M1 Suspended Sediment Monitoring Plan

Aim and Objective

The purpose of **M-1 Suspended Sediment Monitoring Plan** (SSMP) is to implement a regular monitoring program that meets operational needs and permitting requirements for the project and to ensure that the suspended solid concentrations in water are maintained at a safe level, suitable for use by local villages. Monitoring data will be collated and used to establish, and where needed refine, performance targets for the concentration of suspended solids, assess the performance of the mitigation measures, and support adaptive management. Where monitoring data are deemed insufficient to identify the cause of elevated suspended solids in water, this plan will be revised and improved.

The SSMP will be implemented in parallel with **M-2 Water Quality Monitoring Plan** (WQMP).

Summary of Impacts and Risks

Water quality of the Tina River and downstream Ngalimbiu River is a central issue for local villages. Project support and acceptance by the local villages depends on the capability of the Project to maintain high water quality downstream. A typical indicator of water quality is Total Suspended Solids (TSS), which is the quantity of suspended particles and is also correlated with turbidity.

Project-related activities during construction that may impact TSS and turbidity includes but is not limited to: vegetation clearance; excavation and blasting of roads, the dam site other project infrastructure; road gravelling, sealing and maintenance; aggregate extraction; spoil stockpiling; inadequate erosion and sediment control; wastewater generation; and the accidental discharge of chemicals. Non-project impacts that may also impact TSS and turbidity within the Tina River includes: heavy rainfall and extreme weather events; timber harvesting in middle and upper catchment; domestic activities by local villages; algal blooms; and downstream activities such as agriculture, palm oil, and gravel extraction.

The Tina River exhibits natural peaks in TSS and turbidity during heavy rains. During construction, the river may also be exposed to intermittent, additional sediment-laden run-off from cleared areas and works undertaken by the Project, which may affect water quality. Monitoring TSS and turbidity will enable estimation of siltation rates and provide data on TSS peaks. Monitoring may also assist with the resolution of any potential disputes that arise within the villages to determine natural versus project-related sources of suspended solids. Appropriate management largely relies on regular, comprehensive sampling of water, with comparison against international standards (thresholds and trigger values), with provision and implementation of effective and adequate mitigation measures.

Mitigation and Management Actions

#	Issue or Risk	Action	Timing / Frequency	Responsibility
M-1-1.	Discharge of sediment and contaminants from construction activities	Implementation of management actions specified in the other ESMPs, particularly **P-12 Waste Management and Point Source Pollution Plan; P-13 Hazardous Materials Management Plan**; **P-14 Spill Prevention and Emergency Response Plan**; **C-8 Watercourse Crossing Management Plan**; **C-9 Spoil and Topsoil Management Plan;** and **C-10 Drainage, Erosion and Sediment Control Plan.**	Throughout construction	HEC Construction Manager HEC EHS Manager

Monitoring Requirements

#	Title	Description	Target / Performance Indicator	Timing / Frequency[1]	Responsibility
M-1-A.	Surface water quality monitoring	• Monitoring for TSS and turbidity will be undertaken at six sampling stations (A-E) along Tina River plus one site on the Toni River (F) as shown in **Annex M-1-I.** A single sample from a representative location in or near the middle of the river will be collected, at a depth of 10-20 cm from the water surface. • At each site, measurements or samples will be taken for TSS and turbidity, as per **Annexes M-1-II** and **M-1-III**: – Once per month, TSS samples will be collected in 500 mL plastic (PE) bottles for analysis at an approved laboratory[2]. – Once per week, turbidity will be measured *in situ* using a hand-held probe, targeting a range of flow conditions including high and low flows, rain and non-rain events. – More frequent (daily) turbidity monitoring will be conducted following spill events, exceedances or complaints, in order to investigate the event and inform remedial actions to be taken. • Correlation between TSS and flow (automatically measured at the gauging station A) shall be calculated and graphed.	Water quality trigger values have been set based on the results of baseline monitoring and international research.[3] Turbidity 15.0 NTU TSS 300 mg/L	Weekly (NTU field) Monthly (TSS lab) Daily sampling following spill events or complaints, until water quality has returned to background levels. Reported in the quarterly E&S monitoring report including photos.	HEC E&S Supervisor
M-1-B.	Erosion and sediment control and water treatment devices monitoring	• Monitoring for *in situ* turbidity will be undertaken at four sampling locations (ST1-ST4): at the outlet of three sediment ponds along the access road and at one location downstream of spoil disposal sites 2, 3, and 5 (refer **Annex M-1-I**). • Monitoring for *in situ* turbidity will be undertaken at the discharge location for other water treatment devices on site, as applicable e.g. wheel wash bay, concrete batching plant, aggregate crusher/washing plant, dam, powerhouse, tunnel treatment plant.	Turbidity 15.0 NTU	Monthly throughout construction Reported in quarterly E&S monitoring report	HEC E&S Supervisor
M-1-C.	Treated wastewater quality monitoring	• Monitoring for TSS of the treated effluent from the wastewater treatment plant at the Workers Accommodation Camp. • Refer to **M-2 Water Quality Monitoring Plan** for additional water quality parameters to be tested.	IFC EHS guidelines for treated sanitary sewage: TSS 50 mg/L	Monthly throughout construction Reported in quarterly E&S monitoring report	HEC E&S Supervisor
M-1-D.	Sedimentation monitoring	• Monitoring of sediment loads (TSS) in the river during normal flows and flood flows at two locations (A and B) with three replicates in accordance with Section 4.2 and Appendix 10 of the Investigation of Discharge and Sediment Load report (**Annex M-1-IV**).	Monitoring completed and included in quarterly E&S reports	Weekly during regular flows & floods >200m³/s Reported in quarterly E&S monitoring report	HEC E&S Supervisor

Supporting Documents

Annex	Name	Description
M-1-I.	Water quality monitoring locations for TSS and turbidity	Locations of sampling sites on the Tina River and along the access road.
M-1-II.	Sampling methods	Sampling methods and equipment for TSS and turbidity analysis.
M-1-III.	SPE monitoring and reporting	Sampling parameters and reporting requirements from the subcontractor undertaking water quality sampling under M-1 and M-2.
M-1-IV.	Investigation of Discharge and Sediment Load	Report "Investigation of Discharge and Sediment Load" prepared by HEC, dated 15 December 2022.

[1] Water quality monitoring has been undertaken at varying frequencies to date. The contractor has found that monthly monitoring is achievable and practical, while weekly monitoring is not. Monthly is considered suitable for a long-term monitoring programme.
[2] Commercial laboratory to be approved by THL/OE. Note that at present there is no accredited laboratory in the Solomon Islands.
[3] Default trigger values for upland and lowland rivers from the Queensland Water Quality Guidelines 2009, dated 2013 (https://environment.des.qld.gov.au/management/water/quality-guidelines); EPA Suspended Sediment Effects on Fish: A Literature Review (https://www.epa.gov/sites/default/files/documents/mrsboappa.pdf); Servizi, J.A. and Martens, J.A. (1992) Sublethal Responses of Coho Salmon (*Oncorhynchus kisutch*) to Suspended Sediments, *Canadian Journal of Fisheries and Aquatic Sciences*, Vol. 49: 1389-1395.

ANNEX M-1-I WATER QUALITY MONITORING LOCATIONS FOR TSS AND TURBIDITY

Water Quality Monitoring Locations

Tina River and Toni River Monitoring Sites

Site	ID	Location	GPS Coordinates
A	A2	Within reservoir / Upstream of dam and all construction activity (M)	9°33'33.48"S, 160° 3'23.13"E
B	B2	100m downstream toe of dam (M)	9°33'28.53"S, 160° 3'38.63"E
C*	C2*	Upstream of the powerhouse (M)	9°32'44.83"S, 160° 5'4.88"E
C	C2	Immediately downstream of the powerhouse (M)	9°32'33.30"S, 160° 5'1.00"E
D	D2	At Vuramali, approximately 10 km downstream of the dam (M)	9°30'22.21"S, 160° 7'17.31"E
E	E2	At Ngalimbiu bridge, approximately 20km downstream of the dam (M)	9°27'17.90"S, 160° 8'43.10"E
F	F	Toni River upstream of confluence with Tina River. Same as M-3 site 8.	9°31'25.14"S, 160° 7'26.94"E

Should landowners prevent access to Site E this monitoring site can be moved downstream to M-3 site 10.

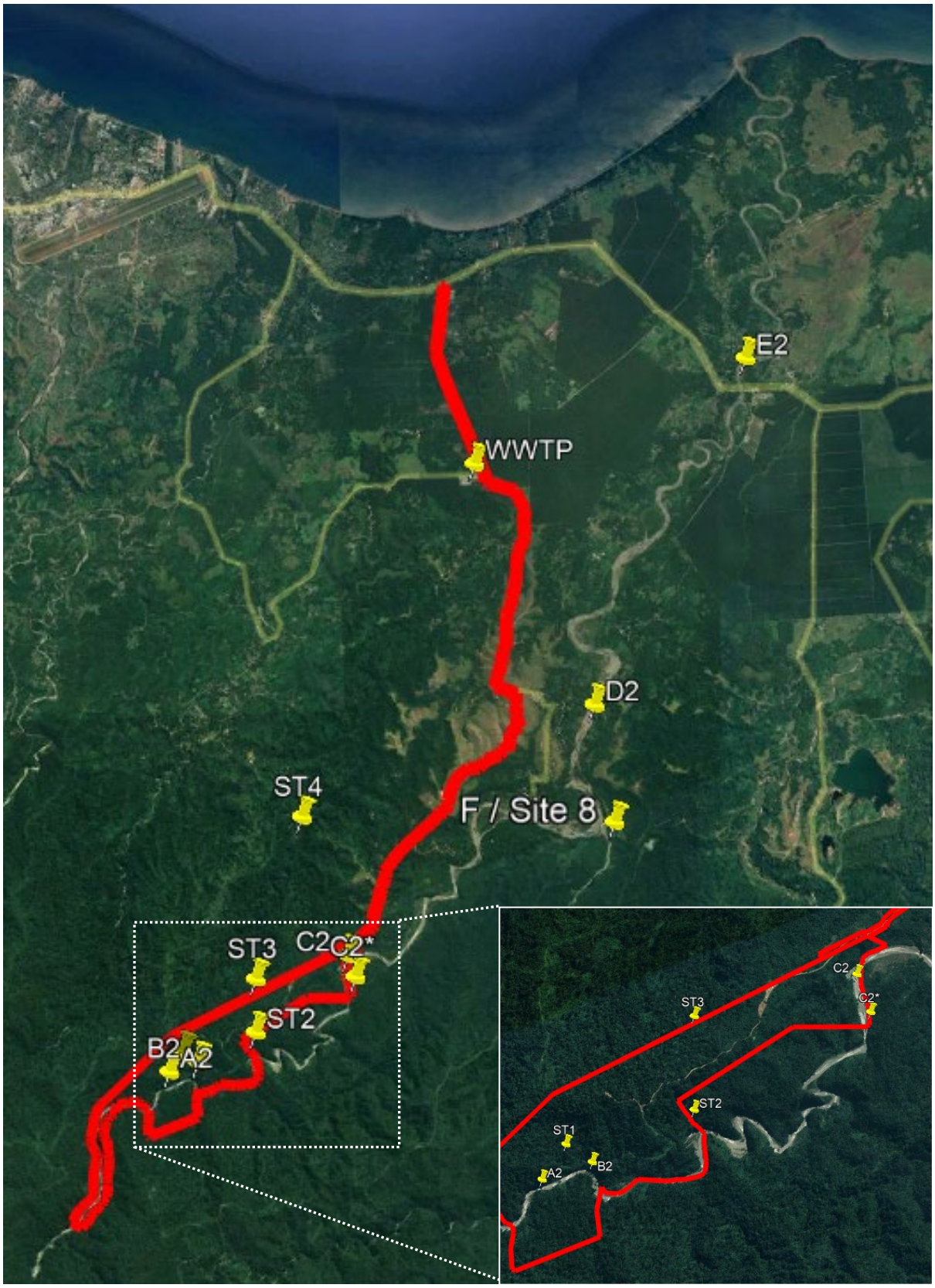
Erosion and Sediment Control Monitoring Sites

Site	Location	GPS Coordinates
ST1	Sediment trap located adjacent to Lot 2-3	9°33'22.98"S, 160° 3'30.65"E
ST2	Sediment trap located adjacent to Lot 2-2	9°33'13.38"S, 160° 4'10.14"E
ST3	Sediment trap located adjacent to Lot 3-2	9°32'45.00"S, 160° 4'10.74"E
ST4	Confluence below Spoil Disposal Sites 2,3 and 5	9°31'18.84"S, 160° 4'37.45"E

Wastewater Treatment Plant

Site	Location	GPS Coordinates
WWTP	Workers Accommodation Camp wastewater treatment plant outlet	9°28'11.68"S, 160° 6'14.78"E

Google Earth Map of Monitoring Sites



ANNEX M-1-II SAMPLING METHODS

3 MONITORING AND EVALUATION

3.1 MONITORING

Monitoring requirements for the construction phase include, at a minimum, the requirements provided in Table 3.1.

Table 3.1: Suspended sediment sampling campaign during construction

Item	Campaign Requirements
Stations	Suspended sediment sample collection and *in situ* measurements will be conducted at the following river locations: 1) Within the reservoir/ Upstream of Dam- Site A (these were monitored during the baseline upstream reservoir); 2) Immediately downstream of the toe of the dam (will be moved 100m downstream during Dam construction or main works to have a better representative sampling)- Site B; 3) Upstream of the powerhouse - Site C*; 4) Immediately downstream of the powerhouse- Site C; 5) At Vuramali, approximately 10 km downstream of the dam- Site D; and 6) At Ngalimbiu Bridge, approximately 20 km downstream of dam- Site E. 7) Toni River confluence - Site F (aka M-3 Site 8) The locations selected for suspended sediment sampling during the construction phase are the same locations used for water sampling (M-2). The location for this monitoring should target river section that is expected to be well-mixed and have stable river bed/banks. Besides the sampling stations provided above, the final discharge points of 4 sediment traps (STP1-4) and the treated sewage effluent at Works Camp (WWTP) need to be monitored for suspended sediment in order to determine the efficiency of the sediment traps and sewage treatment plant respectively. Other water treatment devices installed during construction will also be monitored.

Time of the Year	Water quality monitoring will be conducted at least once per month throughout the year.
Sampling Method	At each of the six river water sampling locations, suspended sediment water samples will be collected in or near the centre of the river. At each sampling position along the imaginary transect line, water sampling or measurement shall be conducted at a depth of 10-20 cm from the surface. Water samples for suspended solids shall be collected in 500ml plastic (PE) bottles without any preservatives. The same water sample in which suspended solids will be measured will also be used to measure the turbidity *in situ* or on site. TSS will be measured in the laboratory using a Filtration/Gravimetric Method, EPA Approved Method. In addition to laboratory determination, watercolour shall also be assessed *in situ* through photography. During the collection of water samples at the six river water sampling locations, the in situ samples for TSS and turbidity will be collected and measured first before other parameters. This is to prevent disturbance of the riverbed, contamination of the results of TSS in the laboratory and in situ turbidity results. If disturbance to the riverbed occurs prior to collecting the in-situ samples for TSS and turbidity, hold off on collecting the sample until sufficient time and flow has passed and the stream is clear. Sample bottles are dipped into stream flow either by hand or at the end of a sampling pole. During flood events or at sites where it is difficult to collect samples by hand, reusable 1-litre bailers will be used to collect water samples. Bailers will be thrown into the river body with a rope attached at one end, will sink into the river body and the collected sample volume will be retrieved and assessed and stored. Sample bottles are sealed, labelled, and placed into a cooler. Where required by the analytical laboratory, samples will be kept in the dark and at a stable cold temperature with ice. For the collection of sediment traps and treated sewage effluent sample(s), sample bottle(s) are held by hand at the final discharge point to collect water samples. Where it is difficult to collect samples

	by hand, reusable 1-L bailers will be used to collect water samples. The collected sample volume will be retrieved, assessed and stored. Sample bottles are sealed, labelled, and placed into a cooler. Where required by the analytical laboratory, samples will be kept in the dark and at a stable cold temperature with ice. Sampling personnel to wear non-powdered disposable gloves, preferably nitrile (if nitrile gloves are unavailable, sterile gloves from a commercially packaged box will be acceptable). The use of disposable gloves will reduce the risk of cross-contamination of samples. A blank sample will be used in the laboratory to assess accuracy. A hand-held water probe instrument will be used to take an *in-situ* measurement of turbidity. Triplicate measurements will be recorded. Note weather conditions and abnormal site observations during sampling at the sampling points and in the vicinity. This observation will be used to justify the sampling results.
Calibration Method	The manufacturers of turbidity sensors will recommend which solutions or standards are approved for successful calibration and these approved solutions are the only ones that should be used. In addition, some manufacturers, have turbidity solutions that are specifically made for the instrumentation they provide. HEC will be responsible to procure or prepare the necessary solutions. Instruments come with their own calibration kits/standard solutions. Calibrations will be conducted in the field just before measurements are taken. Suspended solids will be measured using Laboratory based Filtration/Gravimetric Method, an EPA Approved Method.
Effort per Monitoring Event	Sampling results to be recorded and samples appropriately stored within 24h for laboratory analysis completion. Data from hand held turbidity probe will be recorded in field logs and backed up electronically.

Frequency	Suspended solids monitoring will be conducted at least once per month. Additional sampling will be conducted following rainfall events and spill events.
Data collation	Historical series to be maintained available for statistical analysis. Data to be presented in tabular and graphical form.
Analysis	• Correlation between TSS and turbidity Turbidity and total suspended solids exhibit correlation in water samples and may be used to indirectly measures vectors for heavy metal contamination. Mostly, simple relationships are reported: $TSS = m\ Turbidity\ \ (NTU)$. Correlation of average TSS concentrations from water samples and average turbidity (NTU) measurements from handheld probe will be analysed by simple linear regression. • Correlation between TSS and flow measured at the gauging station From the continuous records obtained at the station, hydrologists can make predictions and decisions concerning water flow measurement changing and implement mitigation measures if required. • Comparison of peaks of TSS during construction work with those observed in natural conditions Construction activities may also alter downstream flow and sediment volumes, timing, predictability, and flow change rates, which, together with temperature, water clarity, and other water quality changes, can alter species composition and relative abundance, and can disrupt flow-related cues that trigger important fish life history milestones such as migration or spawning. Naturally, a river experiments peak in TSS during the different seasons (dry and wet) hence the importance to obtain a robust baseline to distinguish TSS construction works from natural baseline conditions.
Reporting	Data shall be reported in HEC monthly and quarterly E&S reports

The following table specifies the minimum equipment and protocol to conduct the sampling activities.

Table 3.2: Analytical methods and sampling methodology of surface water monitoring.

Parameter	Width (cm)	Height (cm)	Campaign Requirements
TSS	**14**	**8**	PE Plastic Bottle 500 ml. Rinse bottles by sampling water for 2 times, fill bottle with sampling water without slop (bottleneck is fine), tightly close the bottle and put in a zip lock bag and seal tightly.  Methodology: Dried at 103-105 ^{O}C TSS will be determined using the US Environmental Protection Agency (EPA) method – which is the laboratory-based filtration of 100ml sample through a 1.2um microfiber filter paper followed by Gravimetric determination after drying at 105 ^{0}C.
Turbidity			Hand held water probe for turbidity measurement (Note: some models are multi-parameter probe which may also serve the water quality monitoring). HEC currently has a handheld EUTECH TN100 turbidimeter with a detection limit of 0.02 NTU. Example:

Parameter	Width (cm)	Height (cm)	Campaign Requirements
			  Methodology: As per operational manual, the measurement will be taken by placing the sensor directly into the river or by inserting the sensor into a collected water sample. The 'one-off' reading will be recorded in the daily survey log and electronically. Water probes will be appropriately calibrated prior to surveys and calibration records maintained. At each sampling site, a beaker will be used to collect water sample and the turbidimeter probe will be inserted into the sample to immediately determine turbidity on site. Three replicates of water samples will be collected and measured in situ at each sampling site.
Logger			Logger installation would create a technical problem, especially with maintenance. It would be very expensive and time consuming to maintain the equipment. It also prone to theft. Furthermore, the weather at the core area was

Parameter	Width (cm)	Height (cm)	Campaign Requirements
			observed to rain every two days and would cause frequent flooding. This would create a confusion problem, particularly with the data collected by the logger. The logger would record a high number of suspended sediment data from otherwise natural flood events that could implicate HEC construction activities.

3.2 EVALUATION

The objective of TSS monitoring is to evaluate the current performance of the control measures in place in the construction sites. In the event that the TSS concentration shows spikes not attributable to natural causes, HEC is responsible to improve the current technologies used or develop new strategies to limit the increase of TSS in the Tina/Ngalimbiu River.

The results of the analysis will be presented as comparison between pre-construction and construction conditions and correlation may also be calculated and compared to the two different seasons (dry and wet).

3.3 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

Field logs shall be maintained for all survey work, noting the date of the survey, equipment used, and a record of all activities and observations. Field logs shall be retained for the duration of the survey.

Measured data shall be digitally recorded from the instruments and converted into Microsoft Excel format, or manually noted. Both disc copy and hard copy shall be retained for the file records. Any deviation from the standard procedure shall be noted in the log and the reason for the deviation recorded. In addition, field logs shall contain notes of events or activities in the vicinity of the monitoring location which might give rise to anomalous data being recorded.

All *in situ* monitoring instruments shall be checked, calibrated and certified and subsequently re-calibrated throughout all stages of the monitoring, or as required by the manufacture's specification.

3.4 TRANSPORT OF SAMPLES

All samples transferred from the survey vessel to the laboratory should be accompanied by Chain of Custody (COC) forms supplied by the laboratory. The number of samples, the parameters to be tested and the time of delivery will be clearly stated on the COC forms to ensure that samples are analysed for the correct parameters and suitable time is provided to the analytical laboratory for provision of resources required in the analyses.

ANNEX M-1-III SPE MONITORING AND REPORTING

Extract from TSS and Water Quality Baseline Study Design

Table 1. Physico-chemical parameters and instruments or methods for determining them.

Physico-chemical Parameters	Method/Instrument	Detection limits
Total Suspended Solids	Laboratory based Filtration/Gravimetric Method, EPA Approved Method	5 mg/L
Turbidity	*In situ* measurement, using a portable EUTECH TN100 Turbidimeter	0.02 NTU
Odour	Field odour test and laboratory based odour test at 60 ^{0}C.	-
Colour	Photographing at site and lab testing using Hach Method 8025 – Platinum/Cobalt standard Method	15 mg/L
Temperature	*In situ* measurement, using a portable pH/EC/TDS/Temp multi-meter (Eco-Testr)	-10 ^{0}C
pH	*In situ* measurement, using a portable pH/EC/TDS/Temp multi-meter (Eco-Testr)	1.0
Electrical Conductivity (EC)	*In situ* measurement, using a portable pH/EC/TDS/Temp multi-meter (Eco-Testr)	0.01 uS/cm
Dissolved oxygen	*In situ* measurement using a dissolved oxygen meter (EUTECH DO6)	2.0 mg/L
Salinity	Calculate from EC values above	0.1 mg/L
Oil and Grease	Hexane extractable gravimetric determination, EPA method 1664.	15 mg/L
Nutrients NH4-N	Using UV Spectrophotometer*, Hach Method 10023	0.02 mg/L
Nutrients (NO3-N)	Using UV Spectrophotometer, Hach Method 10206	0.20mg/L
Nutrients (PO4-P)	Using UV spectrophotometer, Hach Method 10209	0.01mg/L
Fecal Contamination (*E.coli & Total coliform*)	Colilert-18 Method**	<1 count

*SPE uses an advanced UV spectrophotometer (DR 3900) from Hach, a leading water quality analyses specialist

**Colilert-18 Method is the latest technology for microbiological analyses from IDEXX, with a short turnaround time of only 18 hours to determine both *E.coli* and total coliform together.

Reporting

The results will be presented in a tabular format (Table 2 below) and submitted to HEC on a monthly basis. The report will include values of each parameter at each sampling position (1-3) across the river and at each locations or sites (A –E) along the river. Included in this report table will be the WHO or ANZECC acceptable values for each parameter to be able to assess the level of each water quality parameter.

Correlation analyses between turbidity and suspended solids will also be carried out and presented in the report.

Table 2: Physico-chemical analyses results of Tina River water quality at 5 sites along the river.

No	Sample ID	Temp	pH	EC	Salinity (estimate)	Dissolved Oxygen	Turbidity	TSS	Nitrate (NO3-N)	Ammonia (NH3-N)	Phosphate (PO4-P)	Colour Test	Odour Test
		°C	unit	µS/cm	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	Pt-Co mg/L	Average of 5 sniffers
1	A1												
2	A2												
3	A3												
4	B1												
5	B2												
6	B3												
7	C1												
8	C2												
9	C3												
10	D1												
11	D2												
12	D3												
13	E1												
14	E2												
15	E3												
Acceptable Values (ANZECC/ADWG)		*< 35*	*6.5-8.5*	*20-250*	*>390*	*>6.0*	*< 5.0*	*-*	*<10*	*< 0.5*	*< 0.01*	*<15*	*acceptable*

Assessment

Assessment will be made on the levels of each parameter prior to the construction phase. Attention will be given to the mean seasonal levels or levels during high water or floodings or rainy and dry seasons. The suitability of the river for drinking purposes will also be assessed against acceptable levels given by the ANZECC and WHO. Correlations of turbidity and suspended sediments will also be made to determine the link between sediment production and turbidity during the construction phase.

ANNEX M-1-IV INVESTIGATION OF DISCHARGE AND SEDIMENT LOAD

PROJECT : Tina River Hydropower Development Project (TRHDP)

INVESTIGATION OF DISCHARGE AND SEDIMENT LOAD

DOCUMENT No : E-GE-CVHH-R0-10130-D

EMPLOYER : TINA HYDROPOWER LIMITED (THL)
EPC CONTRACTOR : HYUNDAI ENGINEERING CO., LTD. (HEC)

ISSUE STATUS

D	15-DEC-2021	REVISED AS PER REVIEWS & DISCUSSIONS (UPDATED)	D.E. Yoon		J.H. Yang		T.H. KIM		J.M. KIM	
C	30-JUN-2021	REVISED AS PER REVIEWS & DISCUSSIONS (UPDATED)	D.E. Yoon		J.H. Yang		T.H. KIM		J.M. KIM	
B	11-NOV-2020	REVISED AS PER REVIEWS & DISCUSSIONS	D.E. Yoon		J.H. Yang		T.H. KIM		J.K. LEE	
A	30-APR-2020	ISSUED FOR REVIEW	D.E. Yoon		J.H. Yang		T.H. KIM		J.K. LEE	
REV. No.	DATE	DESCRIPTION	PREPARED		CHECKED		REVIEWED		APPROVED	

Tina River Hydropower Development Project (TRHDP)

INVESTIGATION OF DISCHARGE AND SEDIMENT LOAD

15-DEC-2021

Tina Hydropower Limited

HYUNDAI ENGINEERING CO., LTD.

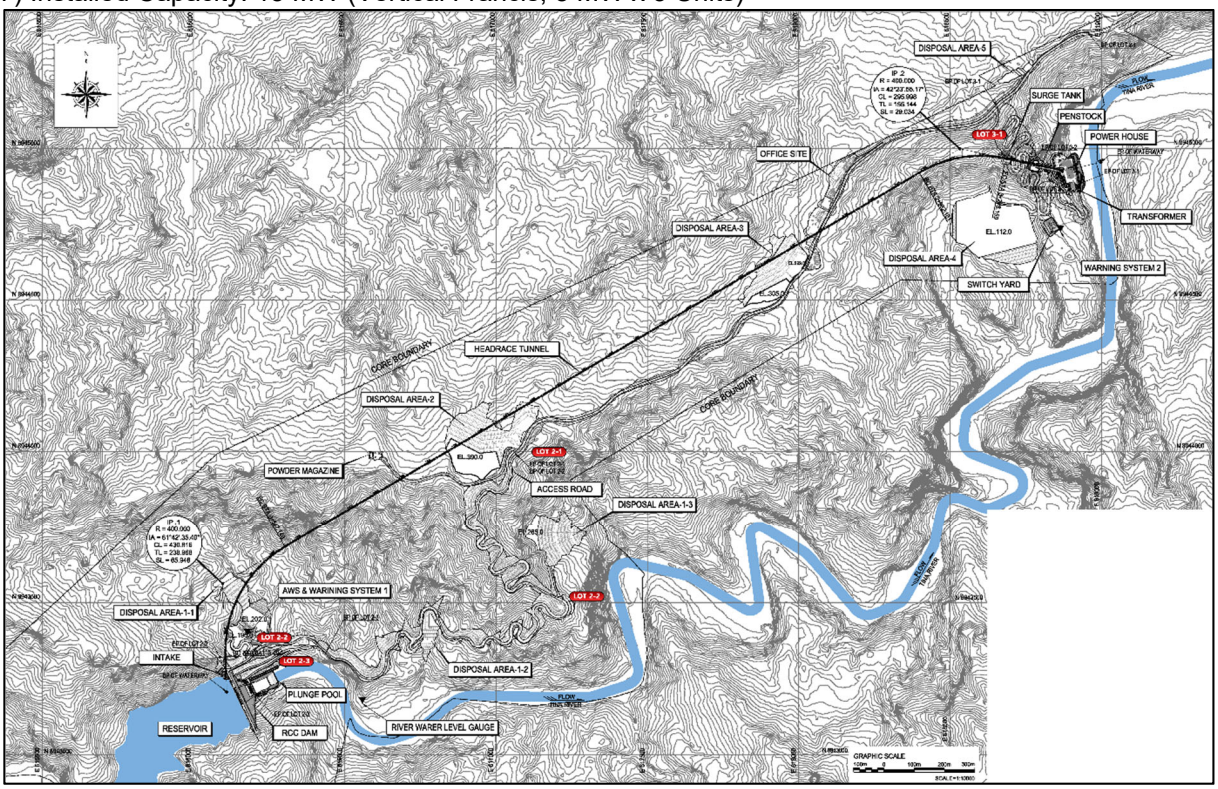
Content

1. Introduction

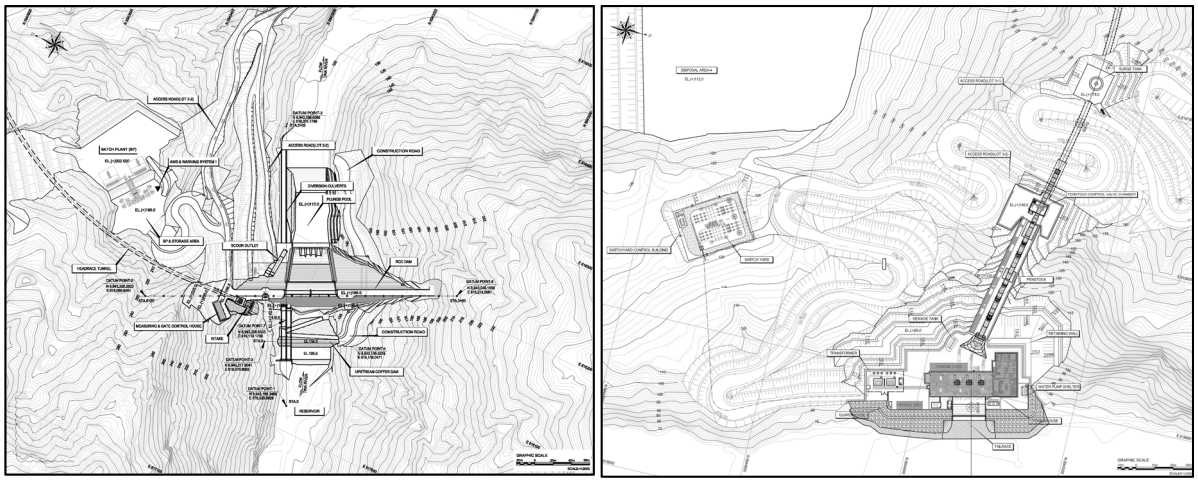
1. Introduction

1.1. Summary

1) Study Name: Investigation of Discharge and Sediment load for the Tina River Hydropower Development Project (hereinafter called the “Project”) in Solomon Islands
2) Study Location: Tina River, Southeast of Honiara, Guadalcanal Island, Solomon Islands
3) Dam: RCCD (Roller Compacted Concrete Dam), H 71.3 m, L 234 m
4) Spillway: W 55 m
5) Power Waterway: Headrace Tunnel D 3.8 m & L 3.2 km, Penstock L 181 m, Surge Tank D 7.0 m
6) Power Station: W 16.3 m x H 28.0 m x L 40.9 m
7) Installed Capacity: 15 MW (Vertical Francis, 5 MW x 3 Units)



<Figure 1.1> Study General Layout



<Figure 1.2> General Layout of Dam Area and Powerhouse Area

1.2. Study objective

The purpose of this study is to provide basic data of hydraulic characteristics through investigation in discharge and sediment load in the Tina River for the Project in Solomon Islands.

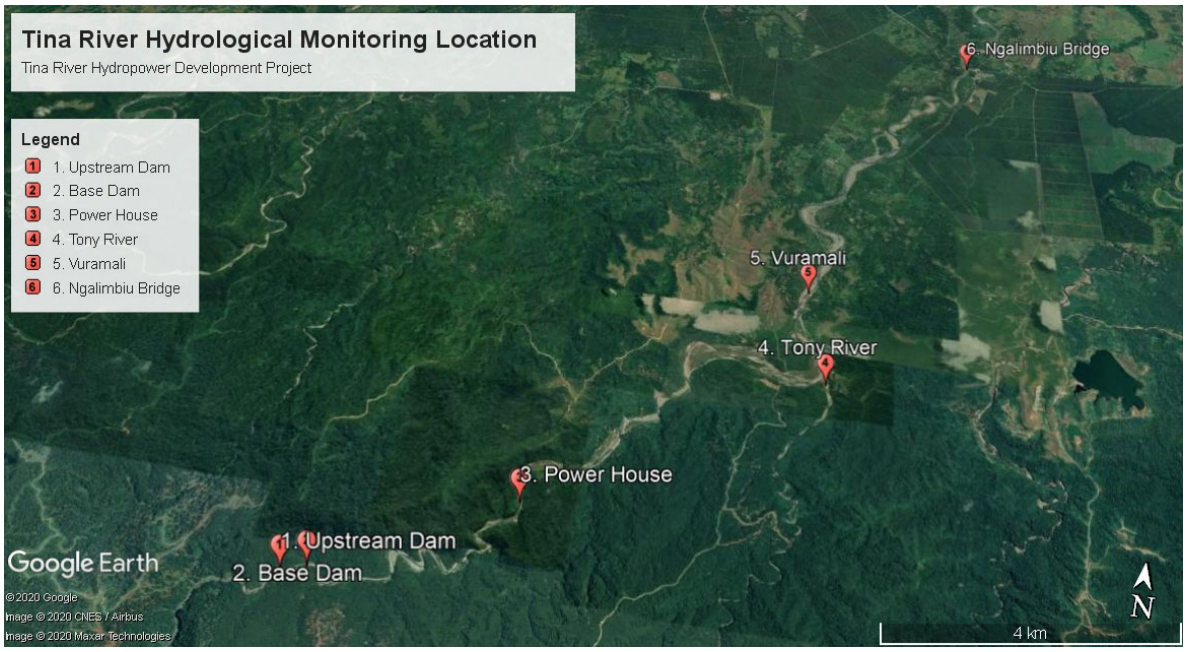
1.3. Scope of works

Scope and major items of investigation in discharge and sediment load are as follows.

1.3.1. Investigation points

Investigation/measurement points were selected based on the contractual requirements and ESIA (2017) requirements. The measurements are to be conducted along the six points of Tina River; ❶ Upstream of Dam Site, ❷ Base of Dam Site, ❸ Power House, ❹ Tony River (before junction with Tina River), ❺ Vuramali Village (Approx. 10 km from Dam Site), and ❻ Ngalimbiu Bridge (Approx. 20 km from Dam Site).

(Note that, from the resumption of field measurement in October 2021, No. 3 and 4 are not additionally measured, only No. 1, 2, 5, and 6 are measured.)



<Figure 1.3> Measurement points of discharge & sediment-discharge in Tina River

1.3.2. Timing of investigation

Timing of discharge measurement, sediment load measurement and bed materials sampling is as follows:

1) Discharge measurement : from low water level to high water level
2) Sediment load measurement : from rising limb to recession limb
3) Bed material sampling: before and after the flood

※ The measuring points and timing can be changed depending on the field situations.

1.3.3. Investigation items

1) Discharge measurement

① Velocity measurement using flow velocity meter

② Velocity measurement using float

③ Discharge measurement

2) Sediment load measurement

① Methods: Depth-integrated sampling, point-integrating sampling, surface sediment load sampling

② Determine the number of cross-sections and location of cross-sections

③ Grain size and component analysis*

*Sediment load measurement plan can be changed depending on number of sediment load samples and analysis equipment condition.

3) Bed material sampling

① Determine the number of cross-section and location of cross-section

② Grain size and component analysis

1.3.4. Analysis

1) Analysis of discharge measurement including establishment of stage-discharge relationship

2) Analysis of suspended sediment and bedload samples, including laboratory tests and establishment of discharge-sediment relationship

- Laboratory tests includes weighing, particle size distribution, mineral composition and hard mineral analysis (e.g. hardness, shape of particle).

2. Method Statement for River Discharge Measurement – Normal Condition

2. Method Statement for River Discharge Measurement - Normal Condition

2.1. Overview

The discharge measurements for Tina River are carried out using the current meter (Area – Velocity Method). The product of the water velocity (V) and cross-sectional area (A) is used to determine the Discharge (Q).

The objective of this report is to provide detail method statement of the technique and instruments used to measure the river velocity and cross-sectional area, to explain the calculations required to determine the river discharge, and to outline the factors affecting the accuracy of the discharge measurements.

2.2. Monitoring Schedule

Monitoring began in July 2020 and will continue through the construction period. For normal times the frequency of monitoring is on a weekly-to-monthly basis. The table below shows field monitoring conducted up to date. However, whenever there is flooding the monitoring team will be dispatched to the site to conduct additional monitoring.

The site monitoring for the six locations normally takes one-whole day. The monitoring team normally starts at 06:00 and finishes at 18:00.

