

FAP24

Government of
the People's
Republic of
Bangladesh

Water Resources
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European
Commission

Delft
Hydraulics



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RIVER SURVEY PROJECT

Special
Report
No.22

River Data Book
January 1993 - March 1995

Part B. 9 : Gorai

October 1996

2

Special Report 22

River Data Book
January 1993 - March 1995

Part B.9: Gorai (Kushtia)

October 1996

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Part B: Routine gauging January 1993 - March 1995

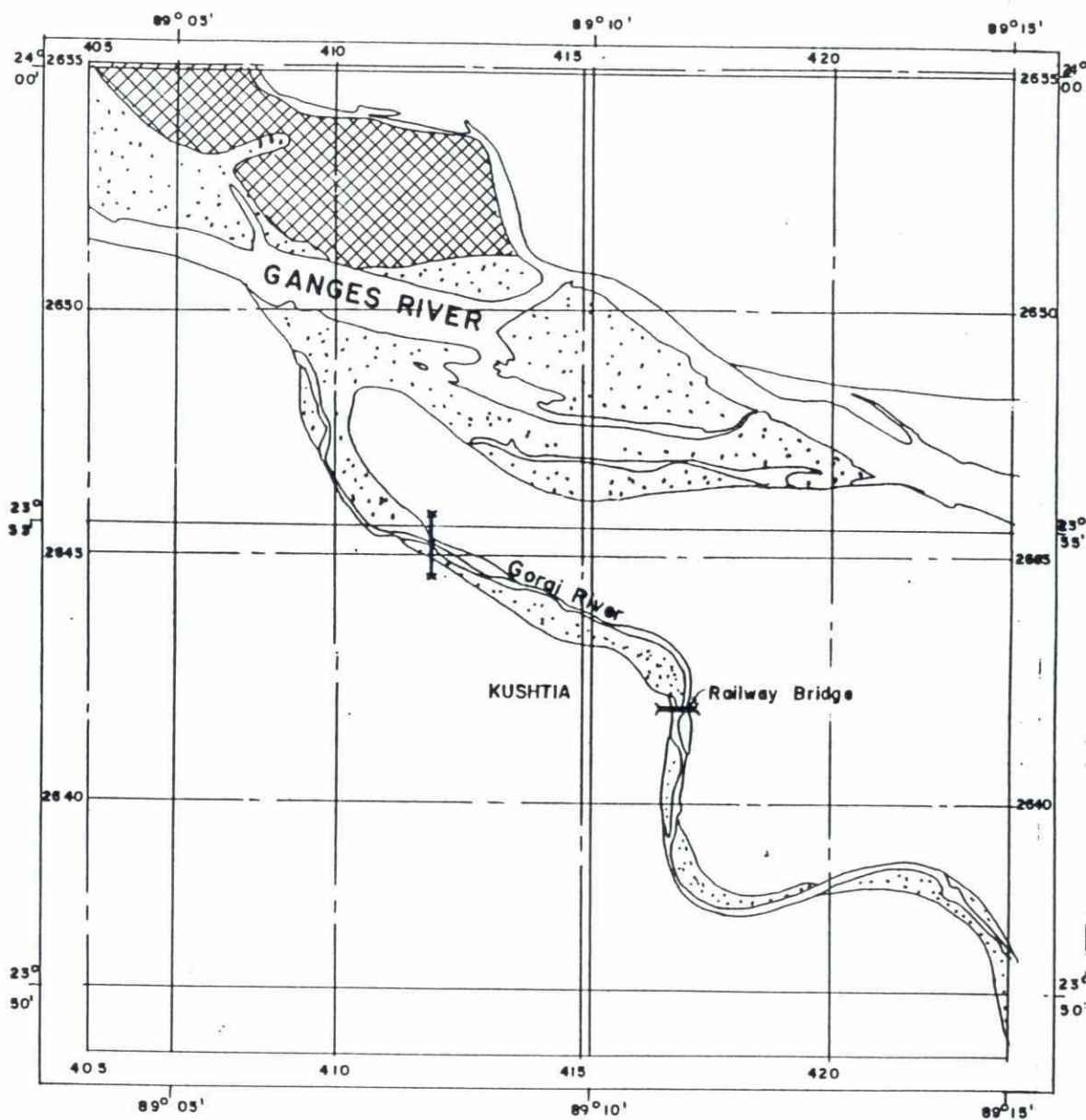
B.1	Bahadurabad
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109	24/10 94
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130	5/1 95



LEGEND:-

- X—X Measurement Cross Section
- High Land
- Unstable/Low land
- BWDB Embankment



5000m 2500m 0

Map is based on most recent
Satellite Image of March 1993.



RIVER SURVEY PROJECT

Delft Hydraulics/Danish Hydraulic Institute
in association with Oxis/Approtech/HydroLand

Survey Bulletin No. 16 - Sep , 1993

Location No.9 : Gorai River at Gorai Offtake

File:

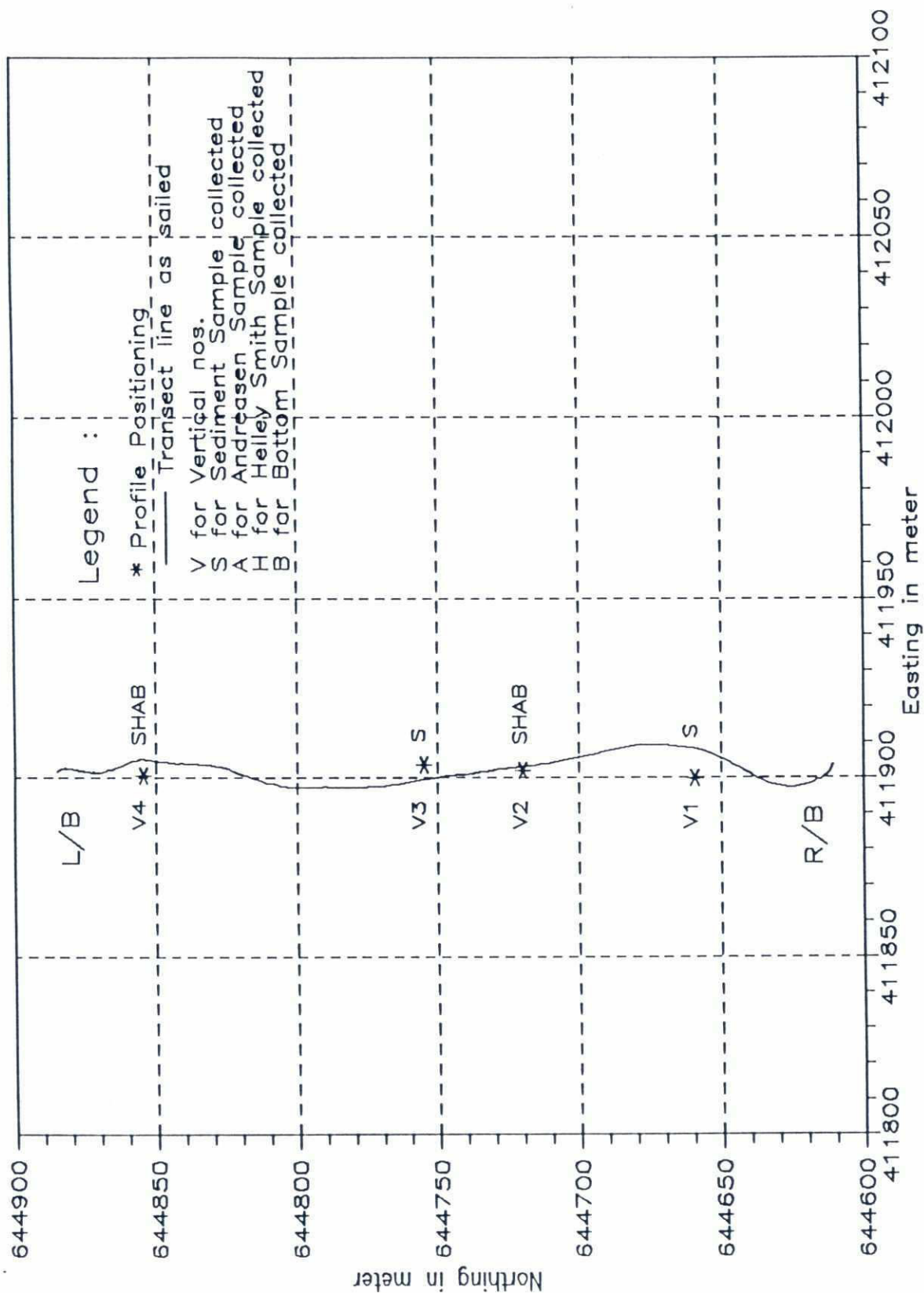
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KEY PLAN

Fig.



FAP 24



DELFT - DHI

RIVER SURVEY PROJECT

Flood Plan Coordination Organization

Commission of the European Communities

Survey Bulletin 16 : September 1993

Location 9 : Gorai River, Gorai Offtake

Location of Measurements

Date :

Init :

9

River : Gorai
ADCP/EMF Discharge

Date of Survey : 29-30 September 1993
Location : Gorai River at Gorai Offtake
Station No. 9

Date	Transect	Bank		Water Level	Total Width	Area	Discharge
		From	To	(m+PWD)	(m)	(sq.m)	(cumec)
29/09/93	K39T1T03	Right	Left	11.98	282	2421	3340
29/09/93	K39T1T04	Left	Right	11.98	287	2543	3419
30/09/93	K39U1T02	Left	Right	11.98	296	2715	3309
30/09/93	K39U1T05	Right	Left	11.98	300	2581	3802
30/09/93	K39U1T06	Left	Right	11.98	288	2717	3410

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



River : Gorai
S4 velocity

Date of Survey : 29-30 September 1993
Location : Gorai River at Gorai Offtake
Station No. 9

Vertical 1		Vertical 2		Vertical 3		Vertical 4	
Total depth = 10.60 m		Total depth = 8.80 m		Total depth = 9.40 m		Total depth = 12.25 m	
Depth	Velocity	Depth	Velocity	Depth	Velocity	Depth	Velocity
[m]	[m/s]	[m]	[m/s]	[m]	[m/s]	[m]	[m/s]
1.98	1.80	1.81	1.72	1.04	1.77	1.00	1.17
4.03	1.91	3.60	1.77	2.05	1.74	2.38	1.01
6.17	1.89	5.49	1.65	4.08	1.73	4.73	0.92
8.08	1.82	7.39	1.49	6.12	1.61	7.10	1.04
9.34	1.67	8.49	1.31	8.25	1.40	9.44	1.04
				8.41	1.32	11.26	0.90

$Q_w = 2865 \text{ (m}^3/\text{s)}$

Table 3.2 SUMMARY OF RESULTS (S4 Current)

Concentration

Date of Survey : 29-30 September 1993
Location : Gorai River at Gorai Offtake
Station No. 9

Vertical 1		Vertical 2		Vertical 3		Vertical 4	
Total depth = 10.60 m		Total depth = 8.80 m		Total depth = 9.40 m		Total depth = 12.25 m	
Depth	Conc.	Depth	Conc.	Depth	Conc.	Depth	Conc.
[m]	[mg/l]	[m]	[mg/l]	[m]	[mg/l]	[m]	[mg/l]
0.80	1598.52	0.59	1585.25	1.04	1828.15	1.00	1524.14
1.98	1634.44	1.81	1643.55	2.05	2185.29	2.38	1572.13
4.03	1701.35	3.60	1760.76	4.08	2450.00	4.73	1568.99
6.17	1695.95	5.49	1774.60	6.12	2772.73	7.10	1639.46
8.08	1723.40	7.39	2023.61	8.25	3494.03	9.44	1627.54
9.34	1897.71	8.49	2523.08	8.41	3797.51	11.26	2285.51

$Q_s = 6008 \text{ (Kg/s)}$

Table 3.3 SUMMARY OF RESULTS (Suspended Sediment Concentration)

River : Gorai

Bed load

Date of Survey : 29-30 September 1993

Location : Gorai River at Gorai Offtake

Station No. 9

Helley-Smith samples		
Vertical no.	Bed load sb in Kg/ms	
	1	2
2	0.384760	0.270290
4	0.002020	0.013930

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

River : Gorai

Grain size of bed material

Date of Survey : 29-30 September 1993

Location : Gorai River at Gorai Offtake

Station No. 9

Sample No	Date	Time	D16 (mm)	D35 (mm)	D50 (mm)	D90 (mm)	Standard Deviation
DHA-1	29/09/93	14:15	0.146	0.162	0.185	0.303	1.338
DHA-2	29/09/93	16:46	0.073	0.094	0.113	0.211	1.628

Table 3.5 SUMMARY of RESULTS (grain size bed material)

20
River : Gorai

Grain size suspended sediment

Date of Survey : 29-30 September 1993

Location : Gorai River at Gorai Offtake

Station No. 9

Sample No	Date	Time	D16 (mm)	D35 (mm)	D50 (mm)	D90 (mm)	Standard Deviation
A15	29/09/93	14:05	0.013	0.030	0.050	0.220	3.900
A472	29/09/93	16:45	0.004	0.012	0.018	0.050	3.210

Table 3.6 SUMMARY OF RESULTS (Grain size suspended sediment)

River : Gorai

Grain size of bed load

Date of Survey : 29-30 September 1993

Location : Gorai River at Gorai Offtake

Station No. 9

Sample No	Date	Time	D35 (mm)	D50 (mm)	D90 (mm)	Standard Deviation
A32	29/09/93	13:40	0.159	0.180	0.204	1.323
A39	29/09/93	14:10	0.160	0.181	0.205	1.328
A31	29/09/93	16:40	0.271	0.315	0.366	1.753
A460	29/09/93	16:55	0.104	0.137	0.182	1.911

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	17:00:14	17:03:22	K39T1T03*				T	T	T							
Transect	17:06:03	17:09:34	K39T1T04				T	T	T							
Profile	12:10:43	13:16:12	K39T2P04	1	411899	644653		P		P		6	-	-	-	-
Profile	13:42:05	14:25:36	K39T2P05	2	411896	644722		P		P		6	1	2	-	1
Profile	15:03:37	16:02:11	K39T2P06	3	411898	644772		P		P		6	-	-	-	-
Profile	16:22:47	17:03:52	K39T2P07	4	411897	644853		P		P		6	1	2	-	1

* transect in PSD 24 data base

Date of Survey : 29 September 1993
Location : Gorai River at Gorai Offtake

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	08:15:05	08:18:22	K39U1T02				T	T	T							
Transect	08:23:08	08:26:37	K39U1T05				T	T	T							
Transect	08:30:23	08:33:42	K39U1T06				T	T	T							

Date of Survey : 30 September 1993
Location : Gorai River at Gorai Offtake
Station No. 9

Table 2.1 SURVEY PROGRAMME AS MADE

30

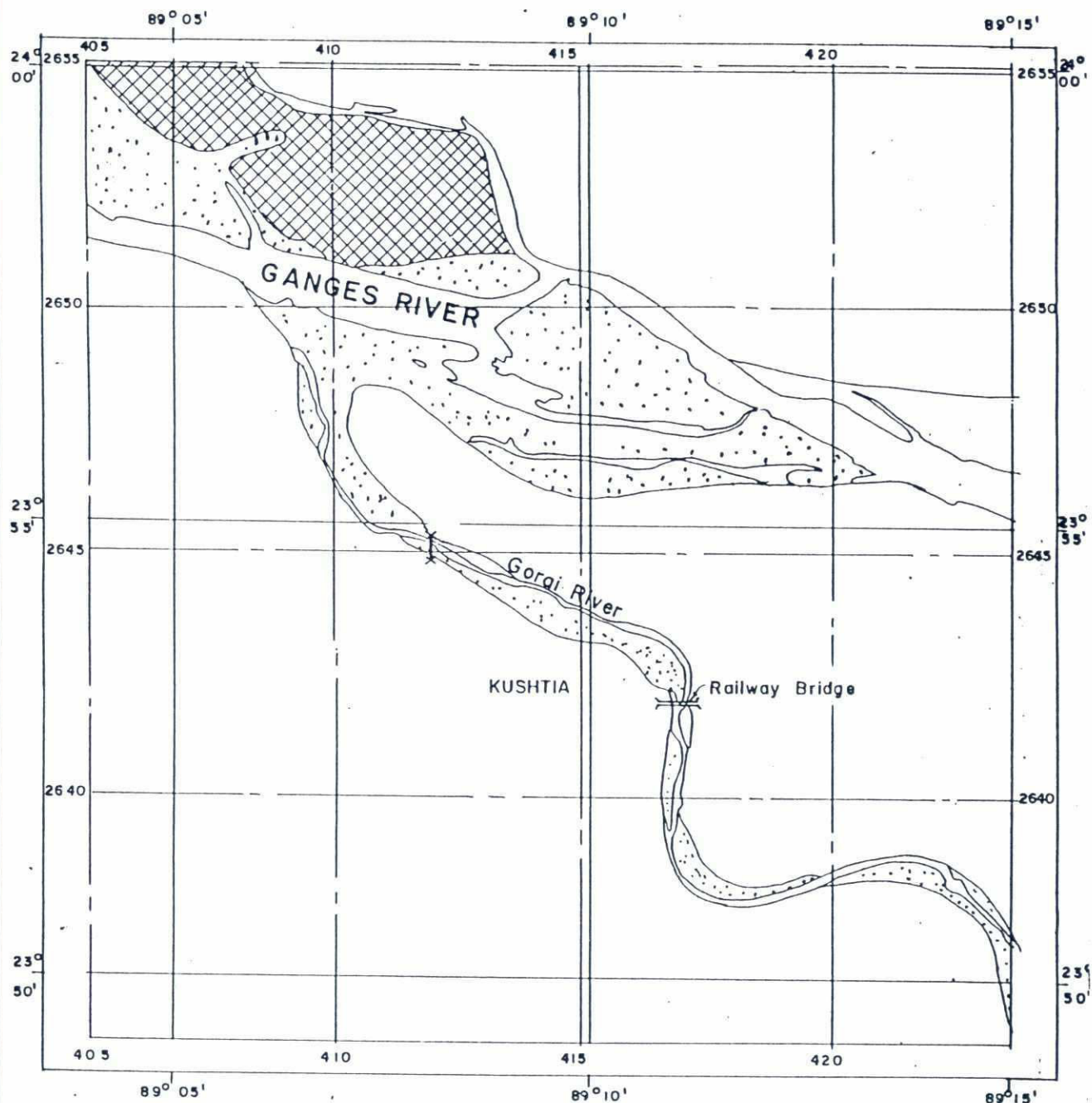
22 ✓

Type Of Samples	Sample Nos.	Total Sample Nos.	Vertical No.
Point Integrated Samples	A222,A220,A219,A194,A216,A212	6	1
	A195,A200,A208,A235,A499,A522	6	2
	A480,A483,A482,A481,A479,A485	6	3
	A484,A495,A476,A475,A474,A477	6	4
Andreasen Tube Sample	A15	1	2
	A472	1	4
Helley-Smith Samples	A32,A460	2	2
	A31,A460	2	4
Vanveen Samples	DHA-1	1	2
	DHA-2	1	4

Date of Survey : 29 September 1993
Location : Gorai River at Gorai Offtake
Station No. 9

Table 2.2 List of Sediment Samples

Types of Data	Channel	Format	Filename
ADCP/S4/EMF	1	QUATTRO	K39T1T03 .ase
Echosounder	1	QUATTRO	K39T1T03 .ech
Sediment transport data	1	QUATTRO	K39T1T03 .sed
Bed load sediment analysis	1	QUATTRO	K39T1T03 .bdl
Suspended sed. conc. analysis	1	QUATTRO	K39T1T03 .ssc
Transect plot data	1	QUATTRO	K39T1T03 .trs
Iso-velocity plot data	1	MIKE 21	K39T1T03 .ct2 K39T1T03 .dt2
Table 5.1 PSD 24 Database file description			



LEGEND:-

- X—X Measurement Cross Section
- High Land
- Unstable/Low land
- BWDB Embankment



5000m 2500m 0

Map is based on most recent
Satellite Image of March 1993.



