

THE RUATANIWHA WATER STORAGE SCHEMEmE: SUSTAINABLE IRRIGATION FOR CENTRAL HAWKE’S BAY, NEW ZEALAND

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New Zealand is a “water rich” nation and has abundant arable land and a sophisticated agricultural sector. However, water is unevenly distributed (see Figure 1) and potentially productive areas suffer from droughts which are predicted to worsen with climate change. Increasing competition for water for irrigation and other uses, including sustaining and restoring environmental values, is starting to drive development of large water harvesting and storage schemes. But there are major obstacles to implementation. New Zealand has, what some consider, an idealistic and obstructive legislative framework for water resource development which emphasizes environmental and cultural protection. It is geologically active because of its position on the boundary of the Australian and Pacific Plates (see Figure 2, and this presents issues for dam building, with frequent earthquakes and mountainous terrain yielding large floods and high sediment loads.

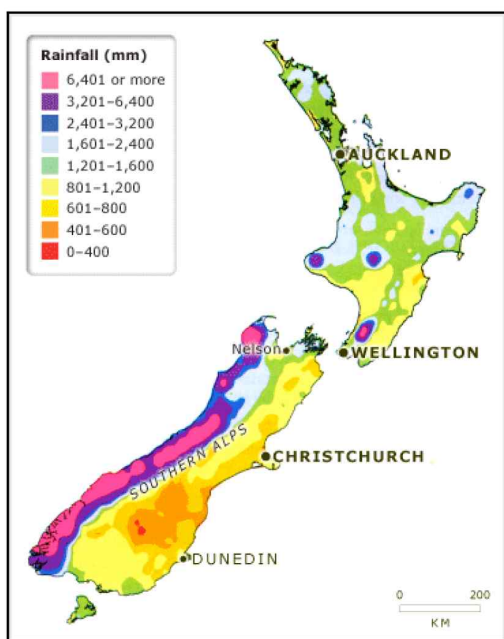


Figure 1. New Zealand mean annual rainfall 1971-2000

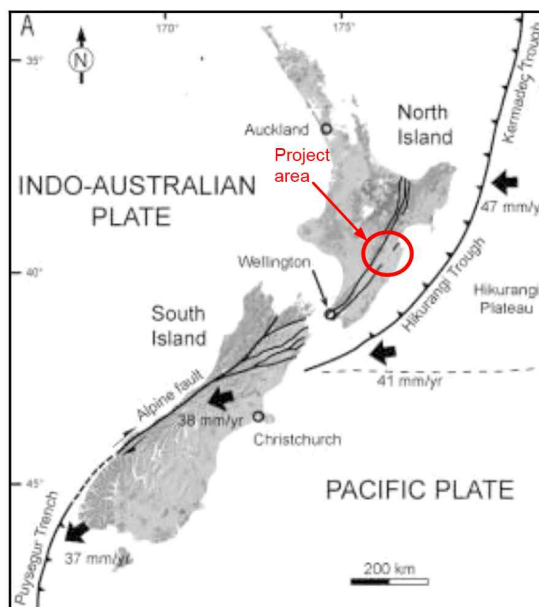


Figure 2. Tectonic plate setting of New Zealand

This paper provides an overview of the Ruataniwha Water Storage Scheme (RWSS) and the many challenges facing its implementation. This scheme, promoted by the Hawke’s Bay

Regional Council, will provide drought resilient irrigation to around 25,000ha of the inland plains in Hawke’s Bay and resolve over-allocation affecting summer river flows in a complex groundwater/surface water system. It involves a 85m high dam with 90million m³ storage capacity and a distribution system comprising river intakes, a 32km long headrace and main laterals of large diameter PE pipe, plus modest hydro-electric power generation (6.5MW).

