



## DHI CASE STORY

# RIVER MOUTH TRAINING IN THE BAY OF PLENTY

## Designing twin training walls for the dynamic Opotiki Harbour Entrance

Opotiki is a township with a strong vision of increasing the social and economic well-being of its community. Researched initiatives have shown that Opotiki is perfectly positioned for a large-scale aquaculture venture—a success that can only be brought alive through a transformation of the harbour entrance. Once a well-used trading route, local authorities are looking to make the harbour easier to navigate by constructing two parallel river training walls at the entrance. We provided design expertise and also assessed many significant factors which could impact the components of the ambitious project.

### A DYNAMIC COASTAL ENVIRONMENT

The coastal township of Opotiki sits on New Zealand's eastern coast, in the North Island's Bay of Plenty. Prior to the mid 1960's, the Opotiki harbour entrance had a long history of use by coastal shipping vessels which visited the township primarily as a trading port. Since then, the ability to navigate through the entrance has been adversely affected as waves routinely transporting sediments into the entrance formed an unreliable and often unsafe passage between the river and the sea. The confluence of the Waioeka and Otara rivers, approximately 1.5 kilometres above the harbour entrance, adds further complexity to the dynamic nature of the unique coastal environment.



Samples being collected from the Opotiki Harbour Entrance © DHI

### SUMMARY

#### CLIENT

Opotiki District Council (ODC)

#### CHALLENGE

Recreate a safe and navigable passage through the dynamic and complex Opotiki Harbour Entrance

#### SOLUTION

A reliable optimisation of the river mouth created through river mouth training, providing safe access between the river and the sea

#### VALUE

The Opotiki Harbour Entrance improvements will allow for a variety of marine industry developments. Future aquaculture ventures, an increase in recreational and commercial boating access, and marine-based tourism will increase the overall social, economic and cultural well-being of the local community

#### LOCATION / COUNTRY

Opotiki, North Island, New Zealand

The most serious incident to date was when the entrance was closed for 64 days in 2007. Regular users of the route found it challenging and dangerous to navigate the passage five days out of 30 in a month on average. The Opotiki District Council (ODC) rallied central and local government, iwi and community groups, and commissioned a series of investigations to improve access to the harbour.

We were engaged to find a solution by providing a conceptual design for the river training works while assessing environmental impacts at the same time. After considering many alternatives, our findings concluded that twin training walls at the entrance would provide the most appropriate stabilisation. One of the most important elements involved determining whether the large scale infrastructure project would adversely affect flood levels on the township.

### UNDERSTANDING THE OPTIONS AND THE IMPACTS

Different training wall configurations were assessed for a range of river flows and coastal conditions. We studied many aspects of the walls, including their ability to maintain a navigable entrance, the expected navigation conditions and possible scour in their vicinity. We also assessed the impacts on salinity within the harbour, sedimentation elements, and backwater effects. On mitigating flood impacts, our experts recommended a confluence realignment as a feasible solution.

Our solution was to construct two short straight breakwater training walls with a new entrance to the east of the existing one. The walls, approximately 500 metres long and 120 metres apart, will also have scour protection elements included, without which the walls could be undermined during a large flood when deep scour may occur in between. The construction costs were calculated and outlined in the project report which we presented to ODC in 2007.



*Opotiki sits at the confluence of the Otara and the Waioeka rivers*  
© DHI

### A LARGE SCALE INFRASTRUCTURE PROJECT

We needed to ensure long term viability in order to continually support Opotiki's aquaculture vision. To undertake such a large-scale project, there were critical elements to consider. Risk factors, flooding impacts and design issues were considerable challenges for our experts.

Ensuring the safe navigation of the harbour entrance while avoiding upstream flooding was principal within the project, as was understanding the many various coastal morphological impacts at play.

With the application of one-dimensional (1D) and two-dimensional (2D) models utilising MIKE21 FM, MIKE 21 SW, LITPACK, MIKE21 ST and MIKE 3, our team successfully developed a robust solution for ODC.

From our modelling, we established that a re-engineered harbour entrance could alleviate the vessel access issues, allowing for more stable and improved entrance conditions. Although long term morphological impacts for flooding mitigation required further investigation, a realignment channel would somewhat reduce flooding impacts. The project, when undertaken, will greatly open up opportunities for the coastal settlement of Opotiki, creating potential aquaculture ventures and raising the wellbeing of the local community on many levels.

Contact: [info@dhigroup.com](mailto:info@dhigroup.com)

For more information visit: [www.dhigroup.com](http://www.dhigroup.com)