

Introducing the next generation of Flood Modeller

Questions for the Introducing the next generation of Flood Modeller webinar

By Bob Potter, Development Manager for Flood Modeller at Jacobs

Below are questions asked during our recent webinar, Introducing the next generation of Flood Modeller. If you have any further questions, please get in touch with our [support team](#).

You can watch the webinar on our [YouTube channel](#).

1D urban solver

How does the 1D urban solver compare with other solutions in terms of accuracy and speed?

The 1D urban solver builds on over 40 years of development and application of the US EPA SWMM model, so it's very fast, accurate and proven. We have undertaken a number of benchmarking exercises which have confirmed that the 1D urban solver is comparable with alternative software solutions and in some cases significantly faster. We will be sharing the results of this in coming weeks.

On your integrated modelling slide, you mentioned you could link the 1D urban solver to Flood Modeller's existing solvers. Can I link the 1D river solver, 1D urban solver and 2D solver together in a single model?

Yes, you can! By doing this, you are able to develop fully integrated catchment models within a single environment.

Can the 1D urban solver load InfoWorksICM models?

Not directly, however there is a way for you to export an InfoWorks model and load this into Flood Modeller's 1D urban solver. We hope to have some guidelines on how to do this available on release of 5.0.

When will the build capabilities of the 1D urban solver become available?

The build capabilities are already being developed and are close to completion. We hope to be able to release these as part of 5.1 in early 2021.

How can I create an inp file? Do I do this directly from a shape file or AutoCAD .dwg files?

The inp file contains all model data for an urban network, so it is a lot more than just a drawn object (i.e. shapefile or dwg file). It cannot just be "drawn". You can create a new inp file using software compatible with EPA SWMM models, e.g. EPA's own free software tool available [here](#). Alternatively, InfoWorks ICM has an option to export existing urban networks created in that software to inp format.

In the near future, we will be releasing Flood Modeller v5.1 which will add functionality to create new urban networks within the Flood Modeller user interface.

Can we see the maximum water level in Longitudinal section?

Maximum water levels can be plotted on 1D river network longitudinal sections by selecting this as an additional variable to plot. The maximum water level values cannot currently be plotted from urban

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network results, but these data are written to the urban network summary data file (text file with .rpt extension).

Is the backwater effect from river to urban links considered?

Yes. The 1D urban solver itself is fully hydrodynamic and therefore incorporates backwater effects via the St Venant equations. In terms of linking, in the case where the 1D river solver passes the head to the 1D urban solver then those backwater effects will be naturally incorporated.

Do I have to pay any more for the 1D urban solver or does it come with the Standard edition of Flood Modeller?

The 1D urban solver is available as an add-on to both the Standard and Professional editions of Flood Modeller. It can be rented on a short-term basis or added to your licence in the long-term. Please contact our [sales team](#) to discuss the different licensing options.

How does the 1D urban solver handle energy losses at manhole locations? Would energy losses be fixed or perhaps vary depending on approaching and departure velocities?

You can specify an entry and/or exit loss coefficient, and the energy loss is determined as a product of this and the velocity head ($kv^2/2g$); therefore, the energy loss magnitude will indeed vary with approaching and departure velocity.

Will it be possible to link 1D urban/1D network with TUFLOW?

A 1D river network can be linked to both the 1D urban solver and TUFLOW in the same simulation, but there would be no benefit in doing this as there would be no link between TUFLOW and the 1D urban solver. Therefore, the solution would not be fully integrated and would not fully model the interaction of surface flows with the urban network. To achieve this, you would need to convert the TUFLOW model into a Flood Modeller 2D model (and then link this to your 1D urban and 1D river networks). All three of Flood Modeller's 2D solvers are provided at no additional cost as part of the Standard and Professional editions of the software.

What software formats can you import into the 1D urban?

You can only import .inp formats. This format is also used by EPA in their Storm Water Management Models (SWMM). It is also a format that you can export InfoWorks ICM networks to (from InfoWorks software). Furthermore, we will soon be releasing Flood Modeller v5.1 which will add functionality to create new urban networks (i.e. inp files) within the Flood Modeller user interface.

Would both 1D river network and 1D urban network be integrated?

Yes, the 1D river and 1D urban networks would exchange data dynamically in a simulation at any user defined linking locations (these will be 1D urban node locations). In addition, both of these networks can also link dynamically to a Flood Modeller 2D model domain at the same time as linking to each other.

