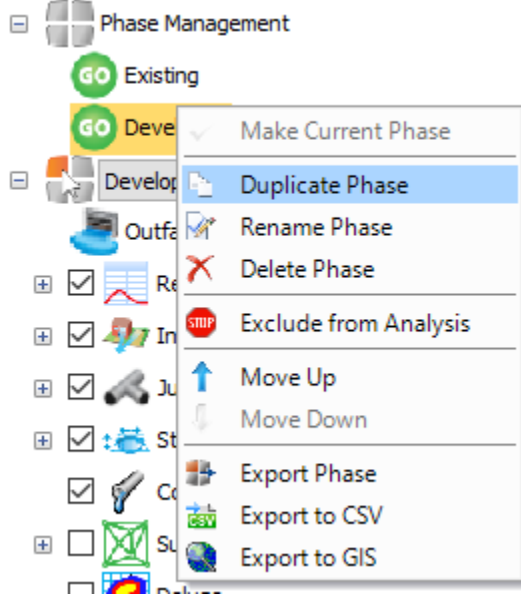


Metric Tutorial 5 - Results

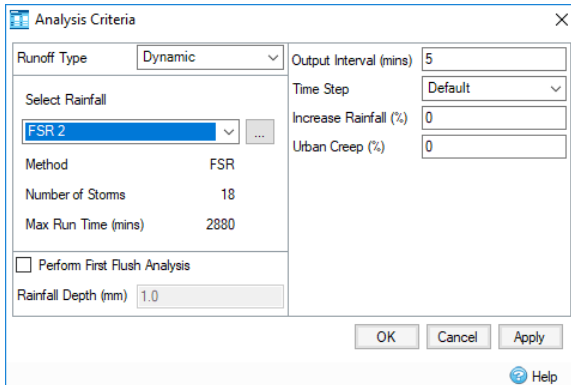
File/s needed:

Click to download the [METRIC model files](#).

1. Continue with your previous file or open **XP_Tutorial4.xpd**.
2. Expand the **Phase Management** section of the **Tree View** and right-click on the **Developed** phase then select **Duplicate Phase**. Right-click the new phase and select **Rename Phase**, calling it **Sizing of Treatment** then switch to the **Sizing of Treatment** phase by selecting from the drop-down list on the left **Tree View** panel, if it is not already selected.



3. Now that the Treatment Train is laid out, you can review the **Analysis Criteria** and Rainfall set up by browsing to the **Analysis** ribbon and selecting **Analysis Criteria**.



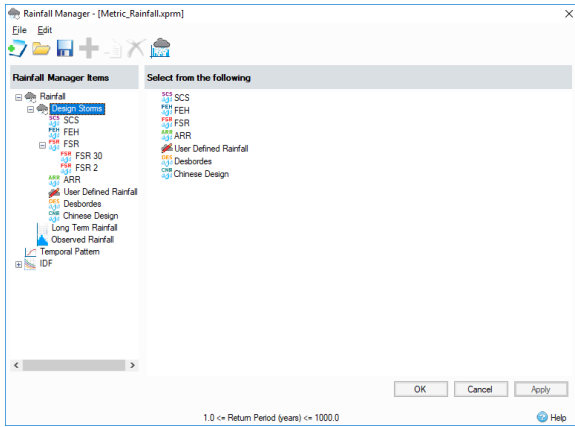
4. The Rainfall used in the **Analysis Criteria** can be altered by selecting the ... button to edit. This opens up the **Rainfall Manager**, within here a variety of rainfall types can be created, amended, or imported into the software to be used for analysis.



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Section Pages

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Rainfall Manager allows management of rainfall data. Multiple rainfall events can be created under one file, which allows much greater ease in switching between rainfall types for analysis. It also enables entire sets of rainfalls to be loaded in to the manager, allowing standard sets of rainfall profiles to be used for varying jobs. Also found within **Rainfall Manager** is the ability to build IDF Profiles, or Temporal Patterns which can be used in conjunction with previously defined rainfalls.

- For this tutorial, we are going to be using a pre-existing set of rainfall profiles, which are present in the file **Metric_Rainfall.xprm**. If the Rainfall Manager is empty, this file will need to be loaded

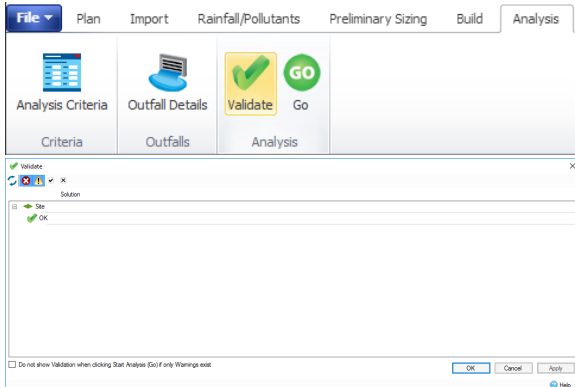
in using the  button at the top of **Rainfall Manager**.

