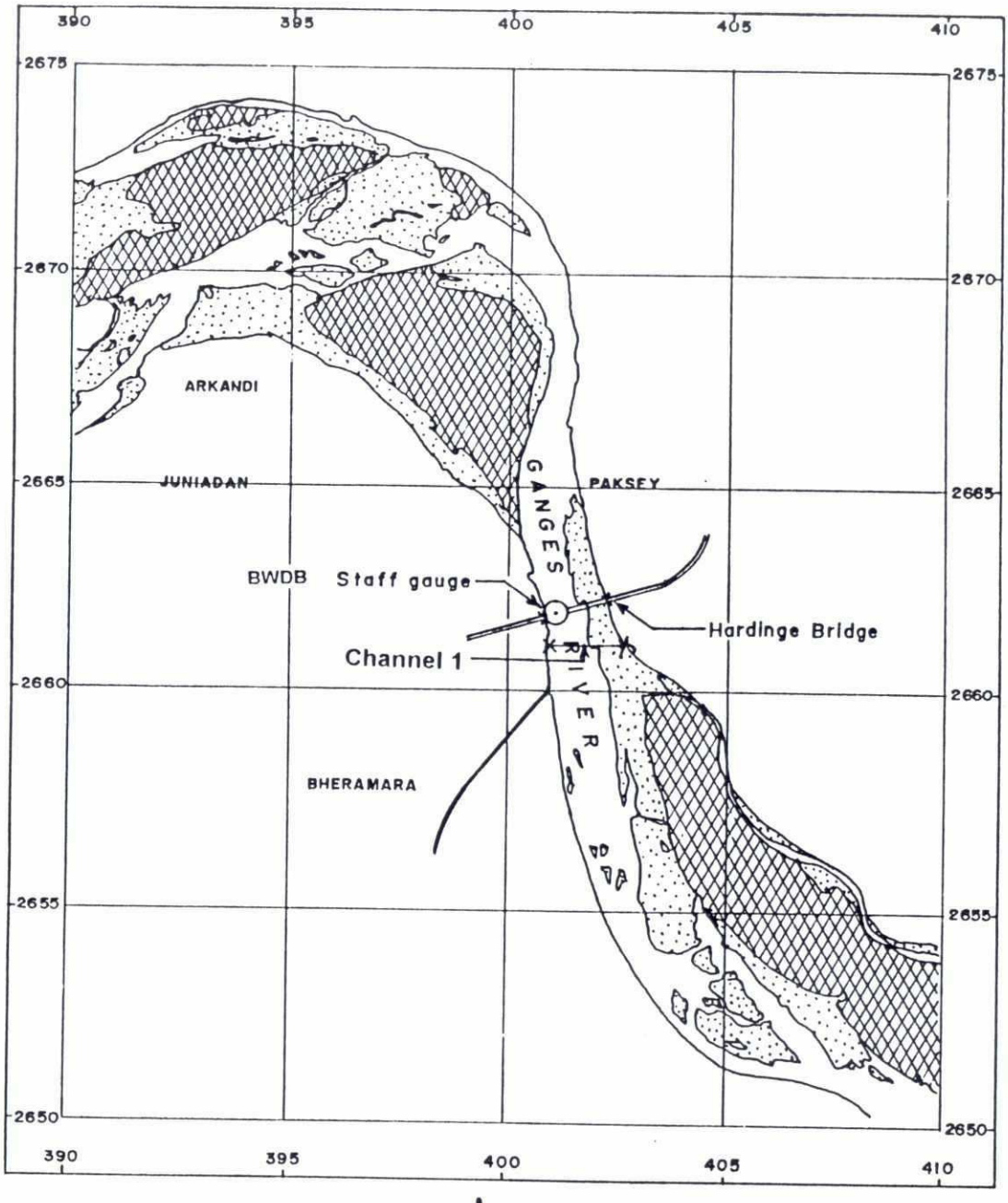
* ADCP & MEX not availabl

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	6	9406201112-1137	400966	660673	5.30
		2	6	9406201146-1209	401055	660659	6.90
		3	6	9406201222-1248	401188	660662	12.10
		4	6	9406210851-0917	401265	660674	13.30
		5	6	9406210926-0950	401358	660661	14.00
		6	6	9406210959-1022	401456	660674	14.00
		7	6	9406211032-1054	401547	660680	9.00
		8	6	9406211104-1127	401672	660681	6.00
		9	6	9406211134-1156	401776	660670	4.50
		10	3	9406211204-1213	401868	660666	2.80
		11	3	9406211219-1229	401972	660673	2.00
		12	1	9406211235-1240	402074	660679	1.30

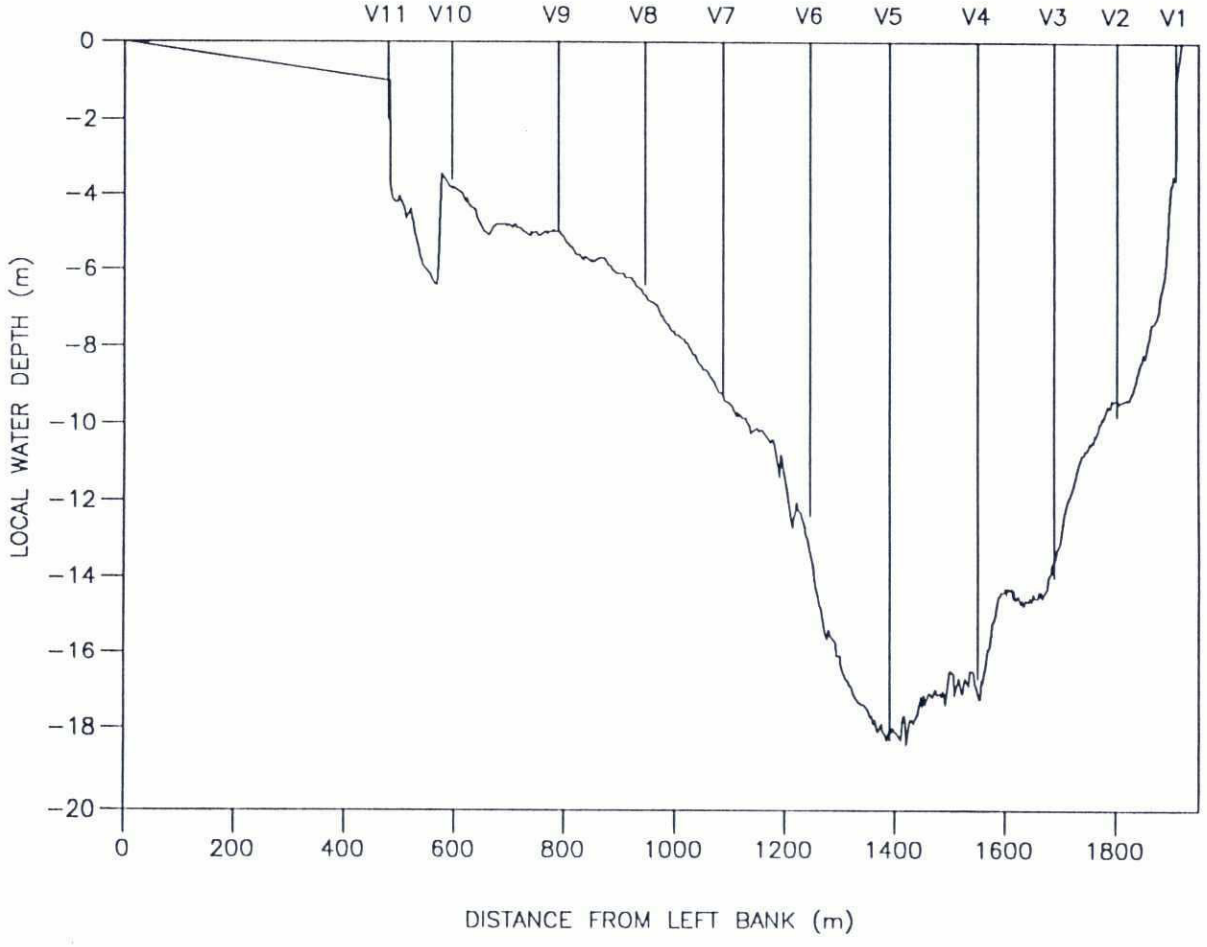
Table 6.3: Suspended sediment - point sampled

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H46K0T02 .ase
Echosounder data	1	QUATTRO	H46K0T02 .ech
Sediment transport data	1	QUATTRO	H46K0T02 .sed
Bed load sediment analysis	1	QUATTRO	H46K0T02 .bdl
Susp. sed. conc. analysis	1	QUATTRO	H46K0T02 .ssc
Transect plot data	1	QUATTRO	H46K0T02 .trs

Table 7.1 PSD 24 Database file description



FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 79 : 14 - 15 July, 1994	
	Location 4 : Ganges River, Hardinge Bridge	
	Date : 10 Oct 1994 Init : mk	Location map
		page 1.1



Water level : 11.77 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 79 : 14 - 15 July, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H47E3T05	Date : 10 Oct 1994	Cross-sections and measured verticals	page
	Init : mk	Channel 1	1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	2	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	-	-	-	-
Vertical current profile	No.of verticals in channel	10	-	-	-
	ADCP	10	-	-	-
	S4 current meter	1	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	6	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	11	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	16	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

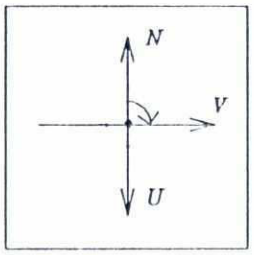
Table 2.1: Survey programme as made

Channel	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	1936	14767	11.77	14411	7	18196

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Hardinge Bridge	Channel 1	14 Jul 94 15 Jul 94	11.77 11.67	BWDB

Table 2.3: Water-levels

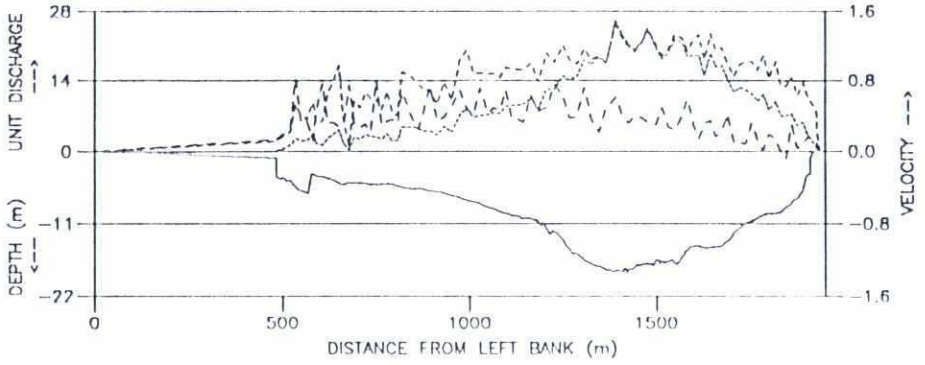


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



FLOW

LEGEND :

—— *WATER DEPTH (m below STAGE)*

····· *UNIT DISCHARGE (m²/s.m)*

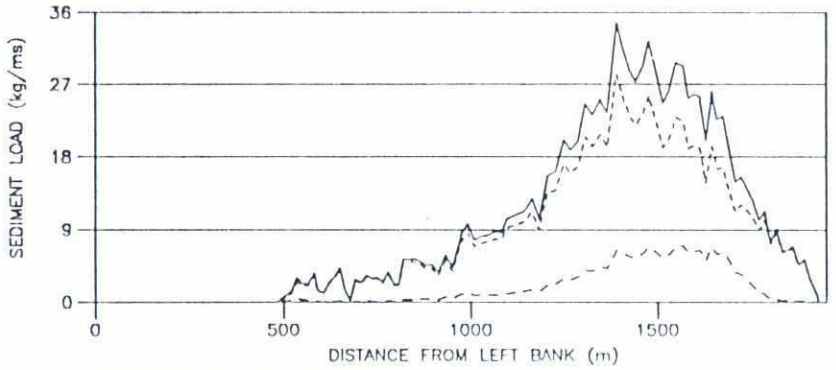
---- *U – (m/s)*

- - - *V – (m/s)*

STAGE = 11.77 (m+PWD)

A = 14767 (m²)

Q = 14411 (m³/s)



SEDIMENT TRANSPORT

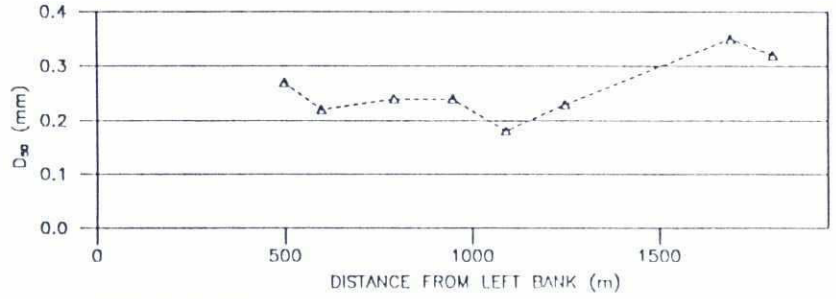
LEGEND :

—— S_{TOTAL} 18203 (kg/s)

----- $S_{WASH\ LOAD}$ 14998 (kg/s)

- - - - $S_{SUSP.\ BED}$ 3198 (kg/s)

····· $S_{BED\ LOAD}$ 7 (kg/s)



GRAIN SIZE

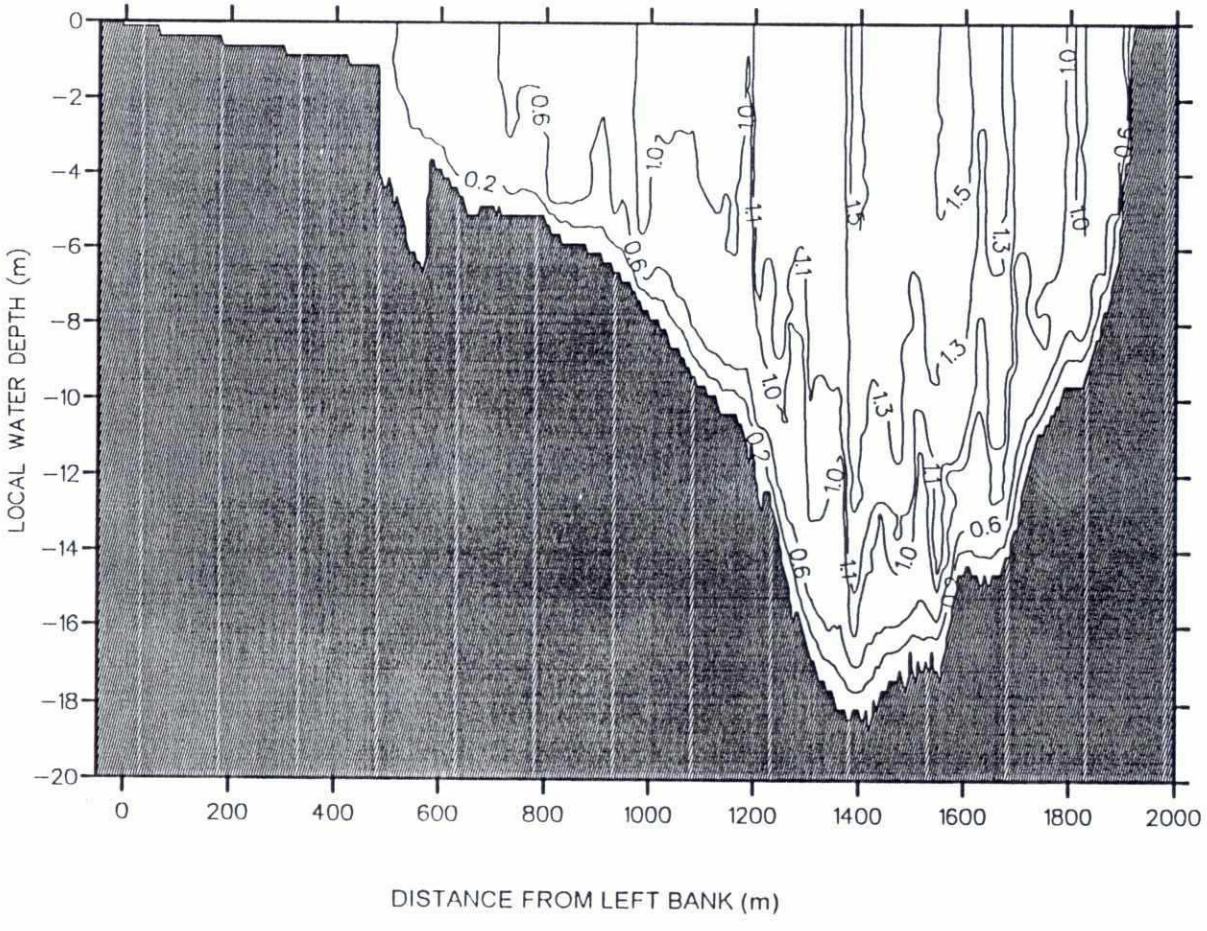
LEGEND :

◇◇◇◇◇ $D_{60\ SUSP.}$ (mm)

△△△△△ $D_{60\ BED\ LOAD}$ (mm)

□□□□□ $D_{60\ BED\ MAT.}$ (mm)

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 79 : 14 - 15 July, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H47E3T05	Date : 10 Oct 1994 Init : mk	Horizontal distribution of flow and sediments Channel 1	page 3.1



Iso-velocity contours (m/s)
Water level : 11.77 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 79 : 14 - 15 July, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H47E3T05	Date : 10 Oct 1994	Cross-sectional distribution of flow velocity	page 4.1
	Init : mk	Channel 1	

X8

Andreasen settling tube

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth	Weight percent < 0.06 mm > 0.06 mm	D10 (mm)	D50 (mm)	D90 (mm)
Sample not collected							

Table 5.1: Grain size of near bed suspended sediment (0.3 m above river bed)

US BM-54 bed samples

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth	Weight percent < 0.06 mm > 0.06 mm	D10 (mm)	D50 (mm)	D90 (mm)
Sample not collected							

Table 5.2 : Grain size of bed material

Helley-Smith

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm	> 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
1	2	9407141427-1429	9.80	2.643	97.360	0.256	0.301	0.355
	2	9407141427-1429	9.80	0.133	99.870	0.308	0.347	0.391
	3	9407141407-1418	14.0	0.217	99.780	0.311	0.349	0.391
	3	9407141407-1418	14.0	0.123	99.880	0.312	0.350	0.393
	6	9407141453-1455	12.4	0.767	99.230	0.288	0.328	0.373
	6	9407141453-1455	12.4	15.19	84.810	0.102	0.141	0.184
	7	9407141516-1520	9.30	4.962	95.040	0.208	0.271	0.328
	7	9407141516-1520	9.30	24.35	75.650	0.074	0.093	0.117
	8	9407141542-1558	6.40	11.15	88.850	0.147	0.215	0.290
	8	9407141542-1558	6.40	5.554	94.450	0.198	0.262	0.322
	9	9407141609-1618	5.00	5.946	94.050	0.184	0.237	0.301
	9	9407141609-1618	5.00	7.074	92.930	0.184	0.240	0.304
	10	9407141629-1633	3.60	25.58	74.420	0.128	0.188	0.268
	10	9407141629-1633	3.60	6.499	93.500	0.187	0.246	0.309
	11	9407141650-1702	2.00	1.284	98.720	0.211	0.265	0.321
	11	9407141650-1702	2.00	1.577	98.420	0.219	0.274	0.329

Table 5.3 : Grain sizes of bed load

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
ADCP & EMF transect	1	9407141027-1039 9407141051-1104	H47E3T05 * H47E3T07

Table 6.1: ADCP & EMF transects

* : transect in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	2	9407141427-1429	401007	660670	9.80	H47E3P06 *
		3	9407141407-1418	401120	660667	14.0	H47E3P05 *
		4	9407141353-1358	401259	660660	16.7	H47E3P03 *
		5	9407141206-1302	401418	660674	18.3	H47E2P01 **
		5	9407141239-1259	401414	660668	18.0	H47E3P01 *
		6	9407141453-1455	401562	660662	12.4	H47E3P10 *
		7	9407141516-1520	401721	660666	9.30	H47E3P11 *
		8	9407141542-1558	401863	660666	6.40	H47E3P12 *
		9	9407141609-1618	402020	660664	5.00	H47E3P13 *
		10	9407141629-1633	402214	660662	3.60	H47E3P14 *
		11	9407141650-1702	402312	660661	2.00	H47E3P17 *

Table 6.2: Vertical profiles

** ADCP and MEX not available

* S4 and MEX not available

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	5	6	9407141206-1302	401418	660674	18.3

Table 6.3: Suspended sediment - point sampled

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	1	9407141413-1440	400900	660669	3.00
		2	1	9407141427-1429	401007	660670	9.80
		3	1	9407141407-1418	401120	660667	14.0
		4	1	9407141353-1358	401259	660660	16.7
		5	1	9407141206-1302	401418	660674	18.3
		6	1	9407141453-1455	401562	660662	12.4
		7	1	9407141516-1520	401721	660666	9.30
		8	1	9407141542-1558	401863	660666	6.40
		9	1	9407141609-1618	402020	660664	5.00
		10	1	9407141629-1633	402214	660662	3.60
		11	1	9407141650-1702	402312	660661	2.00

