



Student SURVEY Expeditions

Karalee Water Catchment And Dam Survey

Kim Rose

Department of Spatial Sciences, Curtin University

History



Figure 1: Karalee Dam Construction (Photo courtesy of Lance Stevens)

The Karalee Rocks area, approximately 50km east of Southern Cross in the Shire of Yilgarn, was first discovered by surveyor Charles Hunt during his expedition from York in 1864. During subsequent expeditions in search of suitable agricultural land, Hunt developed a series of wells and dams along his route to Hampton Plains in 1865 and 1866.

The major development at Karalee was as a result of the building of the Southern Cross to Coolgardie railway by the Wilkie Brothers Contractors in 1895 & 1896. The steam trains travelling along the railway required frequent supplies of water, with the water from the Goldfields pipeline deemed to be too saline, which would drastically reduce the life for the steam engines. In 1897, William Shields, a Public Works Department railway engineer, designed the Karalee water supply by utilising the two vast granite outcrops. These rocks had a stone catchment wall built around their six kilometre perimeter which caught the water flowing from the rock before directing through a stone sluice and steel flume to the earthen dam. This water proceeded to be piped to a storage tank at the railway siding.

The introduction of diesel locomotives in 1953 spelled the end of the line for Karalee in its initial purpose, with the Water Authority taking control and using the site for supplementary water for the Goldfields Water Supply.

The area has become a popular attraction for campers and picnickers, with Karalee being vested in the National Trust in 1999 and placed on the State's Register of Heritage Places in 2001.

