Burwood Beach Ocean Outfall

Client: Hunter Water Corporation
Year: 1996, 1998, 2007, 2008, 2009
Project Reference: 06101
WRL Technical Reports: Burwood Beach Ocean Outfall Monitoring (A96/06); Burwood Beach Ocean Outfall: Testing of 8 Inch Check Valve (A96/18); Burwood Beach Ocean Outfall Monitoring (A96/28); Burwood Beach Ocean Outfall Monitoring & Modelling May - August 1998 (1998/54); Burwood Beach Ocean Outfall Monitoring and Modelling (2007/11); Hydraulic Assessment of Burwood Beach Ocean Outfalls with New Tideflex Valves (2008/02); Burwood Beach Ocean Outfall Modelling 2009 (2009/06); Burwood Beach Ocean Outfall Modelling 2009 Environmental Conditions Preceding Events (2009/19)

Burwood Beach Wastewater Treatment Works (WwTW) is located approximately 7 km south-west of the entrance to the Hunter River at Newcastle, and services approximately 70 km^2 of the city of Newcastle. Liquid effluent and sludge are disposed of following secondary treatment via an outfall tunnel extending 1500 m offshore of Burwood Beach and discharging into water of 22 m depth. Liquid effluent is discharged though 9 diffuser heads with a total of 71 ports. Sludge is disposed through a separate pipeline (approximately 100 m in length, with 18 active ports) extending from a tenth diffuser head.

Initial work was undertaken in 1996, comprising two field exercises, near-field dilution modelling, and the establishment of a steady state three-dimensional (3D) hydrodynamic and far-field water quality model. WRL was commissioned in 1998 to undertake further monitoring works to investigate the performance of diffusers and subsequent water quality impacts at the Burwood Beach Ocean Outfall under winter conditions.

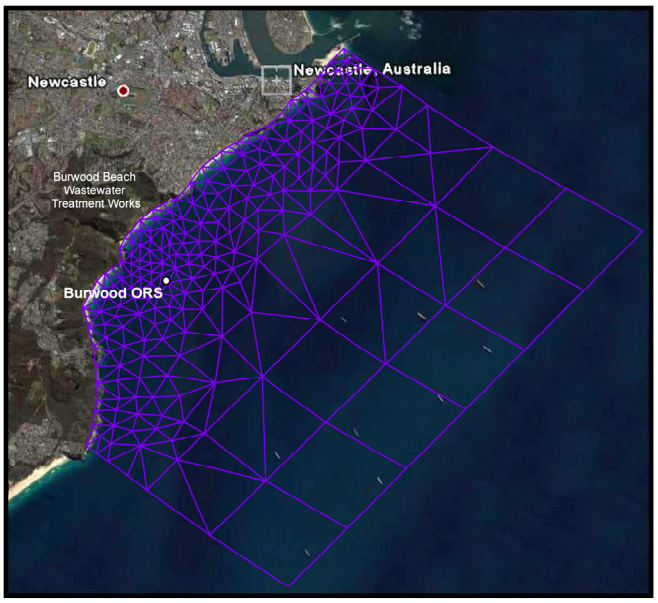
In 2007, WRL undertook a similar study to determine the performance of the outfall under stratified summer condition for present (2007) and future (2030) flow rates. This was achieved through the use of dye isotope (Rhodamine WT) tracking in the field coupled with extensive deterministic modelling of the likely plume dynamics to generate concentration statistics.

In 2008, WRL in conjunction with the Water Research Centre (WRC), of the University of New South Wales was commissioned by the Hunter Water Corporation (HWC) to undertake additional data analysis and modelling tasks related to the Burwood Beach Ocean Outfall. The outcomes of this study are to be utilised by the WRC to assess infection risk probabilities associated with the full range of hazardous event likelihoods at eight 'representative' sites along the Newcastle coast.

Further work was undertaken in 2009 with the water quality capabilities of the far-field random walk model (3DRWalk) upgraded to include: a range of diurnal solar radiation variables to be applied and linked to particle depth; and a series of output variables to be generated for each particle and time step.

For this study, the winter 1998 and the summer 2007 datasets were proposed to represent onsite general winter and summer conditions. To determine if the existing data represent long term trends, the data was compared to long-term datasets from other representative sites.

This analysis was undertaken via a comparison of both wind and current roses, coupled with spectral analysis, to determine the validity of the 1998 and 2007 data sets. The summer and winter datasets were coupled with the 2007 and 2030 effluent flow rates as inputs to the updated 3DRWALK model to enable particle inactivation to be accurately modelled. Both spatial and temporal statistical data were extracted for assessment of hazardous events.



3D numerical mesh (RMA-10) designed and calibrated to simulate currents near Burwood Beach Ocean Outfall

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