RIVER SURVEY PROJECT

Delft Hydraulics/Danish Hydraulic Institute
in association with Osmo/Approfect/Hydroland

Survey Bulletin 35 - 15 Feb, 1994

Location No.9 : Gorai River at Gorai Offtake

File:

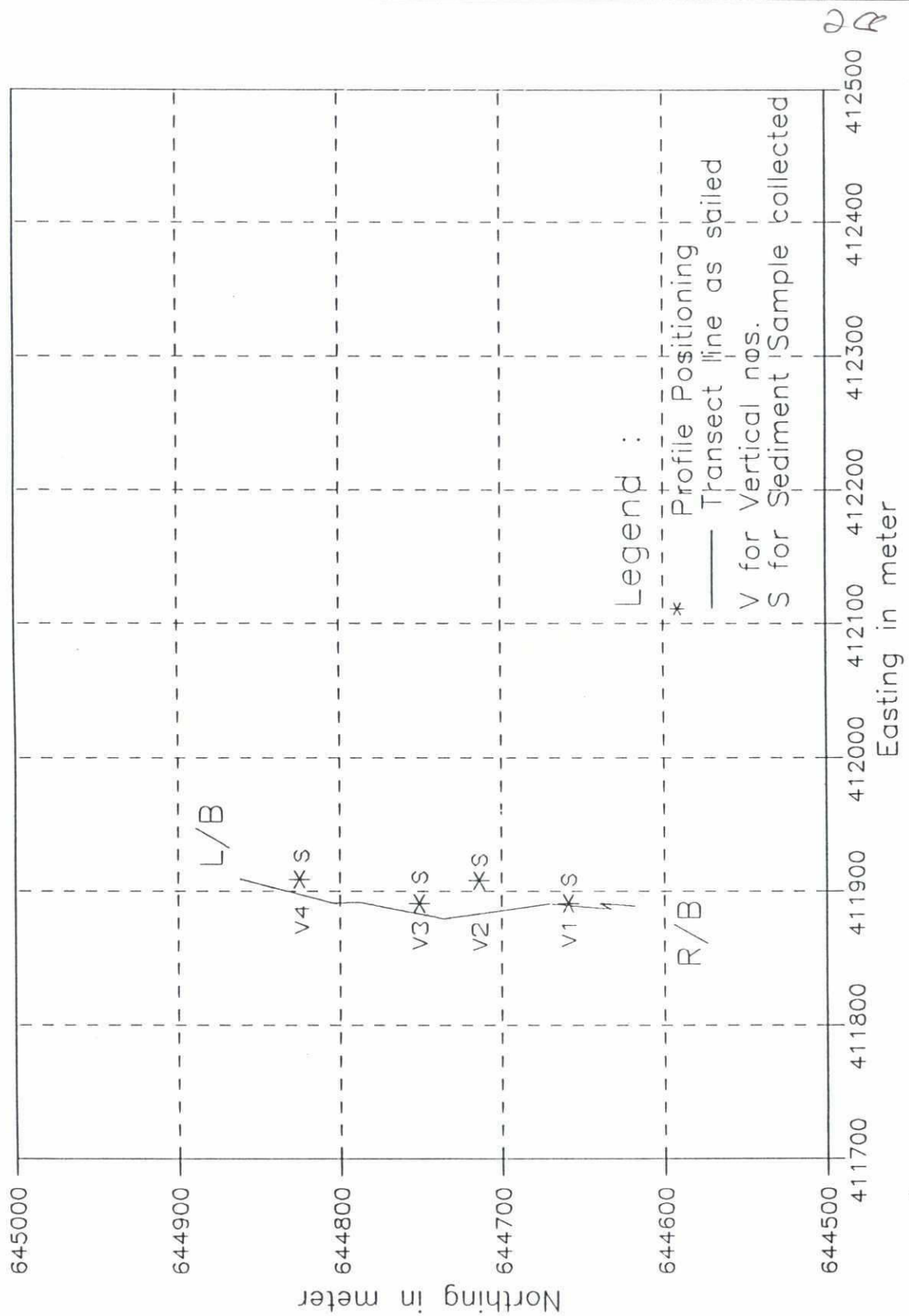
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KEY PLAN

Fig.



22

<div data-bbox="151 1803 295 1926"> FAP 24 DELFT - DHI </div> <div data-bbox="367 1848 638 1937"> RIVER SURVEY PROJECT <small>Flood Plan Coordination Organization</small> <small>Commission of the European Communities</small> </div>		Survey Bulletin 35 : February 1994	
		Location 9 : Gorai River, Gorai Offtake	
	Date :	Location of Measurments	
	Init :		

29
River : Gorai
S4 Discharge

Date of Survey : 15 February 1994
Location : Gorai River at Gorai Offtake
Location No : 9

Date	Profile File	Bathy File	Water Level	Total Width	Area	Discharge	Sediment Transport
			(m+PWD)	(m)	(sq.m)	(cumec)	(Kg/s)
15/02/94	K42F0P01	K42F0T01	4.19	264.00	417.00	16.87	0.42
15/02/94	K42F0P02						
15/02/94	K42F0P03						
15/02/94	K42F0P04						

Table 3.1 SUMMARY OF RESULTS (S4-discharge)

River : Gorai
S4 Velocity

Date of Survey : 15 February 1994
Location : Gorai River at Gorai Offtake
Location No : 9

Vertical 1		Vertical 2		Vertical 3		Vertical 4	
Total Depth = 0.46 m		Total Depth = 0.70 m		Total Depth = 1.10 m		Total Depth = 3.00 m	
Depth	Velocity	Depth	Velocity	Depth	Velocity	Depth	Velocity
[m]	[m/s]	[m]	[m/s]	[m]	[m/s]	[m]	[m/s]
0.11	0.07	0.47	0.08	0.60	0.08	0.60	0.08
						1.80	0.03
						2.40	0.02

Table 3.2 SUMMARY OF RESULTS (S4 Current)

River : Gorai
Concentration

Date of Survey : 15 February 1994
Location : Gorai River at Gorai Offtake
Location No : 9

Vertical 1		Vertical 2		Vertical 3		Vertical 4	
Total Depth = 0.46 m		Total Depth = 0.70 m		Total Depth = 1.10 m		Total Depth = 3.00 m	
Depth	Conc.	Depth	Conc.	Depth	Conc.	Depth	Conc.
[m]	[mg/l]	[m]	[mg/l]	[m]	[mg/l]	[m]	[mg/l]
0.11	58.02	0.47	30.91	0.60	15.00	0.60	17.66
						1.80	20.72
						2.40	24.46

Table 3.3 SUMMARY OF RESULTS (Suspended Sediment Concentration)

DISCHARGE GAUGING							SEDIMENT TRANSPORT GAUGING									
Type	Time		File Name	Ver. No.	Easting (meter)	Northing (meter)	ADCP	HYDRO	EMF	S4	MEX	Suspended Sediment Samples	Andreasen Tube Samples	Helley Smith Samples	Integrated Sediment Samples	Bottom Samples
	From	To														
Transect	14:19:00	14:23:00	K42F0T01*					T								
Profile	15:25:00	15:32:00	K42F0P01	1	411891	644659		P		P		1	-	-	-	-
Profile	15:40:00	15:49:00	K42F0P02	2	411908	644714		P		P		1	-	-	-	-
Profile	15:54:00	16:00:00	K42F0P03	3	411891	644751		P		P		1	-	-	-	-
Profile	16:11:00	16:26:00	K42F0P04	4	411909	644825		P		P		3	-	-	-	-

transect in PSD 24 data base

* transect in PSD 24 data base

Date of Survey : 15 February 1994
 Location : Gorai River at Gorai Offtake
 Location No : 9

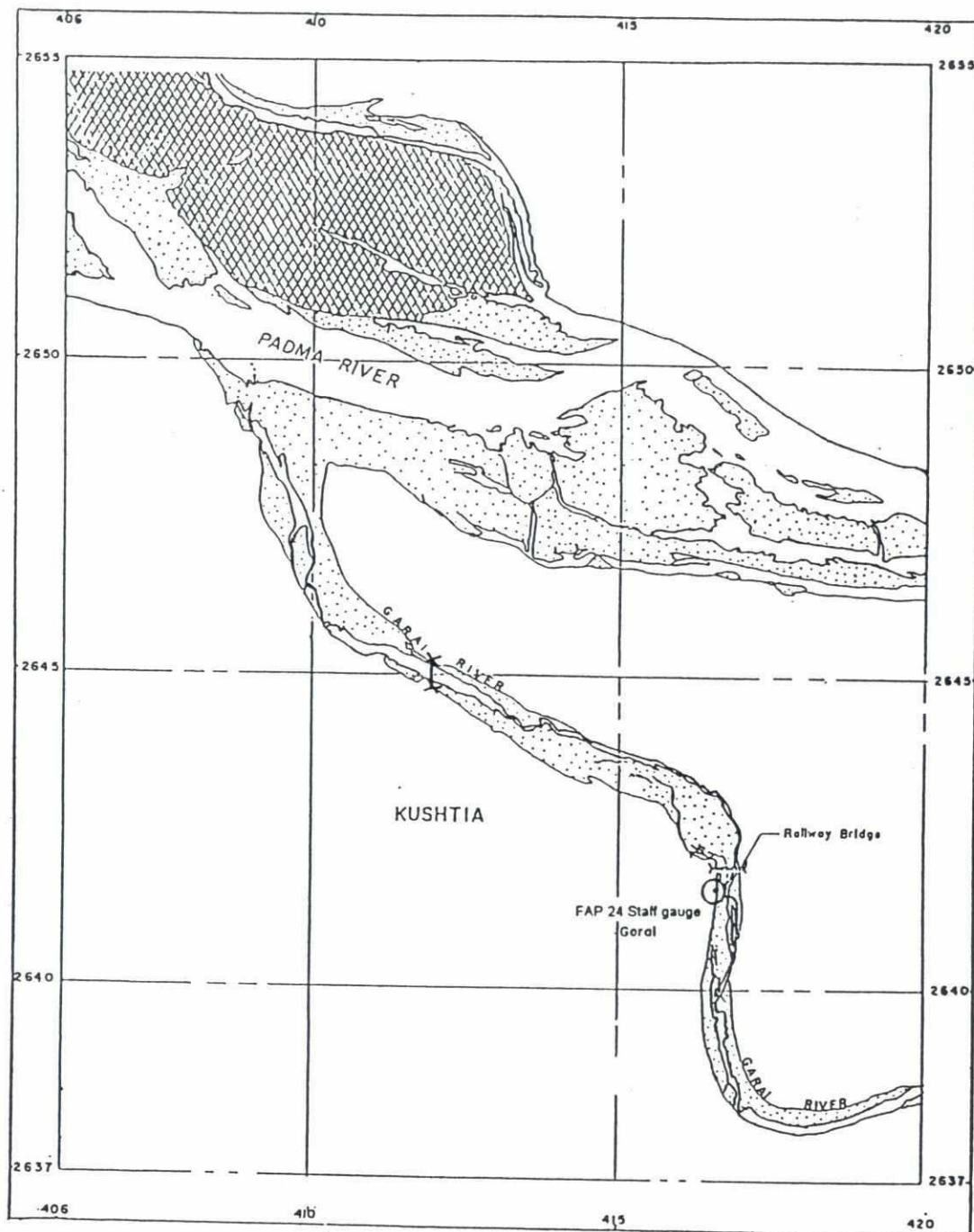
Table 2.1 SURVEY PROGRAMME AS MADE

Type Of Samples	Sample Nos.	Total Sample Nos.	Vertical No.
Point Integrated Samples	A1254	1	1
	A1260	1	2
	A1222	1	3
	A1247,A1269,A1339	3	4

Date of Survey : 15 February 1994
 Location : Goral River at Goral Offtake
 Location No : 9

Table 2.2 List of Sediment Samples

Types of Data	Channel	Format	Filename
ADCP/S4/EMF	1	QUATTRO	K42F0T01 .ase
Echosounder	1	QUATTRO	K42F0T01 .ech
Sediment transport data	1	QUATTRO	K42F0T01 .sed
Bed load sediment analysis	1	QUATTRO	K42F0T01 .bdl
Suspended sed. conc. analysis	1	QUATTRO	K42F0T01 .ssc
Transect plot data	1	QUATTRO	K42F0T01 .trs
Iso-velocity plot data	1	MIKE 21	K42F0T01 .ct2 K42F0T01 .dt2
Table 5.1 PSD 24 Database file description			



LEGEND:-

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



5000 m 2500 m 0

Map is based on satellite
images of March 1994



RIVER SURVEY PROJECT

Delft Hydraulics/Danish Hydraulic Institute
in association with Osiris/Approtech/HydroLand

Survey Bulletin No.38 - March, 1994

Location No.9 : Gorai River at Gorai Offtake

File:

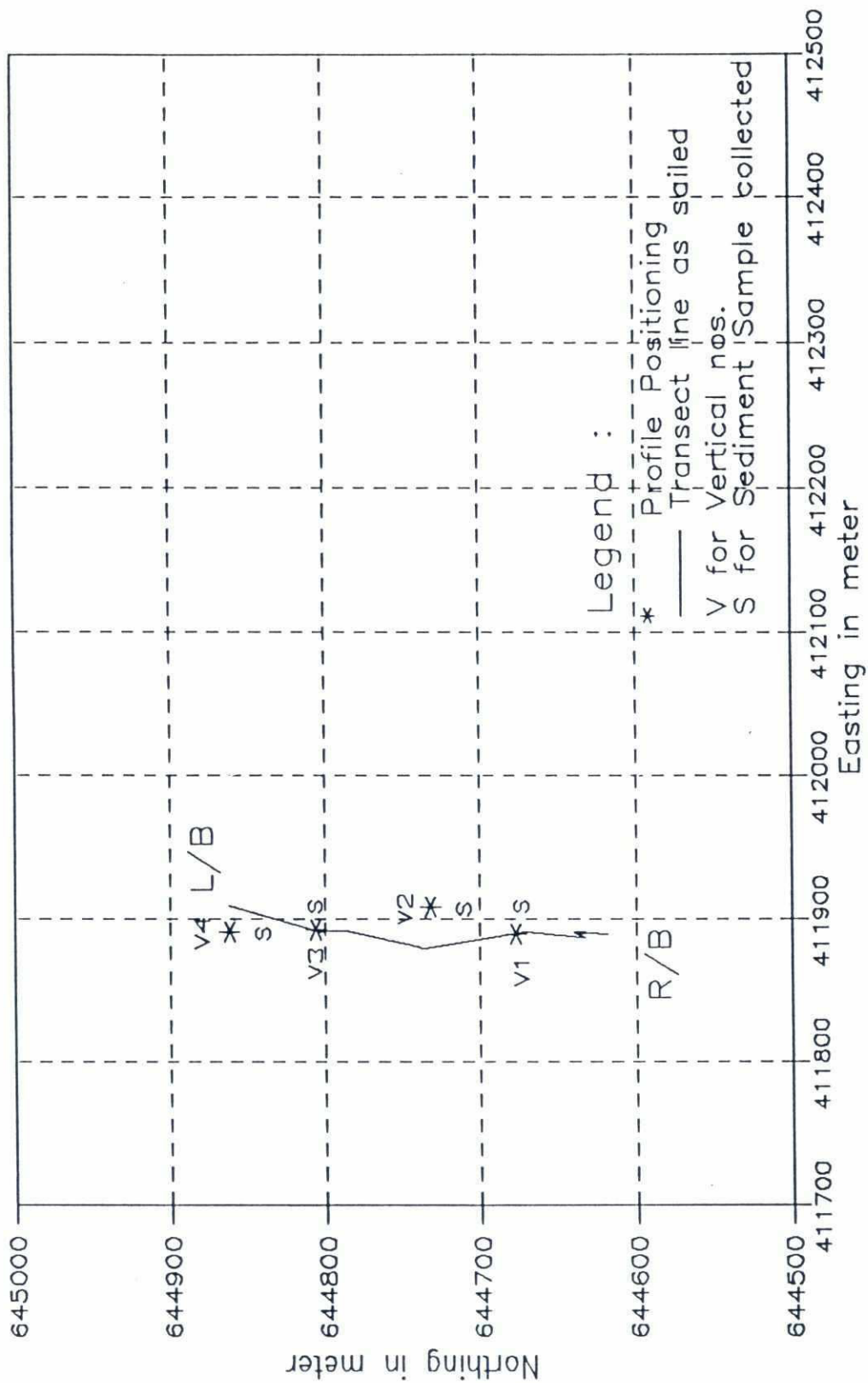
Date:

Scale:

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KEY PLAN

Fig.



River : Gorai
S4 Discharge

Date of Survey : 6 March 1994
Location : Gorai River at Gorai Offtake
Location No : 9

Date	Profile File	Bathy File	Water Level	Total Width	Area	Discharge	Sediment Transport
			(m+PWD)	(m)	(sq.m)	(cumec)	(Kg/s)
06/03/94	K4360P01	K42F0T01	4.18	264.00	417.48	3.37	0.02
06/03/94	K4360P02		4.18				
06/03/94	K4360P03		4.18				
06/03/94	K4360P04		4.18				

Table 3.1 SUMMARY OF RESULTS (S4-discharge)



River : Gorai
S4 Velocity

Date of Survey : 6 March 1994
Location : Gorai River at Gorai Offtake
Location No : 9

Vertical 1		Vertical 2		Vertical 3		Vertical 4	
Total Depth = 0.80 m		Total Depth = 1.26 m		Total Depth = 1.88 m		Total Depth = 3.11 m	
Depth	Velocity	Depth	Velocity	Depth	Velocity	Depth	Velocity
[m]	[m/s]	[m]	[m/s]	[m]	[m/s]	[m]	[m/s]
0.12	0.08	0.25 0.47	0.07 0.05	0.37 1.02	0.04 0.06	0.61 1.86 2.48	0.08 0.05 0.06

Table 3.2 SUMMARY OF RESULTS (S4 Current)

River : Gorai
Concentration

Date of Survey : 6 March 1994
Location : Gorai River at Gorai Offtake
Location No : 9

Vertical 1		Vertical 2		Vertical 3		Vertical 4	
Total Depth = 0.80 m		Total Depth = 1.26 m		Total Depth = 1.88 m		Total Depth = 3.11 m	
Depth	Conc.	Depth	Conc.	Depth	Conc.	Depth	Conc.
[m]	[mg/l]	[m]	[mg/l]	[m]	[mg/l]	[m]	[mg/l]
0.12	Cancelled	0.25 0.47	6.97 7.92	0.37 1.02	4.52 5.29	0.61 1.86 2.48	7.34 17.70 20.79

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			14:19:00	14:23:00	K42FOT01*					T								
Profile			12:50:00	12:54:00	K4360P01	1	411889	644677		P				1				
Profile			13:09:00	13:37:00	K4360P02	2	411908	644732		P				2		-	-	
Profile			13:49:00	14:00:00	K4360P03	3	411892	644806		P				2		-	-	
Profile			14:29:00	14:47:00	K4360P04	4	411891	644862		P				3		-	-	
transect in PSD 24 data base																		

* transect in PSD 24 data base

Date of Survey : 6 March 1994

Location : Gorai River at Gorai Offtake

Location No : 9

Table 2.1 (SURVEY PROGRAMME AS MADE)

23

Type Of Samples	Sample Nos.	Total Sample Nos.	Vertical No.
Depth Integrated samples	A1330	1	1
	A1251,a1186	2	2
	A1323,a1267	2	3
	A1207,a1165,a1202	3	4

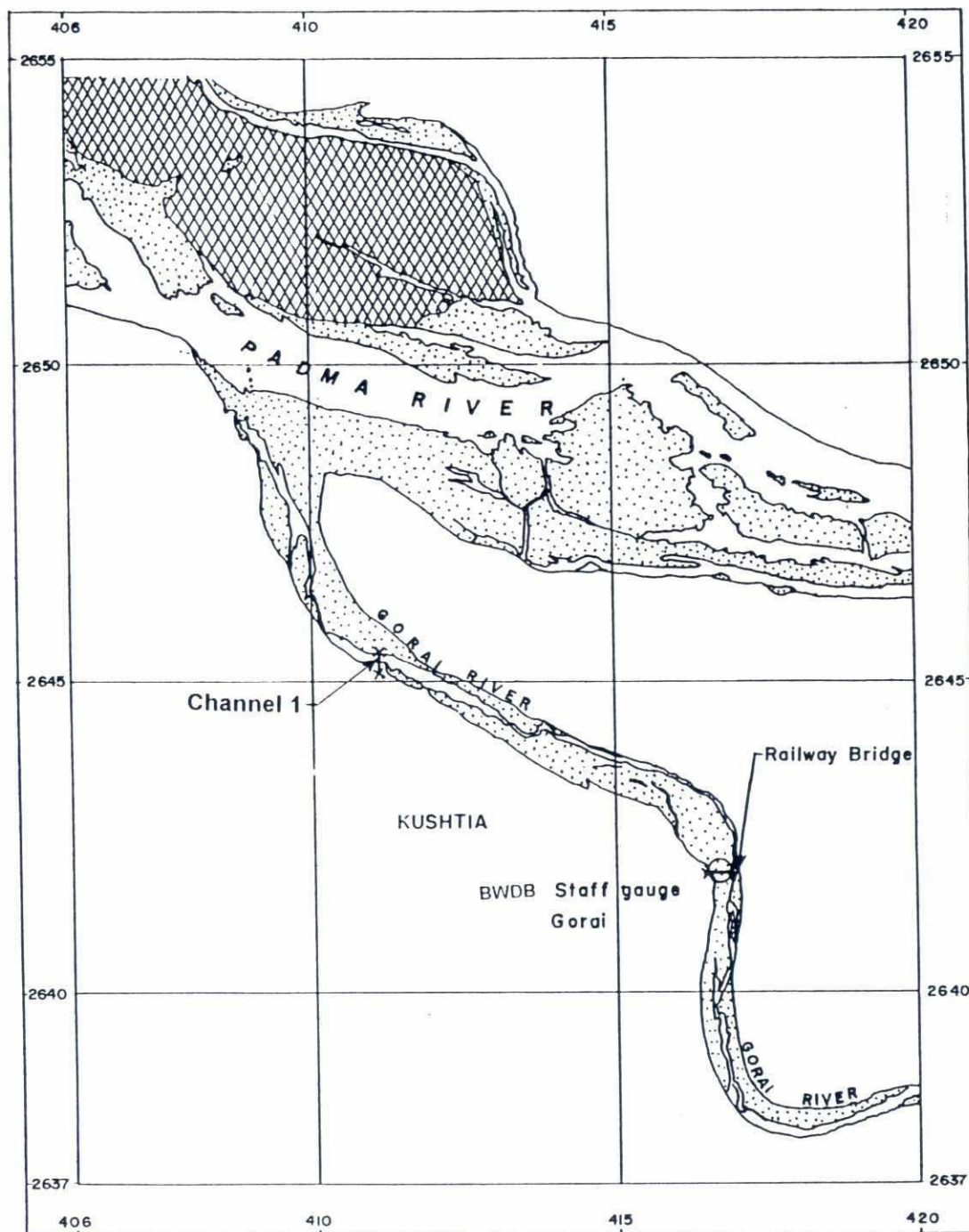
Date of Survey : 6 March 1994

Location : Gorai River at Gorai Offtake

Location No : 9

Table 2.2 List of Sediment Samples

Types of Data	Channel	Format	Filename
ADCP/S4/EMF	1	QUATTRO	K42F0T01 .ase
Echosounder	1	QUATTRO	K42F0T01 .ech
Sediment transport data	1	QUATTRO	K42F0T01 .sed
Bed load sediment analysis	1	QUATTRO	K42F0T01 .bdl
Suspended sed. conc. analysis	1	QUATTRO	K42F0T01 .ssc
Transect plot data	1	QUATTRO	K42F0T01 .trs
Iso-velocity plot data	1	MIKE 21	K42F0T01 .ct2 K42F0T01 .dt2
Table 5.1 PSD 24 Database file description			



LEGEND:

- ✕—✕ Cross Section
- ▨ High land
- ░ Unstable/low char
- BWDB Staff gauge



5000m 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 57 : 11 May, 1994

Location 9 : Gorai River, Gorai Offtake

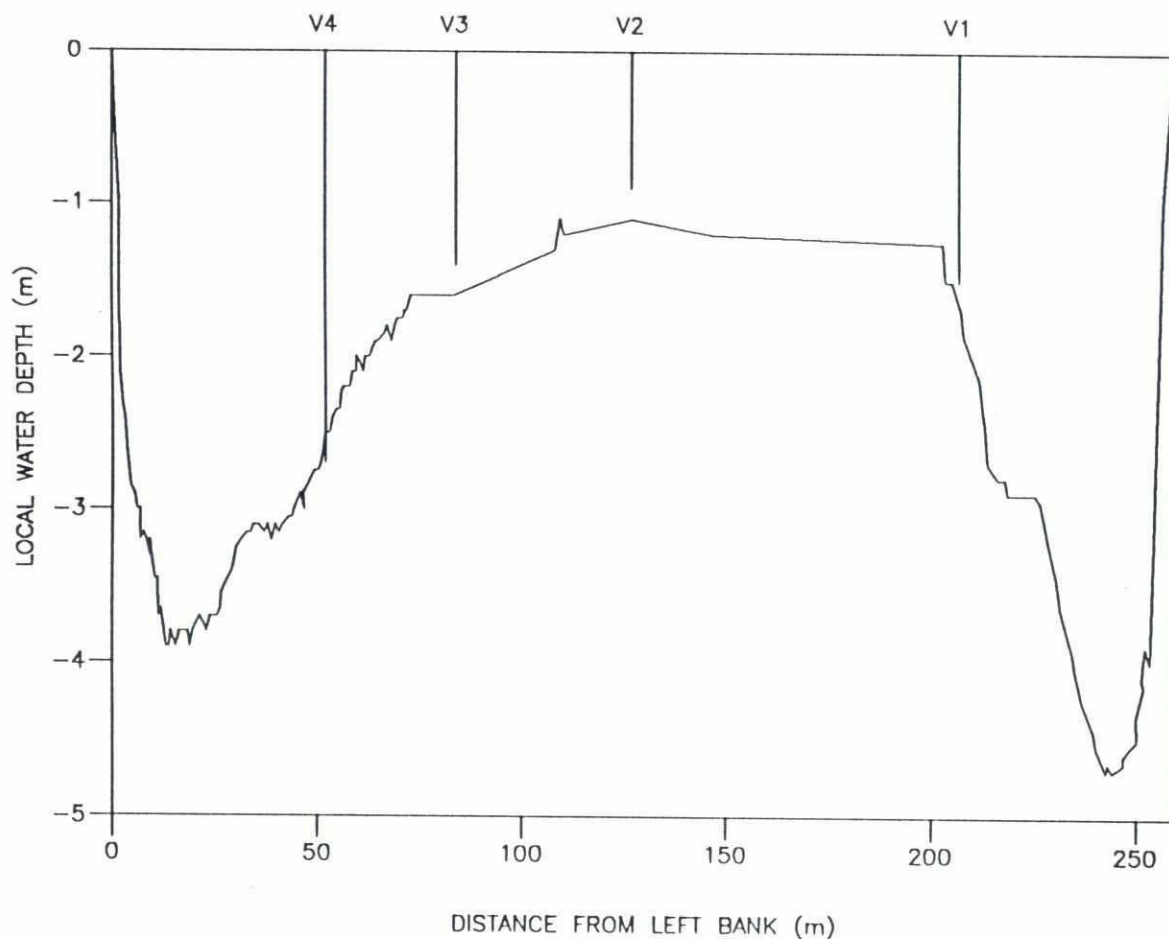
Date : 23 Aug 1994

Init : mk


Location map

page

1.1



Water-level : 4.11 m + PWD measured at the station indicated on page 1.1

FAP 24  DELFT - DHI		Survey Bulletin 57 : 11 May, 1994	
RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Location 9 : Gorai River, Gorai Offtake	
File : K45B0T01	Date : 23 Aug 1994	Cross-sections and measured verticals Channel 1	page 1.2
	Init : mk		

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	4	-	-	-
	ADCP	-	-	-	-
	S4 current meter	4	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	10	-	-	-
	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

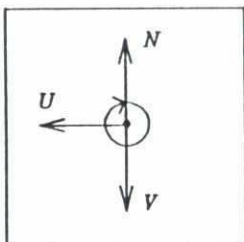
	Width (m)	Area (m ²)	Stage h (m+PWD)	Discharge Q (m ³ /s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	257	543	4.11	26	0.0	0.45

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Gorai Offtake	Channel 1	11 May 94	4.11	BWDB

Table 2.3: Water-levels

<div><div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div><div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div></div>		Survey Bulletin 57 : 11 May , 1994	
		Location 9 : Gorai River, Gorai Offtake	
File : K45B0T01	Date : 23 Aug 1994	Survey programme as made and key figures	page
	init : mk		2.1

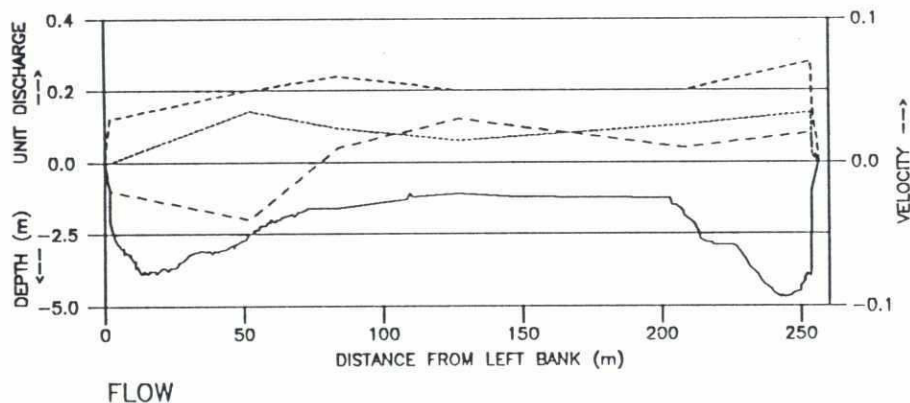


TRANSECT AZIMUTH = 360°

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 (m³/s.m)

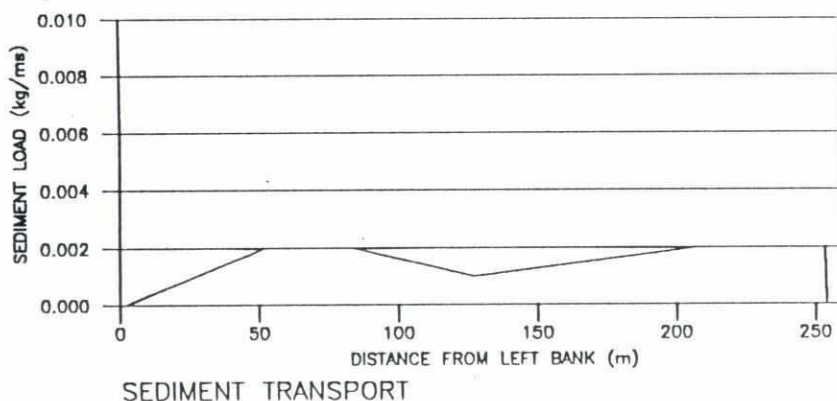
--- U - (m/s)

--- V - (m/s)

STAGE = 4.11 (m+PWD)

A = 543 (m²)

Q = 26 (m³/s)



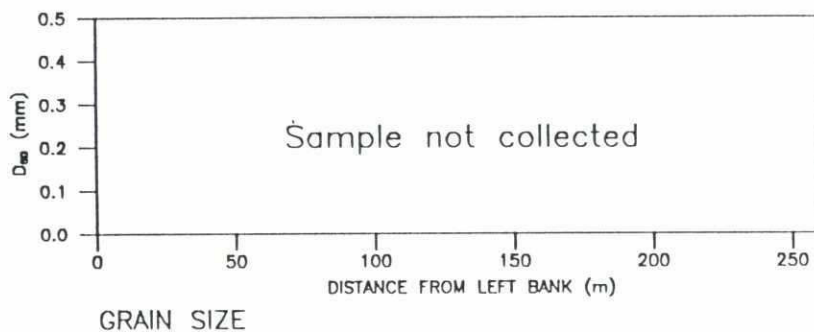
LEGEND :

— S_{TOTAL} 0.45 (kg/s)

--- S_{WASH LOAD} 0.43 (kg/s)

--- S_{SUSP. BED} 0.02 (kg/s)

..... S_{BED LOAD} 0.00 (kg/s)



◇◇◇◇◇ D₅₀ SUSP. (mm)

△△△△△ D₅₀ BED LOAD (mm)

□□□□□ D₅₀ BED MAT. (mm)

FAP 24



DELFT - DHI

RIVER SURVEY PROJECT

Flood Plan Coordination Organization

Commission of the European Communities

Survey Bulletin 57 : 11 May, 1994

Location 9 : Gorai River, Gorai Offtake

File : K45B0T01

Date : 23 Aug 1994

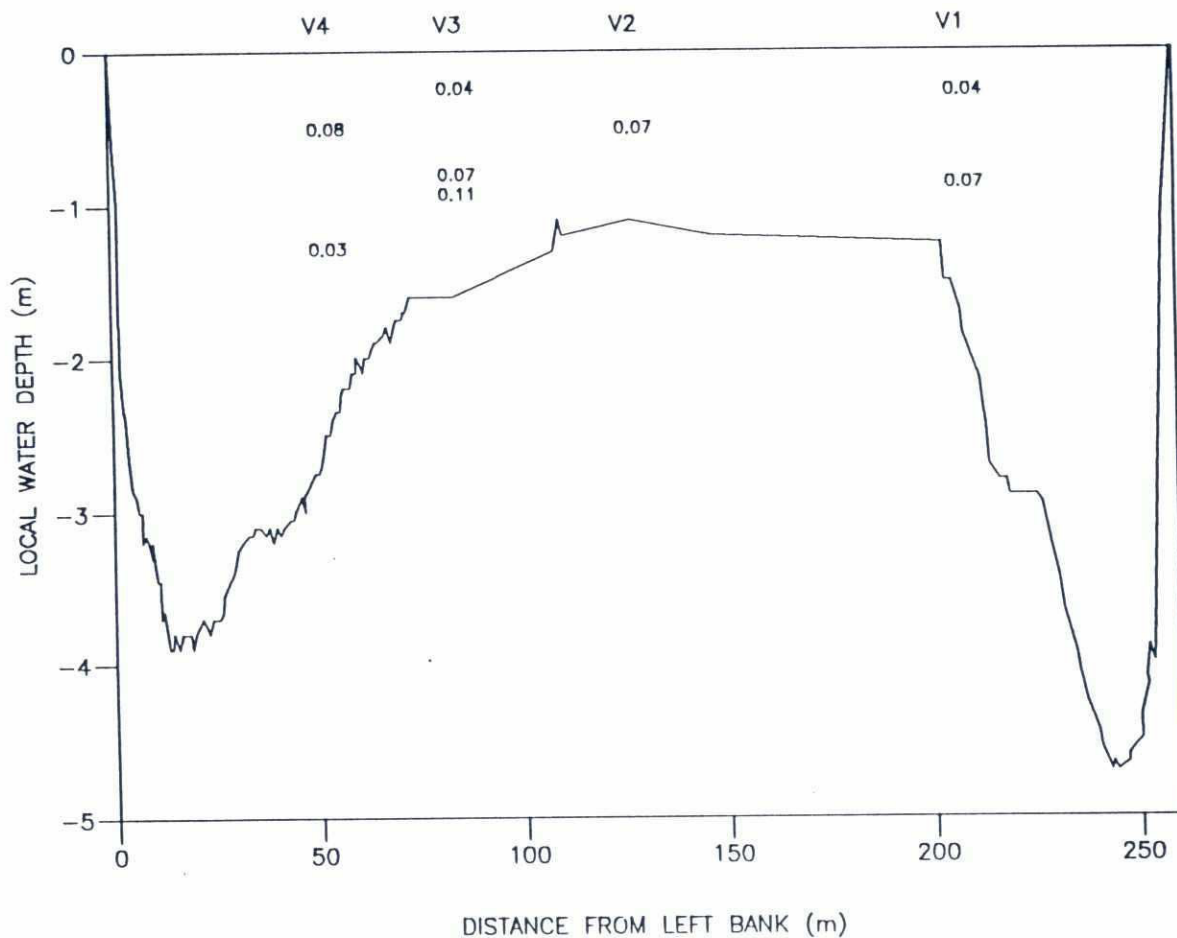
Init : mk

Horizontal distribution of flow and sediments


Channel 1

page

3.1



Water-level : 4.11 m + PWD measured at the station indicated on page 1.1

FAP 24  DELFT - DHI		Survey Bulletin 57 : 11 May, 1994	
		Location 9 : Gorai River, Gorai Offtake	
File : K45B0T01	Date : 23 Aug 1994	Cross-sectional distribution of flow velocity Channel 1	page
	Init : mk		4.1

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	199405111037-1042 199405111044-1051	K45B0T01 * K45B0T02

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	199405111310-1324	411901	644663	1.50	K45B0P01 *
		2	199405111352-1658	411894	644735	0.90	K45B0P02 *
		3	199405111408-1419	411893	644783	1.40	K45B0P03 *
		4	199405111436-1449	411896	644821	2.70	K45B0P04 *

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	199405111310-1324	411901	644663	1.50
		2	1	199405111352-1658	411894	644735	0.90
		3	3	199405111408-1419	411893	644783	1.40
		4	3	199405111436-1449	411896	644821	2.70


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)				Sample not collected			

Table 6.4: Suspended sediment - depth integrated


Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Helley-Smith Sample			No bed load is traced				

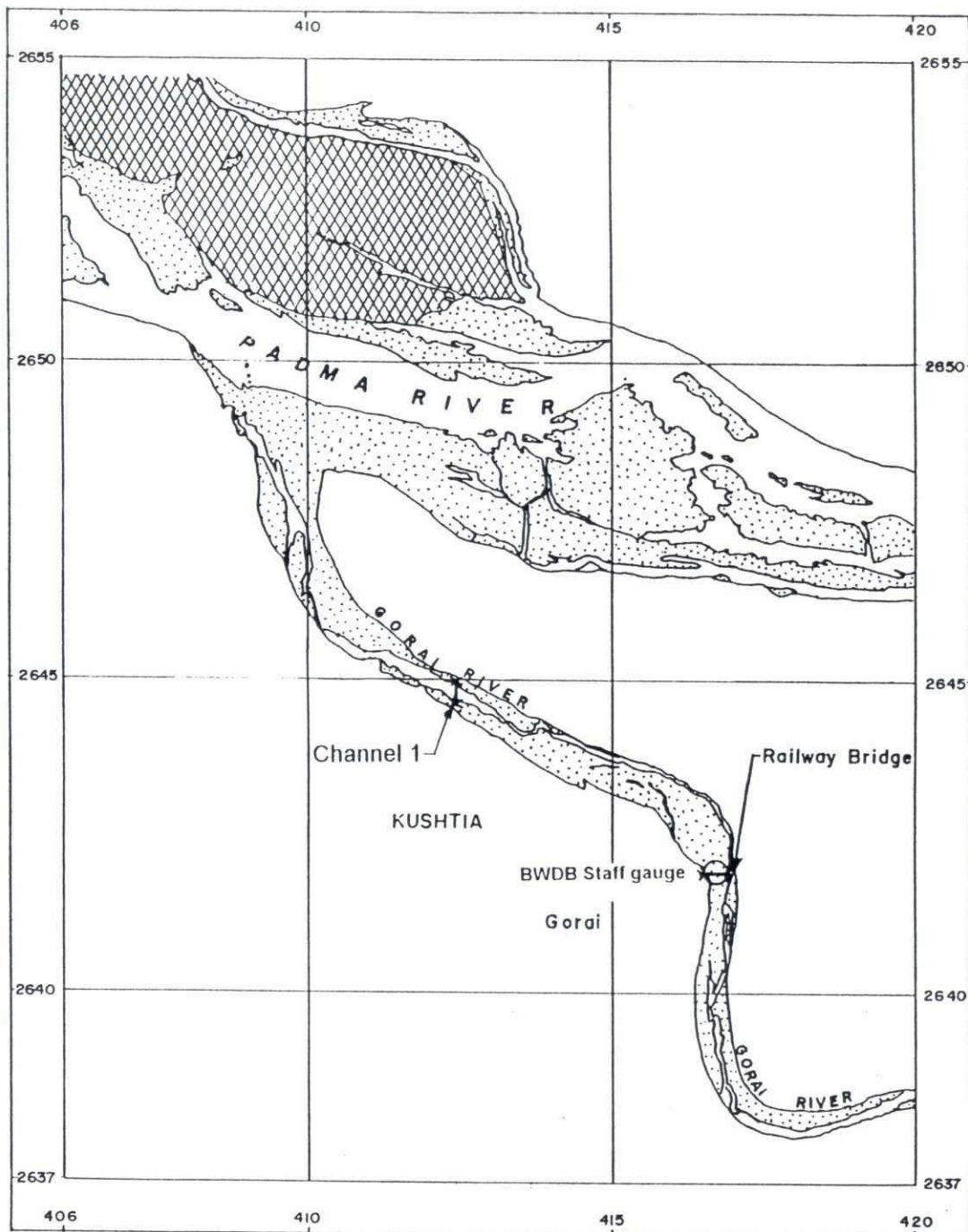
Table 6.5: Bed load

 FAP 24 RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities	Survey Bulletin 57 : 11 May , 1994		
	Location 9 : Gorai River, Gorai Offtake		
	Date : 23 Aug 1994	Collected data and their storage (1)	
	init mk		
			page 6.1

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	K45B0T01 .ase
Echosounder data	1	QUATTRO	K45B0T01 .ech
Sediment transport data	1	QUATTRO	K45B0T01 .sed
Bed load sediment analysis	1	QUATTRO	K45B0T01 .bdl
Susp. sed. conc. analysis	1	QUATTRO	K45B0T01 .ssc
Transect plot data	1	QUATTRO	K45B0T01 .trs

Table 7.1 PSD 24 Database file description

FAP 24  DELFT - DHI		Survey Bulletin 57 : 11 May, 1994	
RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Location 9 : Gorai River, Gorai Offtake	
	Date : 23 Aug 1994	PSD 24 Database file description	page
	Init : mk		7.1



LEGEND:

- ✕—✕ Cross Section
- ▨ High land
- ░ Unstable/low char
- BWDB Staff gauge



5000m 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 66 : 19 June, 1994

Location 9 : Gorai River, Gorai Offtake

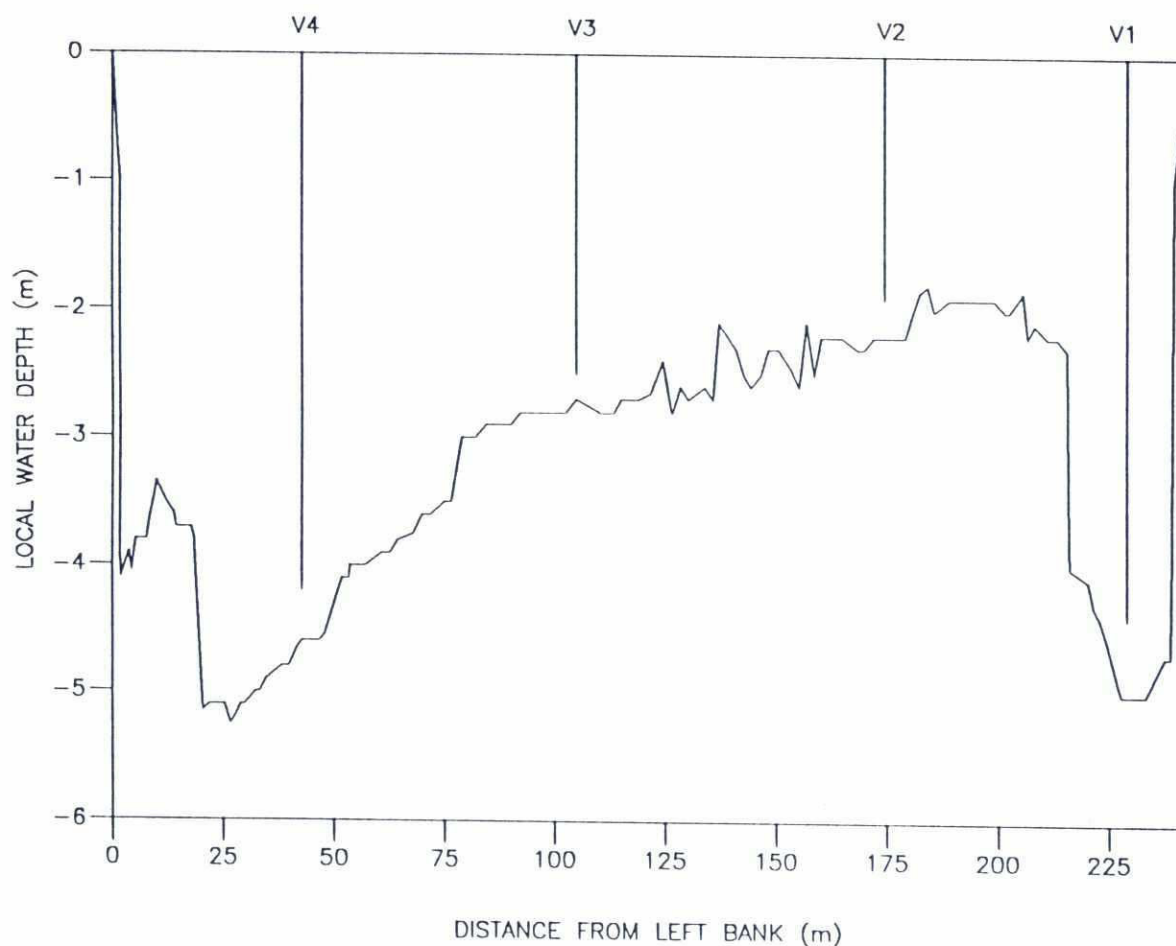
Date : 06 Aug 1994

Location map

Init : sjr

page

1.1



Water level : 5.56 m + PWD measured at the station indicated on page 1.1

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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	4	-	-	-
	ADCP	-	-	-	-
	S4 current meter	4	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	18	-	-	-
	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

