Archiving ADV Flowtracker Gaugings

Overview:

Horizons Regional Council carries out several different types of gaugings across the region. As part of the Quality Assurance process of the gaugings, the raw data (gauging file) is processed, the gauging is then quality coded, reviewed and assured, and handed on to the Data Analysts ready to be archived. This Standard Operating Procedure (SOP) details the archiving of ADV Flowtracker Gaugings, specifying the key areas to verify that the gauging was conducted, processed and Quality Assured appropriately.

The presumption is that the gauging has been quality coded and all the information is present and/or accounted for before the archiving process begins.

Preparation:

You need to have the following in front of you in order to archive the gauging:

1) Physical gauging facecard (preferably already quality coded)
2) Discharge Measurement Summary (DMS) print out – there should be 4 pages of this
3) Hilltop printout sheet of the gauging loaded into the appropriate Regional Gauging location
4) Hilltop Manager open with the gauging that is to be archived located in the correct Region location

If any of these are missing then the gauging needs to be returned to the Technician with a note explaining what needs to be added.

Extras with the gauging may include photographs if an object or obstruction impacted the gauging that would be relevant for the end user to know about.

Checking the Information:

Key information Check List:

Detailed below and illustrated with diagrams is the information that needs to be checked off to ensure the paperwork and the digital file contain the same information, the correct information, and assigned the correct Quality Code to subsequently be archived. During the Quality Assurance process these would have all been checked with a final Quality Code applied, however the ultimate responsibility of the quality of the gauging rests with the ones who commit the gauging to the archive, therefore this needs to be doubled checked. To save time, it is recommended that the printed out paperwork be assessed and compared first to verify that information is all correct and then compare the Facecard information with the digital file.

NOTE: Flow Tracker Gaugings cannot be heavily edited back in the office – how the instrument & software works is identifying issues with the gauging in the field, therefore issues picked up on the Quality Assurance and Archiving may not be able to be corrected, resulting in a lowered Quality Code. Any issues or discrepancies should be given back to the Technician to discuss to determine if it can be edited or if it will have to be archived as is.

If any of the information does not match up that is listed below please return to the Technician with a note explaining what needs to be corrected

- Gauging number, Date & Time – these should <u>all be the same</u>, filed to the exact time (NOTE: the DMS paperwork <u>does not</u> contain the gauging number nor the time the gauging is filed at, but rather the start time of the gauging)
- Site name & Number (obtained from the Gauging Register)
- Instrumentation used with serial number & date of calibration– on the Hilltop printout & digital file there is a 'Method Code' section which needs to have the number '46'. On the Facecard and DMS the meter type and serial number shall be recorded
- Filed Stage height – this is <u>not</u> on the DMS Printout

Archiving ADV Flowtracker Gaugings

- The 'Disch. Equation' on the DMS Summary printout needs to be **Mean-Section**

Facecard Information Check List:

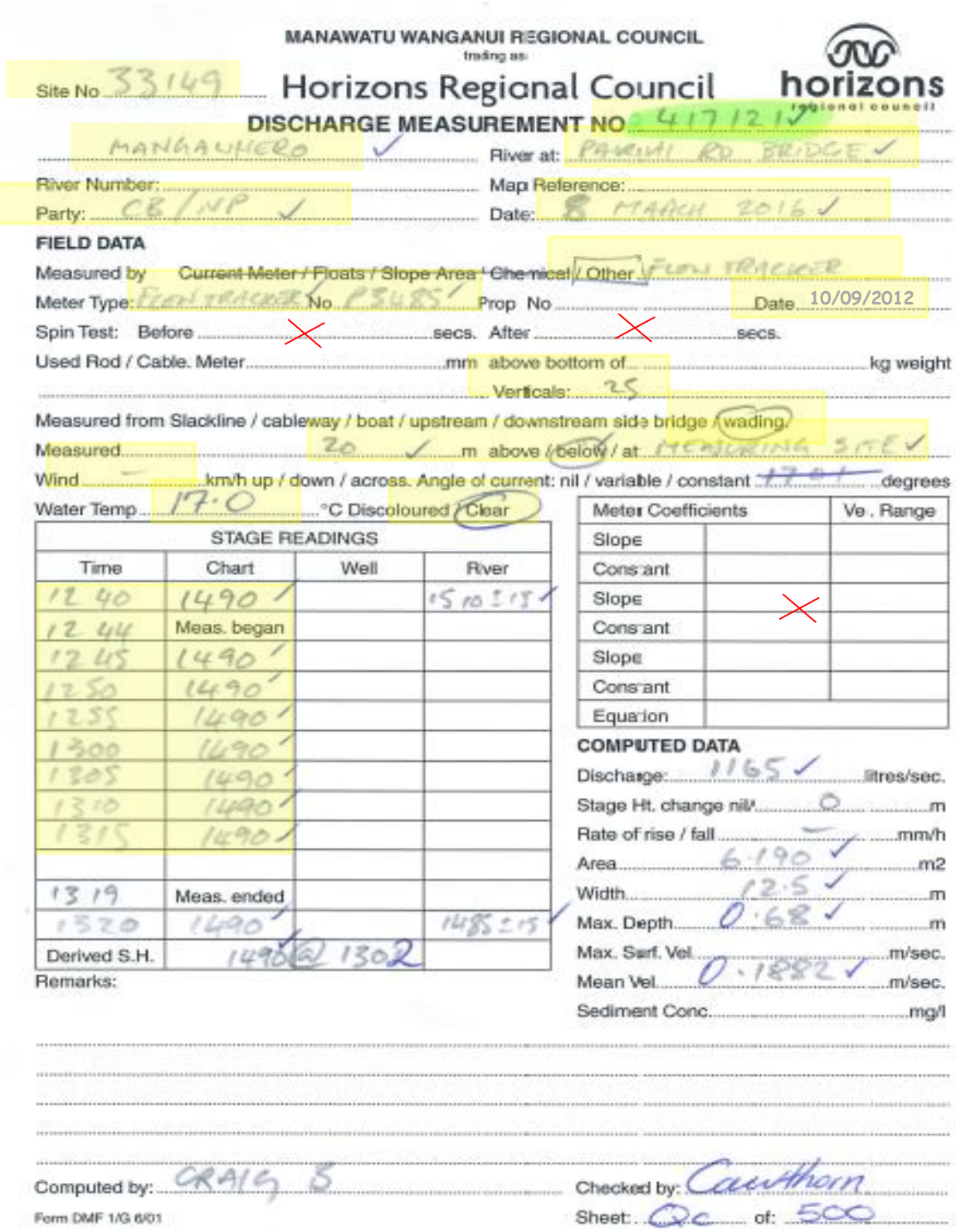
Along with the key information check list outlined above, the following is specific information required on the Facecard and refers to Diagram 1:

- 'Party' shall have the names and/or initials of those who conducted the gauging
- 'Measured by…' shall have 'Other' circled with 'Flow Tracker written beside it
- 'Meter Type….No.' shall have the Meter Serial Number recorded, with the calibration date recorded by 'Date' section. NOTE: Flow Trackers require to be calibrated every 5 years under the NEMS – this impacts the final Quality Code and needs to be checked in Assets.
- Number of verticals done and method used
- ;Measured from….' shall have one of the options circled
- 'Measured….' shall have the distance, in metres, noted in respect to where the gauging was conducted from, with either 'above, below, at' circled
- Wind speed and direction noted and circled, otherwise a line shall be drawn through it
- Angle on current shall be circled – either 'nil', 'variable' or 'constant' with the degrees recorded
- Water Temperature recorded – if a handheld temperature value was used the instrument that measured it shall be noted next to the number
- The colour of the water circled – either 'discoloured' or 'clear'
- The Start & End times of the gauging shall be noted in the 'Stage Readings' section – if a Logger is set up at the site the Water Level readings shall be recorded at 5 minute punches during the gauging Start & End time. If no continuous data is available this shall be left blank.
- The 'Derived S.H.' is the middle Water Level point of the gauging that the associated discharge will be filed against – if the gauging occurred during a rise or fall of recorded Water Level a Weighted Mean Stage Height needs to be calculated, with the appropriate evidence attached to the gauging. If no continuous Water Level data is recorded at the site the Derived S.H. is '-1'. The Time of the Gauging shall be recorded next to the derived Stage Height
- The 'Computed Data' section shall be filled out – this includes the Discharge, Stage height change, Rate of rise/fall, Area, Width, Max. Depth and Mean Velocity – this information is obtained from the Hilltop Printout & Digital files
- Under the 'Remarks' section anything of particular importance or interest for the end user should be noted. Examples include if changes were made to the site during the inspection that would impact the Water Level readings (clearing weirs, moving debris), ways the data may have been corrected (azimuth degrees, verticals excluded) or potential conditions affecting the quality of the gauging (bad section, stopped half way through).
- The person who computed the Gauging shall record their name and/or initials on the bottom of the Facecard
- The person who checked the gauging (i.e. Reviewed/Quality Assured it) shall record their initials/name at the bottom right corner of the gauging card

Archiving ADV Flowtracker Gaugings

Archiving ADV Flowtracker Gaugings

Diagram 1: Facecard



MANAWATU WANGANUI REGIONAL COUNCIL
trading as
Horizons Regional Council

Site No 33149

DISCHARGE MEASUREMENT NO 417121

MANGAWHERO — River at: PAHIATUA RD BRIDGE

River Number: — Map Reference:

Party: CB / NP — Date: 8 MARCH 2016

FIELD DATA

Measured by ~~Current Meter / Floats / Slope Area / Chemical~~ / Other FLOW TRACKER

Meter Type: FLOW TRACKER No P3485 — Prop No — Date 10/09/2012

Spin Test: Before ... secs. After ... secs.

Used Rod / Cable. Meter ... mm above bottom of ... kg weight

Verticals: 25

Measured from Slackline / cableway / boat / upstream / downstream side bridge / wading.