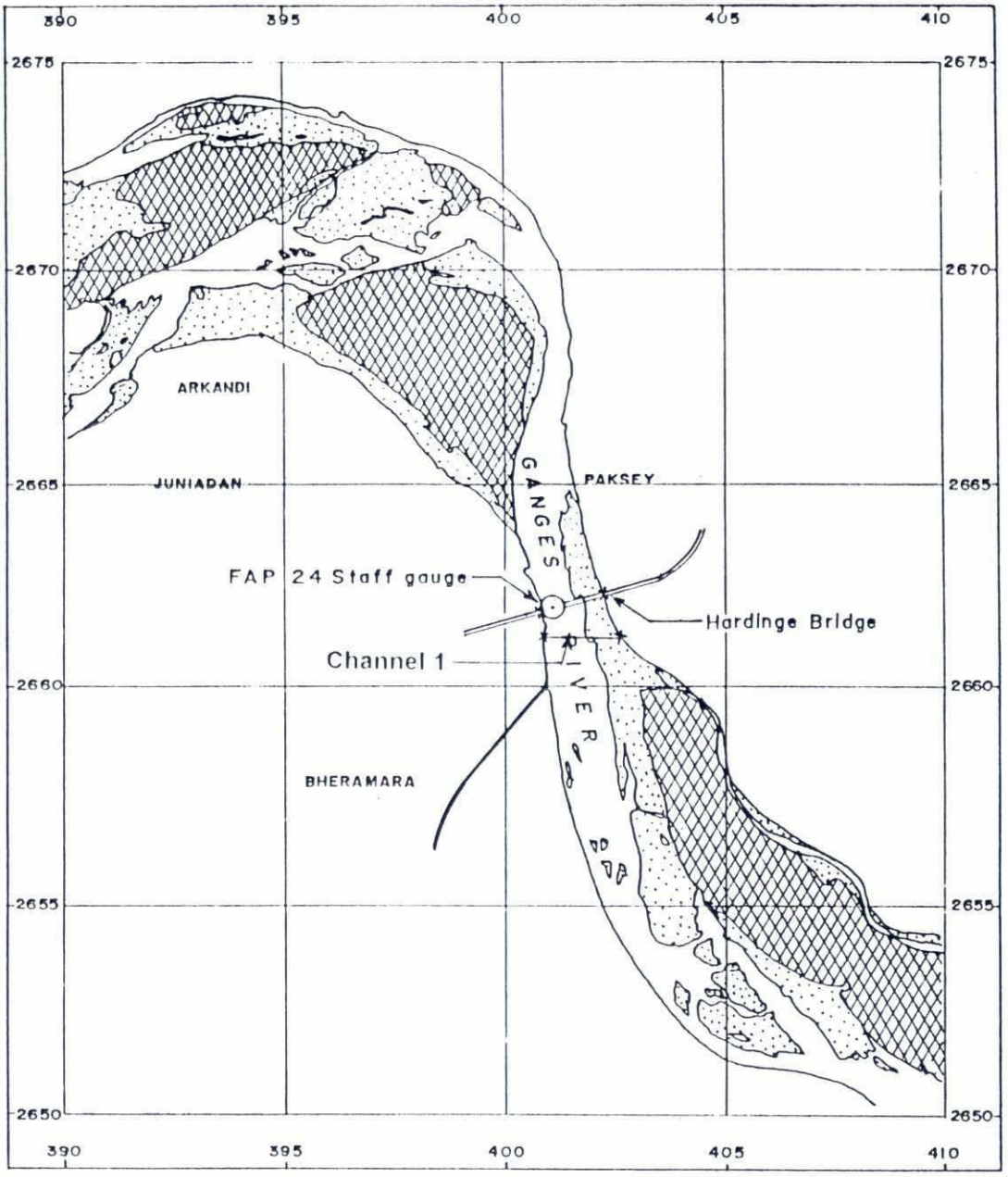
Table 6.4: Suspended sediment - depth integrated

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Helley-Smith Sample	1	2	9407141427-1429	401007	660670	9.8	A707
		2	9407141427-1429	401007	660670	9.8	A1595
		3	9407141407-1418	401120	660667	14.0	A1380
		3	9407141407-1418	401120	660667	14.0	A111
		6	9407141453-1455	401562	660662	12.4	A1810
		6	9407141453-1455	401562	660662	12.4	A1892
		7	9407141516-1520	401721	660666	9.30	A1885
		7	9407141516-1520	401721	660666	9.30	A1813
		8	9407141542-1558	401863	660666	6.40	A1848
		8	9407141542-1558	401863	660666	6.40	A1883
		9	9407141609-1618	402020	660664	5.00	A1889
		9	9407141609-1618	402020	660664	5.00	A1803
		10	9407141629-1633	402214	660662	3.60	A1806
		10	9407141629-1633	402214	660662	3.60	A1897
		11	9407141650-1702	402312	660661	2.00	A1886
		11	9407141650-1702	402312	660661	2.00	A1818

Table 6.5: Bed load

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H47E3T05 .ase
Echosounder data	1	QUATTRO	H47E3T05 .ech
Sediment transport data	1	QUATTRO	H47E3T05 .sed
Sus. sed. conc. analysis	1	QUATTRO	H47E3T05 .ssc
Bead load sediment analysis	1	QUATTRO	H47E3T05 .bdl
Transect plot data	1	QUATTRO	H47E3T05 .trs
Iso-velocity plot data	1	MIKE 21	H47E3T05 .ct2 H47E3T05 .dt2

Table 7.1 PSD 24 Database file description



LEGEND:

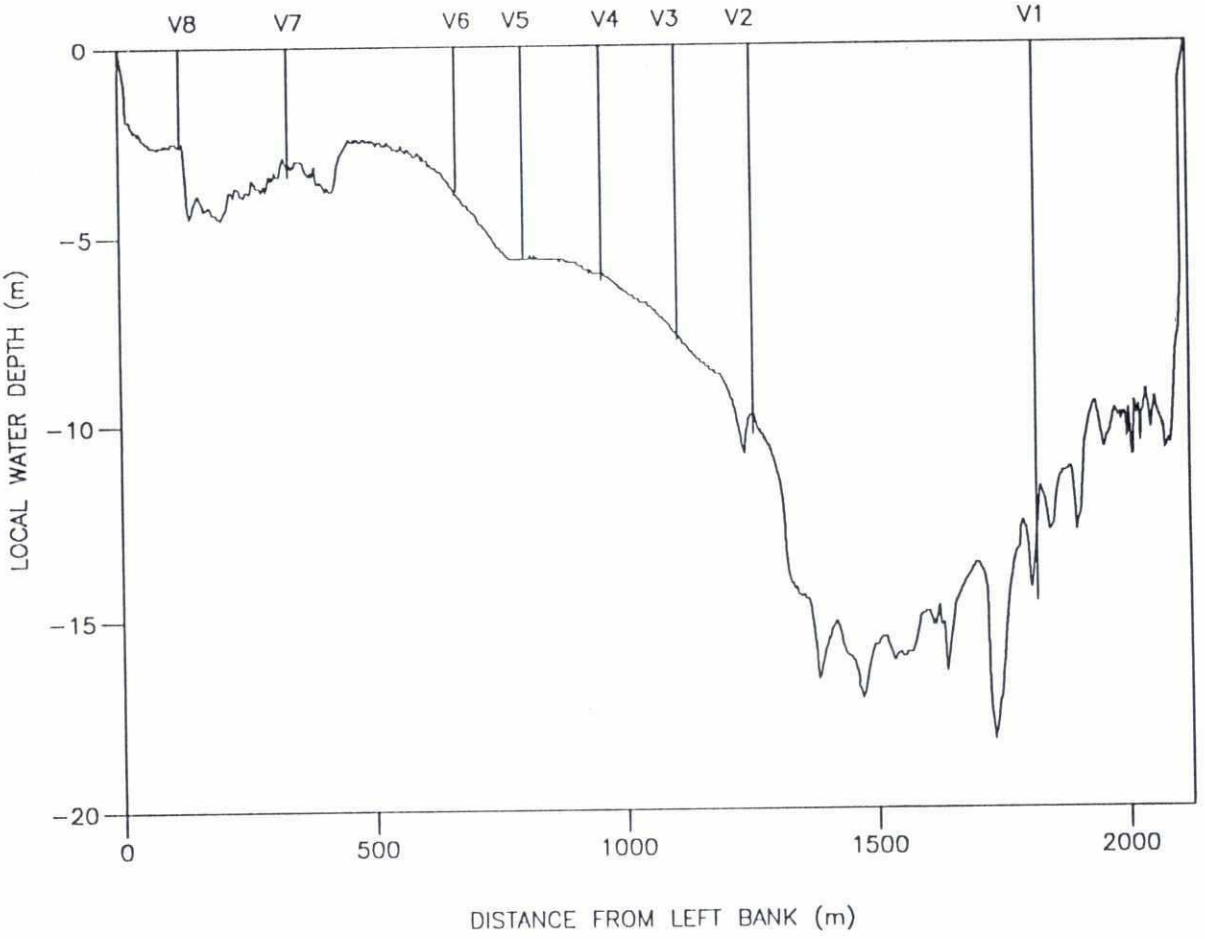
- Cross section
- Highland
- Unstable / low char
- FAP 24 Staff gauge

N

5000 m 2500m 0

Map is based on satellite images of March 1994

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 87 : 01 August, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
	Date : 25 Oct 1994	Location map	page 1.1
	Init : sjr		



Water level : 12.84 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 87 : 01 August , 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4813T02	Date : 25 Oct 1994 Init : sjr	Cross-sections and measured verticals Channel 1	page 1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	6	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	-	-	-	-
Vertical current profile	No.of verticals in channel	8	-	-	-
	ADCP	8	-	-	-
	S4 current meter	-	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	-	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	11	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	13	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

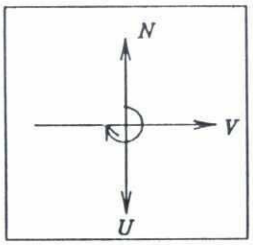
Table 2.1: Survey programme as made

	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	2125	18281	12.84	34667	119	138726

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Hardinge Bridge	Channel 1	01 Aug 94	12.84	FAP 24

Table 2.3: Water-levels

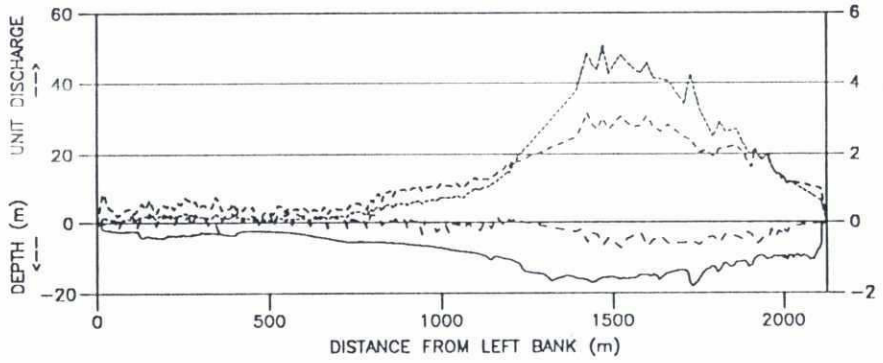


TRANSECT AZIMUTH = 270°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



FLOW

LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE (m²/s.m)

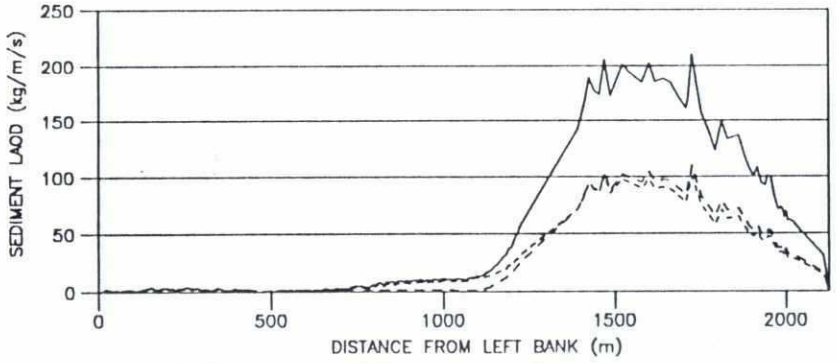
U (m/s)

V (m/s)

STAGE = 12.84 (m+PWD)

A = 18281 (m²)

Q = 34667 (m³/s)



SEDIMENT TRANSPORT

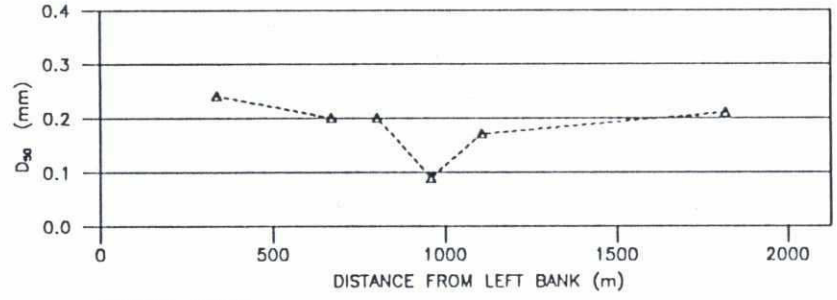
LEGEND :

S_{TOTAL} 138846 (kg/s)

$S_{WASH\ LOAD}$ 69849 (kg/s)

$S_{SUSP.\ BED}$ 68877 (kg/s)

$S_{BED\ LOAD}$ 119 (kg/s)



GRAIN SIZE

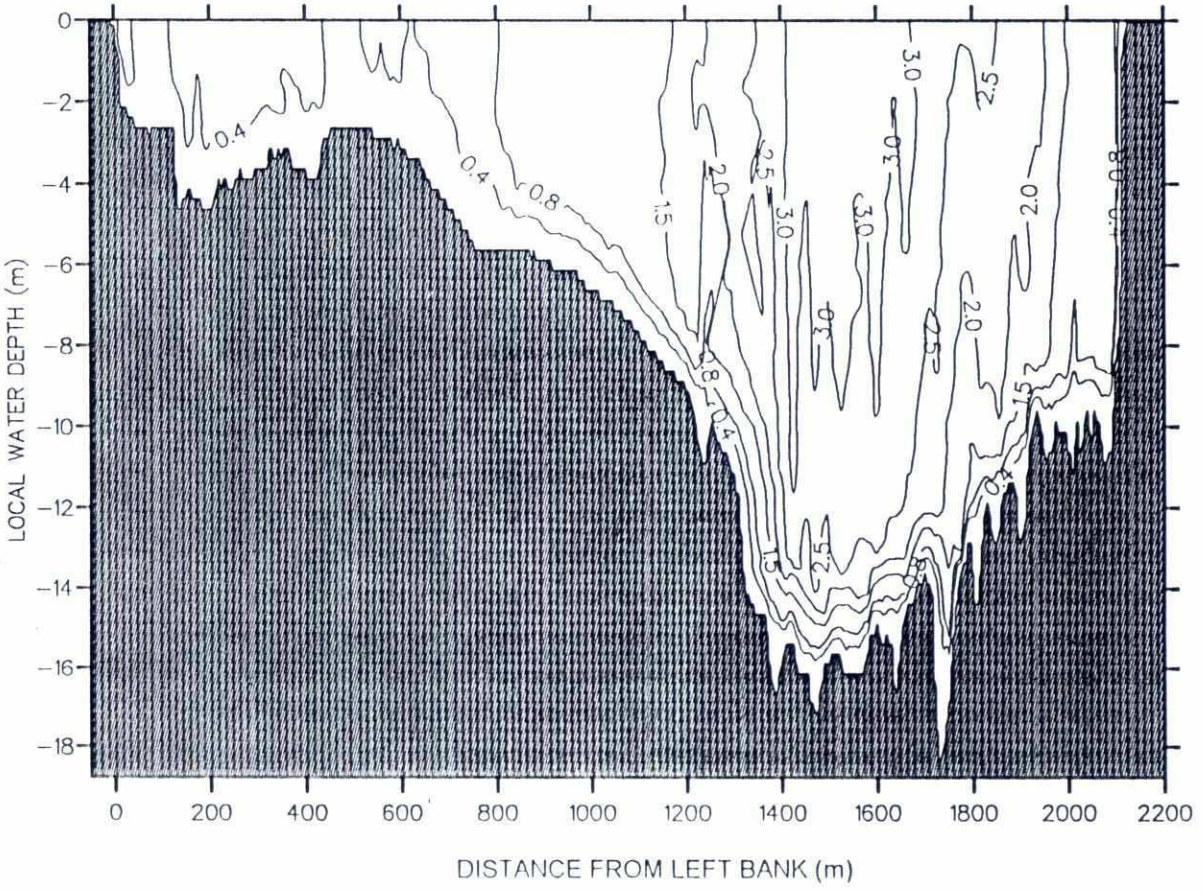
LEGEND :

◇◇◇◇◇ $D_{50\ SUSP.}$ (mm)

△△△△△ $D_{50\ BED\ LOAD}$ (mm)

□□□□□ $D_{50\ BED\ MAT.}$ (mm)

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 87 : 01 August , 1994	
	Location 4 : Ganges River, Hardinge Bridge	
File : H4813T02	Date : 25 Oct 1994 Init : sjr	Horizontal distribution of flow and sediments Channel 1
		page 3.1



Iso-velocity contours (m/s)
Water level : 12.84 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 87 : 01 August , 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4813T02	Date : 25 Oct 1994 Init : sjr	Cross-sectional distribution of flow velocity Channel 1	page 4.1

Andreasen settling tube

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.1: Grain size of near bed suspended sediment (0.3 m above river bed)

US BM-54 bed samples

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.2 : Grain size of bed material

Helley-Smith

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm	> 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
1	1	9408011740-1759	14.60	1.610	98.390	0.162	0.188	0.217
	3	9408011640-1652	7.80	9.959	90.041	0.093	0.118	0.159
	4	9408011605-1620	6.20	28.834	71.166	0.068	0.083	0.101
	5	9408011520-1535	5.60	3.987	96.013	0.251	0.299	0.356
	6	9408011445-1459	3.80	12.931	87.069	0.144	0.189	0.249
	7	9408011242-1254	3.40	8.445	91.555	0.195	0.256	0.317
	8	9408011130-1145	2.60	-	100.00	-	-	-
	1	9408011740-1759	14.60	0.900	99.1	0.193	0.242	0.306
	3	9408011640-1652	7.80	9.642	90.358	0.162	0.214	0.28
	4	9408011605-1620	6.20	21.636	78.364	0.073	0.086	0.102
	5	9408011520-1535	5.60	20.280	79.72	0.079	0.1	0.128
	6	9408011445-1459	3.80	27.043	72.957	0.13	0.202	0.285
	7	9408011242-1254	3.40	1.751	98.249	0.182	0.217	0.265

Table 5.3 : Grain sizes of bed load

68

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
ADCP & EMF transect	1	9408010745-0804	H4813T01
		9408010810-0835	H4813T02 *
		9408010846-0903	H4813T03
		9408010948-1008	H4813T04
		9408011015-1032	H4813T05
		9408011845-1850	H4813T10

Table 6.1: ADCP & EMF transects

* : transect in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9408011740-1759	401104	660627	14.60	H4813P09 *
		2	9408011655-1711	401665	660689	10.30	H4813P08 *
		3	9408011640-1652	401815	660691	7.80	H4813P07 *
		4	9408011605-1620	401964	660681	6.20	H4813P06 *
		5	9408011520-1535	402120	660690	5.60	H4813P05 *
		6	9408011445-1459	402252	660668	3.80	H4813P03 *
		7	9408011242-1254	402586	660656	3.40	H4813P02 *
		8	9408011130-1145	402800	660680	2.60	H4813P01 *

Table 6.2: Vertical profiles

* S4 & MEX not available

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Sample not collected							

Table 6.3: Suspended sediment - point sampled

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments	1	1	1	9408011740-1759	401104	660627	14.60
		2	1	9408011655-1711	401665	660689	10.30
		3	2	9408011640-1652	401815	660691	7.80
		4	2	9408011605-1620	401964	660681	6.20
		5	2	9408011520-1535	402120	660690	5.60
		6	1	9408011445-1459	402252	660668	3.80
		7	1	9408011242-1254	402586	660656	3.40
		8	1	9408011130-1145	402800	660680	2.60