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Can the new integrated method be exported in a mapping format as per the 'create 1D/2D' flood map'?

Flood extents can be created as polygon shapefiles from both 1D river and 2D model results. The Flood Modeller user interface then includes tool to enable shapefiles to be merged together, thus to create a combined 1D/2D extent outline.

Embedded structures

Is it still ok to continue embedding structures the old way and build a 1D network? Or do you recommend only using the embedded structures in v5.0?

You can use either approach. The key benefits of using the new embedded structures approach, include efficient model building and editing as well as improved stability.

However, if you want to incorporate operational control rules, you would currently need to develop a 1D model and embed them that way.

Can I edit the embedded structures data file in the standard Flood Modeller user interface or do I have to use the embedded structures editor?

Whilst technically you can edit the datafile in the standard user interface, we recommend that you use the embedded structures editor as this ensures data consistency and accuracy of setting up your model. The nice thing about the embedded structures editor is that it manages the format of the data and the layout of the file and nodes for you.

Levee markers

Can you provide a bit more information on the levee function? Are there any reasons why you wouldn't use levee markers?

By including the levee you can more simply represent the river system. It also enables greater compatibility of importing models from HEC-RAS. Using levees where they are not needed is an unnecessary addition to your model.

When using levees in a 1D model, how is the software representing the section beyond the levee. Will it undertake flow conveyance calculations for that panel/section separately or treat it as a flood cell (hence like a storage node filling up)?

The conveyance in the flood plain compartment is calculated separately and full dynamic effects are modelled in the flood plain compartment as well as the in-bank section. Insofar as the St Venant equations are solved, the conveyance for the cross section is calculated as the sum of the composite conveyances within the channel and floodplain.

On the levees, is the flow between the channel and floodplain controlled by a weir flow and can the spill coefficient be adjusted?

At the moment, no - it uses a simple look up table to calculate water level in the flood plain relative to the channel. It is something we are considering for the future, but we went for a simple approach for now.

Other

Have you assessed what are the pros & cons to using Flood Modeller over HEC RAS, that already have the 1D/2D structures, levees and so on?

It is true that HEC-RAS has some of the features mentioned in this webinar, however as Flood Modeller has been developed for over 40 years, it provides many more options in terms of 1D river unit types (which include operational control rules), advanced 2D solver options, embedded hydrological boundaries, and a wide-range of user interface tools (for pre and post-processing model data). It also provides more powerful mapping functionality for developing your models in a GIS environment, and enables you to run your simulations in the cloud at a push of a button. In addition to these features, Flood Modeller also provides access to a dedicated support team who are on hand to give you the support and guidance you need when using the software. This is in addition to a vast amount of online resources, including an extensive user manual, quick start guides and how to videos.

Extensive testing and benchmarking has also been carried out independently, and confirms that Flood Modeller is one of the fastest, most accurate and robust solutions available.

What infiltration data is ultimately required for an effective 2D model output?

The 2D model can model dynamic infiltration using the Green-Ampt method, or methods such as the CN loss method, whereby losses are derived a priori from the input rainfall data, or indeed a time series of loss rates (e.g. entered as negative rainfall), so there are a few options there. With the urban solver, again similar options are available in its hydrology module, including (Modified) Horton, Green-Ampt and CN. Therefore, in each solver, you can use methods by which a predefined time series is needed or you can use soil characteristics.

In the 'coming soon' slide, you mentioned the addition of ReFH2.3 – can you confirm when this will be added and whether it will include additional output options?

The development team are working hard on a range of new hydrological features. This includes improvements to how Flood Modeller integrates with ReFH2.3. We hope to include some of these improvements in 5.1 early next year where it will give access to the editable parameters included in 2.3.

If you have specific requests, please get in touch as we need your feedback to help with future development of Flood Modeller.

What kind of speed improvements can I expect when loading large 2D results sets?

When loading 2D results there is the time taken for the initial loading of the results file and then there is the time taken to move between timesteps whilst viewing the results. The gains you get depend somewhat on the file type and size, but the initial loading has been halved in general and the stepping through time steps, which was the main issue previously has been sped up by up to 11x.

Can I download Flood Modeller 5.0 for free?

For customers with a valid support and maintenance contract, you can download Flood Modeller version 5.0 directly from our website and use it immediately. For those who do not have a support contract, please contact our [sales team](#).