Measured 20 m above / below / at GAUGING SITE

Wind ... km/h up / down / across. Angle of current: nil / variable / constant ~0~ degrees

Water Temp 17.0 °C Discoloured / Clear

STAGE READINGS			
Time	Chart	Well	River
12 40	1490		1510 ± 15
12 44	Meas. began		
12 45	1490		
12 50	1490		
12 55	1490		
13 00	1490		
13 05	1490		
13 10	1490		
13 15	1490		
13 19	Meas. ended		
13 20	1490		1485 ± 15
Derived S.H.	1490 @ 1302		

Remarks:

Meter Coefficients		Ve . Range
Slope		
Constant		
Slope		
Constant		
Slope		
Constant		
Equation		

COMPUTED DATA

Discharge: 1165 litres/sec.
Stage Ht. change nil/ 0 m
Rate of rise / fall ... mm/h
Area 6.190 m2
Width 12.5 m
Max. Depth 0.68 m
Max. Surf. Vel. ... m/sec.
Mean Vel. 0.1882 m/sec.
Sediment Conc. ... mg/l

Computed by: CRAIG B — Checked by: Cawthorn

Form DMF 1/G 6/01 — Sheet: Qc of: 500

Areas highlighted in yellow need to have their respective sections filled in. If not, send the whole gauging back to the Technician who computed the gauging for it to be corrected. The information highlighted also needs to match what is in the Hilltop digital file, the Hilltop printed out file and parts of the Discharge Measurement Summary (DMS) sheet

Note that there is no spin test no Meter Coefficients to fill out for Flow Trackers

NOTE: The Date & Time and Gauging Number should be checked first as this must be the same across all documentation – if not send back

Archiving ADV Flowtracker Gaugings

Discharge Measurement Summary Check List:

Along with the key information check list, the following is specific information required on the Discharge Measurement Summary (DMS) print outs (four pages) and refers to Diagrams 2, 3, 4 & 5. The DMS printouts contain a lot of extra information that should be checked over to make sure it makes sense (i.e. a sanity check) with the below points the key areas that need to be focused on.

NOTE: The Time on the DMS is the START TIME of the gauging, not the filed, middle time of the gauging, therefore it will not match what is on the Hilltop print out or digital file.

Page 1:

- System Information: Shall include the Sensor Type (Flow Tracker) and the Serial Number
- Units: Shall be in metric
- Summary: The 'Mean Temp' shall have a temperature recorded that matches other documentation
- **Disch. Equation: Shall have 'Mean-Section'** – this is very important, if this is 'Mid-Section' it needs to be returned to the Technician and inquired why it was done this way (USGS does it this way, we do not!) and corrected/reprocessed in Hilltop file.
- # Stations: shall have the total verticals done – NOTE: the first vertical is called '0' which may confuse some people
- Measurement Results: these should be compared with the Hilltop printout details, and should match up. Note that the software puts verticals that are suspicious/warning in italics – these should be investigated to make sure they are OK. By default, verticals get flagged when the spacing changes significantly (software encourages even spacing) and when there is negative flow – **negative flow is acceptable**. Unlike Conventional gaugings, Flow Trackers can separate the direction the flow is going in, therefore can account for backwater effects for the overall discharge in the river. Therefore negative velocities and subsequent flows in verticals are acceptable, but should be checked (i.e. if occurring in the middle of the channel, most likely something went wrong! Would expect to see these on the edges). **If ever unsure, discuss with Technician who conducted the gauging**.

Page 2:

- First graph showing % Discharge vs. Location shall show the percentage of measured discharge (Q) in each vertical. If there is at least one vertical with ≥10 % then the maximum Quality Code assigned to the gauging is QC 400.
- Second graph showing Velocity (m/s) vs. location shall show the direction and velocity measured in each vertical. **Negative velocities** are acceptable as they demonstrate backwater effects, however if there is negative flow in the middle of the channel / not at the edges further investigation is needed.
- Third graph showing Depth (m) vs. location shall show the channel cross section and the depth each measurement was conducted. This should be at 0.6 depth, or if multiple depths taken at each vertical, recorded at 0.2, 0.6 or 0.8 depths.

Page 3:

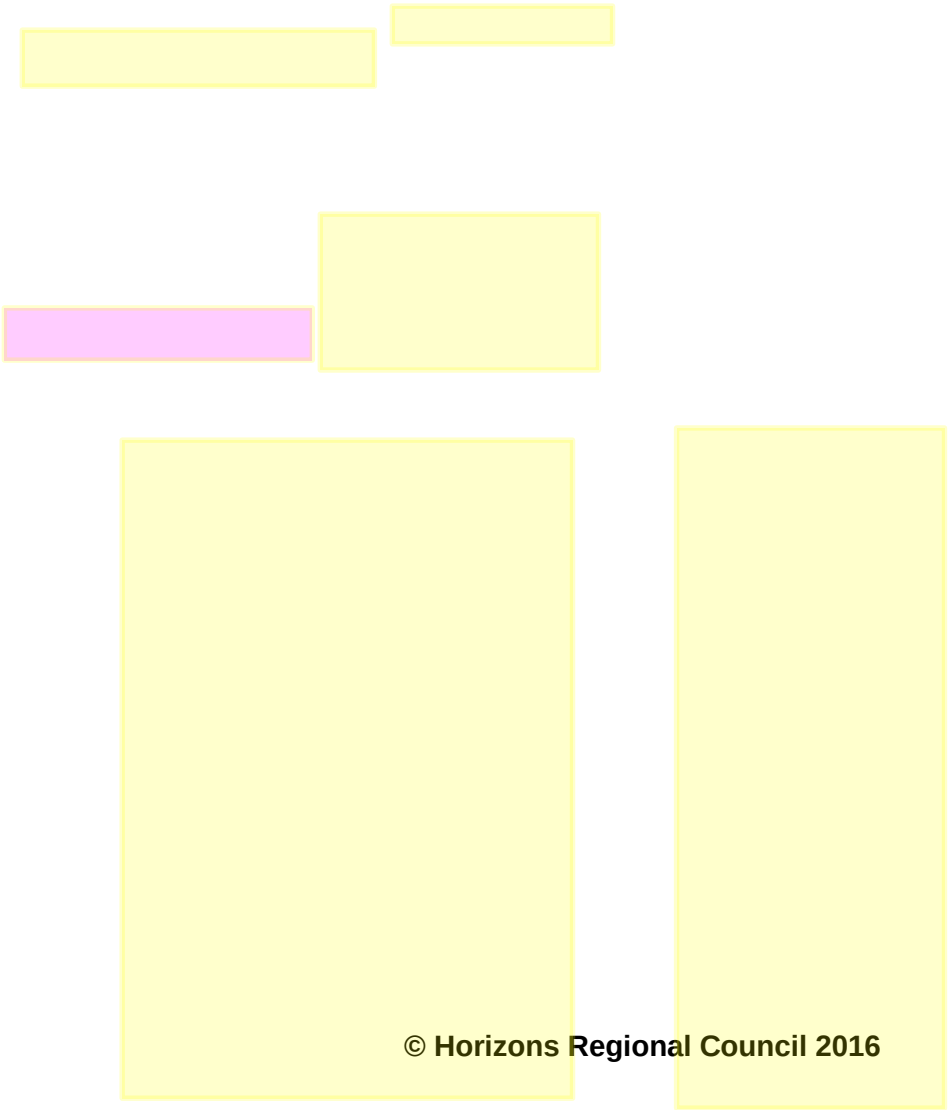
- Quality Control – at present Flow Tracker Gaugings Quality Control value is determined by the ISO748: 2007 standard controls, therefore this printout only needs to be checked that it has the same File Information and Site Details as the other DMS printouts. **This still needs to be included**.

Page 4:

- Automatic Quality Control Test (BeamCheck) – Beams shall line up on the graph, with the 4 checks recorded underneath ticked as 'Pass' – if not, needs to be sent back to the Technician.

Archiving ADV Flowtracker Gaugings

Diagram 2: Page 1 of the Discharge Measurement Summary (DMS) printout with key features highlighted to be checked.



Areas highlighted in yellow need to have their respective sections filled in. If not, send the whole gauging back to the Technician who computed the gauging for it to be corrected (if it can be).

Area highlighted in pink is very important to check that it is 'Mean – Section'.

Negative flow values are acceptable if in logical place in gauging (i.e. the edges where backwater effects could be).

Archiving ADV Flowtracker Gaugings

Discharge Measurement Summary

Date Generated: Tue Mar 29 2016

File Information

File Name	PAKIHI2.WAD
Start Date and Time	2016/03/08 12:44:14

Site Details

Site Name	
Operator(s)	CRAIG

System Information

Sensor Type	FlowTracker
Serial #	P3485
CPU Firmware Version	3.9
Software Ver	2.30
Mounting Correction	0.0%

Units (Metric Units)

Distance	m
Velocity	m/s
Area	m^2
Discharge	m^3/s

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.1%	1.3%
Velocity	0.5%	1.0%
Width	0.1%	0.1%
Method	1.7%	-
# Stations	2.0%	-
Overall	**2.8%**	**1.9%**

Summary

Averaging Int.	40	# Stations	26
Start Edge	LEW	Total Width	12.500
Mean SNR	19.8 dB	Total Area	6.190
Mean Temp	17.01 °C	Mean Depth	0.495
Disch. Equation	Mean-Section	Mean Velocity	0.1882
		Total Discharge	**1.1650**

