FIELD REPORT-NEW WATER LOGGERS-MURRELL RIVER

DPLUS206 CLIMATE IMPACTS ON FI PAST, PRESENT AND FUTURE FRESHWATER DYNAMICS

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3. The holder of proprietary environmental knowledge of the South Atlantic – by continuing to provide the research expertise offered to date.

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TABLE OF CONTENTS

1. INTRODUCTION

The Freshwater Research Project aims to utilize satellite-based imagery to assess both past and present freshwater dynamics across the Falkland Islands. As part of Work Package 2: Establishing a Freshwater Baseline, the project is expanding in-situ hydrological measurements to complement satellite observations and support hydrological modelling efforts.

To achieve this objective, new water level loggers (Baro Stout and Level Stout) will be installed in key river systems to provide continuous records of water level fluctuations. These ground-based measurements will serve as critical reference data for the calibration and validation of hydrological models, thereby enhancing the accuracy of freshwater dynamics assessments and contributing to long-term water resource management strategies.

2. FIELD OBSERVATION

On 5 August 2025, a site visit was conducted to the Water Treatment Plant and associated reservoir at Moody Brook. During this visit, discussions were held with Mr. Zachary Stephenson (Water Supervisor, PDW) and his team regarding the operational processes of the treatment facility and the standardized procedures in place for maintaining water quality.

Raw water is abstracted directly from both the Murrell River and Moody Brook using two pumping engines at each location, with pumping rates adjusted daily in accordance with the water demand of Stanley (Figure 1). The treatment process involves the application of three main chemicals: sodium aluminate, sodium carbonate, and aluminium sulphate (Figure 2). Prior to distribution, the treated water is disinfected by the addition of chlorine, achieved through mixing 20 litres of sodium hypochlorite per 1000 litres of water (Figure 3).

On 8 August 2025, a subsequent visit was made to the pumping station at the Murrell River reservoir. The site is equipped with water level monitoring supported by CCTV surveillance, allowing operators at the treatment plant control centre to monitor reservoir levels in real time. However, no systematic data recording of water levels is currently undertaken at this site, highlighting the need for the planned installation of automated loggers to ensure continuous and reliable hydrological records.

The Water Department provided valuable collaboration by supplying daily water usage data for the periods 2023–2024 and 2024–2025, as well as annual water usage records from 1995 to September 2025. Analysis of these datasets shows a consistent upward trend in water consumption in Stanley, largely driven by population growth (Figure 4). Annual usage has risen from 179,588.7 m^3 in 1995 to 380,330 m^3 in 2024, representing an increase of approximately 112%. The daily usage data reinforce this long-term pattern: average daily consumption rose from 960.3 m^3/day in 2023–2024 to 1,027.7 m^3/day in 2024–2025, an increase of about 7%. This sustained rise highlights the importance of establishing hydrological monitoring at both the Murrell River and Moody Brook to ensure the long-term sustainability of the town's water supply. In response, the Freshwater Project has initiated water-

level monitoring in the Murrell River as a first step toward strengthening local water resource management.

