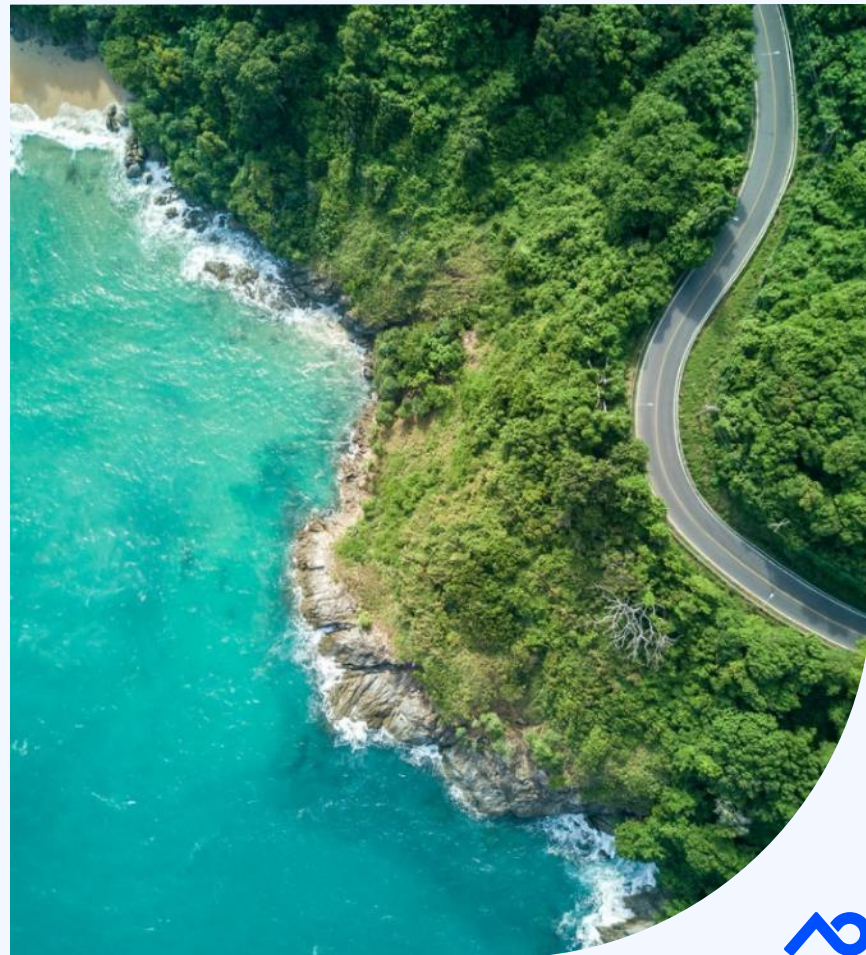


Mapping Streamflows with Emerging Technology in Warrill Creek

James Shingles, Nick Purdam
OzWater26





“We acknowledge the Traditional Custodians of Country throughout Australia and their connections to land, sea and community. We pay our respect to their Elders past and present and extend that respect to all First Nations peoples.”

‘To make Life Better for All’
Artist: Patrick Caruso, Eastern Arrernte
Graphic Designer and Artist.

The Warrill Trial

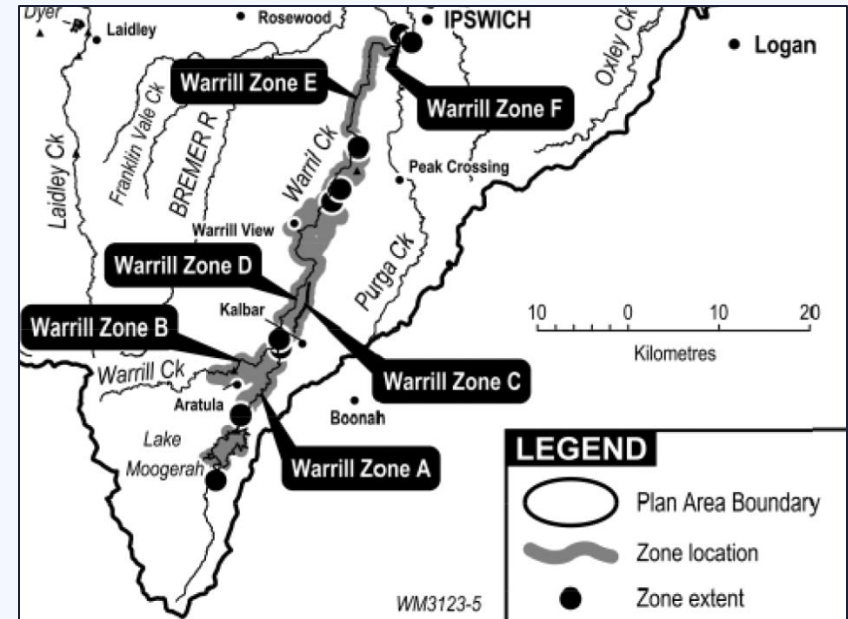
An initiative of the *SEQ Agriculture Regional Water Assessment*

