



Curriculum Vitae

Heiko Loehr

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Heiko is a metocean engineer with over 9 years of experience in coastal, maritime and environmental engineering. He previously worked within specialised coastal and marine teams at Royal HaskoningDHV, MetOcean Solutions (NZ) and the University of Southampton (UK). He graduated from University of Southampton with distinction in Engineering in the Coastal Environment in 2014. Heiko also has a science degree majoring in Maritime Technologies (distinction) with a strong focus on structural engineering, oceanography and marine sensors.

Having worked on a range of innovative coastal projects in the metocean industry Heiko has developed a sound understanding of dynamic coastal environments and has an extensive skill set ranging from coastal processes to engineering design. This includes modelling of hydrodynamic, wave and sediment transport processes ranging from ocean scale to CFD modelling tools using numerous licensed and open source software.

He is an expert in the interpretation of field, physical and numerical modelling data as well as data quality control, process automation and visualisation. Heiko has led a wide range of coastal hazard, numerical modelling and coastal management projects. He has developed numerous innovative tools for coastal and metocean studies including probabilistic hazard models, tropical cyclone risk models and ship simulation models as well as 2D/3D GIS tools.

Nationality

German

Years of experience

9 years

Years with Bluecoast

4 years

Professional memberships

Member, Institution of Civil Engineers, UK

Qualifications

2014 Master of Science in Coastal Engineering (distinction)

2012 Bachelor of Science Maritime Technologies (distinction)

Training Courses

STCW95 Sea Survival Certificate

STCW95 Personal Safety & Social Responsibility Certificate

2018 OpenFOAM CFD Modelling Training at RHDHV, NL

2017 XBEACH Modelling 2-day Training at Deltares, NL

2014 NOAA/NCEP Wave Watch III 5-day Training at Swinburne University, VIC

2014 TELEMAR Modelling 14-day Training at University of Southampton, UK

Publications

Proceedings of the Coasts and Ports 2019 in Hobart, Australia: *'Nearshore wave dynamics at a coral atoll'*

Nature, Scientific Data 2015: *'A user-friendly database of coastal flooding in the United Kingdom from 1915–2014'*

PIANC Yearbook 2017: *'Predicting Propeller Wash And Bed Disturbance By Recreational Vessels At Marinas'*

Languages

English and German

Professional experience

Main Beach Shoreline Project

Byron Shire Council have engaged Bluecoast Consulting Engineers (Bluecoast) to deliver the first stage of the Main Beach Shoreline Project (MBSP). The project's first stage is focused on finding the solution for modification of the coastal protection works (also known as the Jonson Street Protection Works) that will give the best possible outcomes for Main Beach, Byron Bay and adjacent areas. Heiko is a senior project engineer and is involved in the coastal processes investigation including numerical modelling and monitoring as well as the engineering design aspects of the Main Beach Shoreline Project.

Stockton Beach CMP

The City of Newcastle engaged Bluecoast to undertake a review of coastal processes and sediment budget as well as a probabilistic coastal hazard assessment as part of Stage 2 and Stage 3 of the CMP. A cost benefit analysis (CBA) was undertaken in support of the CMP by Bluecoast and their sub-consultants Rhelm. The CBA assessed three identified coastal management options for Stockton Beach. CN are in the process of developing a CMP in accordance with the Coastal Management Act (2016) and are developing long-term actions to address on-going beach erosion and shoreline recession. The draft CMP was completed in a record time and submitted to the NSW Minister for Local Government as one of the first CMPs in the state.

Cocos (Keeling) Islands Coastal Vulnerability Assessment

On behalf of the WA Department of Planning, Lands and Heritage a CVA at the low-lying atoll part of the Australian Indian Ocean Territory is being undertaken. Heiko is one of the lead engineers on this project undertaking a comprehensive one year coastal monitoring campaign including metocean and regular topographic measurements. Furthermore, an interactive database of social/natural/built assets was built, detailed numerical modelling using Deflt3D, XBeach and a range of sediment transport modelling tools as well as GIS mapping of present day and future erosion and inundation extents and asset vulnerability was undertaken. The project is the first step in the CHRMAP process for these unique islands.

