Innovyze®

Apply Calibrated Models to Derive Network System Performance & Frequency of Overflows Webinar Q & A

Q: How did you manage changes in antecedent conditions between events?

A: In each project, the preceding rainfall was used to define the start conditions of each simulation. S1 catchment uses the API30 value, S2 catchment and the Melbourne project using a 180-day hydrology only simulation and defining the initial soil saturation and groundwater store levels.

Q: Have you considered using optimisation tools running on genetic algorithms to optimise your planning for wastewater network?

A: We ran a trial several years ago, but haven't used it further.

Q: How were inflows due to surface stormwater modelled?

A: As the models have been calibrated to temporary flow monitoring and several wet weather events, all inflows are inherently included in the runoff parameters and no explicit inclusion was made in these projects. This is a good point though and could warrant further work on models.

Q: In terms of frequency and volume of spills, how do you compare the time series results with ARR78 and ARR2019?

A: Spills are ranked from largest to smallest. In a 50-year time series the highest ranked spill is 1 in 50 return period, the second is 1 in 25 and so on with the 10th ranked spill being the 1 in 5-year return period spill volume. This was compared with the spill for a 1 in 5-year ARR1987 storm. We haven't run ARR2019 but the process would be similar except for ARR2019 you would use the median spill from the ensemble.

Q: Did you just use Melbourne Water's (MW) owned network or did you add some elements of retailer's networks as well? The reason for this question is there are a number of sewer flow control facilities and other infrastructures which may affect the flow patterns to MW mains.

A: The model includes all RWC sewers 300 mm and larger and includes RWC flow control facilities as well.

Q: I heard from BOM recently that the review of ARI rating of rainfall is a work in progress, but there is insufficient data to substantially change design storms at this point.

A: Yes, it is an interesting notion that what we perceive as a ARI may actually be lower now we are collecting more data. This may prompt updates in future and changes to the rainfall creating the containment standard design events. For the Melbourne project, the ARR2016 climate change factors were applied to the design rainfall events and tested against the long time series modelling for comparison. Until more data is available to inform the larger ARI events, applying the climate change factors may be a good contingency measure.

Q: How long did the 50-year sim take to run?

A: 3 - 4 days

Q: Is this webinar all based on InfoWorks ICM software?

A: InfoWorks ICM

Q: Did you verify analysis results using actual measured spill volumes?

A: Yes, for the long time series in Melbourne, we compared the ERS spill volumes with the model predictions. For the Brisbane project, no verification was undertaken. Permanent logging of overflow structure operation was not available for this study. Several structures did have flow loggers in them during the model calibration and the flow and volume through these structures was calibrated for.

Q: I wonder how to set the initial groundwater conditions before running the model?

A: Initial groundwater conditions were set using the same methodology that the models were calibrated on. For the S1 catchment, it was zero value for soil store and setting the API30 value in each rainfall file. For the S2 catchment, the preceding 180 days to each rainfall event was simulated on a runoff only model and a groundwater infiltration file produced from the final timestep result (the input to the model is the same groundwater file method Jonathan explained in the Melbourne project)

Q: Were there any issues with getting ICM to handle the almost 900M points of rainfall data?

A: Yes, we had to break up the files into 1-year increments.

Q: How did you model and calibrate the overflow structures (OF) with in the flood plain? Did you assume overflow structures will be always available for free flow or did you apply creek water levels in the model?

A: For the Brisbane project, no creek levels were applied. In calibration, overflow structures are assumed to be free discharging unless they are near a flow monitor and we can see that there is a boundary condition (which for some we did) or have a flow monitor installed in the pipes. In these cases, we sometimes put level files on but more typically recognise that there is no water escaping and inactivate the structure instead. For the long time series modelling we consciously made the decision to let the network operate on ideal conditions with the knowledge that in further planning this is a point that will need to be looked at. In the first instance, it does provide evidence for network operators to inspect the structures that operate commonly which they didn't know about.

Q: Does ICM have a built in LTS tool that defines start and stop conditions for discontinuous simulation?

A: There is the option to utilise Episode Collections and simulate only the runoff component in-between the main network hydraulics simulations. The Episode Collections function within ICM will automatically separate out events for the user based on exceedance criteria – saving time from manually configuring the events and on the compute times for running longer event simulations. Please refer to the ICM helpfile or reach out to Innovyze (support@innovyze.com) for a walkthrough of this aspect of the software.

Q: What is the best way to handle timeseries data within ICM?

A: The Timeseries Database Technology (TSDB) is a performance database within ICM (and ICMLive) that allows users to connect directly to telemetry, SCADA & temporary/permanent network gauge data. Performance and data reliability gains can be made, applicable to these projects for: Long timeseries data management, large timeseries data file sizes, multiple data feeds, data handling/cleansing, attribute to a particular area or polygon etc. Once the connection to the database is established data can be updated automatically.

Q: How were those scripts automatically run for the scenario analysis?

A: ICM Exchange provides existing ICM users with the ability to auto-model updates from asset data, optioneering- scenario analysis, sensitivity analysis for by adjusting actual calibration parameters. Exchange is typically used to run batches of simulations with changes coming from outside the software, allowing users to automate modelling processes without needing to open the software.