<Table 2.1> Monitoring conducted until November 2021

Month & Year	No.	Dates of Monitoring				
Jun, 2020	2	29.06.2020	30.06.2020			
Jul, 2020	5	01.07.2020	02.07.2020	03.07.2020	07.07.2020	14.07.2020
Aug. 2020	2	04.08.2020	25.08.2020			
Sep. 2020	1	01.09.2020				
Oct. 2020	4	07.10.2020	13.10.2020	20.20.2020	27.10.2020	
Nov. 2020	2	03.11.2020	17.11.2020			
Dec. 2020	1	29.12.2020				
Jan. 2021	1	14.01.2021				
Feb. 2021	11	02.02.2021	10.02.2021	11.02.2021	12.02.2021	13.02.2021
		18.02.2021	19.02.2021	20.02.2021	25.02.2021	26.02.2021
		27.02.2021				
Mar. 2021	9	04.03.2021	05.03.2021	06.03.2021	13.03.2021	14.03.2021
		23.03.2021	24.03.2021	26.03.2021	27.03.2021	
Jun. 2021	4	11.06.2021	17.06.2021	18.06.2021	19.06.2021	
Jul. 2021	1	04.07.2021				
Oct. 2021	2	16.10.2021	23.10.2021			
Nov. 2021	3	05.11.2021	06.11.2021	07.11.2021		

2.3. Equipment Used

<Table 2.2> OTT MF Pro current meter used on site

		
OTT MF Pro	OTT MF Pro	Using OTT MF Pro for Monitoring

2.4. Method

1) During normal river conditions the OTT MF Pro current meter is used to measure the depth and velocity of the river. The subsection width of the river (1 m interval) is determined using the measuring tape.
2) The river channel cross section is divided into numerous 1 meter strip. In each strip the area is obtained by multiplying the width and the depth of the strip, and the water velocity for each strip is estimated from the mean of the velocity measured at 0.2 and 0.8 depth in that strip.
3) The discharge in each strip is computed by multiplying the strip area with the mean velocity.
4) The total discharge is then computed by summing the discharge of each subsection.
5) The discharge determined from the Area-velocity method using current meter, will be plotted in the Rating curve graph showing the Discharge (Q) against depth of flow (D). To plot the rating curve, it is necessary to take measurements at many different water levels, including infrequent occurring flood flows.

<Table 2.3> Parameters measured using current meter and calculation of the discharge

1	2	3	4	5	6	7	8
Section	Depth	Width	Area (m/s2) [2 x 3]	Flow Velocity (m/s)			Discharge (Q) [4 x 7]
				0.2D	0.8D	Mean	

3. Method Statement for River Discharge Measurement During Flood

3. Method Statement for Discharge Measurement during Flood

3.1. Floating Device

The rate of flow passing a point in a ditch or other open channel can be determined by multiplying the cross sectional area of water by the average velocity of the water. Normally, the cross sectional area can be determined by direct measurement of the channel dimensions. The velocity can be estimated by timing the passage of a float through a measured length of channel. The procedure for estimating rate of flow by the float method is as follows:

1) . Select a straight section of ditch with fairly uniform cross sections. The length of the section will depend on the current, but 30 meters usually will be adequate. A shorter length may be satisfactory for slow flowing ditches.
2) Make several measurements of depth and width within the trial section to arrive at the average cross sectional area. The area should be expressed in terms of square meters.
3) Place a float in the ditch about a meter upstream from the upper end of the trial section. Determine the number of seconds it takes for the float to travel from the upper end of the trial section to the lower end. Make several trials to get the average time of travel. In this investigation, rod floats of 1.2m length were used for measurement of flows above wading level.
4) Determine the velocity (or speed) of the float in units of meters per second by dividing the length of the section (in meters) by the time (in seconds) required for the float to travel that distance.
5) To secure more accuracy of rod float measurements, comparative measurements by a current meter and by rod floats will be conducted up to the highest wadable level as well as necessary re-survey of cross-section. With this comparison, a velocity correction factor can be derived. (Note that the correction factor of 1.00 was applied to discharge estimates from rod floats currently presented in this report, considering that USGS suggests the correction factor value ranging from 0.85 to 1.00 for rod float measurement and that the correction factor for long rod floats often approximates 1.00 for high flow/flood conditions.)
6) Compute the rate of flow. The rate of flow is obtained by multiplying the average cross sectional area (item 2) by the average stream velocity (item 5). The accuracy of these estimates of flow rates is dependent upon the preciseness with which average cross sectional areas and float velocities have been determined and upon the selection of the proper correction coefficient.

3.2. Applicability and Practice Actually Performed at Site

The Contractor checked measurement methods including cableways to measure the river velocity, and to sample the suspended sediment and bed load material during flows greater than those suitable for wading method. Regarding the cableway type, the Contractor concludes that it is not practicable to install the commercial cableway systems using electricity to operate the instruments to the sites because there are no power supply, and other infrastructures to install the structures. The method to use the cable tied boat can be an alternative method to approach the center of river, however the safety and applicability matters should be considered. The road condition is another hindrance to install or carry the materials to the sites, especially at dam site.

Although comments of reviewers including OE and DSAP on alternative measuring such as using cableways are respected, the Contractor thinks that actual site conditions do not allow standard application and practice of it. According to the Contractor's experiences from dam site reconnaissance and investigations, the site's surrounding conditions and very limited accessibility is not simply superable. Similarly, due to the safety and applicability matters, the current meter cannot be used under flood flow conditions either.

As mentioned above, ADCP will not be applied due to site conditions, but suspended sediment will be collected by a depth-integrated sampler with help of a simple cableway to be installed upstream and downstream of the dam.

Currently, there is no staff gauges and benchmark datums at measurement locations upstream and downstream of the dam. HEC will install staff gauges and benchmark datums at the time when installing stream gauging facilities such as the cableway and automatic gauging equipment.

3.3. Reference

Phil Turnipseed and Vernon B. Sauer, 2010, Discharge Measurements at Gaging Stations, USGS

CEE 370 Lab, 2019, Lab Exercise #1: Stream flow

John S. Gierke, Ph.D., P.E., 2002, ENG5300 Engineering Applications in the Earth Sciences: Measuring River Discharge

4. Method Statement for Suspended Sediment and Bed Load Sampling

4. Method Statement for Suspended Sediment and Bed Load Sampling

4.1. Overview

Sediment movement in streams and rivers takes two forms. Suspended sediment is the finer particles which are held in suspension by the eddy currents in the flowing stream, and the larger solid particles are rolled along the streambed and called the bed load. There is an intermediate type of movement where particles move downstream in a series of bounces or jumps, sometimes touching the bed and sometimes carried along in suspension until they fall back to the bed. This is called movement in saltation, and is a very important part of the process of transport by wind, but in liquid flow the height of the bounces is so low that they are not readily distinguished from rolling bed load.

The relative quantities moved as suspended sediment and as bed load vary greatly. At one extreme, where the sediment is coming from a fine-grained soil such as a wind-deposited loess, or an alluvial clay, the sediment may be almost entirely in suspension. On the other hand, a fast-flowing clear mountain stream may have negligible amounts of suspended matter and almost all the movement by rolling gravel, pebbles and stones on the streambed. Very high concentrations of sediment, as occur in some rivers such as the Yellow River in China and the Mississippi in the USA, may cause significant changes in the rheological properties of the water. The viscosity is higher and the particle settling velocity much lower, so that the threshold between suspended sediment and bed load becomes blurred. The estimation of suspended load by sampling is relatively simple, but taking a representative sample of bed load is difficult.

4.2. Suspended Sediment Sampling and Analysis

This report provides insight into how Suspended Sediments from Tina River were sampled and analysed.

4.2.1 Suspended Sediment Sampling

The suspended sediment will be sampled using Depth-Integrating Suspended Sediment Sampler with gradually moving upwards from the bed. The sampling device of USGS DH-48 will be used according to the field conditions. Under the flood conditions, the cableway deploying USGS D-74 sampler will be considered and operated after feasibility test considering safety matters in high velocity conditions, and equipment and apparatus to be used for monitoring.

The Contractor checked measurement methods including cableways to measure the river velocity, and to sample the suspended sediment and bedload material during flows greater then wading conditions. Regarding the cableway type, the Contractor concludes that it is not practicable to install the commercial cableway systems using electricity to operate the instruments to the sites because there are no power supply, and other infrastructures to install the structures. The method to use the cable tied boat can be an alternative method to approach the center of river, however the safety matters should be considered. The road condition is another hindrance to install or carry the materials to the sites, especially at dam site.

US DH-48

US D-74

<Figure 4.1> Suspended Sediment Sampler

1) Method

Two primary types of surface-water samplers used by the USGS are; ❶ Isokinetic depth-integrating samplers ❷ Nonisokinetic samplers. In this project the monitoring team will be adopting the Isokinetic Depth-Integrating Sampler Method.

A. Isokinetic Depth-Integrating Sampler

Depth integrating samplers are designed to isokinetically and continuously accumulate a representative sample from a stream vertical. Depth-integrating samplers collect a discharge-weighted sample as they are lowered at a uniform rate from the water surface to the streambed, instantly reversed, and then raised up the vertical again to the water surface.

(1) US DH-48

The US DH-48 was one of the first samplers designed by the FISP. The US DH-48 is a lightweight handheld depth-integrating sampler used for the collection of suspended sediment samples in wadable streams.

i. This instrument is calibrated with an intake nozzle of 1/4 inch in diameter.

ii. The un-sampled zone using the US DH-48 is 9 cm.

iii. The sampler can be used in velocities that range from 0.46 to 2.7 m/s.

iv. A standard 1/2 inch diameter wading rod is threaded into the top of the sampler body for suspending the sampler.

To sample to depths greater than can be waded, wading rod extensions in 0.3- and 0.9-metre lengths can be added to the sampler. With the extensions, the sampler can be deployed from a low bridge or boat.

(2) US D-74

The US D-74 is a 28 kg cable-suspended sediment sampler. The sampler is a more recent version of the D-49 sampler. The only differences between the D-74 and D-49 samplers are the shape and size of their sample container.

i. The D-74 will accommodate either round or squared pint-bottle containers.

ii. The D-74 sampler is lowered and raised from a bridge crane or cableway by means of a standard hanger bar and reel and cable suspension system.

iii. The sampler can be used in stream depths up to 4.6 m and in stream velocities ranging from 0.46 to 2 m/s. Distance between nozzle intake and streambed is 10.4 cm.

iv. Intake nozzles of 1/8, 3/16 and 1/4 inch internal diameters are available to project into the stream current for collecting samples.

<Table 4.1> Isokinetic samplers and characteristics

Sampler type	Weight (kg)	Suspension type	Intake nozzle size (inch)	Maximum Depth (m)	Velocity range (m/s)	Sampler container size int litre
US DH-48	1.6	Rod	1/4	2.8	0.46-2.7	0.47
US D-74	28	Reel and cable	1/8, 3/16 and 1/4	4.6	0.46-2	0.47

4.2.2 Suspended Sediment Analysis

1) Overview

The USGS used measurement of suspended-sediment concentration as the most accurate way to measure the total amount of suspended material in a water sample collected from the flow in rivers. Another commonly used measurement of suspended material is the TSS analytical method.

This report explains the method of analysis adopted to determine the total suspended sediment concentration and the Particle Size Distribution from the sample collected in Tina River while conducting the monitoring.

A. Particle Size Distribution (PSD),), Composition & Heavy Metal Analysis, Hardness Test and Shape of hard particle

Method	Method 11.1 Particle size distribution – Sieving method
Standard	AS 1141.11.1 – 2009
Laboratory conducting analysis	Soils Laboratory - Ministry of Infrastructure Development; Geochemical Laboratory - Ministry of Mines and Energy, SI
Apparatus	Balance, Drying oven, Sampler divider, Sieves, Brushes, Mechanical sieve shaker.
Scope	
This test used to determine the particle size distribution in the coarse and fine aggregates. The amount of passing a 75 µm sieve may be determined using AS1141.12 or by this method when sample are washed over a 75 µm sieve. If the percentage of material passing a 75 µm sieve is specified, then follow the procedure detailed in AS 1141.12.	

B. Total Suspended Sediments (TSS)

Method	EPA Method 160.2 (Gravimetric, Dried at 103 – 105°C)
Laboratory conducting analysis	SPE Analytical & Scientific
Analytical Parameters	Total Suspended Solids (TSS) in water sample
Apparatus	Glass fibre filter disc, Filter support, Suction flask, Drying oven (103 – 105°C), Desiccator, Analytical balance
Scope	
The water samples collected from the river is well-mixed and then filtered through a glass fibre filter, and the residue retained on the filter is dried to constant weight at 103 – 105°C. Refer to the procedure outlined in EPA method 160.2 for the analysis of samples for TSS.	

4.3. Bed Load Sampling and Analysis

Bed load is that sediment carried down a river by rolling and saltation or near the stream bed. It is defined as part of the sedimentary load of the stream which moving in almost continuous contact with the stream bed, being rolled or pushed along the bottom by the tractive force of the moving water. The mechanism by which it moves can be varied and complex. The estimations of bed load may be obtained from samples caught in a device which is lowered to the streambed for a measured time then brought up for weighing the catch.

This report provides insight into understating of sediment sampling equipment used for sampling, guidance for the selection of the appropriate equipment, and detail information on how Bed load material from Tina River were sampled and analysed.

Bed load trap is a portable sampler designed specifically for collecting gravel and cobble bed load in wade-able streams. Bed Load traps consist of a frame with an along trailing net is attached. Bed load taps are installed on the ground plated, that are anchored to the stream bottom with metal stakes. The traps do not have to be hand-held while sampling and have a large volumetric capacity. This allows collection of bed load over relatively long intervals, typically one hour per sample.

The river discharge was measured at the same time and location while conducting the Bedload sampling. The time the trap was active inside the water prior to removing the materials depends on the site conditions and flow of the river.

At the sites near the dam (upstream dam & downstream dam), it took approximately 30 minutes to fill the trap before removal of the trap. At sites from the powerhouse to the bridge, it took approximately 45 to 60 minutes at maximum to fill the trap before removal of the trap. This is because the river flow is slow and it took a longer period of time for the trap to be filled.

4.4 Sampling Methodology For Low Flow Condition

This section provides a brief summary of the Field Investigation and Laboratory Testing for the five sites namely:

1. Site 1 (Upstream of Dam)
2. Site 2 (Downstream of Dam)
3. Site 3 (Power House)
4. Site 4 (Varamali)
5. Site 5 (Ngalimbiu Bridge)

4.4.1 Field Sampling

Bed Load Sediment sampling was done on 23rd to 27th November 2020. The method of sampling done is outlined and discussed below. Additional sampling will be done on a regular basis or after flooding events through the construction period.

4.4.2 Installation of Bed Load Traps

The installation of bed load traps on the stream bed involves five major steps;

A. Selecting a site, considering both the stream and cross section

Careful selection of the sampling location is important in order to adequately sample bed load. Two main criteria considered while selecting the sampling sites are;

1. Appropriateness of the site and

2. Suitability of the site to deploy bed load traps.

Appropriateness of the sampling site must satisfy the following conditions;

Distance from upstream gravel source and sinks – Proximity of upstream gravel sources or sink affects measured bed load transport rates and influences the shape of the bed load transportation discharge relations. In general, it is better to avoid site just downstream from either source or sink locations.

Suitability of the site to deploy bed load traps;

While using bed load traps the following criteria must be considered when conducting site selection;

Wade ability of the flow condition - whether the flow condition is wadable by personnel installing the bed load traps.

Absence of boulders in the stream bed – avoid sites dominated by large cobbles and boulder in the stream bed when using bed load traps. Protruding boulders direct the flow, causing irregular spatial patterns of transport and disposition of the bed load within the cross-section.

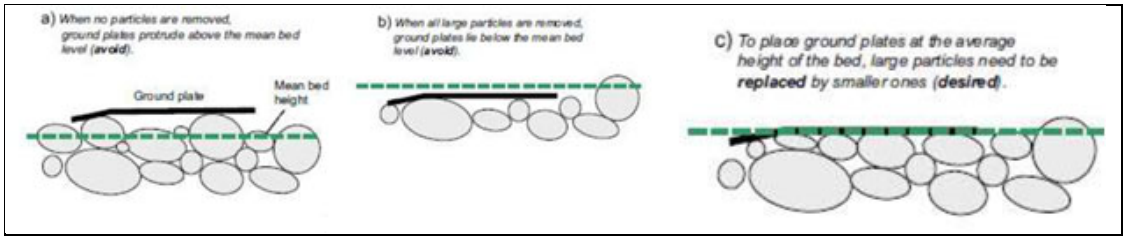
B. Positioning the Traps within selected cross section

The bed load traps were deployed evenly in three locations per cross section to cover the majority of the river width. However, in some cases the bed load trap spacing is a compromise between equal width spacing, equal transport spacing. To provide accurate prediction of the cross-sectional transport rate, trap spacing should coincide with width increments of approximately equal transport. This requires predicting the locations of the highest transport rates from the patterns of stream flow.

C. Setting and anchoring the ground plates

Placing the ground plates at the right height on the bed – Positioning ground plates flush with the mean surface level of the bed without protruding above, or lying below. Two methods can be used to obtain this position:

1. When flow is low, remove large surface particles from the area where the ground plate is to be placed and replace them with smaller ones. Place the ground plate on the stream bed and check it for the appropriate height. Fill the gaps along the sides of the ground plate with few stones large enough to fill the gap.
2. If the flow is high, ground plate are best stalled by shoving the edge of the plate about an inch deep into the bed surface. Lower the plate onto the bed and check for the appropriate elevation relative to the mean height of the bed. Remove and replace larger stones with smaller ones until a satisfactory position for the ground plate is reached.



<Figure 4.2> Setting and anchoring the ground plates

D. Preparing the area next to the Traps

If the installation processes disturbed the stream bed at the upstream side of the traps, the bed must be restored to avoid artificially increased or decreased particle entrainment condition near the bed load trap entrance. Replace the large particles that were removed at the upstream side of the ground plates with smaller ones along the front edge of the ground plate that sticks into the bed. Gather finer material from a nearby location and carefully place it over the replacement stones to refill interstitial spaces to ensure that particles at the remolded stream bed have settled into place.

	
1. Set up ground plates	2. Installed ground plate on the stream bed

<Figure 4.3> Preparing the area next to the Traps

E. Operation of Bed Load Traps

<Table 4.2> Operation of Bed Load Traps

		
1. Fixing the shaft collar	2. Sliding the pipe over	3. Pushing the trap down stake
		
4. Checking the trap position	5. Fastening the shaft	6. Leave it for sometimes

		
7. Collect the samples	8. Place it in a plastic bag	9. Transport the samples to the Laboratory

4.5 Sampling Methodology For High Flow Condition

Under the flood condition, the grab sampling will be considered considering in situ conditions, however, when it is not adequate to use the grab sampling, the alternative method using the Wilcock-Crowe equation to estimate the bed load rate.

Wilcock and Crowe (2003) developed a transport relation based on the full grain size distribution of the bed surface, including the sand. This relation includes an additional function that accounts for the nonlinear effect of sand content on gravel transport rates.

4.6 Laboratory Testing and Analysis

Samples for laboratory testing was done in two different laboratories; classification test for particle size distribution (PSD) was done at the Soils Laboratory of the Ministry of Infrastructure Development and analytical test for heavy metals was conducted at the Geochemical Laboratory of the Ministry of Mines and Energy.

As other analysis items, we plan to carry out gravimetric measurement, composition & mineralogy, hardness test for high-hardness mineral components, and shape of hard particle analysis at a later date.
However, the entire laboratory was burned down due to violent protests in the Solomon Islands between November and December. Therefore, additional samples were lost, but sampling will continue in the future.

4.6.1 Classification Test (Particle Size Distribution)

Sieve analysis test was performed to identify the grain size distribution of the material. The procedure and methodology was done with reference to AS1289:3.6.1 Standard. Summary of the methodology is outlined below;

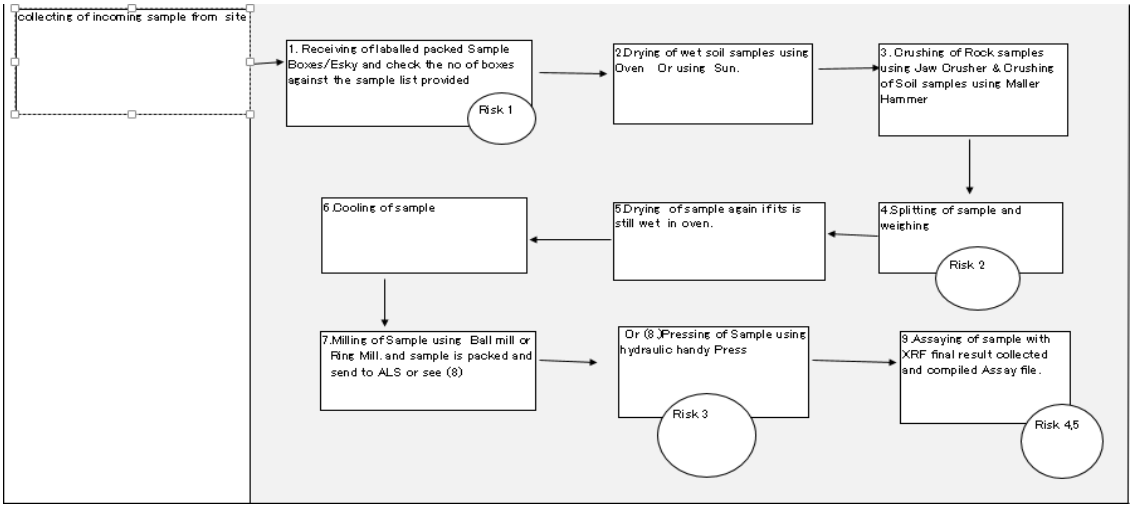
1. Spreading of sample (air dried)
2. Segregation (Mixing)
3. Riffling (Quartering & Reduction)
4. Extract representative sample and quantity required
5. Sieving

4.6.2 Geochemical Test

The analysis of major and trace elements in the sample was done using An X-ray fluorescence (XRF) spectrometer, the procedure was done in accordance to American quality assurance Standard. Flow Chart of the procedure adopted is as follows;

Collection of incoming sample from site;

1. Receiving of labelled packed sample Boxes/Esky and check the number of boxes against the sample list provided.
2. Drying of wet samples using oven or using sun (air dried).
3. Crushing of Rock samples using Jaw Crusher and crushing of soil samples using Maller Hammer.
4. Splitting of the sample and weighing.
5. Drying of sample again if it is still wet in oven
6. Cooling of Sample.
7. Milling of sample using Ball Mill or Ring Mill and sample is packed and send to ALS or
8. Pressing of sample using hydraulic handy Press.
9. Assaying of sample with XRF final result collected and compiled Assay file.



<Figure 4.4> Flow Chart Showing Geochem Lab Testing Procedure

4.7 Reference

Myers, M. D. (2020, 09 22). Techniques of Water-Resources Investigations. Retrieved from U.S. Geological Survey: http://pubs.water.usgs.gov/twri9A

NIWA, Jun 2017, Review of suspended sediment measurement techniques

5. Analysis Results

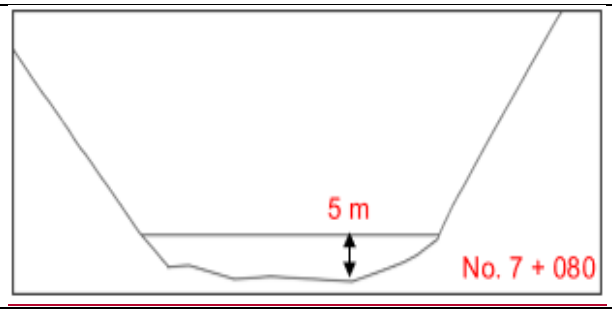
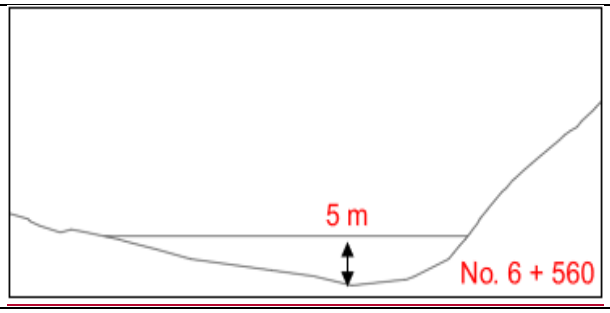
5. Analysis Results

5.1. Discharge analysis results

5.1.1. Elevation-Area relationship

When calculating the flow rate, it is necessary to apply the elevation-area relationship by referring to the cross section of the survey. The measured river cross-section and corresponding cross-sectional area were used, and the water level-cumulative cross-sectional area table for the upstream dam and downstream dam was prepared in Table 5.1 below. The water level-cumulative cross-sectional area table is displayed at 0.5m intervals up to 5m.

<Table 5.1> Elevation-Area relationship

	
Upstream of dam	Downstream of dam

<Table 5.2> Water level – Cumulative cross-sectional area

1.Upstream of dam			2. Downstream of dam		
Water depth	Surface width	Accumulated area	Water depth	Surface width	Accumulated area
0.0	0.0	0	0.0	0.0	0
0.5	19.3	5.1	0.5	7.4	1.9
1.0	31.3	18.03	1.0	12.0	6.82
1.5	38.9	35.3	1.5	17.0	14.1
2.0	44.5	56.49	2.0	22.0	23.82
2.5	47.0	79.4	2.5	27.1	36.2
3.0	49.1	103.41	3.0	30.4	50.6
3.5	51.0	128.5	3.5	32.8	66.4
4.0	52.9	154.41	4.0	35.3	83.39
4.5	54.8	181.3	4.5	37.9	101.7
5.0	55.9	209.01	5.0	40.7	121.31

5.1.2. Analysis of measured data

At the site 1, upstream of dam, at the site 2, downstream of dam, at the site3, power house, at the site4, tony river, at the site5, Vulamali Village, and at the site6, Ngalimbiu Bridge, measurements were undertaken from June 2020 to November 2021 as summarized below. Table 5.1, Table 5.2 and Table 5.3 show the average value for the river discharge, water depth and flow velocity. Detailed data of the river discharge measurement are attached under Appendix 6.

The relationship of the water depth according to the discharge flow (i.e. rating curves) are shown in Figure 5.1 to Figure 5.6 for the site 1 to the site 6 .

In the meantime, further measurement of river discharge needs to be conducted as collected data up to date is relatively limited and does not cover wide flow regimes including flooding conditions. It is expected that collection of river flow data will be enhanced when automatic gauges are installed at the site 1 and site 2, i.e. the upstream of dam and the downstream of dam. As river flow measurement data is accumulated, corresponding update of the rating curves should be made based on increased reliability and coverage of data.

<Table 5.3> Average River Discharges (m³/s)

Measuring Sites	1.Upstream of dam	2. Downstream of dam	3.Power house	4.Tony River	5.Vulamali Village	6.Ngalimbiu Bridge
29 Jun 2020					4.02	4.65
30 Jun 2020	5.99	5.08				
1 Jul 2020			4.88			
2 Jul 2020					10.06	
3 Jul 2020		7.93				
7 Jul 2020	5.13	5.33	6.50	2.26		
14 Jul 2020	4.15	4.44	7.63	1.33		
4 Aug 2020	3.10	3.29	2.79	1.24	3.98	4.64
25 Aug 2020	2.80	3.20	2.33	1.00	3.95	4.54
1 Sep 2020	2.92	3.42	2.48	1.00	4.10	4.67
7 Oct 2020	6.06	6.24	6.49	1.33	6.70	6.78
13 Oct 2020	5.56	6.08	5.94	1.35	6.20	5.97
20 Oct 2020	7.13	7.66	8.39			63.31
27 Oct 2020	28.89	28.21	47.40		71.38	92.00
3 Nov 2020	24.06	23.27	38.05		74.32	97.06
17 Nov 2020	18.81	20.06	34.61		55.68	60.93
29 Dec 2020	26.18	34.28	34.61		62.65	79.56
14 Jan 2021	37.34	38.68	47.27			107.31
2 Feb 2021	37.10	33.85	41.97			107.64
10 Feb 2021	47.17	52.90				
11 Feb 2021	46.66	57.41				
12 Feb 2021	50.25	56.22				
13 Feb 2021			36.99	14.26	62.88	69.84
18 Feb 2021	39.95	90.52				
19 Feb 2021	59.07	66.69				
20 Feb 2021				13.35	48.95	50.99
25 Feb 2021	93.76	111.07				
26 Feb 2021	93.94	107.51				
27 Feb 2021			61.15	16.23	77.73	84.03
4 Mar 2021	123.08	128.18				
5 Mar 2021	166.59	176.55				
6 Mar 2021			80.06	29.56	137.11	140.75
13 Mar 2021				12.45	70.23	100.37
14 Mar 2021				2.07	70.19	120.19
23 Mar 2021				15.51	47.06	58.89

24 Mar 2021				10.88	57.19	58.82
26 Mar 2021					59.49	85.26
27 Mar 2021					60.66	85.54
11 Jun 2021	12.87	13.23	13.99			
17 Jun 2021	9.49	1.66				
18 Jun 2021	9.77	1.66				
19 Jun 2021	5.73	1.98				
4 Jul 2021	13.02	2.55				
16 Oct 2021	13.41	11.40			17.26	17.93
23 Oct 2021	5.94	6.21				
5 Nov 2021	12.53	2.34				
6 Nov 2021	163.87	24.58				
7 Nov 2021	18.97	5.85				

<Table 5.4> Average Water Depth (m)

Measuring Sites	1.Upstream of dam	2. Downstream of dam	3.Power house	4.Tony River	5.Vulamali Village	6.Ngalimbiu Bridge
29 Jun 2020					0.47	0.90
30 Jun 2020	0.70	0.55				
1 Jul 2020			0.45			
2 Jul 2020					0.69	
3 Jul 2020		0.65				
7 Jul 2020	0.62	0.55	0.56	0.25		
14 Jul 2020	0.58	0.49	0.60	0.21		
4 Aug 2020	0.45	0.38	0.35	0.22	0.45	0.90
25 Aug 2020	0.43	0.38	0.34	0.21	0.43	0.80
1 Sep 2020	0.45	0.40	0.35	0.21	0.45	0.80
7 Oct 2020	0.70	0.60	0.55	0.24	0.60	1.10
13 Oct 2020	0.68	0.50	0.50	0.24	0.60	1.00
20 Oct 2020	0.90	1.70	0.62			1.60
27 Oct 2020	0.90	1.40	0.67		0.50	1.75
3 Nov 2020	0.84	1.50	0.65		0.48	1.75
17 Nov 2020	0.79	1.40	0.64		0.45	1.60
29 Dec 2020	0.89	1.80	0.64		0.48	1.70
14 Jan 2021	0.99	1.97	0.65			1.80
2 Feb 2021	1.01	1.70	0.67			1.80
10 Feb 2021	1.09	2.30				
11 Feb 2021	1.05	2.31				
12 Feb 2021	1.10	2.26				
13 Feb 2021			0.63	0.40	0.47	1.63
18 Feb 2021	1.05	2.48				
19 Feb 2021	1.20	2.27				
20 Feb 2021				0.41	0.45	1.51
25 Feb 2021	1.15	2.33				

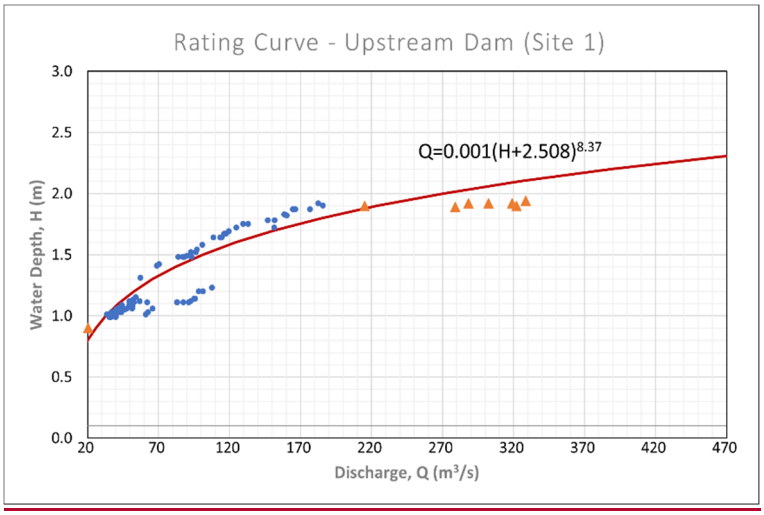
26 Feb 2021	1.52	2.92				
27 Feb 2021			0.73	0.43	0.50	1.51
4 Mar 2021	1.70	2.49				
5 Mar 2021	1.84	2.74				
6 Mar 2021			0.76	0.48	0.65	1.81
13 Mar 2021				0.41	0.59	1.50
14 Mar 2021				0.33	0.57	1.53
23 Mar 2021				0.47	0.60	1.48
24 Mar 2021				0.40	0.62	1.51
26 Mar 2021					0.62	1.61
27 Mar 2021					0.63	1.61
11 Jun 2021	0.58	1.20	0.39			
17 Jun 2021	0.73					
18 Jun 2021	0.82					
19 Jun 2021	0.64					
4 Jul 2021	0.76					
16 Oct 2021	0.85	0.99			0.71	1.20
23 Oct 2021	0.67	0.67				
5 Nov 2021	0.84	0.57				
6 Nov 2021	1.43	1.04				
7 Nov 2021	0.88	0.73				

<Table 5.5> Average Flow Velocity (m/s)

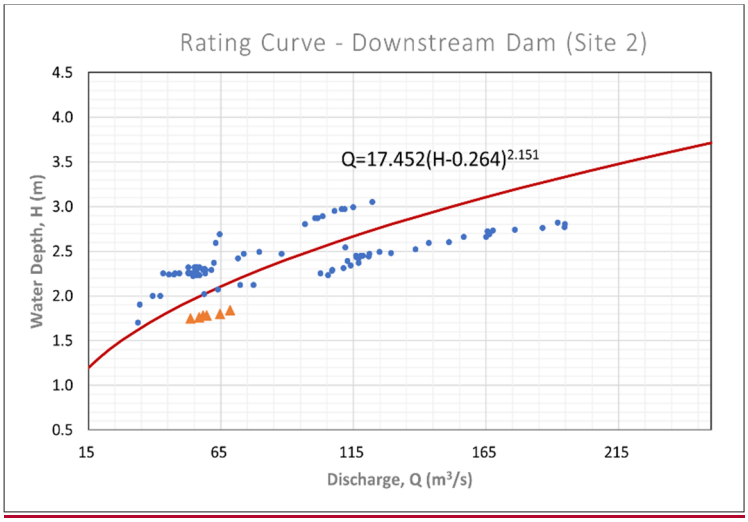
Measuring Sites	1.Upstream of dam	2. Downstream of dam	3.Power house	4.Tony River	5.Vulamali Village	6.Ngalimbiu Bridge
29 Jun 2020					0.32	0.36
30 Jun 2020	0.7	0.55				
1 Jul 2020			0.71			
2 Jul 2020					0.57	
3 Jul 2020		0.7				
7 Jul 2020	0.97	0.58	0.71	0.52		
14 Jul 2020	0.81	0.55	1.22	0.46		
4 Aug 2020	0.69	0.55	0.51	0.38	0.4	0.38
25 Aug 2020	0.67	0.56	0.54	0.34	0.4	0.41
1 Sep 2020	0.71	0.55	0.54	0.34	0.4	0.42
7 Oct 2020	0.92	0.77	0.81	0.35	0.46	0.47
13 Oct 2020	0.85	0.81	0.8	0.35	0.46	0.42
20 Oct 2020	0.92	0.79	0.83			1.80
27 Oct 2020	1.31	1.55	1.57		1.78	2.34
3 Nov 2020	1.21	1.72	1.32		1.96	2.36
17 Nov 2020	1.05	1.33	1.23		1.62	1.73
29 Dec 2020	1.20	1.59	1.23		1.68	1.99
14 Jan 2021	1.46	1.58	1.64			2.48
2 Feb 2021	1.41	1.86	1.39			2.39
10 Feb 2021	1.61	1.62				

11 Feb 2021	1.67	1.73				
12 Feb 2021	1.70	1.77				
13 Feb 2021			1.38	1.32	1.83	1.86
18 Feb 2021	1.61	2.46				
19 Feb 2021	1.78	2.15				
20 Feb 2021				1.19	1.43	1.23
25 Feb 2021	2.98	3.32				
26 Feb 2021	1.97	2.20				
27 Feb 2021			1.79	1.33	1.94	1.94
4 Mar 2021	2.20	3.44				
5 Mar 2021	2.65	4.09				
6 Mar 2021			2.16	1.92	2.40	2.62
13 Mar 2021				1.10	1.37	2.05
14 Mar 2021				0.44	1.44	2.11
23 Mar 2021				1.04	0.91	1.37
24 Mar 2021				1.03	1.06	1.36
26 Mar 2021					1.09	1.87
27 Mar 2021					1.09	1.85
11 Jun 2021	1.28	1.27	1.15			
17 Jun 2021	1.05	0.68				
18 Jun 2021	0.81	0.72				
19 Jun 2021	0.81	0.79				
4 Jul 2021	1.18	0.96				
16 Oct 2021	0.81	0.77			0.86	0.76
23 Oct 2021	0.58	0.74			0.69	0.68
5 Nov 2021	0.94	0.97				
6 Nov 2021	3.42	1.91				
7 Nov 2021	1.31	1.51				

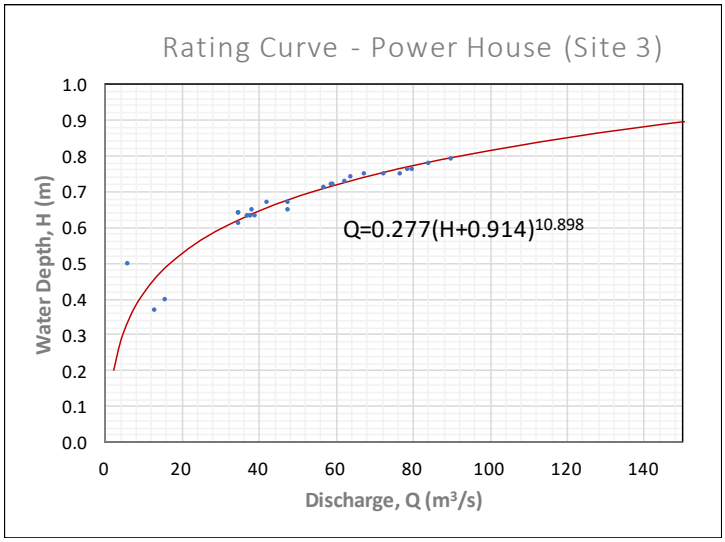
Figures 5.1 and 5.2 show rating curve graphs according to additional measurements from June 2021 to November 2021, and the part marked in orange is the additionally updated data. As it seems that there has been change in rating at the location “downstream of dam” shown in Figure 5.2, it is necessary to survey the channel section again and necessary re-rating, in parallel with continuing measuring and sampling.