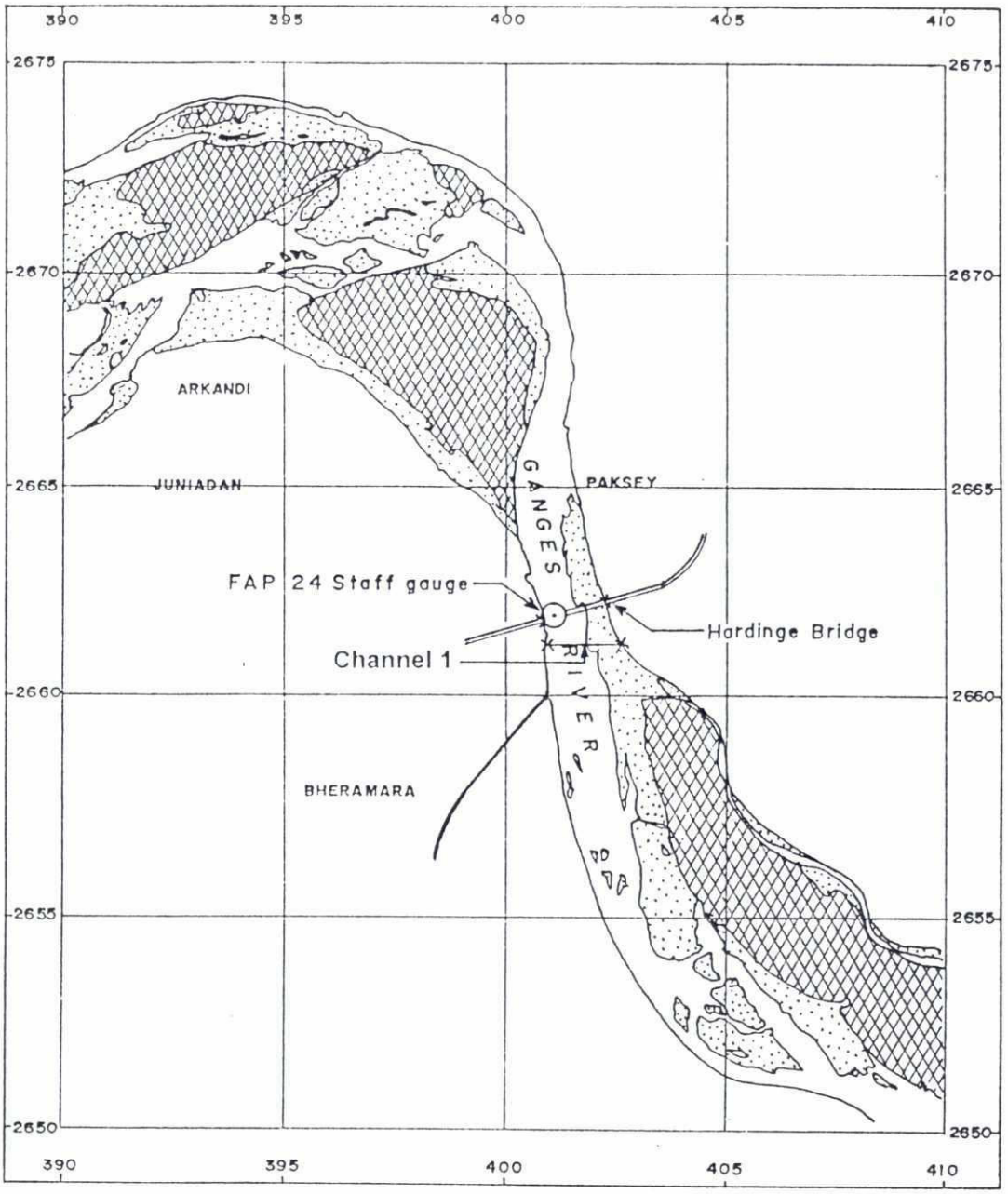
Table 6.4: Suspended sediment - depth integrated

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Helley-Smith Sample	1	1	9408011740-1759	401104	660627	14.60	A1843
		3	9408011640-1652	401815	660691	7.80	A1948
		4	9408011605-1620	401964	660681	6.20	A2144
		5	9408011520-1535	402120	660690	5.60	A717
		6	9408011445-1459	402252	660668	3.80	A1853
		7	9408011242-1254	402586	660656	3.40	A1819
		8	9408011130-1145	402800	660680	2.60	A2138
		1	9408011740-1759	401104	660627	14.60	A2158
		3	9408011640-1652	401815	660691	7.80	A2176
		4	9408011605-1620	401964	660681	6.20	A2031
		5	9408011520-1535	402120	660690	5.60	A1814
		6	9408011445-1459	402252	660668	3.80	A1831
		7	9408011242-1254	402586	660656	3.40	A1861

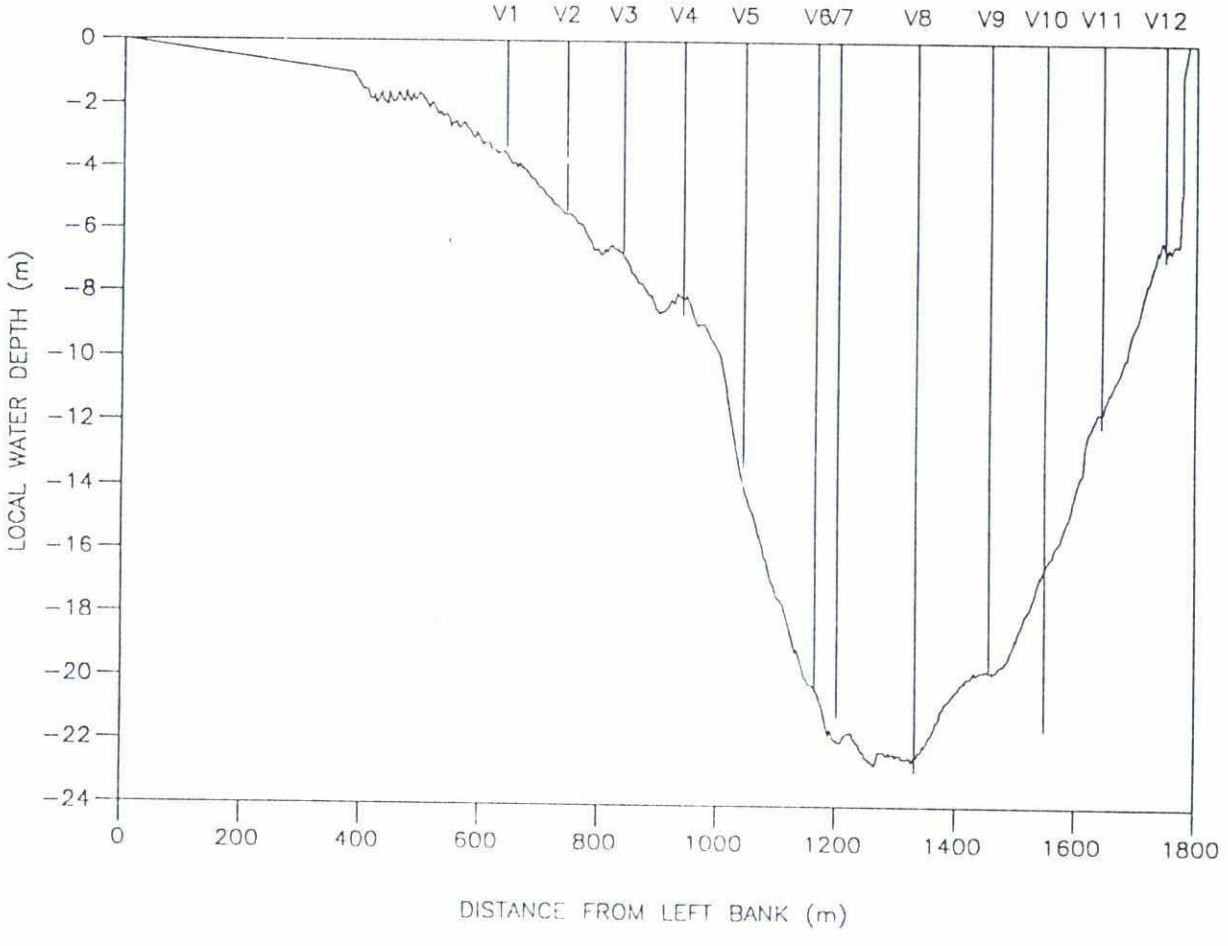
Table 6.5: Bed load

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H4813T02 .ase
Echosounder data	1	QUATTRO	H4813T02 .ech
Sediment transport data	1	QUATTRO	H4813T02 .sed
Bed load sediment analysis	1	QUATTRO	H4813T02 .bdl
Susp. sed. conc. analysis	1	QUATTRO	H4813T02 .ssc
Transect plot data	1	QUATTRO	H4813T02 .trs
Iso-velocity plot data	1	MIKE 21 MIKE 21	H4813T02 .ct2 H4813T02 .dt2

Table 7.1 PSD 24 Database file description



FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 104 : 11 - 12 October, 1994
		Location 4 : Ganges River, Hardinge Bridge
	Date : 18 Jan 1995	Location map
	Init : mk/tr	page 1.1



Water-level : 10.98 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 104 : 11 - 12 October, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4AB3T03	Date : 18 Jan, 1995	Cross-sections and measured verticals	page
	Init : mk/tr	Channel 1	1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	8	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	-	-	-	-
Vertical current profile	No.of verticals in channel	12	-	-	-
	ADCP	12	-	-	-
	S4 current meter	-	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	6	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	12	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	12	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

Table 2.1: Survey programme as made

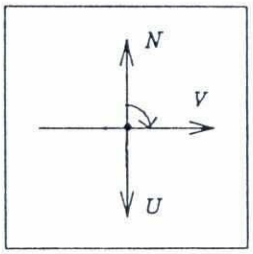
Channel	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	1786	16291	10.98	11786	2	6204

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m + PWD)	Gauge
Hardinge Bridge	Channel 1	11 Oct 94 12 Oct 94	10.98 10.64	FAP 24

Table 2.3 : Water-levels

2D

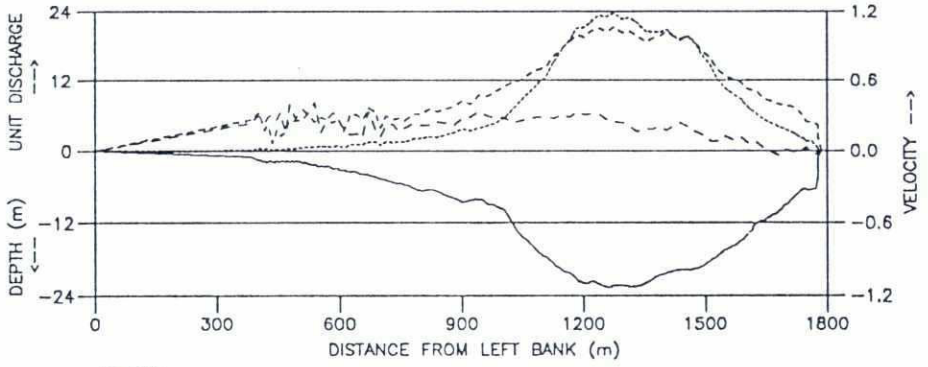


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



FLOW

LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE (m^2/s.m)

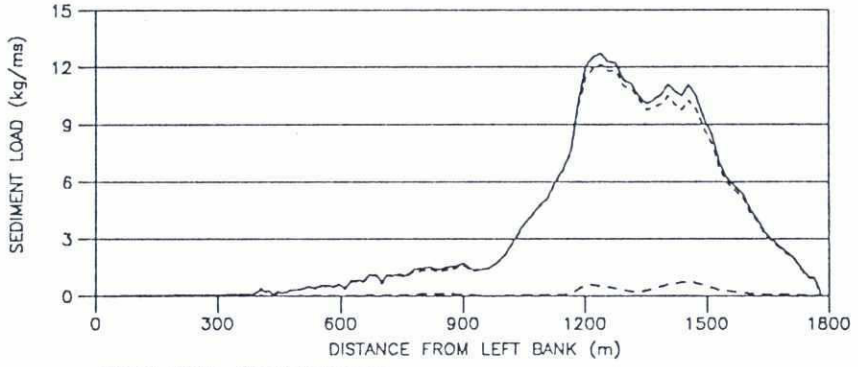
U – (m/s)

V – (m/s)

STAGE = 10.98 (m+PWD)

A = 16291 (m^2)

Q = 11786 (m^3/s)



SEDIMENT TRANSPORT

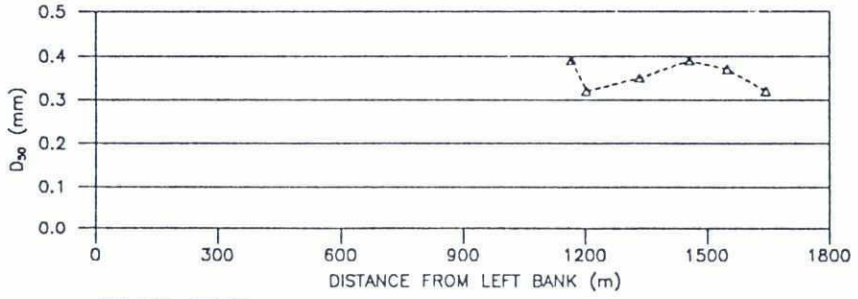
LEGEND :

S_{TOTAL} 6206 (kg/s)

$S_{WASH\ LOAD}$ 5939 (kg/s)

$S_{SUSP.\ BED}$ 265 (kg/s)

$S_{BED\ LOAD}$ 2 (kg/s)



GRAIN SIZE

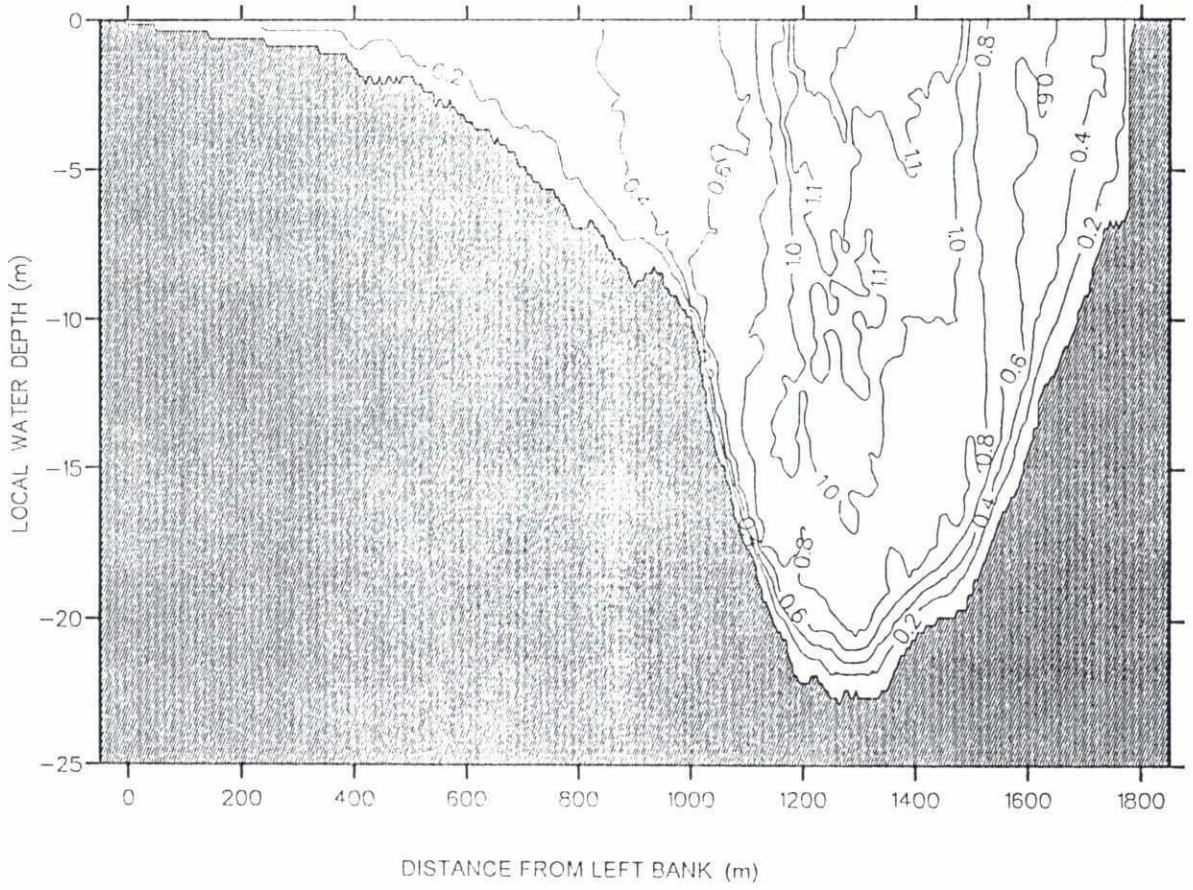
LEGEND :

$D_{50\ SUSP.}$ (mm)

$D_{50\ BED\ LOAD}$ (mm)

$D_{50\ BED\ MAT.}$ (mm)

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 104 : 11-12 October, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4AB3T03	Date : 18 Jan, 1995 Init : mk / tr	Horizontal distribution of flow and sediments Channel 1	page 3.1



Iso-velocity contours (m/s)
Water-level : 10.98 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 104 : 11 - 12 October, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4AB3T03	Date : 18 Jan, 1995	Cross-sectional distribution of flow velocity	page 4.1
	Init : mk/tr	Channel 1	

Andreasen settling tube

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth	Weight percent < 0.06 mm	Weight percent > 0.06 mm	D10 (mm)	D50 (mm)	D90 (mm)
Sample not collected								

Table 5.1: Grain size of near bed suspended sediment (0.3 m above river bed)

US BM-54 bed samples

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth	Weight percent < 0.06 mm	Weight percent > 0.06 mm	D10 (mm)	D50 (mm)	D90 (mm)
Sample not collected								

Table 5.2 : Grain size of bed material

Helley-Smith

Channel	Vertical	Time (YYMMDDHHMM)	Depth (m)	Weight percent < 0.06 mm	Weight percent > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
1	6	9410121021-1032	20.40	0.141	99.859	0.327	0.378	0.437
	7	9410111351-1359	21.20	0.050	99.950	0.300	0.339	0.383
	8	9410120935-0946	22.90	1.856	98.144	0.248	0.298	0.358
	9	9410111620-1629	19.70	0.077	99.923	0.326	0.381	0.446
	10	9410111546-1557	21.60	0.342	99.658	0.315	0.366	0.424
	11	9410111251-1303	12.10	3.631	96.369	0.269	0.312	0.363
	6	9410121021-1032	20.40	0.084	99.916	0.339	0.399	0.470
	7	9410111351-1359	21.20	1.256	98.744	0.262	0.306	0.357
	8	9410120935-0946	22.90	0.094	99.906	0.333	0.393	0.463
	9	9410111620-1629	19.70	0.140	99.860	0.330	0.392	0.464
	10	9410111546-1557	21.60	0.170	99.830	0.321	0.370	0.425
	11	9410111251-1303	12.10	0.852	99.148	0.282	0.324	0.372

Table 5.3 : Grain sizes of bed load

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
ADCP & EMF transect	1	9410111143-1154	H4AB3T03 *
		9410111216-1230	H4AB3T05
		9410111659-1709	H4AB3T06
		9410111715-1728	H4AB3T07
		9410120850-0901	H4AC3T02
		9410120908-0922	H4AC3T03
		9410121322-1334	H4AC3T04
		9410121339-1348	H4AC3T05

Table 6.1: ADCP & EMF transects

* : transect in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9410121236-1241	402019	660683	3.30	H4AC3P07 *
		2	9410121227-1233	401918	660675	5.40	H4AC3P06 *
		3	9410121159-1209	401825	660682	6.70	H4AC3P05 *
		4	9410121133-1144	401710	660680	8.70	H4AC3P04 *
		5	9410121053-1104	401626	660683	13.40	H4AC3P03 *
		6	9410121021-1032	401501	660668	20.40	H4AC3P02 *
		7	9410111351-1359	401457	660687	21.20	H4AB3P03 *
		8	9410120935-0946	401333	660664	22.90	H4AC3P01 *
		9	9410111620-1629	401212	660664	19.70	H4AB3P05 *
		10	9410111546-1557	401108	660671	21.60	H4AB3P04 *
		11	9410111251-1303	401021	660678	12.10	H4AB3P02 *
		12	9410111121-1130	400917	660679	6.90	H4AB3P01 *

Table 6.2: Vertical profiles

* S4 and MEX not available

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	7	6	9410111351-1359	401457	660687	21.20

Table 6.3: Suspended sediment - point sampled

28

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments	1	1	1	9410121236-1241	402019	660683	3.30
		2	1	9410121227-1233	401918	660675	5.40
		3	1	9410121159-1209	401825	660682	6.70
		4	1	9410121133-1144	401710	660680	8.70
		5	1	9410121053-1104	401626	660683	13.40
		6	1	9410121021-1032	401501	660668	20.40
		7	1	9410111351-1359	401457	660687	21.20
		8	1	9410120935-0946	401333	660664	22.90
		9	1	9410111620-1629	401212	660664	19.70
		10	1	9410111546-1557	401108	660671	21.60
		11	1	9410111251-1303	401021	660678	12.10
		12	1	9410111121-1130	400917	660679	6.90