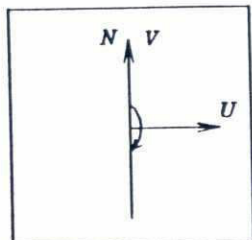
	Width (m)	Area (m ²)	Stage h (m+PWD)	Discharge Q (m ³ /s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	242	766	5.56	54	-	3.10

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Gorai Offtake	Channel 1	19 June 94	5.56	BWDB

Table 2.3: Water-levels

 FAP 24 RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities DELFT - DHI		Survey Bulletin 66 : 19 June, 1994	
		Location 9 : Gorai River, Gorai Offtake	
File : K46J0T05	Date : 06 Aug 1994	Survey programme as made and key figures	page
	Init : sjr		2.1

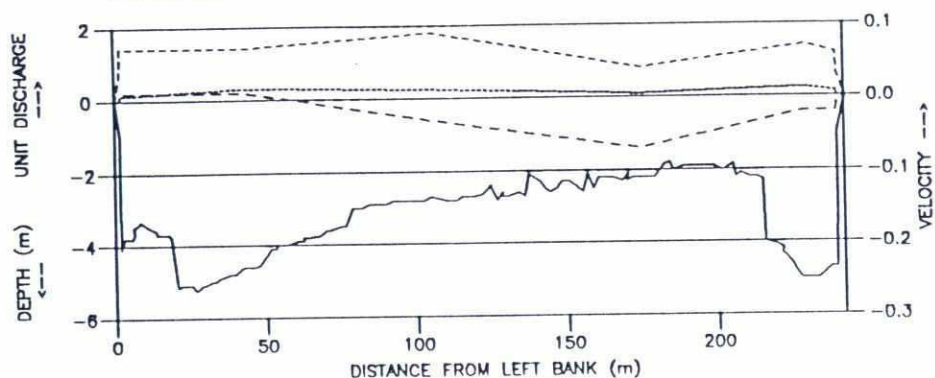


TRANSECT AZIMUTH = 180°

U - VELOCITY NORMAL TO TRANSECT (m/s)

V - VELOCITY PARALLEL TO TRANSECT (m/s)

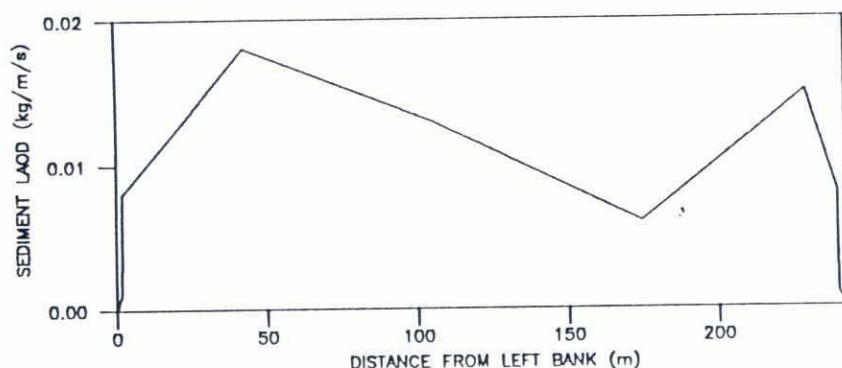
N - MAGNETIC NORTH



FLOW

LEGEND :

- WATER DEPTH (m below STAGE)
- - - UNIT DISCHARGE ($\text{m}^3/\text{s.m}$)
- ... U (m/s)
- . - V (m/s)
- STAGE = 5.56 (m+PWD)
- A = 766 (m^2)
- Q = 54 (m^3/s)



SEDIMENT TRANSPORT

LEGEND :

- S_{TOTAL} 3.10 (kg/s)
- - - $S_{WASH LOAD}$ 3.06 (kg/s)
- ... $S_{SUSP. BED}$ 0.04 (kg/s)
- . - $S_{BED LOAD}$ - (kg/s)

Sample not collected

GRAIN SIZE

FAP 24



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

Survey Bulletin 66 : 19 June, 1994

Location 9 : Gorai River, Gorai Offtake

File : K46J0T05

Date : 06 Aug 1994

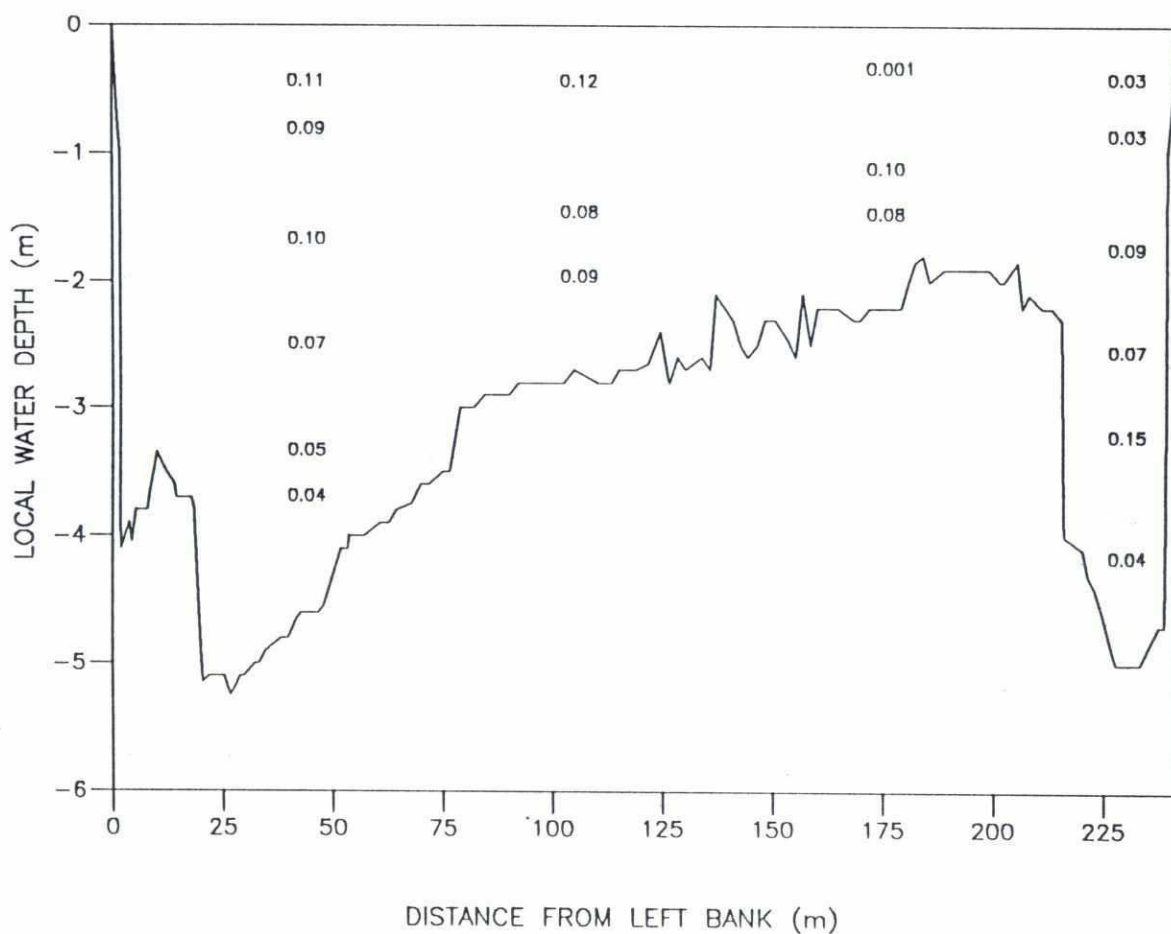
Init : sjr

Horizontal distribution of flow and sediments
Channel 1

page

3.1

07



Water level : 5.56 m + PWD measured at the station indicated on page 1.1

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	9406191109-1112	K46J0T05 *


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	9406191312-1340	411899	644647	4.40	K46J0P01 *
		2	9406191351-1404	411903	644692	1.90	K46J0P02 *
		3	9406191419-1430	411909	644767	2.50	K46J0P03 *
		4	9406191439-1506	411906	644828	4.20	K46J0P04 *


Table 6.2: Vertical profiles * ADCP & MEX not available

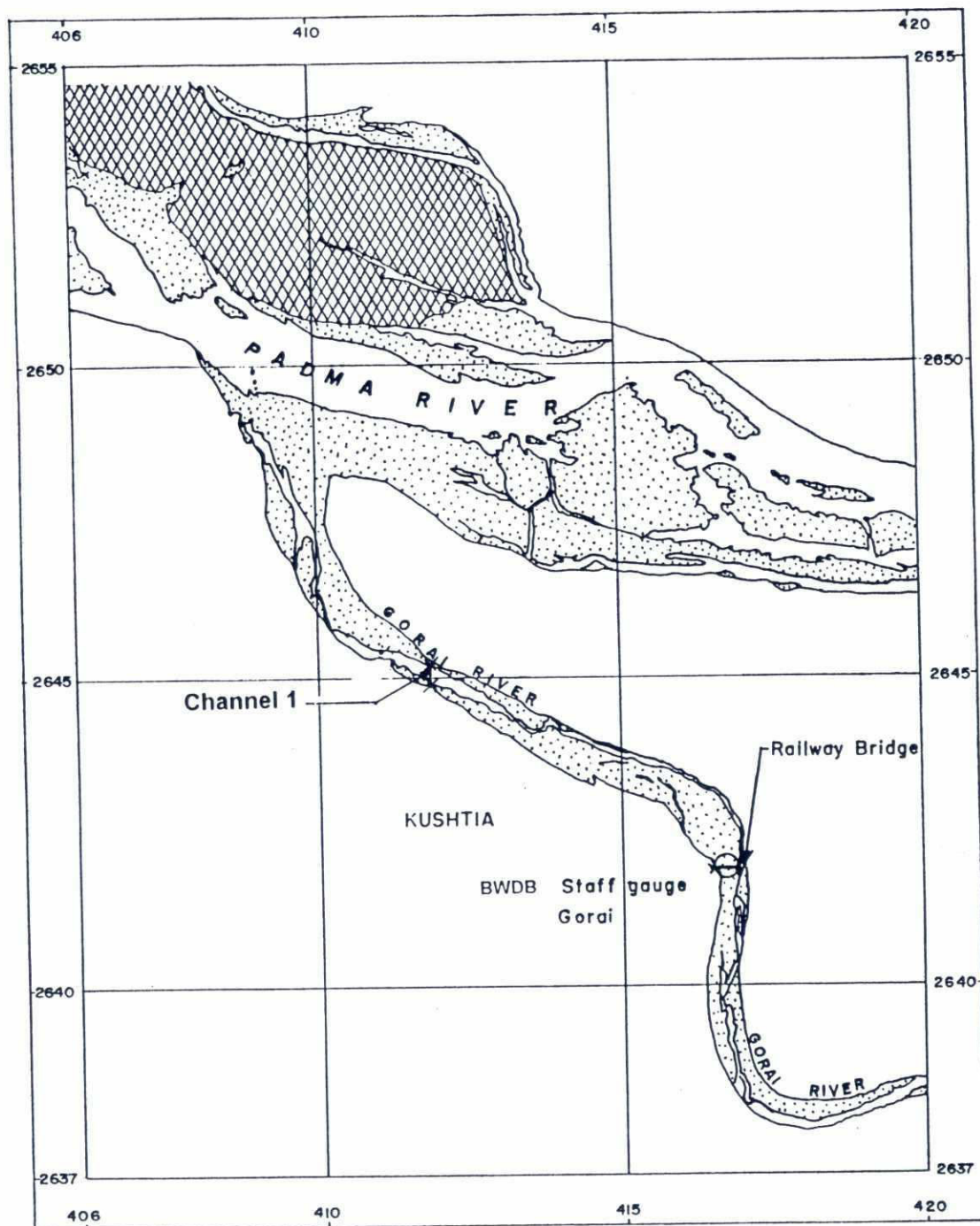
Method	Channel	Vertical	No. of samples	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)
Suspended sediments (pump bottle)	1	1	6	9406191312-1340	411899	644647	4.40
		2	3	9406191351-1404	411903	644692	1.90
		3	3	9406191419-1430	411909	644767	2.50
		4	6	9406191439-1506	411906	644828	4.20

Table 6.3: Suspended sediment - point sampled

 <p>FAP 24 DELFT - DHI</p>	<p>RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities</p>	Survey Bulletin 66 : 19 June, 1994	
		Location 9 : Gorai River, Gorai Offtake	
	Date : 06 Aug 1994	Collected data and their storage (1)	page 6.1
	Init : sjr		

Types of Data	Channel	Format	Filename 82
ADCP/S4/EMF data	1	QUATTRO	K46J0T05 .ase
Echosounder data	1	QUATTRO	K46J0T05 .ech
Sediment transport data	1	QUATTRO	K46J0T05 .sed
Susp. sed. conc. analysis	1	QUATTRO	K46J0T05 .ssc
Transect plot data	1	QUATTRO	K46J0T05 .trs
Table 7.1 PSD 24 Database file description			

FAP 24  DELFT - DHI		Survey Bulletin 66 : 19 June, 1994	
RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Location 9 : Gorai River, Gorai Offtake	
	Date : 06 Aug 1994	PSD 24 Database file description	page
	Init : sjr		7.1



LEGEND:

- Cross Section
- High land
- Unstable/low char
- BWDB Staff gauge

5000m 2500m 0

Map is based on satellite
images of March 1994

FAP 24



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

Survey Bulletin 88 : 03 - 05 August, 1994

Location 9 : Gorai River, Gorai Offtake

Date : 14 Nov 1994

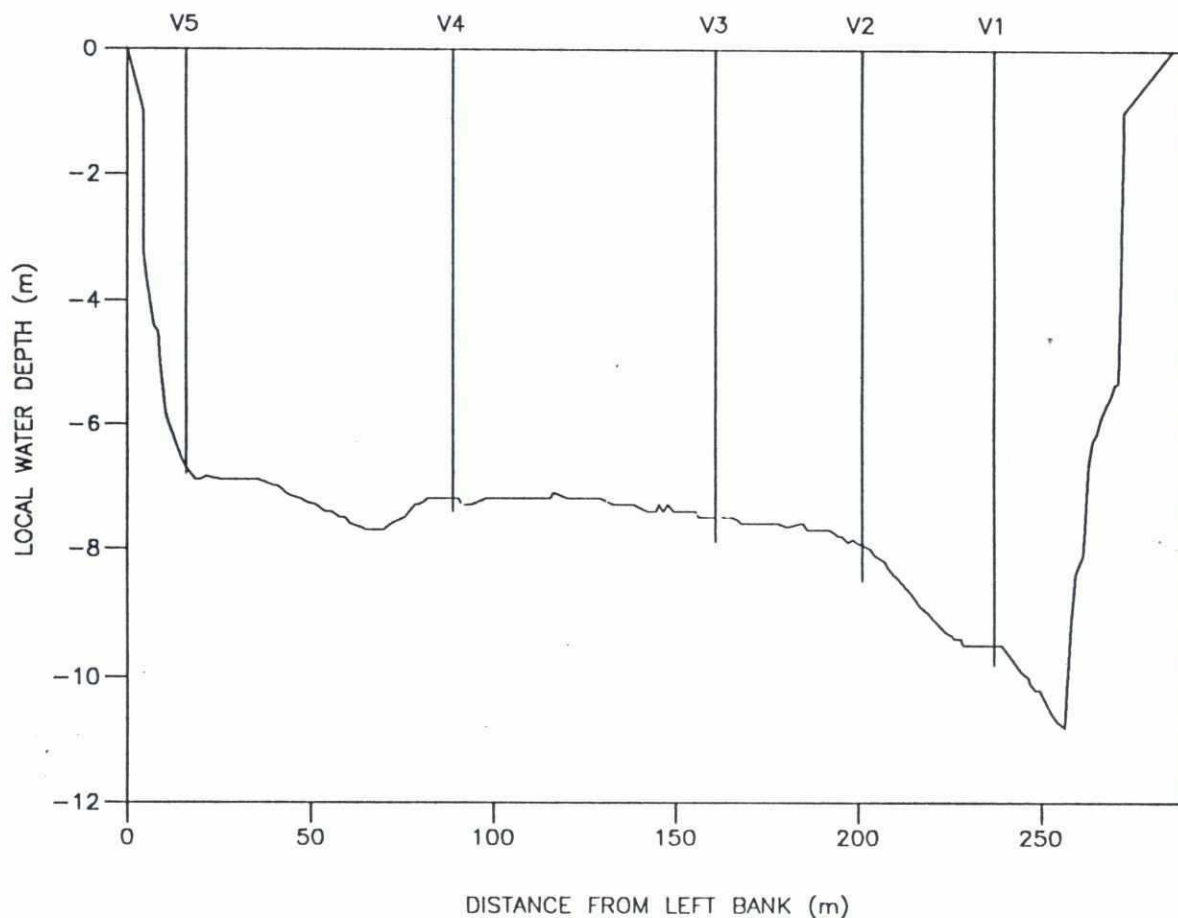
Init : mk

Location map


page

1.1

86



Water-level : 11.34 m + PWD measured at the station indicated on page 1.1

FAP 24  DELFT - DHI		Survey Bulletin 88 : 03 - 05 August, 1994	
RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Location 9 : Gorai River, Gorai Offtake	
File : K4853T05	Date : 14 Nov 1994	Cross-sections and measured verticals Channel 1	page
	Init : mk		1.2



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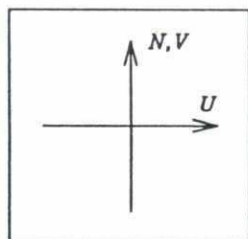
Type of measurement	Method	No. of measurements in channel			
		1	2	3	4
Discharge	ADCP transect	9	-	-	-
	EMF transect	-	-	-	-
	Echo-Sounding	-	-	-	-
Vertical current profile	No. of verticals in channel	5	-	-	-
	ADCP	5	-	-	-
	S4 current meter	-	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	15	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	9	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	10	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	5	-	-	-
	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	287	2069	11.34	3103	33	6019
Table 2.2: Key figures						

Gauge Location	Channel	Date	Water level (Daily average) (m+PWD)	Gauge
Gorai Offtake	Channel 1	03 Aug 94 04 Aug 94 05 Aug 94	11.24 11.28 11.34	FAP 24

Table 2.3: Water-levels

<div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div> <div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div>		Survey Bulletin 88 : 03 - 05 August, 1994	
		Location 9 : Gorai River, Gorai Offtake	
File :	Date : 14 Nov 1994	Survey programme as made and key figures	page
K4853T05	Init : mk		

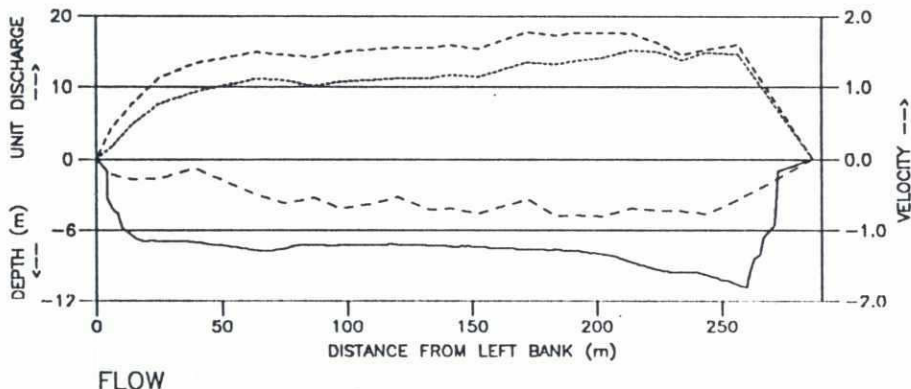


TRANSECT AZIMUTH = 0°

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 (m³/s.m)

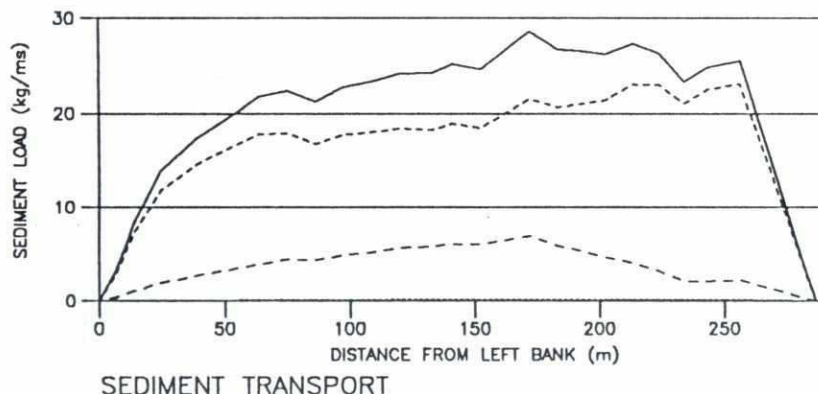
--- U - (m/s)

-.- V - (m/s)

STAGE = 11.34 (m+P.W.D)

A = 2069 (m²)

Q = 3103 (m³/s)



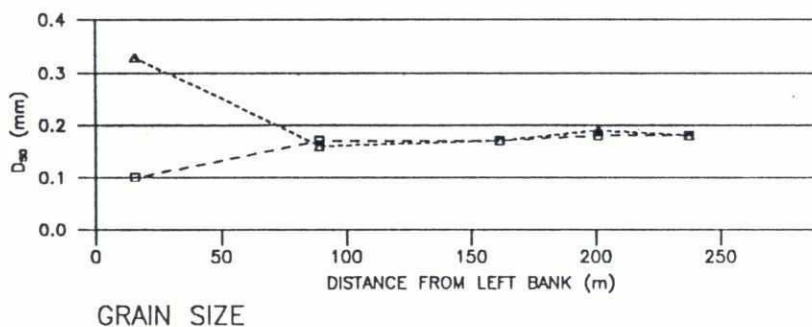
LEGEND :