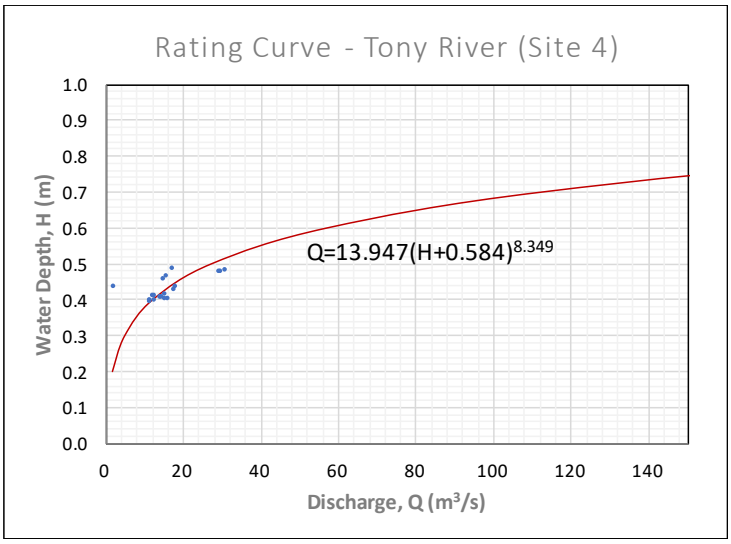
<Figure 5.1> Rating Curve - Upstream of Dam



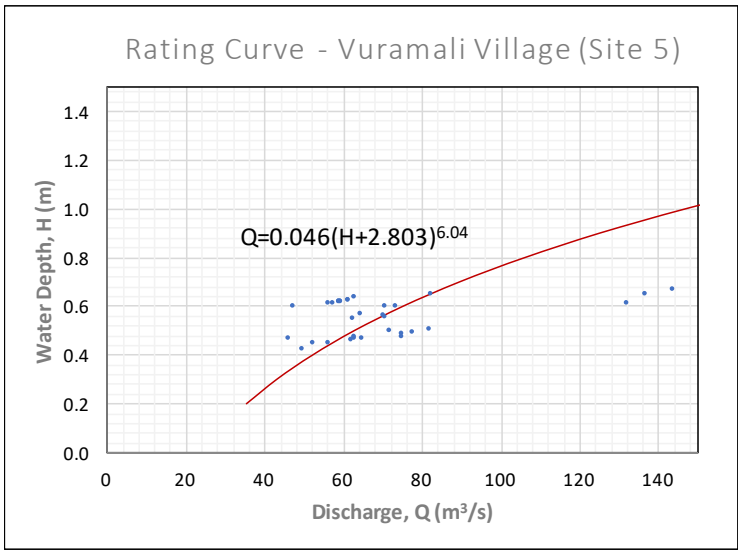
<Figure 5.2> Rating Curve – Downstream of Dam



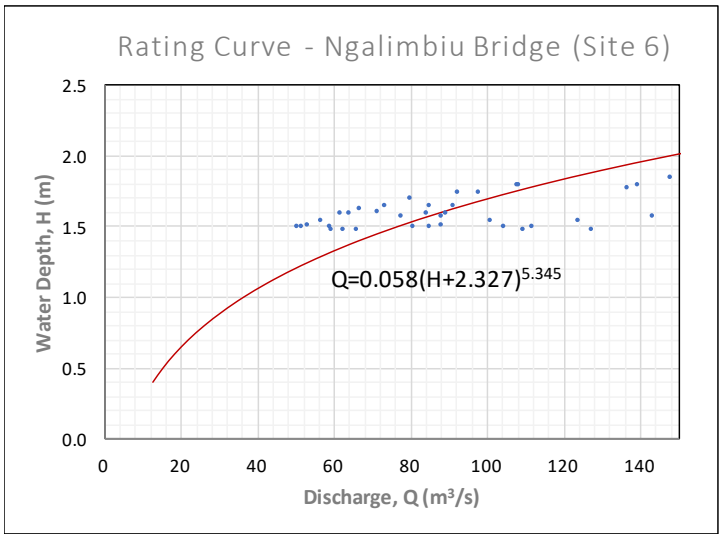
<Figure 5.3> Rating Curve – Power House



<Figure 5.4> Rating Curve – Tony River



<Figure 5.5> Rating Curve – Vuramali Village



<Figure 5.6> Rating Curve – Ngalimbiu Bridge

5.1.3. Comparison between measurements and calculations

The table below compares the water depths at the upstream of dam, downstream of dam, and power house by applying the HEC-RAS program. Comparison was made for cases that have similar flowrate values and it was indicated that there are slight differences between measured water depths and calculated water depth. Although this difference is allowable at the current stage and measured data can be used for a preliminary assessment, deviation between measured and theoretically estimated values needs to be minimized by further measurement and analysis so that establishment of well-fitted rating curves and reliable representation and monitoring of river flow based on such rating curves can be achieved.

<Table 5.6> Comparison of calculated and measured water depths

Measurement Sites	Q Total (m3/s)	Min Ch El. (m)	W.S. El. (m)	Calculated water depth (m)	Measured water depth (m)	Difference [Cal. – Meas.] (m)
Upstream of Dam (No.7+080)	Q10	121.75	122.29	0.54	0.58	-0.04
	Q40	121.75	122.55	0.8	1.05	-0.25
	Q50	121.75	122.62	0.87	1.09	-0.22
	Q100	121.75	122.92	1.17	1.20	-0.03
Downstream of Dam (No.6+560)	Q10	116.33	118.07	1.74	1.20	0.54
	Q40	116.33	118.85	2.52	2.25	0.27
	Q50	116.33	119.02	2.69	2.32	0.37
	Q100	116.33	119.65	3.32	2.87	0.45
Power House (No.1+560)	Q12.67	70.58	71.19	0.61	0.37	0.24
	Q19	70.58	71.27	0.69	0.40	0.29
	Q50	70.58	71.52	0.94	0.71	0.23

5.2 Suspended sediment load analysis results

The concentrations of the suspended sediments from five measuring sites except the additionally added site 4, Tony River, were determined by sampling. Sampling were undertaken intermittently at site 1, 2, 3, 5 and 6 from June 2020 to February 2021. The weather on sampling days were mostly sunshine and the river condition in general were clearer upstream at site 1 and site 2 and murkier downstream especially at site 5 and site 6.

Measured TSS (Total Suspended Solids) of each site is described in Table 5.5. TSS of upstream, site 1 and 2, are about 5mg/L to 10mg/L for relatively low flow conditions and about 50mg/L to 300mg/L for medium flow conditions. However, in downstream area of site 5 and 6, TSS are higher as 5 to 45mg/L for the low flow conditions. Higher values of TSS in downstream which are approximately 10 to 20km from the dam are inferred to be caused by the anthropogenic activities.

<Table 5.7> Measured TSS (mg/L)

Measuring Sites	1.Upstream of dam	2. Downstream of dam	3.Power house	5.Vulamali Village	6.Ngalimbiu Bridge
29 Jun 2020					15
2 Jul 2020				10	
14 Jul 2020	5	5	10		

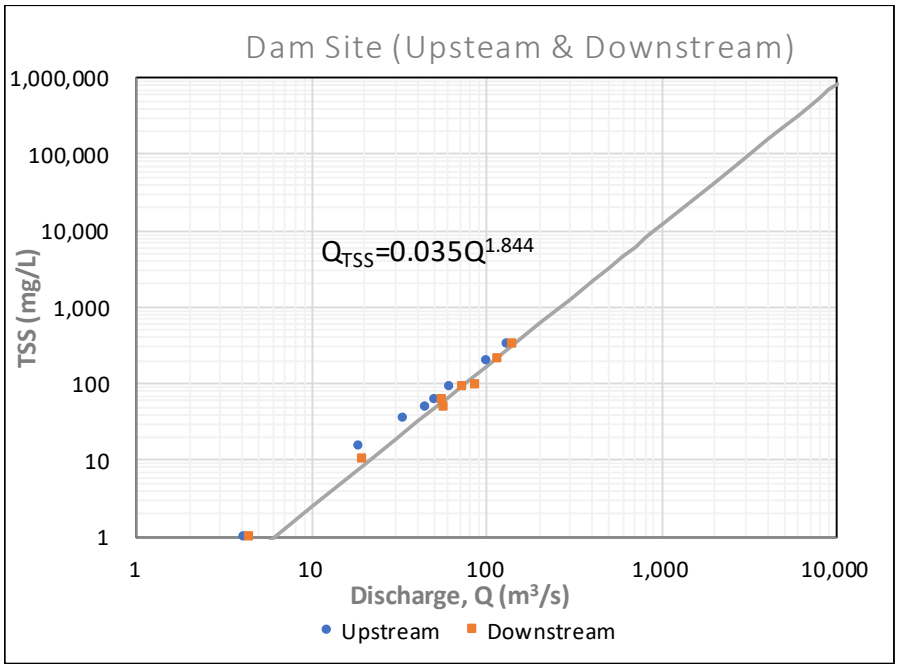
17 Nov 2020	12	12	16	20	28
11 Feb 2021	80	80			
12 Feb 2021	40	40			
18 Feb 2021	40	40			
19 Feb 2021	35	40			
20 Feb 2021			5		
26 Feb 2021	260	300			
4 Mar 2021	320	320			

Note : Samples for TSS measurement were collected since resumption of field measurement in October 2021, but violent protests in the Solomon Islands resulted in a complete burn down of the laboratory. Thus, samples were lost and TSS values could not be included in this table. Meantime, sampling will continue during the construction period.

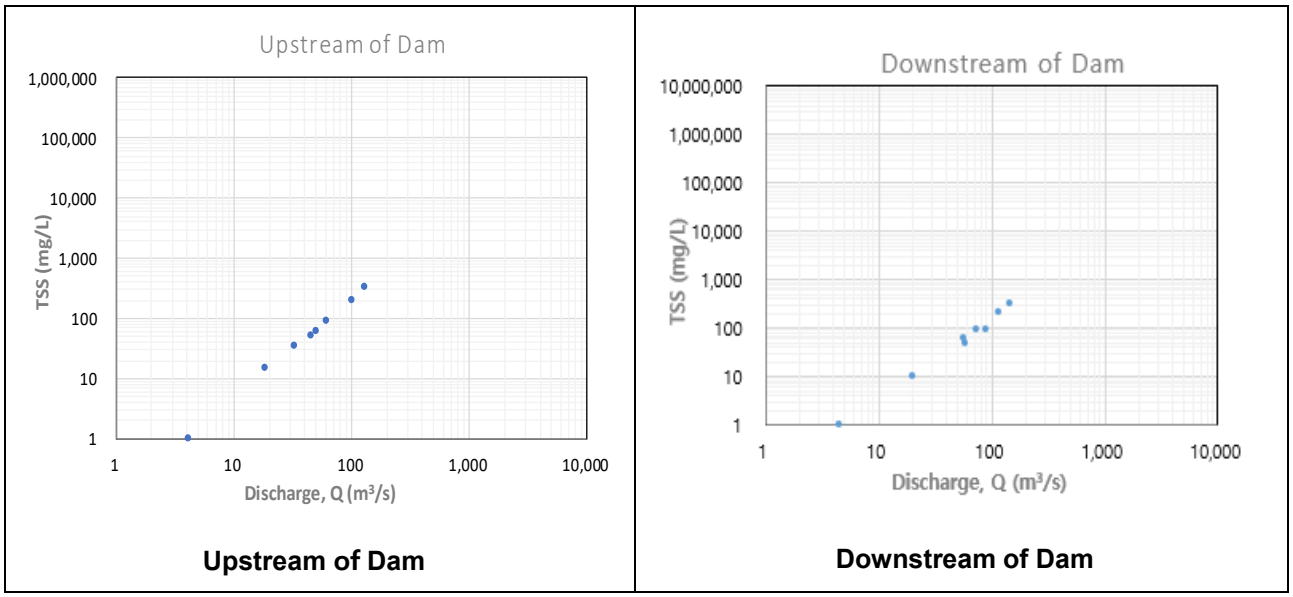
The following figures from Figure 5.9 to Figure 5.14 are with reference to the table above and show the relationship between TSS and river discharge at each site. Although the TSS data presented in Table 5.6 and figures below is limited, it is expected that TSS in Tina river is relatively low for low to medium flow conditions. For the measurement site 1 (upstream of dam) and site 2 (downstream of dam), measured data were combined for analysis since these two sites are very close to each other and believed to show a similar trend with respect to discharge and suspended sediment. Based on these data, the relationship between TSS and the river discharge was derived. The derived TSS-Q curve is presented in form of a power function and plotted on a logarithmic scale, as shown in Figure 5.9. As for the individual measurement site, only measured data are plotted for reference but the TSS-Q curves were not derived in consideration of insufficient number of measurement data at each site and consequent uncertainty.

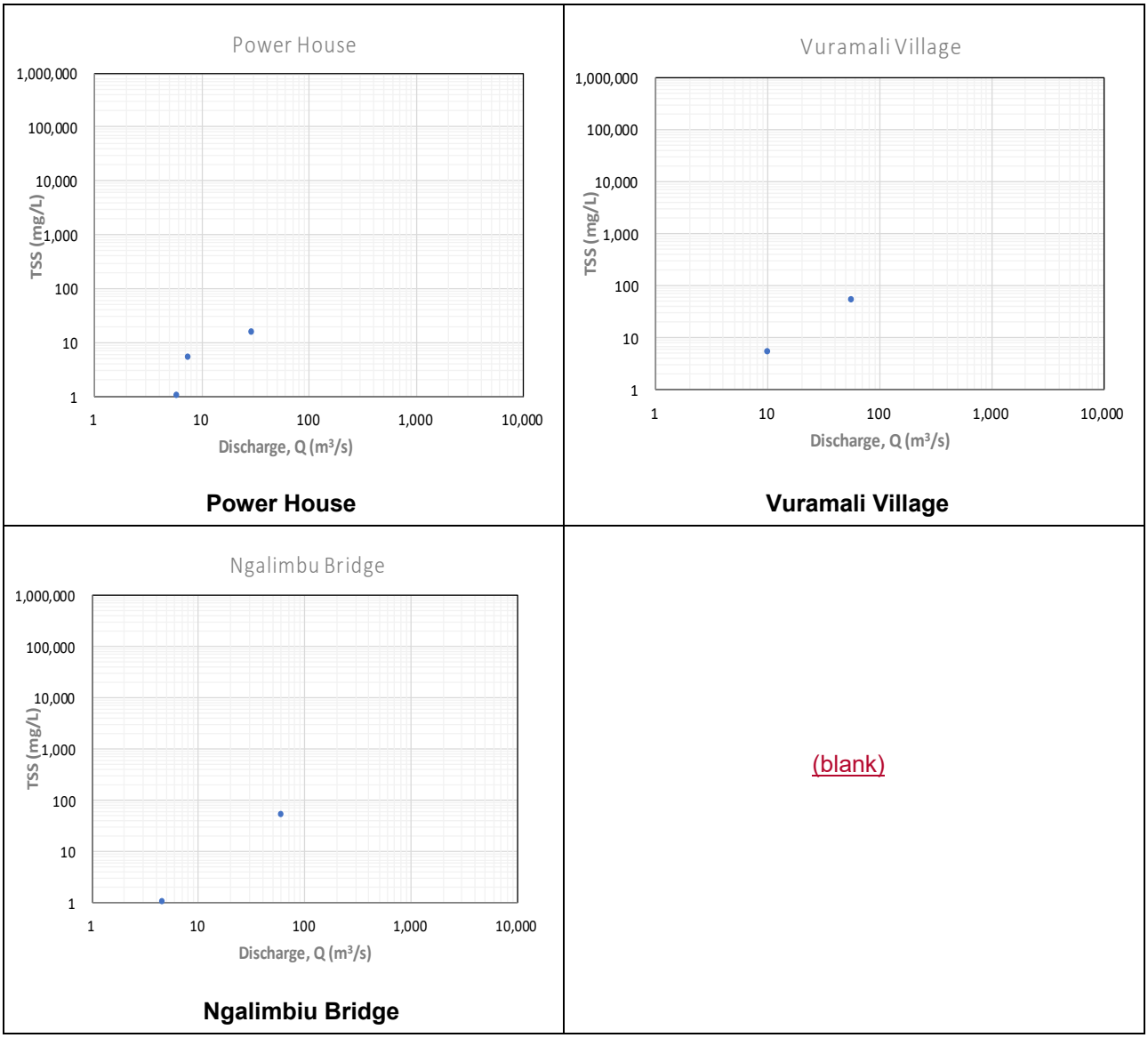
The mineral composition of the suspend sediments were also tried to be analyzed. However, the solid proportions of the suspended sediment in sampled river water were not enough to take laboratory analysis. Taking more samples in the high water condition will be tried continuously. However, since March, 2021, the measurements and sampling have been stopped because of disputes and hindrances by the local people arising from the core land and compensation issue. As soon as the problems are settled down, the survey will be continued.

In the meantime, further measurement of suspended sediment load needs to be conducted as collected data up to date is limited and does not cover wide flow regimes including flooding conditions. It is expected that collection of suspended sediment data will be enhanced when automatic gauges of monitoring discharge are installed at the site 1 and site 2, i.e. the upstream of dam and the downstream of dam. As suspended sediment measurement data is accumulated, corresponding update of the relationship between river discharge and suspended sediment load should be made based on increased reliability and coverage of data. Analysis of suspended sediment will include weighing, particle size distribution, composition and mineralogy, hardness test as applicable.



<Figure 5.7> TSS-Discharge Distribution – Dam Site (Upstream & Downstream)





<Figure 5.8> TSS-Discharge Distribution

5.3 Bed load analysis results

5.3.1 Geochemical laboratory analysis results

Bed load sampling conducted along the river sites confirmed that the material is sandy gravel, alluvial deposits weathered from boulders and outcrop located at high upstream. The method of sampling carried out was based on United States Department of Agriculture (USDA) procedure which was proven very effective and useful during the exploration.

Five sites were marked along the river to obtain samples that will produce a representative material of the region to give help in designing and construction. By examining the chemical composition of the stream sediment samples at the five (5) sites presented to the geochemical laboratory, it was found that samples for site 1 to site 5 have higher percentage of Silicon (Si), Aluminium (Al), Iron (Fe), Calcium (Ca), Potassium (K), Phosphorus (P) and Sulphur (S). (See attached XRF (X-Ray Fluorescence) results in Table 5.8 to Table 5.12.) By applying gravimetric technique, the results shows that all the sediments have composition of fine sand and contain an estimated average of 36% of quartz (19%) and feldspar (17%). Finally the material sampled along the sites are key substrate or

residue of the parent rock that represents the geology of the existing five sites .The results produced from the laboratories define the physical and chemical properties of the sediments or the samples.

<Table 5.9> Laboratory results – Site1 Upstream of Dam

	Elements/Names	PPM* (Part per Million)	Feldspar Composition in % (KAlSi3O8 – NaAlSi3O8- CaAl2Si2O8) Estimated	Quartz Composition in % (SiO2) Estimated
SITE 1 Upstream of Dam	K – Potassium	4138	15%	20%
	P - Phosphorus	1228		
	S- Sulfur	891		
	Ca – Calcium	40500		
	Ti – Titanium	2426		
	Mn - Manganese	710		
	Fe- Iron	44300		
	Cu- Copper	81		
	Zn – Zinc	57		
	Rb - Rubidium	14		
	Sr – Tin	438		
	Y- Yttrium	15		
	Zr – Zirconium	69		
	Ba – Barium	233		
	W – Tungsten	46		
	Th- Thorium	7		
	Al - Aluminium	17000		
	Si- Silicon	59100		

* 1ppm = 1gram/tonne, 10,000ppm = 1%

<Table 5.10> Laboratory results – Site2 Downstream of Dam

	Elements	PPM*(Part Per Million)	Feldspar Composition in % (KAlSi3O8 – NaAlSi3O8- CaAl2Si2O8) Estimated	Quartz Composition in % (SiO2) Estimated
SITE 2 Downstream of Dam	K--Potassium	3962	20%	18%
	P - Phosphorus	1630		
	S- Sulfur	1138		
	Ca - Calcium	36000		
	Ti - Titanium	3793		
	Mn - Manganese	635		
	Fe- Iron	55700		
	Cu- Copper	113		
	Zn - Zinc	74		
	Rb - Rubidium	13		
	Sr – Tin	432		
	Y- Yttrium	14		
	Zr - Zirconium	74		
	Ba - Barium	209		
	Ni-Nickel	116		
	Nb-Niobium	4		
	Al - aluminium	16900		
	Si- Silicon	64300		

* 1ppm = 1gram/tonne, 10,000ppm = 1%

<Table 5.11> Laboratory results – Site 3 Power House

	ELEMENTS	PPM* (Part Per Million)	Feldspar Composition in % (KAlSi3O8 – NaAlSi3O8- CaAl2Si2O8) Estimated	Quartz Composition in % (SiO2) Estimated
SITE 3 Power House	K--Potassium	4375	18%	20%
	S- Sulfur	881		
	Ca - Calcium	39300		
	Ti - Titanium	2142		
	Mn - Manganese	576		
	Fe- Iron	40500		
	Cu- Copper	123		
	Zn - Zinc	61		
	Rb - Rubidium	12		
	Sr - Tin	484		
	Y- Yttrium	13		
	Zr - Zirconium	71		
	Ba - Barium	232		
	Nb - Niobium	2		
	Al - Aluminium	19400		
	Si- Silicon	65900		

* 1ppm = 1gram/tonne, 10,000ppm = 1%

<Table 5.12> Laboratory results – Site 5 Vuramali

	ELEMENTS	PPM*(Part Per Million)	Feldspar Composition in % (KAlSi3O8 – NaAlSi3O8- CaAl2Si2O8) Estimated	Quartz Composition in % (SiO2) Estimated
SITE 5 Vuramali Village	K - Potassium	4284	16%	18%
	S - Sulfur	1026		
	Ca- Calcium	52000		
	Ti - Titanium	2239		
	Mn- Manganese	614		
	Fe - Iron	40000		
	Cu- Copper	88		
	Zn - Zinc	57		
	Rb - Rubidium	13		
	Sr - Tin	461		
	Y - Yttrium	15		
	Zr - Zirconium	63		
	Ba - Barium	229		
	Al - aluminium	20300		
	Si – Silicon	63300		

* 1ppm = 1gram/tonne, 10,000ppm = 1%

<Table 5.13> Laboratory results – Site 6 Ngalimbiu Bridge

	ELEMENTS	PPM*(Part Per Million)	Feldspar Composition in % (KAlSi3O8 – NaAlSi3O8- CaAl2Si2O8) Estimated	Quartz Composition in % (SiO2) Estimated
SITE 6 Ngalimbiu Bridge	K - Potassium	4188	15%	20%
	P -Phosphorus	973		
	S - Sulfur	886		
	Ca - Calcium	33400		
	Ti - Titanium	2727		
	Mn- Manganese	709		
	Fe - Iron	42800		
	CU - Copper	66		
	Zn - Zinc	66		
	Rb - Rubidium	14		
	Sr - Tin	448		
	Y – Yttrium	13		
	Zr- Zirconium	64		
	Nb - Niobium	2		
	Ba – Barium	236		
	Al -Aluminium	21700		
	Si – Silicon	68500		

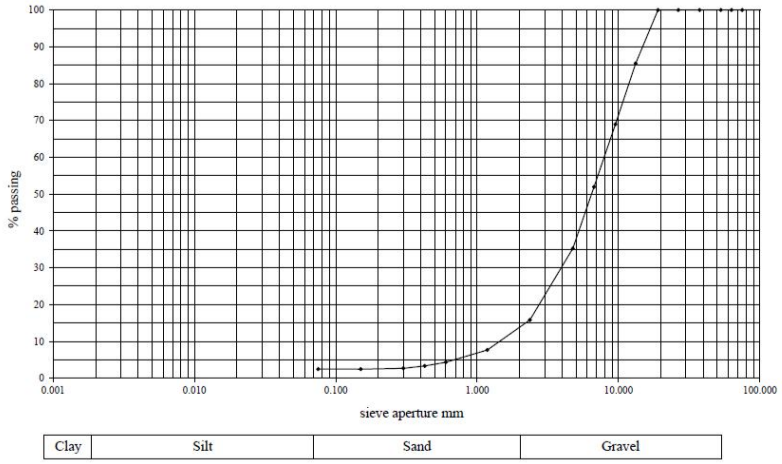
* 1ppm = 1gram/tonne, 10,000ppm = 1%

5.3.2 Particle size distribution and classification

Particle size distribution for the sampled bed load for the five sites (Site 1, 2, 3, 5 and 6) were analyzed as shown in the following tables and figures. Bed material is composed of mostly gravel and sand with small amount of silt up to 2% and is classified to sandy gravel or gravelly sand, except the site 5 of which silt composition is high.

<Table 5.14> Site 1

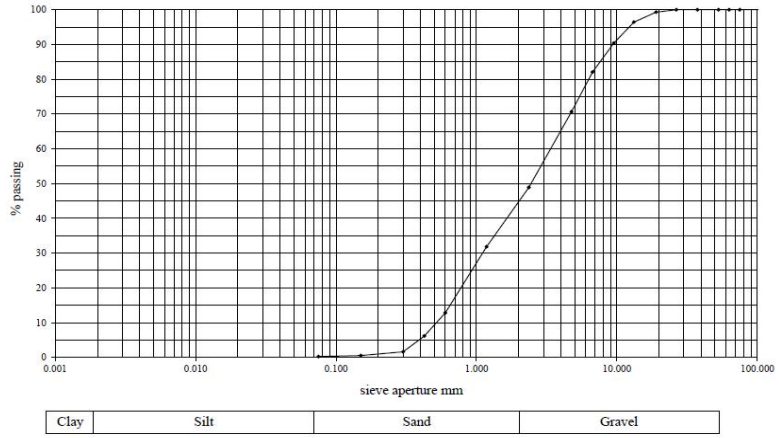
LOCATION	COMPOSITION		SOIL CLASSIFICATION
Site1 (Upstream)	Grain Size Distribution	Passing (%)	SANDY GRAVEL (ALLUVIUM): Mottled Grey-White Brown, fine to coarse sub angular gravel, fine to coarse sand, dense, dry, non-plastic.
	Gravel	84	
	Sand	13	
	Silt	2	



<Figure 5.9> Site 1 Upstream of Dam

<Table 5.15> Site 2

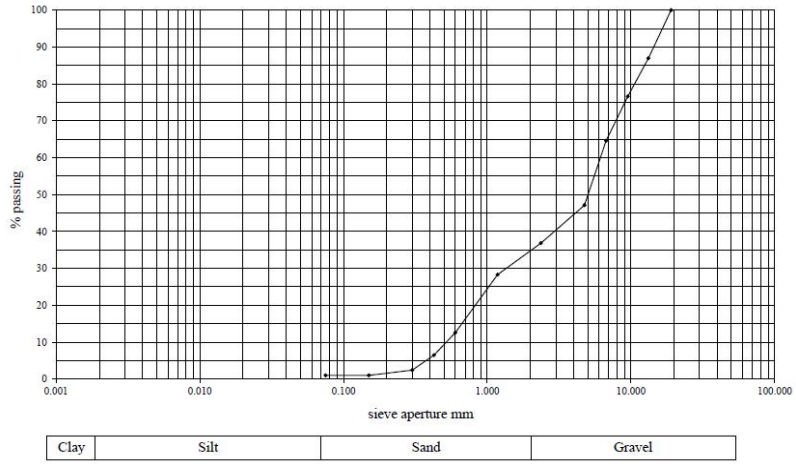
LOCATION	COMPOSITION		SOIL CLASSIFICATION
Site 2 (Downstream of Dam)	Grain Size Distribution	Passing (%)	SANDY GRAVEL (ALLUVIUM): Mottled Grey- white Brown, fine to coarse sub rounded gravel, fine to coarse sand, dense, non-plastic.
	Gravel	51	
	Sand	49	
	Silt	0	



<Figure 5.10> Site 2 Downstream of Dam

<Table 5.16> Site 3

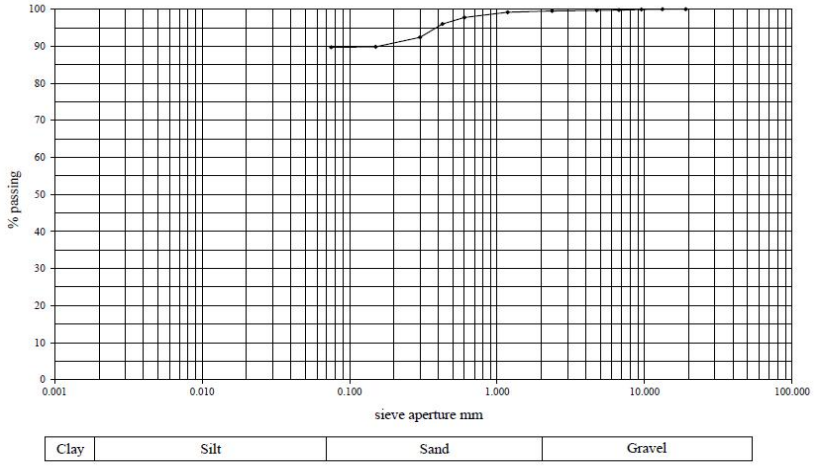
LOCATION	COMPOSITION		SOIL CLASSIFICATION
Site 3 (Power House)	Grain Size Distribution	Passing (%)	SANDY GRAVEL (ALLUVIUM): Mottled Grey- white, Brown, fine to coarse sub angular to sub rounded gravel, fine to coarse sand, trace of silt, non-plastic.
	Gravel	63	
	Sand	36	
	Silt	1	



<Figure 5.11> Site 3 Power House

<Table 5.17> Site 5

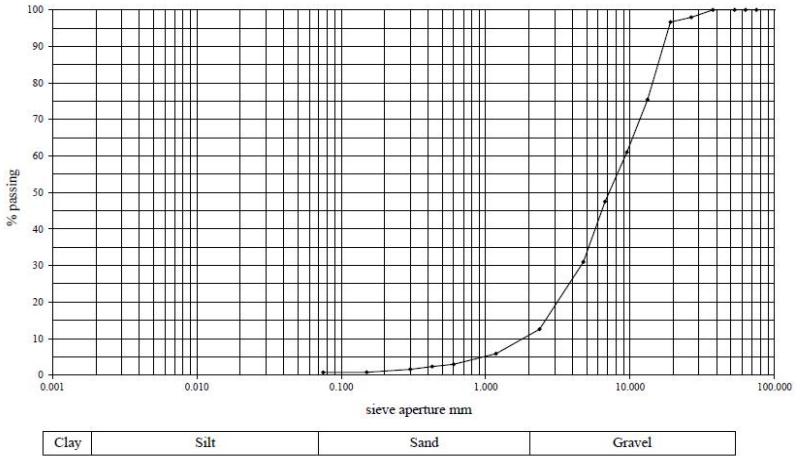
LOCATION	COMPOSITION		SOIL CLASSIFICATION
Site 5 (Varamali)	Grain Size Distribution	Passing (%)	SAND (ALLUVIUM): Mottled Grey White- Brown, trace of gravel and silt, dry, non-plastic.
	Gravel	0	
	Sand	10	
	Silt	90	



<Figure 5.12> Site 5 Varamali Village

<Table 5.18> Site 6

LOCATION	COMPOSITION		SOIL CLASSIFICATION
Site 6 (Ngalimbiu Bridge)	Grain Size Distribution	Passing (%)	GRAVELLY SAND (ALLUVIUM): Mottled Grey – White Brown, fine to coarse sub rounded gravel, fine to coarse sand, dense, dry, non-plastic.
	Gravel	87	
	Sand	12	
	Silt	1	



<Figure 5.13> Site 6 Ngalimbiu Bridge

5.4 Discussions and Conclusions

In previous sections, measurements and related analysis of discharge, suspended sediment load and bed load were presented as summarized below.

- River discharges were measured at six (6) locations, i.e. upstream of dam, downstream of dam, powerhouse, Tony river, Varamali Village and Ngalimbiu Bridge. Based on measurement data which is considered as low to medium flow, rating curves (stage-discharge relationship) at each measurement site were derived. For the future measurement since resumption of field measurement in October 2021, measurements will be made at only four points, except the locations Power House and Tony River.

- When installing river measuring facilities such as cableway and automatic gauging equipment, the results of laboratory analysis such as PSD and TSS will be described in the report later in consideration of field measurement and observation results and local conditions.

- For examination of suspended sediment load, river water were sampled at five (5) measurement sites except the site 4 Tony river. Sampling were made for relatively low to medium flow conditions and corresponding TSS was found to be relatively low. For the dam site, a TSS-Q curve based on the measured data from two sites (upstream and downstream of the dam) was derived and proposed in a graph with a curve equation. Analysis of particle size and mineralogy for sampled suspended sediment could not be conducted due to insufficient amount of TSS in sampled water. Similarly to river discharge measurement, measurements of suspended sediment will be made at only four points, except the locations Power House and Tony River.

- Bed load materials were sampled and analyzed in terms of particle size and mineral composition. However, analysis results lack for information to evaluate risk of abrasion due to hard minerals and analysis of bed load and suspended load should be made up with more details.

In addition to the above, further measurement of river discharge and suspended sediment needs to be conducted as collected data up to date is relatively limited and does not cover full flow regimes including flooding conditions. It is expected that collection of river flow and suspended sediment data will be enhanced when automatic gauges are installed at the site 1 and site 2, i.e. the upstream of dam and the downstream of dam. As river flow and sediment measurement data is accumulated, corresponding update of the rating curves and sediment load should be made based on increased reliability and coverage of data. For details of proposed plan of river flow and sediment monitoring, refer to Appendix-10.

It is emphasized that, according to discussions with DSAP and OE, future measurement will be more focused on high flows in consideration of its importance and laboratory analysis for bed load and suspended load will include weighing, particle size distribution, composition and mineralogy, hardness test, etc. as applicable.

As mentioned earlier, discharge and sediment monitoring was resumed in October and is to continue throughout the construction period, i.e. a few years. Thus, with respect to submission of monitoring results and revision of this document, the following is recommended.

- Collected measurement results will be submitted as a separate document including full details of measurement, lab tests and analysis regularly based on contractual requirements at a quarterly basis until installing automatic gauging equipment and at a monthly basis after installation of automatic gauging equipment as the volume of monitoring data will significantly increase.

- The main report, i.e. this document E-GE-CVHH-R0-10130 (Currently Rev.D), is to be finalized with comprehensive inclusion of all measurement results and analysis upon completion of dam construction.

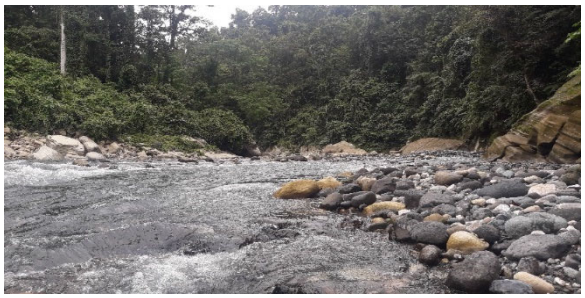
5.5 References

Peter. S Roy., 1990: Quaternary Geology of the Guadalcanal Plain and adjacent Seabed, Solomon Islands.
CCOP/SOPAC Technical Report 61: 99 pages, 30 figures.
Geology of Honiara, MNR, 1979.
Hackman, B., 1979, Geology of the Honiara Area. Hong Kong: Libra Press Limited.
AS1726-1993: Geotechnical Site Investigation and AS1289.3.6.1: Standard Practice for Classification of Soils.
AS1289.1.2.1 Sampling and Preparation of Disturbed samples –Standard Method.
AS1289.3.6.1 Particle Size Distribution, Standard Sieving.
Greg Schellenberg, C. Richard Donnelly, (2020) dealing with Sediment: Effects on Dams and Hydropower Generation issue 1 volume 25.

Appendixes

Appendix-1 Photographs of field reconnaissance

Site 1. Upstream of dam

	
1) Upstream of dam – upstream view	2) Upstream of dam – downstream view
	
3) Upstream of dam – measuring line (1)	4) Upstream of dam – measuring line (2)
	
5) Upstream of dam – discharge measuring (1)	6) Upstream of dam – discharge measuring (2)

Site 2. Downstream of dam

	
7) Downstream of dam – measuring line	8) Downstream of dam – discharge measuring (1)
	
9) Downstream of dam – discharge measuring (2)	10) Downstream of dam – flooding condition
	
11) Downstream of dam – water level mark	12) Downstream of dam – discharge measurement using floating stick

Site 3. Power house

	
13) Power house – upstream view	14) Power house – downstream view
	
15) Power house – measuring line (1)	16) Power house – measuring line (2)
	
17) Power house – discharge measuring (1)	18) Power house – discharge measuring (2)

Site 4. TONY River

	
19) TONY River – junction of TONY and TINA Rivers	20) TONY River – upstream view
	
21) TONY River – discharge measuring	

Site 5. Vuramali Village

22) Vuramali Village – upstream view

23) Vuramali Village – downstream view

24) Vuramali Village – measuring line

25) Vuramali Village – discharge measuring (1)

26) Vuramali Village – discharge measuring (2)

Site 6. Ngalimbiu Bridge

	
27) Ngalimbiu Bridge – upstream view	28) Ngalimbiu Bridge – downstream view
	
29) Ngalimbiu Bridge – discharge measuring	

Appendix-2 Current Meter

The MF Pro model, which is an electronic flowmeter from OTT Inc., is selected to automatically measure the water level and flow rate in consideration of the situation of the Tina River. According to the test certification, the measurement range of MF pro is 0-6 m/s. And the accuracy is ± 2 % (0.015 m/s) at 0-3 m/s and ± 4 % (0.015 m/s) at 3-5 m/s.

<Table A2-1> Technical data of OTT MF Pro

Item	Technical data	Photography
Measurement method	Magnetic-inductive	
Measuring range (m/s)	0 – 6	
Accuracy at 0-3 m/s	± 2 % (0.015 m/s)	
Accuracy at 3-5 m/s	± 4 % (0.015 m/s)	
Methods for discharge calculation	EN ISO 748	

Appendix-3 Certification of Current Meter

FAT MF pro

Magnetisch Induktiver Strömungssensor
Magnetic Flow Sensor

Abnahmeprüfzeugnis 3.1, Factory Acceptance Test 3.1
DIN EN 10204:2004

Artikel-Nr, Part Nr.	1040500595-0D
Bearbeiter, Agent	administrator
Datum, Date	04.03.2020
Unterschrift, Signature	

OTT Serien-Nr.	**OTT Serial No.**	339217
Software		
Firmware Version	Application Version	1.02
Bootloader Version	Bootloader Version	1.00

Druckzelle	**Pressure cell**		**Ergebnis/Result**
Wassertank mit Pegelstand	Tank with certain stage	Toleranz [m] Tolerance [m]	
	0.610 m	+/- 0.013	0.604

Leitfähigkeitsmessung	**Conductivity measurement**	
Verifikation der Leitfähigkeit	Conductivity verification	PASS

Geschwindigkeitsmessung	**Velocity measurement**				
Geschwindigkeit	Velocity[m/s]	Sollwert [m/s] Target [m/s] min.		max.	
0.000 m/s	0.000	-0.015	...	0.015	-0.000
0.593 m/s	0.593	0.580		0.606	0.589

Nullpunkttest	Zero Stability Check	X
Speichertest	Non-Volatile Memory Test	X
Kabeltest	Cable Test	X
Schnittstellentest	Interface Check	X

	Telefon, Phone	**Fax**	**E - Mail**
HydroService	0831 / 5617-430	0831 / 5617-439	HydroService@ott.com
Reparatur, Repair	0831 / 5617-433	0831 / 5617-439	Repair@ott.com
Vertrieb, Sales	0831 / 5617-0	0831 / 5617-209	Sales@ott.com

Certification issued by the manufcturer (OTT)

시험성적서

KICT 한국건설기술연구원
KOREA INSTITUTE of CIVIL ENGINEERING and BUILDING TECHNOLOGY
경기도 고양시 일산서구 고양대로 283번지
Tel: 031-910-0669 Fax: 031-910-0301

성적서 번호 :
KICT-R-K-2020-00163-1

쪽 (1) / 총 (2)

시험성적서 TEST CERTIFICATE KICT

시험확인 진본 2020/04/16 17:39:26 KST 정부시험확인센터

1. 의뢰자
   - 기 관 명 : (주)에스디엠이앤씨
   - 주 소 : 서울특별시 금천구 가산디지털1로 212, 605호(가산동)
2. 시험대상품목(또는 시료명) : OTT MF pro_339217
3. 시험기간 : 2020년 04월 07일 ~ 2020년 04월 07일
4. 시험방법 : 수문조사업무규정
5. 시험환경
   - 수온 : 11.5 ℃ - 장소 : 유속계검정장
6. 시험결과 : y = 1.0109x + 0.0087(y : 실제유속, x : 유속계의 유속)

측정번호	1	2	3	4	5	6	7	8	9	10
기준유속(m/s)	0.202	0.403	0.606	0.808	1.010	1.212	1.417	1.616	1.817	2.019
측정유속(m/s)	0.192	0.392	0.587	0.798	0.987	1.189	1.390	1.587	1.787	1.995

※ 이 시험결과는 의뢰자가 제시한 시료 및 시료명에만 한정됩니다.
※ 본 성적서는 KS Q ISO/IEC 17025 및 KOLAS 인정과 관련 없는 성적서임을 밝힙니다.

