Adding Storms Using the ARR Storm Generator

The **ARR Storm Generator** allows you input the ARR Data Hub Text File, ARR Temporal Patterns Increments File, and BOM Design Rainfall to produce an XPX file with the Annual Exceedance Probability (AEP) and all of the durations for the given location, which you can then import to xpswmm for further analysis. Moreover, the XPX file contains a set of rainfall global database, infiltration global database, and global storm definitions.
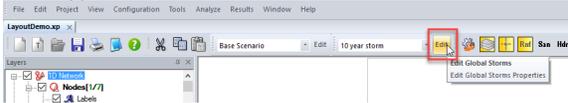
 Back to: Help Documentation

Accessing the ARR Storm Generator Dialog

1. In the application, click the **Edit Global Storms** button in the toolbar.

2. In the **Global Storms** dialog, click the **ARR Storm Generator** button.

3. In the **ARR Storm Generator** dialog, click **New**.
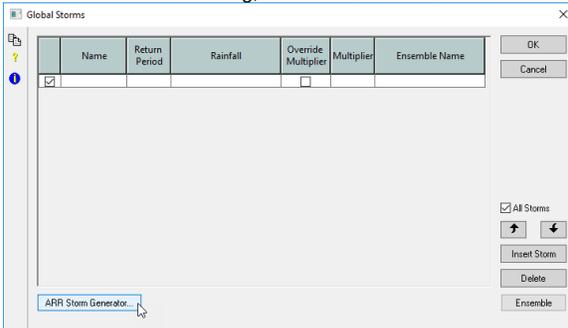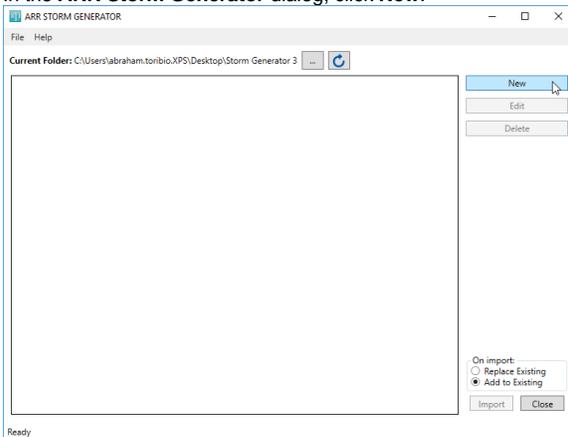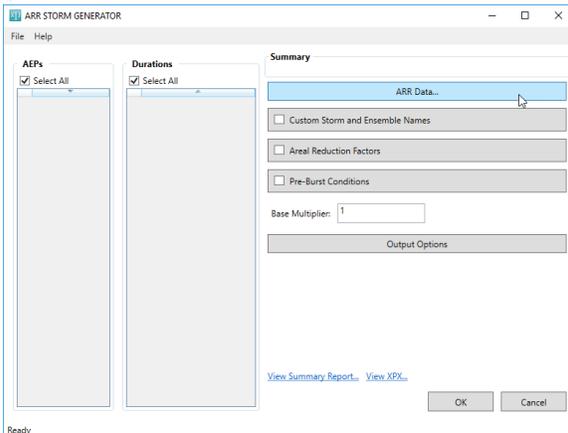

4. Click **ARR Data**.

Section Pages

- Adding Storms Using the ARR Storm Generator
- Ensemble Statistics Utility
- Viewing the ARR Storms Data Using the Global Data Dialog
- Editing Storms Using the ARR Storm Generator
- Removing Storms Using the ARR Storm Generator

The **ARR Storm Generator** will appear.
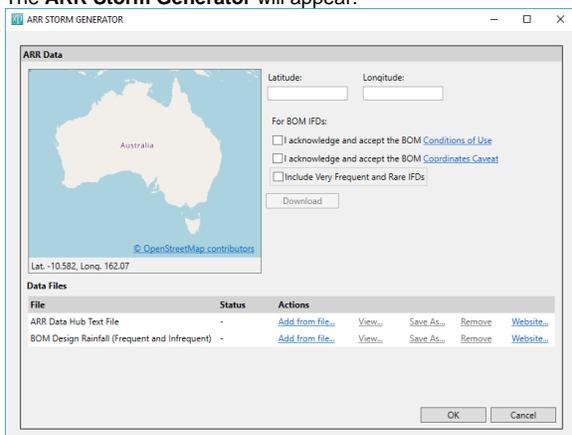
Adding ARR Data into the ARR Storm Generator

There are three ways in which you can input the **ARR Data Hub Text** file and **BOM Design Rainfall** file into the application:

1. If you want to use the map in the dialog to download and populate data:
   a. Click on the map to select the location and the **Latitude** and **Longitude** coordinate of the catchment centroid will be automatically populated. Alternatively, you can input the **Latitude** and **Longitude**.