Table 6.4: Suspended sediment - depth integrated

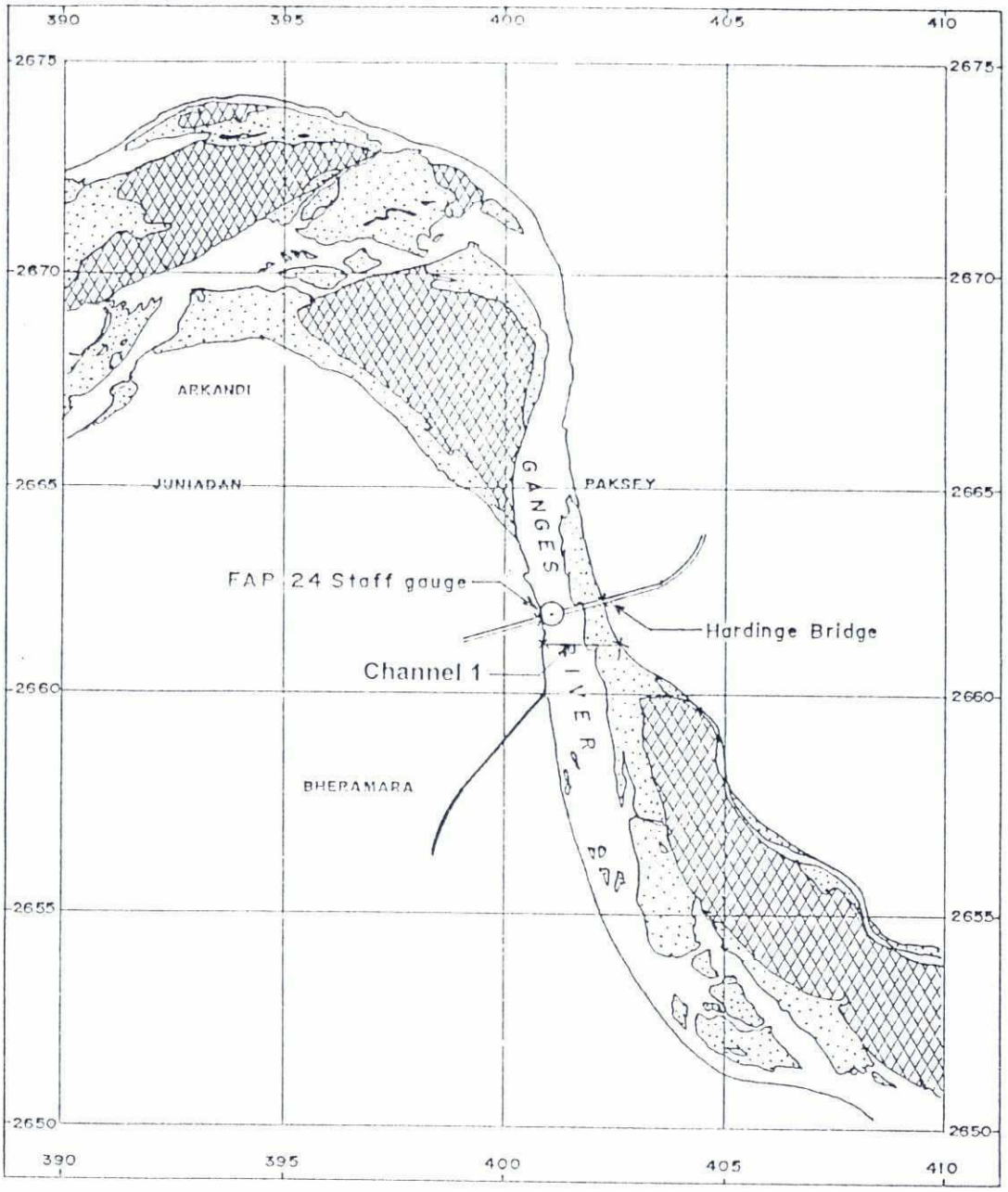
Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Helley-Smith Sample	1	6	9410121021-1032	401501	660668	20.40	A2223
		7	9410111351-1359	401457	660687	21.20	A3016
		8	9410120935-0946	401333	660664	22.90	A1991
		9	9410111620-1629	401212	660664	19.70	A1839
		10	9410111546-1557	401108	660671	21.60	A1153
		11	9410111251-1303	401021	660678	12.10	A3021
		6	9410121021-1032	401501	660668	20.40	A1993
		7	9410111351-1359	401457	660687	21.20	A3020
		8	9410120935-0946	401333	660664	22.90	A2009
		9	9410111620-1629	401212	660664	19.70	A117
		10	9410111546-1557	401108	660671	21.60	A1989
		11	9410111251-1303	401021	660678	12.10	A2307

Table 6.5: Bed load

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H4AB3T03 .ase
Echosounder data	1	QUATTRO	H4AB3T03 .ech
Sediment transport data	1	QUATTRO	H4AB3T03 .sed
Bed load sed. analysis	1	QUATTRO	H4AB3T03 .bdl
Sus. sed. conc. analysis	1	QUATTRO	H4AB3T03 .ssc
Transect plot data	1	QUATTRO	H4AB3T03 .trs
Iso-velocity plot data	1	MIKE 21	H4AB3T03 .ct2 H4AB3T03 .dt2

Table 7.1 PSD 24 Database file description

24



LEGEND:

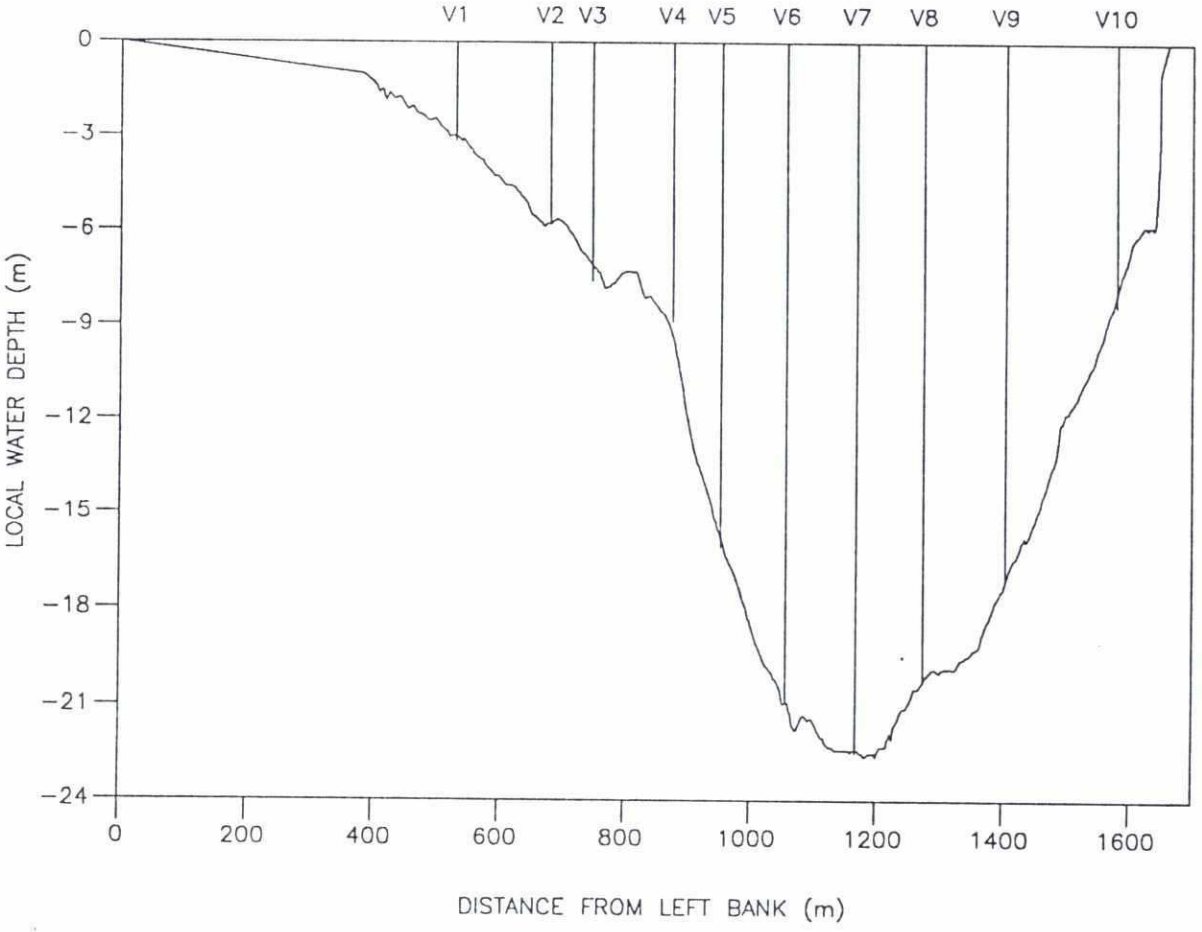
- Cross section
- Highland
- Unstable / low char
- FAP 24 Staff gauge

N

5000 m 2500m

Map is based on satellite images of March 1994

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 108 : 20 October, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
	Date : 19 Jan 1995	Location map	page 1.1
	Init : mk/tr		



Water-level : 10.05 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 108 : 20 October, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4AK3T01	Date : 19 Jan, 1995	Cross-sections and measured verticals	page
	Init : mk/tr	Channel 1	1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	4	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	-	-	-	-
Vertical current profile	No.of verticals in channel	10	-	-	-
	ADCP	10	-	-	-
	S4 current meter	1	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	6	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	10	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	7	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

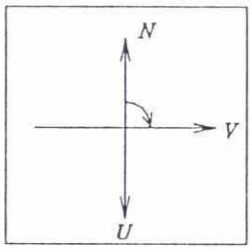
Table 2.1: Survey programme as made

Channel	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	1661	15443	10.05	7810	2	3152

Table 2.2: Key figures

Guage Location	Channel	Date	Water level (Daily average) (m + PWD)	Gauge
Hardinge Bridge	Channel 1	20 Oct 94	10.05	FAP 24

Table 2.3: Water-levels

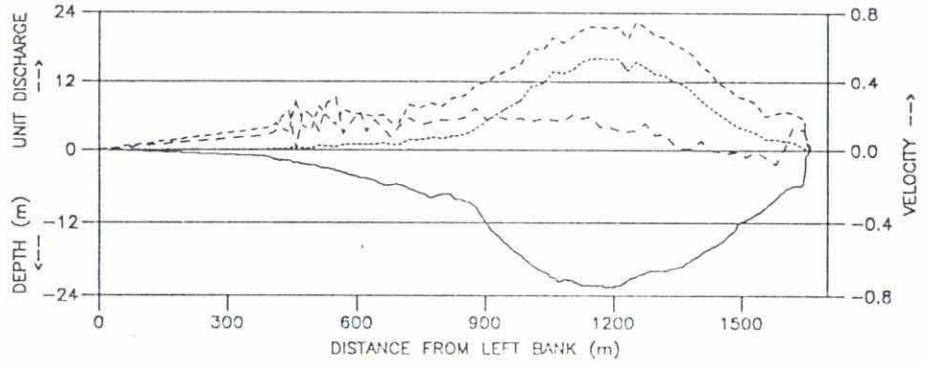


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



FLOW

LEGEND :

WATER DEPTH (m below STACE)

UNIT DISCHARGE (m^2/s.m)

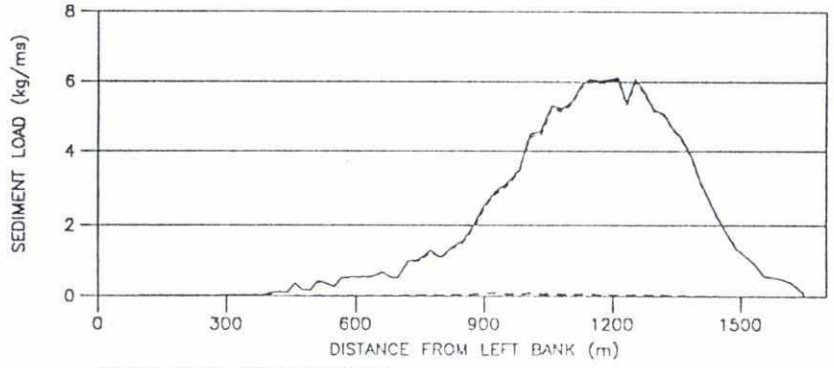
U – (m/s)

V – (m/s)

STACE = 10.05 (m+PWD)

A = 15443 (m^2)

Q = 7810 (m^3/s)



SEDIMENT TRANSPORT

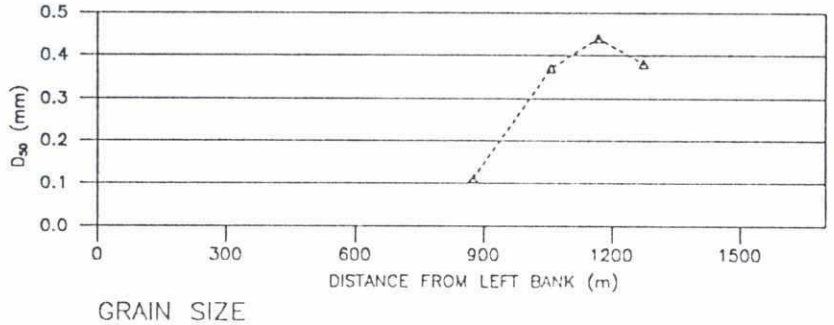
LEGEND :

S_{TOTAL} 3154 (kg/s)

$S_{WASH\ LOAD}$ 3101 (kg/s)

$S_{SUSP.\ BED}$ 51 (kg/s)

$S_{BED\ LOAD}$ 2 (kg/s)



GRAIN SIZE

LEGEND :

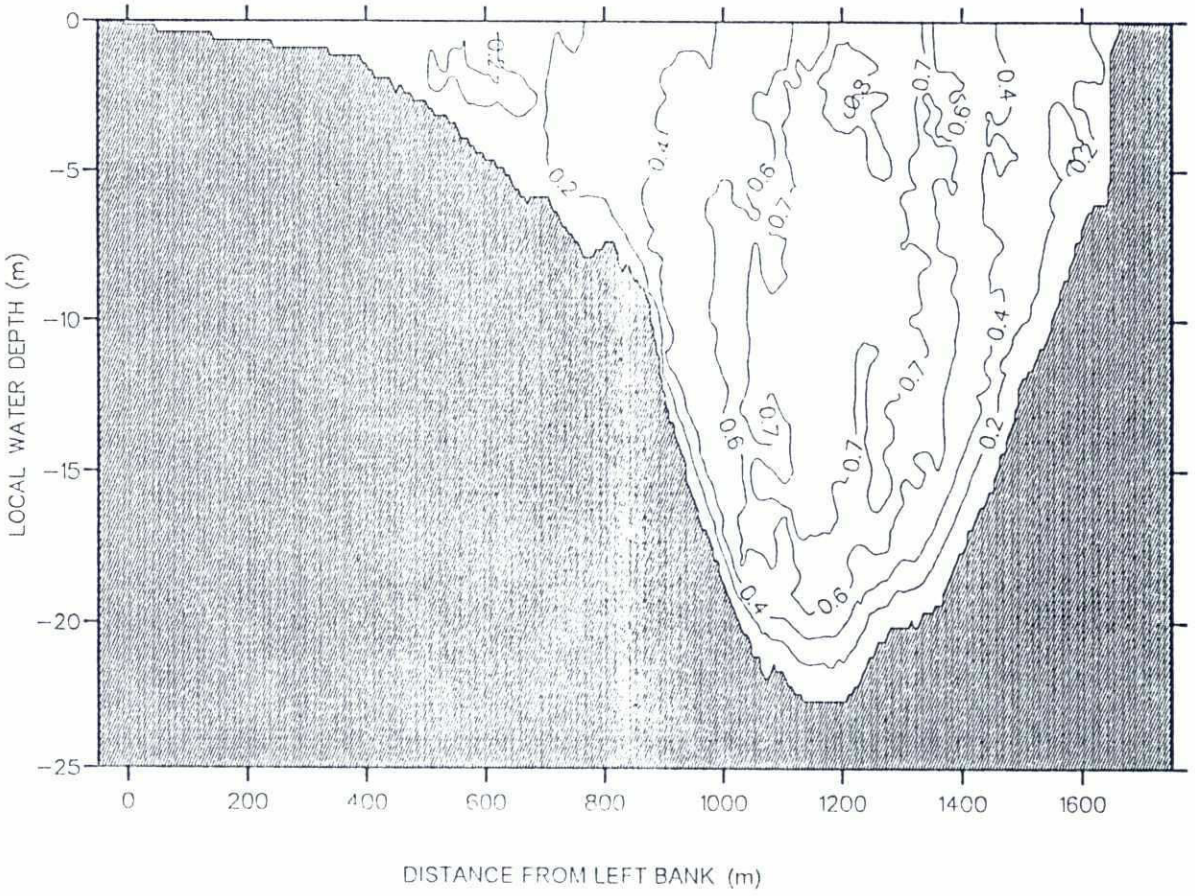
$D_{50\ SUSP.}$ (mm)

$D_{50\ BED\ LOAD}$ (mm)

$D_{50\ BED\ MAT.}$ (mm)

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 108 : 20 October, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4AK3T01	Date : 19 Jan, 1995	Horizontal distribution of flow and sediments	page
	Init : mk/tr	Channel 1	3.1

2DD



Iso-velocity contours (m/s)
Water-level : 10.05 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 108 : 20 October, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4AK3T01	Date : 19 Jan, 1995 Init : mk/tr	Cross-sectional distribution of flow velocity Channel 1	page 4.1

Andreasen settling tube

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth	Weight percent		D10	D50	D90
				< 0.06 mm	> 0.06 mm	(mm)	(mm)	(mm)
Sample not collected								

Table 5.1: Grain size of near bed suspended sediment (0.3 m above river bed)

US BM-54 bed samples

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth	Weight percent		D10	D50	D90
				< 0.06 mm	> 0.06 mm	(mm)	(mm)	(mm)
Sample not collected								

Table 5.2 : Grain size of bed material

Helley-Smith

Channel	Vertical	Time (YYMMDDHHMM)	Depth	Weight percent		D35	D50	D65
			(m)	< 0.06 mm	> 0.06 mm	(mm)	(mm)	(mm)
1	4	9410201158-1215	8.9	37.742	62.258	-	0.111	0.167
	6	9410201352-1418	20.90	0.085	99.915	0.319	0.374	0.438
	7	9410201230-1240	22.50	0.050	99.950	0.329	0.403	0.493
	8	9410201429-1432	20.30	0.054	99.946	0.329	0.393	0.469
	6	9410201352-1418	20.90	0.281	99.719	0.319	0.369	0.428
	7	9410201230-1240	22.50	0.085	99.915	0.378	0.479	0.607
	8	9410201429-1432	20.30	0.043	99.957	0.312	0.374	0.449

Table 5.3 : Grain sizes of bed load

202

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
ADCP & EMF transect	1	9410200945-0952 9410200958-1008 9410201510-1518 9410201530-1538	H4AK3T01 * H4AK3T02 H4AK3T04 H4AK3T05

Table 6.1: ADCP & EMF transects * : transect in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9410201045-1053	401997	660672	3.20	H4AK3P01 *
		2	9410201105-1125	401855	660668	5.80	H4AK3P02 *
		3	9410201134-1150	401770	660673	7.60	H4AK3P03 *
		4	9410201158-1215	401664	660677	8.90	H4AK3P04 *
		5	9410201327-1336	401575	660673	16.10	H4AK3P06 *
		6	9410201352-1418	401480	660664	20.90	H4AK3P07 *
		7	9410201257-1355	401360	660669	22.50	H4AK3P05 *
		7	9410201257-1355	401360	660669	22.50	H4AK2P01 **
		8	9410201429-1432	401260	660666	20.30	H4AK3P08 *
		9	9410201434-1440	401120	660670	17.20	H4AK3P09 *
		10	9410201445-1451	400955	660679	8.40	H4AK3P10 *

Table 6.2: Vertical profiles *S4 and MEX not available ** ADCP and MEX not available

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	7	6	9410201257-1355	401360	660669	22.50

Table 6.3: Suspended sediment - point sampled

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments	1	1	1	9410201045-1053	401997	660672	3.20
		2	1	9410201105-1125	401855	660668	5.80
		3	1	9410201134-1150	401770	660673	7.60
		4	1	9410201158-1215	401664	660677	8.90
		5	1	9410201327-1336	401575	660673	16.10
		6	1	9410201352-1418	401480	660664	20.90
		7	1	9410201230-1240	401360	660669	22.50
		8	1	9410201429-1432	401260	660666	20.30
		9	1	9410201434-1440	401120	660670	17.20
		10	1	9410201445-1451	400955	660679	8.40

Table 6.4: Suspended sediment - depth integrated

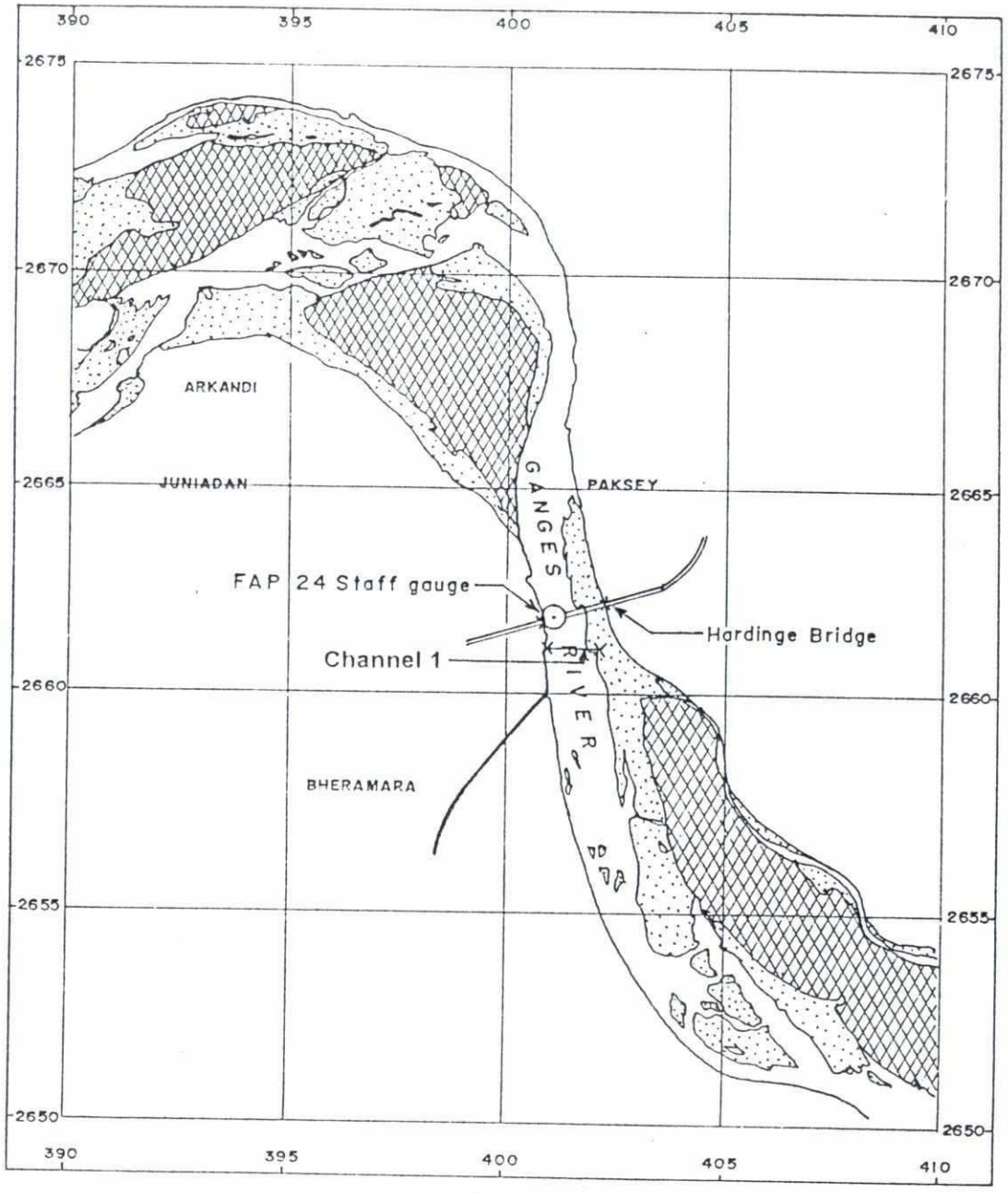
Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Helley-Smith Sample	1	4	9410201158-1215	401664	660677	8.90	A1999
		6	9410201352-1418	401480	660664	20.90	A1980
		7	9410201230-1240	401360	660669	22.50	A1876
		8	9410201429-1432	401260	660666	20.30	A3050
		6	9410201352-1418	401480	660664	20.90	A371
		7	9410201230-1240	401360	660669	22.50	A84
		8	9410201429-1432	401260	660666	20.30	A2259