확인	작성자	승인자
	성 명 : 한 형 준 (서명)	성 명 : 엄 중 현 (서명)

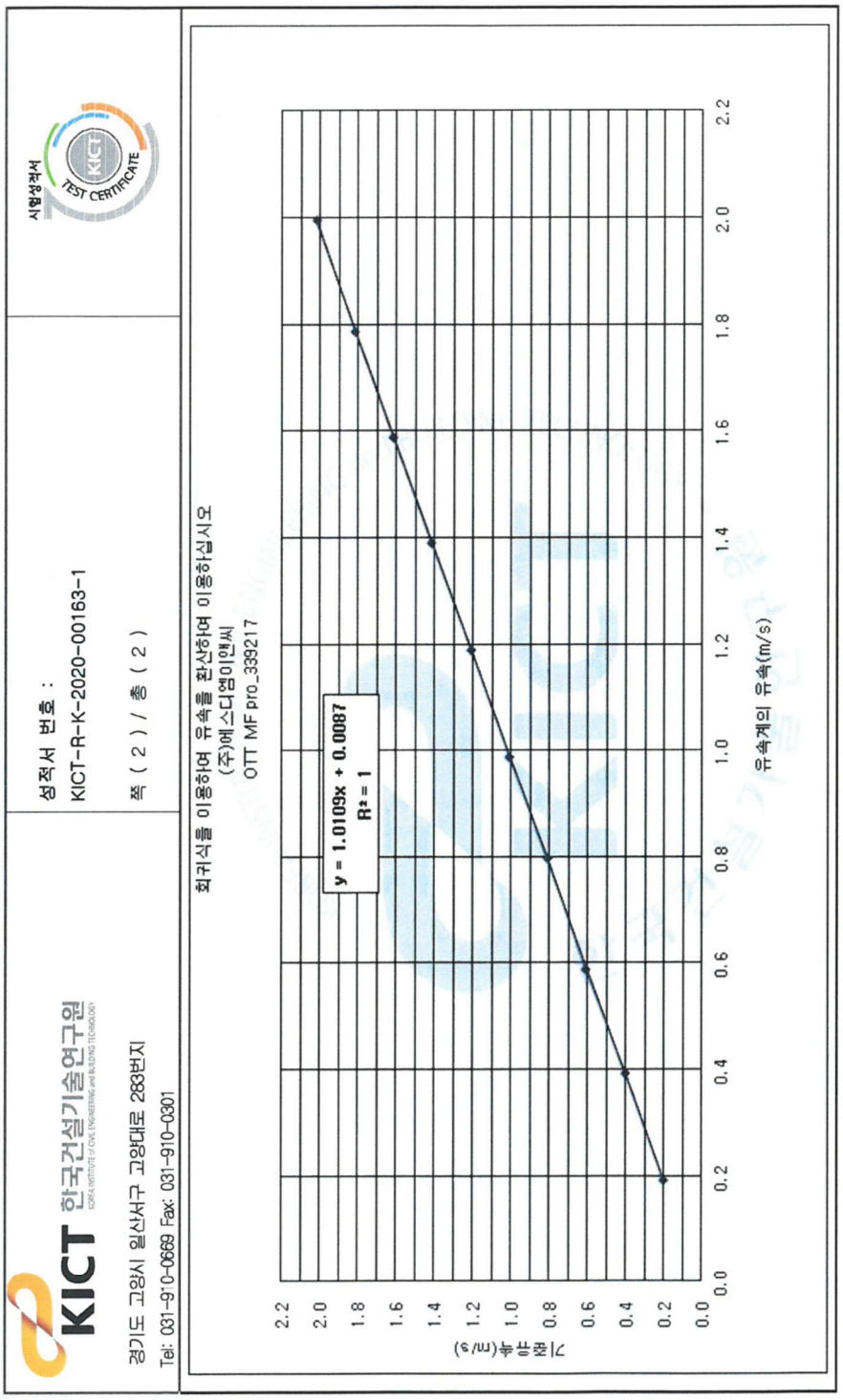
2020년 04월 16일

한국건설기술연구원장

F-P-13-01-1/2 한국건설기술연구원

G4B(www.g4b.go.kr)진위확인코드 : 3cpfe9ZYMto=

Certification issued by KICT (Korea Institute of Civil Engineering and Building Technology)



Certification issued by KICT (Korea Institute of Civil Engineering and Building Technology)

Appendix-4 Measuring Equipments

Electromagnetic Current Meter
(OTT MF Pro)

Floating Device

Sediment Sampler
(DH-48)

Turbidity Meter

Appendix-5 Total Suspended Solids(TSS) – EPA method

<Table A5-1> Summary of Contract Required Detection Limits, Holding times, and Preservation for Total Suspended Solids(TSS)

Analytical Parameter	Contract Required Detection Limit(CRDL)	Technical and Contract Holding Times	Preservation
Total Suspended Solids(TSS)	10 mg/L	Technical: 7 days from collection; Contract: 5 days from receipt at laboratory	Cool to 4℃±2℃

Follow the procedure outlined in EPA method 160.2 for the analysis of samples for TSS.
Weigh solid residue to a constant weight, defined as two consecutive weight measurements differing by less than 0.5 mg, or less than 4%, whichever is smaller.

Data Calculations and Reporting Units:

Calculate the sample results according to Section 8 of EPA Method 160.2.
Report sample results in concentration units of milligram per liter (mg/L) as total suspended solids.
Report TSS concentrations that are less than 100 mg/L to 2 significant figures, and TSS concentrations that are greater than or equal to 100 mg/L to 3 significant figures.

For rounding results, adhere to the following rules:

a) If the number following those to be retained is less than 5, round down;
b) If the number following those to be retained is greater than 5, round up; or
c) If the number following the last digit to be retained is equal to 5, round down if the digit is even, or round up if the digit is odd.

All records of analysis and calculations must be legible and sufficient to recalculate all sample concentrations and QC results. Include an example calculation in the data package.

<Table A5-2> Summary of Internal Quality Control Procedures for Total Suspended Solids(TSS)

QC Element	Frequency	Acceptance Criteria	Corrective Action
Analytical Balance Check: Weights of 100mg, 1g, and 100g	Daily	Difference < 0.5mg	1. Identify and document problem 2. Verify before sample analysis
Method Blank(mb)	One per batch or SDG(1 per 20 samples minimum)	< CRDL	1. If lowest sample concentration is more than 10x the blank conc., no action 2. If samples are non-detected, no action 3. If detected sample concentrations are less than 10x blank conc., all associated samples must be prepared again with another method blank and reanalyzed
Duplicate Sample(DUP)	One per batch or SDG(1 per 20 samples minimum)	RPD<20% for samples > 5x CRDL; ± CRDL for samples <5x CRDL	1. Flag associated data with an "*"
One set (two concentration levels) mineral reference samples	One set batch or SDG(1 set 20 samples minimum)	±15% from expected concentration	1. Terminate analysis 2. Identify, document, and correct the problem 3. Reanalyze all associated samples

SDG – Sample Delivery Group – each case of field samples received; or each 20 field samples within a case; or each 14 calendar day period during which field samples in a case are received.

Use sample aliquots of 100mL. If the weight of captured residue is less than 1.0mg, increase the sample volume (up to 200mL) to provide at least 1.0mg of residue and repeat the analysis.

Appendix-6 Discharge Measurement Data

Site 1. Upstream of Dam

(Tue)30-Jun-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Upstream of Dam**						
Date:	**(Tue)30-Jun-2020**						
Weather:	**Fine**						
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.360	0.089	0.225	0.126	1	0.126	0.028
2	0.537	0.412	0.475	0.274	1	0.274	0.130
3	0.565	0.456	0.511	0.405	1	0.405	0.207
4	1.836	1.207	1.522	0.405	1	0.405	0.616
5	1.165	1.917	1.541	0.665	1	0.665	1.025
6	1.843	1.842	1.843	0.578	1	0.578	1.065
7	1.048	1.290	1.169	0.700	1	0.700	0.818
8	1.065	2.055	1.560	0.592	1	0.592	0.924
9	0.906	1.298	1.102	0.669	1	0.669	0.737
10	0.390	0.504	0.447	0.490	1	0.490	0.219
11	0.120	0.219	0.170	0.363	1	0.363	0.062
12	0.178	0.139	0.159	0.231	1	0.231	0.037
13	0.228	0.264	0.246	0.210	1	0.210	0.052
14	0.077	0.087	0.082	0.320	1	0.320	0.026
15	0.074	0.169	0.122	0.345	1	0.345	0.042
16	0.021	0.024	0.023	0.247	1	0.247	0.006
Total					**16**	**6.620**	**5.993**
Water Level Depth (m)				**0.700**			
Total Area (A)				**6.620**			
Total Discharge (Q)				**5.993**			

(Tue)07-Jul-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Upstream of Dam**						
Date:	**(Tue)07-Jul-2020**						
Weather:	**Fine**						
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.233	0.296	0.265	0.083	1	0.083	0.022
2	0.38	0.521	0.451	0.106	1	0.106	0.048
3	0.498	0.835	0.667	0.159	1	0.159	0.106
4	0.727	0.997	0.862	0.330	1	0.33	0.284
5	1.286	1.549	1.418	0.210	1	0.21	0.298
6	1.503	1.984	1.744	0.520	1	0.52	0.907
7	1.326	1.829	1.578	0.550	1	0.55	0.868
8	0.95	1.818	1.384	0.473	1	0.473	0.655
9	0.872	1.772	1.322	0.620	1	0.62	0.820
10	0.802	1.177	0.990	0.472	1	0.472	0.467
11	0.789	1.134	0.962	0.479	1	0.479	0.461
12	0.807	0.902	0.855	0.210	1	0.21	0.179
13	0.178	0.039	0.109	0.178	1	0.178	0.019
Total					**13**	**4.390**	**5.133**
Water Level Depth (m)				**0.620**			
Total Area (A)				**4.390**			
Total Discharge (Q)				**5.133**			

(Tue)14-Jul-2020-TSS measurement

Determining the Water Discharge (Q) from current meter readings							
Location:	**Upstream of Dam**						
Date:	**(Tue)14-Jul-2020**						
Weather:	**Fine**						
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.019	0.055	0.037	0.084	1	0.084	0.003
2	0.153	0.222	0.188	0.110	1	0.11	0.021
3	0.315	0.579	0.447	0.237	1	0.237	0.106
4	0.764	1.099	0.932	0.396	1	0.396	0.369
5	0.879	1.293	1.086	0.512	1	0.512	0.556
6	0.794	1.589	1.192	0.577	1	0.577	0.687
7	0.816	1.683	1.250	0.450	1	0.45	0.562
8	0.942	1.716	1.329	0.440	1	0.44	0.585
9	0.899	1.255	1.077	0.476	1	0.476	0.513
10	0.582	1.039	0.811	0.436	1	0.436	0.353
11	0.809	1.002	0.906	0.341	1	0.341	0.309
12	0.328	0.639	0.484	0.180	1	0.18	0.087
Total					**12**	**4.239**	**4.151**
Water Level Depth (m)				**0.577**			
Total Area (A)				**4.239**			
Total Discharge (Q)				**4.151**			

(Tue)04-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Upstream of Dam**						
Date:	**(Tue)04-Aug-2020**						
Weather:	**Fine Weather (Dry season)**						
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.014	0.034	0.024	0.144	1	0.144	0.003
2	0.133	0.223	0.178	0.278	1	0.278	0.049
3	0.415	0.822	0.619	0.394	1	0.394	0.244
4	0.866	1.181	1.024	0.416	1	0.416	0.426
5	0.94	1.567	1.254	0.492	1	0.492	0.617
6	0.822	1.227	1.025	0.548	1	0.548	0.561
7	0.776	1.019	0.898	0.447	1	0.447	0.401
8	0.628	1.041	0.835	0.496	1	0.496	0.414
9	0.452	0.686	0.569	0.410	1	0.41	0.233
10	0.354	0.506	0.430	0.347	1	0.347	0.149
Total					**10**	**3.972**	**3.10**
Water Level Depth (m)				**0.450**			
Total Area (A)				**3.972**			
Total Discharge (Q)				**3.098**			

(Tue)25-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Upstream of Dam**						
Date:	**(Tue)25-Aug-2020**						
Weather:	**Isolated Shower (No flooding)**						
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.201	0.489	0.345	0.221	1	0.221	0.076
2	0.28	0.460	0.370	0.283	1	0.283	0.105
3	0.475	0.935	0.705	0.374	1	0.374	0.264
4	0.627	1.440	1.034	0.467	1	0.467	0.483
5	0.707	1.302	1.005	0.434	1	0.434	0.436
6	0.561	1.197	0.879	0.477	1	0.477	0.419
7	0.567	1.040	0.804	0.446	1	0.446	0.358
8	0.401	0.760	0.581	0.460	1	0.46	0.267
9	0.38	0.775	0.578	0.417	1	0.417	0.241
10	0.305	0.560	0.433	0.339	1	0.339	0.147
Total					**10**	**3.92**	**2.80**
Water Level Depth (m)				**0.430**			
Total Area (A)				**3.918**			
Total Discharge (Q)				**2.795**			

(Tue)01-Sep-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Upstream of Dam**						
Date:	**(Tue)01-Sep-2020**						
Weather:	**Isolated Shower**						
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.459	0.482	0.471	0.185	1	0.185	0.087
2	0.563	0.641	0.602	0.335	1	0.335	0.202
3	0.544	0.979	0.762	0.362	1	0.362	0.276
4	0.625	1.147	0.886	0.448	1	0.448	0.397
5	0.748	1.245	0.997	0.517	1	0.517	0.515
6	0.681	1.119	0.900	0.42	1	0.42	0.378
7	0.588	0.982	0.785	0.455	1	0.455	0.357
8	0.465	0.876	0.671	0.484	1	0.484	0.325
9	0.387	0.721	0.554	0.394	1	0.394	0.218
10	0.359	0.639	0.499	0.335	1	0.335	0.167
Total					**10**	**3.94**	**2.92**
Water Level Depth (m)				**0.450**			
Total Area (A)				**3.935**			
Total Discharge (Q)				**2.922**			

(Wed)07-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Upstream of Dam**						
Date:	**(Wed)07-Oct-2020**						
Weather:	**Isolated showers (River condition: after flood)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.18	0.341	0.261	0.548	1	0.548	0.143
2	0.47	1.168	0.819	0.566	1	0.566	0.464
3	0.588	1.553	1.071	0.625	1	0.625	0.669
4	0.947	1.958	1.453	0.65	1	0.650	0.944
5	1.232	2.118	1.675	0.524	1	0.524	0.878
6	0.75	1.537	1.144	0.705	1	0.705	0.806
7	0.663	1.237	0.950	0.695	1	0.695	0.660
8	0.532	1.106	0.819	0.354	1	0.354	0.290
9	0.543	1.08	0.812	0.391	1	0.391	0.317
10	0.605	0.92	0.763	0.325	1	0.325	0.248
11	0.587	1.004	0.796	0.307	1	0.307	0.244
12	0.586	0.862	0.724	0.281	1	0.281	0.203
13	0.528	0.827	0.678	0.285	1	0.285	0.193
Total					**13**	**6.26**	**6.06**
Water Level Depth (m)				**0.70**			
Total Area (A)				**6.26**			
Total Discharge (Q)				**6.06**			

(Tue)13-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Upstream of Dam**						
Date:	**(Tue)13-Oct-2020**						
Weather:	**Cloudy & Haze**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.197	0.229	0.213	0.179	1	0.179	0.038
2	0.547	0.711	0.629	0.353	1	0.353	0.222
3	0.7	1.153	0.927	0.51	1	0.51	0.473
4	1.026	1.537	1.282	0.546	1	0.546	0.700
5	1.52	2.656	2.088	0.685	1	0.685	1.430
6	0.885	1.254	1.070	0.669	1	0.669	0.715
7	0.828	1.171	1.000	0.635	1	0.635	0.635
8	0.705	0.979	0.842	0.681	1	0.681	0.573
9	0.745	0.96	0.853	0.645	1	0.645	0.550
10	0.319	0.339	0.329	0.617	1	0.617	0.203
11	0.031	0.155	0.093	0.256	1	0.256	0.024
Total					**11**	**5.78**	**5.56**
Water Level Depth (m)				**0.68**			
Total Area (A)				**5.78**			
Total Discharge (Q)				**5.56**			

(Tue)20-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Upstream of Dam**						
Date:	**(Tue)20-Oct-2020**						
Weather:	**Isolated Showers**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.31	0.394	0.352	0.141	1	0.141	0.050
2	0.47	0.63	0.550	0.37	1	0.37	0.204
3	0.698	0.969	0.834	0.579	1	0.579	0.483
4	0.964	1.791	1.378	0.657	1	0.657	0.905
5	1.325	2.952	2.139	0.641	1	0.641	1.371
6	0.951	2.052	1.502	0.771	1	0.771	1.158
7	1.114	1.704	1.409	0.724	1	0.724	1.020
8	0.776	0.912	0.844	0.901	1	0.901	0.760
9	0.696	1.01	0.853	0.736	1	0.736	0.628
10	0.54	0.715	0.628	0.624	1	0.624	0.392
11	0.346	0.366	0.356	0.35	1	0.35	0.125
12	0.119	0.157	0.138	0.227	1	0.227	0.031
Total					**12**	**6.72**	**7.13**
Water Level Depth (m)				**0.90**			
Total Area (A)				**6.72**			
Total Discharge (Q)				**7.13**			

(Tue)27-Oct-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
50	37.0	38.0	38.0	39.0	39.0	38.2	1.31	0.9	14.5	22.12	28.89

(Tue)03-Nov-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
50	45.0	43.0	42.0	40.0	37.0	41.4	1.21	0.84	14	19.85	24.06

(Tue)17-Nov-2020-Float/TSS measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	36.0	33.1	39.6	41.6	41.3	38.3	1.05	0.79	13.5	17.96	18.81

(Tue)29-Dec-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	37.6	31.7	36.6	34.2	30.2	34.1	1.18	0.89	14	21.74	25.58
40	32.6	29.6	31.0	33.9	31.6	31.8	1.26	0.89	14	21.74	27.37
40	33.6	31.3	37.8	30.3	37.5	34.1	1.18	0.89	14	21.74	25.58

(Thu)14-Jan-2021-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	32.3	30.4	26.9	25.7	23.8	27.8	1.44	0.99	16	25.52	36.64
40	24.1	29.2	24.2	24.3	26.3	25.6	1.56	0.99	16	25.52	39.94
40	26.2	26.1	33.1	27.9	30.6	28.8	1.39	0.99	16	25.52	35.43

(Tue)02-Feb-2021-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	28.4	26.5	26.9	30.1	29.4	28.3	1.41	1.01	16	26.28	37.10

(Wed)10-Fed-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
12:40	40	27.56	26.35	29.97	25.90	26.56	27.27	1.47	1.06	17.00	28.17	41.41
13:40	40	25.94	25.59	29.63	24.37	25.68	26.24	1.52	1.06	17.00	28.17	42.82
14:40	40	23.71	25.75	26.63	25.37	28.93	26.08	1.53	1.06	17.00	28.17	43.10
15:40	40	27.16	26.50	27.38	25.44	26.16	26.53	1.51	1.09	17.00	29.31	44.25
16:40	40	24.13	25.22	24.88	24.81	23.35	24.48	1.63	1.12	17.00	30.44	49.62
17:40	40	24.60	23.68	21.66	21.97	24.82	23.35	1.71	1.12	17.00	30.44	52.05
18:40	40	21.93	20.97	22.40	20.56	21.31	21.43	1.87	1.12	17.00	30.44	56.92

(Thu)11-Fed-2021-Float/TSS measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
7:30	40	32.68	28.56	24.06	29.41	25.66	28.07	1.42	1.03	17.00	27.04	38.39
8:30	40	26.31	25.10	25.13	27.37	24.47	25.68	1.56	1.03	17.00	27.04	42.18
9:30	40	23.94	25.72	25.37	24.03	23.56	24.52	1.63	1.03	17.00	27.04	44.07
10:30	40	32.54	25.66	28.27	30.78	28.36	29.12	1.37	1.03	17.00	27.04	37.04
11:30	40	23.81	25.53	33.10	26.39	29.90	27.75	1.44	1.05	17.00	27.79	40.02
12:30	40	24.80	26.62	26.84	25.16	30.44	26.77	1.49	1.05	17.00	27.79	41.41
13:30	40	25.60	26.22	24.70	23.45	26.52	25.30	1.58	1.05	17.00	27.79	43.91
14:30	40	25.97	25.09	25.06	23.50	24.66	24.86	1.61	1.06	17.00	28.17	45.36
15:30	40	25.06	21.29	23.25	24.78	23.25	23.53	1.70	1.06	17.00	28.17	47.89
16:30	40	21.19	21.06	22.50	23.40	21.34	21.90	1.83	1.06	17.00	28.17	51.55

17:30	40	19.50	19.87	19.74	18.94	18.38	19.29	2.07	1.11	17.50	30.06	62.23
18:30	40	19.67	17.72	18.31	14.60	15.22	17.10	2.34	1.06	17.50	28.17	65.92

(Fri)12-Fed-2021-Float/TSS measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
7:30	40	24.35	24.43	25.78	26.23	23.97	24.95	1.60	38.39	16.50	27.04	43.26
8:30	40	26.07	24.79	25.16	28.06	23.97	25.61	1.56	42.18	16.70	27.79	43.36
9:30	40	22.27	24.19	22.31	23.00	27.69	23.89	1.67	44.07	16.90	27.79	46.41
10:30	40	21.22	22.31	23.68	22.91	21.32	22.29	1.79	37.04	17.00	28.93	51.78
11:30	40	21.57	22.12	21.50	21.81	25.31	22.46	1.78	40.02	17.00	28.93	51.49
12:30	40	22.90	23.08	21.50	25.69	21.50	22.93	1.74	41.41	17.20	30.06	52.31
13:30	40	22.76	24.85	20.49	22.10	23.50	22.74	1.76	43.91	17.30	30.06	52.91
14:30	40	23.47	22.84	23.71	22.76	23.47	23.25	1.72	45.36	17.40	30.06	51.71
15:30	40	23.72	22.38	23.12	24.09	22.97	23.26	1.72	47.89	17.40	30.44	52.36
16:30	40	23.44	23.40	24.75	23.47	24.03	23.82	1.68	51.55	17.50	30.44	51.14
17:30	40	26.13	24.00	21.15	21.28	25.49	23.61	1.69	62.23	26.00	30.82	52.21
18:30	40	26.26	22.02	23.60	23.74	21.19	23.36	1.71	65.92	26.00	31.57	54.06

(Thu)18-Fed-2021-Float/TSS measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
13:00	50	36.00	33.00	32.00	32.00	32.00	33.00	1.52	1.01	17.00	26.28	39.95
14:00	50	32.00	30.00	32.00	30.00	30.00	30.80	1.62	1.06	17.50	28.17	45.64
15:00	50	32.00	32.00	32.00	26.00	26.00	29.60	1.69	1.09	18.00	29.31	49.53

(Fri)19-Fed-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
10:00	50	37.00	38.00	40.00	40.00	40.00	39.00	1.28	1.01	24.00	26.28	33.64
11:00	50	33.00	34.00	33.00	33.00	33.00	33.20	1.51	1.31	24.00	38.07	57.48
14:30	50	32.00	32.00	32.00	30.00	28.00	30.80	1.62	1.41	25.50	42.58	68.98
15:30	50	30.00	30.00	30.00	32.00	30.00	30.40	1.64	1.42	25.50	43.03	70.57

(Thu)25-Fed-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
9:00	40	13.22	12.83	13.52	12.68	12.71	12.99	3.08	1.14	26.00	31.20	96.04
10:00	40	13.87	13.55	13.81	14.43	12.85	13.70	2.92	1.11	26.00	30.06	87.77
11:00	40	14.21	14.87	14.10	14.56	14.69	14.49	2.76	1.11	26.00	30.06	83.01
12:00	40	14.51	14.21	14.48	14.00	14.83	14.41	2.78	1.11	26.00	30.06	83.47
13:00	40	12.77	13.35	13.18	12.96	13.43	13.14	3.04	1.11	26.00	30.06	91.53
14:00	40	13.20	13.58	12.91	13.13	12.90	13.15	3.04	1.12	26.00	30.44	92.62
15:00	40	13.52	12.79	13.29	12.94	12.99	13.11	3.05	1.14	26.00	31.20	95.20
16:00	40	13.28	13.62	13.72	13.88	13.42	13.58	2.94	1.20	26.00	33.47	98.54

17:00	40	12.87	13.06	13.82	13.58	12.58	13.18	3.03	1.20	26.00	33.47	101.56
18:00	40	12.77	12.32	13.34	12.63	13.06	12.83	3.12	1.23	26.00	34.60	107.90

(Fri)26-Fed-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
9:00	50	24.19	23.31	26.31	23.78	25.68	24.65	2.03	1.52	26.00	47.55	96.52
10:00	50	23.41	24.69	25.38	22.57	26.25	24.46	2.04	1.48	26.00	45.74	93.31
11:00	50	24.84	26.03	26.25	27.87	26.10	26.22	1.91	1.48	26.00	45.74	87.37
12:00	50	27.39	26.97	27.38	27.93	26.44	27.22	1.84	1.48	26.00	45.74	84.16
13:00	50	26.56	23.47	28.06	25.65	26.00	25.95	1.93	1.48	26.00	45.74	88.28
14:00	50	24.57	27.59	26.69	24.50	25.10	25.69	1.95	1.49	26.00	46.19	90.08
15:00	50	28.50	25.25	24.50	24.25	25.95	25.69	1.95	1.52	26.50	47.65	92.92
16:00	50	24.81	25.03	24.31	26.03	25.10	25.06	2.00	1.54	27.00	48.59	97.18
17:00	50	26.31	23.81	27.63	23.65	23.53	24.99	2.00	1.58	27.50	50.47	100.93
18:00	50	29.97	22.82	23.09	23.09	23.50	24.49	2.04	1.64	27.50	53.28	108.69

(Thu)04-Mar-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
9:00	50	23.86	22.87	23.13	23.31	22.91	23.22	2.15	1.64	29.50	53.28	114.55
10:00	50	24.52	22.75	23.83	23.91	22.14	23.43	2.13	1.64	30.00	53.28	113.48
11:00	50	23.01	22.78	23.52	23.3	24.48	23.42	2.14	1.64	30.00	53.28	114.02
12:00	50	23.25	22.39	23.83	23.79	23.93	23.44	2.13	1.67	30.25	54.68	116.48
13:00	50	23.48	22.65	25.60	20.74	23.65	23.22	2.15	1.67	30.25	54.68	117.57
14:00	50	24.57	22.59	22.69	23.50	23.10	23.29	2.15	1.69	30.50	55.62	119.59
15:00	50	22.16	21.50	23.96	24.59	21.76	22.79	2.19	1.72	30.50	57.03	124.89
16:00	50	22.59	21.52	21.50	22.52	24.38	22.50	2.22	1.75	30.75	58.44	129.73
17:00	50	20.35	21.78	24.36	20.18	23.13	21.96	2.28	1.75	30.85	58.44	133.23
18:00	50	20.05	20.46	19.82	20.17	21.28	20.36	2.46	1.78	31.00	59.84	147.21

(Fri)05-Mar-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
9:00	50	19.87	19.31	20.19	19.13	19.86	19.67	2.54	1.78	31.50	59.84	152.00
10:00	50	18.01	19.78	19.52	19.3	17.48	18.82	2.66	1.72	32.00	57.03	151.70
11:00	50	18.42	19.39	18.34	19.79	20.13	19.21	2.60	1.82	32.40	61.72	160.47
12:00	50	19.47	19.56	21.6	18.74	18.65	19.60	2.55	1.83	32.40	62.19	158.58
13:00	50	19.18	18.52	19.96	20.95	18.75	19.47	2.57	1.87	32.45	64.06	164.64
14:00	50	20.59	18.73	17.15	19.22	20.61	19.26	2.60	1.87	32.65	64.06	166.56
15:00	50	17.18	19.03	17.13	19.38	17.81	18.11	2.76	1.87	32.70	64.06	176.81
16:00	50	19.18	16.74	17.15	17.18	17.82	17.61	2.84	1.90	32.80	65.47	185.93
17:00	50	23.73	16.28	17.26	17.27	16.39	18.19	2.75	1.92	33.00	66.41	182.62

(Fri)11-Jun-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)

10:30	35	27.53	30.72	24.6	24.85	26.26	26.79	1.31	0.58	13.00	10.05	13.13
11:30	35	28.54	27.98	27.32	26.86	26.55	27.45	1.28	0.58	13.00	10.05	12.82
12:30	35	28.04	27.51	27.2	26.77	28.80	27.66	1.27	0.58	13.00	10.05	12.72
13:30	35	27.68	26.37	27.18	27.45	28.61	27.46	1.27	0.58	13.00	10.05	12.81

(Fri)11-Jun-2021

Determining the Water Discharge (Q) from current meter readings

Location:	Upstream of Dam
Date:	(Fri)11-Jun-2021
Weather:	Isolated Showers

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.057	0.176	0.117	0.384	1	0.384	0.045
2	0.372	0.404	0.388	0.402	1	0.402	0.156
3	0.503	1.226	0.865	0.46	1	0.46	0.398
4	0.563	1.068	0.816	0.549	1	0.549	0.448
5	0.738	1.523	1.131	0.542	1	0.542	0.613
6	0.68	1.364	1.022	0.559	1	0.559	0.571
7	0.587	1.452	1.020	0.751	1	0.751	0.766
8	0.542	1.223	0.883	0.453	1	0.453	0.400
9	0.322	1.155	0.739	0.597	1	0.597	0.441
10	0.609	1.523	1.066	0.59	1	0.59	0.629
11	0.184	0.493	0.339	0.422	1	0.422	0.143
12	0.234	0.716	0.475	0.532	1	0.532	0.253
13	0.568	0.778	0.673	0.544	1	0.544	0.366
Total					13	6.79	5.23

Water Level Depth (m)	0.70
Total Area (A)	6.79
Total Discharge (Q)	5.23

(Thu)17-Jun-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						

10:00	35	34	34	35	36	32	34.20	1.02	0.705	15.00	9.63	9.85
11:00	35	33	35	32	33	34	33.40	1.05	0.712	15.00	9.80	10.27
12:00	35	34	32	34	30	34	32.80	1.07	0.715	15.00	9.88	10.54
13:00	35	33	33	33	31	35	33.00	1.06	0.728	15.00	10.20	10.82
14:00	35	35	32	31	35	32	33.00	1.06	0.715	15.00	9.88	10.47

(Thu)17-Jun-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Upstream of Dam**
Date:	**(Thu)17-Jun-2021**
Weather:	**Isolated Showers**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.078	0.367	0.223	0.366	1	0.366	0.081
2	0.239	0.48	0.360	0.521	1	0.521	0.187
3	0.484	0.67	0.577	0.229	1	0.229	0.132
4	0.402	1.177	0.790	0.648	1	0.648	0.512
5	0.801	1.208	1.005	0.705	1	0.705	0.708
6	0.823	1.276	1.050	0.651	1	0.651	0.683
7	0.784	1.134	0.959	0.602	1	0.602	0.577
8	0.425	0.602	0.514	0.681	1	0.681	0.350
9	0.382	0.853	0.618	0.713	1	0.713	0.440
10	0.358	1.522	0.940	0.582	1	0.582	0.547
11	0.341	0.818	0.580	0.477	1	0.477	0.276
12	0.56	0.753	0.657	0.425	1	0.425	0.279
13	0.345	0.637	0.491	0.411	1	0.411	0.202
14	0.334	0.538	0.436	0.469	1	0.469	0.204
15	0.004	0.127	0.066	0.128	1	0.128	0.008
Total					**15**	**7.01**	**4.98**

Water Level Depth (m)	**0.81**
Total Area (A)	**7.01**
Total Discharge (Q)	**4.98**

(Fri)18-Jun-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
9:00	35	46	44	45	44	44	44.60	0.78	0.813	15.00	12.37	9.71
10:00	35	45	45	46	43	42	44.20	0.79	0.816	15.00	12.46	9.87
11:00	35	42	43	45	43	42	43.00	0.81	0.835	15.00	13.04	10.61

12:00	35	44	42	43	46	40	43.00	0.81	0.830	15.00	12.89	10.49
13:00	35	43	46	42	46	45	44.40	0.79	0.810	15.00	12.28	9.68
11:00	35	45	43	40	40	45	42.60	0.82	0.825	15.00	12.74	10.46
12:00	35	42	38	43	45	41	41.80	0.84	0.830	15.00	12.89	10.79
13:00	35	40	42	41	42	42	41.40	0.85	0.840	15.00	13.19	11.15

(Fri)18-Jun-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Upstream of Dam**
Date:	**(Fri)18-Jun-2021**
Weather:	**Isolated Showers**

River Width (m)	Flow Velocity (m/s) V1	v2	Mean	Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
1	0.118	0.189	0.154	0.382	1	0.382	0.059
2	0.146	0.396	0.271	0.452	1	0.452	0.122
3	0.412	0.748	0.580	0.439	1	0.439	0.255
4	0.602	1.009	0.806	0.582	1	0.582	0.469
5	0.771	1.109	0.940	0.701	1	0.701	0.659
6	0.707	1.103	0.905	0.783	1	0.783	0.709
7	0.873	1.438	1.156	0.804	1	0.804	0.929
8	0.71	0.942	0.826	0.553	1	0.553	0.457
9	0.363	0.754	0.559	0.692	1	0.692	0.386
10	0.456	0.866	0.661	0.561	1	0.561	0.371
11	0.385	0.507	0.446	0.402	1	0.402	0.179
12	0.361	0.696	0.529	0.563	1	0.563	0.298
13	0.299	0.504	0.402	0.637	1	0.637	0.256
14	0.142	0.323	0.233	0.525	1	0.525	0.122
15	0.028	0.145	0.087	0.138	1	0.138	0.012
Total					**15**	**7.55**	**5.15**

Water Level Depth (m)	**0.80**
Total Area (A)	**7.55**
Total Discharge (Q)	**5.15**

(Sat)19-Jun-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.) 1	2	3	4	5	Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
10:30	35	42	45	43	43	44	43.40	0.81	0.635	14.00	7.90	6.37
11:00	35	42	44	43	42	43	42.80	0.82	0.650	14.00	8.27	6.76
11:30	35	43	45	43	43	41.00	43.00	0.81	0.620	14.00	7.53	6.13

(Sat)19-Jun-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Upstream of Dam**
Date:	**(Sat)19-Jun-2021**
Weather:	**Isolated Showers**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.074	0.108	0.091	0.147	1	0.147	0.013
2	0.085	0.133	0.109	0.421	1	0.421	0.046
3	0.167	0.326	0.247	0.423	1	0.423	0.104
4	0.315	0.686	0.501	0.443	1	0.443	0.222
5	0.602	0.968	0.785	0.525	1	0.525	0.412
6	0.803	1.185	0.994	0.602	1	0.602	0.598
7	0.835	1.189	1.012	0.635	1	0.635	0.643
8	0.705	1.035	0.870	0.468	1	0.468	0.407
9	0.554	0.728	0.641	0.509	1	0.509	0.326
10	0.424	0.689	0.557	0.573	1	0.573	0.319
11	0.437	0.678	0.558	0.257	1	0.257	0.143
12	0.455	0.676	0.566	0.226	1	0.226	0.128
13	0.421	0.768	0.595	0.501	1	0.501	0.298
14	0.357	0.536	0.447	0.547	1	0.547	0.244
15	0.028	0.091	0.060	0.135	1	0.135	0.008
Total					**15**	**5.73**	**3.66**

Water Level Depth (m)	**0.64**
Total Area (A)	**5.73**
Total Discharge (Q)	**3.66**

(Sun)04-Jul-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
9:00	40	35	34	35	37	33	34.80	1.15	0.750	13.00	10.74	12.35
10:00	40	34	32	33	34	35	33.60	1.19	0.765	13.00	11.11	13.23
11:00	40	33	33	31	31	35	32.60	1.23	0.770	13.00	11.24	13.79
12:00	40	34	34	34	32	36	34.00	1.18	0.760	13.00	10.99	12.93
13:00	40	36	33	32	36	33	34.00	1.18	0.755	13.00	10.87	12.78

(Sat)16-Oct-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Upstream of Dam**						
Date:	**(Sat)16-Oct-2021**			**Stat Time : 10:46 AM**			
Weather:	**Rain & Flooding**			**Stop Time : 12:00 PM**			
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.540	0.818	0.679	0.157	1	0.157	0.107
2	0.538	1.007	0.773	0.339	1	0.339	0.262
3	0.782	1.087	0.935	0.467	1	0.467	0.436
4	1.065	1.201	1.133	0.475	1	0.475	0.538
5	0.841	1.239	1.040	0.561	1	0.561	0.583
6	0.936	1.035	0.986	0.756	1	0.756	0.745
7	0.987	1.194	1.091	0.844	1	0.844	0.920
8	0.928	1.453	1.191	0.820	1	0.820	0.976
9	0.944	1.181	1.063	0.789	1	0.789	0.838
10	0.533	1.198	0.866	0.851	1	0.851	0.737
11	0.740	1.150	0.945	0.837	1	0.837	0.791
12	0.734	1.216	0.975	0.745	1	0.745	0.726
13	0.637	1.016	0.827	0.664	1	0.664	0.549
14	0.786	1.196	0.991	0.649	1	0.649	0.643
15	0.717	0.925	0.821	0.613	1	0.613	0.503
16	0.490	1.105	0.798	0.551	1	0.551	0.439
17	0.748	1.207	0.978	0.596	1	0.596	0.583
18	0.739	1.146	0.943	0.494	1	0.494	0.466
19	0.241	0.893	0.567	0.542	1	0.542	0.307
20	0.542	1.008	0.775	0.526	1	0.526	0.408
21	0.420	0.891	0.656	0.539	1	0.539	0.353
22	0.489	0.576	0.533	0.549	1	0.549	0.292
23	0.279	0.817	0.548	0.456	1	0.456	0.250
24	0.548	0.664	0.606	0.503	1	0.503	0.305
25	0.511	0.686	0.599	0.527	1	0.527	0.315
26	0.374	0.455	0.415	0.503	1	0.503	0.208
27	0.211	0.322	0.267	0.489	1	0.489	0.130
			Total		**27**	**15.84**	**13.41**