- Work commenced in 2025 and focused on mapping streamflows and losses in the Warrill Valley Water Supply Scheme in the Scenic Rim.
- Given the size of the scheme and the short period for sampling it forced us to be innovative in data capture techniques.
- The project was an opportunistic chance to understand the Warrill system's flow regimes and was part of a greater investigation into agricultural water security options in South East Queensland.
- The work was a collaboration between SMEC, DLGW, Seqwater and wouldn't have been possible without good support and collaboration



Project objectives

- To map the Water Supply Scheme identifying flow splits, watercourses, measuring infrastructure and key features.
- To develop a methodology to supplement Seqwater's existing flow monitoring in the scheme and provide a more detailed breakdown of the medium sized tributaries
- Identify key flow patterns throughout the system and identify gaps in knowledge
- Identify key areas of 'losses' (areas of potentially high infiltration, agricultural demands, evaporation etc) and approximate loss magnitudes
- Identify points of interest for future investigations and a basis for longer studies



Warrill Valley Water Supply Scheme Zones



Project stages & methodology

- **Desktop Analysis**
 - Obtaining and reviewing existing documentation for the scheme. This improved understanding and allowed us to examine measuring points and existing infrastructure.
- **Workshopping with Seqwater**
 - Site inspections with Seqwater Operations to examine key weirs and possible locations for temporary monitoring equipment
- **Historical Data Review**
 - Fundamental understanding of flow patterns (long periods flow sampling are critical)
 - Provide framework for water balance analysis
- **Field sampling and analysis**
 - Collects current data of the state of the Warrill Scheme
 - Provides a sampling framework for longer term



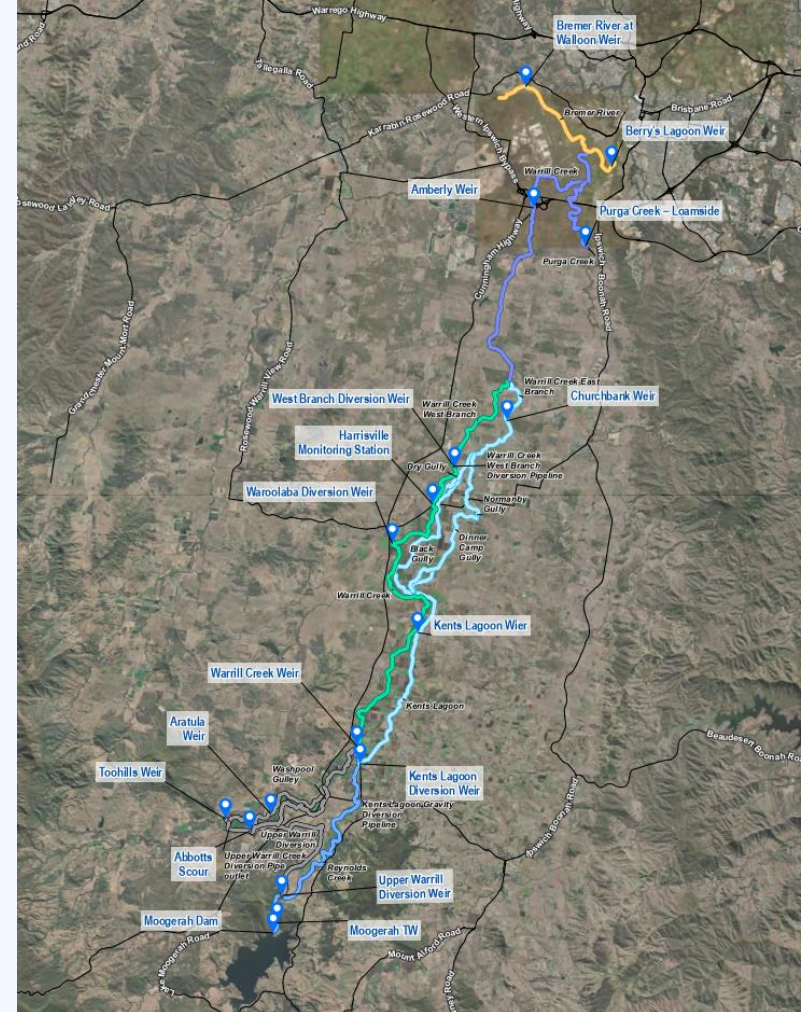
Black Gully Temporary Gauging Station



Desktop analysis

Desktop analysis objectives

- Creation of a digital map of the scheme with key structures and control elements
- Breakdown of the six WWSS Zones
- Map and understand
 - Water courses within the scheme
 - Existing weirs and Infrastructure