   > ⚠️ Note: You can zoom-in on the map to accurately select the location.

   b. Select **I acknowledge and accept the BOM Conditions of Use**, and **I acknowledge and accept the BOM Coordinates Caveat**.
   c. If you want to include very frequent and rare IFDs, select the option for **Include Very Frequent and Rare IFDs**.
   d. Click **Download**, and wait until the application downloads the data.

   Once finished, you will be able to see the **Status** column says **Downloaded** for the ARR Data File and BOM Design Rainfall file.
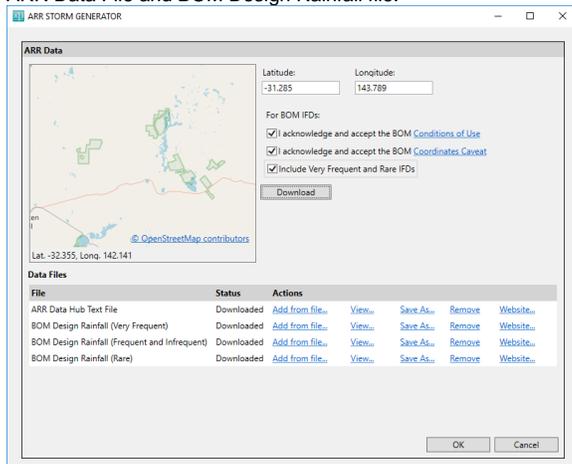
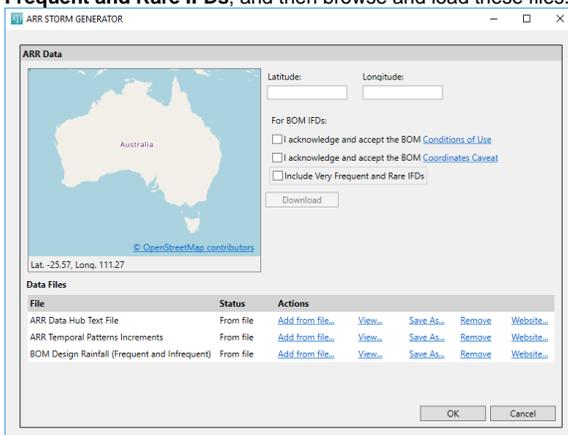2. If you have downloaded the ARR Data Hub Text File and BOM Design Rainfall file previously into your computer:
   a. In **ARR Data Hub Text File**, click **Add from File** under **Actions**. Browse to the file location, select the file, and then click **Open.**
   b. In **ARR Temporal Patterns Increments**, click **Add from File** under **Actions**. Browse to the file location, select the file, and then click **Open.**

⚠️

> ⚠ Note: If the **ARR Data Hub Text File** you have uploaded contains the ARR Temporal Patterns data, this field will be disabled and you will not need to load any data anymore. If the **ARR Data Hub Text File** does not contain the Temporal Patterns data, proceed with this step.

    c. In the **BOM Design Rainfall**, click **Add from File** under **Actions**. Browse to the file location, select the file, and then click **Open**.

    d. If you want to include very frequent and rare IFDs, select the option for **Include Very Frequent and Rare IFDs**, and then browse and load these files.

3. If you want to use the ARR Data Hub website and BOM Rainfall IFD Data System website to download data:

    a. In **ARR Data Hub Text File**, click **Website** and use the ARR Data Hub website to download the file. After the download, click **Add from File** under **Actions**. Browse to the file location, select the file, and then click **Open.**

    b. In **ARR Temporal Patterns Increments**, click **Website** and use the ARR Data Hub website to download the file. After the download, browse to the file location, select the file, and then click **Open**.