Figure 1 Water pumps at Murrell River Reservoir

Figure 2 photos of chemical supply at water treatment plant

Figure 3 Formula of Chlorine mixing at water treatment plant

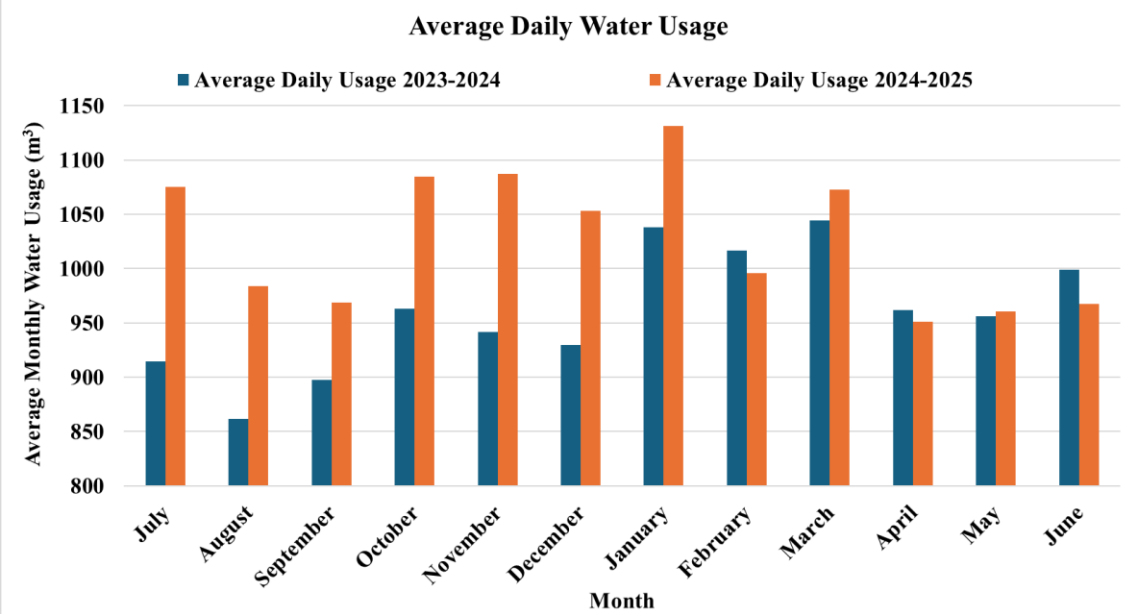

Figure 4 Comparison of average daily water usage for 2023-2024 & 2024-2025 (Source: Water Treatment Plant)

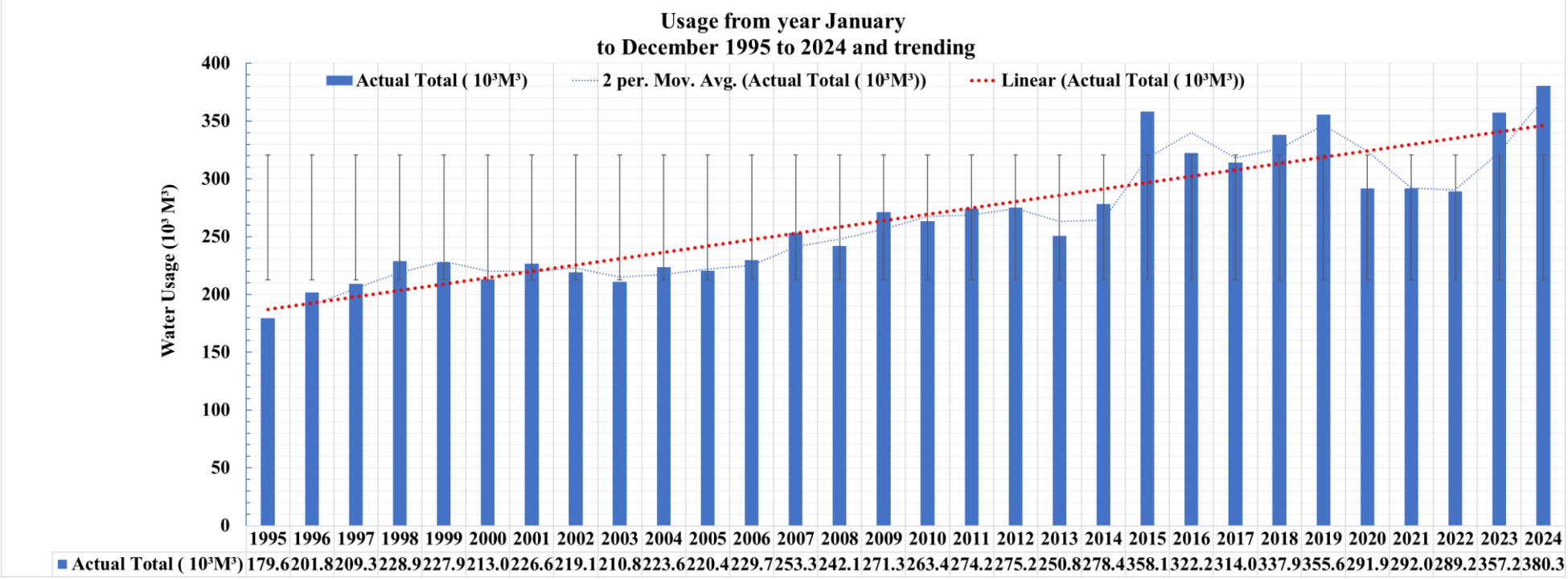

Figure 5 Yearly water usage (10^3m^3) from 1995 to 2024 (Source: Water Treatment Plant)

3. Installation Monitoring Station at Murrell River

On 30 August 2025, the Freshwater Project team successfully installed the first dedicated water-level monitoring station at the Murrell River. The system includes both a BaroSCOUT and a LevelSCOUT, which measure barometric and absolute pressure respectively, allowing for accurate calculation of river water levels.

