Pontianak NetCreate Wastewater Layout Planning

Context

In January 2021, Atkins was appointed by the Asian Development Bank (ADB) to generate a high-level wastewater network for part of Pontianak City in Indonesia using its digital tool NetCreate.

Pontianak is a city located at sea level on the island of Kalimantan in Indonesia, covering an area of approximately 10,898ha, with a population of approximately 675,000. Two catchments serving a total population of 233,217 were selected for the generation of high-level, wastewater networks using NetCreate; Nipah Kuning (RPH) and Martapura (MTP), to allow a comparison against the traditional approach adopted by ADB's consultant designing the network.

Approach

NetCreate is an innovative digital process using global open source or client-specific GIS datasets to automatically create an outline wastewater network on a repeatable basis. It brings together topographic data, road layout and population distribution data to assign the shortest route from each property to the lowest point / defined destination in the catchment along defined roads. Pipe sizes are assigned based on the number of customers (population); manholes are inserted at junctions and defined intervals on straight pipes. Cover levels are taken from topographic data; minimum gradients and pipe depths are based on local standards or good engineering practice.

The output from NetCreate can be imported into proprietary modelling software to refine the hydraulic assessment.

For Pontianak, a topographical survey was provided by ADB, road layouts were obtained from Openstreetmap and population data was based on a combination of Water Utility customer data and Openstreetmap building data.

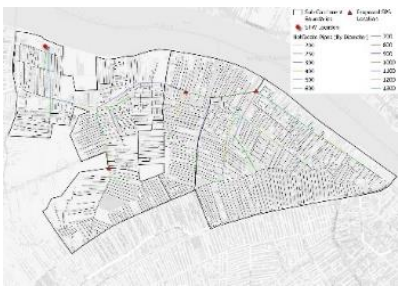
Solutions and Added Value

NetCreate was applied to the RPH and MTP catchments, which currently have no existing piped drainage. ADB's consultant had undertaken review of potential Sewage Treatment Plant locations as part of its Detailed Engineering Design (DED).

For the RHP catchment two scenarios were generated using NetCreate, to allow a depth / pumping comparison to be made.

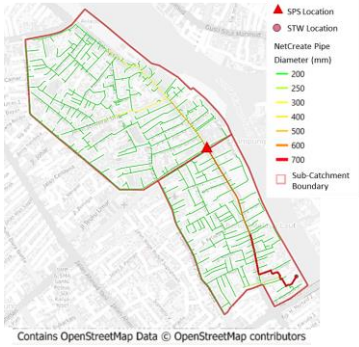
- Scenario 1: Three sub-catchments.
- Scenario 2: Four sub-catchments.

For both scenarios approximately 165km of pipe was generated to serve the population of 184,086 (0.9m / person). If the catchment was served by two pumping stations, then the average depth of pipe was 5.1m whereas if three pumping stations were included then the average depth of pipe reduced to 4.6m. This compared with the original DED option of five pumping stations.



NetCreate Scenario 2 for RPH

For the MTP catchment, one pumping station and approximately 42km of pipe was required to serve a population of 49,131 (0.9m/ person).



NetCreate layout for MTP

For both catchments there was a good visual comparison with the DED layout. NetCreate generated between 13% and 24% less pipe length which may be due in part to the respective approaches adopted. Using unit rates supplied by ADB's consultant, budget estimates for the wastewater layouts were produced for each sub-catchment / scenario.

Key Benefits

- NetCreate generated high-level wastewater network layouts, which compared well with the outputs from the DED, in just one month.
- This demonstrates that NetCreate can be used as a strategic planning tool, to inform large scale capital investment programmes, or to accelerate master planning.
- Being a digital tool, NetCreate is easily configurable for scenario testing.

Client

Asian Development Bank

Contact

Andy Taylor

E: andy.taylor@atkinsglobal.com

T: 01372 754 377