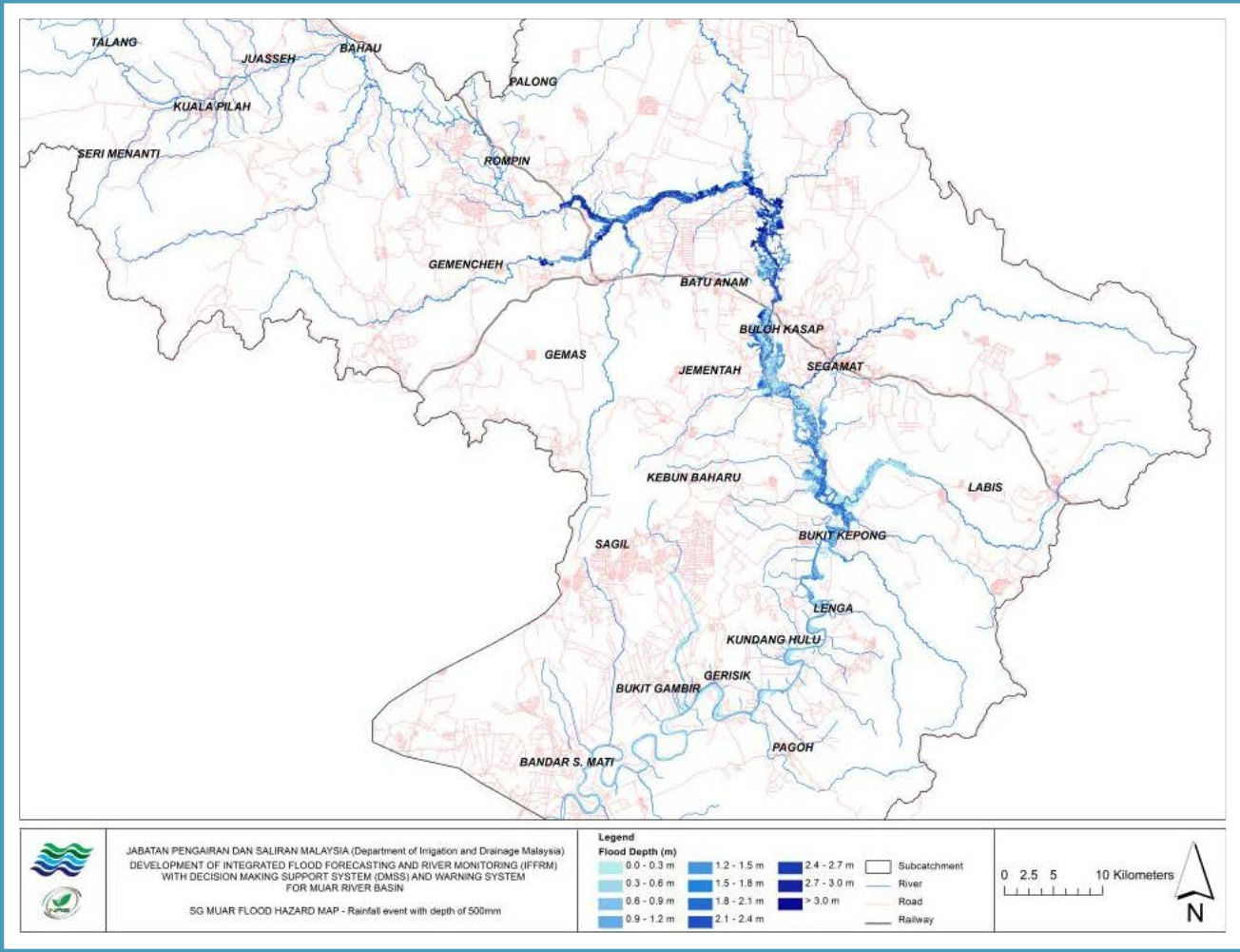
Sungai Muar flood forecasting system

An operational decision support system for flood management in Sungai Muar catchment, Malaysia

Malaysian rivers have repeatedly suffered prolonged, significant flood events which have caused widespread disruption and impacts to residents, businesses and infrastructure. The impacts have been exacerbated by considerable rapid development over the past decade, which has modified the flow regimes and flooding mechanisms. Significant recent flood events have occurred in 2006, 2007, 2011, and 2015. These events led to the evacuation of many tens of thousands of local residents in the affected catchments. Across Malaysia, an estimated fifth of the population is at risk of flooding.

HR Wallingford worked together with the Malaysian Department for Irrigation and Drainage (DID) in the development an Integrated Flood Forecasting and River Monitoring system (iFFRM) for the Sungai Muar catchment, using national network data, telemetry and spatial rainfall data. The partnership with DID enabled the development of an effective and efficient integrated flood forecasting and river monitoring system combined with flood warning dissemination enabling effective emergency decision support by DID.

Automatic hourly simulations are carried out which forecast water levels and flows in the river channels, and to map the flood inundation within the floodplains. Forecast outputs are used to warn DID staff so that immediate action can be taken to provide an effective and proactive emergency response. Results are also passed to the project website and dedicated smartphone application, enabling forecasts to be disseminated more widely. A parallel analytical modelling network has been developed to take over the forecasting role should the primary iFFRM system fail.



The forecasting system

HR Wallingford built the Hydrodynamic Flood Forecasting Model for Sungai Muar iFFRM using the FloodWorks software package, from Innovyze. The iFFRM uses national network data, telemetry data, radar data and rainfall forecasts. The system for Sungai Muar has been operational since 2014. Ongoing structural measures for flood mitigation are captured through a flexible modelling approach through model updates. This approach reflects real changes in the catchment, complementing the structural measures being implemented by DID and ensuring a holistic and sustainable solution.

Installation and maintenance

HR Wallingford worked with DID to develop and install the FloodWorks operational forecasting system on the DID computing systems. The work included setting up all the connections to the live data and testing the automated runs and warnings. During the maintenance period HR Wallingford monitored the performance of the operational system and made adjustments where necessary.

Capacity building

For a forecasting system to be effective a key aspect is that the end users who will operate the system understand how it works and take ownership of it. Through the project HR Wallingford has supported DID in a programme of capacity building to help integrate the forecast system into the decision making process at DID.