This installation represents a significant advancement in local water resource management, providing continuous and reliable long-term data on hydrological fluctuations. By tracking river levels over time, the monitoring station will contribute to a clearer understanding of river health, resilience, and the impacts of environmental variability.

Given that the Murrell River is one of the principal sources of water for Stanley, this development is a critical step toward ensuring the sustainability and security of the community's water supply. The installation marks the beginning of a long-term monitoring programme designed to strengthen knowledge of freshwater dynamics and support informed decision-making for future water management.

Figure 6 Water Level Monitoring Station at Murrell River

4. Drone Survey For 3d Modelling of Murrell River

In collaboration with the LiDAR and Photogrammetry Project Team (DPLR4-1055), a 3D model of the Murrell River reservoir and water-level monitoring station was developed. The team carried out drone-based surveys using a DJI Matrice platform, gaining practical experience and strengthening their expertise in LiDAR technology. LiDAR (Light Detection and Ranging) uses laser pulses to scan the terrain and generate highly detailed 3D models. This technology provides valuable applications

for monitoring environmental changes, such as vegetation growth, river morphology, and soil erosion. The 3D model of the Murrell River will serve as a foundation for hydrological modelling and future research on freshwater dynamics.

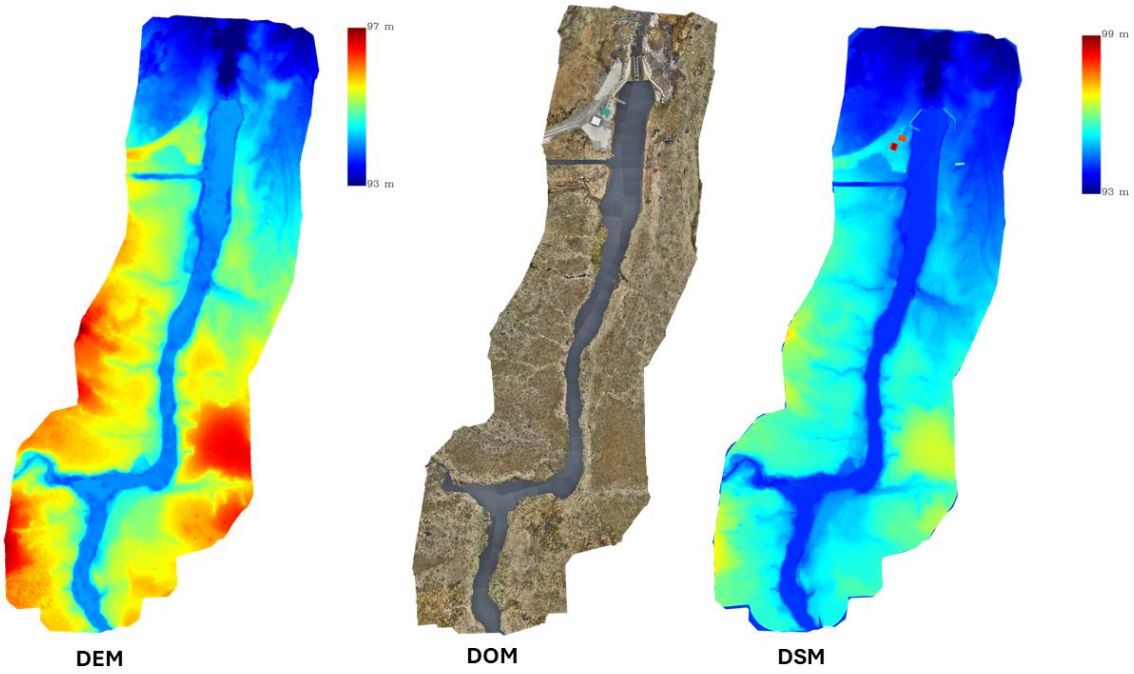

Figure 7 Digital Elevation Model (DEM), Digital Orthomosaic Model (DOM), and Digital Surface Model (DSM) of Murrell River created by LiDAR and Photogrammetry Project Team (DPLR4-1055)

5. Next Step

The next phase of the project will focus on ensuring the continued reliability and accuracy of the newly established monitoring systems. Regular field visits will be conducted to download updated water-level data from the Murrell River and to verify the operational status of all deployed loggers, including those recently installed at Murrell River.

To sustain the programme beyond the lifetime of the current Darwin Plus project, long-term investment will be required. A routine will be established for checking battery charge and memory capacity during site visits to prevent data loss caused by unexpected shutdowns. In addition, field checks will confirm that LevelSCOUT loggers remain consistently submerged during expected wet periods and, where feasible, are positioned in locations less vulnerable to drying out.

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