Warrill trial GIS map of WWSS

Seqwater consultation

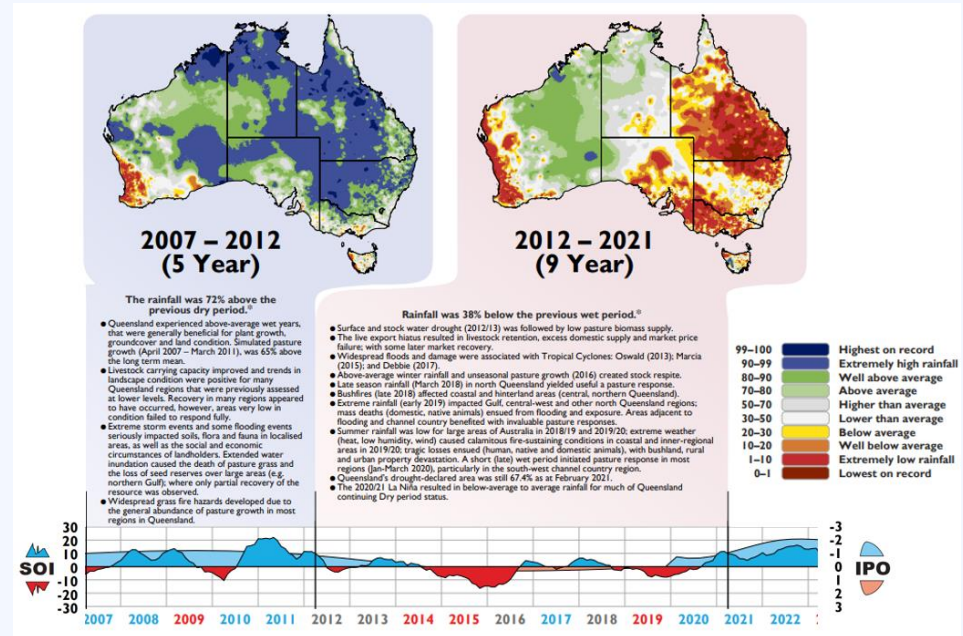
- Site visits to key infrastructure
- Information of scheme operations
- Guidance for temporary gauging station locations
- Planning for operational releases
- Understanding beneficial outcomes



Kents Lagoon Weir TW Site Inspection

Historical data review

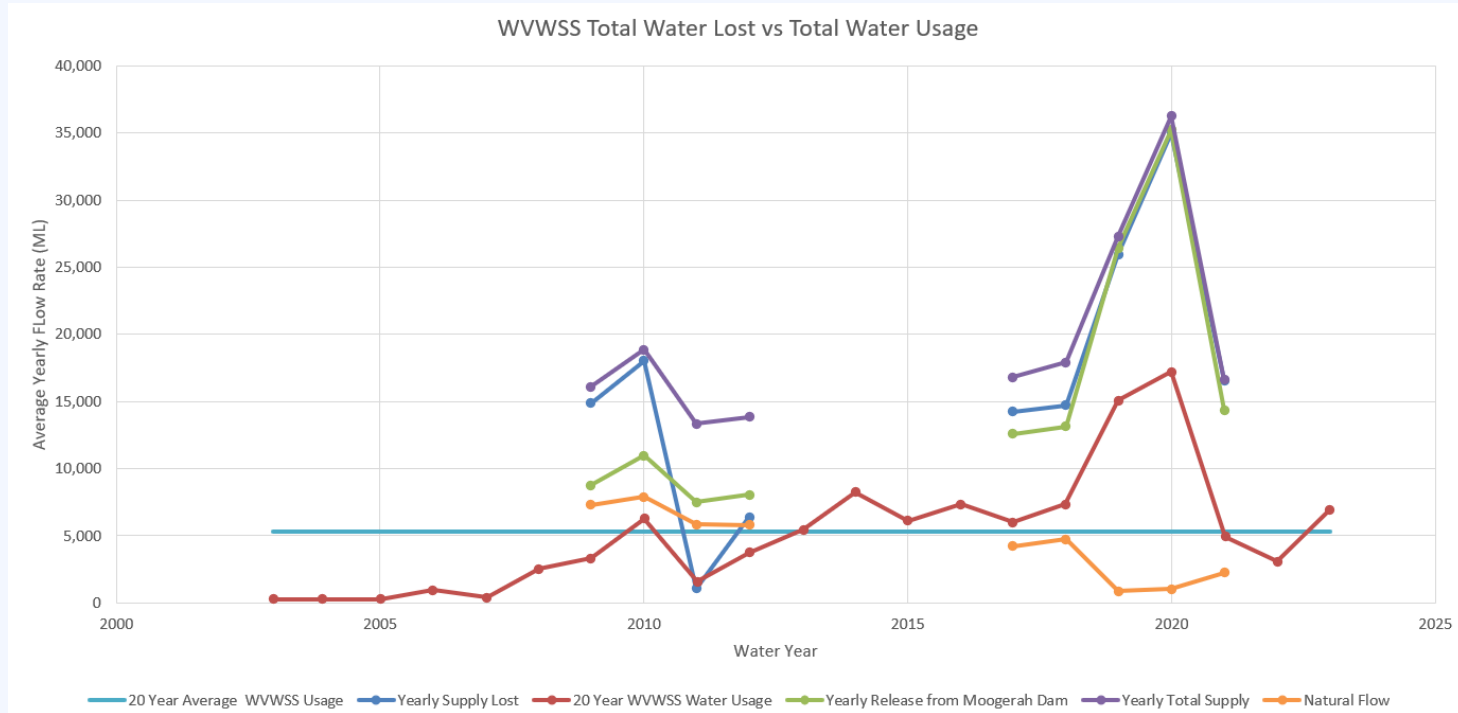
- Analysis of the Seqwater Operations log for the WWSS
- Detailed review and understanding of water course flow characteristics
- Preliminary assessment of losses
- Carried out for two key periods:
 - Wet period: 2008 to 2012
 - Dry period: 2016 to 2017



