

Opuha Dam Downstream Weir Enhancement – Construction Update No. 1



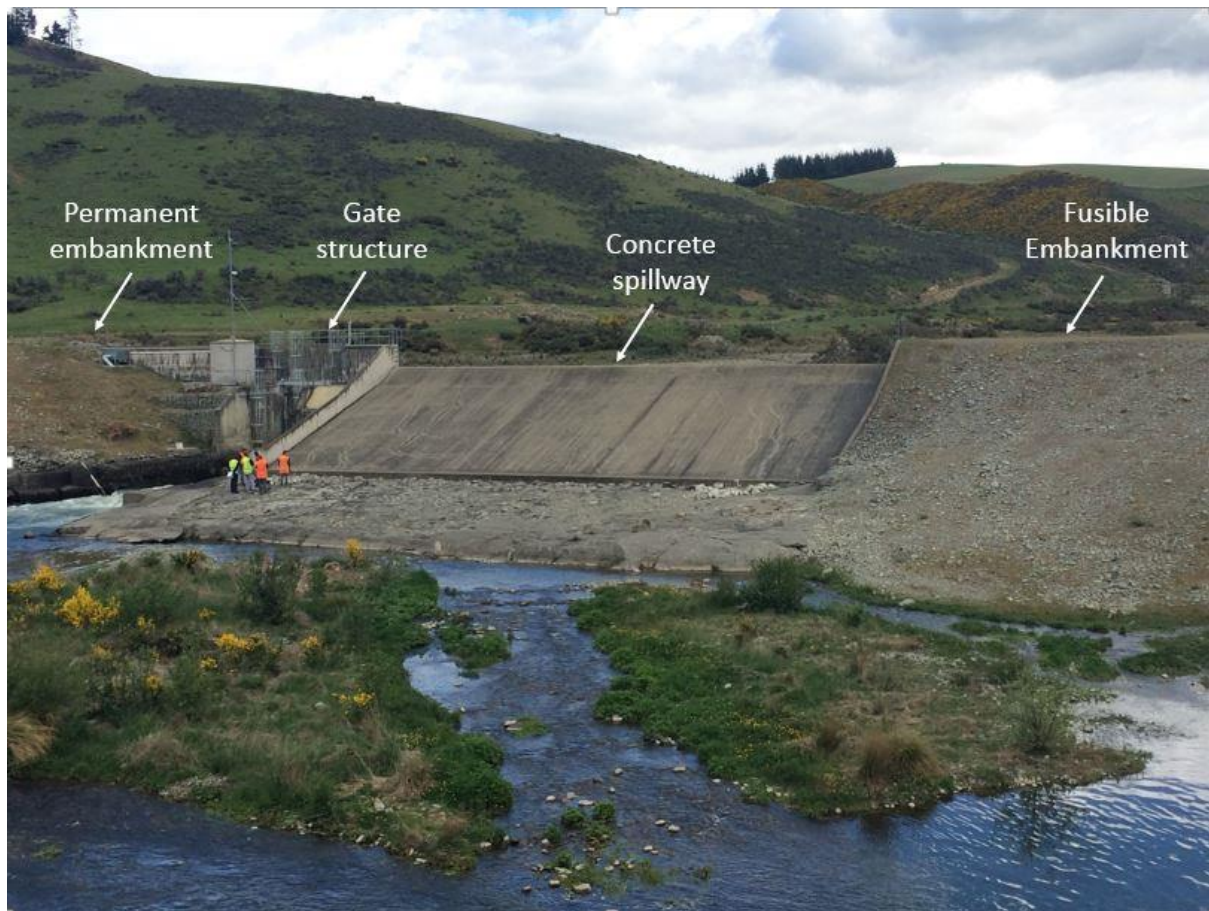
MWH is responsible for the detailed design and construction supervision of the upgrade of the Opuha Dam Downstream Weir (South Canterbury, NZ), owned and operated by Opuha Water Limited.

The weir serves to reregulate releases from the Opuha Dam powerstation, which is typically used as a peaking station, back into the Opuha River for irrigation and environmental purposes.



The weir is a composite structure and includes a permanent embankment, a gate structure with radial gate, a concrete spillway and a fusible embankment. The weir is classified as a 'Large Dam' in accordance with the NZ Building Act and a 'low' potential impact classification (PIC) dam in accordance with the New Zealand Society on Large Dams (NZSOLD) dam safety guidelines.

The current flood passage capacity of the weir prior to activation of the fusible embankment is approximately 120 m³/s, achieved via the concrete spillway and existing radial gate. Fusing has occurred approximately once every 5 years, since original construction of the weir in the late 1990's. The key features of the weir are shown below (viewed from downstream, exiting condition):



The key objectives of the weir upgrade are:

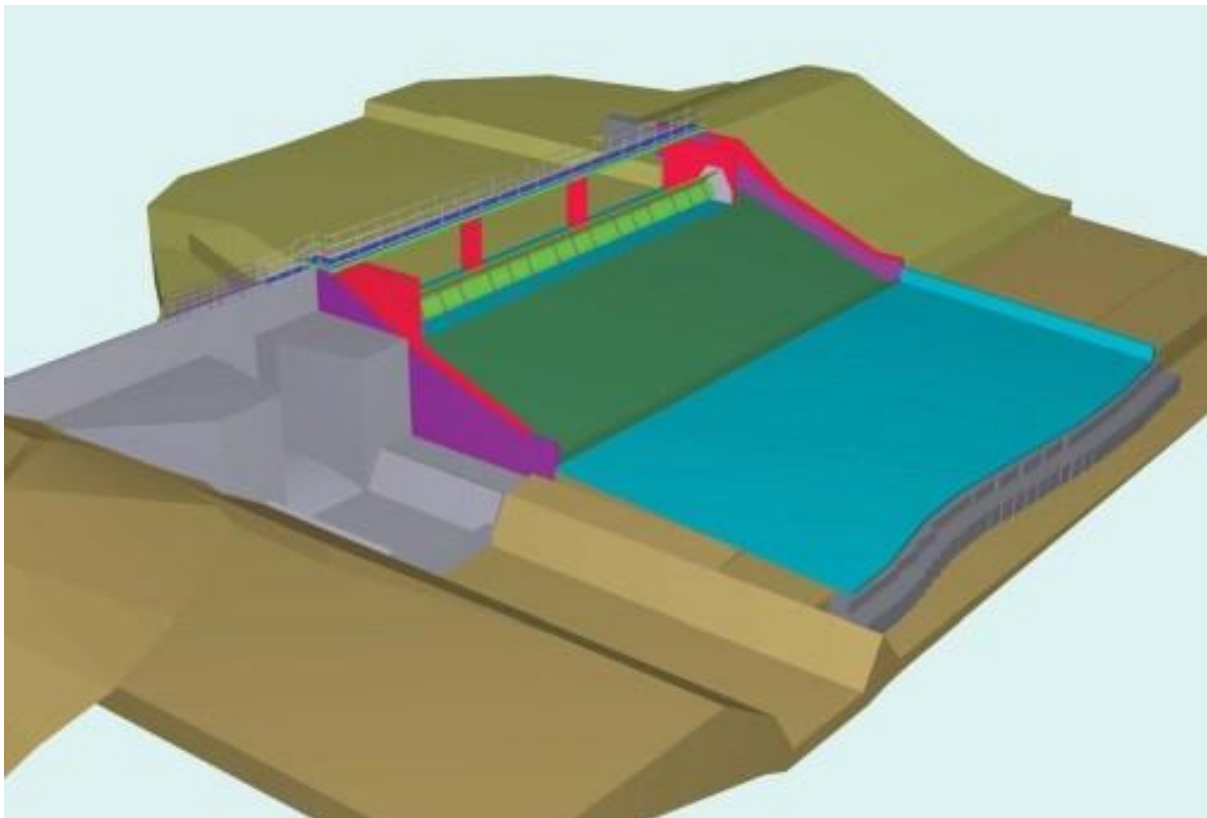
- Increased ability to pass flood flows prior to activation of the fusible embankment from 120m³/s to 250 m³/s and therefore reduce the likelihood of activating the fusible embankment; and
- Increased ability and flexibility to release water for environmental purposes - in terms of river 'flushing flows'.

An Obermeyer Water Control Gate was selected as the preferred solution to achieve the project objectives. The existing ogee crest on the concrete spillway is to be cut down to accommodate the 1.8 m high and 26 m wide gate. The gate can be used to maintain current pond levels, but in the event of a flood, can be lowered and therefore provide increased flood passage ability due to the lowered spillway crest level. In addition, the gate can be partially lowered to allow river flushing flows to be released as required.

The spillway cut down will occur over 26 m of the 30 m wide spillway crest, to remove the need to tie into the existing training walls and the associated risks. The weir pond is to remain fully operational throughout the duration of the works. The construction works have been designed so that the concrete spillway remains fully operational throughout the duration of construction, therefore not increasing the risk of activating the fusible embankment during the works. The existing radial gate is being used as the diversion for the purposes of construction.

The key components of the weir upgrade works are (as shown schematically below in the 3D model we developed for the project):

- The approximately 2m cut down of the existing ogee crest on the concrete spillway.
- Development of a new slab foundation for the gate and construction of new internal training walls.
- Installation of the Obermeyer gate and associated controls.
- Raising of the existing spillway training walls.
- Downstream erosion protection works (including a new cutoff at the toe of the spillway and a concrete slab).
- Construction of a walkway over the concrete spillway.
- Removal of the rock ledge immediately upstream of the spillway.



Construction commenced in April 2016. Temporary works, including the cofferdam, were completed in early-May 2016. A section of the concrete spillway ogee crest has been left in place, and is being used as part of the cofferdam. This section of spillway crest will be demolished towards the end of the project under a reduced pond level, with remaining concreting works upstream of the installed gate completed at this time. A temporary mass concrete wall ties the ogee block 'cofferdam' to the conventional rockfill cofferdam. Here is what the cofferdam arrangement looks like:



And here is what the weir looks like currently, with the spillway cut down completed and foundation preparation works in progress:



I will post further updates over the next few months, as construction progresses. Over the next few days I will detail the construction flood risk management strategy and the construction sequencing for the works. I will also post more on the as-encountered conditions for the gate slab foundation.

Thank you for reading.

- Owner: Opuha Water Limited
- Contractor: Breens Construction Company
- Designer: MWH Global
- ETC: Tim Anderson