Table 6.5: Bed load

208

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H4AK3T01 .ase
Echosounder data	1	QUATTRO	H4AK3T01 .ech
Sediment transport data	1	QUATTRO	H4AK3T01 .sed
Bed load sed. analysis	1	QUATTRO	H4AK3T01 .bdl
Sus. sed. conc. analysis	1	QUATTRO	H4AK3T01 .ssc
Transect plot data	1	QUATTRO	H4AK3T01 .trs
Iso-velocity plot data	1	MIKE 21	H4AK3T01 .ct2 H4AK3T01 .dt2

Table 7.1 PSD 24 Database file description



LEGEND:

- Cross section
- Highland
- Unstable/low char
- FAP 24 Staff gauge

N

5000 m 2500m 0

Map is based on satellite images of March 1994

FAP 24

DELFT - DHI

RIVER SURVEY PROJECT
Flood Plan Coordination Organization
Commission of the European Communities

Survey Bulletin 115 : 31 Oct - 01 Nov, 1994

Location 4 : Ganges River, Hardinge Bridge

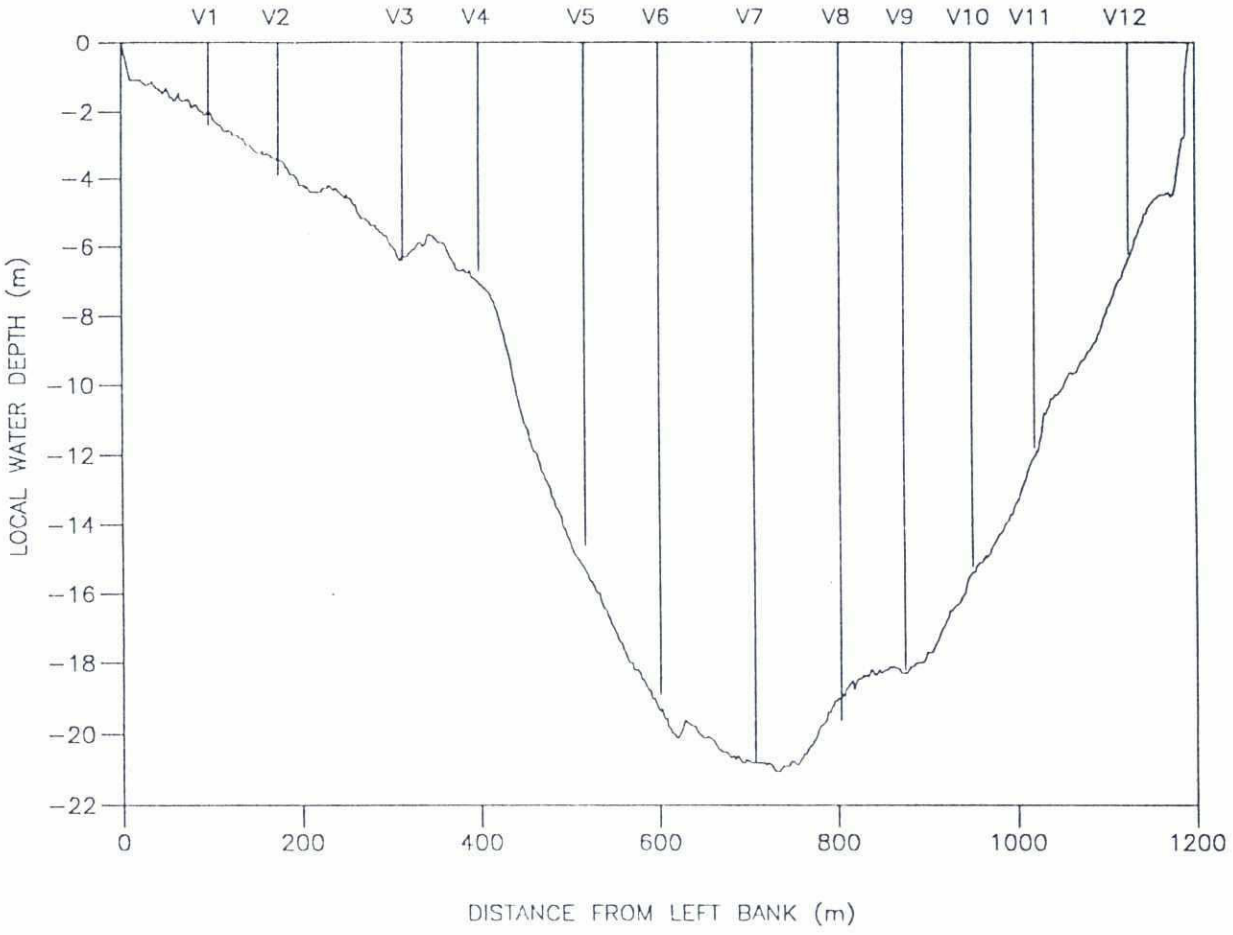
Date : 22 Jan 1995

Init : mk/tr

Location map

pa

1



Water-level : 8.82 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 115 : 31 Oct - 01 Nov, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4B10T03	Date : 22 Jan, 1995	Cross-sections and measured verticals	page
	Init : mk/tr	Channel 1	1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	-	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	1	-	-	-
Vertical current profile	No.of verticals in channel	12	-	-	-
	ADCP	-	-	-	-
	S4 current meter	12	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	62	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler		-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

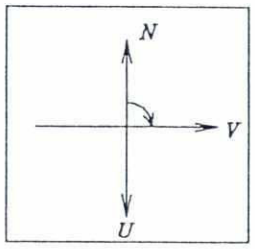
Table 2.1: Survey programme as made

Channel	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	1193	13312	8.82	3370	0	652

Table 2.2: Key figures

Gauge Location	Date	Water level (Daily average) (m + PWD)	Gauge
Hardinge Bridge	31 Oct 1994 01 Nov 1994	8.94 8.82	FAP 24

Table 2.3 : Water-levels

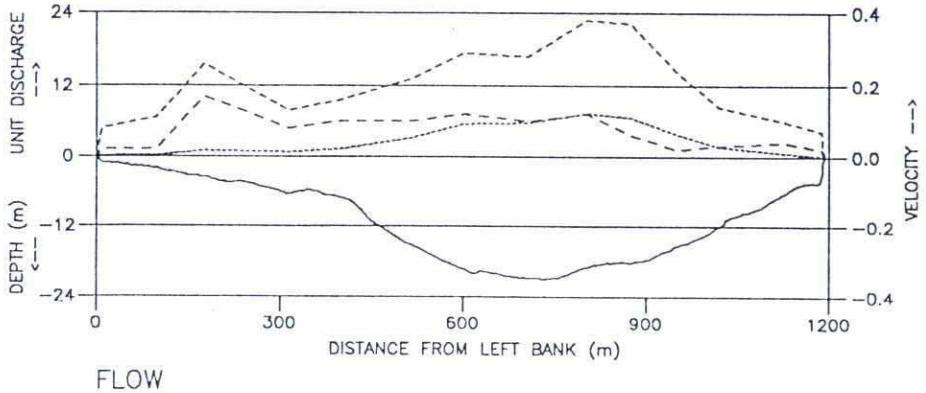


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



FLOW

LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE (m^2/s.m)

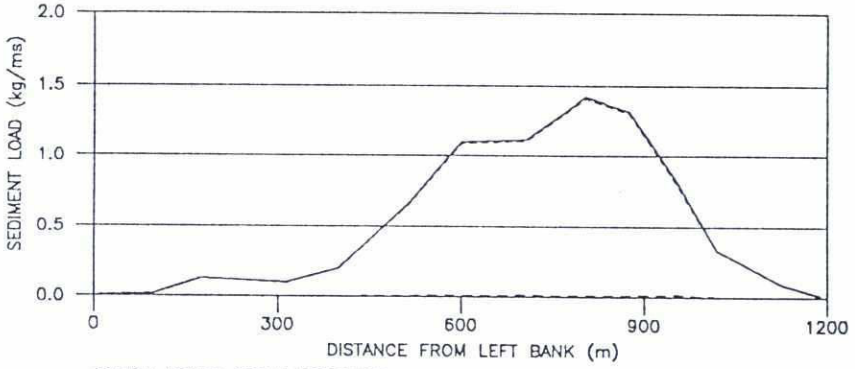
U – (m/s)

V – (m/s)

STAGE = 8.82 (m+PWD)

A = 13312 (m^2)

Q = 3370 (m^3/s)



SEDIMENT TRANSPORT

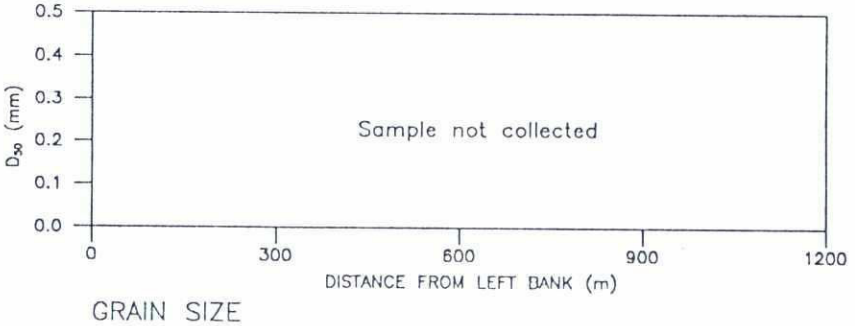
LEGEND :

S_{TOTAL} 652 (kg/s)

$S_{WASH\ LOAD}$ 645 (kg/s)

$S_{SUSP.\ BED}$ 7 (kg/s)

$S_{BED\ LOAD}$ 0 (kg/s)



GRAIN SIZE

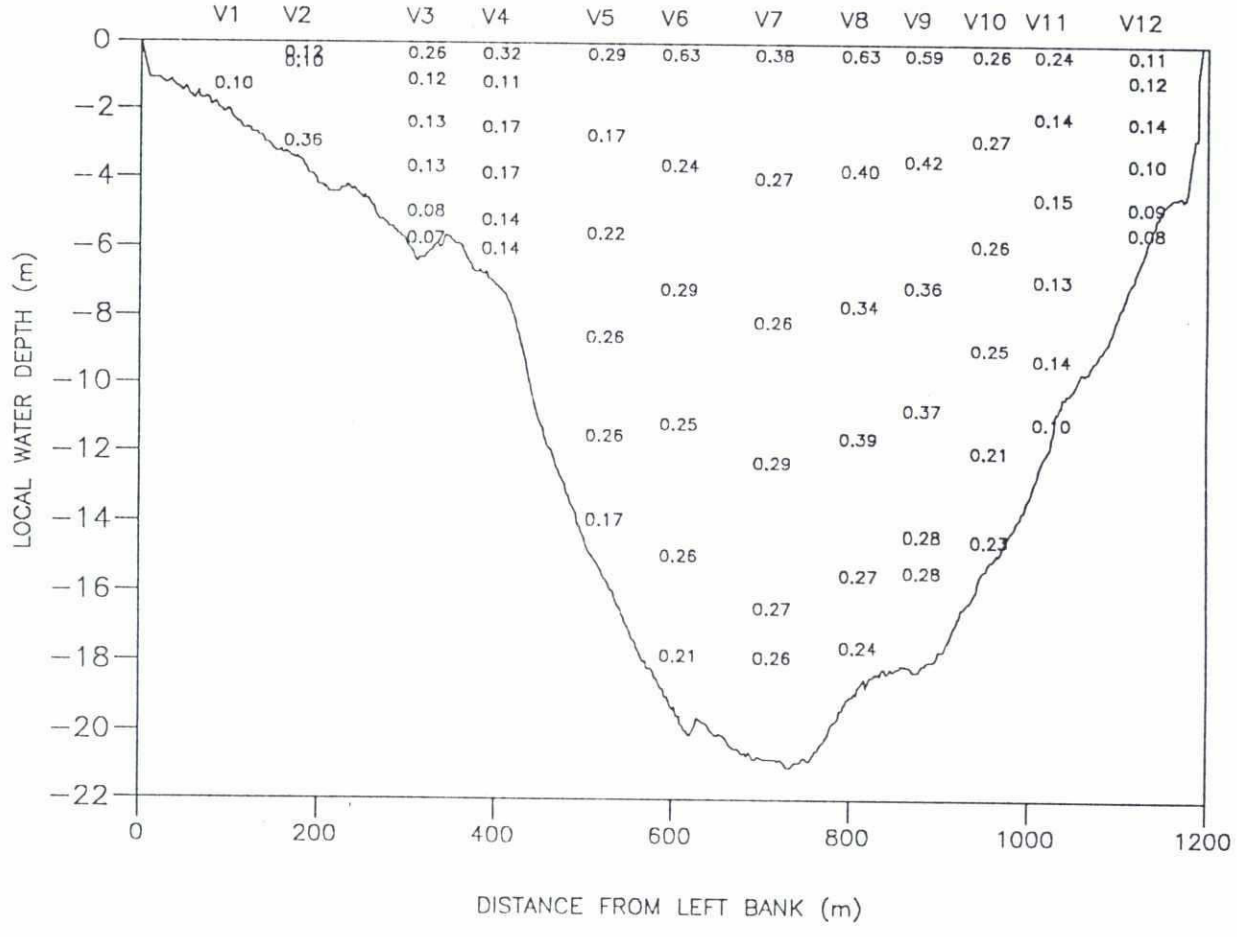
LEGEND :

$D_{50\ SUSP.}$ (mm)

$D_{50\ BED\ LOAD}$ (mm)

$D_{50\ BED\ MAT.}$ (mm)

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 115 : 31 Oct - 01 Nov, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4B10T03	Date : 22 Jan, 1995 Init : mk/tr	Horizontal distribution of flow and sediments Channel 1	page 3.1



Water-level : 8.82 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 115 : 31 Oct - 01 Nov, 1994	
		Location 4 : Ganges River, Hardinge Bridge	
File : H4B10T03	Date : 22 Jan, 1995	Cross-sectional distribution of flow velocity	page 4.1
	Init : mk/tr	Channel 1	

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	9411011237-1244	H4B10T03 *

Table 6.1: Echo-sounding

* : transect in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9411011206-1209	401973	660664	2.40	H4B10P07 *
		2	9411011147-1158	401897	660665	3.90	H4B10P06 *
		3	9411011112-1134	401760	660672	6.40	H4B10P05 *
		4	9411011042-1106	401673	660669	6.70	H4B10P04 *
		5	9411011011-1033	401556	660661	14.60	H4B10P03 *
		6	9411010928-0956	401474	660676	18.90	H4B10P02 *
		7	9411010833-0915	401367	660672	20.80	H4B10P01 *
		8	9410311605-1645	401274	660660	19.60	H4AV0P05 *
		9	9410311354-1450	401199	660679	18.20	H4AV0P04 *
		10	9410311247-1325	401121	660661	15.20	H4AV0P03 *
		11	9410311213-1240	401049	660662	11.80	H4AV0P02 *
		12	9410311137-1203	400947	660663	6.20	H4AV0P01 *

Table 6.2: Vertical profiles

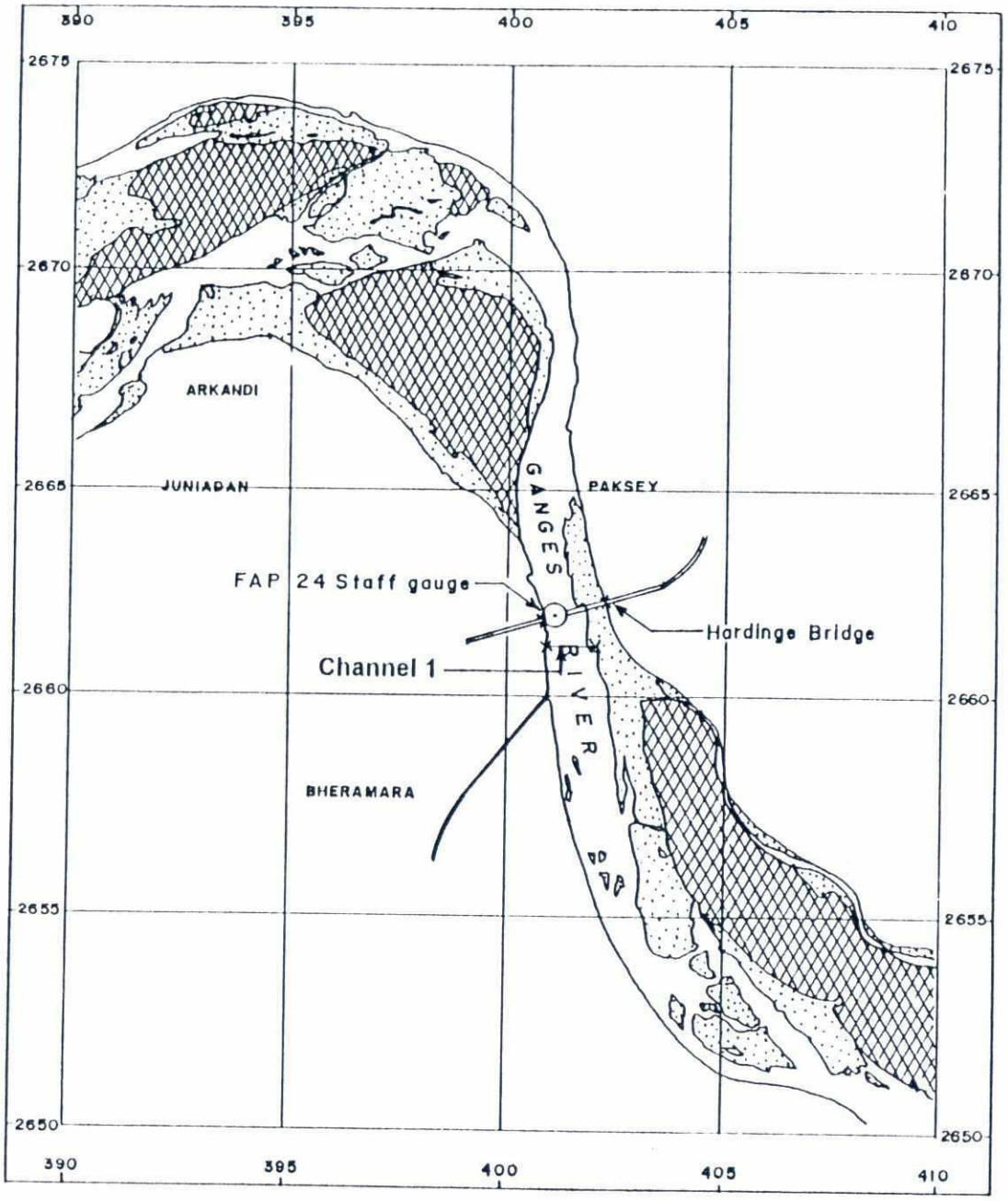
* ADCP and MEX not available

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	1	9411011206-1209	401973	660664	2.40
		2	3	9411011147-1158	401897	660665	3.90
		3	6	9411011112-1134	401760	660672	6.40
		4	6	9411011042-1106	401673	660669	6.70
		5	6	9411011011-1033	401556	660661	14.60
		6	6	9411010928-0956	401474	660676	18.90
		7	5	9411010833-0915	401367	660672	20.80
		8	5	9410311605-1645	401274	660660	19.60
		9	6	9410311354-1450	401199	660679	18.20
		10	6	9410311247-1325	401121	660661	15.20
		11	6	9410311213-1240	401049	660662	11.80
		12	6	9410311137-1203	400947	660663	6.20