Dry and Wet Period Timeline - Adapted from Longpaddock



Historical data review: Losses overview



Average Yearly Flowrate, Losses, and Customer Usage



Historical data review: Results overview

	Wet Period Yearly Average (ML)	Dry Period Yearly Average (ML)	Percentage Change (%)
Total Supply	16278.51	22973.36	41
Moogerah Dam Release	9271.63	20349.66	119
Natural Flow	7006.88	2623.70	63
Total Supply Lost	13095.78	21291.96	63
Usage	3733.34	10106.67	171
Transmission Losses	8651.34	11185.29	29
Remaining Flow Exiting WWSS	3182.73	2623.70	18

Results and Comparison of the Wet and Dry Period

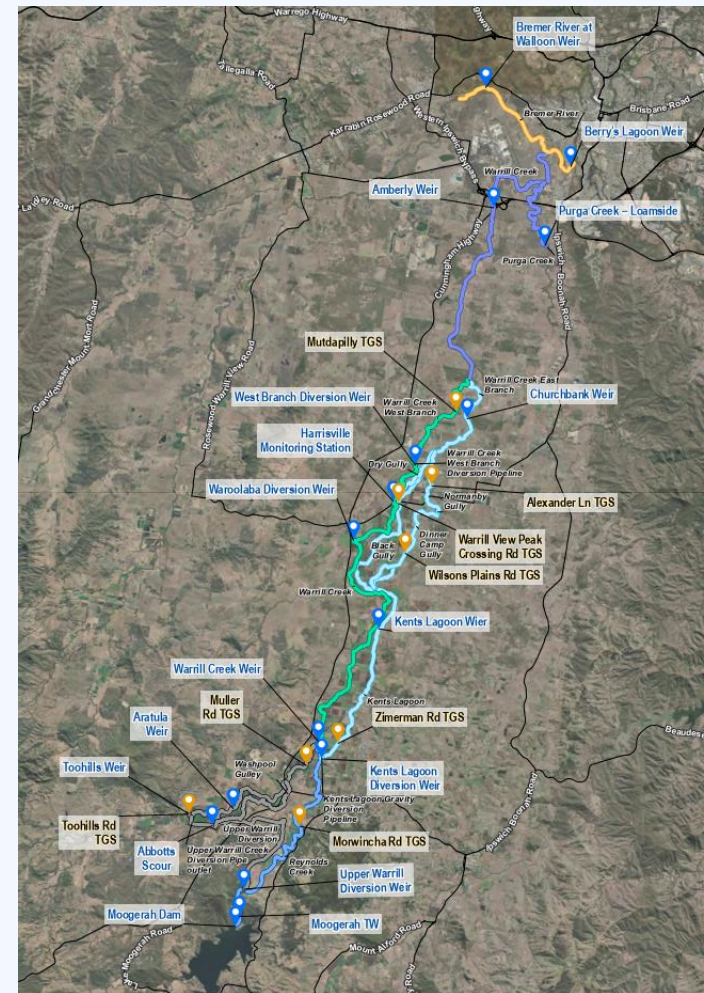


Field Sampling and Analysis

- Fill in the gaps in knowledge in the system
 - Eight Temporary Gauging stations throughout WWSS
- Temporary Gauging Station Methodology
 - Cross-section survey for Stage-area curve
 - HOBO data loggers for water level gauging
 - LSPIV and ADVN for velocity gauging
 - Rating curve development