— S_{TOTAL} 6052 (kg/s)

--- S_{WASH LOAD} 4918 (kg/s)

-.- S_{SUSP. BED} 1101 (kg/s)

..... S_{BED LOAD} 33 (kg/s)



LEGEND :

◇◇◇◇◇ D₅₀ SUSP. (mm)

△△△△△ D₅₀ BED LOAD (mm)

□□□□□ D₅₀ BED MAT. (mm)



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

Survey Bulletin 88 : 03 - 05 August, 1994

Location 9 : Gorai River, Gorai Offtake

File : K4853T05

Date : 14 Nov 1994

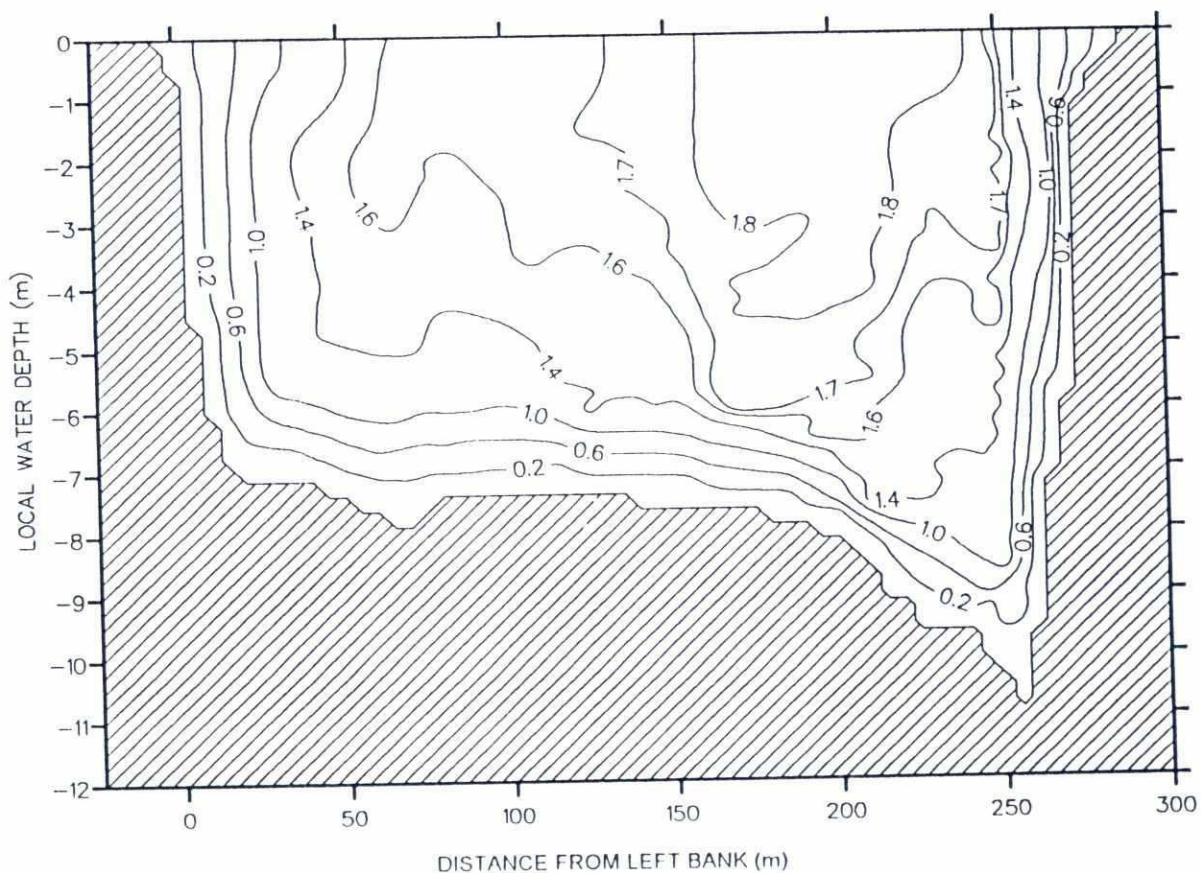
Init : mk

Horizontal distribution of flow and sediments
Channel 1

page

3.1

83



Iso-velocity contours (m/s)

Water-level : 11.34 m + PWD measured at the station indicated on page 1.1



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

Survey Bulletin 88 : 03 - 05 August, 1994

Location 9 : Gorai River, Gorai Offtake

File : K4853T05

Date : 14 Nov 1994

Init : mk

Cross-sectional distribution of flow velocity
Channel 1

page


4.1

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)
1	1	9408051118-1131	9.8	0.207	99.793	0.133	0.185	0.307
	2	9408051045-1102	8.5	0.313	99.687	0.131	0.184	0.299
	3	9408051028-1040	7.9	0.905	99.095	0.125	0.172	0.236
	4	9408051000-1018	7.4	0.967	99.033	0.099	0.167	0.232
	5	9408050950-0957	6.8	6.486	93.514	0.065	0.102	0.201
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	9408051118-1131	9.8	1.313	98.690	0.159	0.182	0.208
	1	9408051118-1131	9.8	1.015	98.980	0.160	0.183	0.208
	2	9408051045-1102	8.5	1.629	98.370	0.163	0.189	0.218
	2	9408051045-1102	8.5	1.394	98.610	0.165	0.190	0.219
	3	9408051028-1040	7.9	1.693	98.310	0.152	0.173	0.197
	3	9408051028-1040	7.9	1.890	98.110	0.152	0.174	0.199
	4	9408051000-1018	7.4	2.892	97.110	0.135	0.163	0.196
	4	9408051000-1018	7.4	3.994	96.010	0.121	0.151	0.188
	5	9408050950-0957	6.8	1.626	98.370	0.289	0.335	0.388
	5	9408050950-0957	6.8	0.819	99.180	0.288	0.330	0.378
Table 5.3 : Grain sizes of bed load								

<div>FAP 24</div> <div></div> <div>DELFT - DHI</div>		<div>RIVER SURVEY PROJECT</div> <div>Flood Plan Coordination Organization</div> <div>Commission of the European Communities</div>	<div>Survey Bulletin 88 : 03 - 05 August, 1994</div>	
		<div>Location 9 : Gorai River, Gorai Offtake</div>		
	<div>Date : 14 Nov 1994</div>	<div>Grain size distributions</div>		<div>page</div> <div>5.1</div>
	<div>init : mk</div>			

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
ADCP & EMF transect	1	9408031024-1026 9408031032-1036 9408031041-1043 9408031048-1051 9408050858-0901 9408050903-0906 9408050909-0913 9408051139-1142 9408051146-1148	K4833T06 K4833T07 K4833T08 K4833T09 K4853T01 K4853T02 K4853T03 K4853T05 * K4853T06

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 2 3 4 5	9408051118-1131 9408051045-1102 9408051028-1040 9408051000-1018 9408050950-0957	411892 411884 411892 411900 411905	644649 644686 644725 644797 644871	9.8 8.5 7.9 7.4 6.8	K4853P05 * K4853P04 * K4853P03 * K4853P02 * K4853P01 *

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	1 2 3 4 5	3 3 3 3 3	9408051118-1131 9408051045-1102 9408051028-1040 9408051000-1018 9408050950-0957	411892 411884 411892 411900 411905	644649 644686 644725 644797 644871	9.8 8.5 7.9 7.4 6.8

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 2 3 4 5	3 2 1 1 2	9408051118-1131 9408051045-1102 9408051028-1040 9408051000-1018 9408050950-0957	411892 411884 411892 411900 411905	644649 644686 644725 644797 644871	9.8 8.5 7.9 7.4 6.8

Table 6.4: Suspended sediment - depth integrated


FAP 24  DELFT - DHI		RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 88 : 03 - 05 August, 1994	
				Location 9 : Gorai River, Gorai Offtake	
Date : 14 Nov 1994 init : mk		Collected data and their storage (1)			page 6.1

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Helley-Smith Sample	1	1	9408051118-1131	411892	644649	9.8	A2137
		1	9408051118-1131	411892	644649	9.8	A2183
		2	9408051045-1102	411884	644686	8.5	A1855
		2	9408051045-1102	411884	644686	8.5	A2189
		3	9408051028-1040	411892	644725	7.9	A2162
		3	9408051028-1040	411892	644725	7.9	A1808
		4	9408051000-1018	411900	644797	7.4	A2134
		4	9408051000-1018	411900	644797	7.4	A2138
		5	9408050950-0957	411905	644871	6.8	A1918
		5	9408050950-0957	411905	644871	6.8	A2147
Table 6.5: Bed load							

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Delft-Bottle Sample							
Sample not collected							
Table 6.6: Bed load							

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
US BM-54 Sample	1	1	9408051118-1131	411892	644649	9.8	DHC-1,KT1X001
		2	9408051045-1102	411884	644686	8.5	DHC-2,KT1X001
		3	9408051028-1040	411892	644725	7.9	DHC-3,KT1X001
		4	9408051000-1018	411900	644797	7.4	DHC-4,KT1X001
		5	9408050950-0957	411905	644871	6.8	DHC-5,KT1X001


Table 6.7: Bed material

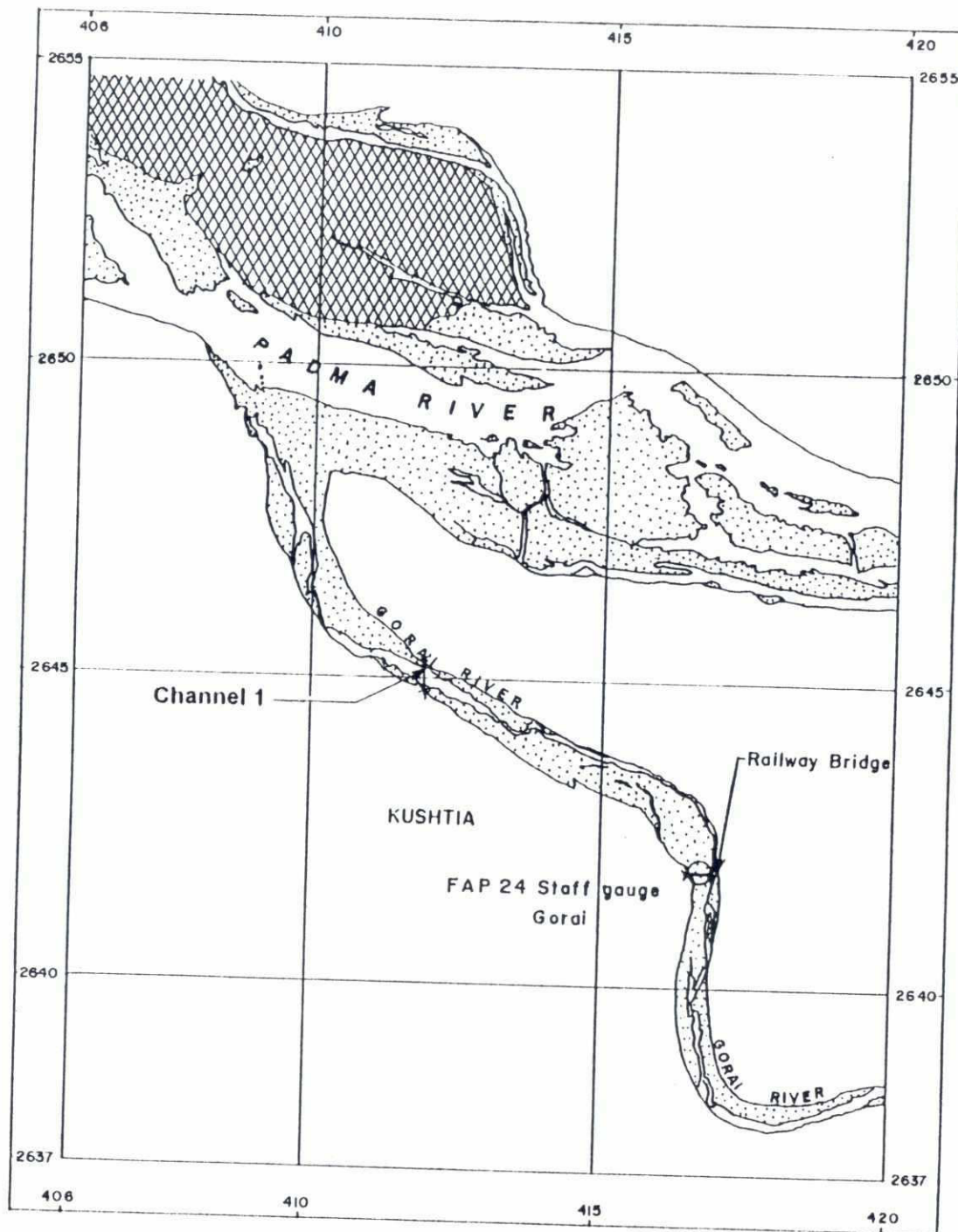
<div><div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div><div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div></div>		Survey Bulletin 88 : 03 - 05 August, 1994	
		Location 9 : Gorai River, Gorai Offtake	
	Date : 14 Oct 1994	Collected data and their storage (2)	page 6.2
	init : mk		

50

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	K4853T05 .ase
Echosounder data	1	QUATTRO	K4853T05 .ech
Sediment transport data	1	QUATTRO	K4853T05 .sed
Sus. sed. conc. analysis	1	QUATTRO	K4853T05 .ssc
Bed load sediment analysis	1	QUATTRO	K4853T05 .bdl
Bed material analysis	1	QUATTRO	K4853T05 .bdm
Transect plot data	1	QUATTRO	K4853T05 .trs
Iso-velocity plot data	1	MIKE 21	K4853T05 .ct2 K4853T05 .dt2

Table 7.1 PSD 24 Database file description

 <p>FAP 24</p> <p>RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities</p>		Survey Bulletin 88 : 03 - 05 August, 1994	
		Location 9 : Gorai River, Gorai Offtake	
	Date : 14 Nov 1994	PSD 24 Database file description	page
	Init : mk		7.1



LEGEND:

- X—X Cross Section
- High land
- Unstable/low char
- FAP 24 Staff gauge

5000m 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 106 : 16 October, 1994

Location 9 : Gorai River, Gorai Offtake

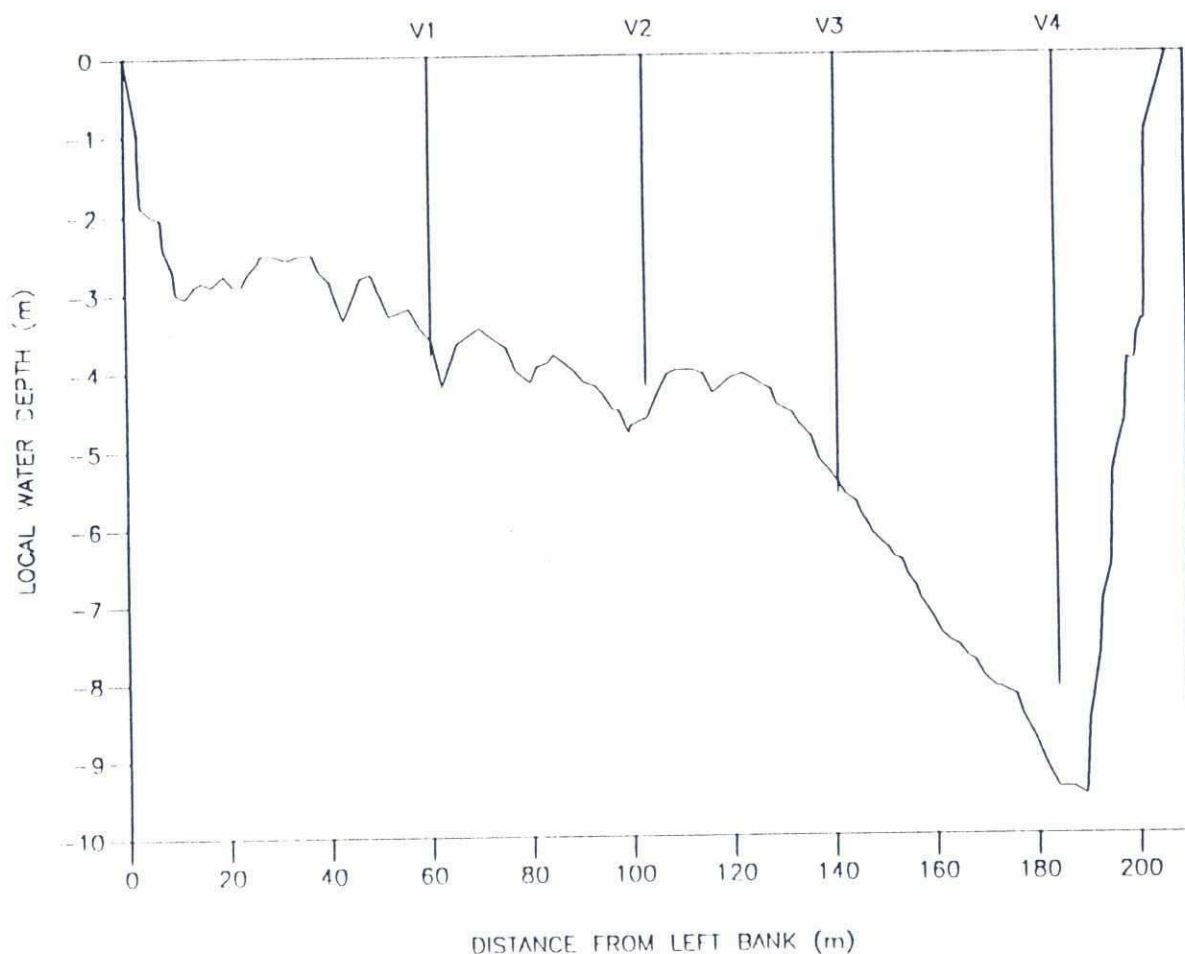
Date : 26 Jan 1995

Init : mk/tr

Location map

page

11



Water-level : 8.50 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 106 : 16 October, 1994

Location 9 : Gorai River, Gorai Offtake

File K4AG0102

Date : 26 Jan, 1995

Init : mk/tr

Cross-sections and measured verticals
Channel 1

page

1.2

26

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	4	-	-	-
	ADCP	-	-	-	-
	S4 current meter	4	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	24	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	6	-	-	-
	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	207	941	8 50	544	1 70	333 10

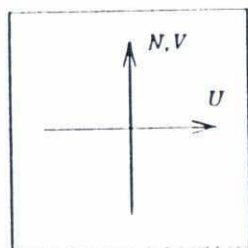
Table 2 2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m + PWD)	Gauge
Gorai	Channel 1	16 Oct 94	8 50	FAP 24

Table 2 3: Water-levels

<div><div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div><div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div></div>		<div>Survey Bulletin 106 : 16 October, 1994</div> <div>Location 9 : Gorai River, Gorai Offtake</div>	
<div>File : K4AG0T02</div>	<div>Date : 26 Jan 1995</div>	<div>Survey programme as made and key figures</div>	<div>page</div>
	<div>Init : mik / tr</div>		<div>21</div>

8

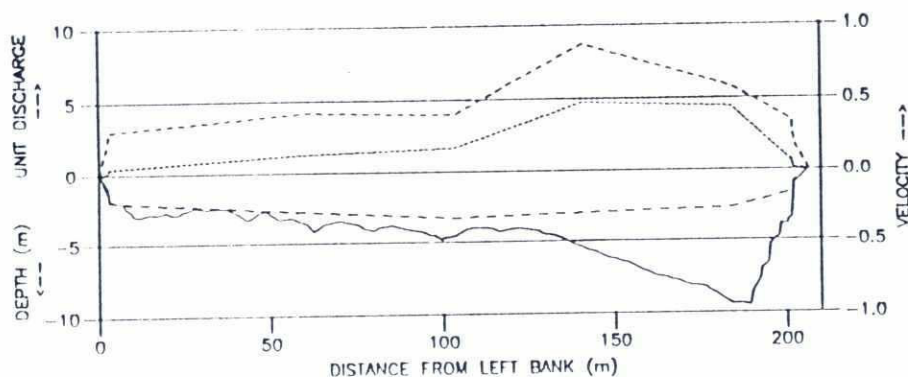


TRANSECT AZIMUTH = 0°

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 (m³/s.m)

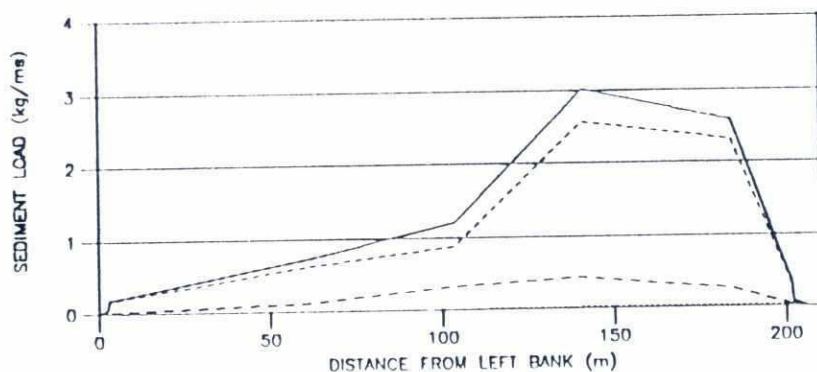
--- U - (m/s)

-.- V - (m/s)

STAGE = 8.50 (m+PWD)

A = 941 (m²)

Q = 544 (m³/s)



SEDIMENT TRANSPORT

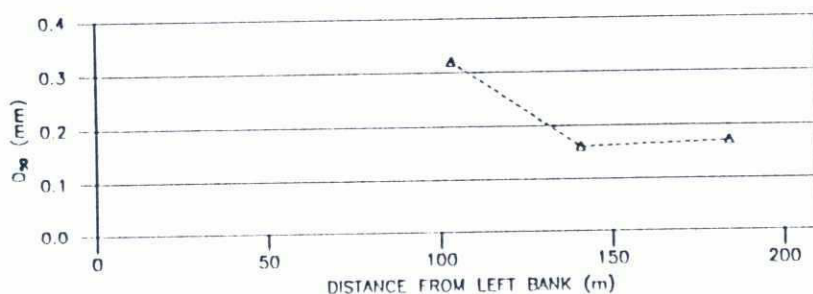
LEGEND :