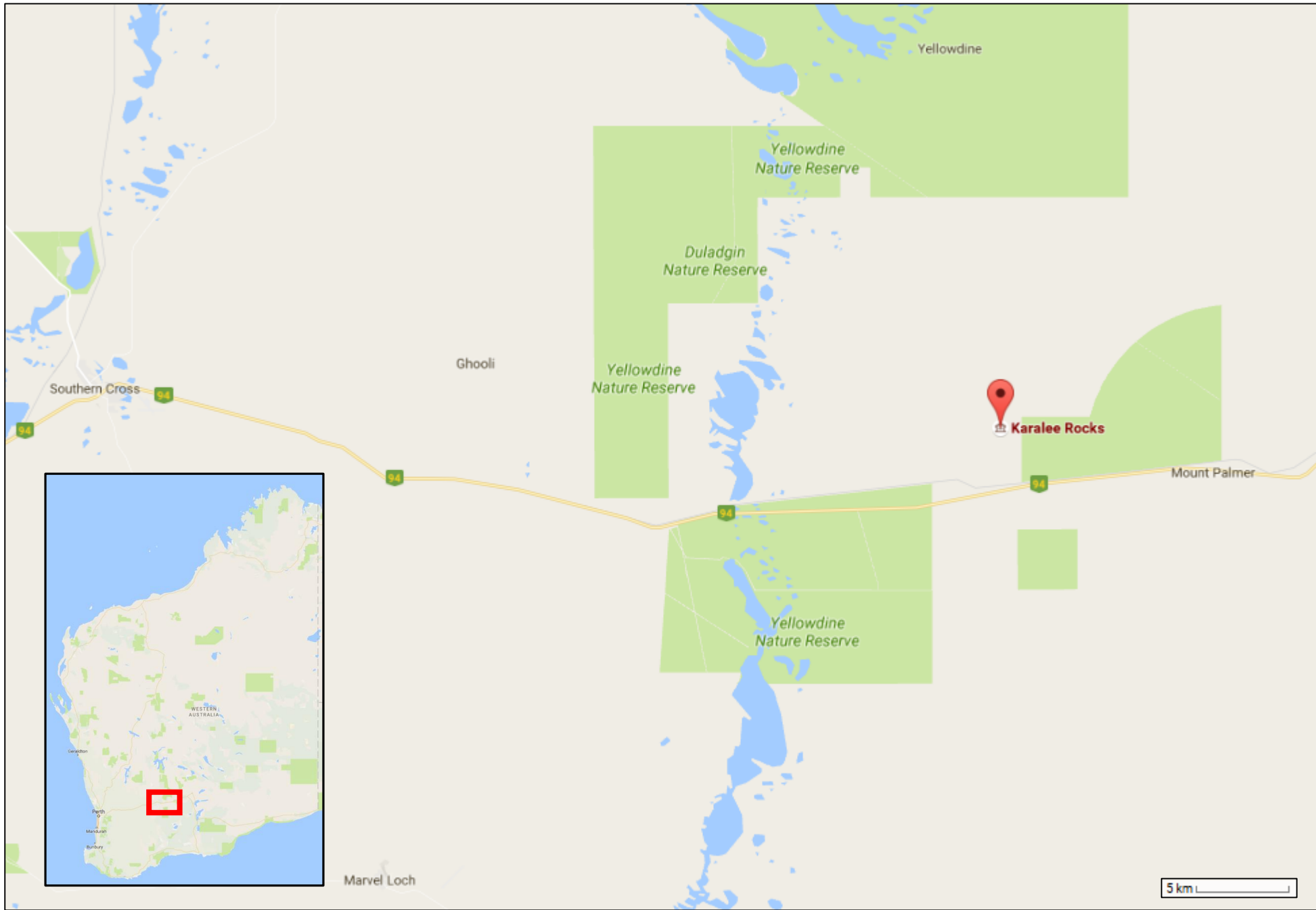


Figure 2: Location of Karalee Rocks (Google Maps)



Figure 3: Laser scanning of Karalee Flume (Photo Courtesy of Geoff Robb)

Aim

The Karalee Water Catchment and Dam survey was proposed to collect and record the location of the current infrastructure at Karalee for historical recording purposes. The survey was designed to incorporate GNSS, terrestrial surveying and laser scanning to create a three-dimensional (3D) database of the flume, dam, catchment wall and a portion of the rock. The Survey Expedition is also aimed at placing students in charge of a project which requires the management of all facets, including the planning, preparation, execution and delivery of the survey in a professional and timely manner.

Figure 4 is the original plan for the water catchment system, designed by William Shields, which will be used for the comparison of the survey undertaken against the original design. The RTK GNSS survey of the earth dam was undertaken as an efficient means of accurately recording the position of the dam, while also serving as a comparison against the laser scanning and the original dam design.

The major component of the project was to utilise laser scanning techniques to capture a coloured 3D point cloud of the dam, steel flume and sections of the stone catchment wall and Karalee Rock.