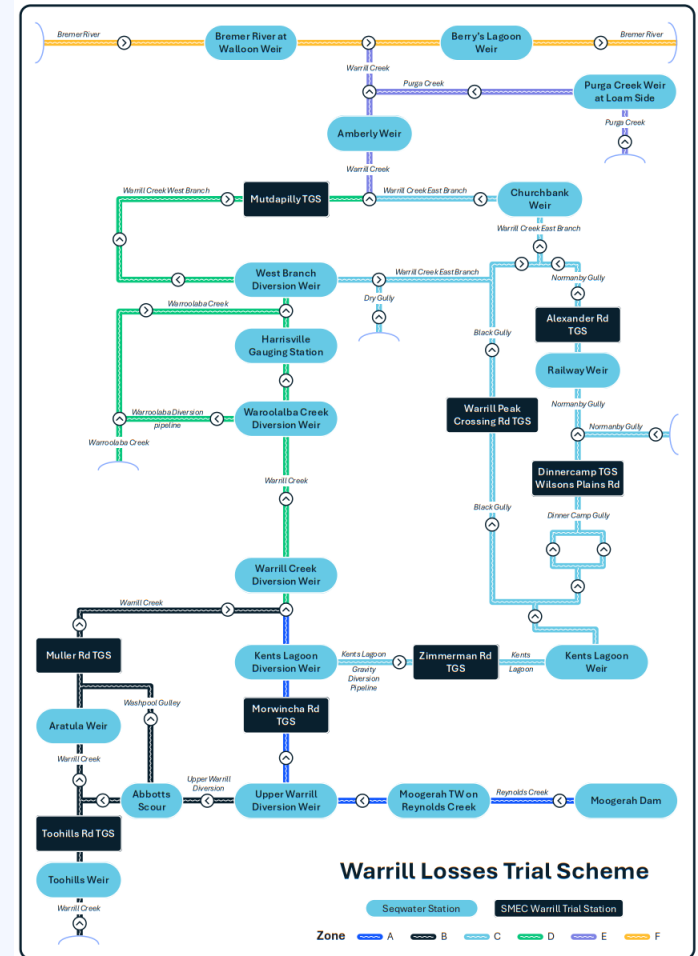
Wilsons Plains Rd Temporary Gauging Station



WWSS GIS Schematic Including TGS

Field Sampling and Analysis

- Temporary Gauging Stations:
 1. Warrill Creek at Toohills Crossing – Zone B
 2. Warrill Creek at Muller Rd Crossing – Zone B
 3. Reynolds Creek at Morwincha Rd Bridge – Zone A
 4. Kents Lagoon at Zimmerman Rd Culvert – Zone C
 5. Dinnercamp Gully on Wilsons Plains Rd – Zone C
 6. Black Gully at Warrill View Peak Crossing Rd – Zone C
 7. Normanby Gully at Alexander Rd – Zone C
 8. Warrill Creek West Branch at Mutdapilly Churchbank Peak Crossing Rd – Zone D

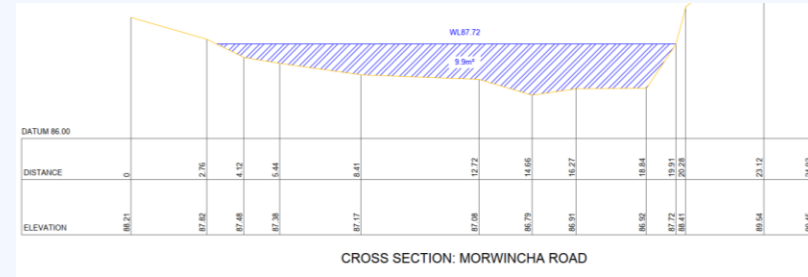


WWSS Line Diagram Schematic Including TGS

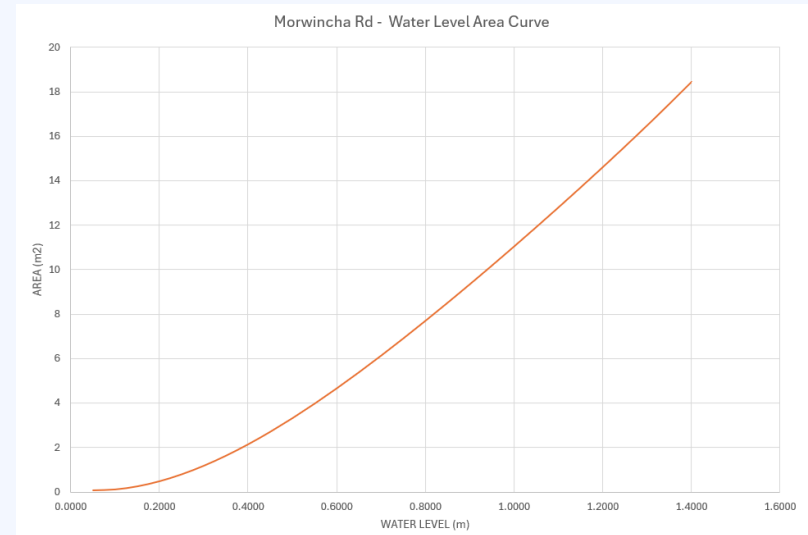
Field Sampling and Analysis: Methodology – Stage-area Curves