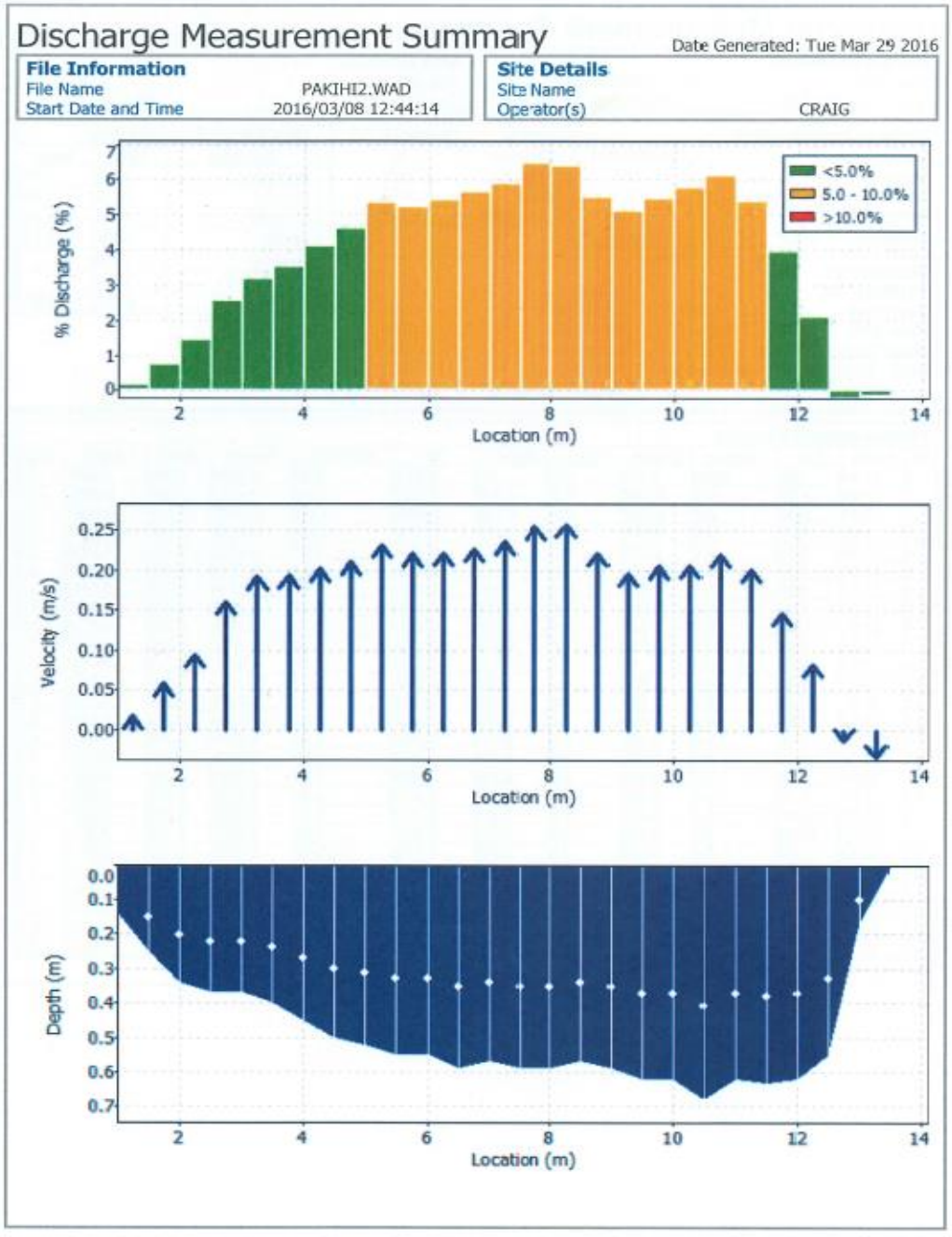
Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	12:44	1.00	None	0.140	0.0	0.0	0.0000	0.00	0.0000	0.000	0.0000	0.0
1	*12:44*	*1.50*	*0.6*	*0.250*	*0.6*	*0.100*	*0.0365*	*1.00*	*0.0182*	*0.098*	*0.0018*	*0.2*
2	*12:46*	*2.00*	*0.6*	*0.340*	*0.6*	*0.136*	*0.0809*	*1.00*	*0.0587*	*0.148*	*0.0087*	*0.7*
3	*12:48*	*2.50*	*0.6*	*0.370*	*0.6*	*0.148*	*0.1092*	*1.00*	*0.0950*	*0.178*	*0.0169*	*1.4*
4	12:49	3.00	0.6	0.370	0.6	0.148	0.2131	1.00	0.1611	0.185	0.0298	2.6
5	12:51	3.50	0.6	0.400	0.6	0.160	0.1716	1.00	0.1923	0.193	0.0370	3.2
6	12:52	4.00	0.6	0.450	0.6	0.180	0.2177	1.00	0.1946	0.213	0.0414	3.6
7	12:54	4.50	0.6	0.500	0.6	0.200	0.1879	1.00	0.2028	0.238	0.0482	4.1
8	12:55	5.00	0.6	0.520	0.6	0.208	0.2337	1.00	0.2108	0.255	0.0538	4.6
9	12:56	5.50	0.6	0.550	0.6	0.220	0.2315	1.00	0.2326	0.268	0.0622	5.3
10	12:58	6.00	0.6	0.550	0.6	0.220	0.2112	1.00	0.2213	0.275	0.0609	5.2
11	13:00	6.50	0.6	0.590	0.6	0.236	0.2335	1.00	0.2223	0.285	0.0634	5.4
12	13:01	7.00	0.6	0.570	0.6	0.228	0.2217	1.00	0.2276	0.290	0.0660	5.7
13	13:02	7.50	0.6	0.590	0.6	0.236	0.2512	1.00	0.2364	0.290	0.0686	5.9
14	13:03	8.00	0.6	0.590	0.6	0.236	0.2600	1.00	0.2556	0.295	0.0754	6.5
15	13:04	8.50	0.6	0.570	0.6	0.228	0.2556	1.00	0.2578	0.290	0.0748	6.4
16	13:06	9.00	0.6	0.590	0.6	0.236	0.1883	1.00	0.2219	0.290	0.0644	5.5
17	13:07	9.50	0.6	0.620	0.6	0.248	0.2052	1.00	0.1967	0.303	0.0595	5.1
18	13:08	10.00	0.6	0.620	0.6	0.248	0.2070	1.00	0.2061	0.310	0.0639	5.5
19	13:10	10.50	0.6	0.680	0.6	0.272	0.2077	1.00	0.2073	0.325	0.0674	5.8
20	13:11	11.00	0.6	0.620	0.6	0.248	0.2326	1.00	0.2201	0.325	0.0715	6.1
21	13:12	11.50	0.6	0.630	0.6	0.252	0.1708	1.00	0.2017	0.313	0.0630	5.4
22	*13:15*	*12.00*	*0.6*	*0.620*	*0.6*	*0.248*	*0.1251*	*1.00*	*0.1479*	*0.313*	*0.0462*	*4.0*
23	*13:17*	*12.50*	*0.6*	*0.550*	*0.6*	*0.220*	*0.0413*	*1.00*	*0.0832*	*0.293*	*0.0243*	*2.1*
24	*13:19*	*13.00*	*0.6*	*0.170*	*0.6*	*0.068*	*-0.0692*	*1.00*	*-0.0139*	*0.180*	*-0.0025*	*-0.2*
25	13:19	13.50	None	0.000	0.0	0.0	0.0000	0.00	-0.0346	0.043	-0.0015	-0.1

