

Preparing the drainage database file

This section provides a quick guide on how to prepare the drainage database file, an input file that contains the network topology and characteristics of the domain used in MESH simulations. A Digital Elevation Model (DEM) file and a land class file (in GeoTIFF or Shapefile format) are processed by the Green Kenue software to create the file.

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Software requirements

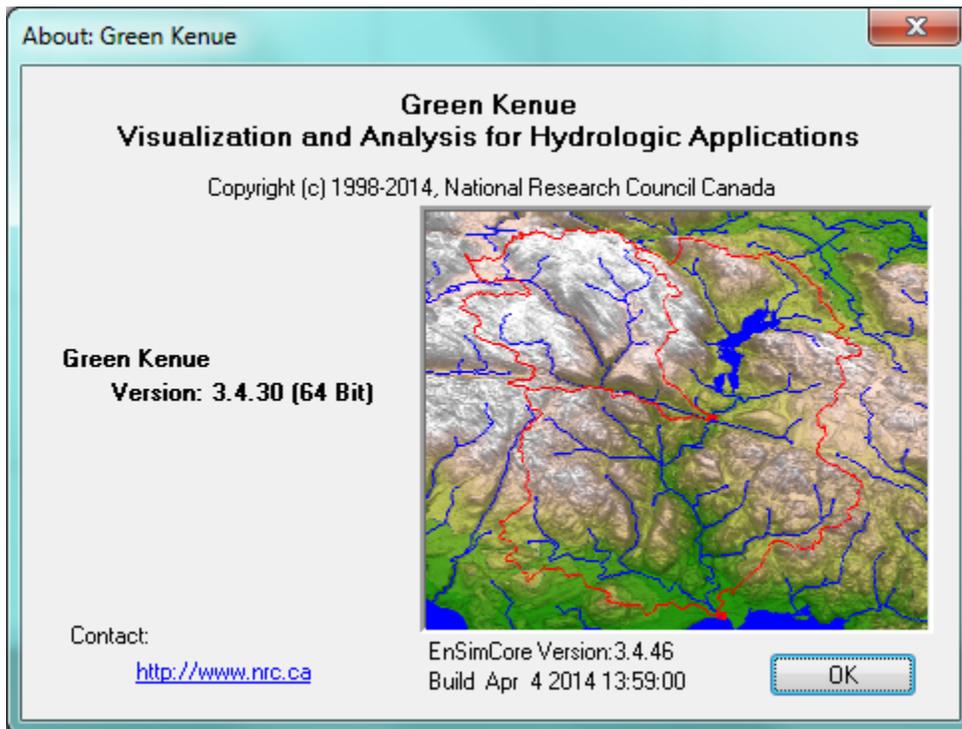
Green Kenue 3.4.30

A newer version of Green Kenue is required than the version available online from [National Research Council Canada](#).

For members of the Global Institute for Water Security, installation files for the 32-bit and 64-bit versions of the software are located at [\\jade\WaterSecurity\Princz\GreenKenue](#). For others, these files can be transferred by request.

To determine what version of Green Kenue has been installed, from Green Kenue:

- Expand the "Help" menu from the top menu bar and click "About ..."
 - The version is shown in the "About: Green Kenue" window
 - A version of 3.4.30 or later is required



Data requirements

The following examples use a Digital Elevation Model (DEM) product in BIL format and land cover data in GeoTIFF format.

- The DEM used is HydroSheds (30 seconds) acquired from USGS: <https://hydrosheds.cr.usgs.gov/dataavail.php>
- The land cover used is CEC 2020 Land Cover (MODIS, 250 m): <http://cec.org/tools-and-resources/map-files/land-cover-2010-modis-250m>

Pre-processing the Digital Elevation Model (DEM)

A Digital Elevation Model (DEM) is a gridded "raster" dataset that contains a collection of cells defined by georeferenced elevation, such as an altitude in feet or meters above some reference, such as mean seal level (MSL).

The DEM is used to derive channel hydrology and build a database of hydrological parameters, predominantly used in the routing scheme.



Provided the nature of deriving hydrology from a DEM, using a "hydrologically conditioned" DEM is recommended. A hydrologically conditioned DEM is one where the elevations in cells have been modified to remove pits (i.e., sources where flow can get trapped) and channels may have been "burned in" (e.g., by an unnatural drop in elevation along channel lines) to force processors to find pre-defined channels.

Some DEMs are already hydrologically conditioned in this way, such as [HydroSHEDS](#) and [MERIT Hydro](#).

