

Bellenden Ker tunnel, power station and a proposed east Mulgrave River water intake for Cairns

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ABSTRACT

The Cairns Regional Council (CRC) has identified the need to acquire an additional water source in the near future (council's corporate plan, section 5.1). Options listed include Barron River, Mulgrave aquifer, dead storage at Copperlode Dam, upgrade freshwater capacity and upgrade of Behana Ck intake. Currently the main additional water source targets are Mulgrave aquifer and Lake Placid (Barron River) water treatment plants (WTP). We present a cost and environmentally superior alternative which is to access the (East) Mulgrave River at the back of Bellenden Ker Mountain via a tunnel from the coastal plane. First we present a stream-flow model for the catchment of the East Mulgrave River above 600 m and show that sufficient water is available at that point for a water intake. This model is based on recent rainfall and cloud stripping research by Dr David McJannet performed on Mount Bellenden Ker. Second we present a costing model for the construction of a one-lane, 6.5 km vehicular tunnel from the base of the mountain near Bellenden Ker township to the back of the mountain at 600 m, and associated infrastructure. The model incorporates a pipeline that takes water from the intake at 600 m to Gordonvale via the base of the tunnel where a power station generates sufficient electricity to run 1500+ homes. This costing model includes an option where the tunnel is the proof of concept for automated mining thereby attracting significant federal funding opportunities. The construction costs are similar to the WTP options however once in operation the tunnel power plant generates income by producing hydro-electricity while a WTP consumes large amounts of energy and other resources. As with the existing Behana Ck intake, the proposed intake only requires filtering and chlorination. Third we present an environmental impact discussion comparing our proposal to the WTP. This includes the carbon hand vs. footprints, effects of the intake on the river and effects of a bore-field and WTP on the aquifer.

Keywords: Cairns water supply; Environmental impact; Hydro power; Robotic tunneling