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Archiving ADV Flowtracker Gaugings

Diagram 3: Page 2 of the Discharge Measurement Summary (DMS) printout with key features highlighted to be checked.



All three graphs should be checked that they make sense and reflect page 1 of the DMS.

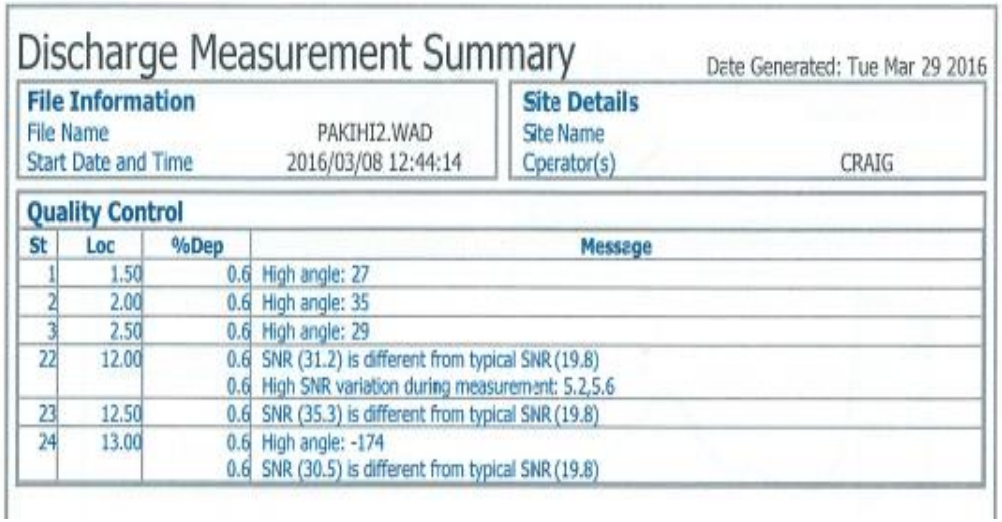
If > 10 % of Q in one vertical max QC 400.

Negative velocities are acceptable if in logical place in gauging (i.e. the edges where backwater effects could be).

Archiving ADV Flowtracker Gaugings

Diagram 4 (left): Page 3 of the Discharge Measurement Summary (DMS) printout with key features highlighted to be checked.

Diagram 5 (right): Page 4 of the Discharge Measurement Summary (DMS) printout with key features highlighted to be checked.