— S_{TOTAL} 334.8 (kg/s)

--- S_{WASH_LOAD} 283.3 (kg/s)

-.- S_{SUSP_LOAD} 49.8 (kg/s)

..... S_{RED_LOAD} 1.7 (kg/s)



GRAIN SIZE

LEGEND :

ooooo D₅₀ SUSP. (mm)

△△△△△ D₅₀ RED LOAD (mm)

□□□□□ D₅₀ RED MAT. (mm)

FAP 24



DELET - DII

RIVER SURVEY PROJECT

Flood Plan Coordination Organization

Commission of the European Communities

Date: 26 Jan 1995

Init: mk / tr

Survey Bulletin 106 : 16 October, 1994

Location 9 : Gorai River, Gorai Offtake

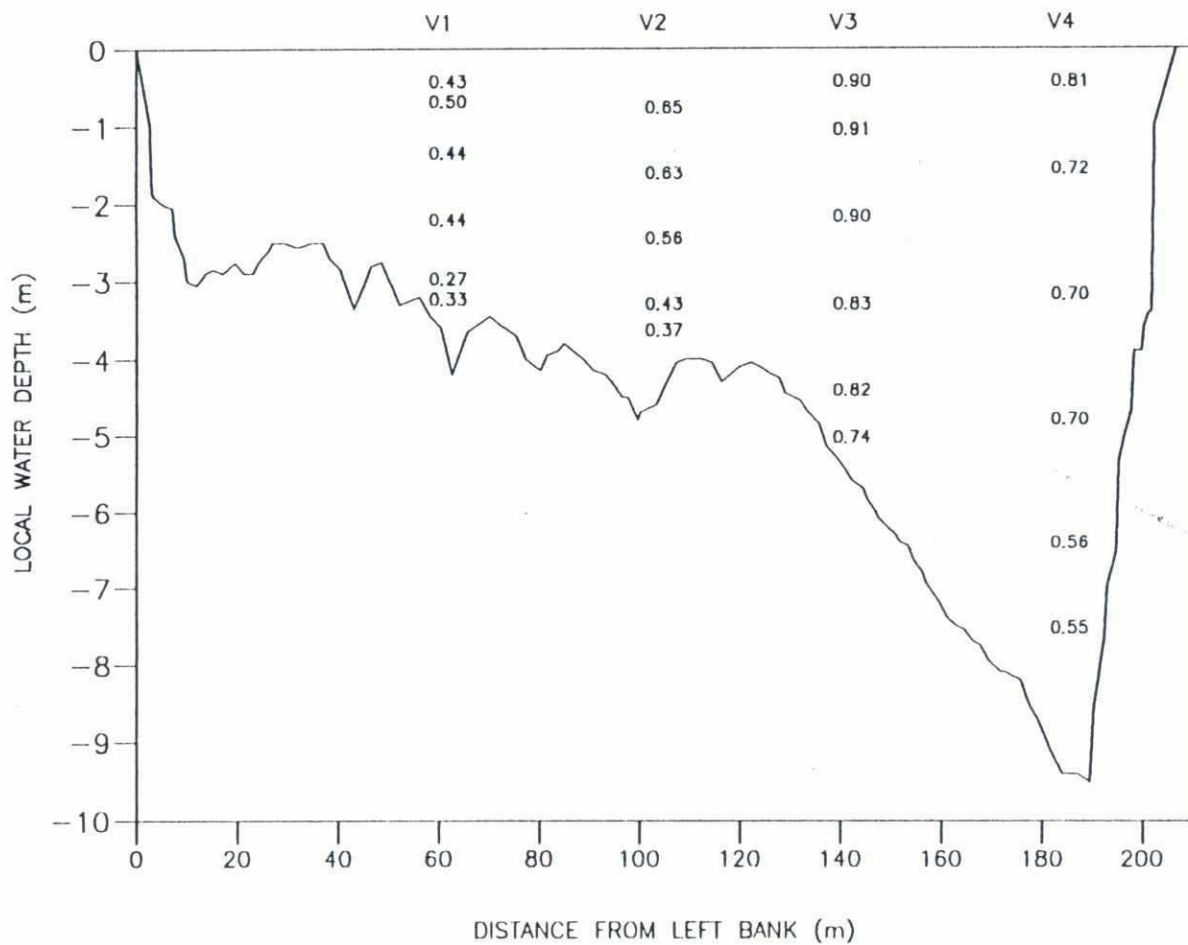
Horizontal distribution of flow and sediments

Channel 1


page

3.1

File: KAAG0102




Water-level : 8.50 m + PWD measured at the station indicated on page 1.1

FAP 24  DELFT - DHI	RIVER SURVEY PROJECT <small>Flood Plan Coordination Organization</small> <small>Commission of the European Communities</small>	Survey Bulletin 106 : 16 October, 1994	
		Location 9 : Gorai River, Gorai Offtake	
File : K4AG0T02	Date : 26 Jan 1995	Cross-sectional distribution of flow velocity Channel 1	page
	Init : mk / tr		41

Andreasen settling tube		Time	Depth	Weight percent	D10	D50	D90
Channel	Vertical	(YYMMDDHHMM-HHMM)		< 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		Time	Depth	Weight percent	D10	D50	D90
Channel	Vertical	(YYMMDDHHMM-HHMM)		< 0.06 mm > 0.06 mm	(mm)	(mm)	(mm)
Sample not collected							
Table 5.2 Grain size of bed material							

Helley-Smith		Time	Depth	Weight percent		D35	D50	D65
Channel	Vertical	(YYMMDDHHMM)		< 0.06 mm > 0.06 mm		(mm)	(mm)	(mm)
1	2	9410161328-1352	4.20	0.709	99.291	0.260	0.307	0.362
	3	9410161517-1540	5.60	0.893	99.107	0.134	0.157	0.185
	4	9410161618-1640	8.10	0.760	99.240	0.143	0.169	0.200
	2	9410161328-1352	4.20	0.575	99.425	0.284	0.327	0.377
	3	9410161517-1540	5.60	0.965	99.035	0.132	0.156	0.186
	4	9410161618-1640	8.10	0.676	99.324	0.152	0.181	0.215
Table 5.3 Grain sizes of bed load								

<div>FAP 24</div> <div></div> <div>DELFT - DHI</div>	<div>RIVER SURVEY PROJECT</div> <div>Flood Plan Coordination Organization</div> <div>Commission of the European Communities</div>	<div>Survey Bulletin 106 : 16 October, 1994</div>	
		<div>Location 9 : Gorai River, Gorai Offtake</div>	<div>Grain size distributions</div>
	<div>Date : 26 Jan 1995</div>		
	<div>Init : mk / tr</div>		

Method	Channel	Time (YYMMDDHHMM HHMM)	File name
Echo-sounding	1	9410161151-1153 9410161154-1156	K4AG0T02 * K4AG0T03

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	9410161222-1249	411894	644754	3.80	K4AG0P01 *
		2	9410161328-1352	411905	644709	4.20	K4AG0P02 *
		3	9410161517-1540	411899	644670	5.60	K4AG0P03 *
		4	9410161618-1640	411899	644635	8.10	K4AG0P04 *

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	6	9410161222-1249	411894	644754	3.80
		2	6	9410161328-1352	411905	644709	4.20
		3	6	9410161517-1540	411899	644670	5.60
		4	6	9410161618-1640	411899	644635	8.10


Table 6.3 Suspended sediment - point sampled

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


Table 6.4 Suspended sediment - depth integrated

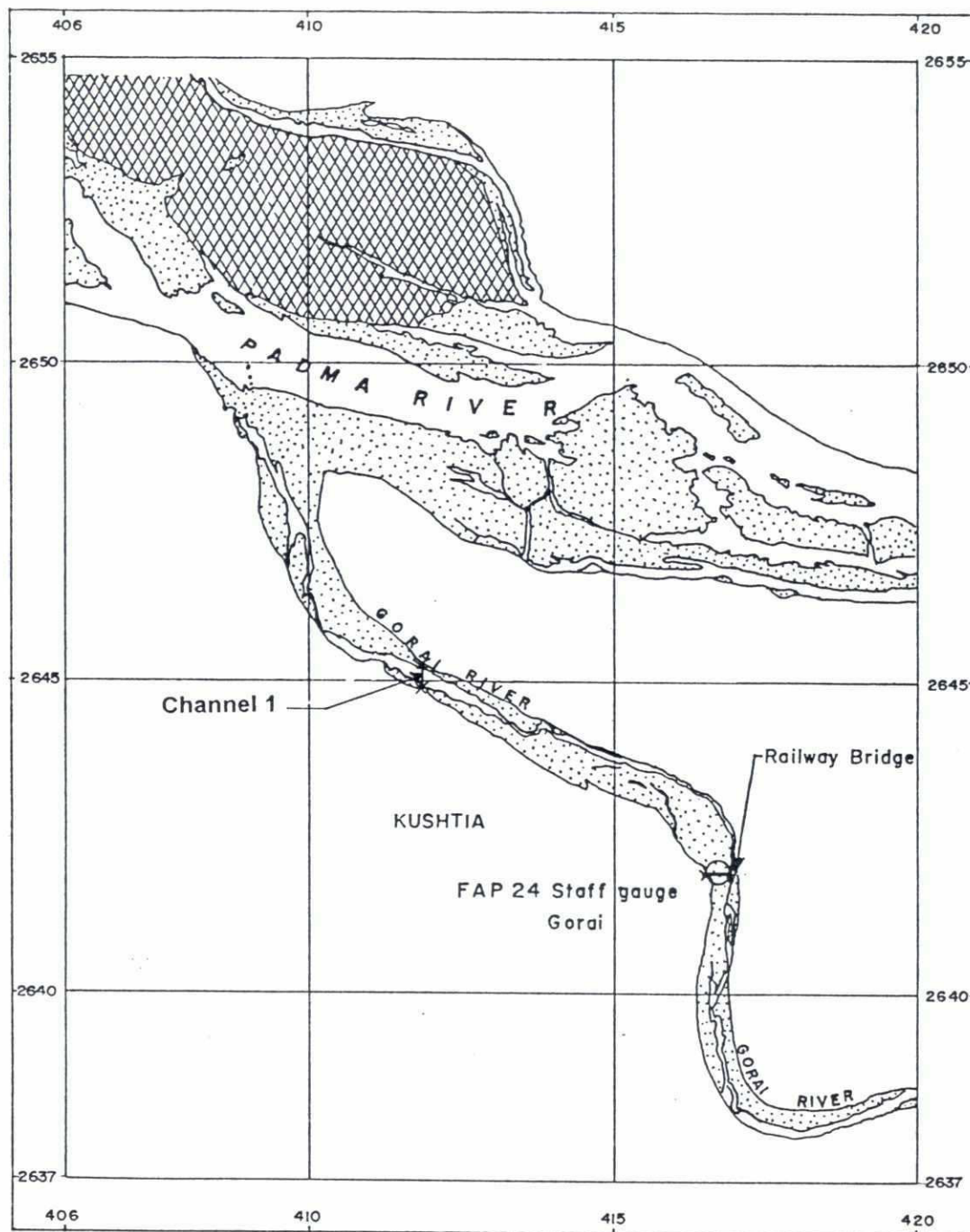
Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Helley Smith Sample	1	2	9410161328-1352	411905	644709	4.20	A2148
		3	9410161517-1540	411899	644670	5.60	A1649
		4	9410161618-1640	411899	644635	8.10	A704
		2	9410161328-1352	411905	644709	4.20	A2026
		3	9410161517-1540	411899	644670	5.60	A367
		4	9410161618-1640	411899	644635	8.10	A1834

Table 6.5 Bed load

<div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div> <div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organisation</div><div>Commission of the European Communities</div></div>		<div>Survey Bulletin 106 : 16 October, 1994</div> <div>Location 9 : Gorai River, Gorai Offtake</div>	
<div>Date 26 Jan 1995</div>	<div>Collected data and their storage (1)</div>	<div>page</div>	
<div>Init. mk / tr</div>		<div>61</div>	

Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	K4AG0T02 .ase
Echosounder data	1	QUATTRO	K4AG0T02 .ech
Sediment transport data	1	QUATTRO	K4AG0T02 .sed
Bed load sed. analysis	1	QUATTRO	K4AG0T02 .bdl
Sus. sed. conc. analysis	1	QUATTRO	K4AG0T02 .ssc
Transect plot data	1	QUATTRO	K4AG0T02 .trs
Table 7.1 PSD 24 Database file description			

FAP 24  DELT - DHI		Survey Bulletin 106 : 16 October, 1994	
RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Location 9 : Gorai River, Gorai Offtake	
Date : 26 Jan 1995 Init : mk / tr		PSD 24 Database file description	page 7.1



LEGEND:

- X—X— Cross Section
- High land
- Unstable/low char
- FAP 24 Staff gauge



5000m 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 109 : 24 October, 1994

Location 9 : Gorai River, Gorai Offtake

Date : 28 Jan 1995

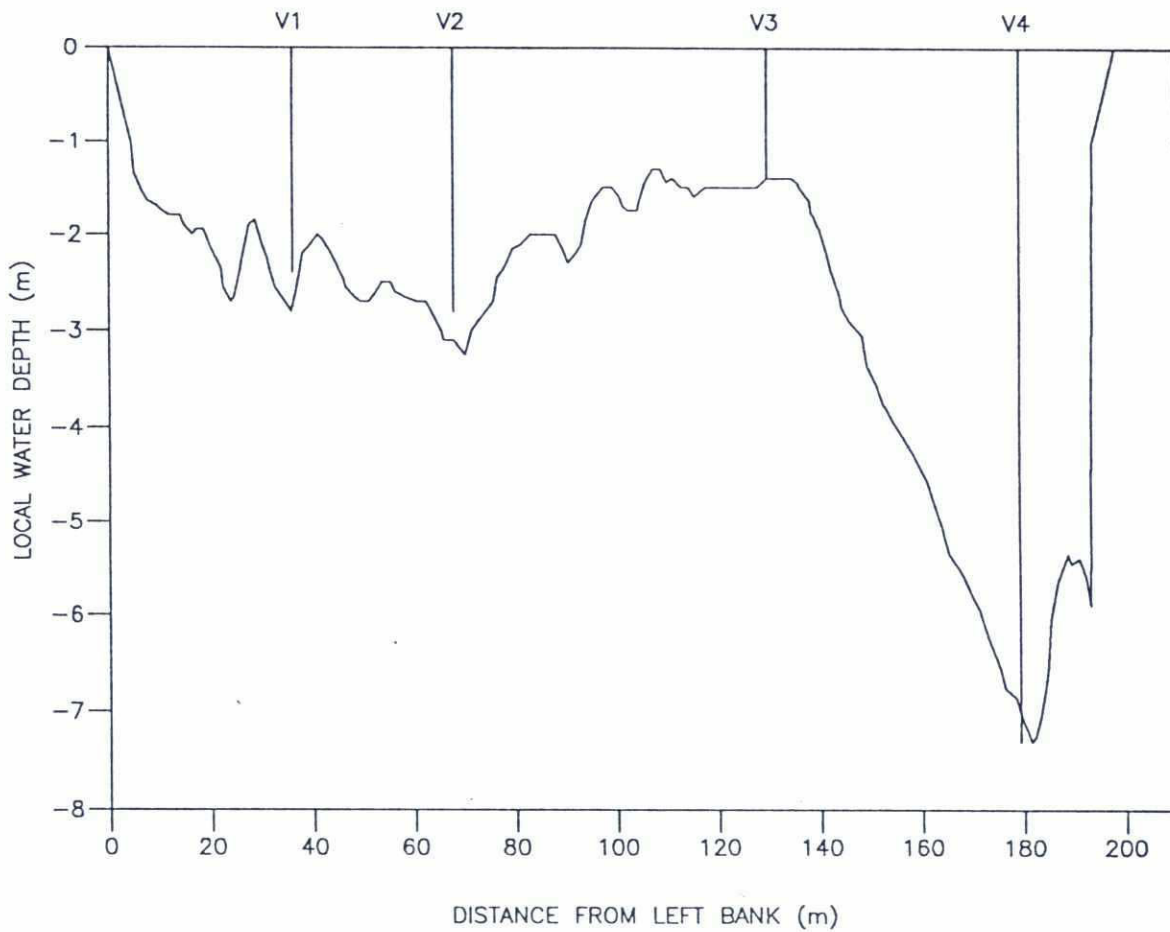
Init : mk/tr

Location map


page

1.1

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Water-level : 6.95 m + PWD measured at the station indicated on page 1.1

FAP 24  DELFT - DHI		Survey Bulletin 109 : 24 October, 1994	
		Location 9 : Gorai River, Gorai Offtake	
File : K4AO0T01	Date : 28 Jan, 1995	Cross-sections and measured verticals Channel 1	page
	Init : mk/tr		1.2

32

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	4	-	-	-
	ADCP	-	-	-	-
	S4 current meter	4	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	14	-	-	-
	Andreasen settling tube	-	-	-	-
	MEX turbidity meter	-	-	-	-
	Integrated bottle sampling	-	-	-	-
	Collapsible bag	-	-	-	-
Bed load	Dune tracking	-	-	-	-
	Helley-Smith sampler	4	-	-	-
	Delft Bottle	-	-	-	-
Bed material	US BM-54 bed sampler	-	-	-	-
	Van Veen bed sampler	-	-	-	-


Table 2.1: Survey programme as made

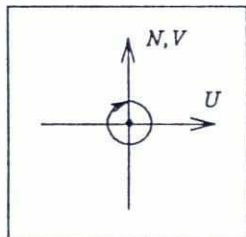
Channel	Width (m)	Area (m ²)	Stage h (m+PWD)	Discharge Q (m ³ /s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	198	550	6.95	225	0.2	82.40

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m + PWD)	Gauge
Gorai	Channel 1	24 Oct 94	6.95	FAP 24

Table 2.3: Water-levels

 FAP 24 RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 109 : 24 October , 1994	
		Location 9 : Gorai River, Gorai Offtake	
File : K4AO0T01	Date : 28 Jan 1995	Survey programme as made and key figures	page 2.1
	Init : mk / tr		

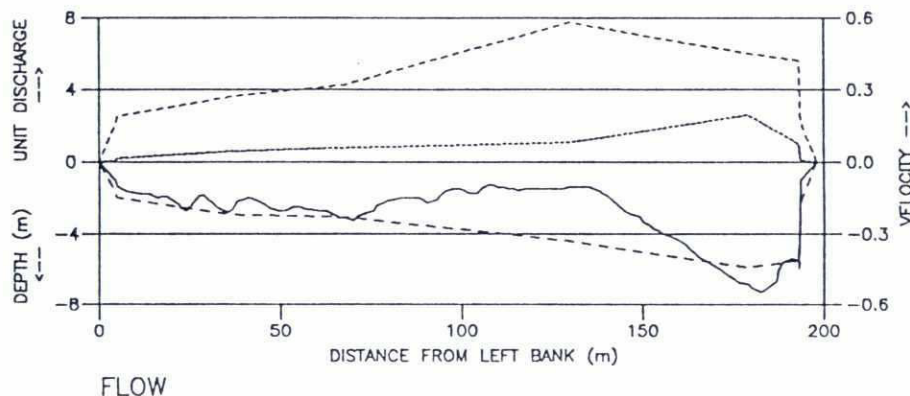


TRANSECT AZIMUTH = 360°

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 ($\text{m}^3/\text{s.m}$)

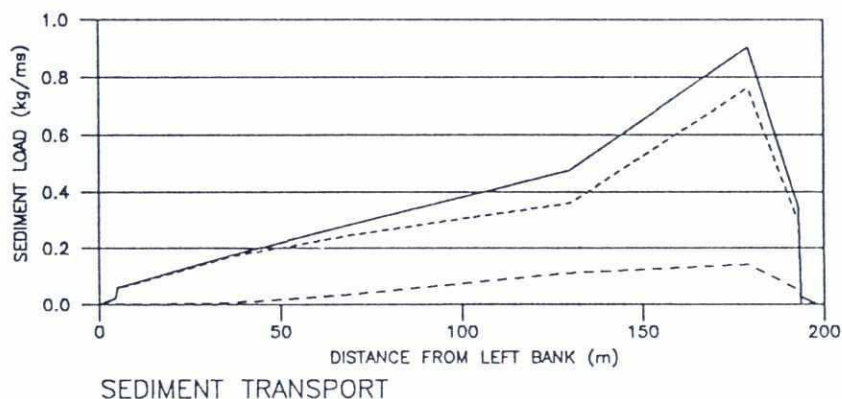
--- U - (m/s)

-.- V - (m/s)

STAGE = 6.95 (m+PWD)

A = 550 (m^2)

Q = 225 (m^3/s)



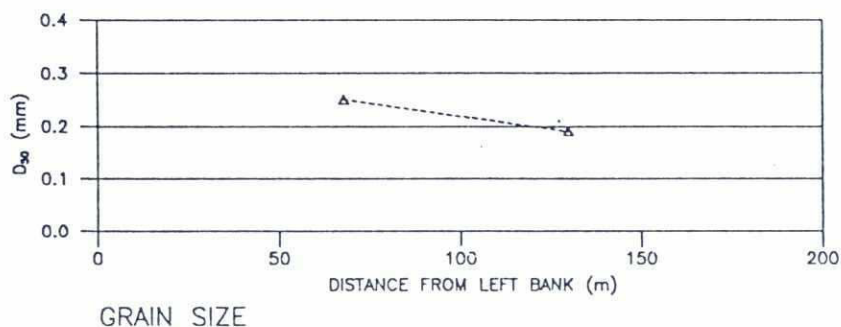
LEGEND :

— S_{TOTAL} 82.6 (kg/s)

--- $S_{\text{WASH LOAD}}$ 88.6 (kg/s)

-.- $S_{\text{SUSP. BED}}$ 13.8 (kg/s)