Water Level Depth (m)	**0.85**
Total Area (A)	**15.84**
Total Discharge (Q)	**13.41**

(Sat)23-Oct-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Upstream of Dam**						
Date:	**(Sat)23-Oct-2021**				**Stat Time : 08:50 AM**		
Weather:	**Cloudy (No flooding)**				**Stop Time : 10:30 AM**		
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1-0.2D	**V2-0.8D**	**Mean**				
1	0.236	0.473	0.355	0.202	0.5	0.101	0.036
2	0.157	0.314	0.236	0.236	0.5	0.118	0.028
3	0.289	0.577	0.433	0.225	0.5	0.112	0.049
4	0.295	0.589	0.442	0.298	0.5	0.149	0.066
5	0.316	0.632	0.474	0.367	0.5	0.184	0.087
6	0.334	0.667	0.501	0.361	0.5	0.180	0.090
7	0.374	0.749	0.562	0.406	0.5	0.203	0.114
8	0.347	0.694	0.521	0.418	0.5	0.209	0.109
9	0.398	0.797	0.598	0.447	0.5	0.224	0.134
10	0.389	0.779	0.584	0.511	0.5	0.256	0.149
11	0.388	0.776	0.582	0.531	0.5	0.266	0.155
12	0.353	0.706	0.530	0.581	0.5	0.290	0.154
13	0.431	0.862	0.647	0.604	0.5	0.302	0.195
14	0.433	0.866	0.650	0.606	0.5	0.303	0.197
15	0.428	0.857	0.643	0.672	0.5	0.336	0.216
16	0.426	0.852	0.639	0.661	0.5	0.330	0.211
17	0.445	0.890	0.668	0.656	0.5	0.328	0.219
18	0.463	0.925	0.694	0.625	0.5	0.312	0.217
19	0.468	0.936	0.702	0.634	0.5	0.317	0.223
20	0.448	0.895	0.672	0.595	0.5	0.298	0.200
21	0.496	0.992	0.744	0.556	0.5	0.278	0.207
22	0.433	0.865	0.649	0.518	0.5	0.259	0.168
23	0.475	0.950	0.713	0.542	0.5	0.271	0.193
24	0.481	0.961	0.721	0.510	0.5	0.255	0.184
25	0.506	1.013	0.760	0.405	0.5	0.202	0.154
26	0.481	0.962	0.722	0.460	0.5	0.230	0.166
27	0.524	1.048	0.786	0.502	0.5	0.251	0.197
28	0.487	0.974	0.731	0.376	0.5	0.188	0.137
29	0.461	0.922	0.692	0.432	0.5	0.216	0.149
30	0.436	0.872	0.654	0.348	0.5	0.174	0.114
31	0.446	0.893	0.670	0.338	0.5	0.169	0.113
32	0.457	0.913	0.685	0.280	0.5	0.140	0.096
33	0.400	0.800	0.600	0.308	0.5	0.154	0.092

34	0.419	0.839	0.629	0.276	0.5	0.138	0.087
35	0.424	0.848	0.636	0.296	0.5	0.148	0.094
36	0.357	0.714	0.536	0.326	0.5	0.163	0.087
37	0.362	0.724	0.543	0.200	0.5	0.100	0.054
38	0.358	0.716	0.537	0.284	0.5	0.142	0.076
39	0.334	0.668	0.501	0.300	0.5	0.150	0.075
40	0.333	0.666	0.500	0.322	0.5	0.161	0.080
41	0.318	0.636	0.477	0.344	0.5	0.172	0.082
42	0.329	0.658	0.494	0.306	0.5	0.153	0.075
43	0.313	0.626	0.470	0.286	0.5	0.143	0.067
44	0.322	0.644	0.483	0.312	0.5	0.156	0.075
45	0.320	0.640	0.480	0.320	0.5	0.160	0.077
46	0.317	0.634	0.476	0.284	0.5	0.142	0.067
47	0.290	0.581	0.436	0.248	0.5	0.124	0.054
48	0.287	0.575	0.431	0.190	0.5	0.095	0.041
49	0.259	0.517	0.388	0.162	0.5	0.081	0.031
Total					**24.5**	**9.83**	**5.94**

Water Level Depth (m)	**0.67**
Total Area (A)	**9.83**
Total Discharge (Q)	**5.94**

(Fri)05-Nov-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
9:00	50	52.28	51.66	53.87	53.63	53.44	52.98	0.94	0.86	27.00	13.80	13.02
9:30	50	52.41	53.61	52.18	52.47	51.62	52.46	0.95	0.85	27.00	13.49	12.86
11:00	50	53.02	52.53	52.44	53.51	52.65	52.83	0.95	0.85	27.00	13.49	12.77
11:30	50	53.24	53.13	52.53	51.72	52.31	52.59	0.95	0.85	27.00	13.49	12.83
13:00	50	53.91	51.18	51.59	53.03	52.51	52.44	0.95	0.84	27.00	13.19	12.58
13:30	50	52.28	52.18	53.56	51.31	53.31	52.53	0.95	0.84	27.00	13.19	12.56
15:00	50	53.93	53.63	52.96	53.66	52.35	53.31	0.94	0.84	27.00	13.19	12.37
15:30	50	53.37	54.22	53.43	53.82	52.47	53.46	0.94	0.84	27.00	13.19	12.34
16:00	50	53.59	54.12	54.31	52.26	54.47	53.75	0.93	0.83	27.00	12.89	11.99
16:30	50	54.65	53.53	53.91	52.26	54.27	53.72	0.93	0.83	27.00	12.89	11.99

(Sat)06-Nov-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
9:00	50	58.41	57.41	60.78	60.12	50.10	57.36	0.87	0.86	27.00	13.49	11.76
9:30	50	59.97	60.34	60.05	54.63	49.75	56.95	0.88	0.85	27.00	13.49	11.85
11:00	50	49.87	52.57	60.51	54.67	53.28	54.18	0.92	0.86	27.00	13.80	12.73
11:30	50	52.79	53.32	50.83	52.37	55.62	52.99	0.94	0.87	27.00	14.10	13.30
13:00	50	60.03	50.69	52.96	52.56	55.09	54.27	0.92	0.86	27.00	13.80	12.71
13:00	50	49.72	54.31	54.65	53.63	52.50	52.96	0.94	0.89	27.00	14.70	13.88

15:00	50	10.01	9.50	8.63	8.69	9.44	9.25	5.40	1.89	36.00	51.66	279.13
15:10	50	7.07	7.09	8.46	7.18	10.63	8.09	6.18	1.90	37.00	52.10	322.16
15:20	50	8.16	8.46	9.57	8.87	6.47	8.31	6.02	1.92	38.00	52.98	318.91
15:30	50	8.04	7.12	8.03	8.58	9.22	8.20	6.10	1.94	38.00	53.86	328.47
15:40	50	8.69	9.47	8.29	9.07	8.30	8.76	5.71	1.92	38.00	52.98	302.25
15:50	50	9.60	10.55	7.75	9.50	8.55	9.19	5.44	1.92	38.00	52.98	288.24
16:00	50	10.19	12.15	11.88	13.12	13.19	12.11	4.13	1.90	37.00	52.10	215.18

(Sun)07-Nov-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
9:00	50	40.75	35.78	38.03	38.07	33.87	37.30	1.34	0.89	29.00	14.70	19.71
9:30	50	39.31	35.44	44.38	38.03	35.47	38.53	1.30	0.87	29.00	14.10	18.30
11:00	50	40.81	35.91	39.70	45.53	34.25	39.24	1.27	0.87	29.00	14.10	17.96
11:30	50	40.00	35.94	38.53	39.31	39.47	38.65	1.29	0.88	29.00	14.40	18.63
13:00	50	37.41	39.35	36.62	38.05	35.50	37.39	1.34	0.89	29.00	14.70	19.66
13:30	50	34.18	34.56	38.72	37.72	37.97	36.63	1.37	0.90	29.00	15.01	20.48

Site 2. Downstream of Dam

(Tue)30-Jun-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Downstream of Dam**						
Date:	**(Tue)30-Jun-2020**						
Weather:	**Fine Weather**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.116	0.167	0.142	0.253	1	0.253	0.036
2	0.364	0.386	0.375	0.318	1	0.318	0.119
3	0.341	0.671	0.506	0.455	1	0.455	0.230
4	0.594	0.913	0.754	0.405	1	0.405	0.305
5	0.629	0.921	0.775	0.500	1	0.500	0.388
6	1.001	1.031	1.016	0.397	1	0.397	0.403
7	1.084	1.084	1.084	0.360	1	0.360	0.390
8	0.694	0.838	0.766	0.315	1	0.315	0.241
9	0.741	0.928	0.835	0.560	1	0.560	0.467
10	0.556	0.709	0.633	0.315	1	0.315	0.199
11	0.338	0.413	0.376	0.337	1	0.337	0.127
12	0.314	0.342	0.328	0.364	1	0.364	0.119
13	0.523	0.599	0.561	0.300	1	0.300	0.168
14	0.708	0.726	0.717	0.395	1	0.395	0.283
15	0.509	0.581	0.545	0.427	1	0.427	0.233
16	0.573	0.711	0.642	0.511	1	0.511	0.328
17	0.506	0.533	0.520	0.556	1	0.556	0.289
18	0.576	0.632	0.604	0.440	1	0.440	0.266
19	0.169	0.334	0.252	0.367	1	0.367	0.092
20	0.267	0.109	0.188	0.326	1	0.326	0.061
21	0.485	0.392	0.439	0.269	1	0.269	0.118
22	0.362	0.632	0.497	0.393	1	0.393	0.195
23	0.192	0.179	0.186	0.089	1	0.089	0.017
Total					**23**	**8.652**	**5.076**
Water Level Depth (m)				**0.550**			
Total Area (A)				**8.652**			
Total Discharge (Q)				**5.076**			

(Fri)03-Jul-2020

Determining the Water Discharge (Q) from current meter readings

Location:	**Downstream of Dam**
Date:	**(Fri)03-Jul-2020**
Weather:	**Isolated Showers & Thunder storms (after over night flood)**

River Width(m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.193	0.226	0.210	0.078	1	0.078	0.016
2	0.298	0.306	0.302	0.234	1	0.234	0.071
3	0.58	0.723	0.652	0.524	1	0.524	0.341
4	0.203	0.291	0.247	0.400	1	0.4	0.099
5	0.293	0.392	0.343	0.291	1	0.291	0.100
6	0.443	0.773	0.608	0.475	1	0.475	0.289
7	0.628	0.943	0.786	0.596	1	0.596	0.468
8	0.702	0.960	0.831	0.536	1	0.536	0.445
9	0.84	1.133	0.987	0.646	1	0.646	0.637
10	0.825	1.321	1.073	0.417	1	0.417	0.447
11	0.756	1.218	0.987	0.452	1	0.452	0.446
12	0.68	0.827	0.754	0.480	1	0.48	0.362
13	0.642	0.795	0.719	0.432	1	0.432	0.310
14	0.808	1.135	0.972	0.440	1	0.44	0.427
15	0.816	1.246	1.031	0.403	1	0.403	0.415
16	1.036	1.293	1.165	0.492	1	0.492	0.573
17	0.887	1.250	1.069	0.454	1	0.454	0.485
18	0.889	1.266	1.078	0.419	1	0.419	0.451
19	0.821	1.125	0.973	0.421	1	0.421	0.410
20	0.673	1.082	0.878	0.487	1	0.487	0.427
21	0.589	0.873	0.731	0.381	1	0.381	0.279
22	0.478	0.840	0.659	0.304	1	0.304	0.200
23	0.374	0.419	0.397	0.263	1	0.263	0.104
24	0.203	0.288	0.246	0.242	1	0.242	0.059
25	0.212	0.275	0.244	0.127	1	0.127	0.031
26	0.252	0.261	0.257	0.132	1	0.132	0.034
Total					**26**	**10.106**	**7.929**

Water Level Depth (m)	**0.626**
Total Area (A)	**10.106**
Total Discharge (Q)	**7.909**

(Tue)07-Jul-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Downstream of Dam**						
Date:	**(Tue)07-Jul-2020**						
Weather:	**Fine**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.257	0.270	0.264	0.429	1	0.429	0.113
2	0.253	0.183	0.218	0.101	1	0.101	0.022
3	0.223	0.347	0.285	0.307	1	0.307	0.087
4	0.313	0.355	0.334	0.437	1	0.437	0.146
5	0.363	0.729	0.546	0.399	1	0.399	0.218
6	0.685	0.953	0.819	0.401	1	0.401	0.328
7	0.826	1.118	0.972	0.395	1	0.395	0.384
8	0.995	1.123	1.059	0.393	1	0.393	0.416
9	0.716	1.055	0.886	0.430	1	0.43	0.381
10	0.719	0.871	0.795	0.311	1	0.311	0.247
11	0.831	1.013	0.922	0.567	1	0.567	0.523
12	0.527	0.749	0.638	0.337	1	0.337	0.215
13	0.419	0.606	0.513	0.333	1	0.333	0.171
14	0.366	0.469	0.418	0.383	1	0.383	0.160
15	0.43	0.668	0.549	0.404	1	0.404	0.222
16	0.672	0.283	0.478	0.408	1	0.408	0.195
17	0.464	0.707	0.586	0.520	1	0.52	0.304
18	0.575	0.781	0.678	0.507	1	0.507	0.344
19	0.547	0.771	0.659	0.473	1	0.473	0.312
20	0.456	0.663	0.560	0.434	1	0.434	0.243
21	0.364	0.492	0.428	0.219	1	0.219	0.094
22	0.248	0.321	0.285	0.214	1	0.214	0.061
23	0.347	0.482	0.415	0.361	1	0.361	0.150
Total					**23**	**8.763**	**5.335**
Water Level Depth (m)				**0.550**			
Total Area (A)				**8.763**			
Total Discharge (Q)				**5.335**			

(Tue)14-Jul-2020-TSS measurement

Determining the Water Discharge (Q) from current meter readings

Location:	**Downstream of Dam**
Date:	**(Tue)14-Jul-2020**
Weather:	**Fine (Dry weather)**

River Width(m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.022	0.118	0.070	0.109	1	0.109	0.008
2	0.208	0.469	0.339	0.210	1	0.21	0.071
3	0.425	0.698	0.562	0.402	1	0.402	0.226
4	0.587	0.960	0.774	0.372	1	0.372	0.288
5	0.680	0.958	0.819	0.348	1	0.348	0.285
6	0.544	0.880	0.712	0.365	1	0.365	0.260
7	0.554	0.887	0.721	0.371	1	0.371	0.267
8	0.454	0.724	0.589	0.316	1	0.316	0.186
9	0.578	0.902	0.740	0.340	1	0.34	0.252
10	0.453	0.731	0.592	0.241	1	0.241	0.143
11	0.355	0.498	0.427	0.334	1	0.334	0.142
12	0.241	0.278	0.260	0.336	1	0.336	0.087
13	0.581	0.732	0.657	0.291	1	0.291	0.191
14	0.531	0.805	0.668	0.375	1	0.375	0.251
15	0.602	0.816	0.709	0.440	1	0.44	0.312
16	0.627	0.779	0.703	0.480	1	0.48	0.337
17	0.572	0.802	0.687	0.491	1	0.491	0.337
18	0.547	0.637	0.592	0.376	1	0.376	0.223
19	0.539	0.602	0.571	0.301	1	0.301	0.172
20	0.211	0.280	0.246	0.232	1	0.232	0.057
21	0.276	0.348	0.312	0.238	1	0.238	0.074
22	0.474	0.764	0.619	0.376	1	0.376	0.233
23	0.267	0.367	0.317	0.116	1	0.116	0.037
Total					**23**	**7.460**	**4.438**

Water Level Depth (m)	**0.491**
Total Area (A)	**7.460**
Total Discharge (Q)	**4.438**

(Tue)04-Aug-2020

Determining the Water Discharge (Q) from current meter readings

Location:	**Downstream of Dam**						
Date:	**(Tue)04-Aug-2020**						
Weather:	**Fine (Dry weather)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.110	0.259	0.185	0.325	1	0.325	0.060
2	0.156	0.619	0.388	0.327	1	0.327	0.127
3	0.408	1.008	0.708	0.415	1	0.415	0.294
4	0.734	1.165	0.950	0.368	1	0.368	0.349
5	0.523	0.800	0.662	0.327	1	0.327	0.216
6	0.482	0.823	0.653	0.362	1	0.362	0.236
7	0.492	0.768	0.630	0.280	1	0.28	0.176
8	0.768	0.863	0.816	0.341	1	0.341	0.278
9	0.751	0.917	0.834	0.219	1	0.219	0.183
10	0.648	0.712	0.680	0.256	1	0.256	0.174
11	0.46	0.758	0.609	0.315	1	0.315	0.192
12	0.419	0.599	0.509	0.370	1	0.37	0.188
13	0.251	0.589	0.420	0.378	1	0.378	0.159
14	0.496	0.644	0.570	0.388	1	0.388	0.221
15	0.546	0.723	0.635	0.255	1	0.255	0.162
16	0.469	0.691	0.580	0.150	1	0.15	0.087
17	0.341	0.443	0.392	0.176	1	0.176	0.069
18	0.28	0.333	0.307	0.165	1	0.165	0.051
19	0.215	0.315	0.265	0.146	1	0.146	0.039
20	0.198	0.258	0.228	0.131	1	0.131	0.030
Total					**20**	**5.694**	**3.291**

Water Level Depth (m)	**0.380**
Total Area (A)	**5.694**
Total Discharge (Q)	**3.291**

(Tue)25-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Downstream of Dam**						
Date:	**(Tue)25-Aug-2020**						
Weather:	**Isolated shower (No Flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.040	0.311	0.176	0.329	1	0.329	0.058
2	0.191	0.580	0.386	0.225	1	0.225	0.087
3	0.482	0.882	0.682	0.374	1	0.374	0.255
4	0.499	0.806	0.653	0.361	1	0.361	0.236
5	0.382	0.873	0.628	0.345	1	0.345	0.216
6	0.246	0.769	0.508	0.350	1	0.35	0.178
7	0.580	0.825	0.703	0.263	1	0.263	0.185
8	0.574	0.831	0.703	0.283	1	0.283	0.199
9	0.51	0.858	0.684	0.276	1	0.276	0.189
10	0.487	0.854	0.671	0.286	1	0.286	0.192
11	0.499	0.887	0.693	0.278	1	0.278	0.193
12	0.554	0.827	0.691	0.431	1	0.431	0.298
13	0.572	0.878	0.725	0.438	1	0.438	0.318
14	0.55	0.814	0.682	0.330	1	0.33	0.225
15	0.391	0.594	0.493	0.322	1	0.322	0.159
16	0.374	0.583	0.479	0.278	1	0.278	0.133
17	0.304	0.368	0.336	0.160	1	0.16	0.054
18	0.175	0.231	0.203	0.154	1	0.154	0.031
Total					**18**	**5.483**	**3.203**
Water Level Depth (m)				**0.380**			
Total Area (A)				**5.483**			
Total Discharge (Q)				**3.203**			

(Tue)01-Sep-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Downstream of Dam**						
Date:	**(Tue)01-DSeop-2020**						
Weather:	**Isolated shower (No Flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.138	0.217	0.178	0.221	1	0.221	0.039
2	0.405	0.625	0.515	0.259	1	0.259	0.133
3	0.414	0.778	0.596	0.338	1	0.338	0.201
4	0.425	0.816	0.621	0.391	1	0.391	0.243
5	0.534	0.962	0.748	0.409	1	0.409	0.306
6	0.524	0.961	0.743	0.477	1	0.477	0.354
7	0.494	0.943	0.719	0.492	1	0.492	0.354
8	0.581	1.066	0.824	0.487	1	0.487	0.401
9	0.409	0.749	0.579	0.394	1	0.394	0.228
10	0.493	0.988	0.741	0.361	1	0.361	0.267
11	0.493	0.903	0.698	0.382	1	0.382	0.267
12	0.429	0.853	0.641	0.284	1	0.284	0.182
13	0.337	0.734	0.536	0.272	1	0.272	0.146
14	0.372	0.684	0.528	0.266	1	0.266	0.140
15	0.334	0.582	0.458	0.153	1	0.153	0.070
16	0.193	0.423	0.308	0.115	1	0.115	0.035
17	0.167	0.353	0.260	0.121	1	0.121	0.031
18	0.165	0.307	0.236	0.101	1	0.101	0.024
Total					**18**	**5.523**	**3.42**
Water Level Depth (m)				**0.380**			
Total Area (A)				**5.523**			
Total Discharge (Q)				**3.422**			

(Wed)07-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Downstream of Dam**						
Date:	**(Wed)07-Oct-2020**						
Weather:	**Isolated shower (River Condition: After flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.095	0.108	0.102	0.13	1	0.13	0.013
2	0.226	0.400	0.313	0.365	1	0.365	0.114
3	0.243	0.718	0.481	0.2	1	0.2	0.096
4	0.531	0.835	0.683	0.393	1	0.393	0.268
5	0.839	1.480	1.160	0.382	1	0.382	0.443
6	0.824	1.450	1.137	0.362	1	0.362	0.412
7	0.930	1.519	1.225	0.331	1	0.331	0.405
8	0.755	1.330	1.043	0.421	1	0.421	0.439
9	0.809	0.963	0.886	0.452	1	0.452	0.400
10	0.803	1.132	0.968	0.601	1	0.601	0.581
11	0.785	1.199	0.992	0.432	1	0.432	0.429
12	0.708	1.233	0.971	0.381	1	0.381	0.370
13	0.972	1.305	1.139	0.364	1	0.364	0.414
14	1.116	1.595	1.356	0.335	1	0.335	0.454
15	0.792	1.121	0.957	0.37	1	0.37	0.354
16	0.688	1.128	0.908	0.359	1	0.359	0.326
17	0.597	1.044	0.821	0.342	1	0.342	0.281
18	0.474	0.639	0.557	0.229	1	0.229	0.127
19	0.309	0.465	0.387	0.333	1	0.333	0.129
20	0.28	0.329	0.305	0.241	1	0.241	0.073
21	0.385	0.448	0.417	0.224	1	0.224	0.093
22	0.135	0.195	0.165	0.125	1	0.125	0.021
Total					**22**	**7.37**	**6.24**
Water Level Depth (m)				**0.600**			
Total Area (A)				**7.372**			
Total Discharge (Q)				**6.244**			

(Tue)13-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Downstream of Dam**						
Date:	**(Tue)07-Oct-2020**						
Weather:	**Isolated shower (River Condition: After flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.340	0.277	0.309	0.055	1	0.055	0.017
2	0.462	0.539	0.501	0.117	1	0.117	0.059
3	0.661	1.308	0.985	0.264	1	0.264	0.260
4	0.823	1.544	1.184	0.354	1	0.354	0.419
5	0.812	1.506	1.159	0.381	1	0.381	0.442
6	0.8	1.479	1.140	0.378	1	0.378	0.431
7	0.912	1.648	1.280	0.454	1	0.454	0.581
8	0.607	0.935	0.771	0.395	1	0.395	0.305
9	0.612	0.907	0.760	0.385	1	0.385	0.292
10	0.722	1.152	0.937	0.371	1	0.371	0.348
11	0.686	1.087	0.887	0.311	1	0.311	0.276
12	0.733	1.124	0.929	0.341	1	0.341	0.317
13	0.774	1.208	0.991	0.437	1	0.437	0.433
14	0.689	1.127	0.908	0.504	1	0.504	0.458
15	0.926	1.311	1.119	0.353	1	0.353	0.395
16	0.687	1.092	0.890	0.332	1	0.332	0.295
17	0.526	0.944	0.735	0.34	1	0.34	0.250
18	0.787	0.787	0.787	0.281	1	0.281	0.221
19	0.721	0.5	0.611	0.21	1	0.21	0.128
20	0.192	0.471	0.332	0.249	1	0.249	0.083
21	0.112	0.459	0.286	0.188	1	0.188	0.054
22	0.148	0.270	0.209	0.104	1	0.104	0.022
Total					**22**	**6.80**	**6.08**
Water Level Depth (m)				**0.500**			
Total Area (A)				**6.804**			
Total Discharge (Q)				**6.083**			

(Tue)20-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Downstream of Dam**						
Date:	**(Tue)20-Oct-2020**						
Weather:	**Isolated shower**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.013	0.073	0.043	0.293	1	0.293	0.013
2	0.212	0.034	0.123	0.378	1	0.378	0.046
3	0.995	1.402	1.199	0.273	1	0.273	0.327
4	0.882	1.531	1.207	0.475	1	0.475	0.573
5	0.835	1.343	1.089	0.488	1	0.488	0.531
6	0.841	1.198	1.020	0.418	1	0.418	0.426
7	0.709	1.333	1.021	0.473	1	0.473	0.483
8	0.781	1.479	1.130	0.486	1	0.486	0.549
9	0.837	1.506	1.172	0.406	1	0.406	0.476
10	0.764	1.132	0.948	0.439	1	0.439	0.416
11	0.782	1.063	0.923	0.44	1	0.44	0.406
12	0.842	1.084	0.963	0.436	1	0.436	0.420
13	0.854	1.114	0.984	0.487	1	0.487	0.479
14	0.92	1.484	1.202	0.653	1	0.653	0.785
15	0.784	1.634	1.209	0.411	1	0.411	0.497
16	0.765	1.058	0.912	0.438	1	0.438	0.399
17	0.516	0.977	0.747	0.364	1	0.364	0.272
18	0.485	0.626	0.556	0.325	1	0.325	0.181
19	0.388	0.599	0.494	0.216	1	0.216	0.107
20	0.475	0.542	0.509	0.235	1	0.235	0.119
21	0.285	0.485	0.385	0.24	1	0.24	0.092
22	0.25	0.312	0.281	0.173	1	0.173	0.049
23	0.051	0.152	0.102	0.136	1	0.136	0.014
Total					**23**	**8.68**	**7.66**
Water Level Depth (m)			**0.510**				
Total Area (A)			**8.683**				
Total Discharge (Q)			**7.660**				

(Tue)27-Oct-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	25.0	25.0	26.0	27.0	26.0	25.8	1.55	1.7	26	18.2	28.21

(Tue)03-Nov-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	24.0	26.0	21.0	23.0	22.0	23.2	1.72	1.4	26	13.53	23.27

(Tue)17-Nov-2020-Float/TSS measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	27.7	31.2	33.7	29.3	29.0	30.2	1.33	1.5	25	15.09	20.06

(Tue)29-Dec-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	23.7	20.9	25.5	23.7	24.3	23.6	1.69	1.4	26	13.53	22.86
40	30.3	29.0	25.6	24.3	27.4	27.3	1.46	2.0	26	26.05	38.03
40	25.3	24.2	23.7	26.5	24.4	24.8	1.61	2.0	26	26.05	41.93

(Thu)14-Jan-2021-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	26.3	23.2	26.2	24.9	22.9	24.7	1.62	1.9	26	21.31	34.52
40	22.7	25.7	22.9	27.0	25.4	24.7	1.62	2.0	26	26.05	42.20
40	27.4	24.9	28.6	26.2	25.1	26.4	1.51	2.0	26	26.05	39.33

(Tue)02-Feb-2021-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
40	22.1	20.1	22.2	21.9	21.5	21.5	1.86	1.7	26	18.2	33.85

(Wed)10-Feb-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
12:40	40	27.47	27.15	25.28	25.81	26.72	26.49	1.51	2.24	26.00	31.40	47.41
13:40	40	28.10	25.44	29.11	28.55	26.69	27.58	1.45	2.24	26.00	31.40	45.53
14:40	40	24.37	25.91	24.68	25.56	25.03	25.11	1.59	2.32	26.00	33.18	52.76
15:40	40	23.60	22.06	24.25	25.75	23.69	23.87	1.68	2.32	26.00	33.18	55.74
16:40	40	22.63	24.81	25.09	22.30	23.94	23.75	1.68	2.32	26.00	33.18	55.74
17:40	40	23.22	21.75	23.87	24.15	25.01	23.60	1.69	2.32	26.00	33.18	56.08
18:40	40	22.03	23.84	22.97	22.81	24.75	23.28	1.72	2.32	26.00	33.18	57.07

(Thu)11-Feb-2021-Float/TSS measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
7:30	40	24.94	23.47	22.76	24.75	24.59	24.10	1.66	2.32	26.00	33.18	55.08
8:30	40	31.06	28.62	30.41	28.75	27.37	29.24	1.37	2.25	26.00	31.62	43.32
9:30	40	25.09	24.75	23.22	22.75	23.57	23.88	1.68	2.25	26.00	31.62	53.12
10:30	40	21.44	23.25	23.91	26.69	24.38	23.93	1.67	2.25	26.00	31.62	52.81
11:30	40	24.03	27.91	28.94	27.47	24.12	26.49	1.51	2.25	26.00	31.62	47.75
12:30	40	24.15	24.44	23.06	22.65	25.94	24.05	1.66	2.26	26.00	31.84	52.86
13:30	40	25.81	21.13	22.31	23.31	24.28	23.37	1.71	2.25	26.00	31.62	54.07
14:30	40	21.32	20.31	24.00	21.37	23.97	22.19	1.80	2.30	26.00	32.74	58.92
15:30	40	21.97	23.41	24.03	26.13	23.00	23.71	1.69	2.30	26.00	32.74	55.32
16:30	40	22.85	24.57	20.31	20.25	21.87	21.97	1.82	2.37	26.00	34.30	62.42
17:30	40	18.00	19.79	21.22	20.34	19.79	19.83	2.02	2.47	26.50	36.53	73.78
18:30	40	18.72	17.40	18.72	18.44	19.57	18.57	2.15	2.49	26.50	36.97	79.49

(Fri)12-Feb-2021-Float/TSS measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
7:30	40	25.28	26.97	25.55	25.63	24.71	25.63	1.56	2.25	26.00	31.62	49.35
8:30	40	25.09	24.41	25.62	26.13	26.84	25.62	1.56	2.25	26.00	31.62	49.37
9:30	40	20.50	21.13	20.31	23.66	20.09	21.14	1.89	2.29	26.00	32.51	61.52
10:30	40	21.85	21.37	22.81	20.59	23.00	21.92	1.82	2.29	26.00	32.51	59.32
11:30	40	22.41	22.22	22.47	21.44	21.22	21.95	1.82	2.28	26.00	32.29	58.84
12:30	40	25.61	21.17	23.03	21.91	21.85	22.71	1.76	2.22	26.00	30.95	54.51
13:30	40	21.44	21.72	21.59	22.69	21.91	21.87	1.83	2.23	26.00	31.17	57.02
14:30	40	26.41	22.21	21.63	21.25	22.56	22.81	1.75	2.25	26.00	31.62	55.45
15:30	40	21.44	22.43	23.25	22.63	21.71	22.29	1.79	2.29	26.00	32.51	58.34
16:30	40	21.86	22.15	23.41	23.06	24.86	23.07	1.73	2.28	26.00	32.29	55.99
17:30	40	21.91	21.97	22.10	23.81	21.68	22.29	1.79	2.23	17.60	31.17	55.80
18:30	40	21.25	21.51	22.60	20.40	21.34	21.42	1.87	2.25	17.70	31.62	59.13

(Thu)18-Feb-2021-Float/TSS measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
16:00	40	15.00	15.00	13.00	13.00	12.00	13.60	2.94	2.54	26.00	38.09	112.02
17:00	40	16.00	16.00	16.00	17.00	18.00	16.60	2.41	2.47	25.00	36.53	88.01
18:00	40	18.00	21.00	20.00	20.00	20.00	19.80	2.02	2.42	24.00	35.41	71.54

(Fri)19-Feb-2021-Float/TSS measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
10:30	50	22.40	22.40	23.20	22.40	22.40	22.56	2.22	2.02	25.50	26.49	58.72
11:30	50	22.40	20.80	21.60	22.40	20.80	21.60	2.31	2.07	25.50	27.61	63.91
13:30	50	20.00	20.00	19.20	20.00	20.00	19.84	2.52	2.12	25.50	28.72	72.38
14:30	50	18.40	19.20	18.40	18.40	18.40	18.56	2.69	2.12	25.50	28.72	77.38

(Thu)25-Feb-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
8:30	40	12.46	12.58	12.20	12.29	12.09	12.32	3.25	2.25	26.00	31.62	102.63
9:30	40	12.70	12.06	11.93	12.28	11.38	12.07	3.31	2.28	26.00	32.29	107.00
10:30	40	12.52	12.03	12.73	11.82	11.59	12.14	3.30	2.29	26.00	32.51	107.15
11:30	40	11.98	12.70	11.32	11.83	11.30	11.83	3.38	2.23	26.00	31.17	105.43
12:30	40	11.81	11.36	11.91	11.85	12.27	11.84	3.38	2.31	26.00	32.96	111.34
13:30	40	11.51	11.66	11.51	11.96	12.34	11.80	3.39	2.34	26.00	33.63	114.02
14:30	40	11.89	12.42	11.70	11.59	11.00	11.72	3.41	2.37	26.00	34.30	117.05
15:30	40	12.02	12.36	12.52	12.97	11.69	12.31	3.25	2.39	26.00	34.74	112.85
16:30	40	12.23	10.35	13.69	12.36	11.88	12.10	3.31	2.42	26.00	35.41	117.04
17:30	40	12.58	13.61	11.57	12.23	11.37	12.27	3.26	2.43	26.00	35.63	116.15

(Fri)26-Feb-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time (s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
8:30	50	22.71	23.79	24.69	22.02	23.12	23.27	2.15	2.80	26.00	45.01	96.74
9:30	50	23.07	23.12	23.48	24.13	23.25	23.41	2.14	2.87	26.00	47.11	100.62
10:30	50	23.51	22.73	22.42	23.37	23.96	23.20	2.16	2.87	26.00	47.11	101.54
11:30	50	23.04	21.23	24.54	23.85	23.4	23.21	2.15	2.87	26.00	47.11	101.48
12:30	50	22.13	24.31	24.21	22.05	22.59	23.06	2.17	2.89	26.00	47.72	103.49
13:30	50	25.65	22.25	22.05	21.25	23.55	22.95	2.18	2.95	26.50	49.56	107.98
14:30	50	22.39	22.27	21.79	23.27	22.59	22.46	2.23	2.97	26.50	50.17	111.68
15:30	50	21.29	24.67	21.85	21.77	23.79	22.67	2.21	2.97	26.50	50.17	110.64
16:30	50	20.79	21.29	24.67	21.85	21.77	22.07	2.27	2.99	26.50	50.79	115.03
17:30	50	20.38	20.81	21.15	21.77	23.50	21.52	2.32	3.05	27.00	52.62	122.25

(Thu)04-Mar-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
8:30	40	12.06	12.44	12.75	12.73	12.37	12.47	3.21	2.45	27.00	36.20	116.12
9:30	40	11.98	12.34	11.91	11.82	11.52	11.91	3.36	2.44	27.00	35.97	120.78
10:30	40	12.40	12.46	12.18	11.86	12.56	12.29	3.25	2.45	27.00	36.20	117.79
11:30	40	12.37	12.40	11.47	12.13	12.64	12.20	3.28	2.45	27.00	36.20	118.68
12:30	40	12.05	12.03	11.86	12.25	12.11	12.06	3.32	2.47	27.00	36.53	121.14
13:30	40	11.39	11.14	11.84	11.16	11.53	11.41	3.50	2.48	27.00	36.87	129.19
14:30	40	12.25	11.30	12.39	11.54	11.89	11.87	3.37	2.49	27.00	37.09	124.97
15:30	40	10.69	10.89	11.11	10.86	11.00	10.91	3.67	2.52	27.00	37.76	138.48
16:30	40	10.53	10.15	11.51	11.98	10.64	10.96	3.65	2.59	27.00	39.33	143.49
17:30	40	9.97	10.77	10.86	10.10	10.63	10.47	3.82	2.60	27.00	39.55	151.15

(Fri)05-Mar-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
8:30	40	10.94	9.97	10.74	11.10	9.43	10.44	3.83	2.66	29.00	40.89	156.72
9:30	40	10.43	9.61	10.14	9.81	9.54	9.91	4.04	2.66	29.00	40.89	165.07
10:30	40	9.80	10.20	9.71	10.38	10.12	10.04	3.98	2.69	29.00	41.77	166.36
11:30	40	11.24	10.34	10.15	9.52	10.25	10.30	3.88	2.72	29.00	42.65	165.63
12:30	40	10.60	10.30	10.35	9.88	10.09	10.25	3.90	2.73	29.00	42.95	167.68
13:30	40	10.13	9.98	9.58	9.92	9.54	9.83	4.07	2.74	29.00	43.24	175.97
14:30	40	9.14	9.23	10.01	9.35	9.29	9.40	4.25	2.76	29.00	43.83	186.45
15:30	40	8.72	8.91	9.23	9.43	9.04	9.07	4.41	2.77	29.00	44.13	194.67
16:30	40	9.97	8.87	9.22	9.38	8.78	9.24	4.33	2.80	29.00	45.01	194.80
17:30	40	8.79	9.33	10.27	9.04	10.02	9.49	4.21	2.82	29.00	45.60	192.17

(Fri)11-Jun-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
11:30	40	31.33	33.41	27.56	30.86	30.74	30.78	1.30	1.20	24.00	10.42	13.54
12:30	40	32.84	30.37	32.90	31.65	31.18	31.79	1.26	1.20	24.00	10.42	13.11
13:30	40	31.86	34.65	31.76	30.77	30.45	31.90	1.25	1.20	24.00	10.42	13.06

(Fri)11-Jun-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Downstream of Dam**
Date:	**(Fri)11-Jun-2021**
Weather:	**Fine (Dry weather)**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.199	0.295	0.247	0.280	1	0.28	0.069
2	0.335	0.510	0.423	0.189	1	0.189	0.080
3	0.299	0.431	0.365	0.150	1	0.15	0.055
4	0.516	0.669	0.593	0.240	1	0.24	0.142
5	0.511	0.526	0.519	0.350	1	0.35	0.181
6	0.457	0.543	0.500	0.372	1	0.372	0.186
7	0.671	0.933	0.802	0.368	1	0.368	0.295
8	0.595	0.721	0.658	0.375	1	0.375	0.247
9	0.65	1.288	0.969	0.345	1	0.345	0.334
10	0.484	1.161	0.823	0.308	1	0.308	0.253
11	0.674	0.725	0.700	0.361	1	0.361	0.253
12	0.448	1.009	0.729	0.260	1	0.26	0.189
13	0.447	0.692	0.570	0.360	1	0.36	0.205
14	0.537	1.132	0.835	0.350	1	0.35	0.292
15	0.694	1.135	0.915	0.347	1	0.347	0.317
16	0.618	1.052	0.835	0.394	1	0.394	0.329
17	0.855	1.103	0.979	0.385	1	0.385	0.377
18	0.528	0.758	0.643	0.369	1	0.369	0.237
19	0.536	0.614	0.575	0.427	1	0.427	0.246
20	0.754	0.838	0.796	0.348	1	0.348	0.277
21	0.809	1.059	0.934	0.444	1	0.444	0.415
22	0.221	1.035	0.628	0.335	1	0.335	0.210
23	0.216	0.940	0.578	0.298	1	0.298	0.172
24	0.132	0.305	0.219	0.281	1	0.281	0.061
Total					**24**	**7.936**	**5.424**

