INTRODUCING VERSION 4 OF THE ROAD STORMWATER SCREENING MODEL

Annette Semadeni-Davies[1], Jennifer Gadd[1], David Greig[2], Rajika Jayaratne[2]

1. NIWA, Auckland
2. Waka Kotahi, New Zealand Transport Agency

The Road Stormwater Screening Model (RSS) is a tool that has been developed for Waka Kotahi / New Zealand Transport Agency to assess risks to freshwater (streams and rivers) and coastal (including harbours and estuaries) receiving environments associated with the discharge of copper and zinc in road runoff and urban stormwater. It is a steady-state model that reflects average annual conditions based on subcatchments in the River Environments Classification stream network. Risk, rated from lowest to highest, is evaluated on a relative rather than absolute basis, from the levels of zinc and copper in runoff and receiving environment sensitivity. The risk assessment also takes into account other (non-road) urban sources of copper and zinc.

RSS V1. Was presented at the 2016 Water NZ Stormwater Conference and consisted of several loosely-coupled spreadsheets and GIS tools, each covering different aspects of a first, single catchment-scale version of the model RSS V.2 collated the initial version into a single spreadsheet and this was followed by a national version using python (RSS V.3; Semadeni-Davies and Moores 2020). Modelling using this national version found that most streams in Aotearoa New Zealand affected by roads are in the lowest risk level and those that do have a higher risk level are found in, or downstream of, urban areas. Like streams, the highest coastal risk levels were found to be associated with coastal towns and cities, and rarely associated with roading alone.

The latest version RSS V.4, developed in 2021/22 has new tools for representing the treatment of road runoff and urban stormwater and has undergone both field testing and sensitivity analyses. Field testing was done by comparing the modelled stream risk against the relative concentrations of zinc and copper measured in streams receiving runoff from major roads. For the majority of sites, the contaminant strength predicted by the model was within the same category as contaminant strength calculated from measurements, or was higher than measured, indicating the model provides a conservative estimate of the risk. The sensitivity analysis involved varying model parameters and input data, both separately and together, to determine how these changes affected risk estimates. Those results show that the model is robust.

RSS V4 model outputs layers will be used by Waka Kotahi on their capital work planning, existing operations and maintenance activities on the network.

Semadeni-Davies, A., Moores, J. (2020) Development and application of the Road Stormwater Screening Model V.3: Guidance and national application, NIWA client report prepared for New Zealand Transport Agency: 2020129AK.