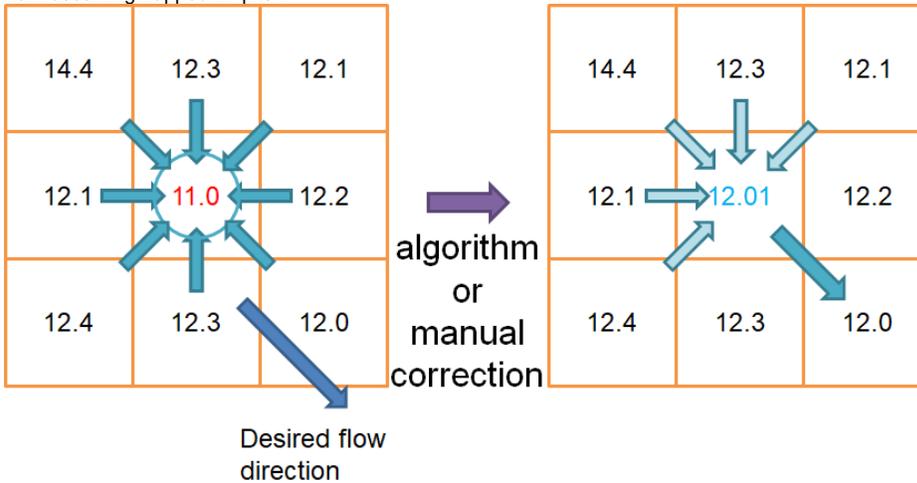


Larger DEMs should be clipped to a regional scale representative of the domain, where possible. However, the DEM should not be clipped to the exact extents of the desired watershed. Instead, a modest buffer should be applied to the true extent of the watershed, and that buffer should be used to clip the DEM. Refer to the resources for examples.

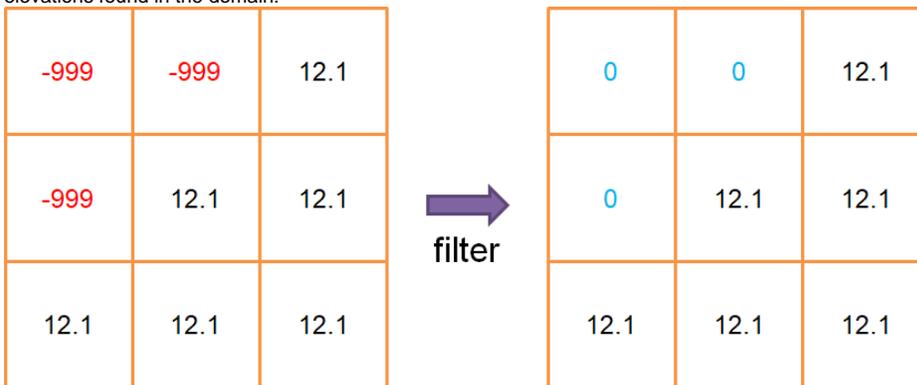
Considerations

At a minimum:

- The DEM must be "pit-filled", where localized drops in elevation are raised to prevent derived channels from reaching premature end-points or from becoming trapped in "pits":



- The DEM should not contain "NO_DATA" values; "NO_DATA" values should be replaced with a numeric value less than the range of natural elevations found in the domain:



- The DEM cannot contain negative values; if the domain naturally contains negative values (e.g., relative to the reference, such as MSL), all elevations in the entire domain should be offset by some artificial datum until all elevations are greater than zero:

1.1	1.0	0.0	➔ += 3.0	4.1	4.0	3.0
1.0	-2.0	-2.0		4.0	1.0	1.0
3.0	2.4	-1.0		6.0	5.4	2.0

Ideally:

- The elevations in the DEM should be conditioned such that there is always a cascade of elevation values and no two adjacent elevations have an identical value (usually already the case in a "hydrologically conditioned" DEM):

0	0	12.1	➔ manual correction	0	0	12.096
0	12.1	12.1		0	12.095	12.097
12.1	12.1	12.1		12.097	12.099	12.1

Output format

- The final post-processed DEM must be in the ARC/INFO ASCII GRID *.ASC or "band interleaved by line" *.BIL format

Resources

Content by label

There is no content with the specified labels



Pre-processing land cover and other geospatial fabrics

Other geospatial fabrics may include land cover and soils information datasets. These datasets can be used to derive Grouped Response Units (GRUs) and to create fully-distributed datasets (if the GRU approach is not used).

Considerations

If using the GRU approach:

- The features in these datasets should be merged, simplified, and combined to reduce to a reasonable number of GRUs
- If combining different kinds of features, such as land cover and/or soil information, the features should be merged and pre-processed into the desired GRUs before mapping them to the model grid

Output format

- The final post-processed format of data for mapping it to the model grid must be in GeoTIFF *.TIF or in shapefile *.SHP format

Resources - GRU approach

GRUs can be defined from a single geospatial fabric, such as land cover or ecodistricts, or a result of the combination of multiple data sources, such as land cover merged with soils information. These datasets should be merged, simplified, and combined to create a reasonable number of GRUs. Having too many GRUs can make parameterization of the model more difficult.



Some datasets may already combine different geospatial fabrics, such as the [National Ecological Framework of Canada](#). Using an existing dataset that already combines the fields of interest may lessen the tasks required for pre-processing the file for mapping to the model grid.

Content by label

There is no content with the specified labels

Resources - Fully-distributed approach

Where data is available, it may be desirable to assign fully-distributed fields for parameters and not use the GRU approach to define parameter groups. Even in this case, the datasets may need to be pre-processed before mapping them to the model grid.

Content by label

There is no content with the specified labels

Related pages

Generate drainage database in Green Kenue

- [SHDFILEFLAG](#) — The SHDFILEFLAG control flag specifies the basin information file format.
- [How to define river classes \(IAK\) using drainage area \(DA\) and optional GRU filtering](#) — This page describes how to create river classes in [MESH_drainage_database.r2c](#) using drainage area (DA) and optional GRU filtering.
- [What's the deal with the impervious class?](#)
- [How to create WATFLOOD "map" file attributes from MESH_drainage_database.r2c](#) — This page describes how to use MESH to create a WATFLOOD "map" file from an existing [MESH_drainage_database.r2c](#) file.