Water Level Depth (m)	**0.360**
Total Area (A)	**7.936**
Total Discharge (Q)	**5.424**

(Thu)17-Jun-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
10:00	30	46.00	45.00	42.00	43.00	45.00	44.20	0.68	0.535	25.50	2.19	1.49
11:00	30	45.00	45.00	43.00	46.00	43.00	44.40	0.68	0.490	25.50	1.86	1.25

12:00	30	46.00	44.00	42.00	42.00	45.00	43.80	0.68	0.514	25.50	2.03	1.39
13:00	30	44.00	40.00	46.00	45.00	42.00	43.40	0.69	0.510	25.50	2.00	1.39
14:00	30	43.00	45.00	44.00	41.00	46.00	43.80	0.68	0.520	25.50	2.08	1.42
15:00	30	48.00	42.00	40.00	43.00	43.00	43.20	0.69	0.525	25.50	2.12	1.47

(Thu)17-Jun-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Downstream of Dam**
Date:	**(Thu)17-Jun-2021**
Weather:	**Fine (Dry weather)**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.019	0.094	0.057	0.168	1	0.168	0.009
2	0.182	0.374	0.278	0.270	1	0.27	0.075
3	0.266	0.523	0.395	0.334	1	0.334	0.132
4	0.263	0.631	0.447	0.435	1	0.435	0.194
5	0.391	0.671	0.531	0.368	1	0.368	0.195
6	0.288	0.524	0.406	0.399	1	0.399	0.162
7	0.445	0.855	0.650	0.379	1	0.379	0.246
8	0.63	1.005	0.818	0.287	1	0.287	0.235
9	0.612	0.870	0.741	0.318	1	0.318	0.236
10	0.696	0.925	0.811	0.187	1	0.187	0.152
11	0.319	0.798	0.559	0.369	1	0.369	0.206
12	0.366	0.767	0.567	0.279	1	0.279	0.158
13	0.455	0.792	0.624	0.358	1	0.358	0.223
14	0.698	1.034	0.866	0.244	1	0.244	0.211
15	0.385	0.612	0.499	0.326	1	0.326	0.163
16	0.398	0.762	0.580	0.351	1	0.351	0.204
17	0.345	0.603	0.474	0.319	1	0.319	0.151
18	0.321	0.511	0.416	0.210	1	0.21	0.087
19	0.289	0.388	0.339	0.166	1	0.166	0.056
20	0.062	0.187	0.125	0.248	1	0.248	0.031
21	0.075	0.185	0.130	0.137	1	0.137	0.018
22	0.070	0.178	0.124	0.125	1	0.125	0.016
23	0.062	0.173	0.118	0.147	1	0.147	0.017
Total					**23**	**6.424**	**3.177**

Water Level Depth (m)	**0.399**
Total Area (A)	**6.424**
Total Discharge (Q)	**3.177**

(Fri)18-Jun-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
9:00	30	42.00	42.00	41.00	42.00	41.00	41.60	0.72	0.514	25.50	2.03	1.47
10:00	30	44.00	40.00	42.00	42.00	40.00	41.60	0.72	0.515	25.50	2.04	1.47
11:00	30	42.00	43.00	40.00	41.00	43.00	41.80	0.72	0.508	25.50	1.99	1.43
12:00	30	41.00	41.00	42.00	43.00	43.00	42.00	0.71	0.505	25.50	1.97	1.41
13:00	30	43.00	42.00	39.00	42.00	43.00	41.80	0.72	0.500	25.50	1.93	1.39
14:00	30	41.00	42.00	41.00	43.00	42.00	41.80	0.72	0.506	25.50	1.97	1.42
15:00	30	39.00	44.00	42.00	42.00	41.00	41.60	0.72	0.505	25.50	1.97	1.42
16:00	30	42.00	41.00	41.00	40.00	42.00	41.20	0.73	0.508	25.50	1.99	1.45

(Fri)18-Jun-2021

Determining the Water Discharge (Q) from current meter readings

Location:	Downstream of Dam
Date:	(Fri)18-Jun-2021
Weather:	Fine (Dry weather)

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.065	0.305	0.185	0.215	1	0.215	0.040
2	0.225	0.374	0.300	0.154	1	0.154	0.046
3	0.242	0.505	0.374	0.165	1	0.165	0.062
4	0.515	0.680	0.598	0.172	1	0.172	0.103
5	0.450	0.708	0.579	0.236	1	0.236	0.137
6	0.488	0.700	0.594	0.270	1	0.27	0.160
7	0.502	0.719	0.611	0.332	1	0.332	0.203
8	0.528	0.627	0.578	0.326	1	0.326	0.188
9	0.283	0.632	0.458	0.537	1	0.537	0.246
10	0.26	0.624	0.442	0.100	1	0.1	0.044
11	0.337	0.603	0.470	0.087	1	0.087	0.041
12	0.705	0.042	0.374	0.159	1	0.159	0.059
13	0.713	0.928	0.821	0.253	1	0.253	0.208
14	0.756	1.229	0.993	0.256	1	0.256	0.254
15	0.544	0.707	0.626	0.220	1	0.22	0.138
16	0.578	0.790	0.684	0.256	1	0.256	0.175
17	0.874	1.058	0.966	0.323	1	0.323	0.312
18	0.657	0.983	0.820	0.283	1	0.283	0.232
19	0.488	0.619	0.554	0.313	1	0.313	0.173
20	0.476	0.694	0.585	0.267	1	0.267	0.156
21	0.546	0.831	0.689	0.329	1	0.329	0.227
22	0.377	0.602	0.490	0.292	1	0.292	0.143

23	0.120	0.130	0.125	0.238	1	0.238	0.030
24	0.140	0.256	0.198	0.317	1	0.317	0.063
25	0.366	0.398	0.382	0.106	1	0.106	0.040
Total					**25**	**6.206**	**3.479**

Water Level Depth (m)	**0.537**
Total Area (A)	**6.206**
Total Discharge (Q)	**3.479**

(Sat)19-Jun-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
9:00	30	36.00	40.00	37.00	38.00	36.00	37.40	0.80	0.480	25.50	1.78	1.43
10:00	30	41.00	38.00	36.00	40.00	37.00	38.40	0.78	0.440	25.50	1.49	1.16
11:00	30	37.00	37.00	38.00	39.00	38.00	37.80	0.79	0.460	25.50	1.63	1.30

(Sat)19-Jun-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Downstream of Dam**
Date:	**(Sat)19-Jun-2021**
Weather:	**Fine (Dry weather)**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.008	0.032	0.020	0.112	1	0.112	0.002
2	0.112	0.300	0.206	0.185	1	0.185	0.038
3	0.216	0.359	0.288	0.212	1	0.212	0.061
4	0.332	0.429	0.381	0.143	1	0.143	0.054
5	0.457	0.640	0.549	0.168	1	0.168	0.092
6	0.492	0.697	0.595	0.275	1	0.275	0.163
7	0.407	0.654	0.531	0.282	1	0.282	0.150
8	0.57	0.739	0.655	0.346	1	0.346	0.226
9	0.593	0.735	0.664	0.284	1	0.284	0.189
10	0.564	0.855	0.710	0.304	1	0.304	0.216
11	0.582	1.136	0.859	0.272	1	0.272	0.234
12	0.698	0.810	0.754	0.318	1	0.318	0.240
13	0.587	0.973	0.780	0.175	1	0.175	0.137
14	0.51	0.894	0.702	0.273	1	0.273	0.192
15	0.762	1.422	1.092	0.230	1	0.23	0.251
16	0.597	0.916	0.757	0.277	1	0.277	0.210
17	0.599	0.992	0.796	0.354	1	0.354	0.282
18	0.528	0.986	0.757	0.293	1	0.293	0.222
19	0.523	0.798	0.661	0.326	1	0.326	0.215

20	0.400	0.681	0.541	0.336	1	0.336	0.182
21	0.482	0.682	0.582	0.281	1	0.281	0.164
22	0.498	0.838	0.668	0.371	1	0.371	0.248
23	0.424	0.656	0.540	0.245	1	0.245	0.132
24	0.398	0.528	0.463	0.202	1	0.202	0.094
25	0.110	0.139	0.125	0.155	1	0.155	0.019
Total					**25**	**6.419**	**4.011**

Water Level Depth (m)	**0.371**
Total Area (A)	**6.419**
Total Discharge (Q)	**4.011**

(Sun)04-Jul-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
10:00	40	42.00	40.00	39.00	45.00	41.00	41.40	0.97	0.620	17.00	2.86	2.77
11:00	40	43.00	43.00	42.00	43.00	39.00	42.00	0.95	0.580	17.00	2.52	2.40
12:00	40	44.00	41.00	40.00	40.00	44.00	41.80	0.96	0.585	17.00	2.56	2.45
13:00	40	42.00	43.00	42.00	39.00	41.00	41.40	0.97	0.600	17.00	2.67	2.58

(Sat)16-Oct-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Downstream of Dam**	
Date:	**(Sat)16-Oct-2021**	**Stat Time : 1:00 PM**
Weather:	**Rain & Flooding**	**Stop Time : 2:00 PM**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.362	0.597	0.480	0.251	1	0.251	0.120
2	0.518	0.761	0.640	0.282	1	0.282	0.180
3	0.742	0.900	0.821	0.304	1	0.304	0.250
4	0.700	0.763	0.732	0.281	1	0.281	0.206
5	0.790	0.403	0.597	0.380	1	0.380	0.227
6	0.694	0.563	0.629	0.342	1	0.342	0.215
7	0.787	0.944	0.866	0.287	1	0.287	0.248
8	0.477	0.879	0.678	0.331	1	0.331	0.224
9	0.665	0.921	0.793	0.474	1	0.474	0.376
10	0.605	1.108	0.857	0.462	1	0.462	0.396
11	0.801	1.149	0.975	0.487	1	0.487	0.475
12	0.682	1.146	0.914	0.400	1	0.400	0.366
13	0.799	1.184	0.992	0.699	1	0.699	0.693
14	0.646	1.186	0.916	0.674	1	0.674	0.617
15	0.733	1.209	0.971	0.854	1	0.854	0.829

16	0.645	1.200	0.923	0.988	1	0.988	0.911
17	1.165	1.336	1.251	0.960	1	0.960	1.200
18	0.827	1.114	0.971	0.848	1	0.848	0.823
19	0.979	1.095	1.037	0.625	1	0.625	0.648
20	0.769	1.072	0.921	0.786	1	0.786	0.724
21	0.745	0.753	0.749	0.809	1	0.809	0.606
22	0.606	0.694	0.650	0.824	1	0.824	0.536
23	0.354	0.406	0.380	0.724	1	0.724	0.275
24	0.285	0.288	0.287	0.606	1	0.606	0.174
25	0.259	0.301	0.280	0.285	1	0.285	0.080
Total					**25**	**13.963**	**11.399**

Water Level Depth (m)	**0.371**
Total Area (A)	**13.963**
Total Discharge (Q)	**11.399**

(Sat)23-Oct-2021

Determining the Water Discharge (Q) from current meter readings

Location:	**Downstream of Dam**		
Date:	**(Sat)23-Oct-2021**	**Stat Time : 10:50 AM**	
Weather:	**Cloudy (No flooding)**	**Stop Time : 12:25 PM**	

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1-0.2D	V2-0.8D	Mean				
1	0.174	0.203	0.189	0.146	0.5	0.073	0.014
2	0.384	0.430	0.407	0.123	0.5	0.062	0.025
3	0.328	0.447	0.387	0.122	0.5	0.061	0.024
4	0.844	0.962	0.903	0.158	0.5	0.079	0.071
5	0.692	0.827	0.760	0.256	0.5	0.128	0.097
6	0.584	0.780	0.682	0.224	0.5	0.112	0.076
7	0.428	0.692	0.560	0.244	0.5	0.122	0.068
8	0.476	0.662	0.569	0.092	0.5	0.046	0.026
9	0.376	0.487	0.432	0.168	0.5	0.084	0.036
10	0.536	0.742	0.639	0.114	0.5	0.057	0.036
11	0.524	0.728	0.626	0.248	0.5	0.124	0.078
12	0.434	0.619	0.526	0.288	0.5	0.144	0.076
13	0.456	0.760	0.608	0.362	0.5	0.181	0.110
14	0.624	1.053	0.838	0.204	0.5	0.102	0.086
15	0.804	1.144	0.974	0.228	0.5	0.114	0.111
16	0.636	0.984	0.810	0.202	0.5	0.101	0.082
17	0.524	1.228	0.876	0.236	0.5	0.118	0.103
18	0.684	0.980	0.832	0.272	0.5	0.136	0.113

19	0.376	0.977	0.677	0.354	0.5	0.177	0.120
20	0.692	1.002	0.847	0.538	0.5	0.269	0.228
21	0.724	1.368	1.046	0.616	0.5	0.308	0.322
22	0.484	0.640	0.562	0.472	0.5	0.236	0.133
23	0.688	1.119	0.903	0.596	0.5	0.298	0.269
24	0.612	0.946	0.779	0.610	0.5	0.305	0.238
25	0.812	1.156	0.984	0.472	0.5	0.236	0.232
26	0.596	1.236	0.916	0.526	0.5	0.263	0.241
27	0.744	1.312	1.028	0.636	0.5	0.318	0.327
28	0.608	1.238	0.923	0.685	0.5	0.343	0.316
29	0.604	1.354	0.979	0.632	0.5	0.316	0.309
30	0.724	1.403	1.063	0.630	0.5	0.315	0.335
31	0.712	1.414	1.063	0.666	0.5	0.333	0.354
32	0.876	1.400	1.138	0.548	0.5	0.274	0.312
33	0.576	1.467	1.022	0.582	0.5	0.291	0.297
34	0.696	1.481	1.089	0.270	0.5	0.135	0.147
35	0.806	1.407	1.107	0.256	0.5	0.128	0.142
36	0.704	1.288	0.996	0.218	0.5	0.109	0.109
37	0.672	1.163	0.918	0.282	0.5	0.141	0.129
38	0.636	0.809	0.723	0.258	0.5	0.129	0.093
39	0.344	0.647	0.495	0.328	0.5	0.164	0.081
40	0.400	0.584	0.492	0.188	0.5	0.094	0.046
41	0.444	0.542	0.493	0.233	0.5	0.117	0.057
42	0.236	0.424	0.330	0.476	0.5	0.238	0.079
43	0.212	0.351	0.282	0.260	0.5	0.130	0.037
44	0.124	0.248	0.186	0.234	0.5	0.117	0.022
Total					**22**	**7.628**	**6.207**

Water Level Depth (m)	**0.371**
Total Area (A)	**7.628**
Total Discharge (Q)	**6.207**

(Fri)05-Nov-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
8:00	50	43.75	42.65	40.11	41.56	39.35	41.48	1.21	0.57	26.00	2.45	2.95
8:30	50	38.43	42.34	41.31	41.69	43.47	41.45	1.21	0.57	26.00	2.44	2.94
10:00	50	34.66	45.22	48.85	39.47	41.56	41.95	1.19	0.57	26.00	2.43	2.90
10:30	50	41.09	56.16	36.40	43.76	54.00	46.28	1.08	0.57	26.00	2.43	2.62
12:00	50	60.49	60.42	60.47	60.41	60.31	60.42	0.83	0.57	26.00	2.42	2.00
12:30	50	60.37	60.36	60.03	60.47	60.38	60.32	0.83	0.57	26.00	2.41	2.00
14:00	50	60.59	60.26	60.52	60.43	60.32	60.42	0.83	0.56	26.00	2.40	1.99
14:30	50	60.37	60.45	60.50	60.32	60.43	60.41	0.83	0.56	26.00	2.40	1.99
17:00	50	60.38	60.40	60.36	60.32	60.29	60.35	0.83	0.56	26.00	2.40	1.99
17:30	50	60.39	60.33	60.51	60.49	60.46	60.44	0.83	0.56	26.00	2.40	1.98

(Sat)06-Nov-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
8:00	50	47.59	45.00	41.69	40.62	43.13	43.61	1.15	0.60	27.00	2.67	3.06
8:30	50	41.63	40.87	40.75	43.25	44.28	42.16	1.19	0.60	27.00	2.67	3.17
10:00	50	47.37	43.40	39.50	43.00	40.85	42.82	1.17	0.60	27.00	2.67	3.12
10:30	50	41.62	40.70	42.38	43.45	41.13	41.86	1.19	0.60	27.00	2.67	3.19
12:00	50	44.34	39.82	43.09	45.69	42.50	43.09	1.16	0.60	27.00	2.67	3.10
12:30	50	41.25	35.81	38.40	26.35	39.62	36.29	1.38	0.60	27.00	2.67	3.68
14:00	50	50.30	49.47	51.12	32.34	40.72	44.79	1.12	0.60	27.00	2.67	2.98
14:10	50	38.50	44.56	39.93	43.62	45.56	42.43	1.18	0.60	27.00	2.67	3.15
14:20	50	39.78	36.56	52.92	42.37	41.94	42.71	1.17	0.60	27.00	2.67	3.13
14:30	50	42.00	41.50	42.37	44.10	39.25	41.84	1.19	0.60	27.00	2.67	3.19
16:30	50	12.00	12.75	15.85	16.00	18.06	14.93	3.35	1.84	43.00	20.46	68.51
16:40	50	14.06	15.89	15.91	12.15	17.86	15.17	3.30	1.80	43.00	19.62	64.65
16:50	50	16.75	15.43	16.75	15.47	16.31	16.14	3.10	1.78	43.00	19.24	59.60
17:10	50	15.35	15.65	17.94	17.00	16.47	16.48	3.03	1.78	43.00	19.24	58.37
17:20	50	16.05	15.16	16.59	17.56	17.60	16.59	3.01	1.76	43.00	18.86	56.83
17:30	50	17.43	17.09	17.65	18.44	16.35	17.39	2.87	1.75	43.00	18.67	53.67

(Sun)07-Nov-2021-Float measurement

Time	Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
		1	2	3	4	5						
8:00	50	30.60	33.06	32.50	30.52	29.70	31.28	1.60	0.75	30.00	4.11	6.57
8:30	50	32.72	32.31	34.37	32.28	32.35	32.81	1.52	0.72	30.00	3.82	5.83
10:00	50	33.28	34.37	33.16	34.59	35.21	34.12	1.47	0.70	30.00	3.63	5.32
10:30	50	34.00	34.50	33.38	32.66	34.58	33.82	1.48	0.70	30.00	3.63	5.37
12:00	50	34.18	32.27	35.26	32.27	33.84	33.56	1.49	0.73	30.00	3.92	5.84
12:30	50	32.91	30.82	35.84	34.75	32.25	33.31	1.50	0.75	30.00	4.11	6.17

Site 3. Power house

(Wed)01-Jul-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Power House**						
Date:	**(Wed)01-Jul-2020**						
Weather:	**Fine**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.315	0.755	0.535	0.156	1	0.156	0.083
2	0.188	0.564	0.376	0.317	1	0.317	0.119
3	0.605	1.248	0.927	0.560	1	0.56	0.519
4	0.799	1.380	1.090	0.556	1	0.556	0.606
5	0.732	1.549	1.141	0.539	1	0.539	0.615
6	0.611	1.382	0.997	0.668	1	0.668	0.666
7	0.817	1.339	1.078	0.778	1	0.778	0.839
8	0.610	1.038	0.824	0.796	1	0.796	0.656
9	0.633	0.818	0.726	0.623	1	0.623	0.452
10	0.573	0.577	0.575	0.477	1	0.477	0.274
11	0.077	0.240	0.159	0.315	1	0.315	0.050
12	0.024	0.044	0.034	0.086	1	0.086	0.003
Total					**12**	**5.871**	**4.881**
Water Level Depth (m)				**0.450**			
Total Area (A)				**5.871**			
Total Discharge (Q)				**4.881**			

(Tue)07-Jul-2020

Determining the Water Discharge (Q) from current meter readings

Location:	**Power House**
Date:	**(Tue)07-Jul-2020**
Weather:	**Fine**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.223	0.454	0.339	0.127	1	0.127	0.043
2	0.381	0.553	0.467	0.120	1	0.12	0.056
3	0.270	0.549	0.410	0.182	1	0.182	0.075
4	0.476	0.602	0.539	0.153	1	0.153	0.082
5	0.536	0.620	0.578	0.176	1	0.176	0.102
6	0.567	0.755	0.661	0.192	1	0.192	0.127
7	0.588	0.804	0.696	0.189	1	0.189	0.132
8	0.491	0.487	0.489	0.299	1	0.299	0.146
9	0.582	0.749	0.666	0.335	1	0.335	0.223
10	0.612	0.943	0.778	0.222	1	0.222	0.173
11	0.657	0.841	0.749	0.208	1	0.208	0.156
12	0.633	0.580	0.607	0.282	1	0.282	0.171
13	0.666	1.041	0.854	0.272	1	0.272	0.232
14	0.662	1.158	0.910	0.325	1	0.325	0.296
15	0.790	1.217	1.004	0.410	1	0.41	0.411
16	0.811	1.130	0.971	0.511	1	0.511	0.496
17	0.953	1.164	1.059	0.407	1	0.407	0.431
18	0.926	1.115	1.021	0.449	1	0.449	0.458
19	0.832	1.309	1.071	0.320	1	0.32	0.343
20	0.929	1.209	1.069	0.422	1	0.422	0.451
21	0.759	1.075	0.917	0.457	1	0.457	0.419
22	0.713	0.840	0.777	0.346	1	0.346	0.269
23	0.7	0.935	0.818	0.346	1	0.346	0.283
24	0.714	0.807	0.761	0.342	1	0.342	0.260
25	0.427	0.750	0.589	0.349	1	0.349	0.205
26	0.528	0.686	0.607	0.319	1	0.319	0.194
27	0.38	0.413	0.397	0.304	1	0.304	0.121
28	0.323	0.428	0.376	0.262	1	0.262	0.098
29	0.261	0.281	0.271	0.182	1	0.182	0.049
Total					**29**	**8.508**	**6.501**

Water Level Depth (m)	**0.560**
Total Area (A)	**8.508**
Total Discharge (Q)	**6.501**

(Tue)14-Jul-2020-TSS measurement

Determining the Water Discharge (Q) from current meter readings							
Location:	**Power House**						
Date:	**(Tue)14-Jul-2020**						
Weather:	**Fine**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.287	0.501	0.788	0.121	1	0.121	0.095
2	0.402	0.447	0.849	0.132	1	0.132	0.112
3	0.432	0.578	1.010	0.203	1	0.203	0.205
4	0.437	0.587	1.024	0.136	1	0.136	0.139
5	0.457	0.749	1.206	0.177	1	0.177	0.213
6	0.422	0.666	1.088	0.242	1	0.242	0.263
7	0.356	0.445	0.801	0.221	1	0.221	0.177
8	0.483	0.690	1.173	0.198	1	0.198	0.232
9	0.43	0.685	1.115	0.187	1	0.187	0.209
10	0.345	0.520	0.865	0.233	1	0.233	0.202
11	0.438	0.711	1.149	0.226	1	0.226	0.260
12	0.421	0.657	1.078	0.313	1	0.313	0.337
13	0.604	0.899	1.503	0.340	1	0.34	0.511
14	0.646	0.961	1.607	0.423	1	0.423	0.680
15	0.642	0.930	1.572	0.454	1	0.454	0.714
16	0.639	0.843	1.482	0.354	1	0.354	0.525
17	0.535	0.858	1.393	0.361	1	0.361	0.503
18	0.591	0.882	1.473	0.340	1	0.34	0.501
19	0.617	1.016	1.633	0.394	1	0.394	0.643
20	0.603	0.818	1.421	0.400	1	0.4	0.568
21	0.508	0.791	1.299	0.413	1	0.413	0.536
Total					**21**	**5.868**	**7.626**
Water Level Depth (m)			**0.760**				
Total Area (A)			**5.868**				
Total Discharge (Q)			**7.626**				

(Tue)04-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Power House**						
Date:	**(Tue)04-Aug-2020**						
Weather:	**Fine (Dry weather)**						
River	**Flow Velocity (m/s)**			**Depth**	**Width**	**Area**	**Discharge**
Width(m)	**V1**	**v2**	**Mean**	**(m)**	**(m)**	**(m^2)**	**(m^3/s)**
1	0.238	0.389	0.314	0.175	1	0.175	0.055
2	0.336	0.465	0.401	0.181	1	0.181	0.072
3	0.403	0.529	0.466	0.190	1	0.19	0.089
4	0.417	0.534	0.476	0.205	1	0.205	0.097
5	0.526	0.573	0.550	0.224	1	0.224	0.123
6	0.494	0.578	0.536	0.240	1	0.24	0.129
7	0.539	0.598	0.569	0.220	1	0.22	0.125
8	0.471	0.613	0.542	0.231	1	0.231	0.125
9	0.478	0.728	0.603	0.261	1	0.261	0.157
10	0.488	0.731	0.610	0.267	1	0.267	0.163
11	0.493	0.728	0.611	0.349	1	0.349	0.213
12	0.639	0.753	0.696	0.357	1	0.357	0.248
13	0.522	0.762	0.642	0.350	1	0.35	0.225
14	0.597	0.779	0.688	0.372	1	0.372	0.256
15	0.416	0.676	0.546	0.377	1	0.377	0.206
16	0.378	0.526	0.452	0.361	1	0.361	0.163
17	0.321	0.518	0.420	0.350	1	0.35	0.147
18	0.214	0.503	0.359	0.322	1	0.322	0.115
19	0.147	0.408	0.278	0.280	1	0.28	0.078
Total					**19**	**5.312**	**2.787**
Water Level Depth (m)			**0.350**				
Total Area (A)			**5.312**				
Total Discharge (Q)			**2.787**				

(Tue)25-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Power House**						
Date:	**(Tue)25-Aug-2020**						
Weather:	**Isolated Shower (No Flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.238	0.389	0.314	0.175	1	0.175	0.055
2	0.336	0.465	0.401	0.181	1	0.181	0.072
3	0.403	0.529	0.466	0.190	1	0.19	0.089
4	0.417	0.534	0.476	0.205	1	0.205	0.097
5	0.526	0.573	0.550	0.224	1	0.224	0.123
6	0.494	0.578	0.536	0.240	1	0.24	0.129
7	0.539	0.598	0.569	0.220	1	0.22	0.125
8	0.471	0.613	0.542	0.231	1	0.231	0.125
9	0.478	0.728	0.603	0.261	1	0.261	0.157
10	0.488	0.731	0.610	0.267	1	0.267	0.163
11	0.493	0.728	0.611	0.349	1	0.349	0.213
12	0.639	0.753	0.696	0.357	1	0.357	0.248
13	0.522	0.762	0.642	0.350	1	0.35	0.225
14	0.597	0.779	0.688	0.372	1	0.372	0.256
15	0.416	0.676	0.546	0.377	1	0.377	0.206
16	0.378	0.526	0.452	0.361	1	0.361	0.163
17	0.321	0.518	0.420	0.350	1	0.35	0.147
18	0.214	0.503	0.359	0.322	1	0.322	0.115
19	0.147	0.408	0.278	0.280	1	0.28	0.078
Total					**19**	**5.312**	**2.787**
Water Level Depth (m)			**0.350**				
Total Area (A)			**5.312**				
Total Discharge (Q)			**2.787**				

(Tue)01-Sep-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Power House**						
Date:	**(Tue)01-Sep-2020**						
Weather:	**Isolated Shower (No Flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.222	0.313	0.268	0.098	1	0.098	0.026
2	0.257	0.389	0.323	0.108	1	0.108	0.035
3	0.326	0.394	0.360	0.121	1	0.121	0.044
4	0.398	0.497	0.448	0.17	1	0.17	0.076
5	0.285	0.445	0.365	0.174	1	0.174	0.064
6	0.321	0.556	0.439	0.167	1	0.167	0.073
7	0.482	0.564	0.523	0.145	1	0.145	0.076
8	0.485	0.612	0.549	0.158	1	0.158	0.087
9	0.597	0.698	0.648	0.214	1	0.214	0.139
10	0.434	0.625	0.530	0.234	1	0.234	0.124
11	0.587	0.793	0.690	0.219	1	0.219	0.151
12	0.481	0.754	0.618	0.329	1	0.329	0.203
13	0.551	0.801	0.676	0.293	1	0.293	0.198
14	0.514	0.799	0.657	0.298	1	0.298	0.196
15	0.560	0.960	0.760	0.326	1	0.326	0.248
16	0.569	0.889	0.729	0.341	1	0.341	0.249
17	0.499	0.821	0.660	0.293	1	0.293	0.193
18	0.446	0.633	0.540	0.333	1	0.333	0.180
19	0.375	0.560	0.468	0.264	1	0.264	0.123
Total					**19**	**4.285**	**2.48**
Water Level Depth (m)			**0.340**				
Total Area (A)			**4.285**				
Total Discharge (Q)			**2.483**				

(Tue)07-Oct-2020

Determining the Water Discharge (Q) from current meter readings

Location:	**Power House**
Date:	**(Tue)07-Oct-2020**
Weather:	**Isolated Shower (River condition: After flooding)**

River Width(m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.425	0.474	0.450	0.298	1	0.298	0.134
2	0.492	0.771	0.632	0.213	1	0.213	0.135
3	0.504	0.845	0.675	0.188	1	0.188	0.127
4	0.769	0.853	0.811	0.194	1	0.194	0.157
5	0.501	0.660	0.581	0.177	1	0.177	0.103
6	0.659	0.890	0.775	0.147	1	0.147	0.114
7	0.756	0.974	0.865	0.159	1	0.159	0.138
8	0.629	0.840	0.735	0.237	1	0.237	0.174
9	0.529	0.967	0.748	0.252	1	0.252	0.188
10	0.642	0.900	0.771	0.25	1	0.250	0.193
11	0.719	1.024	0.872	0.282	1	0.282	0.246
12	0.895	1.016	0.956	0.31	1	0.310	0.296
13	0.869	1.209	1.039	0.346	1	0.346	0.359
14	0.898	1.308	1.103	0.31	1	0.310	0.342
15	0.895	1.149	1.022	0.345	1	0.345	0.353
16	0.858	1.158	1.008	0.449	1	0.449	0.453
17	0.755	1.310	1.033	0.54	1	0.540	0.558
18	0.827	0.982	0.905	0.52	1	0.520	0.470
19	0.591	0.911	0.751	0.442	1	0.442	0.332
20	0.631	0.995	0.813	0.425	1	0.425	0.346
21	0.519	0.833	0.676	0.383	1	0.383	0.259
22	0.486	0.922	0.704	0.397	1	0.397	0.279
23	0.630	0.807	0.719	0.304	1	0.304	0.218
24	0.691	0.952	0.822	0.323	1	0.323	0.265
25	0.687	0.924	0.806	0.317	1	0.317	0.255
Total					**25**	**7.81**	**6.49**

Water Level Depth (m)	**0.550**
Total Area (A)	**0.323**
Total Discharge (Q)	**0.265**

(Tue)13-Oct-2020

Determining the Water Discharge (Q) from current meter readings

Location:	**Power House**
Date:	**(Tue)13-Oct-2020**
Weather:	**Cloudy & Haze**

River Width(m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.645	0.744	0.695	0.2	1	0.200	0.139
2	0.642	0.889	0.766	0.259	1	0.259	0.198
3	0.710	0.929	0.820	0.222	1	0.222	0.182
4	0.722	0.943	0.833	0.208	1	0.208	0.173
5	0.714	0.966	0.840	0.191	1	0.191	0.160
6	0.721	0.951	0.836	0.228	1	0.228	0.191
7	0.839	0.987	0.913	0.223	1	0.223	0.204
8	0.723	1.039	0.881	0.234	1	0.234	0.206
9	0.806	1.064	0.935	0.269	1	0.269	0.252
10	0.866	1.055	0.961	0.349	1	0.349	0.335
11	0.866	1.072	0.969	0.351	1	0.351	0.340
12	0.811	1.127	0.969	0.306	1	0.306	0.297
13	0.805	1.194	1.000	0.307	1	0.307	0.307
14	0.808	1.101	0.955	0.385	1	0.385	0.367
15	0.829	1.060	0.945	0.387	1	0.387	0.366
16	0.921	1.045	0.983	0.515	1	0.515	0.506
17	0.770	0.848	0.809	0.355	1	0.355	0.287
18	0.820	0.864	0.842	0.28	1	0.280	0.236
19	0.694	0.785	0.740	0.364	1	0.364	0.269
20	0.570	0.877	0.724	0.263	1	0.263	0.190
21	0.566	0.817	0.692	0.276	1	0.276	0.191
22	0.485	0.850	0.668	0.293	1	0.293	0.196
23	0.310	0.768	0.539	0.245	1	0.245	0.132
24	0.287	0.541	0.414	0.21	1	0.210	0.087
25	0.258	0.413	0.336	0.124	1	0.124	0.042
Total					**25**	**7.044**	**5.852**

Water Level Depth (m)	**0.500**
Total Area (A)	**0.210**
Total Discharge (Q)	**0.087**

(Tue)20-Oct-2020

Determining the Water Discharge (Q) from current meter readings

Location:	**Power House**
Date:	**(Tue)20-Oct-2020**
Weather:	**Heavy Rain**

River Width(m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.028	0.126	0.077	0.22	1	0.220	0.017
2	0.622	0.835	0.729	0.248	1	0.248	0.181
3	0.696	1.950	1.323	0.243	1	0.243	0.321
4	0.640	0.876	0.758	0.266	1	0.266	0.202
5	0.665	0.769	0.717	0.268	1	0.268	0.192
6	0.632	0.729	0.681	0.292	1	0.292	0.199
7	0.694	1.008	0.851	0.278	1	0.278	0.237
8	0.726	1.147	0.937	0.285	1	0.285	0.267
9	0.824	1.208	1.016	0.319	1	0.319	0.324
10	0.812	1.154	0.983	0.369	1	0.369	0.363
11	0.794	1.384	1.089	0.413	1	0.413	0.450
12	0.721	1.264	0.993	0.401	1	0.401	0.398
13	0.741	1.377	1.059	0.445	1	0.445	0.471
14	0.754	1.228	0.991	0.481	1	0.481	0.477
15	0.664	1.175	0.920	0.583	1	0.583	0.536
16	0.740	1.291	1.016	0.627	1	0.627	0.637
17	0.705	1.185	0.945	0.414	1	0.414	0.391
18	0.722	1.026	0.874	0.42	1	0.420	0.367
19	0.759	1.155	0.957	0.421	1	0.421	0.403
20	0.811	0.991	0.901	0.466	1	0.466	0.420
21	0.742	0.968	0.855	0.367	1	0.367	0.314
22	0.526	1.026	0.776	0.392	1	0.392	0.304
23	0.633	0.971	0.802	0.326	1	0.326	0.261
24	0.493	0.791	0.642	0.415	1	0.415	0.266
25	0.442	0.791	0.617	0.334	1	0.334	0.206
26	0.432	0.576	0.504	0.249	1	0.249	0.125
27	0.230	0.568	0.399	0.164	1	0.164	0.065
Total					**27**	**9.706**	**8.394**

Water Level Depth (m)	**0.520**
Total Area (A)	**9.706**
Total Discharge (Q)	**8.394**

(Tue)27-Oct-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	31.0	34.0	31.0	31.0	32.0	31.8	1.57	0.67	33	30.19	47.40

(Tue)03-Nov-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	31.0	34.0	31.0	31.0	32.0	31.8	1.32	0.65	32	28.82	38.05

(Tue)17-Nov-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	38.0	42.0	40.9	40.2	42.2	40.6	1.23	0.64	29	28.14	34.61

(Tue)29-Dec-2020-Float/TSS measurement

Distance(m)	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	38.0	42.0	40.9	40.2	42.2	40.6	1.23	0.64	30	28.14	34.61

(Thu)14-Jan-2021-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	30.2	29.4	31.4	30.2	30.9	30.4	1.64	0.65	32	28.82	47.27

(Tue)02-Feb-2021-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
40	28.5	29.1	29.0	28.5	28.8	28.8	1.39	0.67	33	30.19	41.97

(Sat)13-Feb-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
8:30	40	30.32	28.05	34.38	28.37	29.69	30.16	1.33	0.61	26.00	26.08	34.59
9:30	40	30.72	26.75	26.59	33.36	27.79	29.04	1.38	0.63	26.00	26.77	36.87
10:30	40	29.69	29.28	27.41	29.65	26.90	28.59	1.40	0.63	26.00	26.77	37.45
11:30	40	25.97	28.84	31.56	27.66	31.56	29.12	1.37	0.63	26.00	26.77	36.77
12:30	40	27.66	31.96	29.16	29.41	28.25	29.29	1.37	0.63	26.00	27.45	37.49
13:30	40	29.09	27.85	27.72	29.13	27.72	28.30	1.41	0.63	26.00	27.45	38.80

(Sat)20-Feb-2021-TSS measurement

Determining the Water Discharge (Q) from current meter readings							
Location:	**Power House**						
Date:	**(Sat)20-Feb-2021**						
Weather:	**Isolated showers**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.028	0.157	0.093	0.177	1	0.177	0.016
2	0.424	0.497	0.461	0.214	1	0.214	0.099
3	0.421	0.545	0.483	0.256	1	0.256	0.124
4	0.410	0.553	0.482	0.271	1	0.271	0.130
5	0.546	0.647	0.597	0.27	1	0.27	0.161
6	0.587	0.656	0.622	0.326	1	0.326	0.203
7	0.303	0.536	0.420	0.344	1	0.344	0.144
8	0.488	0.574	0.531	0.408	1	0.408	0.217
9	0.713	0.839	0.776	0.457	1	0.457	0.355
10	0.746	0.893	0.820	0.425	1	0.425	0.348
11	0.753	0.957	0.855	0.477	1	0.477	0.408
12	0.893	1.086	0.990	0.48	1	0.480	0.475
13	0.895	1.129	1.012	0.45	1	0.450	0.455
14	0.724	0.930	0.827	0.43	1	0.430	0.356
15	0.609	0.851	0.730	0.454	1	0.454	0.331
16	0.759	0.870	0.815	0.445	1	0.445	0.362
17	0.662	0.754	0.708	0.42	1	0.420	0.297
18	0.609	0.750	0.680	0.456	1	0.456	0.310
19	0.642	0.764	0.703	0.437	1	0.437	0.307
20	0.592	0.673	0.633	0.369	1	0.369	0.233
21	0.580	0.616	0.598	0.348	1	0.348	0.208
22	0.568	0.620	0.594	0.268	1	0.268	0.159
23	0.553	0.635	0.594	0.17	1	0.170	0.101
24	0.494	0.452	0.473	0.18	1	0.180	0.085
Total					**24**	**8.532**	**5.886**
Water Level Depth (m)				**0.500**			
Total Area (A)				**8.532**			
Total Discharge (Q)				**5.886**			