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



LEGEND :

◇◇◇◇◇ $D_{50 \text{ SUSP.}}$ (mm)

△△△△△ $D_{50 \text{ BED LOAD}}$ (mm)

□□□□□ $D_{50 \text{ BED MAT.}}$ (mm)

FAP 24



RIVER SURVEY PROJECT

Flood Plan Coordination Organization

Commission of the European Communities

Survey Bulletin 109 : 24 October , 1994

Location 9 : Gorai River, Gorai Offtake

File : K4AO0T01

Date : 28 Jan 1995

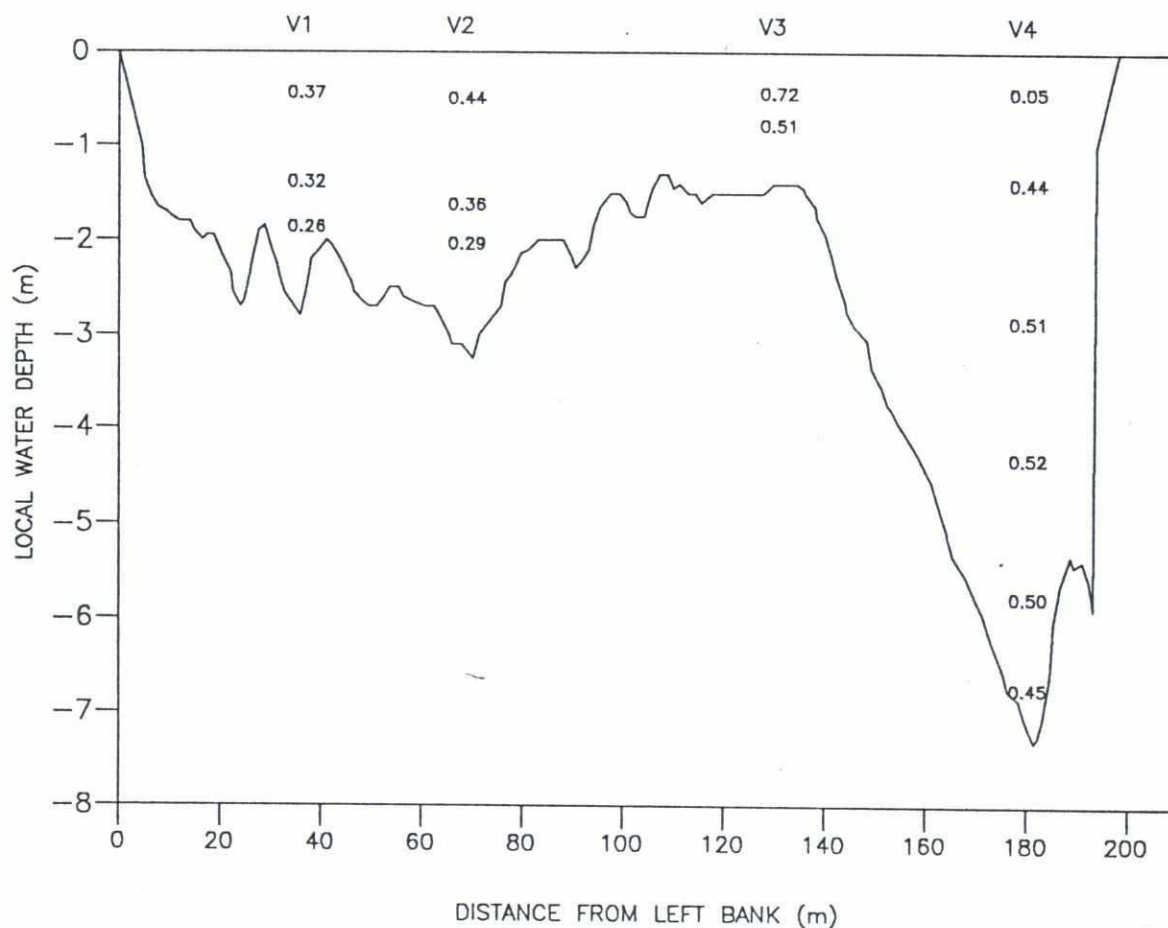
Init : mk / tr

Horizontal distribution of flow and sediments


Channel 1

page

3.1



Water-level : 6.95 m + PWD measured at the station indicated on page 1.1


FAP 24  DELFT - DHI		Survey Bulletin 109 : 24 October, 1994	
		Location 9 : Gorai River, Gorai Offtake	
File : K4AOOT01	Date : 28 Jan, 1995	Cross-sectional distribution of flow velocity Channel 1	page 4.1
	Init : mk/tr		

y8

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)	Depth (m)	Weight percent < 0.06 mm > 0.06 mm		D35 (mm)	D50 (mm)	D65 (mm)
1	2	9410241155-1218	2.80	1.526	98.474	0.190	0.243	0.305
	3	9410241223-1240	1.40	0.338	99.662	0.164	0.201	0.248
	2	9410241155-1218	2.80	2.626	97.374	0.199	0.255	0.314
	3	9410241223-1240	1.40	0.421	99.579	0.151	0.186	0.229
Table 5.3 : Grain sizes of bed load								

<div><div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div><div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div></div>		Survey Bulletin 109 : 24 October , 1994	
		Location 9 : Gorai River, Gorai Offtake	
	Date : 28 Jan 1995	Grain size distributions	page 5.1
	Init : mk / tr		

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	9410240943-0945	K4A00T01 *

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	9410241047-1103	411895	644772	2.40	K4AO0P01 *
		2	9410241155-1218	411901	644740	2.80	K4AO0P02 *
		3	9410241223-1240	411895	644675	1.40	K4AO0P03 *
		4	9410241310-1338	411896	644629	7.30	K4AO0P04 *
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	9410241047-1103	411895	644772	2.40
		2	3	9410241155-1218	411901	644740	2.80
		3	2	9410241223-1240	411895	644675	1.40
		4	6	9410241310-1338	411896	644629	7.30

Table 6.3: Suspended sediment - point sampled


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

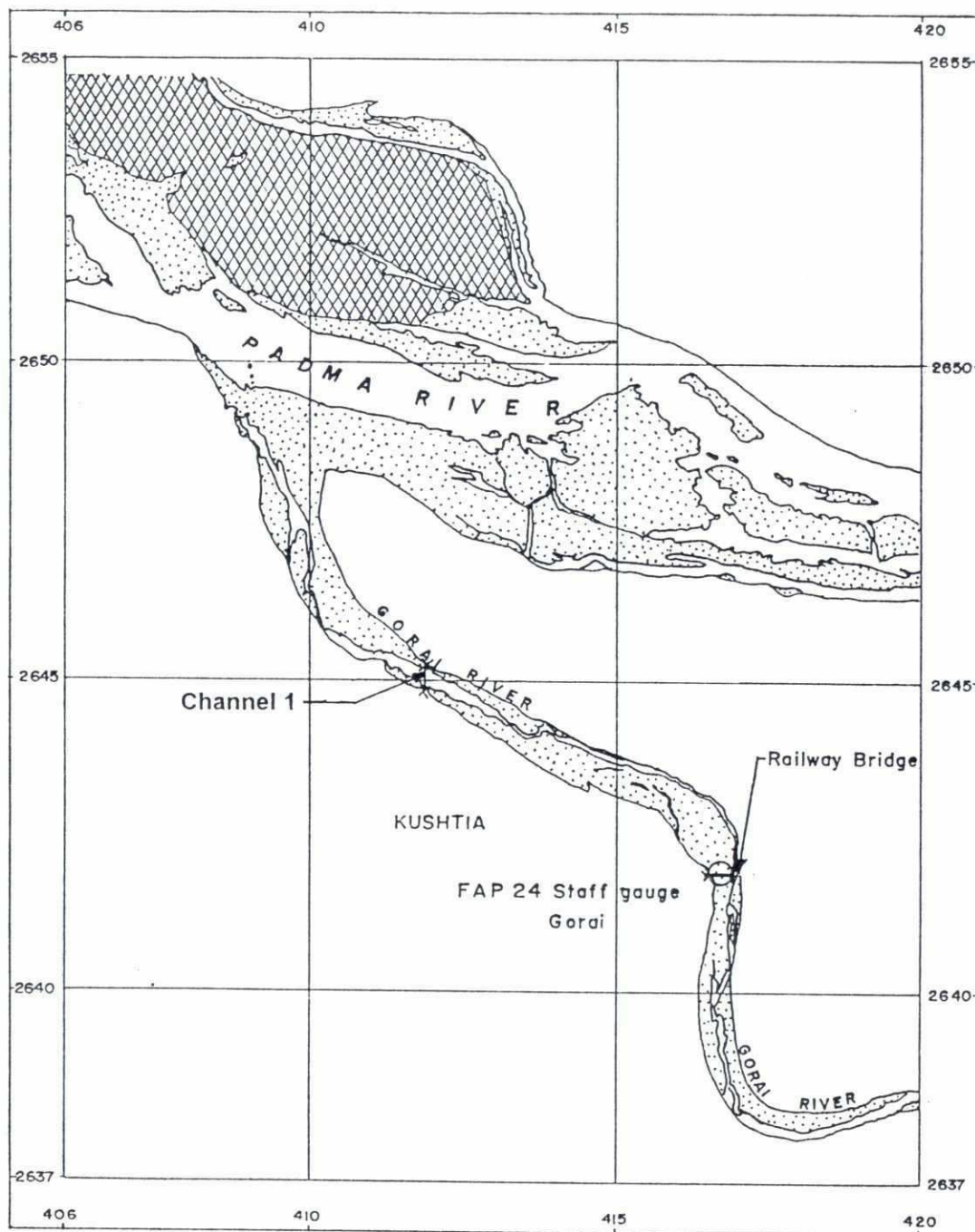
Table 6.4: Suspended sediment - depth integrated

Method	Channel	Vertical	Time (YYMMDDHHMM-HHMM)	Easting (m)	Northing (m)	Depth (m)	Sample No.
Helley-Smith Sample	1	2	9410241155-1218	411901	644740	2.80	A1379
		3	9410241223-1240	411895	644675	1.40	A1827
		2	9410241155-1218	411901	644740	2.80	A2236
		3	9410241223-1240	411895	644675	1.40	A1925

Table 6.5: Bed load

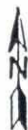
Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	K4AO0T01 .ase
Echosounder data	1	QUATTRO	K4AO0T01 .ech
Sediment transport data	1	QUATTRO	K4AO0T01 .sed
Sus. sed. conc. analysis	1	QUATTRO	K4AO0T01 .ssc
Bed load sed. analysis	1	QUATTRO	K4AO0T01 .bdl
Transect plot data	1	QUATTRO	K4AO0T01 .trs
Table 7.1 PSD 24 Database file description			

<div><div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div><div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div></div>		Survey Bulletin 109 : 24 October , 1994	
		Location 9 : Gorai River, Gorai Offtake	
	Date : 28 Jan 1995	PSD 24 Database file description	page 7.1
	Init : mk / tr		



LEGEND:

- X—X— Cross Section
- High land
- Unstable/low char
- FAP 24 Staff gauge



5000m 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 126: 05 December, 1994.

Location 4 : Gorai River, Gorai Offtake

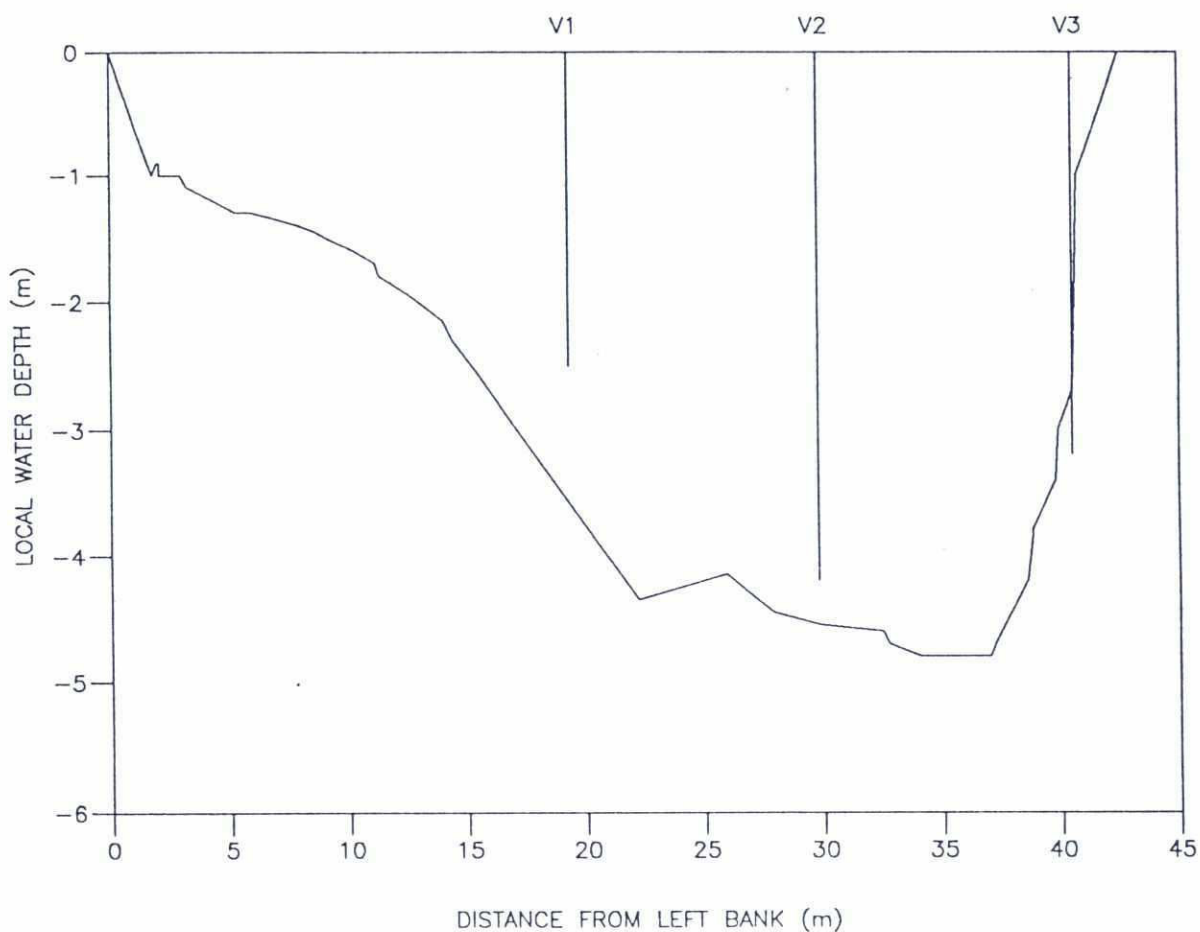
Date : 04 Feb 1995

Init : mk/tr

Location map

page

1.1



Water level : 3.66 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 126 : 05 December, 1994

Location 09 : Gorai River, Gorai Offtake

File : K4C50T01

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	3	-	-	-
	ADCP	-	-	-	-
	S4 current meter	3	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	12	-	-	-
	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

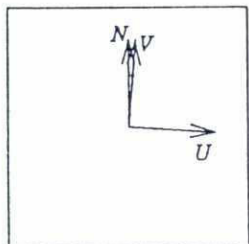
Channel	Width (m)	Area (m ²)	Stage h (m+PWD)	Discharge Q (m ³ /s)	Bed load transport Sb (kg/s)	Suspended Sediment transport Ss total (kg/s)
Channel 1	43	123	3.66	5.00	0	0.23

Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m + PWD)	Gauge
Gorai	Channel 1	05 Dec 94	3.66	FAP 24

Table 2.3: Water-levels

 <p>FAP 24 RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities</p>		Survey Bulletin 126 : 05 December, 1994	
		Location 09 : Gorai River, Gorai Offtake	
File : K4C50T01	Date : 04 Feb 1995	Survey programme as made and key figures	page 2.1
	Init : mk / tr		

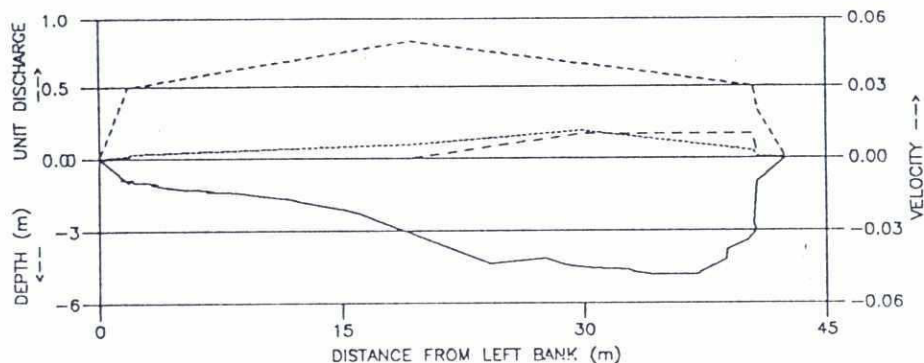


TRANSECT AZIMUTH = 4°

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 (m³/s.m)

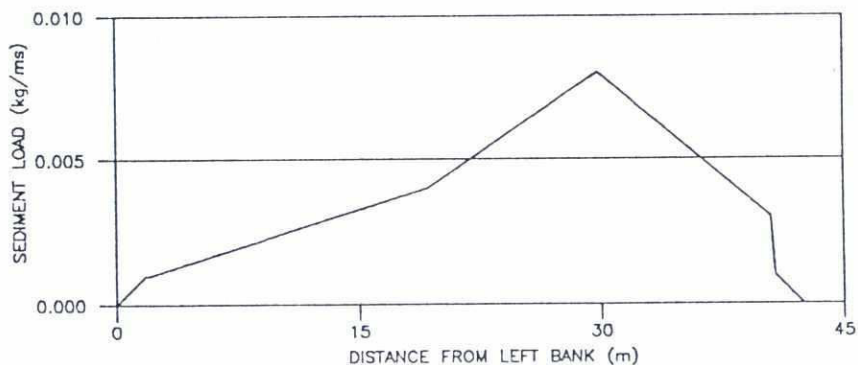
--- U - (m/s)

--- V - (m/s)

STAGE = 3.66 (m+PWD)

A = 123 (m²)

Q = 5 (m³/s)



SEDIMENT TRANSPORT

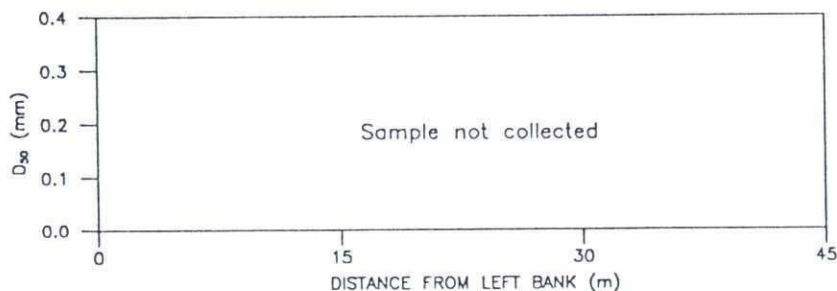
LEGEND :

— S_{TOTAL} 0.23 (kg/s)

--- $S_{WASH\ LOAD}$ 0.22 (kg/s)

--- $S_{SUSP.\ BED}$ 0.01 (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 126 : 05 December, 1994

Location 09 : Gorai River, Gorai Offtake

File : K4C50T01

Date : 04 Feb 1995

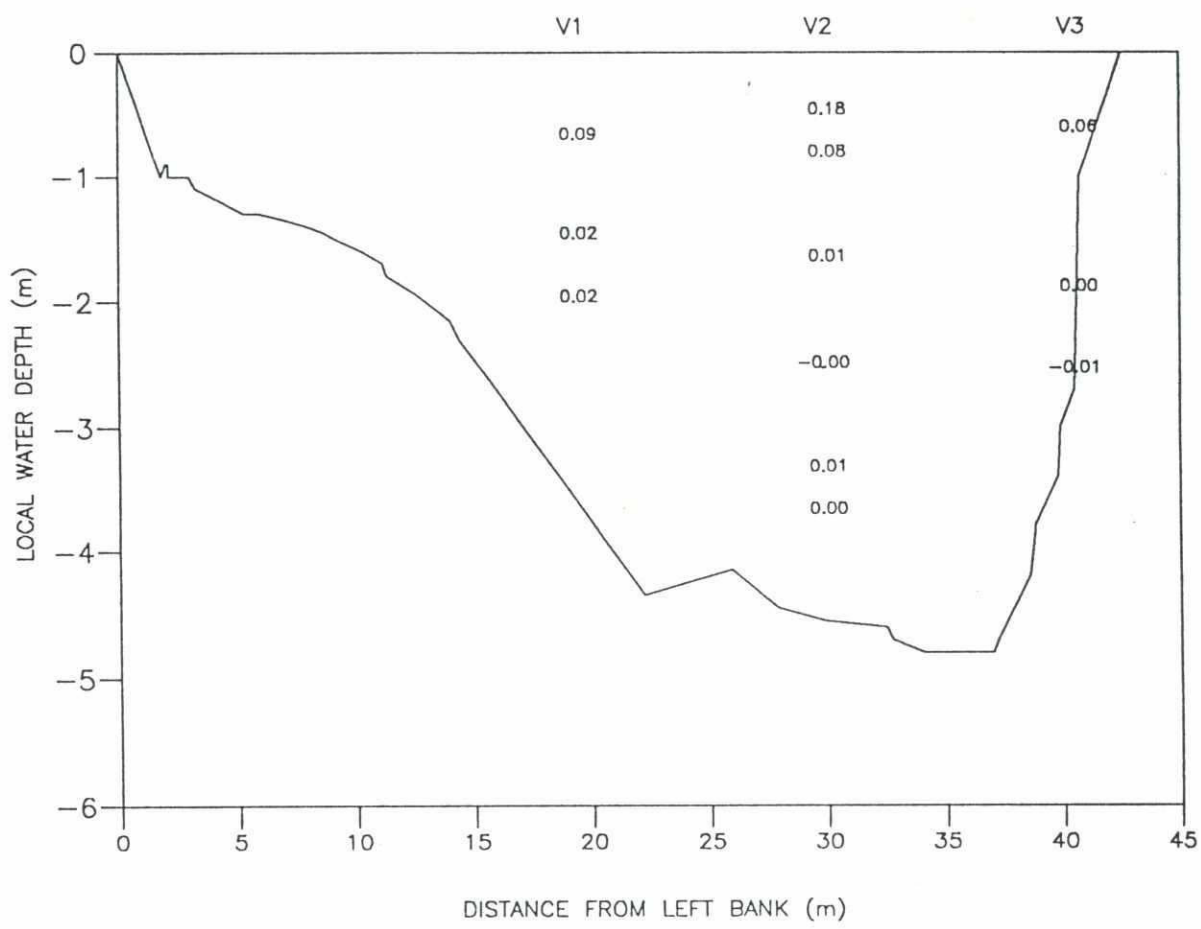
Init : mk / tr

Horizontal distribution of flow and sediments
Channel 1

page

3.1

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Water level : 3.66 m + PWD measured at the station indicated on page 1.1

