

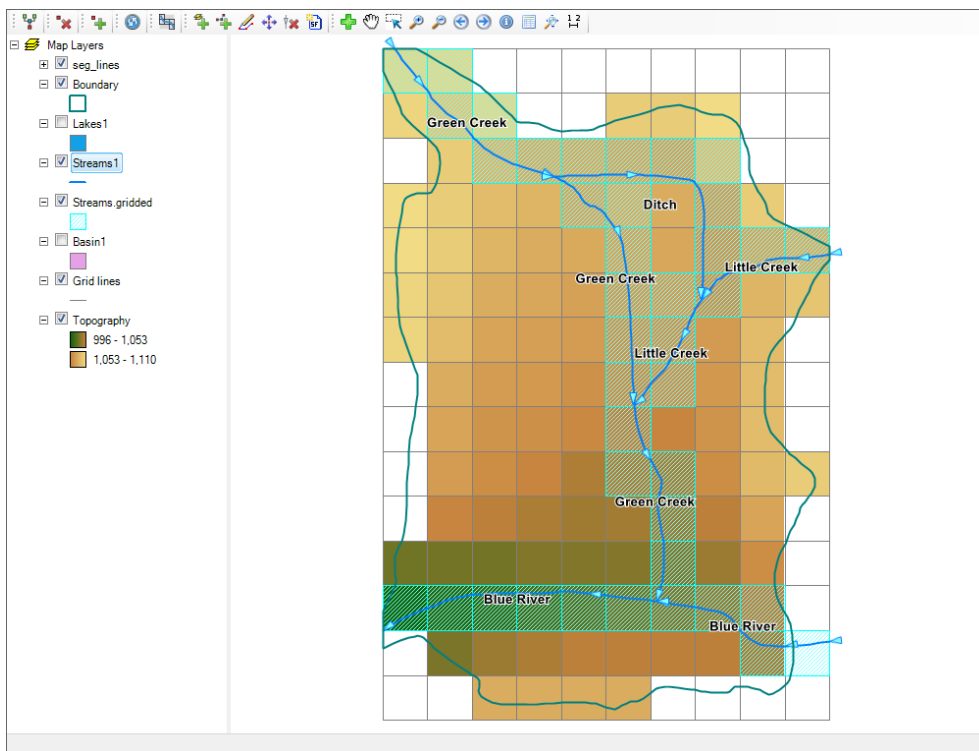
Visual MODFLOW Flex brings together industry-standard codes for groundwater flow and contaminant transport, essential analysis and calibration tools, and stunning 3D visualization capabilities in a single environment.

The following outlines the updates in Visual MODFLOW Flex 7.0

## SECTION 1: USABILITY AND OTHER ENHANCEMENTS

### Surface Water Modeling (SFR2)

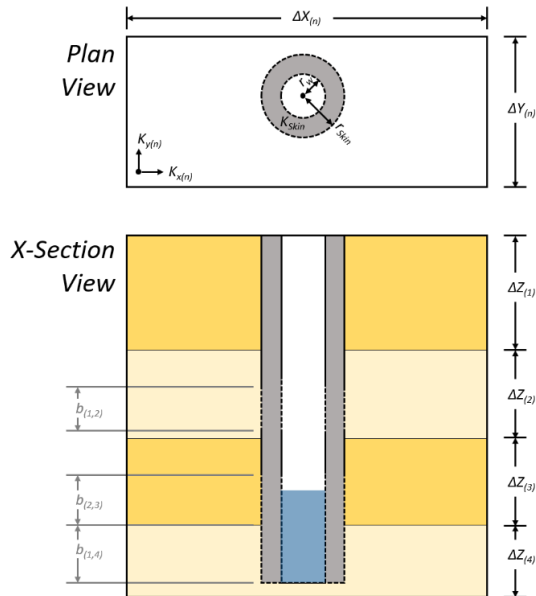
- Support for the Surface Flow and Routing (SFR2) Package in Finite Difference models:



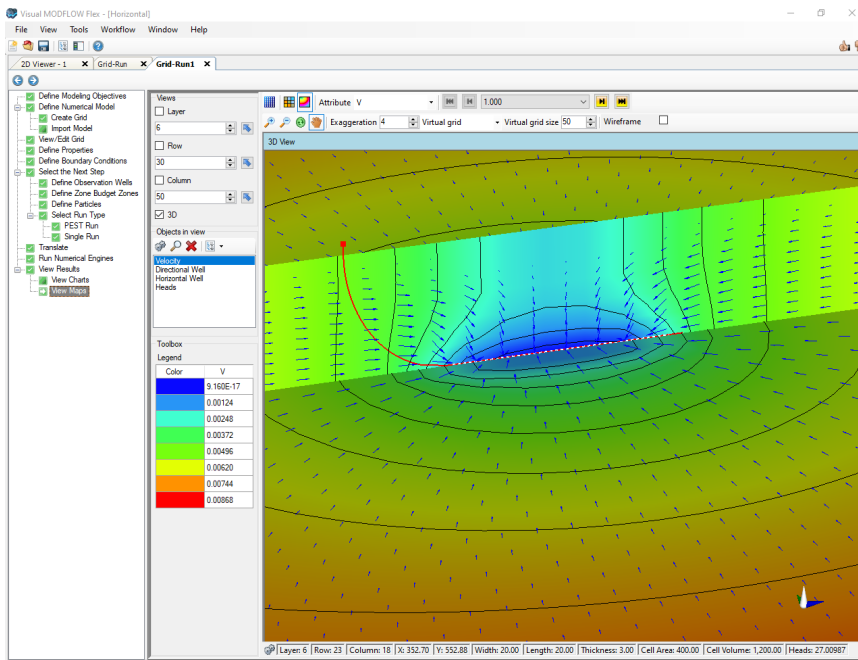
- GIS editing capabilities for digitizing the surface water network including add, remove, edit, delete, snap, split, flip
- Surface water network attribute editing dialog for streams and lakes
- Translated SFR2 package including lake connections and 1-D vertical unsaturated flow beneath perched streams

## Well and Multi-Node Well (MNW1/2)

- Support for multi-node well (MNW1/2/I) packages in Finite Difference Models:



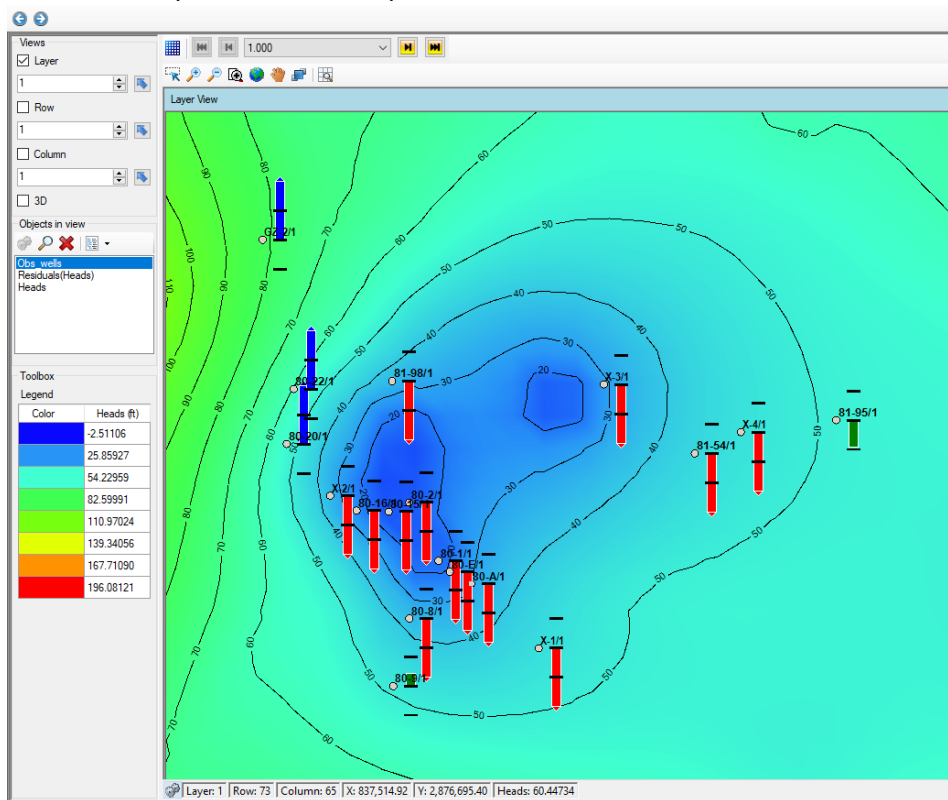
- Dynamically switch between supported well models (WEL/MWN1/MNW2)
- Import and edit well information including head loss, well skin, and pump constraint parameter supported in MNW1/2 packages