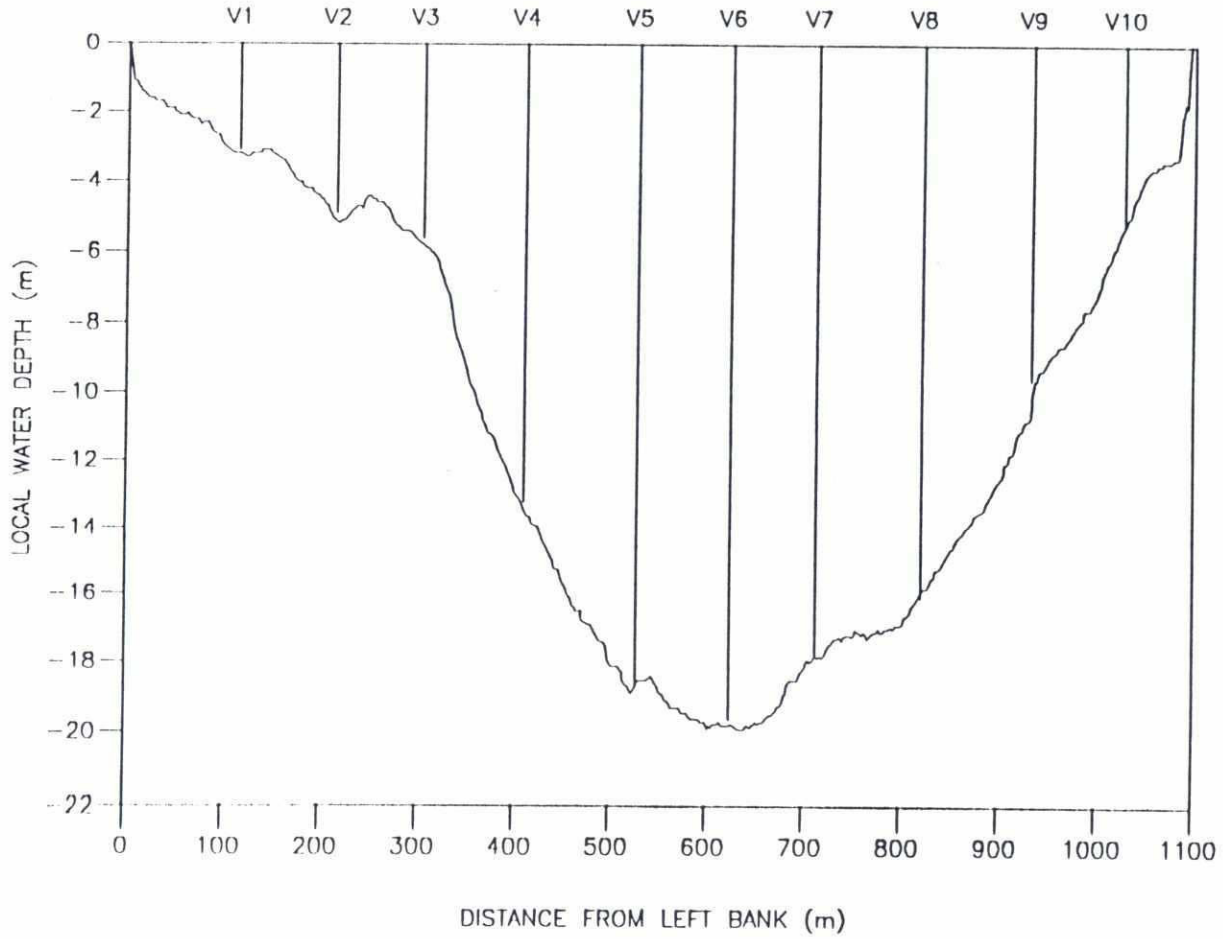
Table 6.3: Suspended sediment - point sampled

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H4B10T03 .ase
Echosounder data	1	QUATTRO	H4B10T03 .ech
Sediment transport data	1	QUATTRO	H4B10T03 .sed
Sus. sed. conc. analysis	1	QUATTRO	H4B10T03 .ssc
Transect plot data	1	QUATTRO	H4B10T03 .trs

Table 7.1 PSD 24 Database file description



FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 125 : 03 - 04 December, 1994
		Location 4 : Ganges River, Hardinge Bridge
	Date : 04 Feb 1995	Location map
	Init . mk/tr	page 11



Water-level : 7.66 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 125 : 03 - 04 December, 1994
		Location 04 : Ganges River, Hardinge Bridge
File : H4C30T02	Date : 04 Feb 1995 Init : mk / tr	Cross-sections and measured verticals Channel 1
		page 1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	-	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	2	-	-	-
Vertical current profile	No of verticals in channel	10	-	-	-
	ADCP	-	-	-	-
	S4 current meter	10	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	57	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	3	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	-	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

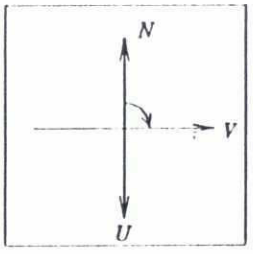
Table 2.1: Survey programme as made

Channel	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	1095	11908	7.66	1839	0	139.9

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m + PWD)	Gauge
Hardinge Bridge	Channel 1	03 Dec 94 04 Dec 94	7.66 7.62	FAP 24

Table 2.3: Water-levels

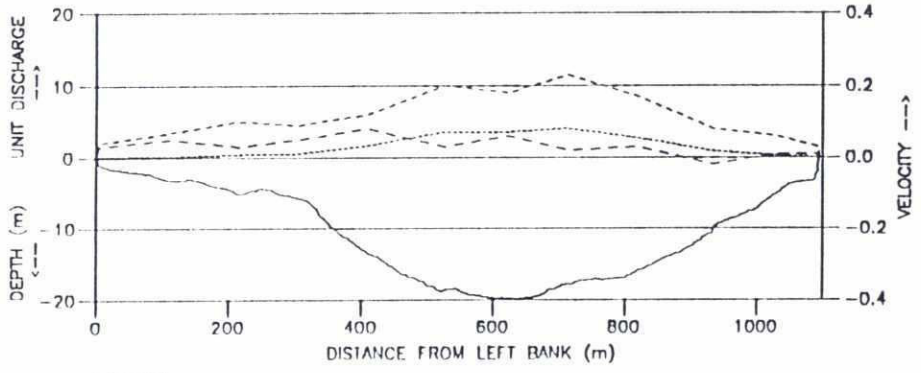


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE (m^2/s.m)

U – (m/s)

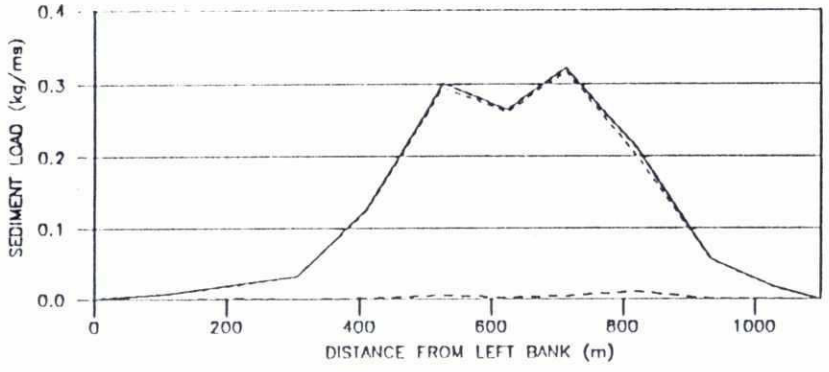
V – (m/s)

STAGE = 7.66 (m+PWD)

A = 11908 (m^2)

Q = 1839 (m^3/s)

FLOW



LEGEND :

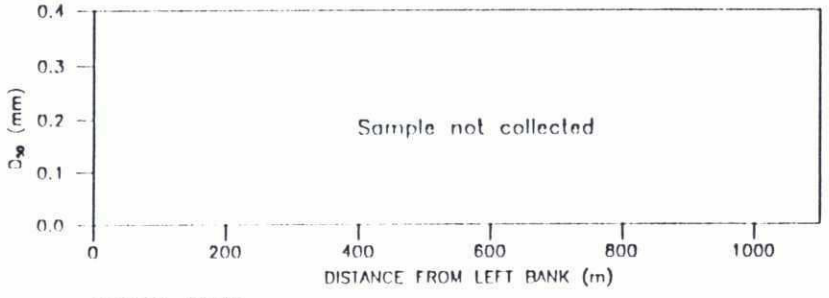
S_{TOTAL} 139.9 (kg/s)

$S_{WASH\ LOAD}$ 136.6 (kg/s)

$S_{SUSP.\ BED}$ 3.4 (kg/s)

$S_{BED\ LOAD}$ 0 (kg/s)

SEDIMENT TRANSPORT



LEGEND :

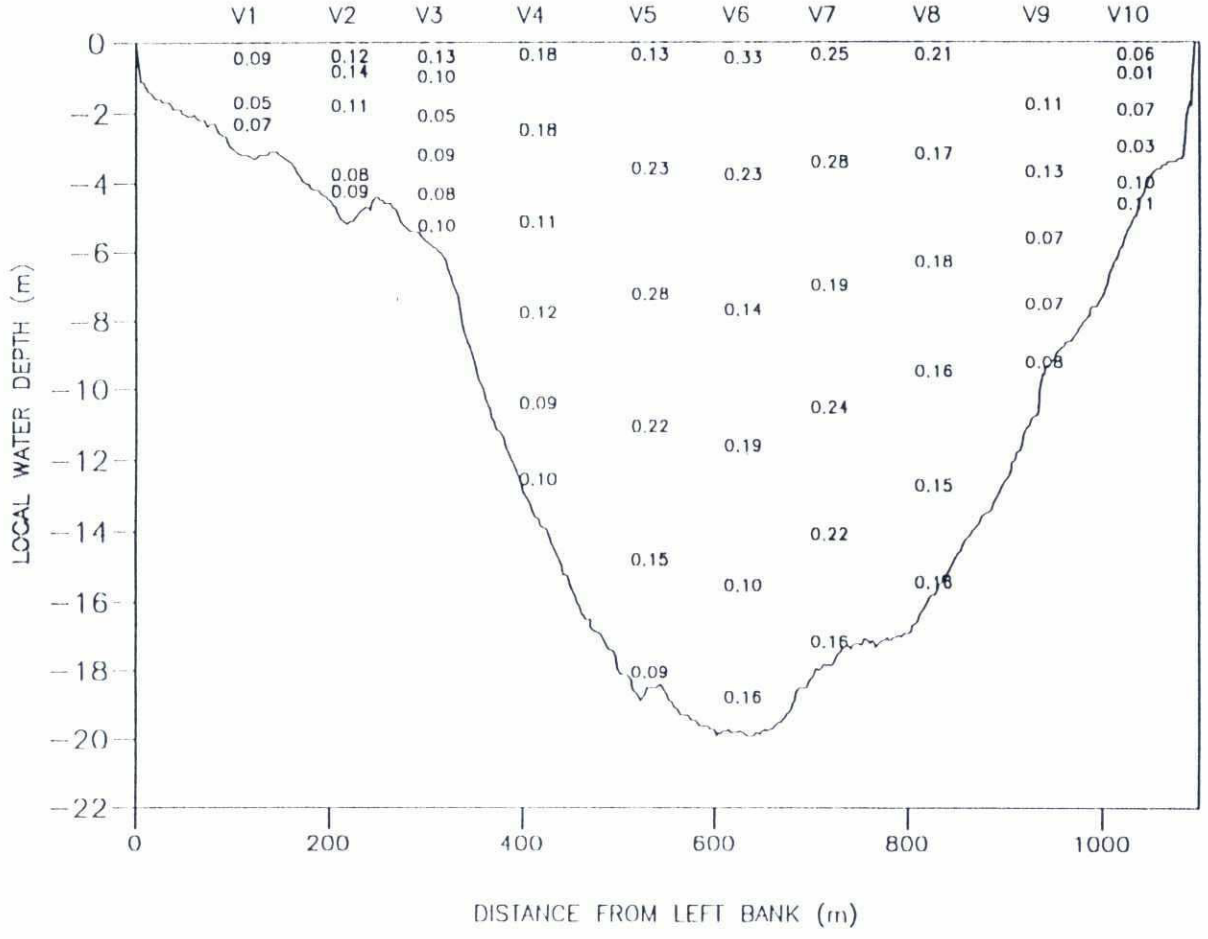
◇◇◇◇◇ $D_{50\ SUSP.}$ (mm)

△△△△△ $D_{50\ BED\ LOAD}$ (mm)

□□□□□ $D_{50\ BED\ MAT.}$ (mm)

GRAIN SIZE

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 125 : 03 - 04 December, 1994	
		Location 04 : Ganges River, Hardinge Bridge	
File : H4C30T02	Date : 04 Feb 1995 Init : mk / tr	Horizontal distribution of flow and sediments Channel 1	page 3.1



Water-level : 7.66 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT DHI	RIVER SURVEY PROJECT Flood Plain Coordination Organization Commission of the European Communities	Survey Bulletin 125 : 03 - 04 December, 1994
		Location 04 : Ganges River, Hardinge Bridge
File : H4C30T02	Date : 04 Feb 1995 Init : mk / tr	Cross-sectional distribution of flow velocity Channel 1
		page 4.1

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo sounding	1	9412031045-1054 9412031055-1103	H4C30T01 H4C30T02 *

Table 6.1: Echo-sounding

* : transect in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9412031251-1309	401864	660666	3 10	H4C30P02 *
		2	9412031217-1243	401767	660669	4 90	H4C30P01 *
		3	9412031312-1335	401676	660670	5 60	H4C30P03 *
		4	9412031440-1506	401572	660673	13 20	H4C30P04 *
		5	9412031515-1540	401456	660672	18 70	H4C30P05 *
		6	9412031548-1614	401358	660671	19 60	H4C30P06 *
		7	9412040855-0935	401268	660668	17 80	H4C40P01 *
		8	9412040939-1006	401161	660670	16 10	H4C40P02 *
		9	9412041025-1053	401047	660669	9 60	H4C40P03 *
		10	9412041056-1130	400953	660672	5 20	H4C40P04 *

Table 6.2: Vertical profiles

* ADCP and MEX not available

Method	Channel	Vertical	No of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	3	9412031251-1309	401864	660666	3 10
		2	6	9412031217-1243	401767	660669	4 90
		3	6	9412031312-1335	401676	660670	5 60
		4	6	9412031440-1506	401572	660673	13 20
		5	6	9412031515-1540	401456	660672	18 70
		6	6	9412031548-1614	401358	660671	19 60
		7	6	9412040855-0935	401268	660668	17 80
		8	6	9412040939-1006	401161	660670	16 10
		9	6	9412041025-1053	401047	660669	9 60
		10	6	9412041056-1130	400953	660672	5 20

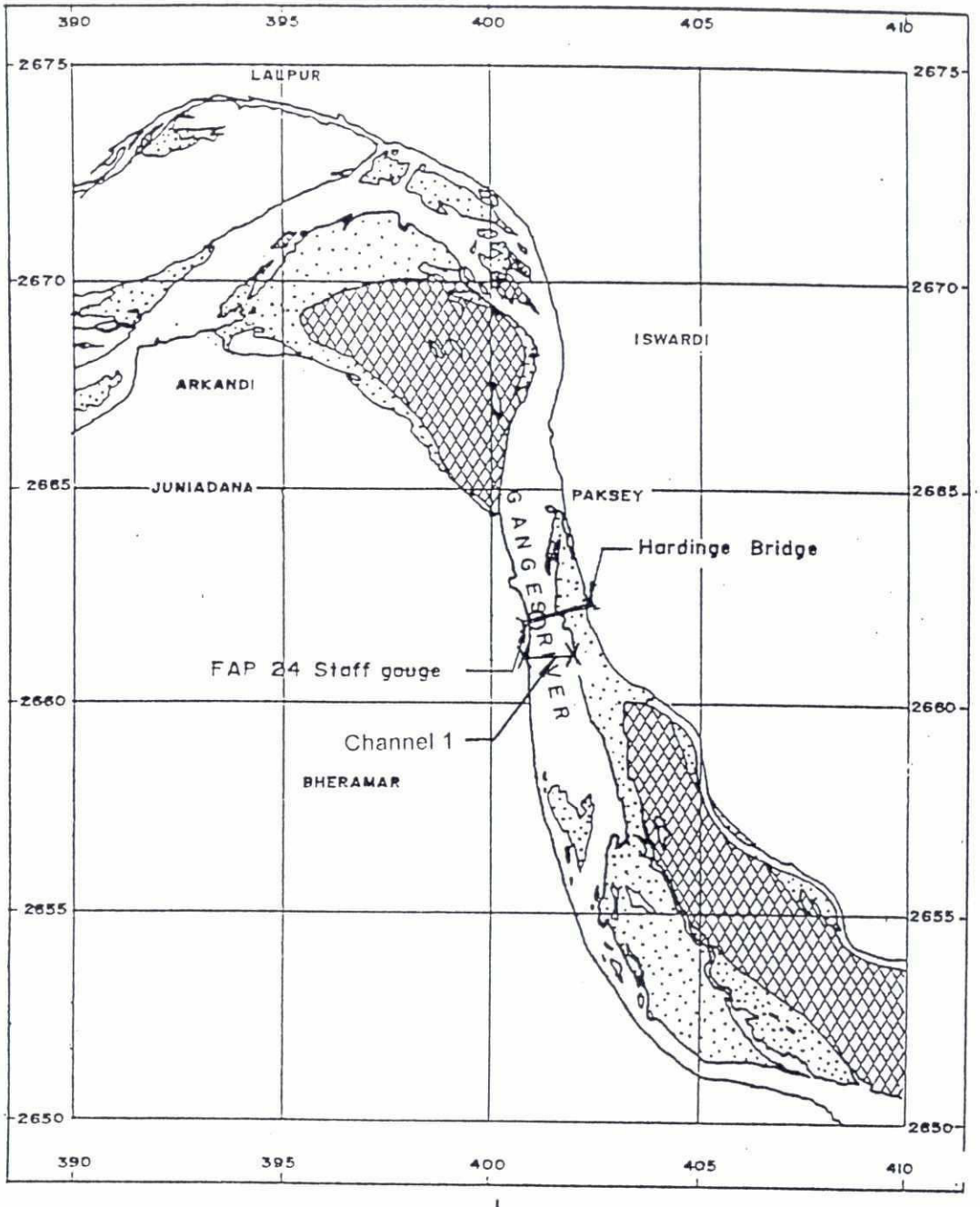
Table 6.3: Suspended sediment - point sampled

Method	Channel	Vertical	No of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No
Suspended sediments (collapsible bag)	1	5	1	9412031515-1540	401456	660672	18 70	A860
		6	1	9412031548-1614	401358	660671	19 60	A2326
		7	1	9412040855-0935	401268	660668	17 80	A2311

Table 6.4: Suspended sediment - depth integrated

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H4C30T02 .ase
Echosounder data	1	QUATTRO	H4C30T02 .ech
Sediment transport data	1	QUATTRO	H4C30T02 .sed
Sus. sed. conc. analysis	1	QUATTRO	H4C30T02 .ssc
Transect plot data	1	QUATTRO	H4C30T02 .trs

Table 7.1 PSD 24 Database file description



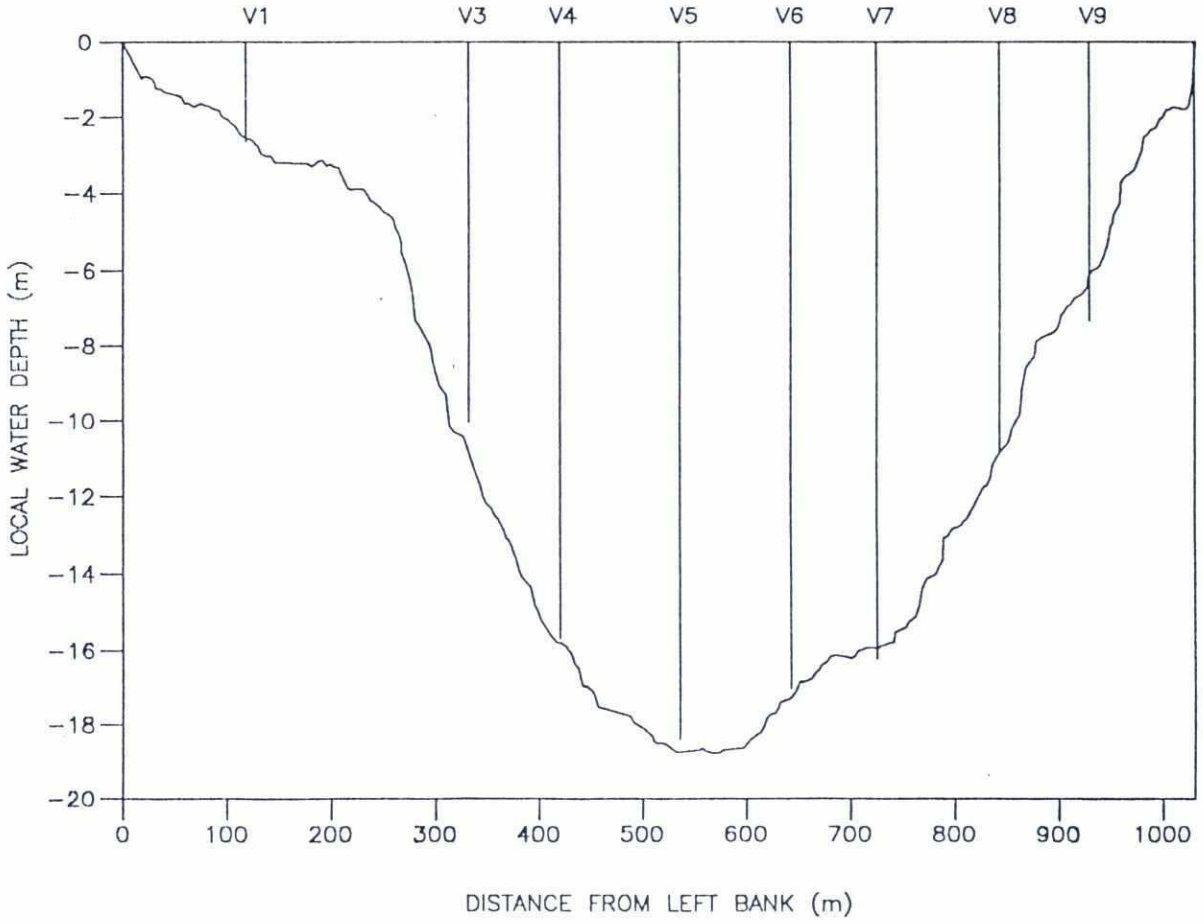
LEGEND:

- High land
- Unstable / low char
- Cross section
- FAP 24 Staff gauge

Map is based on satellite images of March 1995

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 129 : 03 - 04 January , 1995	
	Location 4 : Ganges River, Hardinge Bridge	
	Date : 01 Aug 1995	Location map
	Init : mzh/ss	page 1.1

220



Water level : 6.52 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 129 : 03 - 04 January , 1995	
		Location 4 : Ganges River, Hardinge Bridge	
File : H5138T02	Date : 01 Aug 1995	Cross-sections and measured verticals	page
	Init : mzh/ss	Channel 1	1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	-	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	2	-	-	-
Vertical current profile	No.of verticals in channel	8	-	-	-
	ADCP	-	-	-	-
	S4 current meter	8	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	51	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	2	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	-	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

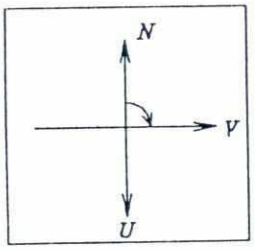
Table 2.1: Survey programme as made

Channel	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sedimer transport Ss total (kg/s)
Channel 1	1031	10480	6.52	1579	-	43

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Hardinge Bridge	Channel 1	03 Jan 95	6.52	FAP 24
		04 Jan 95	6.47	

Table 2.3: Water-Levels

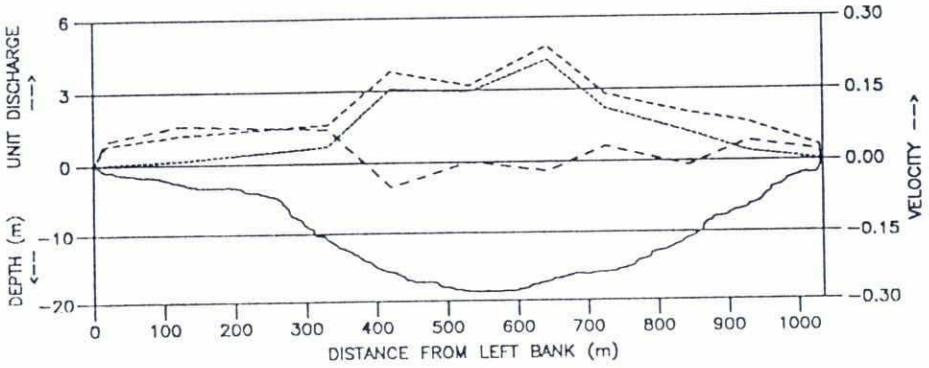


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



FLOW

LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE (m^2/s.m)

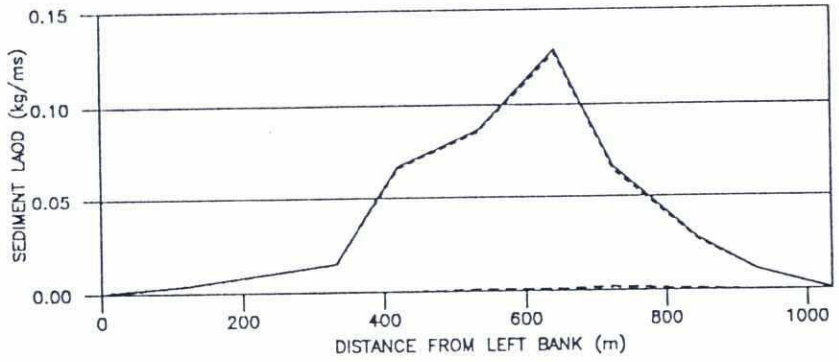
U – (m/s)

V – (m/s)

STAGE = 6.52 (m+PWD)

A = 10480 (m^2)

Q = 1579 (m^3/s)



SEDIMENT TRANSPORT

LEGEND :

S_{TOTAL} 43 (kg/s)

$S_{WASH\ LOAD}$ 42 (kg/s)

$S_{SUSP.\ BED}$ 1 (kg/s)

$S_{BED\ LOAD}$ – (kg/s)

Sample not collected

LEGEND :

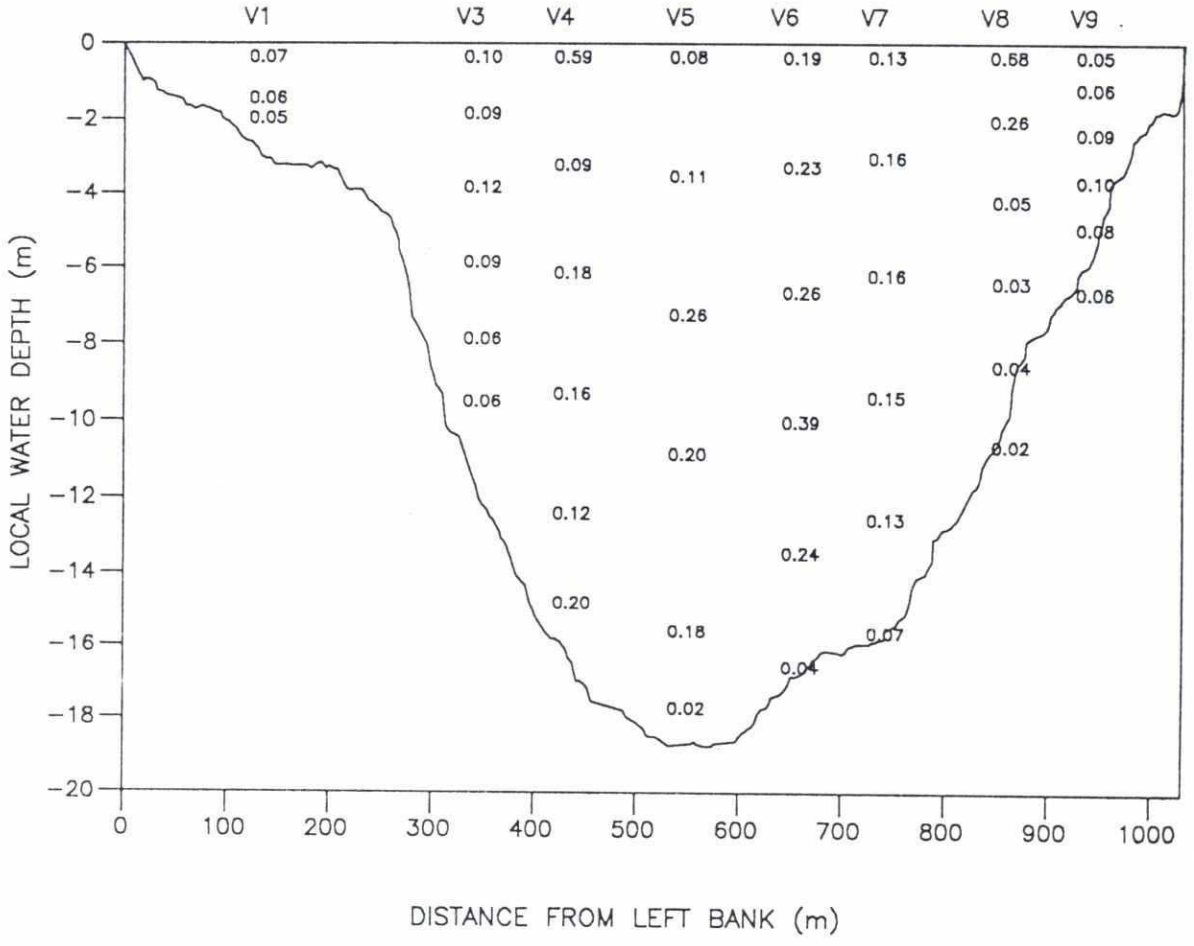
$D_{50\ SUSP.}$ (mm)

$D_{50\ BED\ LOAD}$ (mm)

$D_{50\ BED\ MAT.}$ (mm)

GRAIN SIZE

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 129 : 03 - 04 January , 1995	
		Location 4 : Ganges River, Hardinge Bridge	
File : H5138T02	Date : 01 Aug 1995 Init : mzh/ss	Horizontal distribution of flow and sediments Channel 1	page 3.1



Water level : 6.52 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		**Survey Bulletin 129 : 03 - 04 January , 1995**
		Location 4 : Ganges River, Hardinge Bridge
File : H5138T02	Date : 01 Aug 1995 Init : mzh/ss	**Cross-sectional distribution of flow velocity** **Channel 1**
		page 4.1

Andreasen settling tube

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.1: Grain size of near bed suspended sediment (0.3 m above river bed)

US BM-54 bed samples

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.2 : Grain size of bed material

Helley-Smith

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.3 : Grain sizes of bed load

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	9501031319-1326 9501031328-1337	H5138T02 * H5138T03

Table 6.1: Echo-sounding

*: echo-sounding in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9501041338-1349	401801	660671	2.65	H5148P08 *
		3	9501041232-1255	401591	660673	10.04	H5148P06 *
		4	9501041201-1222	401498	660675	15.70	H5148P05 *
		5	9501041128-1151	401386	660673	18.40	H5148P04 *
		6	9501041053-1117	401279	660667	17.04	H5148P03 *
		7	9501041015-1041	401195	660672	16.26	H5148P02 *
		8	9501040936-1004	401079	660676	10.90	H5148P01 *
		9	9501031601-1622	400990	660679	7.35	H5138P01 *

Table 6.2: Vertical profiles

* ADCP & MEX not available

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	3	9501041338-1349	401801	660671	2.65
		2	6	9501041304-1326	401696	660668	3.94
		3	6	9501041232-1255	401591	660673	10.04
		4	6	9501041201-1222	401498	660675	15.70
		5	6	9501041128-1151	401386	660673	18.40
		6	6	9501041053-1117	401279	660667	17.04
		7	6	9501041015-1041	401195	660672	16.26
		8	6	9501040936-1004	401079	660676	10.90
		9	6	9501031601-1622	400990	660679	7.35

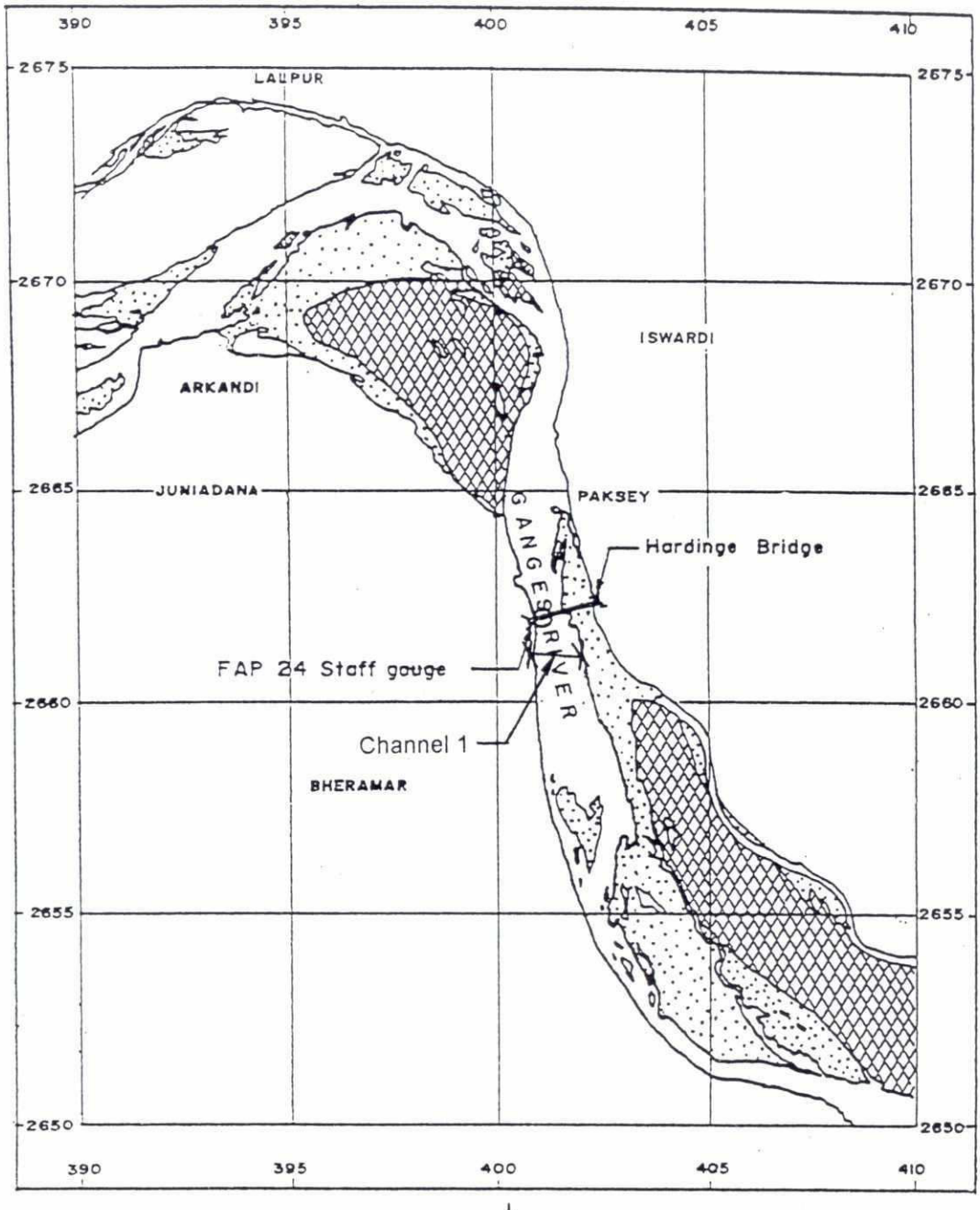
Table 6.3: Suspended sediment - point sampled

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Suspended sediments (collapsible bag)	1	5	1	9501041128-1151	401386	660673	18.40	A2004
		7	1	9501041015-1041	401195	660672	16.26	A3048

Table 6.4: Suspended sediment - depth integrated

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H5138T02 .ase
Echosounder data	1	QUATTRO	H5138T02 .ech
Sediment transport data	1	QUATTRO	H5138T02 .sed
Susp. sed. conc. analysis	1	QUATTRO	H5138T02 .ssc
Transect plot data	1	QUATTRO	H5138T02 .trs

Table 7.1 PSD 24 Database file description



LEGEND:

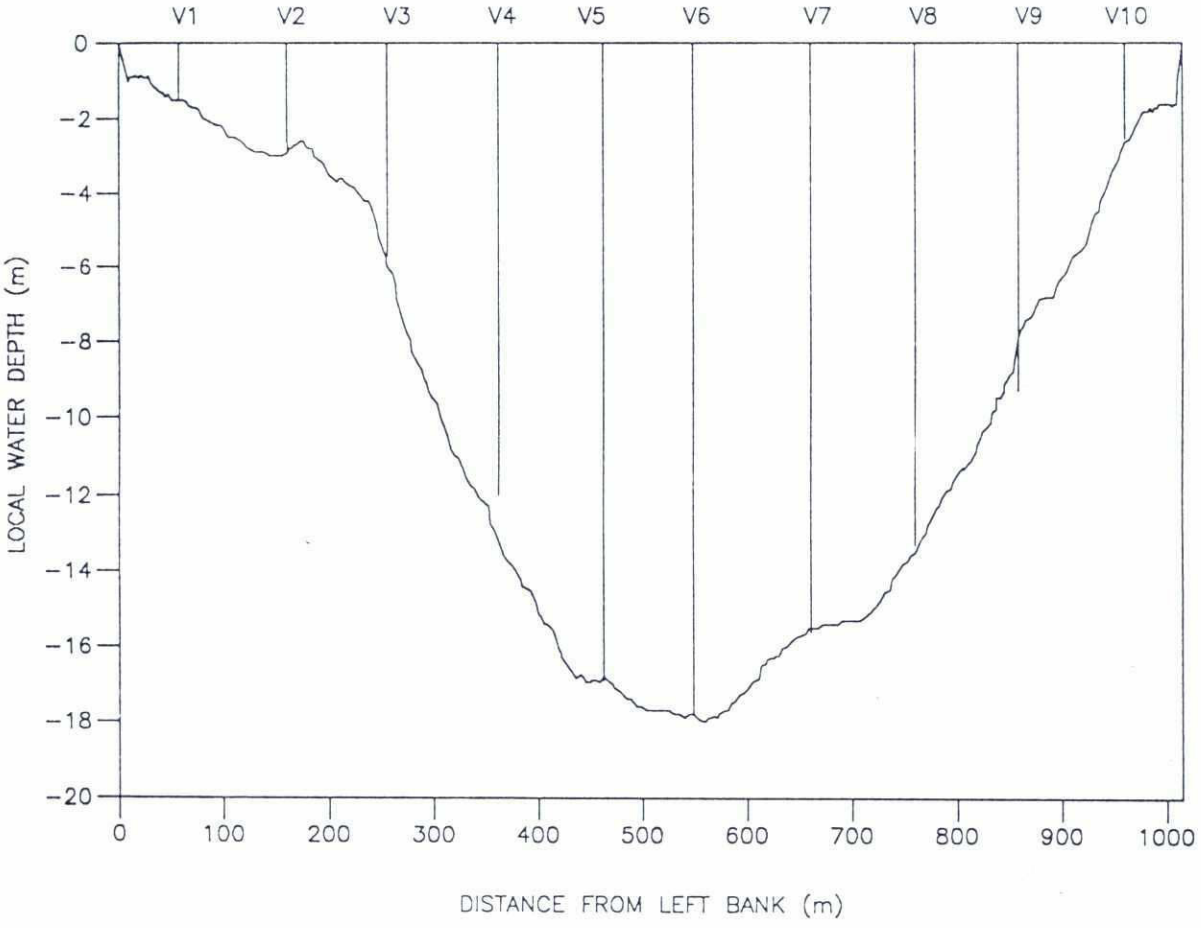
- High land
- Unstable / low char
- Cross section
- FAP 24 Staff gauge

N

5000m 2500m 0

Map is based on satellite images of March 1995

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 131 : 03 - 04 February, 1995	
		Location 4 : Ganges River, Hardinge Bridge	
	Date : 07 Aug 1995	Location map	page 1.1
	Init : mzh/ss		



Water level : 5.87 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 131 : 03 - 04 February, 1995	
		Location 4 : Ganges River, Hardinge Bridge	
File : H5230T01	Date : 07 Aug 1995	Cross-sections and measured verticals	page
	Init : mzh/ss	Channel 1	1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	-	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	2	-	-	-
Vertical current profile	No.of verticals in channel	10	-	-	-
	ADCP	-	-	-	-
	S4 current meter	10	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	49	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	-	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

Table 2.1: Survey programme as made

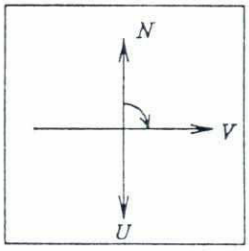
Channel	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	1014	9901	5.87	548	-	9.4

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Hardinge Bridge	Channel 1	03 Feb 95 04 Feb 95	5.87 5.85	FAP 24

Table 2.3: Water-Levels

2GD

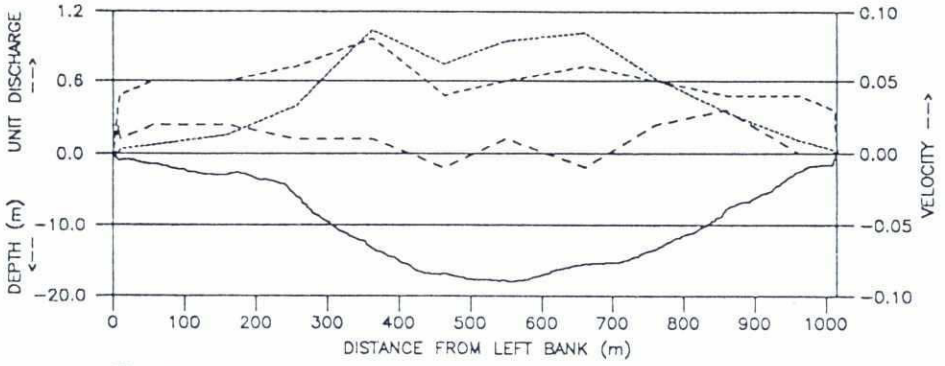


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



FLOW

LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE ($m^2/s.m$)

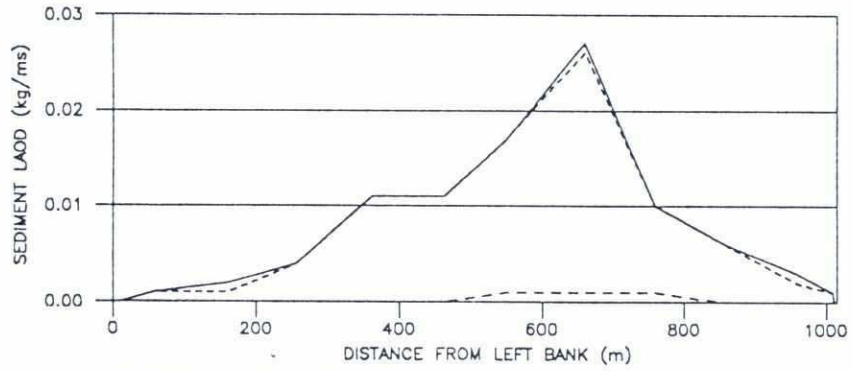
U – (m/s)

V – (m/s)