Discharge Measurement Summary

Date Generated: Tue Mar 29 2016

File Information

File Name PAKIHI2.WAD

Start Date and Time 2016/03/08 12:44:14

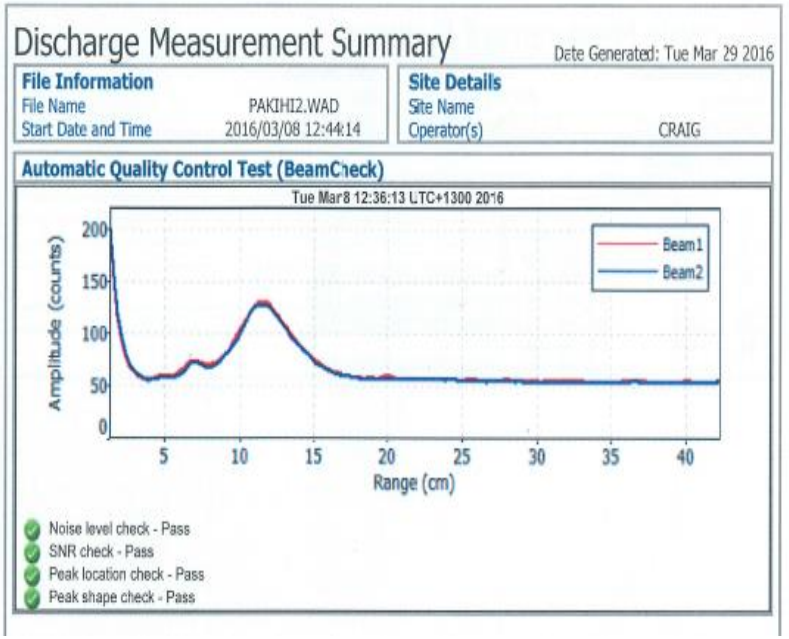
Site Details

Site Name

Operator(s) CRAIG

Quality Control

St	Loc	%Dep	Message
1	1.50	0.6	High angle: 27
2	2.00	0.6	High angle: 35
3	2.50	0.6	High angle: 29
22	12.00	0.6	SNR (31.2) is different from typical SNR (19.8)
		0.6	High SNR variation during measurement: 5.2,5.6
23	12.50	0.6	SNR (35.3) is different from typical SNR (19.8)
24	13.00	0.6	High angle: -174
		0.6	SNR (30.5) is different from typical SNR (19.8)



These two pages are relevant and need to be included and checked that they make sense.

Page 3 of the DMS does not contain information that is comparable to Hilltop.

Page 4 should have everything 'Pass' on it, else issue with instrumentation – discussion with Technician required.

Archiving ADV Flowtracker Gaugings

Hilltop Printout Check List:

Along with the key information check list, the following is specific information required on the Hilltop Printout (and therefore should be in the same digital file) and refers to Diagram 6.

- All of the Summary Results shall have the appropriate information next to it. This information shall match what is on the Facecard, specifically the:
  - Filed Stage Height
  - Flow
  - Area
  - Width
  - Mean Velocity
  - Maximum Depth
  - Stage Height change and Rate of rise/fall if Stage Height did change
  - Method and number of verticals
  - Verticals
  - Meter Serial Number
  - Slope & Intercept (should be 0 for both and therefore left blank on Facecard in Meter Coefficients section)
- As described in the Discharge Measurement Summary (DMS) the Location (called 'Offset' on the Hilltop Print out) Depth, and Mean Velocity need to match – if not send back to the Technician. Ticking next to the numbers is a good way of showing that it was verified
- Check the uncertainty values (ISO748:2007). Under the National Environmental monitoring Standards (NEMS) 2013 v1. when the uncertainty is < 5% maximum quality code is QC 600, >5 % but <10% is QC 500 and > 10% is QC 400. Make sure the Quality Code assigned to this gauging is in line with the uncertainty requirements. For further information of Quality Coding refer to **the NEMS Open Channel Flow Quality Codes system** or to the **'Quality Code Conventional Gauging**' SOP document to verify the correction Quality Code has been applied or to determine it if the gauging hasn't been assigned one. .

Digital Hilltop Check List:

Once all the paper work has been checked and contains the correct information and is all the same, check the digital hilltop file matches the Facecard & Hilltop Printout. The information to check is as follows:

- Date, Time and Gauging Number
- Party (who did the gauging)
- Instrument, Serial Number used and date of calibration of instrument
- Location of gauging
- Wind (if any)
- Angle of current (if any) – if there was none, the 'Nil' option shall be chosen
- Water Temperature
- Colour of water
- Filed Stage Height
- Correct Method selected (46)
- Start & end times of gauging, with associated logger & river readings (if any)
- Discharge, Area, Width, and Mean velocity all matching
- Correct Quality Code assigned to the Digital file and recorded on the Gauging Facecard

Archiving ADV Flowtracker Gaugings

Once again, if the digital file does not match the paperwork this needs to be sent back to the Technician as it indicates that the digital gauging file has been edited since the documents were printed out.