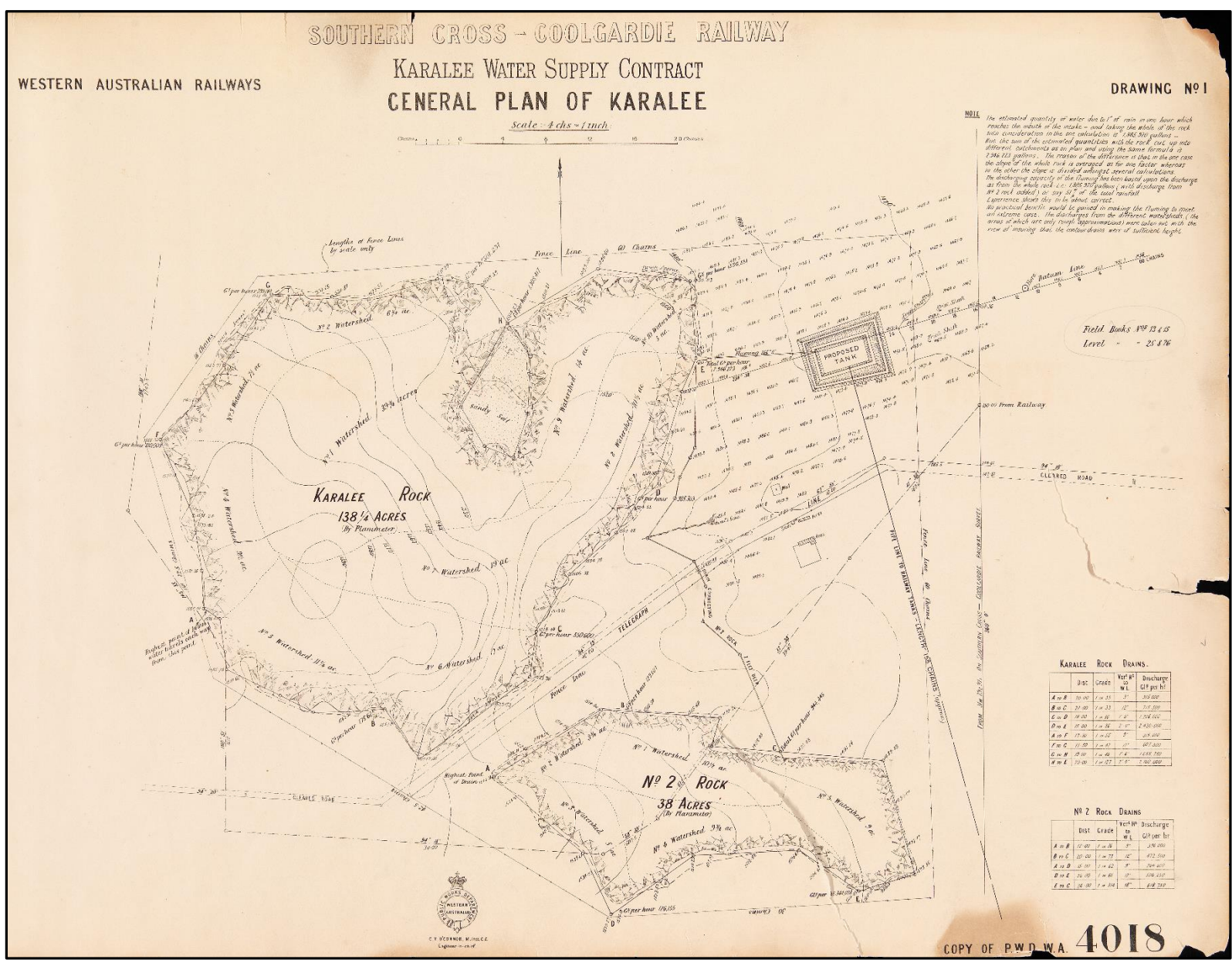


Figure 4: Public Works Department Central Plan of Karalee (State Records Office of WA)

Results

The survey at Karalee was conducted in an efficient manner, using two laser scanners and two RTK GNSS units to reduce capture time.

The RTK survey comparison in Figure 6 shows the original plan almost perfectly matching the surveyed dam, with an overflow in the southwest corner not being on the original plan.

Figure 5 outlines the point cloud of the site that was captured, with Figure 8 displaying a side profile of a part of the flume. The comparison between sections and the original design, in Figure 7, illustrates the steel flume having changed shape. This is most likely due to a fire that caused significant structural damage in the early 2000's, together with 120 years of life.

This point cloud provides a historical record of the water catchment and storage facility with future restoration projects or investigations being able to utilise the coloured dataset. Elevations, sections and a 3D CAD plan is to be provided to the National Trust and Yilgarn Historical Society for their records and any future use.