Wilson's Plains Rd Temporary Gauging Station



Morwincha Rd Cross-sectional Area Output

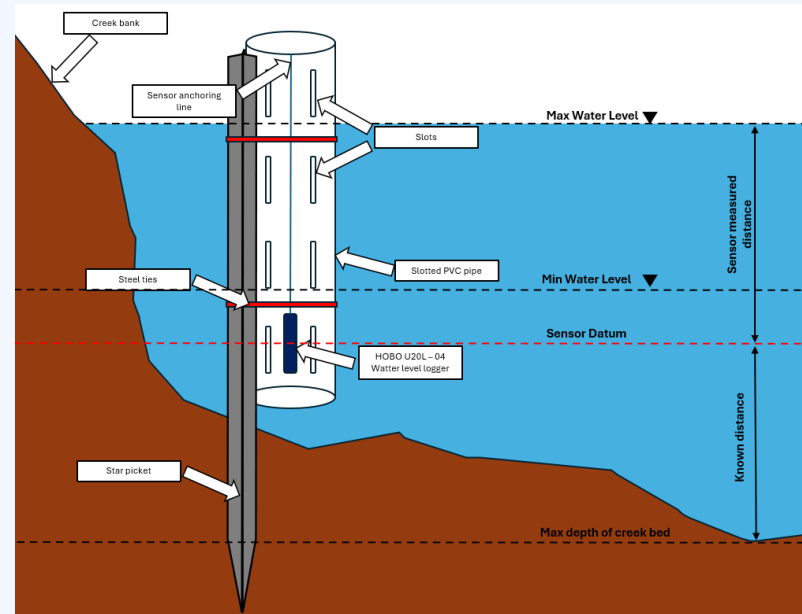


Morwincha Rd Stage-Area Curve Output

Field Sampling and Analysis: Methodology – Water Level Gauging



HOBOTM Water Level Logger



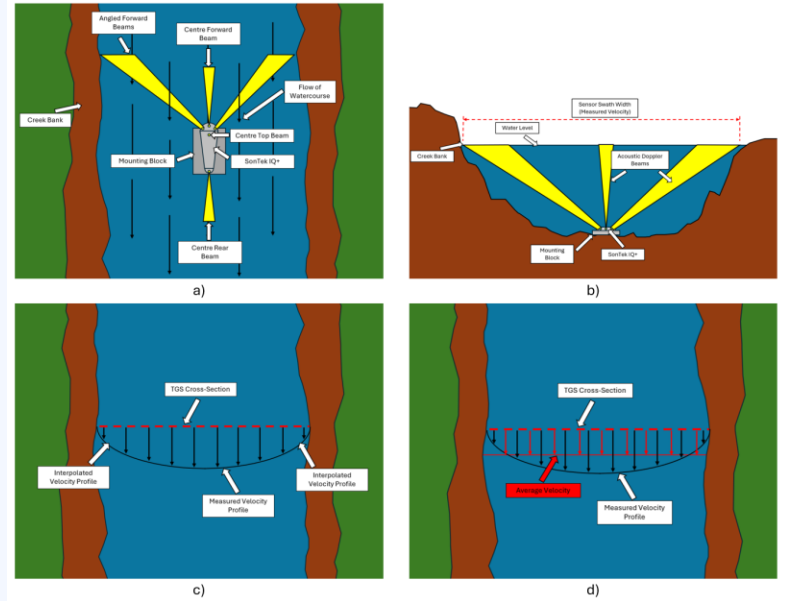
HOBOTM Logger and Stilling Tube Installation



Field Sampling and Analysis: Methodology – Velocity Gauging ADVM



SonTek IQ+ and Concrete Anchoring Block



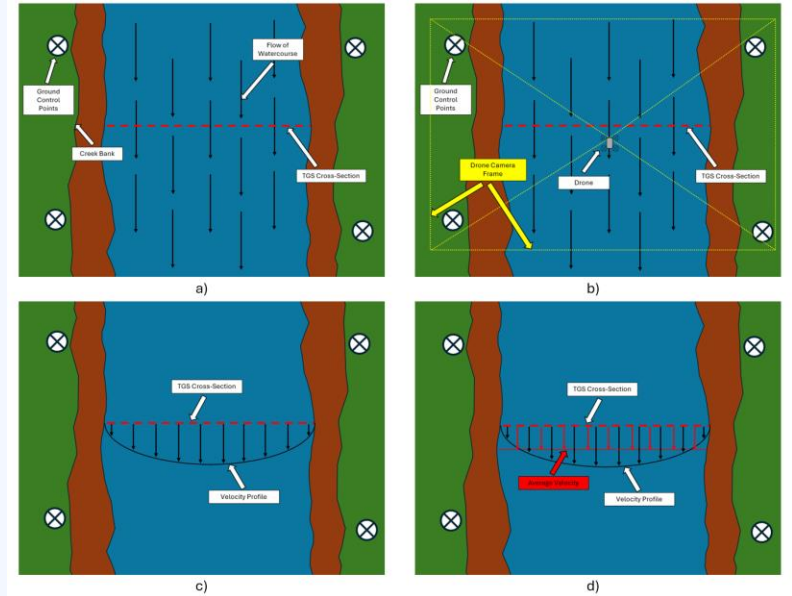
ADVM Method to Determine Average Velocity
using SonTek IQ+