> ⚠ Note: If the **ARR Data Hub Text File** you have uploaded contains the ARR Temporal Patterns data, this field will be disabled and you will not need to load any data anymore. If the **ARR Data Hub Text File** does not contain the Temporal Patterns data, proceed with this step.

    c. In the **BOM Design Rainfall**, click **Website** and use the BOM Rainfall IFD Data System to download the file. After the download, click **Add from File** under **Actions**. Browse to the file location, select the file, and then click **Open**.

    d. If you want to include very frequent and rare IFDs, select the option for **Include Very Frequent and Rare IFDs**, and then browse and load these files.
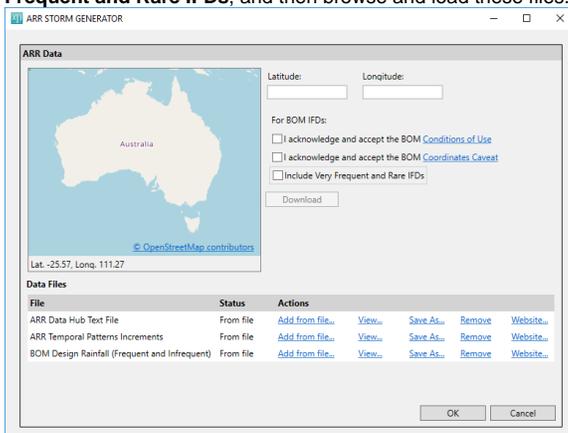

4. To view the files uploaded, click the **View** option. This will open the file in text format.
5. To save the file in your computer, select the **Save As** option and browse to the location where you want to save the file and click **Save**.
6. To remove any file, select the **Remove** option.
7. Click **OK**.

# Editing the Properties in the ARR Storm Generator

The **ARR Storm Generator** dialog allows you to edit how the storms will be saved in your XPX file and how it will appear in the application.
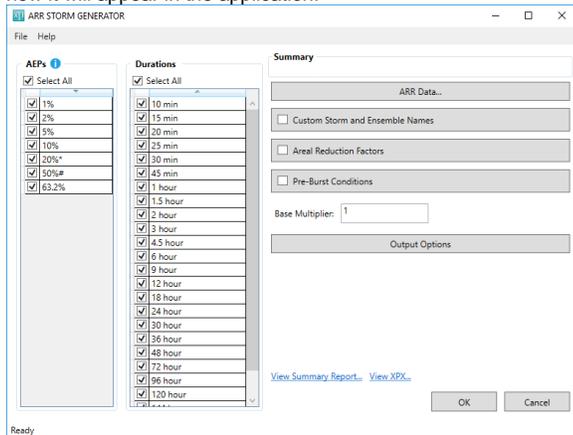
1. In the **AEP** section, select the percentage that you want to reflect in the XPX file. By default, all items are selected.

> The AEP options in the set [0.5,0.2,0.1,0.05,0.02,0.01] and these are dimensionless probabilities. These will be taken from the BOM's IFD Data table. Although the Increments file lists AEPs according to 'Frequent', 'Intermediate' and 'Rare', the way to match these up is listed below.Durations can be some subset of [10, 15, 20, 25, 30, 45, 60, 90,120, 180, 270, 360, 540, 720, 1080, 1440, 1800, 2160, 2880, 4320, 5760, 7200, 8640, 10080] and have the units minutes, however you need not include all these durations (some are 'non-standard' and might not be included in the default CSV file a user will download). These will be the durations present in both the BOM data table and the ARR Increments file.

2. In the **Durations** section, select the duration that you want to reflect in the XPX file. By default, all items are selected.
3. You may select the **Custom Storm and Ensemble Names** check box to reflect the new storm and ensemble names in the XPX file. To modify the storm and ensemble names:
   a. Click the **Custom Storm and Ensemble Names** button and the following dialog will be displayed:
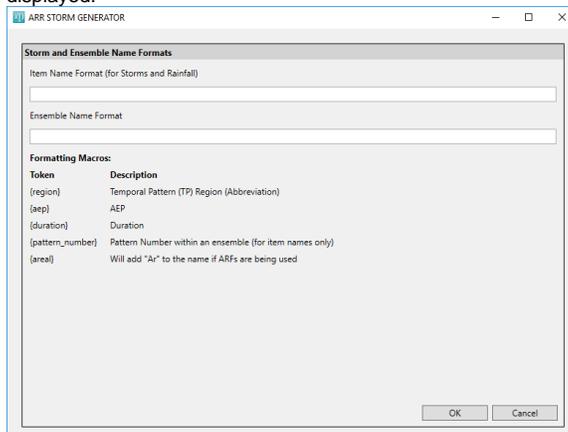
   b. Input the **Item Name Format (for Storms and Rainfall)** and **Ensemble Name Format** fields as necessary. The following formatting macros describe the default file naming convention:

Token	Description
{region}	Temporal Pattern (TP) Region (Abbreviation)
{aep}	AEP
{duration}	Duration
{pattern_number}	Pattern Number within an ensemble (for item names only)
{areal}	Will add "Ar" to the name if ARFs are being used

c. Click **OK** and the modified names will be reflected when creating the XPX file.

4. You may select the **Areal Reduction Factors** check box to reflect the new one in the XPX file. To modify the areal reduction factors:

   a. Click the **Areal Reduction Factors** button and the following dialog will be displayed:

   b. Input the **Total Catchment Area**. This is the sum of the areas of all the active catchments in the model.
   c. Select the **Areal Reduction Factor** to use:

      i. If you want to use the information from ARR Data Hub, select the **Use Areal Reduction Factor Depths** check box. The **Long Reduction Areal Reductions Factor Coefficients** are provided in the table. You may change the values in the table based on your own data.
      ii. If you want to load a file:

         1. Select the **Use Areal Reduction Factor Patterns** check box.
         2. In **Select ARF Temporal Patterns CSV**, click the ellipsis button.
         3. Browse to the location where the CSV file is saved, select the file, and then click **Open**.

   d. Click **OK** and the new areal reduction factor will be reflected in the XPX file.

5. You may select the **Pre-Burst Conditions** check box to reflect the new one in the XPX file. To modify the pre-burst conditions:

   a. Click the **Pre-Burst Conditions** button and the following dialog will be displayed:

   b. Enter your preferred value (integer) in the **Number of Pre-Burst timesteps** field.

   > ⓘ This is the number of time steps/increments to put at the front of each of the temporal patterns to simulate the pre-burst rainfall. The depth of this value will be determined by the ratio of pre-burst rainfall to burst rainfall (read from the ARR Datahub text file), and the integer value you entered. The depth to use will be the ratio divided by the number of time steps. For durations less than 60 minutes, the fraction of the one-hour storm will apply linearly (e.g. a 30-minute storm will use half the pre-burst rainfall). For durations greater than 60 minutes but not listed in the table, the results should be interpolated between closest durations that are listed (e.g. the 270-minute storm pre-burst depth should be an interpolation between the 180-minute and the 360-minute ratios).

c. Click **OK** and the modified pre-burst timesteps will be reflected in the XPX file.

6. In the **ARR Data Importer and Storm Generator** dialog, enter a value in the **Base Multiplier** that you prefer. By default, this is set to one.

> ⓘ The **Base Multiplier** value will be multiplied by the depth value read from the IFD table to adjust all the multipliers for the storms generated. This is for including factors such as Climate Change and Areal Reduction Factors.
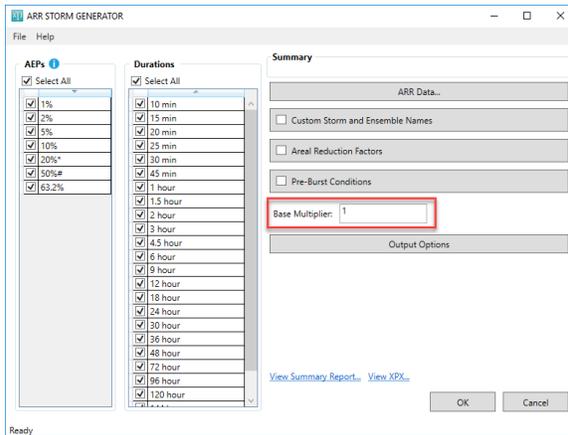
7. Click the **Output Options** button and the following dialog will be displayed:
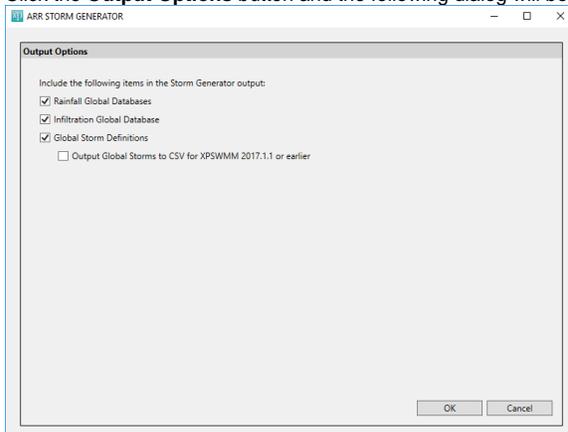
a. You have the option to include any of the following in the XPX file:
   i. **Rainfall Global Databases**
   ii. **Infiltration Global Databases**
   iii. **Global Storm Definitions**
   iv. **Output the Global Storms to CSV for** xpswmm **2017.1.1 or earlier**