(Sat)27-Feb-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
9:00	50	30.84	27.28	30.41	28.78	27.81	29.02	1.72	0.71	27.00	32.94	56.74
10:00	50	28.50	28.97	29.37	28.12	28.28	28.65	1.75	0.72	27.00	33.62	58.68
11:00	50	29.47	27.48	29.74	28.88	26.68	28.45	1.76	0.72	27.00	33.62	59.09
12:00	50	29.94	25.79	25.28	29.19	28.32	27.70	1.80	0.73	27.00	34.31	61.92
13:00	50	28.25	28.38	28.81	25.69	26.78	27.58	1.81	0.74	27.00	34.99	63.43
14:00	50	26.78	26.57	26.28	26.56	27.18	26.67	1.87	0.75	27.00	35.77	67.05

(Sat)06-Mar-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
9:00	50	25.00	24.00	25.00	25.00	25.00	24.80	2.02	0.75	27.00	35.77	72.12
10:00	50	23.00	23.00	24.00	23.00	24.00	23.40	2.14	0.75	27.00	35.85	76.61
11:00	50	24.00	24.00	23.00	23.00	23.00	23.40	2.14	0.76	27.00	36.66	78.34
12:00	50	24.00	24.00	22.00	22.00	23.00	23.00	2.17	0.76	27.00	36.66	79.70
13:00	50	23.00	23.00	22.00	23.00	23.00	22.80	2.19	0.78	27.00	38.28	83.95
14:00	50	22.00	20.00	22.00	23.00	22.00	21.80	2.29	0.79	27.00	39.09	89.66

(Fri)11-Jun-2021-Float measurement

Time	Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	(m)	1	2	3	4	5	Time (s)	(m/s)	(m)	(m)	(m^2)	(Q)
14:00	35	32.39	28.53	33.11	33.53	29.65	31.44	1.11	0.37	21.50	11.38	12.67
14:30	35	30.39	28.79	30.21	27.01	30.76	29.43	1.19	0.40	21.50	12.87	15.31

Site 4. TONY River

(Tue)07-Jul-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Tony River**						
Date:	**(Tue)07-Jul-2020**						
Weather:	**Fine**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.137	0.283	0.210	0.141	1	0.141	0.030
2	0.354	0.563	0.459	0.201	1	0.201	0.092
3	0.398	0.634	0.516	0.229	1	0.229	0.118
4	0.43	0.473	0.452	0.258	1	0.258	0.116
5	0.520	0.702	0.611	0.271	1	0.271	0.166
6	0.352	0.711	0.532	0.323	1	0.323	0.172
7	0.333	0.734	0.534	0.350	1	0.35	0.187
8	0.547	0.632	0.590	0.450	1	0.450	0.265
9	0.544	0.700	0.622	0.423	1	0.423	0.263
10	0.546	0.746	0.646	0.416	1	0.416	0.269
Total					**10**	**3.062**	**1.678**
Water Level Depth (m)				**0.450**			
Total Area (A)				**3.062**			
Total Discharge (Q)				**1.678**			

(Tue)14-Jul-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Tony River**						
Date:	**(Tue)14-Jul-2020**						
Weather:	**Fine**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.11	0.261	0.186	0.147	1	0.147	0.027
2	0.265	0.416	0.341	0.163	1	0.163	0.056
3	0.265	0.500	0.383	0.196	1	0.196	0.075
4	0.367	0.536	0.452	0.216	1	0.216	0.098
5	0.414	0.575	0.495	0.219	1	0.219	0.108
6	0.419	0.677	0.548	0.247	1	0.247	0.135
7	0.421	0.640	0.531	0.295	1	0.295	0.156
8	0.429	0.645	0.537	0.341	1	0.341	0.183
9	0.435	0.641	0.538	0.336	1	0.336	0.181
10	0.438	0.647	0.543	0.327	1	0.327	0.177
Total					**10**	**2.487**	**1.197**
Water Level Depth (m)				**0.400**			
Total Area (A)				**2.487**			
Total Discharge (Q)				**1.197**			

(Tue)04-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Tony River**						
Date:	**(Tue)04-Aug-2020**						
Weather:	**Fine (Dry weather)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.063	0.119	0.091	0.175	1	0.175	0.016
2	0.159	0.214	0.187	0.119	1	0.119	0.022
3	0.228	0.330	0.279	0.257	1	0.257	0.072
4	0.391	0.436	0.414	0.249	1	0.249	0.103
5	0.441	0.494	0.468	0.261	1	0.261	0.122
6	0.531	0.464	0.498	0.354	1	0.354	0.176
7	0.414	0.679	0.547	0.406	1	0.406	0.222
8	0.345	0.541	0.443	0.331	1	0.331	0.147
9	0.358	0.465	0.412	0.276	1	0.276	0.114
10	0.443	0.470	0.457	0.348	1	0.348	0.159
Total					**10**	**2.776**	**1.152**
Water Level Depth (m)				**0.400**			
Total Area (A)				**2.776**			
Total Discharge (Q)				**1.152**			

(Tue)25-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Tony River**						
Date:	**(Tue)25-Aug-2020**						
Weather:	**Isolated Showers (No Flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.101	0.156	0.129	0.123	1	0.123	0.016
2	0.142	0.225	0.184	0.168	1	0.168	0.031
3	0.243	0.321	0.282	0.227	1	0.227	0.064
4	0.328	0.390	0.359	0.333	1	0.333	0.120
5	0.389	0.504	0.447	0.351	1	0.351	0.157
6	0.353	0.553	0.453	0.361	1	0.361	0.164
7	0.372	0.542	0.457	0.335	1	0.335	0.153
8	0.33	0.505	0.418	0.293	1	0.293	0.122
9	0.297	0.427	0.362	0.288	1	0.288	0.104
10	0.295	0.351	0.323	0.155	1	0.155	0.050
Total					**10**	**2.63**	**0.98**
Water Level Depth (m)			**0.360**				
Total Area (A)			**2.634**				
Total Discharge (Q)			**0.980**				

(Tue)01-Sep-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Tony River**						
Date:	**(Tue)01-Sep-2020**						
Weather:	**Isolated Showers (No Flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.081	0.137	0.109	0.131	1	0.131	0.014
2	0.133	0.277	0.205	0.206	1	0.206	0.042
3	0.211	0.307	0.259	0.232	1	0.232	0.060
4	0.289	0.392	0.341	0.304	1	0.304	0.104
5	0.362	0.470	0.416	0.335	1	0.335	0.139
6	0.398	0.514	0.456	0.348	1	0.348	0.159
7	0.469	0.550	0.510	0.305	1	0.305	0.155
8	0.355	0.485	0.420	0.294	1	0.294	0.123
9	0.289	0.434	0.362	0.283	1	0.283	0.102
10	0.266	0.408	0.337	0.285	1	0.285	0.096
Total					**10**	**2.72**	**1.00**
Water Level Depth (m)				**0.390**			
Total Area (A)				**2.723**			
Total Discharge (Q)				**0.995**			

(Wed)07-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Tony River**						
Date:	**(Wed)07-Oct-2020**						
Weather:	**Isolated Showers (No Flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.107	0.16	0.134	0.118	1	0.118	0.016
2	0.133	0.262	0.198	0.275	1	0.275	0.054
3	0.234	0.312	0.273	0.284	1	0.284	0.078
4	0.237	0.36	0.299	0.295	1	0.295	0.088
5	0.271	0.437	0.354	0.357	1	0.357	0.126
6	0.314	0.456	0.385	0.431	1	0.431	0.166
7	0.399	0.493	0.446	0.432	1	0.432	0.193
8	0.409	0.499	0.454	0.415	1	0.415	0.188
9	0.496	0.516	0.506	0.376	1	0.376	0.190
10	0.425	0.515	0.470	0.298	1	0.298	0.140
11	0.314	0.383	0.349	0.22	1	0.22	0.077
Total					**11**	**3.50**	**1.32**
Water Level Depth (m)				**0.430**			
Total Area (A)				**3.501**			
Total Discharge (Q)				**1.316**			

(Tue)13-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Tony River**						
Date:	**(Tue)13-Oct-2020**						
Weather:	**Isolated Showers (Signs of flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.095	0.124	0.110	0.104	1	0.104	0.011
2	0.145	0.266	0.206	0.125	1	0.125	0.026
3	0.31	0.302	0.306	0.253	1	0.253	0.077
4	0.359	0.43	0.395	0.284	1	0.284	0.112
5	0.387	0.444	0.416	0.346	1	0.346	0.144
6	0.374	0.458	0.416	0.430	1	0.43	0.179
7	0.381	0.472	0.427	0.435	1	0.435	0.186
8	0.407	0.501	0.454	0.432	1	0.432	0.196
9	0.436	0.432	0.434	0.377	1	0.377	0.164
10	0.368	0.416	0.392	0.353	1	0.353	0.138
11	0.256	0.272	0.264	0.352	1	0.352	0.093
Total					**11**	**3.49**	**1.33**
Water Level Depth (m)				**0.440**			
Total Area (A)				**3.491**			
Total Discharge (Q)				**1.326**			

(Sat)13-Feb-2021-Float measurement

Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
50	55.64	53.25	52.35	58.06	52.76	43.9	1.14	0.40	15	10.57	12.04
50	50.22	52.22	52.03	59.27	50.53	36.3	1.38	0.41	15	10.86	14.94
50	52.81	50.47	49.24	50.74	50.28	34.6	1.45	0.41	15	10.92	15.80

(Sat)20-Feb-2021-Float measurement

Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
50	60.07	60.17	60.00	60.10	60.05	48.1	1.04	0.40	15	10.51	10.93
50	60.50	55.00	57.53	55.69	60.02	38.9	1.29	0.42	15	11.74	15.10

50	57.55	58.25	59.87	58.22	59.01	39.8	1.26	0.41	15	11.15	14.02

(Sat)27-Feb-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	48.00	55.00	51.00	51.00	51.00	41.0	1.22	0.41	17.5	11.15	13.60
50	52.00	53.00	53.00	51.00	54.00	35.5	1.41	0.43	17.5	12.33	17.35
50	54.00	54.00	52.00	54.00	53.00	36.4	1.37	0.44	17.5	12.91	17.75

(Sat)06-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	32.00	34.00	33.00	33.00	33.00	26.4	1.89	0.48	18	15.26	28.91
50	34.00	34.00	53.00	34.00	34.00	26.4	1.90	0.48	18	15.38	29.18
50	54.00	33.00	33.00	34.00	33.00	26.2	1.97	0.48	18	15.50	30.59

(Sat)13-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	60.05	60.03	61.07	60.28	59.33	48.3	1.22	0.41	15.2	11.15	13.59
50	60.04	60.31	60.13	60.72	60.60	48.2	1.04	0.41	15.4	11.33	11.74
50	59.54	59.68	59.42	59.23	60.60	47.6	1.05	0.42	15.5	11.45	12.03

(Sun)14-Mar-2021

Determining the Water Discharge (Q) from current meter readings							
Location:	**Tony River**						
Date:	**(Sun)14-Mar-2020**						
Weather:	**Isolated Showers (Signs of flooding)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.177	0.204	0.191	0.302	1	0.302	0.058
2	0.197	0.311	0.254	0.466	1	0.466	0.118
3	0.297	0.51	0.404	0.527	1	0.527	0.213
4	0.32	0.574	0.447	0.539	1	0.539	0.241
5	0.328	0.54	0.434	0.522	1	0.522	0.227
6	0.367	0.553	0.460	0.503	1	0.503	0.231
7	0.415	0.596	0.506	0.464	1	0.464	0.235
8	0.357	0.657	0.507	0.377	1	0.377	0.191
9	0.384	0.683	0.534	0.292	1	0.292	0.156
10	0.361	0.686	0.524	0.313	1	0.313	0.164
11	0.414	0.774	0.594	0.387	1	0.387	0.230
Total					**11**	**4.69**	**2.06**
Water Level Depth (m)				**0.440**			
Total Area (A)				**4.692**			
Total Discharge (Q)				**2.063**			

(Tue)23-Mar-2021-Float measurement

Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
50	59.21	59.13	59.06	59.56	59.54	47.4	1.06	0.49	21.50	15.85	16.72
50	60.09	60.13	60.02	60.75	60.47	48.2	1.04	0.47	21.25	14.68	15.22
50	60.09	60.50	60.67	60.04	60.45	48.3	1.04	0.46	21.00	14.09	14.60

(Wed)24-Mar-2021-Float measurement

Distance (m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
50	60.95	60.73	60.34	60.74	60.09	48.6	1.03	0.40	16	10.57	10.88

Site 5. Vuramali Village

(Mon)29-Jun-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Vuramali**						
Date:	**(Mon)29-Jun-2020**						
Weather:	**Isolated Showers & Thunder storms (after over night flood)**						
River Width(m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.068	0.042	0.055	0.055	1	0.055	0.003
2	0.073	0.113	0.093	0.110	1	0.110	0.010
3	0.201	0.142	0.172	0.151	1	0.151	0.026
4	0.228	0.128	0.178	0.200	1	0.200	0.036
5	0.26	0.131	0.196	0.213	1	0.213	0.042
6	0.289	0.134	0.212	0.244	1	0.244	0.052
7	0.235	0.151	0.193	0.237	1	0.237	0.046
8	0.348	0.206	0.277	0.307	1	0.307	0.085
9	0.328	0.328	0.328	0.357	1	0.357	0.117
10	0.535	0.484	0.510	0.434	1	0.434	0.221
11	0.51	0.462	0.486	0.467	1	0.467	0.227
12	0.487	0.58	0.534	0.477	1	0.477	0.254
13	0.491	0.346	0.419	0.458	1	0.458	0.192
14	0.292	0.523	0.408	0.442	1	0.442	0.180
15	0.479	0.602	0.541	0.470	1	0.470	0.254
16	0.615	0.369	0.492	0.453	1	0.453	0.223
17	0.506	0.479	0.493	0.441	1	0.441	0.217
18	0.473	0.575	0.524	0.404	1	0.404	0.212
19	0.05	0.147	0.099	0.404	1	0.404	0.040
20	0.021	0.303	0.162	0.371	1	0.371	0.060
21	0.641	0.677	0.659	0.342	1	0.342	0.225
22	0.137	0.408	0.273	0.339	1	0.339	0.092
23	0.393	0.442	0.418	0.333	1	0.333	0.139
24	0.221	0.394	0.308	0.191	1	0.191	0.059
25	0.268	0.307	0.288	0.169	1	0.169	0.049
26	0.346	0.235	0.291	0.143	1	0.143	0.042
27	0.185	0.265	0.225	0.153	1	0.153	0.034
28	0.267	0.139	0.203	0.132	1	0.132	0.027
29	0.223	0.245	0.234	0.066	1	0.066	0.015
30	0.309	0.372	0.341	0.081	1	0.081	0.028
31	0.215	0.347	0.281	0.133	1	0.133	0.037
32	0.251	0.334	0.293	0.131	1	0.131	0.038
33	0.264	0.364	0.314	0.148	1	0.148	0.046

34	0.487	0.302	0.395	0.160	1	0.160	0.063
35	0.297	0.514	0.406	0.153	1	0.153	0.062
36	0.364	0.401	0.383	0.145	1	0.145	0.055
37	0.463	0.468	0.466	0.110	1	0.110	0.051
38	0.352	0.352	0.352	0.103	1	0.103	0.036
39	0.328	0.358	0.343	0.108	1	0.108	0.037
40	0.340	0.309	0.325	0.125	1	0.125	0.041
41	0.257	0.403	0.330	0.161	1	0.161	0.053
42	0.513	0.448	0.481	0.144	1	0.144	0.069
43	0.312	0.29	0.301	0.148	1	0.148	0.045
44	0.362	0.349	0.356	0.131	1	0.131	0.047
45	0.347	0.359	0.353	0.116	1	0.116	0.041
46	0.249	0.281	0.265	0.103	1	0.103	0.027
47	0.274	0.248	0.261	0.084	1	0.084	0.022
48	0.231	0.251	0.241	0.078	1	0.078	0.019
49	0.168	0.205	0.187	0.052	1	0.052	0.010
50	0.203	0.198	0.201	0.056	1	0.056	0.011
Total					**50**	**11.033**	**4.017**

Water Level Depth (m)	**0.477**
Total Area (A)	**11.033**
Total Discharge (Q)	**4.017**

(Thu)02-Jul-2020-TSS measurement

Determining the Water Discharge (Q) from current meter readings

Location:	**Vuramali**
Date:	**(Thu)02-Jul-2020**
Weather:	**Isolated Showers & Thunder storms (after over night flood)**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.109	0.115	0.112	0.094	1	0.094	0.011
2	0.154	0.221	0.188	0.14	1	0.14	0.026
3	0.231	0.287	0.259	0.179	1	0.179	0.046
4	0.225	0.384	0.305	0.228	1	0.228	0.069
5	0.278	0.417	0.348	0.29	1	0.29	0.101
6	0.385	0.565	0.475	0.226	1	0.226	0.107
7	0.418	0.593	0.506	0.273	1	0.273	0.138
8	0.578	0.725	0.652	0.325	1	0.325	0.212
9	0.544	0.756	0.650	0.332	1	0.332	0.216
10	0.587	0.887	0.737	0.404	1	0.404	0.298
11	0.607	1.037	0.822	0.469	1	0.469	0.386

12	0.985	1.037	1.011	0.562	1	0.562	0.568
13	0.988	1.039	1.014	0.52	1	0.52	0.527
14	0.784	1.015	0.900	0.554	1	0.554	0.498
15	0.789	1.016	0.903	0.623	1	0.623	0.562
16	0.818	0.820	0.819	0.557	1	0.557	0.456
17	0.79	0.943	0.867	0.688	1	0.688	0.596
18	0.627	0.816	0.722	0.609	1	0.609	0.439
19	0.694	0.890	0.792	0.555	1	0.555	0.440
20	0.678	0.872	0.775	0.584	1	0.584	0.453
21	0.728	0.816	0.772	0.593	1	0.593	0.458
22	0.759	0.805	0.782	0.482	1	0.482	0.377
23	0.614	0.737	0.676	0.440	1	0.44	0.297
24	0.554	0.646	0.600	0.356	1	0.356	0.214
25	0.712	0.606	0.659	0.439	1	0.439	0.289
26	0.498	0.740	0.619	0.388	1	0.388	0.240
27	0.559	0.740	0.650	0.351	1	0.351	0.228
28	0.406	0.739	0.573	0.358	1	0.358	0.205
29	0.341	0.737	0.539	0.277	1	0.277	0.149
30	0.336	0.654	0.495	0.247	1	0.247	0.122
31	0.505	0.656	0.581	0.259	1	0.259	0.150
32	0.363	0.603	0.483	0.263	1	0.263	0.127
33	0.381	0.633	0.507	0.216	1	0.216	0.110
34	0.384	0.572	0.478	0.388	1	0.388	0.185
35	0.351	0.383	0.367	0.226	1	0.226	0.083
36	0.481	0.607	0.544	0.203	1	0.203	0.110
37	0.472	0.522	0.497	0.189	1	0.189	0.094
38	0.364	0.471	0.418	0.207	1	0.207	0.086
39	0.317	0.362	0.340	0.193	1	0.193	0.066
40	0.312	0.335	0.324	0.208	1	0.208	0.067
41	0.345	0.375	0.360	0.210	1	0.21	0.076
42	0.347	0.377	0.362	0.192	1	0.192	0.070
43	0.283	0.350	0.317	0.174	1	0.174	0.055
44	0.292	0.360	0.326	0.169	1	0.169	0.055
Total					**44**	**15.240**	**10.063**

Water Level Depth (m)	**0.688**
Total Area (A)	**15.240**
Total Discharge (Q)	**10.063**

(Tue)04-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Vuramali**						
Date:	**(Tue)04-Aug-2020**						
Weather:	**Fine (Dry weather)**						
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.105	0.129	0.117	0.096	1	0.096	0.011
2	0.141	0.192	0.167	0.131	1	0.131	0.022
3	0.106	0.188	0.147	0.218	1	0.218	0.032
4	0.189	0.222	0.206	0.31	1	0.31	0.064
5	0.255	0.344	0.300	0.406	1	0.406	0.122
6	0.261	0.388	0.325	0.426	1	0.426	0.138
7	0.331	0.408	0.370	0.425	1	0.425	0.157
8	0.246	0.407	0.327	0.495	1	0.495	0.162
9	0.36	0.523	0.442	0.501	1	0.501	0.221
10	0.324	0.589	0.457	0.472	1	0.472	0.215
11	0.424	0.523	0.474	0.466	1	0.466	0.221
12	0.489	0.528	0.509	0.440	1	0.44	0.224
13	0.414	0.636	0.525	0.42	1	0.42	0.221
14	0.425	0.610	0.518	0.396	1	0.396	0.205
15	0.434	0.625	0.530	0.322	1	0.322	0.170
16	0.484	0.593	0.539	0.360	1	0.36	0.194
17	0.474	0.582	0.528	0.398	1	0.398	0.210
18	0.488	0.626	0.557	0.343	1	0.343	0.191
19	0.372	0.577	0.475	0.390	1	0.39	0.185
20	0.392	0.631	0.512	0.378	1	0.378	0.193
21	0.374	0.619	0.497	0.335	1	0.335	0.166
22	0.347	0.563	0.455	0.291	1	0.291	0.132
23	0.3	0.535	0.418	0.230	1	0.23	0.096
24	0.286	0.427	0.357	0.198	1	0.198	0.071
25	0.224	0.419	0.322	0.169	1	0.169	0.054
26	0.202	0.408	0.305	0.145	1	0.145	0.044
27	0.23	0.293	0.262	0.127	1	0.127	0.033
28	0.226	0.240	0.233	0.126	1	0.126	0.029
29	0.224	0.231	0.228	0.126	1	0.126	0.029
30	0.136	0.225	0.181	0.130	1	0.13	0.023
31	0.125	0.207	0.166	0.104	1	0.104	0.017
32	0.121	0.204	0.163	0.263	1	0.263	0.043
33	0.114	0.175	0.145	0.216	1	0.216	0.031
34	0.102	0.172	0.137	0.388	1	0.388	0.053

Total		34	10.241	3.981
Water Level Depth (m)	0.450			
Total Area (A)	10.241			
Total Discharge (Q)	3.981			

(Tue)25-Aug-2020

Determining the Water Discharge (Q) from current meter readings

Location:	Vuramali
Date:	(Tue)25-Aug-2020
Weather:	Fine (Dry weather)

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.131	0.185	0.158	0.095	1	0.095	0.015
2	0.152	0.194	0.173	0.163	1	0.163	0.028
3	0.264	0.289	0.277	0.194	1	0.194	0.054
4	0.292	0.365	0.329	0.284	1	0.284	0.093
5	0.327	0.534	0.431	0.301	1	0.301	0.130
6	0.377	0.575	0.476	0.346	1	0.346	0.165
7	0.38	0.598	0.489	0.346	1	0.346	0.169
8	0.344	0.572	0.458	0.4	1	0.4	0.183
9	0.373	0.599	0.486	0.416	1	0.416	0.202
10	0.39	0.684	0.537	0.422	1	0.422	0.227
11	0.45	0.692	0.571	0.435	1	0.435	0.248
12	0.561	0.713	0.637	0.440	1	0.44	0.280
13	0.532	0.721	0.627	0.415	1	0.415	0.260
14	0.525	0.655	0.590	0.388	1	0.388	0.229
15	0.541	0.689	0.615	0.4	1	0.4	0.246
16	0.502	0.680	0.591	0.404	1	0.404	0.239
17	0.514	0.592	0.553	0.353	1	0.353	0.195
18	0.502	0.618	0.560	0.329	1	0.329	0.184
19	0.421	0.606	0.514	0.307	1	0.307	0.158
20	0.325	0.518	0.422	0.300	1	0.3	0.126
21	0.301	0.427	0.364	0.257	1	0.257	0.094
22	0.311	0.436	0.374	0.213	1	0.213	0.080
23	0.3	0.474	0.387	0.199	1	0.199	0.077
24	0.283	0.434	0.359	0.168	1	0.168	0.060
25	0.286	0.386	0.336	0.172	1	0.172	0.058
26	0.22	0.350	0.285	0.158	1	0.158	0.045
27	0.235	0.313	0.274	0.142	1	0.142	0.039
28	0.198	0.301	0.250	0.075	1	0.075	0.019
29	0.177	0.299	0.238	0.074	1	0.074	0.018

30	0.161	0.269	0.215	0.055	1	0.055	0.012
31	0.142	0.212	0.177	0.065	1	0.065	0.012
32	0.101	0.216	0.159	0.064	1	0.064	0.010
Total					**32**	**8.380**	**3.953**
Water Level Depth (m)			**0.430**				
Total Area (A)			**8.380**				
Total Discharge (Q)			**3.953**				

(Tue)01-Sep-2020

Determining the Water Discharge (Q) from current meter readings

Location:	**Vuramali**
Date:	**(Tue)01-Sep-2020**
Weather:	**Fine (Dry weather)**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.161	0.217	0.189	0.098	1	0.098	0.019
2	0.168	0.258	0.213	0.152	1	0.152	0.032
3	0.27	0.301	0.286	0.233	1	0.233	0.067
4	0.29	0.412	0.351	0.295	1	0.295	0.104
5	0.402	0.496	0.449	0.322	1	0.322	0.145
6	0.456	0.497	0.477	0.357	1	0.357	0.170
7	0.482	0.505	0.494	0.377	1	0.377	0.186
8	0.386	0.592	0.489	0.428	1	0.428	0.209
9	0.53	0.628	0.579	0.419	1	0.419	0.243
10	0.586	0.640	0.613	0.422	1	0.422	0.259
11	0.59	0.663	0.627	0.442	1	0.442	0.277
12	0.534	0.543	0.539	0.421	1	0.421	0.227
13	0.488	0.598	0.543	0.413	1	0.413	0.224
14	0.42	0.686	0.553	0.451	1	0.451	0.249
15	0.409	0.627	0.518	0.446	1	0.446	0.231
16	0.355	0.706	0.531	0.443	1	0.443	0.235
17	0.353	0.711	0.532	0.364	1	0.364	0.194
18	0.355	0.605	0.480	0.337	1	0.337	0.162
19	0.403	0.643	0.523	0.369	1	0.369	0.193
20	0.378	0.563	0.471	0.341	1	0.341	0.160
21	0.341	0.530	0.436	0.294	1	0.294	0.128
22	0.286	0.465	0.376	0.174	1	0.174	0.065
23	0.352	0.457	0.405	0.168	1	0.168	0.068
24	0.251	0.441	0.346	0.134	1	0.134	0.046
25	0.248	0.355	0.302	0.124	1	0.124	0.037
26	0.178	0.345	0.262	0.12	1	0.12	0.031

27	0.132	0.384	0.258	0.111	1	0.111	0.029
28	0.129	0.362	0.246	0.121	1	0.121	0.030
29	0.112	0.342	0.227	0.111	1	0.111	0.025
30	0.094	0.328	0.211	0.098	1	0.098	0.021
31	0.112	0.295	0.204	0.097	1	0.097	0.020
32	0.122	0.211	0.167	0.094	1	0.094	0.016
Total					**32**	**8.78**	**4.10**
Water Level Depth (m)			**0.450**				
Total Area (A)			**8.776**				
Total Discharge (Q)			**4.101**				

(Wed)07-Oct-2020

Determining the Water Discharge (Q) from current meter readings

Location:	**Vuramali**
Date:	**(Wed)07-Oct-2020**
Weather:	**Isolated shower (River Condition: After flooding)**

River Width (m)	Flow Velocity (m/s)			Depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)
	V1	v2	Mean				
1	0.132	0.220	0.176	0.064	1	0.064	0.011
2	0.183	0.305	0.244	0.096	1	0.096	0.023
3	0.273	0.455	0.364	0.097	1	0.097	0.035
4	0.331	0.551	0.441	0.13	1	0.13	0.057
5	0.355	0.593	0.474	0.203	1	0.203	0.096
6	0.356	0.589	0.473	0.387	1	0.387	0.183
7	0.412	0.686	0.549	0.424	1	0.424	0.233
8	0.520	0.810	0.665	0.428	1	0.428	0.285
9	0.516	0.864	0.690	0.435	1	0.435	0.300
10	0.528	0.896	0.712	0.478	1	0.478	0.340
11	0.564	0.941	0.753	0.448	1	0.448	0.337
12	0.574	0.957	0.766	0.537	1	0.537	0.411
13	0.556	0.927	0.742	0.605	1	0.605	0.449
14	0.559	0.918	0.739	0.511	1	0.511	0.377
15	0.556	0.927	0.742	0.571	1	0.571	0.423
16	0.542	0.901	0.722	0.583	1	0.583	0.421
17	0.496	0.827	0.662	0.478	1	0.478	0.316
18	0.475	0.794	0.635	0.567	1	0.567	0.360
19	0.447	0.745	0.596	0.434	1	0.434	0.259
20	0.420	0.700	0.560	0.426	1	0.426	0.239
21	0.458	0.763	0.611	0.337	1	0.337	0.206
22	0.451	0.751	0.601	0.391	1	0.391	0.235
23	0.436	0.576	0.506	0.331	1	0.331	0.167

24	0.395	0.585	0.490	0.292	1	0.292	0.143
25	0.342	0.570	0.456	0.27	1	0.27	0.123
26	0.326	0.544	0.435	0.244	1	0.244	0.106
27	0.304	0.507	0.406	0.249	1	0.249	0.101
28	0.291	0.485	0.388	0.205	1	0.205	0.080
29	0.262	0.437	0.350	0.202	1	0.202	0.071
30	0.240	0.400	0.320	0.186	1	0.186	0.060
31	0.254	0.423	0.339	0.176	1	0.176	0.060
32	0.233	0.388	0.311	0.163	1	0.163	0.051
33	0.175	0.292	0.234	0.162	1	0.162	0.038
34	0.133	0.222	0.178	0.141	1	0.141	0.025
35	0.136	0.226	0.181	0.121	1	0.121	0.022
36	0.133	0.221	0.177	0.104	1	0.104	0.018
37	0.124	0.203	0.164	0.097	1	0.097	0.016
38	0.104	0.173	0.139	0.094	1	0.094	0.013
39	0.102	0.155	0.129	0.091	1	0.091	0.012
Total					**39**	**11.76**	**6.70**
Water Level Depth (m)				**0.600**			
Total Area (A)				**11.758**			
Total Discharge (Q)				**6.701**			

(Tue)13-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Vuramali**						
Date:	**(Tue)13-Oct-2020**						
Weather:	**Rain & Wind**						
River Width (m)	**Flow Velocity (m/s)**			**Depth (m)**	**Width (m)**	**Area (m^2)**	**Discharge (m^3/s)**
	V1	**v2**	**Mean**				
1	0.088	0.110	0.099	0.093	1	0.093	0.009
2	0.093	0.141	0.117	0.131	1	0.131	0.015
3	1.010	0.169	0.590	0.167	1	0.167	0.098
4	0.298	0.497	0.398	0.329	1	0.329	0.131
5	0.321	0.651	0.486	0.359	1	0.359	0.174
6	0.316	0.770	0.543	0.379	1	0.379	0.206
7	0.347	0.809	0.578	0.438	1	0.438	0.253
8	0.384	0.855	0.620	0.388	1	0.388	0.240
9	0.380	0.850	0.615	0.414	1	0.414	0.255
10	0.416	0.951	0.684	0.458	1	0.458	0.313
11	0.342	0.803	0.573	0.538	1	0.538	0.308
12	0.368	0.848	0.608	0.554	1	0.554	0.337
13	0.458	0.947	0.703	0.608	1	0.608	0.427

14	0.386	0.857	0.622	0.559	1	0.559	0.347
15	0.461	0.951	0.706	0.503	1	0.503	0.355
16	0.306	0.882	0.594	0.508	1	0.508	0.302
17	0.438	0.922	0.680	0.476	1	0.476	0.324
18	0.478	0.847	0.663	0.435	1	0.435	0.288
19	0.314	0.767	0.541	0.397	1	0.397	0.215
20	0.374	0.841	0.608	0.364	1	0.364	0.221
21	0.328	0.785	0.557	0.341	1	0.341	0.190
22	0.309	0.761	0.535	0.336	1	0.336	0.180
23	0.270	0.588	0.429	0.271	1	0.271	0.116
24	0.220	0.525	0.373	0.235	1	0.235	0.088
25	0.372	0.590	0.481	0.301	1	0.301	0.145
26	0.268	0.585	0.427	0.233	1	0.233	0.099
27	0.222	0.653	0.438	0.218	1	0.218	0.095
28	0.279	0.599	0.439	0.211	1	0.211	0.093
29	0.105	0.506	0.306	0.191	1	0.191	0.058
30	0.127	0.521	0.324	0.185	1	0.185	0.060
31	0.146	0.432	0.289	0.168	1	0.168	0.049
32	0.157	0.446	0.302	0.140	1	0.14	0.042
33	0.142	0.428	0.285	0.134	1	0.134	0.038
34	0.135	0.294	0.215	0.093	1	0.093	0.020
35	0.094	0.292	0.193	0.112	1	0.112	0.022
36	0.081	0.226	0.154	0.105	1	0.105	0.016
37	0.904	0.255	0.580	0.090	1	0.09	0.052
38	0.086	0.232	0.159	0.085	1	0.085	0.014
Total					**38**	**11.55**	**6.20**
Water Level Depth (m)			**0.600**				
Total Area (A)			**11.547**				
Total Discharge (Q)			**6.195**				

(Tue)27-Oct-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
50	28.0	28.0	29.0	28.0	28.0	28.2	1.78	0.50	27.5	40.18	71.38

(Tue)03-Nov-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean Time(s)	Velocity (m/s)	Depth (m)	Width (m)	Area (m^2)	Discharge (Q)
	1	2	3	4	5						
50	26.0	27.0	25.0	25.0	24.0	25.4	1.96	0.48	25.5	37.83	74.32

(Tue)17-Nov-2020-Float/TSS measurement

Distance(m)	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	28.1	32.0	30.8	30.9	32.0	30.8	1.62	0.45	24.5	34.30	55.68

(Tue)29-Dec-2020-Float measurement

Distance(m)	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	37.5	33.3	29.5	26.7	21.1	29.6	1.68	0.48	26	37.24	62.65

(Sat)13-Feb-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
40	22.56	20.89	24.60	23.94	22.75	22.9	1.74	0.47	26	37.00	64.50
40	20.93	21.00	20.85	21.40	21.97	21.2	1.88	0.44	26	33.12	62.41
40	21.82	22.72	21.42	20.57	20.79	21.5	1.86	0.47	26	33.12	61.72

(Sat)20-Feb-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	42.29	38.27	39.32	39.90	40.76	40.1	1.25	0.47	30	36.65	45.69
50	31.59	31.33	30.98	35.02	33.05	32.4	1.54	0.43	30	31.94	49.31
50	32.87	37.01	31.58	32.42	31.50	33.1	1.51	0.45	30	34.30	51.85

(Sat)27-Feb-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	25.0	27.0	25.0	27.0	27.0	26.2	1.91	0.49	35	39.00	74.44
50	26.0	26.0	27.0	25.0	24.0	25.6	1.95	0.50	35.5	39.59	77.33
50	24.0	27.0	27.0	26.0	23.0	25.4	1.97	0.51	35.5	41.36	81.41

(Sat)06-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	20.0	22.0	22.0	21.0	21.0	21.2	2.36	0.65	37.5	57.83	136.39
50	21.0	21.0	20.0	22.0	21.0	21.0	2.38	0.67	36.5	60.18	143.30
50	20.0	21.0	18.0	28.0	19.0	21.2	2.45	0.62	29	53.71	131.65

(Sat)13-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	42.47	38.44	38.56	36.66	33.07	37.8	1.32	0.57	29	48.42	63.98
50	36.03	36.13	35.22	39.44	29.91	35.3	1.41	0.65	29	57.83	81.81

50	39.75	32.34	39.32	37.66	28.56	35.5	1.41	0.60	29	51.95	73.11
50	40.25	36.06	39.22	38.5	31.6	37.1	1.35	0.55	29	46.06	62.04

(Sun)14-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	40.25	38.69	37.1	38.1	31	37.0	1.35	0.60	29	51.95	70.15
50	30.88	32.1	36.82	32.4	35.53	33.5	1.49	0.56	29	47.24	70.41
50	29.75	33.25	38	31.34	37.65	34.0	1.47	0.56	29	47.59	70.00

(Tue)23-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	57.39	56.72	56.32	54.31	50.16	55.0	0.91	0.60	29	51.95	47.06

(Wed)24-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	45.12	47.78	46.95	46.91	48.12	47.0	1.06	0.62	29	53.71	57.17
50	48.82	49.38	47.29	46.5	48.06	48.0	1.04	0.62	29	53.71	55.94
50	46.6	45.45	45.13	47.19	47.81	46.4	1.08	0.62	29	54.30	58.47

(Fri)26-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	44.67	45.33	46.28	46.39	45.47	45.6	1.10	0.63	29	55.48	60.79
50	45.86	46.12	46.52	46.23	45.64	46.1	1.09	0.62	29	54.30	58.93
50	46.29	45.43	45.44	47.31	46.66	46.2	1.08	0.62	29	54.30	58.73

(Sat)27-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	46	45	45	46	45	45.4	1.10	0.64	29	56.65	62.39
50	46	46	47	46	46	46.2	1.08	0.62	29	54.30	58.77
50	45	46	46	45	46	45.6	1.10	0.63	29	55.48	60.83

Site 6. Ngalimbiu Bridge

(Mon)29-Jun-2020-TSS measurement

Determining the Water Discharge (Q) from current meter readings							
Location:	**Ngalimbiu Bridge**						
Date:	**(Mon)29-Jun-2020**						
Weather:	**Isolated Showers & Thunder storms (after over night flood)**						
River	**Flow Velocity (m/s)**			**Depth**	**Width**	**Area**	**Discharge**
Width (m)	**V1**	**v2**	**Mean**	**(m)**	**(m)**	**(m^2)**	**(m^3/s)**
1	0.122	0.127	0.125	0.070	1	0.070	0.009
2	0.202	0.133	0.168	0.105	1	0.105	0.018
3	0.206	0.160	0.183	0.200	1	0.200	0.037
4	0.290	0.154	0.222	0.278	1	0.278	0.062
5	0.387	0.274	0.331	0.445	1	0.445	0.147
6	0.269	0.181	0.225	0.575	1	0.575	0.129
7	0.112	0.356	0.234	0.580	1	0.580	0.136
8	0.203	0.290	0.247	0.622	1	0.622	0.153
9	0.321	0.311	0.316	0.598	1	0.598	0.189
10	0.475	0.415	0.445	0.580	1	0.580	0.258
11	0.470	0.538	0.504	0.751	1	0.751	0.379
12	0.356	0.706	0.531	0.871	1	0.871	0.463
13	0.302	0.508	0.405	0.798	1	0.798	0.323
14	0.565	0.500	0.533	0.904	1	0.904	0.481
15	0.472	0.669	0.571	0.875	1	0.875	0.499
16	0.495	0.761	0.628	0.808	1	0.808	0.507
17	0.523	0.753	0.638	0.859	1	0.859	0.548
18	0.230	0.355	0.293	0.804	1	0.804	0.235
19	0.183	0.183	0.183	0.447	1	0.447	0.082
Total					**19**	**11.170**	**4.654**
Water Level Depth (m)			**0.904**				
Total Area (A)			**11.170**				
Total Discharge (Q)			**4.654**				