Field Sampling and Analysis: Methodology – Velocity Gauging LSPIV



DJI Flip Drone used for LSPIV Footage Recording

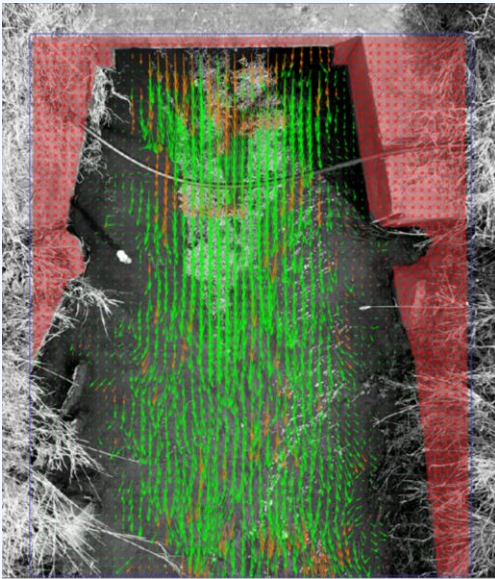


LSPIV Method to Determine Average Velocity using PIVLab and RIVER Software

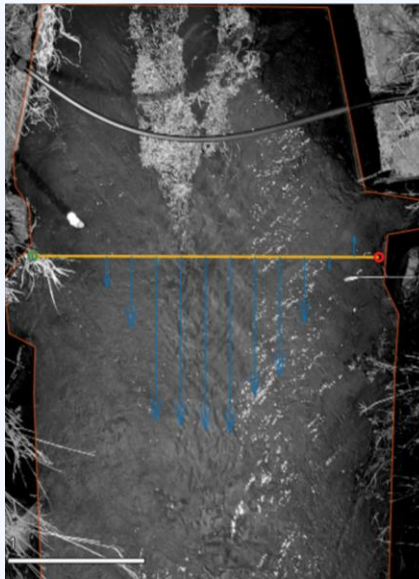


Field Sampling and Analysis: Methodology – Velocity Gauging LSPIV

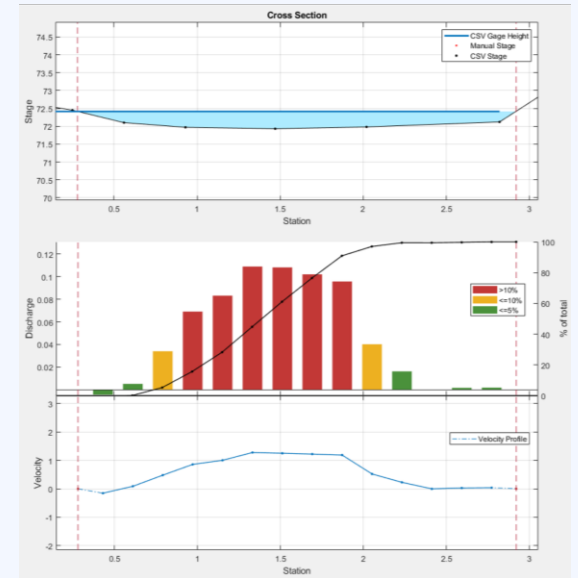
1. Vector Field (PIVLab)



2. Cross-section Velocity Profile (RIVeR)



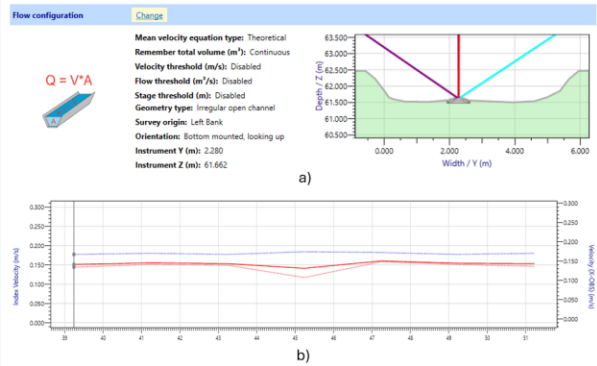
3. CS Area and Discharge Profile (RIVeR)