> ⚠ Note: The XPX file for the **Global Storm Definitions** may only be imported to xpswmm 2017.2 or later. You need to generate a CSV file for earlier versions of xpswmm, which you can then copy and paste into the **Global Storms** dialog.

b. Click **OK**.

8. Click **View Summary Report** to view the details of the output file in text format.
9. Click **View XPX** to produce the XPX file. The location and filename of the output file will be displayed in a window once it is ready.
10. Click **OK**.

Importing the Storms into xpswmm/xpstorm

You can use the **ARR Storm Generator** dialog to add new storms into the application or replace existing storms.

1. In the **ARR Storm Generator** dialog, select the ARR Storm file that you want to import.
2. Under **On Import** in the lower left-hand corner of the dialog, select whether to **Replace Existing** or **Add to Existing**.
    a. **Replace Existing** - This option will clear out existing rainfall global databases and global storms before importing the newly created ARR storms.

    > ⚠ Note: When prompted to confirm, "*All existing Global Storms and (R) Rainfall will be deleted before import. Are you sure you want to continue?*" click **Yes** and the rainfall and global storms will be deleted, then the import will proceed. Click **No** to cancel the import.

    b. **Add to Existing** - This option will add the new storms in the currently existing rainfall global databases and global storms. If no prior data exists, it will create a new one.
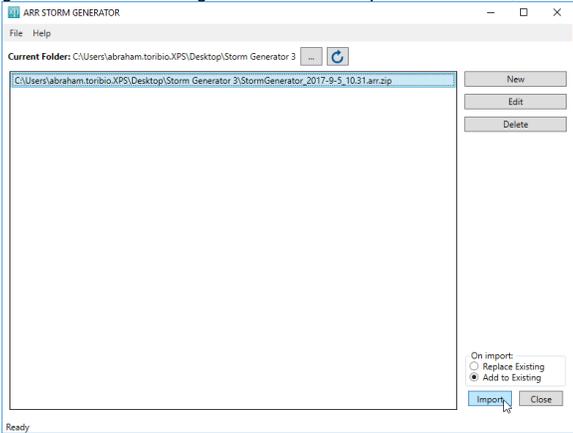
3. Click **Import**. A progress bar will show the status of the import.
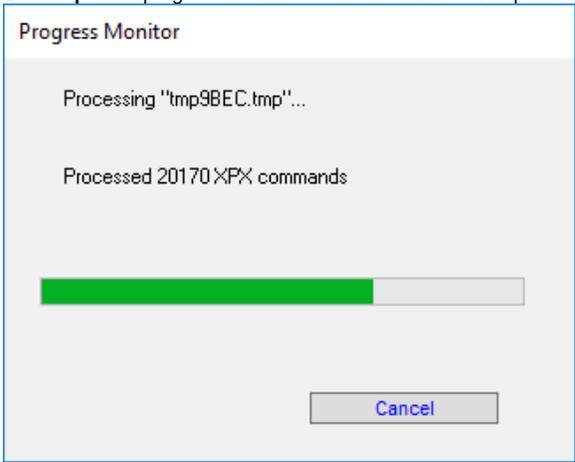
> ⚠ Note: Once completed, the storms will appear in the **Global Storms** and **Global Data** dialog.