Mollymook Beach Coastal Hazard Study and Cost-Benefit-Analysis

In collaboration with Origin a risk-based coastal hazard assessment for South Mollymook Beach to inform the CBA and distributional analysis was undertaken. Heiko developed a probabilistic hazard assessment approach which allows each input parameter to randomly vary according to appropriate probability distribution functions. The randomly sampled parameters were repeatedly combined in a process known as Monte-Carlo simulation. All outputs from the Monte-Carlo simulation were collated to develop a probability curve for shoreline erosion during a study period. Probability distributions for shoreline movement (due to the combined effects of storm erosion and recession) were developed for each beach profile location within the study area which provided the basis for the cost-benefit analysis of management options on an asset-by-asset basis.

Kurnell Coastal Hazard Assessment

Heiko was involved to provide technical coastal engineering input into the project design for Urbis Pty Ltd. This input informed the master planning for the future development of the site, which will be the basis for future land use zones and development controls to guide the long-term development of the site. A key outcome of the coastal engineering study was to define beachfront setback probabilities for the proposed development, as well as setbacks to Quibray Bay, including consideration of long term recession due to sea level rise. It is also necessary to determine the potential impact of oceanic and estuarine inundation on the proposed development, including consideration of sea level rise and other climate change effects.

Lake Cakora Hazard Assessment Review, Brooms Head

A review of a recent coastal hazard assessment for Clarence River Council, NSW was undertaken. The review involved undertaking a geotechnical and geophysical analysis and estimation of historic beach recession rates, sea level rise induced recession and short-term storm demand from photogrammetry data. Heiko was the project manager and lead engineer for this study undertaking the coastal erosion and inundation analysis as well as coastal hazard mapping in GIS. OEH was the assessing authority for this project. Feedback from Council was very positive on all aspects of this project.

Whole of Coast Surf Amenity Enhancements

The City of Gold Coast has engaged Bluecoast to undertake a Whole of Coast Surf Amenity Enhancement Study. The Gold Coast has a reputation as a world class surfing destination and seeks to identify surf amenity enhancement options and locations to accommodate a growing surfing population. In addition, the City has a duty of care to ensure public infrastructure is protected from coastal hazards and therefore the coastal impacts of any potential surf amenity enhancement initiatives should be assessed, including any opportunities to provide multiple benefits including coastal protection. Heiko is undertaking a detailed coastal processes and baseline surf amenity assessment and a world wide review of man-made surf breaks. A multi-criteria assessment of identified options and beach locations on the Gold Coast is undertaken to present a prioritised list for future implementation.

Beresford Foreshore Coastal Enhancement Project

Concept design and associated technical investigations for a foreshore coastal protection and enhancement project in Beresford, WA. This project required a comprehensive understanding of the coastal processes which influence the area to ensure design options would be effective. The team undertook coastal investigations including metocean data collection, detailed wave transformation modelling, sediment transport modelling and optimisation of design options to meet the client's requirements. Heiko was involved in the coastal processes investigations and numerical modelling using SWASH.

Palm Beach Shoreline Project

A Design Reference Report (DRR) for the Palm Beach Shoreline Project (PBSP) was undertaken for the City of Gold Coast. The Palm Beach Shoreline Project aims to prevent the loss and damage of beach front property and public infrastructure at Palm Beach. The City has developed a conceptual design which includes beach nourishment and a nearshore submerged control structure (SCS). RHDHV was engaged to undertake a design review which included extensive numerical modelling, physical modelling and coastal processes studies as well as engineering design of the SCS. Heiko was involved in the review of the concept design findings, coastal processes analyses and the engineering aspects of the

SCS. He was also one of the main engineers in the design of the physical modelling study and undertook a witnessing role at the hydraulics laboratory. During the construction phase he played a key role in the construction quality control and final certification investigations.

