

Filling operation begins at Lake Mead

## Watering up the hard-fought Lake Mead tunnel

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Peter Kenyon, *TunnelTalk*

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Seven years after the start of one of the hardest-fought underground construction projects in history, water is finally being allowed to flow into the new Intake No. 3 tunnel at Lake Mead in Nevada, USA.

Project owner, the Southern Nevada Water Authority (SNWA), expects the new intake structure and tunnel – also known as the third straw – to begin supplying water to the desert city of Las Vegas next month.

Salini-Impregilo, part of the joint venture contractor team that delivered the technically challenging TBM tunnel under the lake, said “true partnership” between the owner and contractors had been critical to achieving success.

Robin Rockey for SNWA told *TunnelTalk* earlier today (17 September) that the draining of 11 million gallons of water currently held in the half-mile long connector tunnel (Fig 1) began last Thursday (10 September). This marks the start of operations to equalise the pressure between the approximately 200m-deep TBM-bored intake tunnel and the lake above. This will be achieved by flooding it to its capacity of 41 million gallons of water, a process that is expected to take approximately two weeks.

The US\$52 million connector tunnel that is being emptied first as part of this flooding process was excavated using the drill+blast method by Renda Pacific. It forms a critical connection between the deep-level TBM-bored tunnel under Lake Mead to the Intake No. 2 tunnel and the pumping station and water treatment plant.

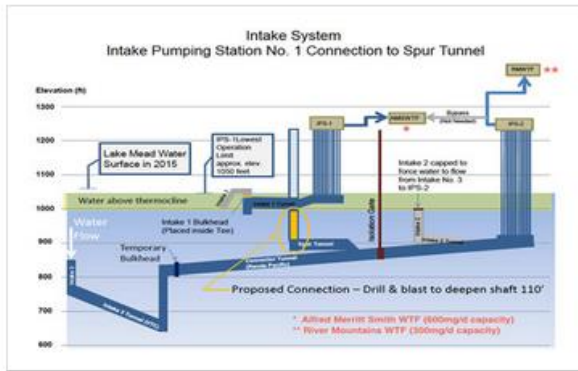
Amid great celebration under the lake, the US\$447 million 4.8km-long TBM bored tunnel finally holed through into the new intake structure in December last year (2014). This followed a tortuous drive that included two inundations at the start in 2010–2011, forcing contractor Salini-Impregilo and its JV partner SA Healy to excavate a new starter tunnel on a different heading to avoid fractured ground conditions; a fatality in June 2012; extremely challenging ground conditions under the lake, necessitating several maintenance stops in hyperbaric conditions at pressures of up to 15 bar; and an overall project completion delay of three years from that initially agreed at contract signature.

But all that was forgotten as the taps were finally turned on last week. “Intake No. 3 tunnel is being filled by various sources, including natural groundwater, and from the draining of approximately 11 million gallons of water from the connector tunnel – which was already in service – through a temporary bulkhead that divides the connector tunnel from the newly completed Intake No. 3 tunnel,” explained Rockey.

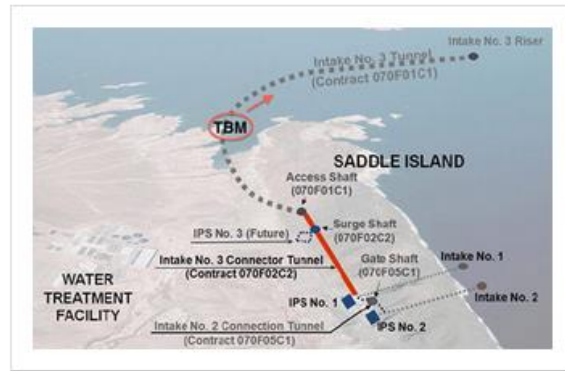


**TBM breakthrough into precast concrete intake structure – the circular plug at the top is holding back Lake Mead above**

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**Fig 1. Layout of intake tunnels and temporary bulkheads**



**Fig 2. TBM and connector tunnel alignments and shafts**

"Once the temporary bulkhead has been removed, which will make the final and permanent connection of the Intake No. 3 tunnel to the connector tunnel, then the rest of the underground works will be filled using water from one of our existing pumping stations.



**Start of watering up operations to fill Intake No. 3**

attached to lifting lugs on the topside of the spherical bulkhead. "The connection to the bulkhead will be completed by a submersible remote operated vehicle (ROV) and no divers will be required," said Rockey.

A spokesman for Salini-Impregilo paid tribute to the collaborative efforts of all parties concerned in the project for finally succeeding in delivering what should have been a four-year project at contract signing in 2008, to a seven-year one. "This has been a technically challenging and demanding project, and one which would not have been completed on budget and on time without the dedication and commitment of Salini Impregilo, SA Healy and Southern Nevada Water Authority working together in true partnership."

"The current rate of flow is determined, essentially, by the maximum amount of flow from valved outlets in the temporary bulkhead, but for final filling it will be controlled to stay under the maximum fill rate as determined by the engineer," said Rockey. "Once the tunnel has been filled up and the pressure on the intake riser bulkhead has been equalized, then the bulkhead on the riser will be removed making the tunnel ready for operation."

The bulkhead, which is made of steel and weighs 1,900lbs, will be removed from above using a barge and winches, cables and hooks that will be



## Gallery



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## References

- Technical victory for TBM drive at Lake Mead – *TunnelTalk*, December 2014
- Pushing TBM design limits under Lake Mead – *TunnelTalk*, September 2014
- Race against time at Lake Mead – *TunnelTalk*, October 2013
- Lake Mead TBM designed for the extreme – *TunnelTalk*, November 2009
- Long wait over for Lake Mead TBM – *TunnelTalk*, September 2011
- Fatal ring-build accident at Lake Mead – *TunnelTalk*, June 2012
- Merger creates Italian tunnelling force – *TunnelTalk*, April 2013