<div> <div> FAP 24 </div> <div> RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities </div> </div>		Survey Bulletin 126 : 05 December, 1994	
		Location 09 : Gorai River, Gorai Offtake	
File : K4C50T01	Date : 04 Feb 1995	Cross-sectional distribution of flow velocity Channel 1	page 4.1
	Init : mk / tr		

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	9412051041-1042 9412051043-1044	K4C50T01 * K4C50T02

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	9412051057-1110	411900	644644	2.50	K4C50P01 *
		2	9412051116-1139	411900	644634	4.20	K4C50P02 *
		3	9412051143-1155	411900	644623	3.20	K4C50P03 *

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	9412051057-1110	411900	644644	2.50
		2	6	9412051116-1139	411900	644634	4.20
		3	3	9412051143-1155	411900	644623	3.20

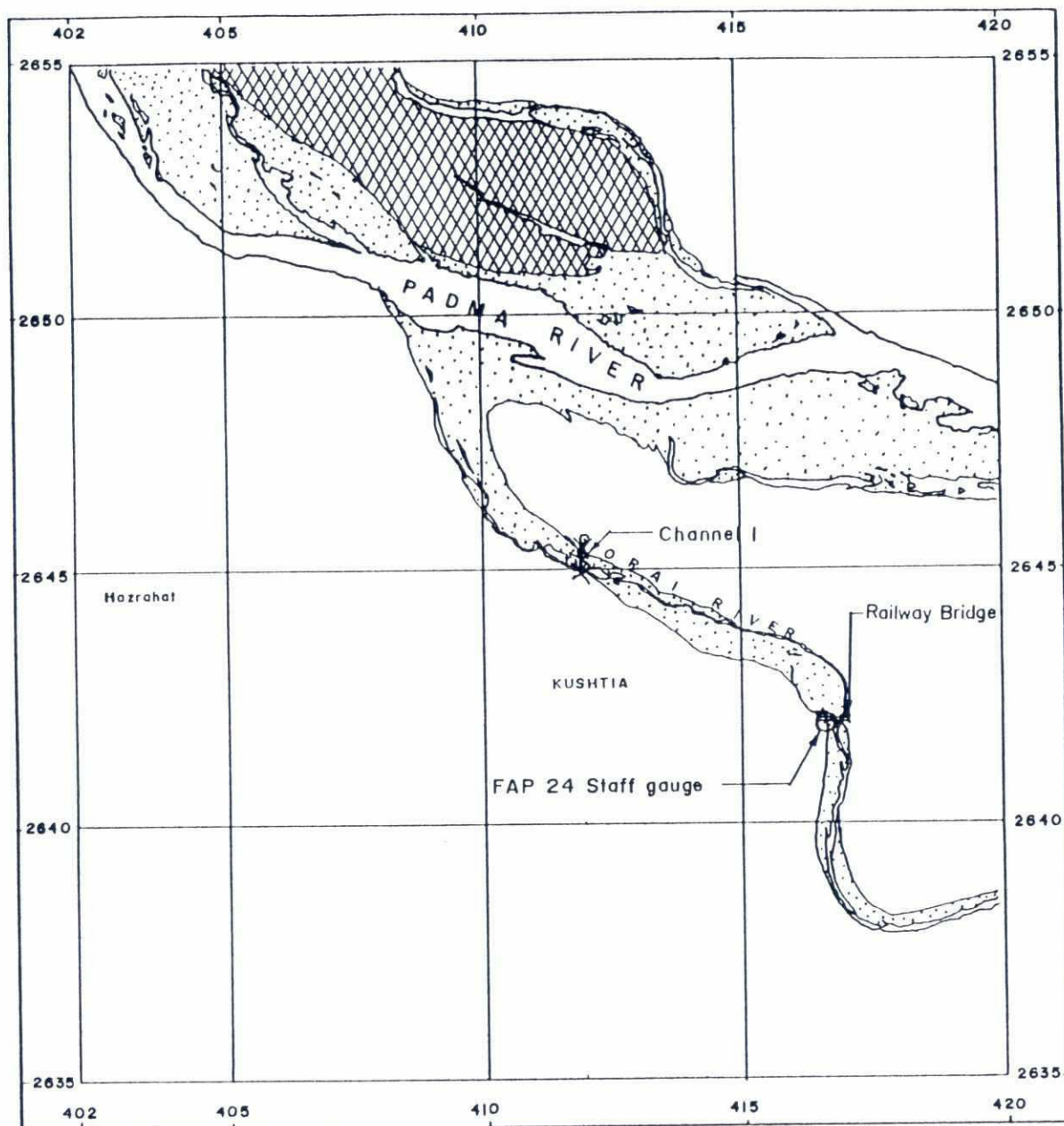
Table 6.3: Suspended sediment - point sampled

 <p>FAP 24 DELFT - DHI</p>	<p>RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities</p>	Survey Bulletin 126 : 05 December, 1994	
		Location 09 : Gorai River, Gorai Offtake	
	Date : 04 Feb 1995	Collected data and their storage (1)	page 6.1
	Init : mk / tr		





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Types of Data	Channel	Format	Filename
ADCP/S4/EMF data	1	QUATTRO	K4C50T01 .ase
Echosounder data	1	QUATTRO	K4C50T01 .ech
Sediment transport data	1	QUATTRO	K4C50T01 .sed
Sus. sed. conc. analysis	1	QUATTRO	K4C50T01 .ssc
Transect plot data	1	QUATTRO	K4C50T01 .trs
Table 7.1 PSD 24 Database file description			

 <p>FAP 24 DELFT - DHI</p>	<p>RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities</p>	Survey Bulletin 126 : 05 December, 1994	
		Location 09 : Gorai River, Gorai Offtake	
	Date : 04 Feb 1995	PSD 24 Database file description	page
	Init : mk / tr		7.1



LEGEND:

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



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 130 : 05 January, 1995

Location 09 ; Gorai River, Gorai Offtake

Date : 06 Aug 1995

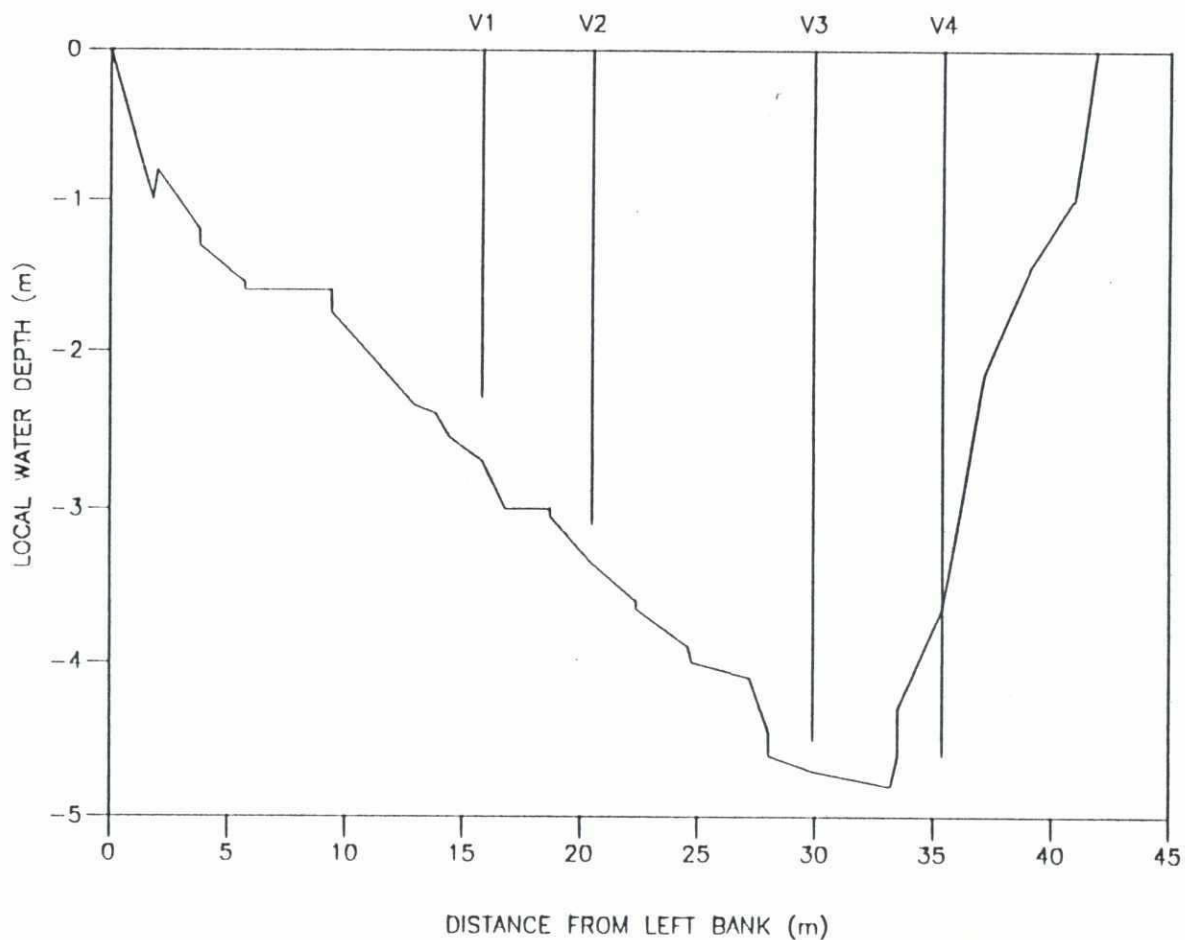
Location map

Init : mk


page

11

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Water level : 4.38 m + PWD measured at the station indicated on page 1.1

<div><div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div><div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div></div>		Survey Bulletin 130 : 05 January, 1995	
		Location 09 : Gorai River, Gorai Offtake	
File : K5159T02	Date : 06 Aug 1995	Cross-sections and measured verticals Channel 1	page 1.2
	Init : mk		

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	4	-	-	-
	ADCP	-	-	-	-
	S4 current meter	4	-	-	-
	Ott current meter	-	-	-	-
Vertical sediment profile	Pump bottle sampling	21	-	-	-
	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	42	114	4.38	0.20	0	0

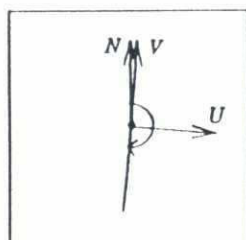
Table 2.2: Key figures

Gauge Location	Channel	Date	Water level (Daily average) (m + PWD)	Gauge
Gorai	Channel 1	05 Jan 95	4.38	FAP 24

Table 2.3: Water-levels

FAP 24  DELFT - DHI		RIVER SURVEY PROJECT Flood Plan Coordination Organization Commission of the European Communities		Survey Bulletin 130 : 05 January, 1995	
				Location 09 : Gorai River, Gorai Offtake	
File : K5159T02	Date : 06 Aug 1995	Survey programme as made and key figures			page
	Init : mk				21

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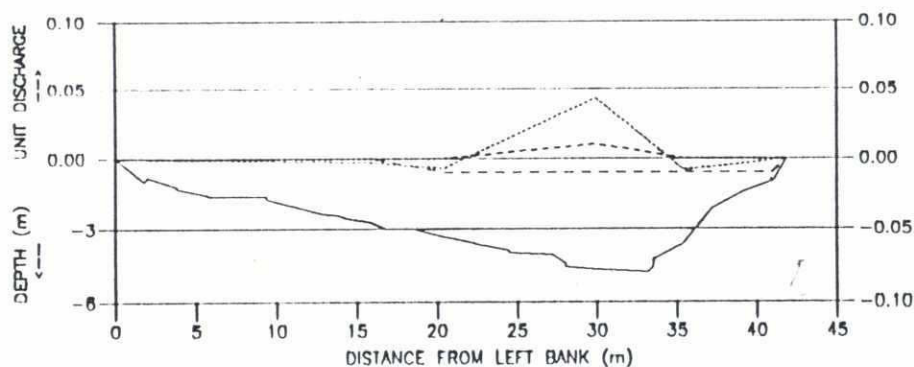


TRANSECT AZIMUTH = 185°

U - VELOCITY NORMAL TO TRANSECT (m/s)

V - VELOCITY PARALLEL TO TRANSECT (m/s)

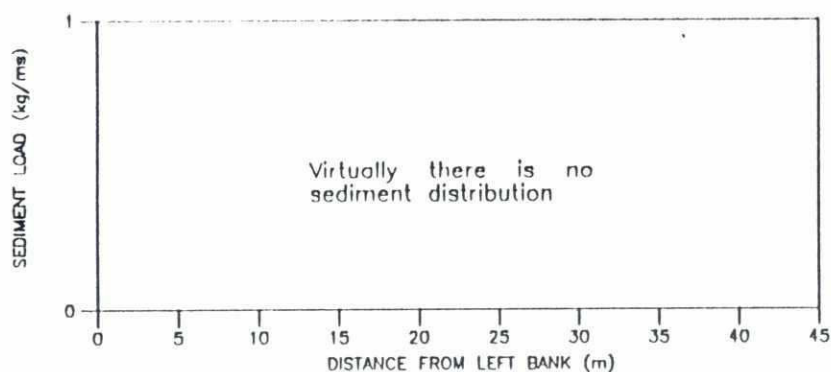
N - MAGNETIC NORTH



FLOW

LEGEND :

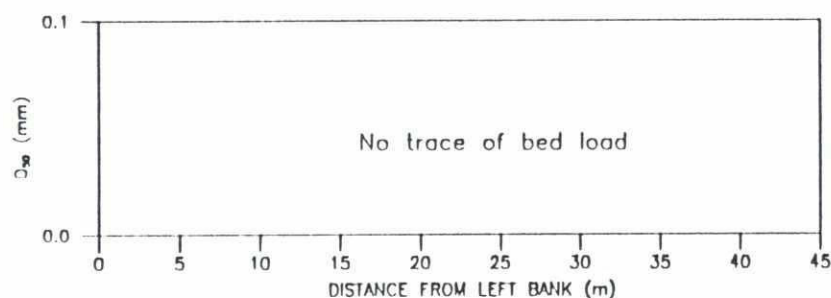
- WATER DEPTH (m below STACK)
- UNIT DISCHARGE (m³/s.m)
- U - (m/s)
- .- V - (m/s)
- STACK = 4.38 (m+PWD)
- A = 114 (m³)
- Q = 0.2 (m³/s)



SEDIMENT TRANSPORT

LEGEND :

- S_{TOTAL} 0 (kg/s)
- S_{WASH LOAD} 0 (kg/s)
- .- S_{SUSP. BED} 0 (kg/s)
- S_{BED LOAD} 0 (kg/s)



GRAIN SIZE

LEGEND :

- ♦♦♦♦♦ D₅₀ SUSP. (mm)
- △△△△△ D₅₀ BED LOAD (mm)
- D₅₀ BED MAT. (mm)

FAP 24



DELFT - DHI

RIVER SURVEY PROJECT

Flood Plan Coordination Organization

Commission of the European Communities

Survey Bulletin 130 : 05 January, 1995

Location 09 : Gorai River, Gorai Offtake

File : K5159T02

Date : 06 Aug 1995

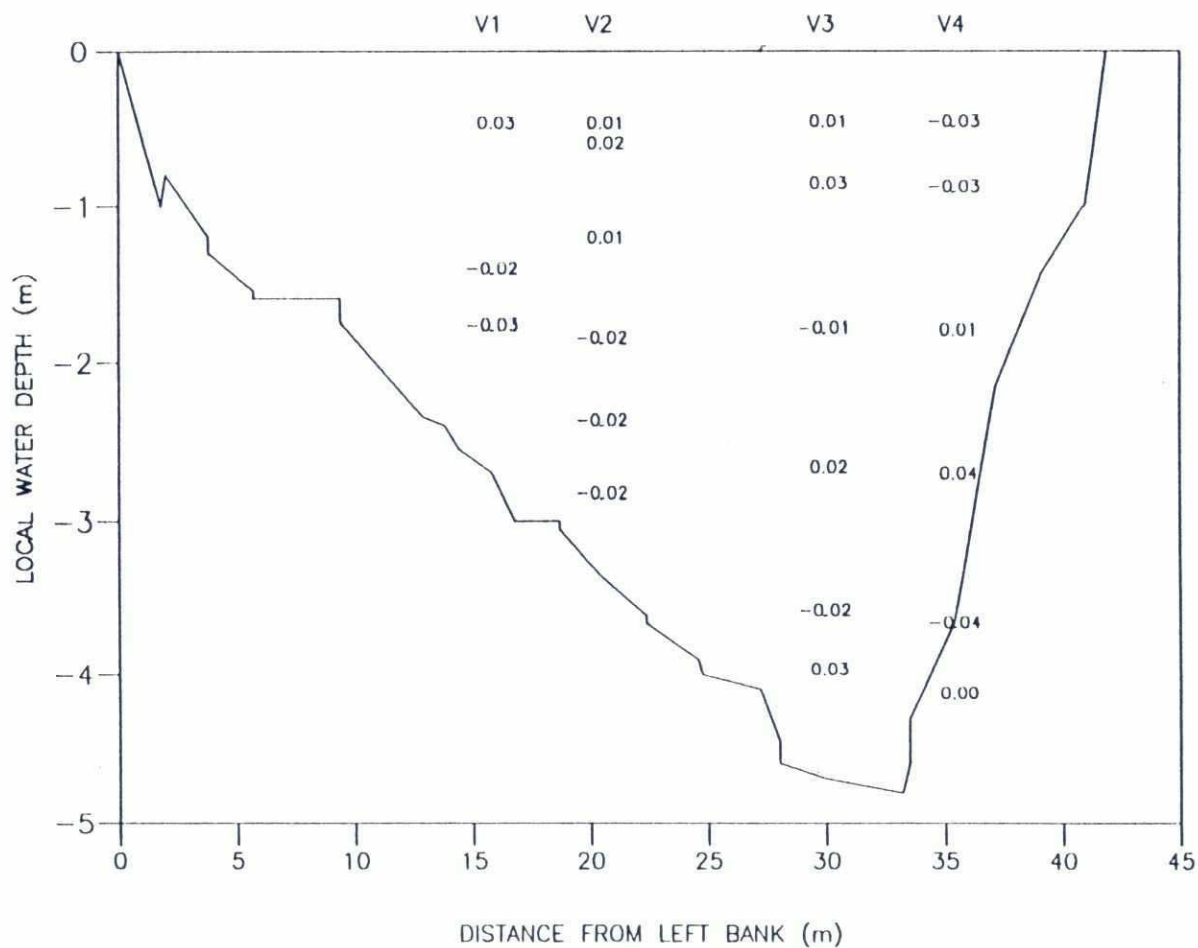
Init : mk

Horizontal distribution of flow and sediments
Channel 1

page

3.1

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Water level : 4.38 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 130 : 05 January, 1995

Location 09 : Gorai River, Gorai Offtake

File : K5159T02

Date : 06 Aug 1995

Init : mk

Cross-sectional distribution of flow velocity
Channel 1

page

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

Table 5.2 : Grain size of bed material

<div><div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div><div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div></div>	Survey Bulletin 130 : 05 January, 1995	
	Location 09 : Goral River, Goral Offtake	
Date : 06 Aug 1995	Grain size distributions	page
Init : mk		5.1

Method	Channel	Time (YYMMDDHHMM-HHMM)	File name
Echo-sounding	1	9501051301-1303	K5159T02 *

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	9501051417-1431	411899	644646	2 30	K5159P02 *
		2	9501051436-1500	411901	644640	3 10	K5159P03 *
		3	9501051504-1533	411896	644631	4 50	K5159P04 *
		4	9501051324-1359	411891	644626	4 60	K5159P01 *

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	9501051417-1431	411899	644646	2 30
		2	6	9501051436-1500	411901	644640	3 10
		3	6	9501051504-1533	411896	644631	4 50
		4	6	9501051324-1359	411891	644626	4 60

Table 6.3: Suspended sediment - point sampled

<div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div> <div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div>		<div>Survey Bulletin 130 : 05 January, 1995</div> <div>Location 09 : Gorai River, Gorai Offtake</div>	
<div>Date : 06 Aug 1995</div> <div>Init : mk</div>		<div>Collected data and their storage (1)</div>	<div>page</div> <div>61</div>

Types of Data	Channel	Format	Filename b2
ADCP/S4/EMF data	1	QUATTRO	K5159T02 .ase
Echosounder data	1	QUATTRO	K5159T02 .ech
Sediment transport data	1	QUATTRO	K5159T02 .sed
Sus sed. conc. analysis	1	QUATTRO	K5159T02 .ssc
Transect plot data	1	QUATTRO	K5159T02 .trs
Table 7.1 PSD 24 Database file description			

<div><div><div>FAP 24</div><div></div><div>DELFT - DHI</div></div><div><div>RIVER SURVEY PROJECT</div><div>Flood Plan Coordination Organization</div><div>Commission of the European Communities</div></div></div>		Survey Bulletin 130 : 05 January, 1995	
		Location 09 : Gorai River, Gorai Offtake	
	Date : 06 Aug 1995	PSD 24 Database file description	page
	Init : mk		7.1