City of Gold Coast Surfers Paradise Sand Backpassing Project

As part of the Surfers Paradise Sand Backpassing Project, the project team worked closely with the City of Gold Coast to: Provide the City with an economical sand backpassing design to deliver sand to Surfers Paradise and Main Beach for beach replenishment; Deliver a practical operational procedure which can integrate with the existing Gold Coast Seaway Sand Bypassing System (GCSSBS) infrastructure and maintenance dredging operations; Provide a solution which has no unacceptable impact on natural coastal processes. The Surfers Paradise Sand Backpassing Study completed the forward planning stage of the Project and resulted in the development of a detailed, costed concept design. Heiko undertook the metocean data assessment, coastal processes analysis and GIS mapping for this study.

City of Albany Artificial Surfing Reef

Heiko has been involved in the development of a feasibility study in response to the CoA's desire to provide recreational surfing amenity at Middleton Beach, Albany, Western Australia through a proposed Artificial Surfing Reef.

Heiko was involved in the detailed technical analysis and numerical modelling investigations as well as delivering key design elements for infrastructure options for the client. The project also entailed a comprehensive stakeholder engagement process involving key community as well as local and state government representatives.

Wellington Harbor Coastal Inundation Modelling

2D modelling of hydrodynamic and wave processes in Wellington Harbor was completed as part of a combined fluvial and coastal inundation risk study. The hydrodynamic modelling focused on representing harbor water levels caused by storm surge superimposed of astronomical tides. The wave model simulated local wind generated waves over Wellington Harbor. Finally, overtopping volumes were determined using a joint approach of the Neural Network Overtopping calculator by WL

| Delft Hydraulics and a sub-grid structure in the coupled hydrodynamic and wave model. Heiko was responsible for the development of both models and the inundation calculations as well as presentation in GIS.

Tweed River Entrance Sand Bypassing Project - Sediment Tracing Study (NSW Crown Lands).

In 2016 a sediment tracing study was undertaken for the NSW Department of Primary Industries (Lands). The study was proposed to confirm the hypothetical sediment transport pathways and quantify the relative material transport between Queensland and NSW following placement of material dredged from the entrance bar. Heiko was the lead engineer for all field work, data analysis and reporting.

Storm surge and flooding database for the United Kingdom

Development of a national scale and public accessible web database which contains meteorological conditions, water level data, storm surge analysis and extent of flooding for the top 100 storm surge events in the United Kingdom over the past decade. Heiko was involved in the analysis of water level and meteorological data as well as numerical modelling of surges using a 2D hydrodynamic model forced by a parametric cyclone wind model.

Hay Point Bathymetric Model

A detailed bathymetric modelling study of the Port of Hay Point was undertaken for NQBP. This study involved the analysis of all available bathymetric surveys in order to investigate historic rates of sedimentation in the ports apron, berths and departure channels. The study also involved a detailed analysis of local metocean conditions in determining relationships between these conditions and sedimentation rates at the port. Heiko was involved in the development and programming of a predictive model to predict the sedimentation within the port using a simple Graphical User Interface.

Hay Point Tropical Cyclone Modelling

Design wave conditions within the tug harbor at Hay Point were determined. A synthetic tropical cyclone dataset of 1,000yrs was produced to simulate associated wave heights at Hay Point using a spectral wave model. The synthetic dataset provided the basis for a statistical analysis to estimate annual recurrence intervals of tropical cyclone generated waves.

Samoa Tropical Cyclone Modelling

The inundation risk of key infrastructure on Savaii and Upolu Island, Samoa was assessed. A number of historic tropical cyclone wind fields were generated to force a coupled spectral wave and 2D hydrodynamic model. Heiko was the lead engineer on all modelling and GIS work.