

North Bank Tunnel Concept Flow Regime



Waitaki Regional Plan overview

The Waitaki Regional Plan includes a year-round minimum flow of 150 cumecs in the Waitaki River from the Waitaki Dam to the sea and seven flushing flows each year.

Meridian Energy proposes a lower minimum flow in the stretch of Waitaki River (between the Waitaki Dam and Stonewall) to provide for a viable hydro generation prospect. Scientific assessments, based on more than two decades of intensive studies, suggest that this proposed North Bank Tunnel Concept (NBTC) flow regime with a lower minimum flow would achieve the river values identified in the Waitaki Regional Plan and enable a viable hydro generation proposal.

The proposed NBTC flow regime

The proposed NBTC flow regime would be much more stable than the existing flow regime, with daily and weekly variations significantly reduced, as well as a seasonal profile which is lowest (110 cumecs) in the winter and highest (150 cumecs) in summer.

The NBTC flow regime includes flushing flows (at least four each year) to flush the river of fine sediments and nuisance periphyton growths. It is also proposed to shut-down the tunnel when flood flows into Lake Waitaki exceed 900 cumecs (approximately once every two years). This flow regime will have an annual mean of 165 cumecs before abstractions based on recent hydrology (1979-2005).

Glossary of terms

Cumec – one cubic metre of water per second flowing past a given point.

Hydrology – The scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.

Managed reach – the 34km section of river from the Waitaki Dam to Stonewall.

Mean flow – the average flow during a period of time (i.e. daily, weekly, or annual average).

Median flow – flow that is exceeded 50% of the time.

NBTC flow regime – the way and rate that water is released at Waitaki Dam which has a minimum flow (monthly variable from 110-150 cumecs), flushing flows, and channel flows.

NBTC minimum flow – flow that must be released and maintained between Waitaki Dam and the outfall.

Periphyton – the community of algae, bacteria and fungi that lives on the surface of stones and rocks in streams, and forms an essential part of the food chain.

Ramping rate – how quickly the river rises and falls as a result of hydroelectric activity.

River values – Waitaki Regional Plan

The first objective listed in the Waitaki Regional Plan is:

“To sustain the qualities of the

environment of the Waitaki River and associated beds, banks, margins, tributaries, islands, lakes, wetlands and aquifers.”

The proposed NBTC flow regime is designed to make the most efficient use of water for economic purposes while at the same time sustaining the values of the Waitaki River, as defined in the Waitaki Regional Plan.

The proposed NBTC flow regime minimum flows

Meridian Energy's proposed NBTC flow regime sets minimum river flows for each month, ranging from 150 cumecs in late summer to 110 cumecs in winter.

This flow regime has been based on extensive research and analysis that shows there would be negligible difference in impact on the river values with a variable monthly minimum flow down to 110 cumecs, compared with the flat 150 cumec minimum set in the Waitaki Regional Plan.

Both the Waitaki Regional Plan and the NBTC flow regime allow for seasonal provision of irrigation water between Waitaki Dam and Stonewall.

Habitat quality versus quantity

The Waitaki River below the Waitaki Dam is currently subject to frequent (daily and weekly) changes in flow levels as a result of the operation of the Waitaki hydroelectric power scheme. The quality of the natural environment in the river is affected by these fluctuations.



Flow at 119 cumecs, Waitaki River looking downstream from near Bortons



Flow at 351 cumecs, same location as picture on left

If a scheme based around the North Bank Tunnel Concept were built, this flow variability would be confined mainly to the tunnel. The managed reach of the Waitaki River between Waitaki Dam and Stonewall would have far less daily and weekly variability, and in this regard would be much more like a natural lake-fed river. Although there would be a reduced quantity of water, there would be an increase in the quality of habitat (see also *The River Food-chain* information sheet).

The scientific studies show the amount of viable in-river habitat for most species would be similar, despite the reduction in river flow.

Flushing flows

Flushing flows of around 450 cumecs for between 24 and 48 hours would help to keep

the riverbed fresh and help remove periphyton and silt.

Meridian Energy's proposal is to provide for four flushing flows each year, three in summer/autumn and one in winter.

Ramping rates

Ramping rates would continue to apply under Meridian Energy's proposed NBTC flow regime, at both the Waitaki Dam and at the tunnel outfall.

There are limitations on ramping rates to ensure public safety and avoid fish stranding.

Flood management

Floods of greater than 900 cumecs are needed to mobilise and transport gravel down the river. Floods of this size currently happen approximately every two years.

When river flows into Lake Waitaki exceed 900 cumecs, the tunnel would be shut down for a period of 48 hours to allow the full flood flow to pass down the river. This would help to sustain the values of the Waitaki River.

Didymo

Didymo has been identified in the Waitaki River and early indications are that it is not likely to be removed by medium-sized 450 cumec flushing flows. Meridian Energy is continuing to research the impact of Didymo and how it may be controlled in the Waitaki and other South Island catchments. Current research suggests that regular gravel-mobilising flows are needed to flush Didymo, which underpins the proposal to shut down the tunnel at flows exceeding 900 cumecs.

Proposed monthly minimum flows under NBTC flow regime

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Minimum flow in cumecs	140	150	145	125	120	110	110	110	120	125	130	140

North Bank Tunnel Concept overview

The NBTC covers the 34km stretch of the lower Waitaki River from the Waitaki Dam, 6km upstream from Kurow, to Stonewall on the north bank of the river across from Black Point.

The North Bank Tunnel Concept would divert water from Lake Waitaki into a tunnel, through a power station, and return it to the river upstream of Stonewall.

If a scheme based on the NBTC went ahead, it would generate approximately 1100 to 1400 GWh of additional power each year (enough to power every household in Christchurch).

North Bank Tunnel Concept consenting process

Meridian Energy has proposed a two-stage process:

- Stage One, which is underway now, is to obtain the necessary water-only resource consents to divert and take water from Lake Waitaki and to use that water for hydro-electric generation, as well as to discharge the water back into the Waitaki River at Stonewall.
- Stage Two, which would only proceed if suitable water consents were granted, would be to obtain land-use consents and the other approvals needed to construct and operate a scheme based on the North Bank Tunnel Concept.

How to get more information

Information days: watch your local newspapers for notices of NBTC information days, which are held from time to time as part of the consultation process.

Send us a letter: Project Manager, NBTC, Meridian Energy, PO Box 2454, Christchurch.

Email us at: hydro.info@meridianenergy.co.nz

Phone us on: 0800 496 501

Web: www.meridianenergy.co.nz

Technical reports

This information sheet is one of a series summarising key areas from the Application for Water Consents for a *North Bank Tunnel Concept - Assessment of Environmental Effects*.

The topics covered by this series of information sheets are: NBTC Project Booklet; Consultation Process; Flow Regime; Recreation and Angling; Groundwater and Wetlands; The River Food-chain; Braided River Birds; River and Coastal Processes; Flow Regime in Waitaki River; and Mitigation.

We use recyclable chlorine-free paper and vegetable oil-based printing inks.