Diagram 6: Hilltop print out with key features to check

Hydrometric Gauging at Mangawhero at Pakihi Rd Bridge at 8-Mar-2016 13:02:00

Summary Results

Stage	1.490 m	Flow	1.166 m3/s	Area	6.190 m2
Mean Vel.	0.188 m/s	Max. Depth	0.680 m	Slope	0 mm/km
Width	12.500 m	Hyd Radius	0.482 m	Wet Perim.	12.841 m
Sed. Conc.	-1 mg/l	Temperature	17.0 C	Stage Change	0 mm/hr
Method & Vert	4624	Verticals	241002003	Gauging No	417121
Meter S/N	P3485	Slope	0.000	Intercept	0.000

Vertical spacing was Good.
The uncertainty is 6.2% and flow is between 1.094 and 1.237 using ISO748:1979
The uncertainty is 5.8% and flow is between 1.098 and 1.233 using ISO748:2007
Uncertainties and flows are to the 95% confidence limit.
The velocity meter supplied the velocity errors at each point.

Details

OFFSET (m)	DEPTH (m)	POINT VELOCITIES (method code = vel (m/s)	MEAN VEL (m/s)	SEGMENT VALUES VEL (m/s)	AREA (m2)	FLOW (m3/s)
1.000	0.140		E=50%			
				0.018	0.0975	0.002
1.500	0.250	6=0.037	0.037			
				0.059	0.1475	0.009
2.000	0.340	6=0.081	0.081			
				0.095	0.1775	0.017
2.500	0.370	6=0.109	0.109			
				0.161	0.1850	0.030
3.000	0.370	6=0.213	0.213			
				0.193	0.1925	0.037
3.500	0.400	6=0.172	0.172			
				0.195	0.2125	0.041
4.000	0.450	6=0.218	0.218			
				0.203	0.2375	0.048
4.500	0.500	6=0.188	0.188			
				0.211	0.2550	0.054
5.000	0.520	6=0.234	0.234			
				0.233	0.2675	0.062
5.500	0.550	6=0.232	0.232			
				0.222	0.2750	0.061
6.000	0.550	6=0.211	0.211			
				0.223	0.2850	0.063
6.500	0.590	6=0.234	0.234			
				0.228	0.2900	0.066
7.000	0.570	6=0.222	0.222			
				0.236	0.2900	0.069
7.500	0.590	6=0.251	0.251			
				0.256	0.2950	0.075
8.000	0.590	6=0.260	0.260			
				0.258	0.2900	0.075
8.500	0.570	6=0.256	0.256			
				0.222	0.2900	0.064
9.000	0.590	6=0.188	0.188			
				0.197	0.3025	0.059
9.500	0.620	6=0.205	0.205			
				0.206	0.3100	0.064
10.000	0.620	6=0.207	0.207			
				0.207	0.3250	0.067
10.500	0.680	6=0.208	0.208			

Areas highlighted in yellow need to have their respective sections/columns checked. If not, send the whole gauging back to the Technician who computed the gauging for it to be corrected (if it can be).

This needs to be included as it is filed away separately from the gauging.

Negative flows are acceptable as long as they occur in a logical place (i.e. edges where backwater effects can occur).

NOTE that Hilltop calls the location of each vertical the 'offset'. There maybe minor differences in values due to rounding – this is acceptable.

Archiving ADV Flowtracker Gaugings

11.000	0.620	6=0.233	0.233	0.221	0.3250	0.072
11.500	0.630	6=0.171	0.171	0.202	0.3125	0.063
12.000	0.620	6=0.125	0.125	0.148	0.3125	0.046
12.500	0.550	6=0.041	0.041	0.083	0.2925	0.024
13.000	0.170	6=-0.069	-0.069	-0.014	0.1800	-0.003
13.500	0.000		E=50%	-0.035	0.0425	-0.001
				Totals	6.1900	1.166

Archive the Gauging:

If all the information on the printouts and digital file matches and makes sense the gauging can be copied to the Hydrometric Archive.

This is done by right clicking the gauging that you wish to archive and selecting 'copy'. This will bring up the 'Copy Section' box. Make sure that the Time Range is only the date & time of the gauging you wish to copy (do NOT select 'all data'), that the site name is correct, the data source is 'Hydrometric Gauging' and the Filename is going to the Hydrometric Archive. For more information regarding copying to the Hydrometric Archive refer to the 'Archive Gaugings' SOP.

Check the Gauging has been copied across correctly:

Check the gauging file has copied correctly to the Hydrometric Archive (F5 to refresh Hilltop if you already had it open).

Completing the Gauging Register:

Open the Gauging Register (Info, HydraPro, Gauging Register) Find using the Gauging Number and complete the 'Archived By' box and check the 'Archived?' Box. In the Comments section type the QC of the gauging and any other relevant information that would be useful for future staff members to aid in processing. Once all filled in, click Save. The Archive Date should automatically update.

Completing and Filing away the Paperwork:

Stamp the Gauging card with ENTERED, update with Quality code if not already written on the card, put your name and the date you archived on the Gauging card and on the Hilltop Hydrometric Gauging print out. Staple the DMS printouts to the Gauging Facecard.

The Gauging Facecard is then filed in the Gaugings draw (in appropriate order) and the Hilltop Hydrometric Gauging Print Out is filed away in the ring-binders with the other gauging papers.