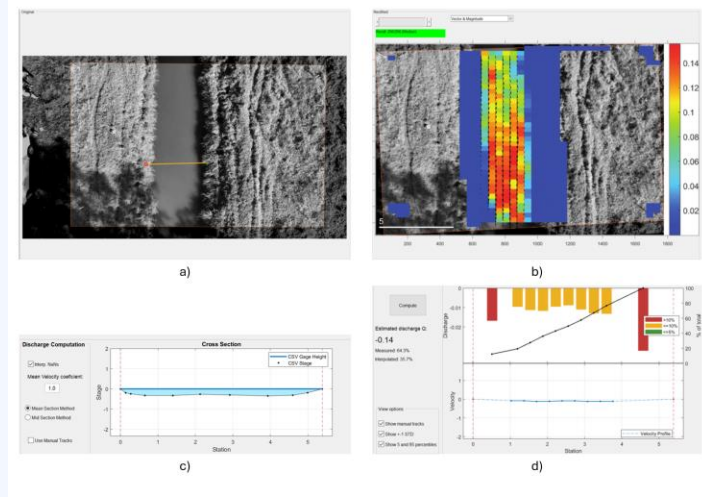
Field Sampling and Analysis: Calibration & Testing



Kents Lagoon
Survey Data
Collection



ADVM SonTek
IQ+ Processing



LSPIV Processing

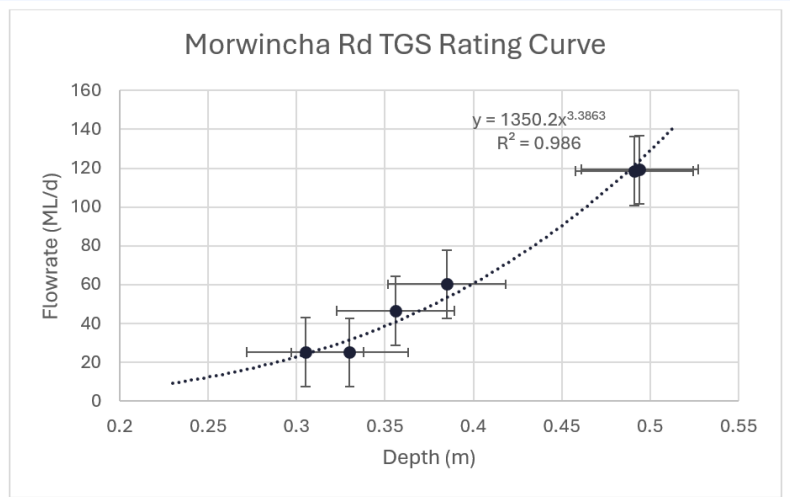
Table 5: Results of Kents Lagoon Calibration and Trouble Shooting Trial

	Kents Lagoon Weir TW	SonTek IQ+	LSPIV
Flowrate (ML/d)	14.08	13.77	12.10
ERR (%)	-	2.20	14.06

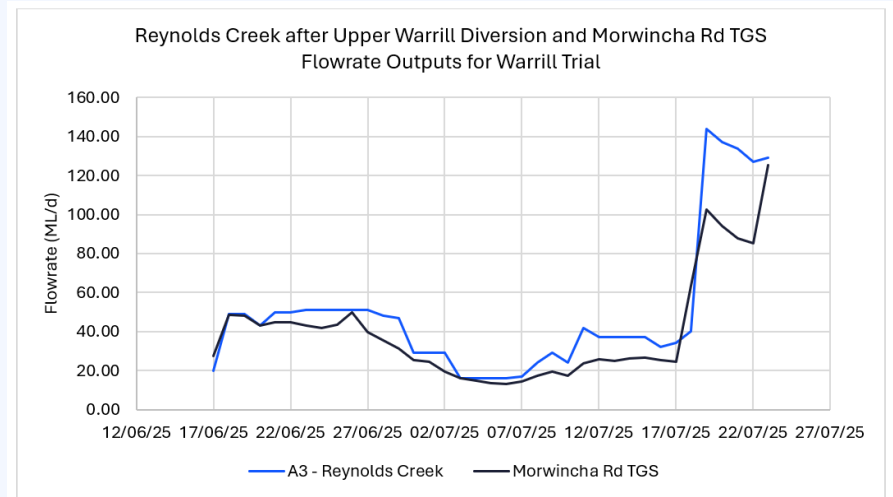
Calibration and Testing Results and Comparison to Kents
Lagoon Weir TW



Field Sampling and Analysis: Application – Rating Curve



Morwincha Rd Temporary Gauging Station
Rating Curve



Morwincha Rd TGS Comparison to
Node A3



Key findings

- Identify historical trends in flow characteristics and losses through historical wet and dry period data review
- Accurate capturing of natural flowrate entering WWSS through Zone B using Toohills TGS
- Preliminary transmission losses profile surrounding the Boonah-Fassifern WTP offtake in Zone A
- Improved flow characteristic mapping achieved through Zone A and B with the ability to refine the zones losses occur
- Identify flow characteristics through Zone C and capture natural inflow from upstream Normanby Gully
- Develop key areas of interest to pursue in future studies





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