- Define conceptual Wells by drawing or by assigning wellhead points
- Multi-select editing of well parameters and schedules

### Calibration

- Import and/or set target residuals for Head/Concentration Observations
- Display spatial distribution of residuals relative to target residuals by layer or observation group at the View Maps workflow step



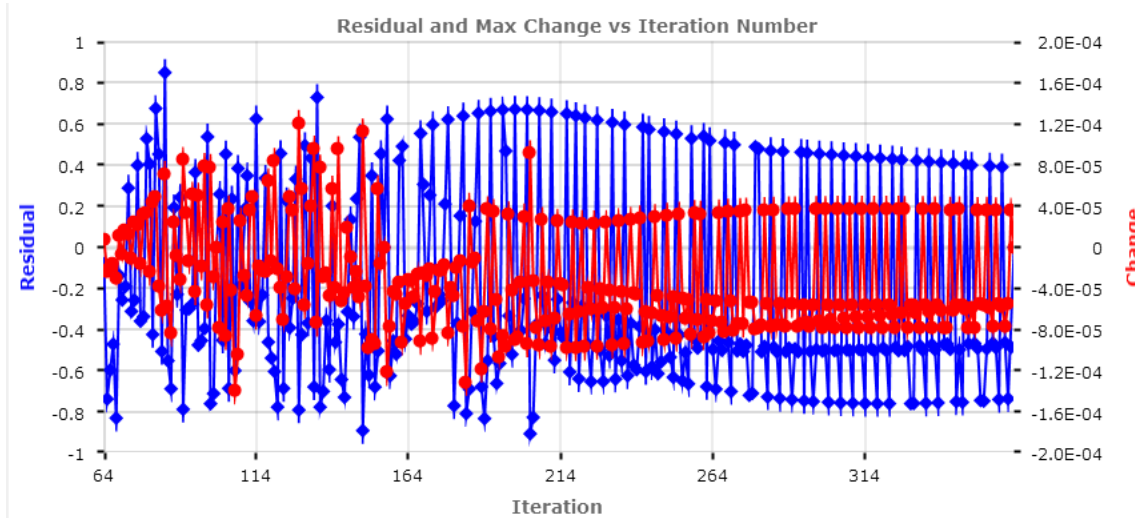
- The number of observations is included as a statistic below Calculated versus Observed calibration charts

Number of Data Points: 160  
 Min.Residual: -0.00022 (m) at obore\_4 Time=91.3  
 Max.Residual: -0.23 (m) at obore\_1 Time=7.738  
 Residual Mean: -0.022 (m)  
 Abs.Residual Mean: 0.064 (m)

Standard Error of the Estimate: 0.0063 (m)  
 Root Mean Squared: 0.082 (m)  
 Normalized RMS: 1.24 (%)  
 Correlation Coefficient: 1

### Model Runs

- Flow and Transport model run results are graphically displayed in real time including the global residual error and the max head/concentration change, as supplied by the active solver package settings.