The search for a suitable dam site that commenced in 2008 has been difficult indeed, with more than 30 sites covering a large area investigated and rejected, the majority on the basis of unsuitable geotechnical conditions, proximity to faults or poor economics. Both off-river and on-river dams were evaluated. The finally selected dam and reservoir site on the Makaroro River (see Figure 3) is not without issues; it is close to the active Mohaka fault system, is subject to a very high bed load regime, and has moderately significant ecological values.

The storage capacity required at the dam is dependent not only on the size of the irrigated area, but also on aspects such as the environmental flow release regime, future irrigated land use mix, supply reliability criteria, achievable on-farm irrigation efficiency, conveyance losses, and allowance for sediment infill and climate change effects. Detailed modelling of the reservoir behaviour based on historical climate and river flow data for the period 1972 to 2010 and assuming full irrigation uptake was used to establish the required live storage. Figure 4 shows the simulated reservoir storage variation with time.

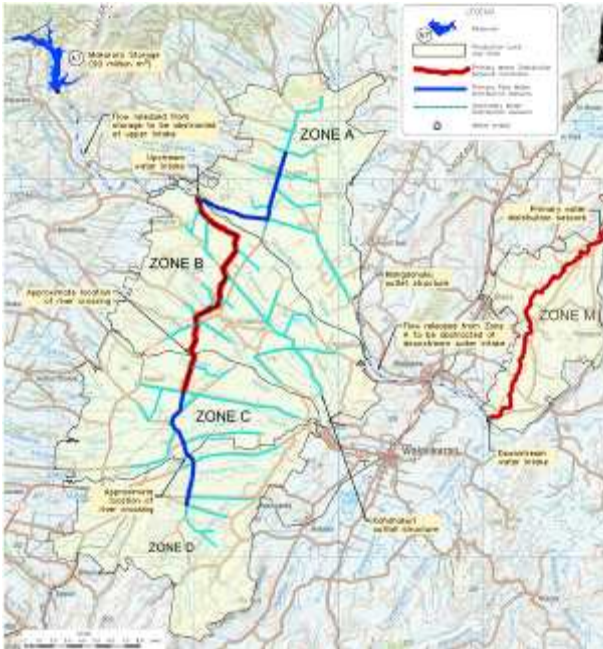


Figure 1. Proposed scheme and command area

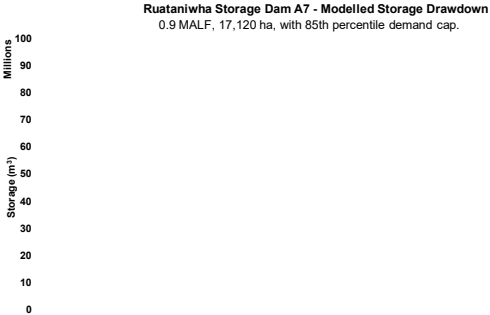


Figure 1. Modelled reservoir storage behaviour

A broad consultative approach was adopted at the investigation and planning stage in which all potentially affected parties including local communities, irrigators, landowners, interest groups, and iwi (tribal landowners) were engaged to assess the fit of the Project within the community. To expedite the programme, environmental, cultural and economic/commercial work streams were progressed in parallel with engineering investigations. Nevertheless, no short cuts can afford to be taken. Apart from the high environmental sustainability threshold tests set by the approval authorities, the Project, particularly as it involves an on-river dam, has attracted the close attention of interest groups and environmentally sensitive members of the public, who can influence the approval process.

The New Zealand regulatory framework provides for public submission and participation in the approval process at a number of levels. A formal hearing process involving testimonies of numerous subject matter experts concluded in early 2014, and approvals for the scheme were issued in June 2014. However, constant challenges to the legality of the land take for the reservoir (no resettlement required) and political opposition at a territorial level, has repeatedly delayed the procurement of the Project. A resolution of the outstanding issues is anticipated by the middle of this year.

This Project illustrates the many hurdles facing the development of a major water storage scheme in New Zealand. Apart from the challenges posed by its very dynamic physical environment, New Zealand has a highly regulated environment and legislation that truly empowers democratic due process which can unreasonably hamper water resource development projects.