Figure 5: Overview of coloured point cloud of Karalee site

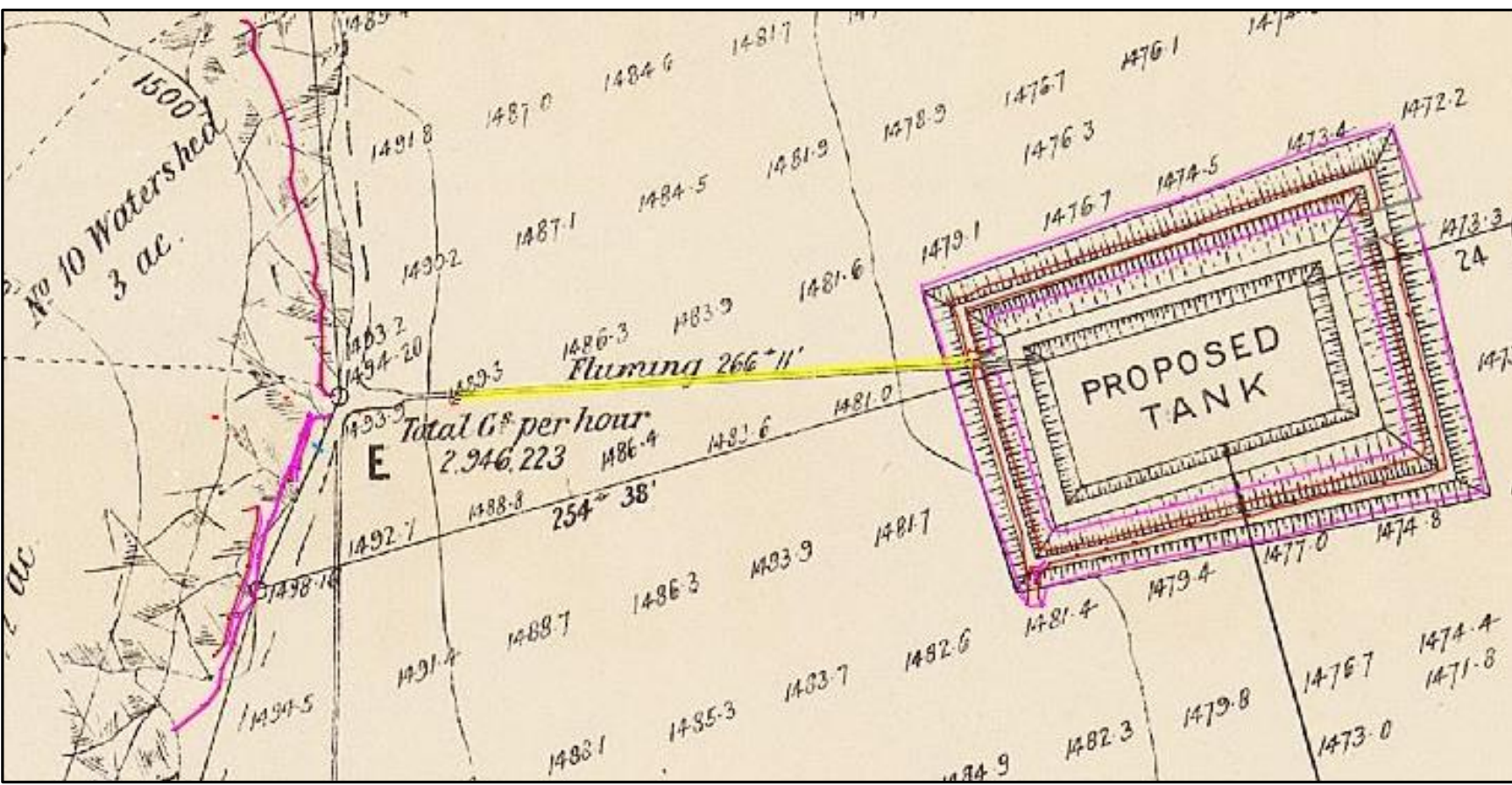


Figure 6: RTK survey overlaid on the original Karalee plan

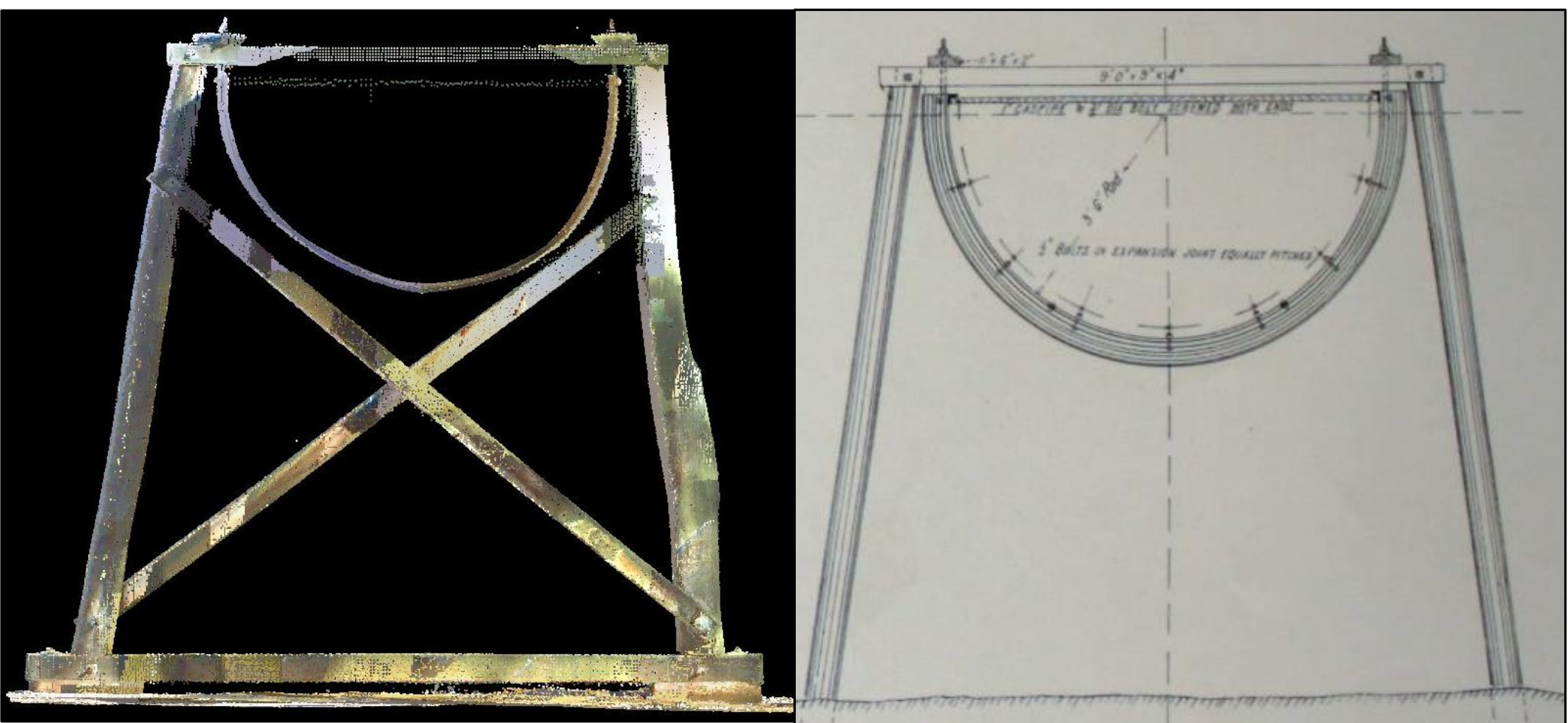


Figure 7: Cross-section of Karalee flume from the point cloud (left) and the original drawing (right)

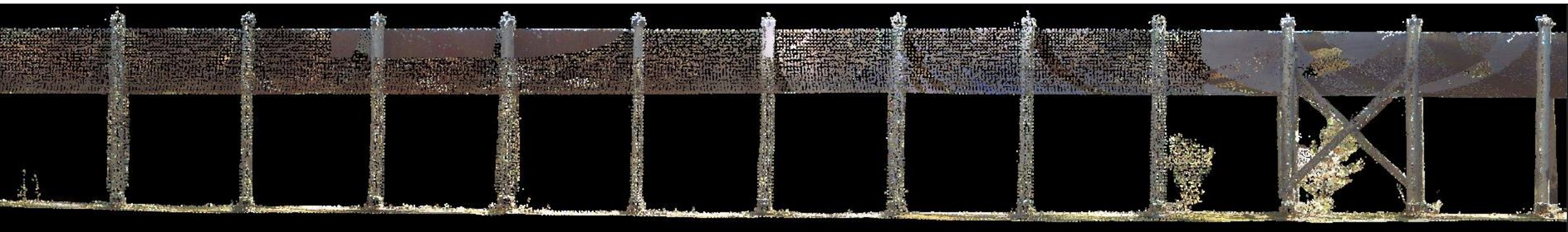


Figure 8: Side view of Karalee flume from coloured point cloud

Conclusion

The undertaking of the 2016 Curtin University Survey Expedition resulted in many great experiences, with friendships formed and many skills developed. The experience of managing small projects with a team of workers in a remote location will prove invaluable for students in the years to come.

The recording of historical assets around Western Australia is an initiative that should be more readily undertaken to preserve these relics of the past.

The site at Karalee is a magnificent reminder of all pioneers who helped shape and develop Western Australia, with the flume and water catchment system remaining in immaculate condition.

Acknowledgements

The 2016 Expedition has been supported by Curtin University together with the sponsors displayed below..

Both the Yilgarn Historical Society and project mentor Wayne Garwood provided guidance and knowledge of the site and local area which directed the initial historical research and survey planning.

The tireless work of fellow students, expedition mentors and Curtin staff from the expedition enabled the successful completion of the Karalee Dam field work and processing.



Figure 9: 2016 Curtin University Survey Expedition team photo at Niagara Dam



SURVEYS



Curtin University