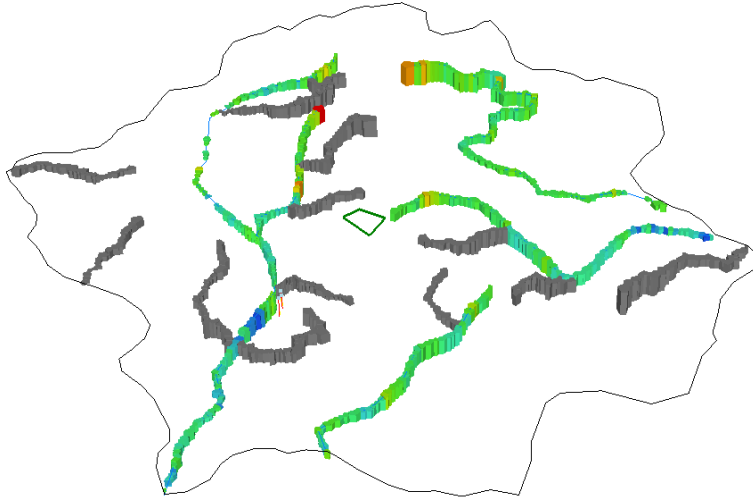
- Modified MODFLOW-USG to report solver progress in real time to the display console including global residual error

### Model Import

- When importing a MODFLOW model, you can now define an offset and rotation angle for the grid to set the model in world coordinates.
- Import MODFLOW-NWT model and supported packages
- When importing files MODFLOW files, invalid values that will cause issues during a simulation (such as negative conductivities) are replaced with project default values.

## Usability and Other Enhancements

- Visualize Flow Budgets/Fluxes for MODFLOW-USG simulations



- When visualizing multi-attribute plugins (such as Flux, Velocity) to visualize you can select the active attribute to be shown in the view and in the status bar
- Edit individual top/bottom of individual cells via the mouse or via script when editing grid layers
- Graphically select refinement rows/columns using the mouse when editing the grid in plan view
- A link to the model files is available at the Parameter Estimation step in PEST workflow
- Translation log is copyable to the Windows Clipboard
- NWT translation settings include option for the IPH DRY setting

## **SECTION 2: DEFECTS ADDRESSED**

- Error during Visual MODFLOW Classic project import in projects with zero thickness cells when loading conductivity values
- The selected background color was not included in exported images of 2D views
- Property Zones listed in alphabetical order rather numerical order in the Edit Properties window
- Style settings of polygon were not retained between sessions
- Error "MS Office is not installed..." shows up during import occurs when certain versions of Office are installed
- The internal handling of time units was refactored handle schedules and values with varying time units and scales with improved precision, accuracy, and consistency to within one second regardless of schedule duration and time units selected
- Unable to enter negative model coordinates when defining a grid
- In some cases, when reloading a project, the "Failed to move to target step" error appears
- Voronoi grid not generated correctly when input features nearly coincide with the model boundary
- Some dialog and workflow step buttons were missing/cutoff when using lower resolution display settings
- Unable to edit/assign boundary conditions if the duration of the schedule too large
- Background color was not saved between sessions in some views
- The option to use shapefile attribute data to define conceptual property zones not functional
- In some cases, errors prevented the export of calibration data
- Unable to convert a conceptual model to USG when certain shapefiles are used to define the model domain
- The option to use shapefile attribute data to define conceptual property zones not functional
- Errors preventing MODPATH runs in 32-Bit Versions of Flex
- Extract Subgrid failed if any model run under the original grid was previously deleted
- In some cases, concentration observations were not correctly displayed at the View Charts step
- Edit grid script failed when using shift model origin commands on variably refined grids
- Head and concentration observations were not displayed due to translation errors in some SEAWAT models
- Concentrations were not available in the Project Color Palette
- In rare cases, the pumping schedule was not correctly translated in the WEL package
- In some cases, the project could enter a state where it could no longer be saved due to the presence of larger shapefiles
- In some cases, the RT3D simulation time was not correctly translated into the BTN package
- Rerunning a model reset/removed the outputs selected in the cell inspector

- Immobile concentrations were not correctly read on successful dual domain runs of MT3DMS or SEAWAT
- PEST workflows did not correctly support overlapping zones in multi-layer models
- In some cases, observations could not be read with a Wall BC was present in the simulation
- In some cases, importing a 3D-gridded data object deleted certain property values in related numerical model(s)
- Pilot Point values not correctly assigned in distributed models, particularly in Tikhonov Regularization
- In some cases, very thin model cells in a Q-grid cause errors when converting conceptual model to a MODFLOW-USG workflow