(Tue)04-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Ngalimbiu Bridge**						
Date:	**(Tue)04-Aug-2020**						
Weather:	**Fine (Dry weather)**						
River	**Flow Velocity (m/s)**			**Depth**	**Width**	**Area**	**Discharge**
Width (m)	**V1**	**v2**	**Mean**	**(m)**	**(m)**	**(m^2)**	**(m^3/s)**
1	0.146	0.198	0.172	0.043	1	0.043	0.007
2	0.195	0.200	0.198	0.195	1	0.195	0.039
3	0.268	0.202	0.235	0.322	1	0.322	0.076
4	0.164	0.346	0.255	0.388	1	0.388	0.099
5	0.246	0.348	0.297	0.544	1	0.544	0.162
6	0.273	0.409	0.341	0.651	1	0.651	0.222
7	0.287	0.416	0.352	0.811	1	0.811	0.285
8	0.256	0.495	0.376	0.685	1	0.685	0.257
9	0.338	0.514	0.426	0.788	1	0.788	0.336
10	0.324	0.599	0.462	0.709	1	0.709	0.327
11	0.478	0.659	0.569	0.735	1	0.735	0.418
12	0.513	0.715	0.614	0.902	1	0.902	0.554
13	0.528	0.727	0.628	0.797	1	0.797	0.500
14	0.465	0.640	0.553	0.715	1	0.715	0.395
15	0.344	0.617	0.481	0.609	1	0.609	0.293
16	0.279	0.580	0.430	0.602	1	0.602	0.259
17	0.272	0.483	0.378	0.561	1	0.561	0.212
18	0.192	0.358	0.275	0.490	1	0.490	0.135
19	0.182	0.218	0.200	0.314	1	0.314	0.063
Total					**19**	**10.861**	**4.637**
Water Level Depth (m)				**0.900**			
Total Area (A)				**10.861**			
Total Discharge (Q)				**4.637**			

(Tue)25-Aug-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Ngalimbiu Bridge**						
Date:	**(Tue)25-Aug-2020**						
Weather:	**Isolated Shower (No flooding)**						
River	**Flow Velocity (m/s)**			**Depth**	**Width**	**Area**	**Discharge**
Width (m)	**V1**	**v2**	**Mean**	**(m)**	**(m)**	**(m^2)**	**(m^3/s)**
1	0.115	0.131	0.123	0.028	1	0.028	0.003
2	0.136	0.181	0.159	0.141	1	0.141	0.022
3	0.150	0.233	0.192	0.305	1	0.305	0.058
4	0.194	0.276	0.235	0.549	1	0.549	0.129
5	0.227	0.313	0.270	0.565	1	0.565	0.153
6	0.376	0.451	0.414	0.822	1	0.822	0.340
7	0.340	0.410	0.375	0.742	1	0.742	0.278
8	0.427	0.485	0.456	0.828	1	0.828	0.378
9	0.352	0.534	0.443	0.866	1	0.866	0.384
10	0.558	0.667	0.613	0.798	1	0.798	0.489
11	0.516	0.714	0.615	0.779	1	0.779	0.479
12	0.503	0.760	0.632	0.668	1	0.668	0.422
13	0.412	0.618	0.515	0.553	1	0.553	0.285
14	0.490	0.637	0.564	0.484	1	0.484	0.273
15	0.458	0.564	0.511	0.403	1	0.403	0.206
16	0.407	0.563	0.485	0.475	1	0.475	0.230
17	0.401	0.495	0.448	0.434	1	0.434	0.194
18	0.333	0.433	0.383	0.317	1	0.317	0.121
19	0.244	0.328	0.286	0.335	1	0.335	0.096
Total					**19**	**10.092**	**4.540**
Water Level Depth (m)			**0.800**				
Total Area (A)			**10.092**				
Total Discharge (Q)			**4.540**				

(Tue)01-Sep-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Ngalimbiu Bridge**						
Date:	**(Tue)01-Sep-2020**						
Weather:	**Isolated Shower (No flooding)**						
River	**Flow Velocity (m/s)**			**Depth**	**Width**	**Area**	**Discharge**
Width (m)	**V1**	**v2**	**Mean**	**(m)**	**(m)**	**(m^2)**	**(m^3/s)**
1	0.106	0.289	0.198	0.126	1	0.126	0.025
2	0.225	0.395	0.310	0.230	1	0.230	0.071
3	0.294	0.446	0.370	0.388	1	0.388	0.144
4	0.319	0.473	0.396	0.357	1	0.357	0.141
5	0.339	0.553	0.446	0.463	1	0.463	0.206
6	0.357	0.557	0.457	0.544	1	0.544	0.249
7	0.388	0.612	0.500	0.614	1	0.614	0.307
8	0.407	0.585	0.496	0.688	1	0.688	0.341
9	0.429	0.581	0.505	0.714	1	0.714	0.361
10	0.485	0.631	0.558	0.767	1	0.767	0.428
11	0.429	0.647	0.538	0.805	1	0.805	0.433
12	0.437	0.684	0.561	0.777	1	0.777	0.436
13	0.405	0.673	0.539	0.738	1	0.738	0.398
14	0.388	0.586	0.487	0.789	1	0.789	0.384
15	0.324	0.567	0.446	0.536	1	0.536	0.239
16	0.266	0.515	0.391	0.585	1	0.585	0.228
17	0.191	0.462	0.327	0.441	1	0.441	0.144
18	0.133	0.326	0.230	0.374	1	0.374	0.086
19	0.122	0.275	0.199	0.226	1	0.226	0.045
Total					**19**	**10.16**	**4.67**
Water Level Depth (m)			**0.800**				
Total Area (A)			**10.162**				
Total Discharge (Q)			**4.666**				

(Wed)07-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Ngalimbiu Bridge**						
Date:	**(Wed)07-Oct-2020**						
Weather:	**Isolated Shower (River condition: after flood)**						
River	**Flow Velocity (m/s)**			**Depth**	**Width**	**Area**	**Discharge**
Width (m)	**V1**	**v2**	**Mean**	**(m)**	**(m)**	**(m^2)**	**(m^3/s)**
1	0.127	0.204	0.166	0.135	1	0.135	0.022
2	0.175	0.364	0.270	0.221	1	0.221	0.060
3	0.226	0.394	0.310	0.443	1	0.443	0.137
4	0.202	0.402	0.302	0.304	1	0.304	0.092
5	0.246	0.473	0.360	0.581	1	0.581	0.209
6	0.320	0.507	0.414	0.838	1	0.838	0.347
7	0.426	0.627	0.527	0.912	1	0.912	0.480
8	0.471	0.623	0.547	0.852	1	0.852	0.466
9	0.531	0.672	0.602	0.877	1	0.877	0.528
10	0.554	0.735	0.645	0.910	1	0.910	0.586
11	0.606	0.827	0.717	1.134	1	1.134	0.813
12	0.623	0.922	0.773	0.833	1	0.833	0.643
13	0.582	0.864	0.723	0.718	1	0.718	0.519
14	0.563	0.816	0.690	0.776	1	0.776	0.535
15	0.440	0.661	0.551	0.748	1	0.748	0.412
16	0.380	0.549	0.465	0.669	1	0.669	0.311
17	0.338	0.533	0.436	0.649	1	0.649	0.283
18	0.323	0.437	0.380	0.427	1	0.427	0.162
19	0.292	0.423	0.358	0.348	1	0.348	0.124
20	0.098	0.291	0.195	0.262	1	0.262	0.051
Total					**20**	**12.64**	**6.78**
Water Level Depth (m)			**1.00**				
Total Area (A)			**12.64**				
Total Discharge (Q)			**6.78**				

(Tue)13-Oct-2020

Determining the Water Discharge (Q) from current meter readings							
Location:	**Ngalimbiu Bridge**						
Date:	**(Tue)13-Oct-2020**						
Weather:	**Rain & Wind**						
River	**Flow Velocity (m/s)**			**Depth**	**Width**	**Area**	**Discharge**
Width (m)	**V1**	**v2**	**Mean**	**(m)**	**(m)**	**(m^2)**	**(m^3/s)**
1	0.095	0.234	0.165	0.151	1	0.151	0.025
2	0.124	0.355	0.240	0.167	1	0.167	0.040
3	0.107	0.340	0.224	0.212	1	0.212	0.047
4	0.173	0.342	0.258	0.335	1	0.335	0.086
5	0.123	0.439	0.281	0.615	1	0.615	0.173
6	0.220	0.614	0.417	0.779	1	0.779	0.325
7	0.314	0.804	0.559	0.834	1	0.834	0.466
8	0.305	0.857	0.581	0.898	1	0.898	0.522
9	0.325	0.762	0.544	0.869	1	0.869	0.472
10	0.403	0.835	0.619	1.020	1	1.020	0.631
11	0.374	0.728	0.551	0.846	1	0.846	0.466
12	0.323	0.828	0.576	0.941	1	0.941	0.542
13	0.334	0.946	0.640	0.822	1	0.822	0.526
14	0.301	0.862	0.582	0.746	1	0.746	0.434
15	0.224	0.766	0.495	0.725	1	0.725	0.359
16	0.233	0.649	0.441	0.677	1	0.677	0.299
17	0.214	0.636	0.425	0.632	1	0.632	0.269
18	0.218	0.537	0.378	0.378	1	0.378	0.143
19	0.109	0.411	0.260	0.318	1	0.318	0.083
20	0.103	0.319	0.211	0.305	1	0.305	0.064
Total					**20**	**12.27**	**5.97**
Water Level Depth (m)				**1.00**			
Total Area (A)				**12.27**			
Total Discharge (Q)				**5.97**			

(Tue)20-Oct-2020-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	24.0	24.0	30.0	31.0	30.0	27.8	1.80	1.6	22	35.2	63.31

(Tue)27-Oct-2020-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	24.0	23.0	21.0	19.0	20.0	21.4	2.34	1.75	22.5	39.4	92.00

(Tue)03-Nov-2020-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	22.0	22.0	20.0	21.0	21.0	21.2	2.36	1.75	23.5	41.1	97.06

(Tue)17-Nov-2020-Float/TSS measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	28.3	29.7	26.6	30.8	29.3	28.9	1.73	1.5	23.5	35.3	60.93

(Tue)29-Dec-2020-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	25.3	27.2	25.3	25.9	21.9	25.1	1.99	1.7	23.5	40.0	79.56

(Thu)14-Jan-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	21.3	19.2	19.3	20.1	20.9	20.1	2.48	1.8	24	43.2	107.31

(Tue)02-Feb-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	21.3	23.1	20.3	21.0	18.9	20.9	2.39	1.8	25	45.0	107.64

(Sat)13-Feb-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	26.4	27.1	24.9	27.1	25.5	26.2	1.91	1.61	23	37.0	70.70
50	28.32	28.67	28.37	26.94	29.58	28.4	1.76	1.63	23	37.5	66.06
50	28.23	26.08	27.62	20.09	28.37	26.1	1.92	1.65	23	38.0	72.76

(Sat)20-Feb-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	38.0	42.0	39.0	41.0	43.0	40.6	1.23	1.50	27.5	41.3	50.80
50	45.0	46.0	37.0	42.0	39.0	41.8	1.20	1.51	27.5	41.5	49.67
50	39.0	42.0	39.0	39.0	40.0	39.8	1.26	1.52	27.5	41.8	52.51

(Sat)27-Feb-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	25.0	27.0	25.0	27.0	27.0	26.2	1.91	1.20	35	42.0	80.15
50	26.0	26.0	27.0	25.0	24.0	25.6	1.95	1.22	35.5	43.3	84.59
50	24.0	27.0	27.0	26.0	23.0	25.4	1.97	1.25	35.5	44.4	87.35

(Sat)06-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	18.0	18.0	19.0	20.0	19.0	18.8	2.66	1.80	29	52.2	138.83
50	18.0	18.0	18.0	19.0	18.0	18.2	2.75	1.85	29	53.7	147.39
50	20.0	21.0	21.0	19.0	21.0	20.4	2.45	1.50	37.0	55.5	136.03

(Sat)13-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	24.97	26.19	25.41	26.85	23.06	25.3	1.98	1.40	37.5	52.5	103.77
50	25.38	25.94	26.66	28.03	25.62	26.3	1.90	1.45	36.5	52.9	100.52
50	22.01	23.52	27.65	25.35	26.28	25.0	2.00	1.47	37.0	54.4	108.95
50	23.70	21.19	21.06	20.88	21.95	21.8	2.30	1.49	37.0	55.1	126.70

(Sun)14-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	31.59	37.56	36.1	35.06	35.06	35.1	1.43	1.58	29	45.8	65.32
50	22.42	23.34	23.49	25.22	23.58	23.6	2.12	1.40	37.5	52.5	111.18
50	20.78	19.8	21.16	22.15	23.52	21.5	2.33	1.45	36.5	52.9	123.18
50	21.3	19.1	18.5	18.8	19.6	19.5	2.57	1.50	37.0	55.5	142.63

(Tue)23-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	36.59	37.45	37.12	35.34	36.56	36.6	1.37	1.15	37.5	43.1	58.89

(Wed)24-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	37.93	36.52	36.28	34.18	30.61	35.1	1.42	1.16	37.5	43.5	61.96
50	35.21	37.87	36.19	36.59	38.21	36.8	1.36	1.15	37.5	43.1	58.57
50	38.28	39.82	37.92	36.5	38.6	38.2	1.31	1.14	37.5	42.8	55.92

(Fri)26-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	26.47	27.85	25.75	25.53	26.37	26.4	1.89	1.23	37.5	46.1	87.38
50	26.38	27.09	27.45	26.96	27.45	27.1	1.85	1.21	37.5	45.4	83.82
50	27.64	25.79	27.3	26.55	26.83	26.8	1.86	1.21	37.5	45.4	84.59

(Sat)27-Mar-2021-Float measurement

Distance	No. Trials (Time in Sec.)					Mean	Velocity	Depth	Width	Area	Discharge
(m)	1	2	3	4	5	Time(s)	(m/s)	(m)	(m)	(m^2)	(Q)
50	27	25	27	28	39	29.2	1.71	1.20	37.5	45.0	77.05
50	25	27	26	26	27	26.2	1.91	1.24	37.5	46.5	88.74
50	25	28	25	24	27	25.8	1.94	1.25	37.5	46.9	90.84

Appendix-7 Geochemical Lab Report

SITE 1 Upstream	Elements/ Names	PPM (Part per Million)	Feldspar Composition in % (KAlSi3O8 -- CaAl2Si2O) Estimated	Quartz Composition in % (SiO2) Estimated
	K--Potassium	4138		
	P- Phosphorus	1228		
	S- Sulfure	891		
	Ca - Calcium	4.05%		
	Ti - Thallium	2426		
	Mn - Manganese	710		
	Fe- Iron	4.43%		
	Cu- Copper	81	12.06%	15%
	Zn - Zinc	57		
	Rb - Rubidium	14		
	Sr - Tin	438		
	Y- Yttrium	15		
	Zr - Zirconium	69		
	Ba - Barium	233		
	W - Tungsten	46		
	Th- Thorium	7		
	Al - Aluminium	1.70%		
	Si- Silicon	5.91%		
SITE 2 Base Dam	Elements	PPM		
	K--Potassium	3962		
	P- Phosphorus	1630		
	S- Sulfur	1138		
	Ca - Calcium	3.60%		
	Ti - Thallium	3793		
	Mn - Manganese	635		

	Fe- Iron	5.57%	15%	18%
	Cu- Copper	113		
	Zn - Zinc	74		
	Rb - Rubidium	13		
	Sr - Tin	432		
	Y- Yttrium	14		
	Zr - Zirconium	74		
	Ba - Barium	209		
	Ni-Nickel	116		
	Nb-Niobium	4		
	Al - aluminium	1.69%		
	Si- Silicon	6.43%		
SITE 3 POWER HOUSE	ELEMENTS	PPM (Part Per Million)		
	K--Potassium	4375		
	S- Sulfur	881		
	Ca - Calcium	3.93%		
	Ti - Thallium	2142		
	Mn - Manganese	576		
	Fe- Iron	4.05%		
	Cu- Copper	123	15%	16%
	Zn - Zinc	61		
	Rb - Rubidium	12		
	Sr - Tin	484		
	Y- Yttrium	13		
	Zr - Zirconium	71		
	Ba - Barium	232		
	Nb - Niobium	2		
	Al - aluminium	1.94%		
	Si- Silicon	6.59%		
SITE 4 Vuramali	ELEMENTS	PPM		
	K - Potassium	4284		
	S - Sulfur	1026		
	Ca- Calcium	5.20%		
	Ti - Thallium	2239		
	Mn-	614	14%	18%
	Fe - Iron	4.08%		
	Cu- Copper	88		
	Zn - Zinc	57		
	Rb - Rubidium	13		
	Sr - Tin	461		

	Y - Yttrium	15		
	Zr - Zirconium	63		
	Ba - Barium	229		
	Al - aluminium	2.03%		
	Si - Silicon	6.33%		

Site 5 Ngalimbiu Bridge	ELEMENTS	PPM * (Part Per Million)		
	K - Potassium	4188		
	P - Phosphorus	973		
	S - Sulfur	886		
	Ca - Calcium	3.34%		
	Ti - Thallium	2727		
	Mn - Manganese	709		
	Fe - Iron	4.28%	12%	18%
	CU - Copper	66		
	Zn - Zinc	66		
	Rb - Rubidium	14		
	Sr - Tin	448		
	Y - Yttrium	13		
	Zr - Zirconium	64		
	Nb - Niobium	2		
	Ba - Barium	236		
	Al - Aluminium	2.17%		
	Si - Silicon	6.85%		

Meaning *

1 ppm = 1gram/tonne

10,000 ppm = 1%

MINISTRY OF MINES, ENERGY AND RURAL ELECTRIFICATION
Date:.....
Sign:.....
SOLOMON ISLANDS

Analyst by	John Ramo Laboratory Technician	Approval by lab Supervisor	William Angisiramo
Sign		Sign	
Date	27/11/2020	Date	27/11/2020

Appendix-8 Particle size Distribution Reports

	Solomon Islands Government Ministry of Infrastructure Development MID-Construction Materials Laboratory.	File No.	MID-CML-R25-4
		Date Issued	27th June 2015
		Version / Authorised	V1/A
		Laboratory Form No.	LF-W03-1

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client: SDM ENC

Address: Henderson

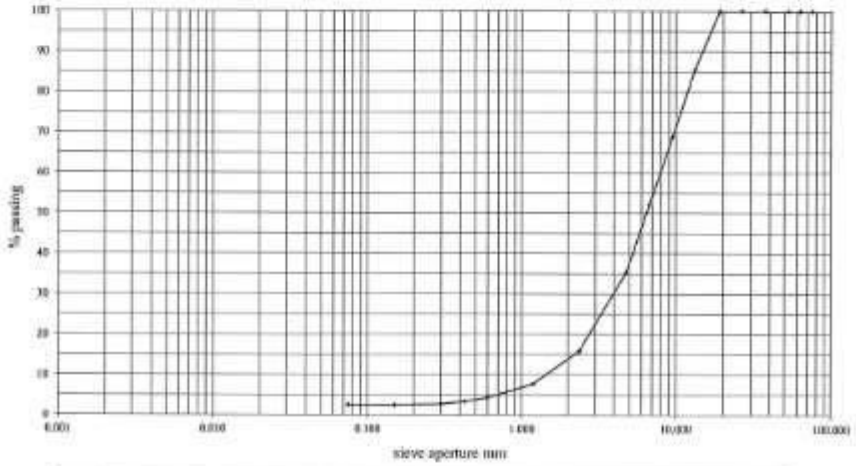
Project: Tina River Hydro Power Development

Test Method: AS1289 3.6.1

Job Number: 116-001 — Lab Number: 2405A

Sample Source: Site 1, (Upstream) — Date Tested: 13.12.2020

Sampled by: Client — Checked By: NJK



Clay	Silt	Sand	Gravel

Sample Description: SANDY GRAVEL (ALLUVIUM): Mottled Grey - White, Brown, fine to coarse subangular gravel,fine to coarse sand, non-plastic.

Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0	100	1.18	8
75.0	100	0.600	4
63.0	100	0.425	3
53.0	100	0.300	3
37.5	100	0.150	2
26.5	100	0.075	2
19.0	100	0.050	
13.2	85	0.020	
9.5	69	0.010	
6.7	52	0.005	
4.75	35	0.002	
2.36	16		

Hydrometer Type: ASTM 152H / N/A

Dispersant Type: Sodium Hexametaphosphate / N/A

Pretreatment: RTA T102 / RTA T103 / None

Loss on Pretreatment: None

Remarks:

Name: NELSON J KILE

Approved Signature:

File CD6 File C:\Excel Reports\CD6 Particle Size Distribution +\Sieve No Rifle Issue 2 June 2008 CL

Solomon Islands Government Ministry of Infrastructure Development **MID-Construction Materials Laboratory**	File No.	MID-CML-R25-4
	Date Issued	27th June 2015
	Version / Authorised	V1/AA
	Laboratory Form No.	LF-W03-1

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client: SDM ENC

Address: Henderson

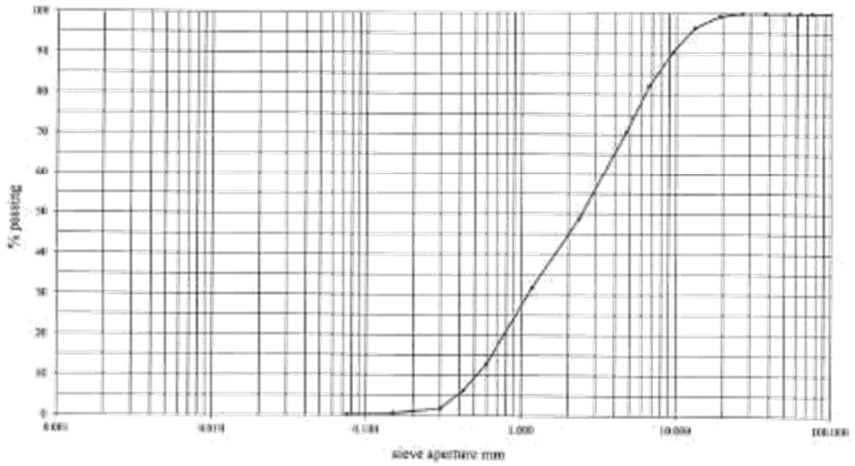
Project: Tina River Hydro Power Development

Test Method: AS 1289 3.6.1

Job Number: 116-001 | Lab Number: 2405B

Sample Source: Site 2, Base Dam | Date Tested: 13.12.2020

Sampled by: Client | Checked By: NJK



Clay	Silt	Sand	Gravel

Sample Description: **SANDY GRAVEL(ALLUVIUM): Mottled Grey - White, Brown, fine to coarse subrounded gravel,fine to coarse sand, dry, non-plastic.**

Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0	100	1.18	32
75.0	100	0.600	13
63.0	100	0.425	6
53.0	100	0.300	2
37.5	100	0.150	1
26.5	100	0.075	0
19.0	99	0.050	
13.2	96	0.020	
9.5	90	0.010	
6.7	82	0.005	
4.75	71	0.002	
2.36	49		

Hydrometer Type: ASTM 152H / N/A

Dispersant Type: Sodium Hexametaphosphate / N/A

Pretreatment: RTA T102 / RTA T103 / None

Loss on Pretreatment: None

Remarks:

Name: NELSON J KILI

Approved Signature:

Form C06 File C:\Excel Reports\C06 Particle Size Distribution 116tina Tina Rifles Issue 2 June 2008 CL

Solomon Islands Government Ministry of Infrastructure Development MID-Construction Materials Laboratory	File No.	MID-CML-R25.4
	Date Issued	27th June 2016
	Version / Authorised	V1/A
	Laboratory Form No.	LF-W03-1

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client: SDM ENC

Address: Henderson

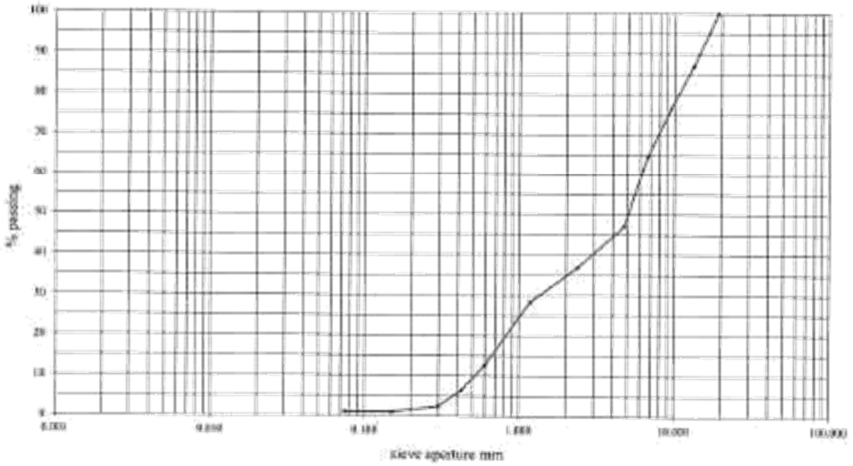
Project: Tina River Hydro Power Development

Test Method: AS 1289 3.6.1

Job Number: 116-001 | Lab Number: 2405C

Sample Source: Site 3, Power House | Date Tested: 13.12.2020

Sampled by: Client | Checked By: NJK



Clay	Silt	Sand	Gravel

Sample Description: **SANDY GRAVEL(ALLUVIUM) : Mottled Grey - White Brown,subrounded to rounded gravel,fine to coarse sand,trace of silt,non-plastic.**

Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	28
75.0		0.600	13
63.0		0.425	6
53.0		0.300	2
37.5		0.150	1
26.5		0.075	1
19.0	100	0.050	
13.2	87	0.020	
9.5	77	0.010	
6.7	65	0.005	
4.75	47	0.002	
2.36	37		

Hydrometer Type: ASTM 152H / N/A

Dispersant Type: Sodium Hexametaphosphate / N/A

Pretreatment: RTA T102 / RTA T103 / None

Loss on Pretreatment: None

Remarks:

Name: NELSON J KILI

Approved Signature:

Form C06 File C:\Users\ Reports\C06 Particle Size Distribution –Phase One Riffle Issue 2 June 2008 CL

	Solomon Islands Government Ministry of Infrastructure Development MID-Construction Materials Laboratory	File No:	MID-CML-R25-4
		Date Issued:	27th June 2016
		Version / Authorised:	V10A
		Laboratory Form No:	LF-W03-1

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client: SDM ENC

Address: Henderson

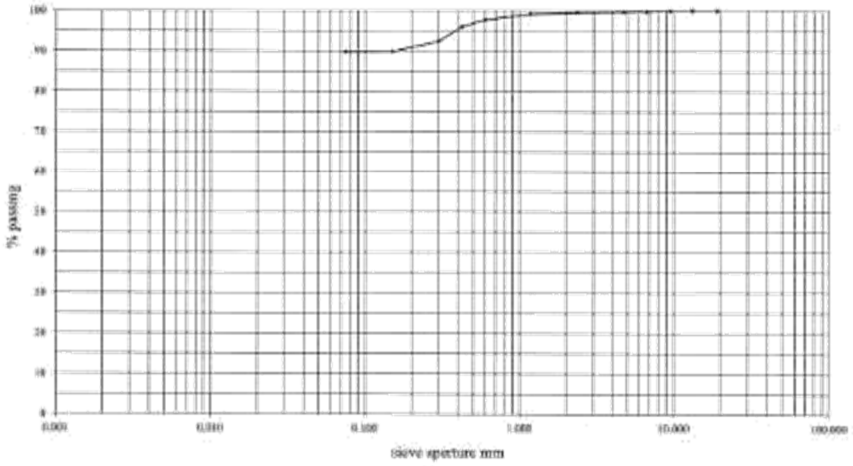
Project: Tina River Hydro Power Development

Test Method: AS 1289 3.6.1

Job Number: 116-001 Lab Number: 2405D

Sample Source: Site 4, Yaramali Date Tested: 13.12.2020

Sampled by: Client Checked By: NJK



Clay	Silt	Sand	Gravel

Sample Description: **SANDY SILT(ALLUVIUM): Mottled Grey - White Brown, fine to coarse sand, trace of gravel, dry, non-plastic.**

Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0		1.18	99
75.0		0.600	98
63.0		0.425	96
53.0		0.300	92
37.5		0.150	90
26.5		0.075	90
19.0	100	0.050	
13.2	100	0.020	
9.5	100	0.010	
6.7	100	0.005	
4.75	100	0.002	
2.36	100		

Hydrometer Type: ASTM 152H / N/A

Dispersant Type: Sodium Hexametaphosphate / N/A

Pretreatment: RTA T102 / RTA T103 / None

Loss on Pretreatment: None

Remarks:

Name: NELSON J KILE

Approved Signature:

Form C06 File C:\Excel Reports\C06 Particle Size Distribution -19mm No Riffle Issue 2 June 2008 CL

	Solomon Islands Government Ministry of Infrastructure Development MID-Construction Materials Laboratory.	File No.	MID-CML-R25-4
		Date Issued	27th June 2015
		Version / Authorised	V1/IA
		Laboratory Form No.	LF-W03-1

PARTICLE SIZE DISTRIBUTION TEST REPORT

Client: SDM ENC

Address: Henderson

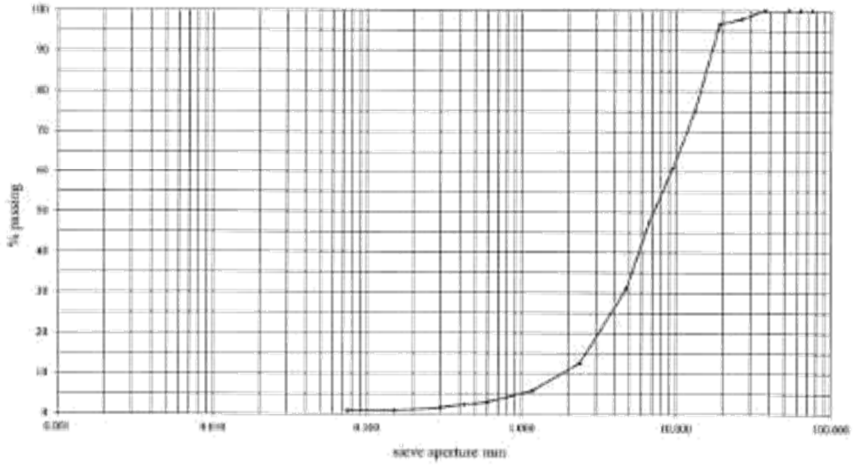
Project: Tina River Hydro Power Development

Test Method: AS1289.3.6.1

Job Number: 116-001 — Lab Number: 2405E

Sample Source: Site 5, Ngalimbiu Bridge — Date Tested: 13.12.2020

Sampled by: Client — Checked By: NJK



Clay	Silt	Sand	Gravel

Sample Description: **SANDY GRAVEL(ALLUVIUM): Mottled Grey - White Brown, fine to coarse subangular gravel,fine to coarse sand,dense, dry,non-plastic .**

Sieve Size (mm)	% Passing	Sieve Size (mm)	% Passing
150.0	100	1.18	6
75.0	100	0.600	3
63.0	100	0.425	2
53.0	100	0.300	2
37.5	100	0.150	1
26.5	98	0.075	1
19.0	97	0.050	
13.2	75	0.020	
9.5	61	0.010	
6.7	48	0.005	
4.75	31	0.002	
2.36	13		

Hydrometer Type: ASTM 152H / N/A

Dispersant Type: Sodium Hexametaphosphate / N/A

Pretreatment: RTA T102 / RTA T103 / None

Loss on Pretreatment: None

Remarks:

Name: NELSON J KILE

Approved Signature:

File C06 File C:\Excel\Reports\C06 Particle Size Distribution + 19mm No Riffle Issue 2 June 2008 CL

Appendix-9 Laboratory Testing Photos

-Lab Photos for Geochemical Lab Procedure and Testing

1. Samples finely crushed and ready to be placed inside **Ball Mill Machine** for **pulverisation.**

2. The Samples were then pressed using **Hydraulic handy press.**

3. Testing of Samples in progress Using **Innovax XRF 50KV** Compatible **Analytical Machine.**

- Particle size Distribution (Sieve Analysis) Test Lab Photos

1. Sample Preparation and air drying.

2. Riffling and reduction of material to obtain required sample mass for testing.

3. Sieving of sample through sieves to determine particle size distribution.

Appendix-10 Proposed Hydrological Monioring Plan (For Upstream & Downstream of Dam During Construction)

In the pre-construction and under-construction stages, flow monitoring and sediment surveys will be conducted both upstream (Site A) and downstream (Site B) of the dam site, and a temporary water level gauging station against flooding during construction will be installed upstream of the upstream cofferdam (Site C). And the AWS (Automatic Weather Station) will be installed at the batch plant site (Site D) to provide real-time weather information during the RCC dam construction.

HEC plans to install a flow gauging station at Site A and an automatic water level gauging station at Site B prior to commencement of construction works in order to collect continuous data.

Besides automatic monitoring by installing gauging stations, additional measurement by using rod floats will be conducted at Site A and Site B and corresponding comparison with automatic gauging data and re-establishment or adjustment of the stage-discharge relationship for Site B will be made.

At Site A and B, under high flow condition, HEC plans to collect sediment samples at the center, left and right of the river width by help of a cableway (steel wire rope) hanging across the river. Sampling schedule will be on a regular basis, e.g. weekly, and/or on an event basis.

Information on the above flow, sediment and weather monitoring at pre-/under-construction stage is summarized in the table below.

Site	Location [1)]	Monitoring					Monitoring Periods	Remarks
		Items	Devices	Nos.	Auto/Manual	Flow Condition		
Site A. Upstream of Dam	Approx. 0.6km upstream of dam (outside of backwater influence of coffer dam reservoir for discharges up to 320m³/s to 350m³/s)	Water level	Ultrasonic level sensor	1	Auto	Low to high	Feb.2022 (Automatic) ~ Before initial reservoir filling	To continue automatic monitoring of water level throughout construction To install a cableway across the river width for sediment sampling
		Water velocity	Radar velocity sensor	1	Auto	Low to high		
			Rod floats	-	Manual	Low to High		
		Sediment	Sediment sampler	1	Manual	Low to high		
Site B. Downstream of Dam	Approx. 0.5km downstream of dam (existing site)	Water level	Pressure type level sensor	2 (1set)	Auto	Low to high	Feb.2022 (Automatic) ~ Until completion of construction	To continue automatic monitoring of water level throughout construction To install a cableway across the river width for sediment sampling
		Water velocity	Rod floats	1	Manual	Low to High		
		Sediment	Sediment sampler	1	Manual	Low to high		
Site C. Upstream Cofferdam	Upstream of upstream cofferdam	Water level	Pressure type level sensor	2 (1set)	Auto	-	Feb.2022 (Automatic) ~ Before initial reservoir filling	Temporary use during construction against emergency evacuations (Early warning system)
Site D. Dam site	Dam site (Batch Plant)	AWS	(Automatic Weather Station)	1set	Auto	Continuous	After completion of batch plant construction	Initially to be installed at the office site, then moved to Site D after batch plant construction
		- Temperature	Metal sheath type					
		- Rainfall	Conduction type					
		- Wind speed	Optical chopper type					

1) Final locations of Sites A, B, C and D may differ from those proposed here. Final locations will be determined through site surveys.

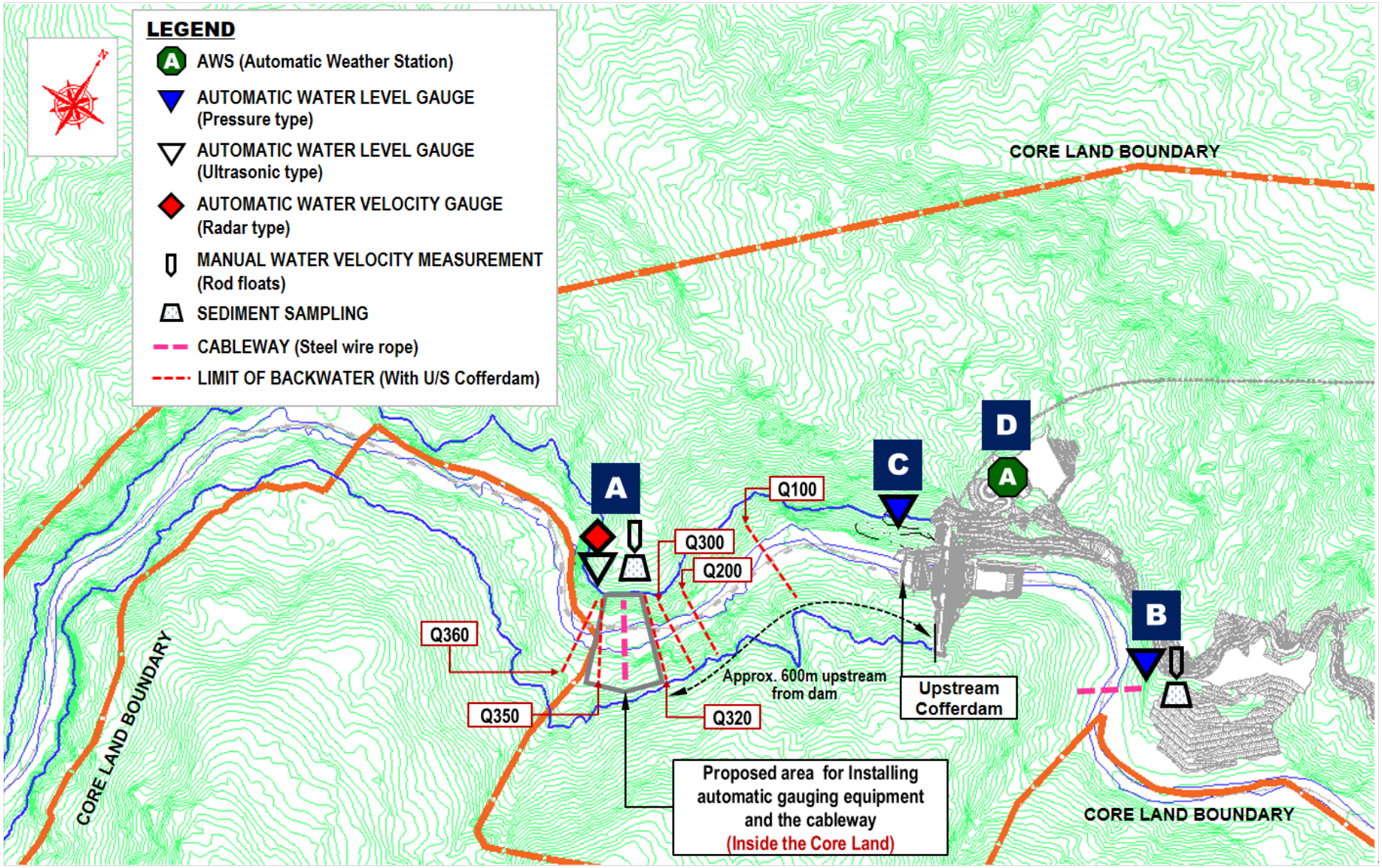


Figure. Schematic of monitoring plan in the pre-construction and under-construction stages