STAGE = 5.87 (m+PWD)

A = 9901 (m^2)

Q = 548 (m^3/s)



SEDIMENT TRANSPORT

LEGEND :

S_{TOTAL} 9.4 (kg/s)

$S_{WASH\ LOAD}$ 9.0 (kg/s)

$S_{SUSP.\ BED}$ 0.4 (kg/s)

$S_{BED\ LOAD}$ 0 (kg/s)

Sample not collected

LEGEND :

$D_{60\ SUSP.}$ (mm)

$D_{60\ BED\ LOAD}$ (mm)

$D_{60\ BED\ MAT.}$ (mm)

GRAIN SIZE

FAP 24 DELFT - DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 131 : 03 - 04 February, 1995	
		Location 4 : Ganges River, Hardinge Bridge	
File : H5230T01	Date : 07 Aug 1995	Horizontal distribution of flow and sediments	page
	Init : mzh/ss	Channel 1	3.1

Andreasen settling tube

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.1: Grain size of near bed suspended sediment (0.3 m above river bed)

US BM-54 bed samples

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.2 : Grain size of bed material

Helley-Smith

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.3 : Grain sizes of bed load

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	9502031200-1213 9502031230-1236	H5230T01 * H5230T03

Table 6.1: Echo-sounding

* : echo-sounding in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9502031400-1404	401844	660669	1.50	H5230P01 *
		2	9502031414-1427	401742	660675	2.90	H5230P02 *
		3	9502031438-1502	401644	660672	5.70	H5230P03 *
		4	9502031510-1530	401543	660672	12.00	H5230P04 *
		5	9502041212-1238	401442	660670	16.90	H5240P06 *
		6	9502041138-1202	401354	660670	17.80	H5240P05 *
		7	9502041100-1125	401244	660667	15.60	H5240P04 *
		8	9502041011-1038	401142	660668	13.30	H5240P03 *
		9	9502040927-1001	401046	660672	9.30	H5240P02 *
		10	9502040909-0921	400944	660672	2.50	H5240P01 *

Table 6.2: Vertical profiles

* ADCP & MEX not available

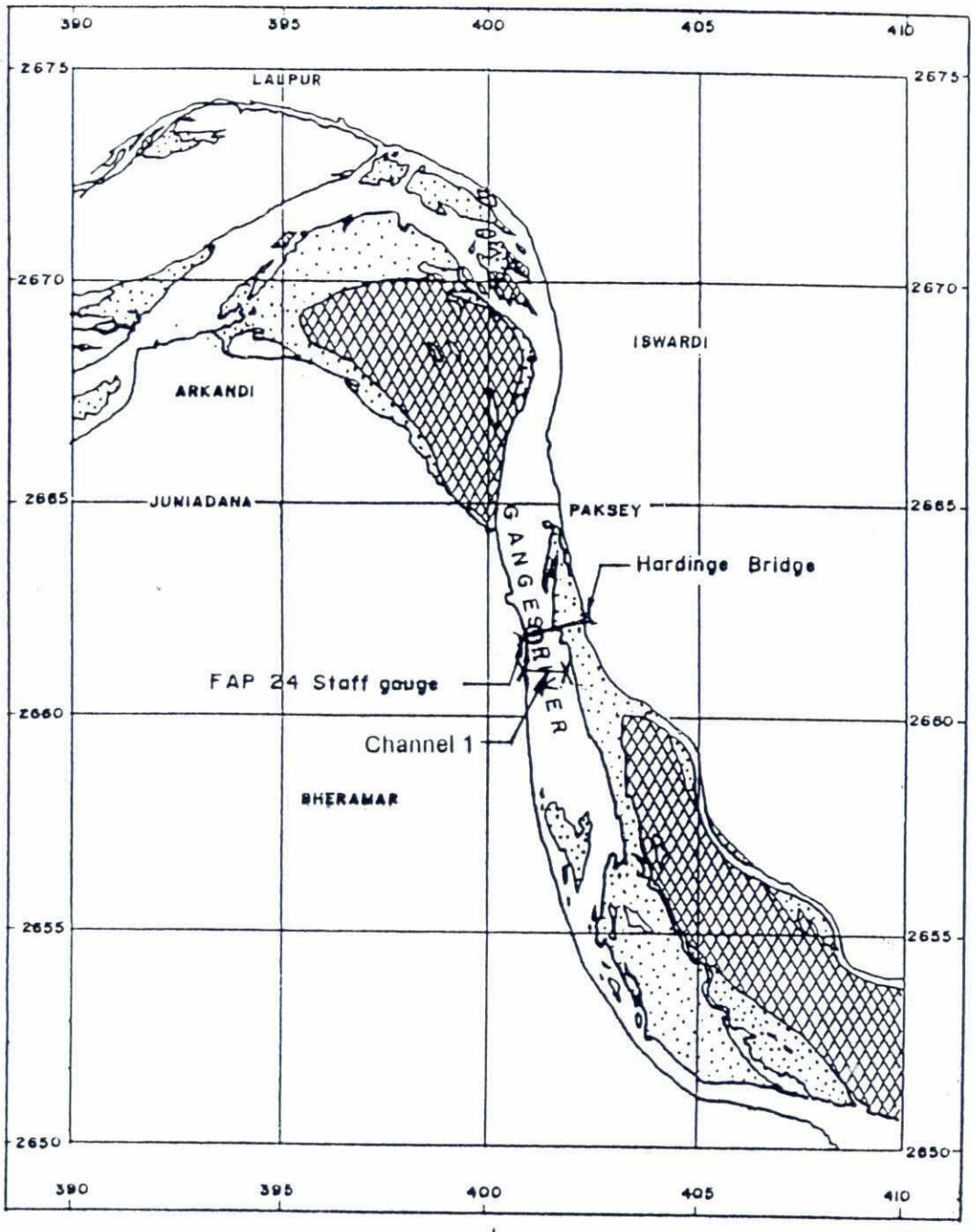
Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	1	9502031400-1404	401844	660669	1.50
		2	3	9502031414-1427	401742	660675	2.90
		3	6	9502031438-1502	401644	660672	5.70
		4	6	9502031510-1530	401543	660672	12.00
		5	6	9502041212-1238	401442	660670	16.90
		6	6	9502041138-1202	401354	660670	17.80
		7	6	9502041100-1125	401244	660667	15.60
		8	6	9502041011-1038	401142	660668	13.30
		9	6	9502040927-1001	401046	660672	9.30
		10	3	9502040909-0921	400944	660672	2.50

Table 6.3: Suspended sediment - point sampled

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H5230T01 .ase
Echosounder data	1	QUATTRO	H5230T01 .ech
Sediment transport data	1	QUATTRO	H5230T01 .sed
Susp. sed. conc. analysis	1	QUATTRO	H5230T01 .ssc
Transect plot data	1	QUATTRO	H5230T01 .trs

Table 7.1 PSD 24 Database file description

268



LEGEND:

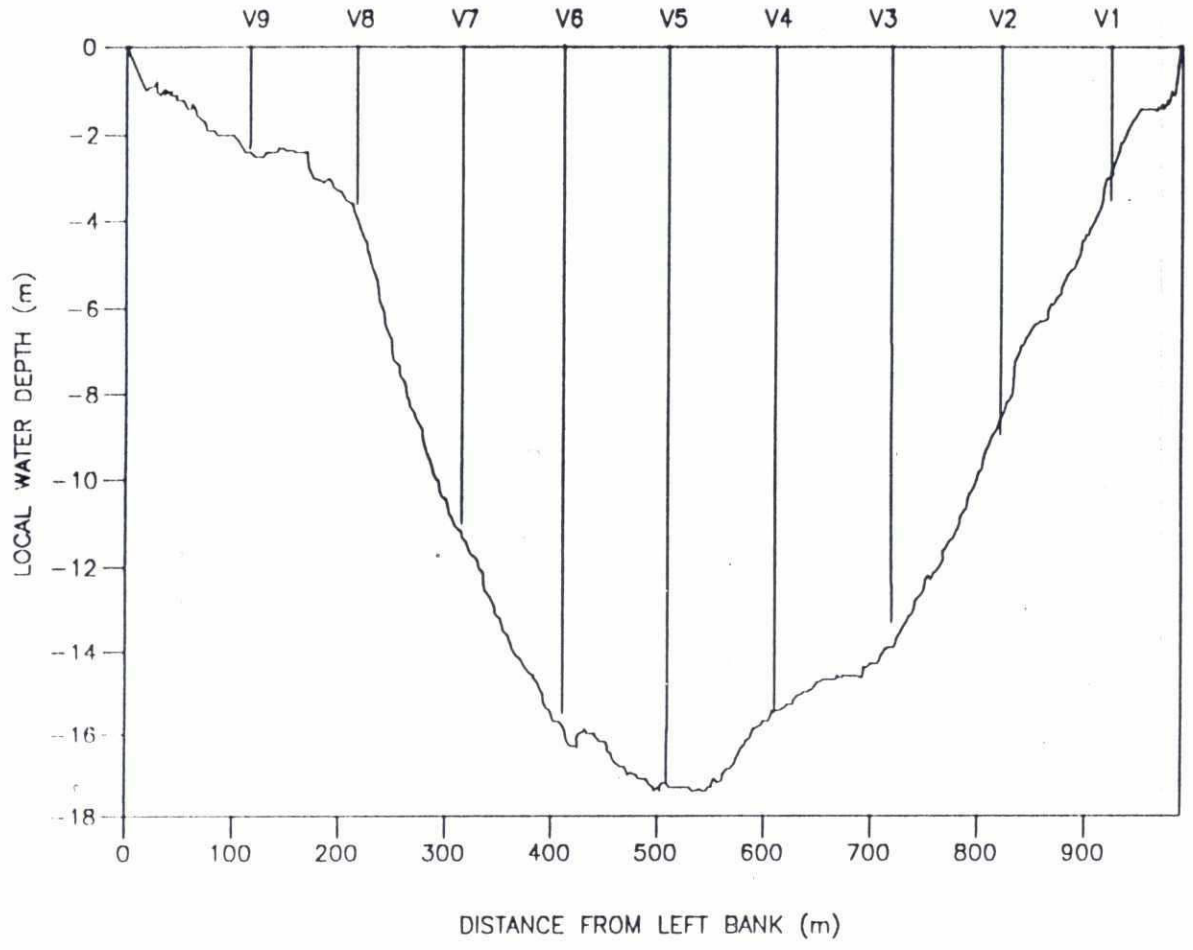
- High land
- Unstable / low char
- Cross section
- FAP 24 Staff gauge

N

5000m 2500m 0

Map is based on satellite images of March 1995

FAP 24 RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities DELFT - DHI	Survey Bulletin 143 : 28 - 29 March, 1995	
	Location 4 : Ganges River, Hardinge Bridge	
Date : 13 Aug 1995 Init : mzh/ss	Location map	page 11



Water level : 5.29 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT - DHI RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 143 : 28 - 29 March, 1995	
		Location 4 : Ganges River, Hardinge Bridge	
File : H53S0T01	Date : 13 Aug 1995 Init : mzh/ss	Cross-sections and measured verticals Channel 1	page 1.2

Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	-	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	2	-	-	-
Vertical current profile	No.of verticals in channel	9	-	-	-
	ADCP	-	-	-	-
	S4 current meter	9	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	51	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	-	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-

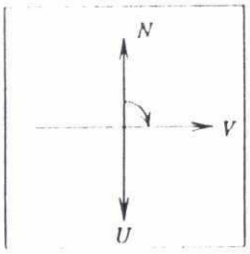
Table 2.1: Survey programme as made

Channel	Width (m)	Area (m^2)	Stage h (m+PWD)	Discharge Q (m^3/s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	988	9324	5.29	417	-	4.1

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Hardinge Bridge	Channel 1	28 Mar 95 29 Mar 95	5.29 5.29	FAP 24

Table 2.3: Water-Levels

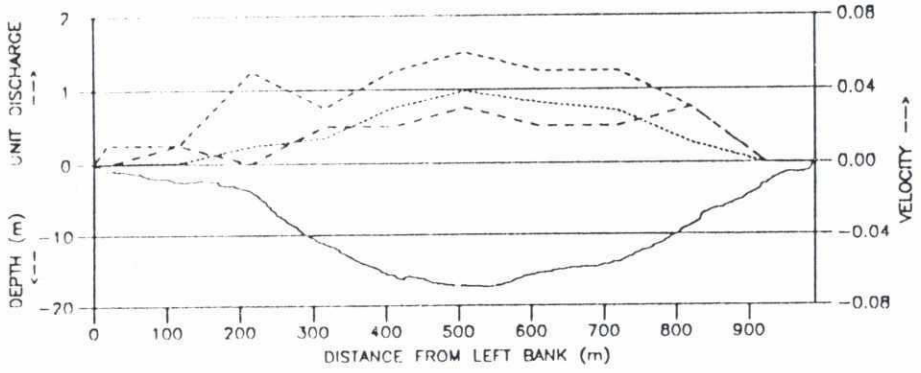


TRANSECT AZIMUTH = 90°

U – VELOCITY NORMAL TO TRANSECT (m/s)

V – VELOCITY PARALLEL TO TRANSECT (m/s)

N – MAGNETIC NORTH



LEGEND :

WATER DEPTH (m below STAGE)

UNIT DISCHARGE (m^2/s.m)

U – (m/s)

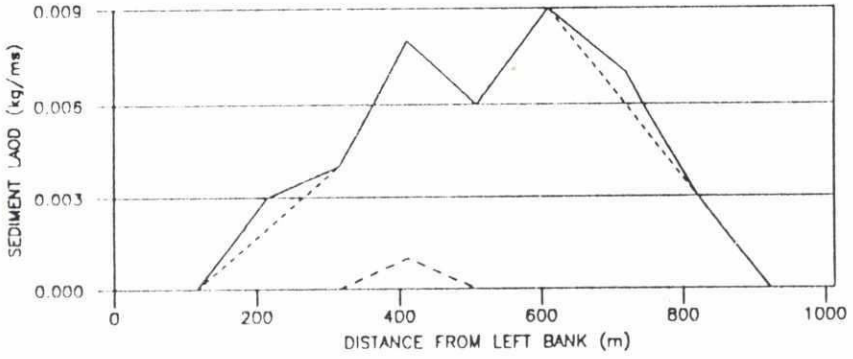
V – (m/s)

STAGE = 6.29 (m+PWD)

A = 9324 (m^2)

Q = 417 (m^3/s)

FLOW



LEGEND :

S_{TOTAL} 4.1 (kg/s)

$S_{WASH\ LOAD}$ 3.9 (kg/s)

$S_{SUSP.\ BED}$ 0.2 (kg/s)

$S_{BED\ LOAD}$ 0 (kg/s)

SEDIMENT TRANSPORT

Sample not collected

LEGEND :

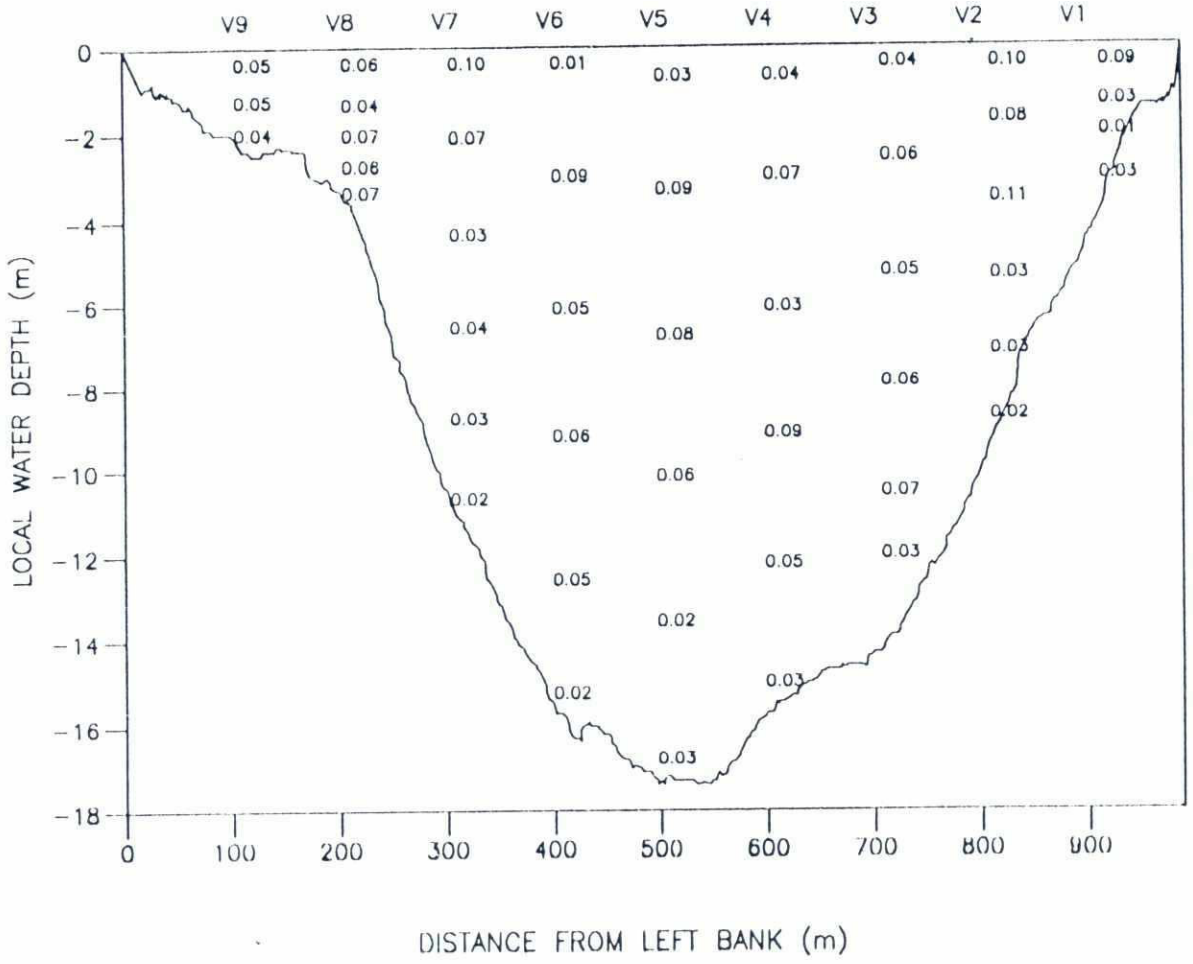
◊◊◊◊◊ $D_{50\ SUSP.}$ (mm)

△△△△△ $D_{50\ BED\ LOAD}$ (mm)

□□□□□ $D_{50\ BED\ MAT.}$ (mm)

GRAIN SIZE

FAP 24 DELFT HYDRAULICS	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 143 : 28 - 29 March, 1995	
		Location 4 : Ganges River, Hardinge Bridge	
File H5350101	Date 13 Aug 1995	Horizontal distribution of flow and sediments	page
	Init mzh/ss	Channel 1	3.1



Water level : 5.29 m + PWD measured at the station indicated on page 1.1

FAP 24 DELFT · DHI	RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 143 : 28 - 29 March, 1995	
		Location 4 : Ganges River, Hardinge Bridge	
File : H53S0T01	Date : 13 Aug 1995	Cross-sectional distribution of flow velocity	page
	Init : mzh/ss	Channel 1	4.1

Andreasen settling tube

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.1: Grain size of near bed suspended sediment (0.3 m above river bed)

US BM-54 bed samples

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	D35 (mm)	D50 (mm)	D65 (mm)
Sample not collected							

Table 5.2 : Grain size of bed material

Helley Smith

Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm	$\bar{D}35$ (mm)	$\bar{D}50$ (mm)	$\bar{D}65$ (mm)
Sample not collected							

Table 5.3 : Grain sizes of bed load

280

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo sounding	1	9503281020-1028 9503281031-1039	H53S0T01 * H53S0T02

Table 6.1: Echo-sounding

*: echo-sounding in PSD 24 data base and presented in Sections 3 and 4

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	File name
Vertical current & turbidity profiles (ADCP/S4/MEX)	1	1	9503281150-1220	400957	660673	3.50	H53S0P01 *
		2	9503281231-1259	401059	660684	9.00	H53S0P02 *
		3	9503281357-1422	401159	660664	13.30	H53S0P03 *
		4	9503290842-0911	401267	660668	15.40	H53T0P01 *
		5	9503290920-0951	401371	660669	17.20	H53T0P02 *
		6	9503291003-1030	401468	660673	15.50	H53T0P03 *
		7	9503281525-1550	401564	660669	11.00	H53S0P06 *
		8	9503281456-1518	401664	660666	3.60	H53S0P05 *
		9	9503281438-1450	401762	660666	2.30	H53S0P04 *

Table 6.2: Vertical profiles

* ADCP & MEX not available

Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	6	9503281150-1220	400957	660673	3.50
		2	6	9503281231-1259	401059	660684	9.00
		3	6	9503281357-1422	401159	660664	13.30
		4	6	9503290842-0911	401267	660668	15.40
		5	6	9503290920-0951	401371	660669	17.20
		6	6	9503291003-1030	401468	660673	15.50
		7	6	9503281525-1550	401564	660669	11.00
		8	6	9503281456-1518	401664	660666	3.60
		9	3	9503281438-1450	401762	660666	2.30

Table 6.3: Suspended sediment - point sampled

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	H53S0T01 .ase
Echosounder data	1	QUATTRO	H53S0T01 .ech
Sediment transport data	1	QUATTRO	H53S0T01 .sed
Susp sed conc analysis	1	QUATTRO	H53S0T01 .ssc
Transect plot data	1	QUATTRO	H53S0T01 .trs

Table 7.1 PSD 24 Database file description