- If we need to create a new rainfall profile, we would select the required rainfall type and then

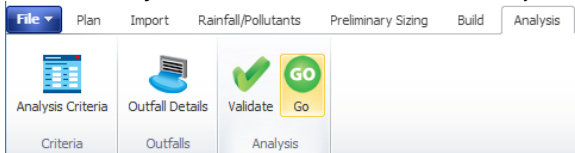
 select the  button at the top of the window. This then populates the right hand side with the relevant data entry fields that need to be populated.

The default Analysis Criteria and FSR Rainfall events do not need to be updated before running the model. Further information about the **Analysis Criteria** dialog and the **Rainfall Manager** can be found on the given Help topic [Analysis Criteria](#).

- Ensure the 'FSR 2' rainfall is selected and click **OK** to close the **Rainfall Manager** and **Analysis Criteria** forms.
- Validate the project by selecting **Validate** under the **Analysis** ribbon. This carries out a check of your network to make sure that all values in your network are within suitable ranges. Once the validation is complete, a window will pop up displaying any errors or warnings found during the validation.



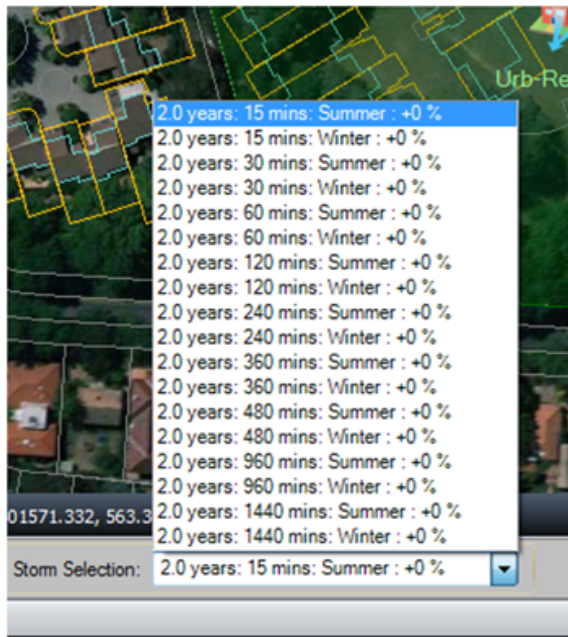
- Now that we know our network is valid, we can run the analysis. This can be done by selecting **Go** under the **Analysis** ribbon. The **Validation** is automatically run when selecting **Go**.



- The **Stormwater Controls Summary** result table appears automatically after an Analysis has been run. These results indicate at a glance if the stormwater controls in the design are suitably sized. The **Stormwater Controls Summary** result table can also be selected on the **Results** ribbon.

| Stormwater Control | Max Level (m) | Max Depth (m) | Max Inflow (L/s) | Max Resident Volume (m ³) | Max Flooded Volume (m ³) | Total Lost Volume (m ³) | Max Outflow (L/s) | Total Discharge Volume (m ³) | Status |
|--------------------|---------------|---------------|------------------|---------------------------------------|--------------------------------------|-------------------------------------|-------------------|--|--------|
| Dry Pond | 561.67 | 0.57 | 132.1 | 185.082 | 0.000 | 0.000 | 13.6 | 88.705 | OK |

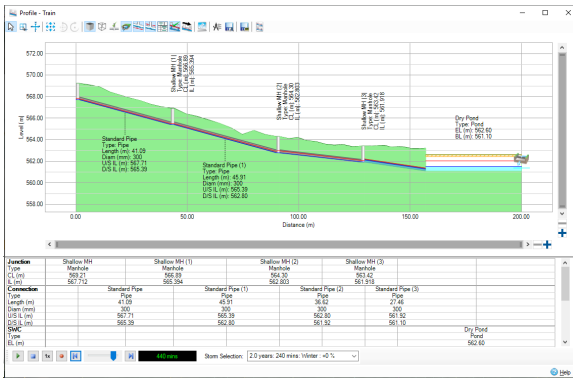
- The different storm events simulated can be selected by using the **Storm Selection** list at the bottom of the screen or in the **Results** ribbon. Note if there are any Flood Risk or Flooded status for each Storm.



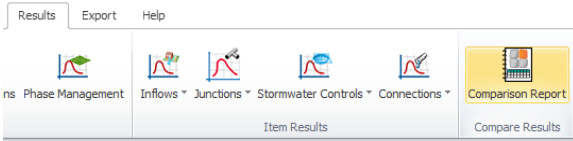
- It is possible to view **All Items** for an individual storm event, or **All Storms** for an individual Item. Select the **Critical Storm** icon to highlight the worst case event by **Max Depth**.

| Storm Event | Max Level (m) | Max Depth (m) | Max Inflow (L/s) | Max Resident Volume (m ³) | Max Flooded Volume (m ³) | Total Lost Volume (m ³) | Max Outflow (L/s) | Total Discharge Volume (m ³) | Status |
|------------------------------------|---------------|---------------|------------------|---------------------------------------|--------------------------------------|-------------------------------------|-------------------|--|--------|
| 2.0 years: 15 mins: Summer: +0 % | 561.67 | 0.57 | 132.1 | 185.082 | 0.000 | 0.000 | 13.6 | 88.705 | OK |
| 2.0 years: 15 mins: Winter: +0 % | 561.72 | 0.63 | 140.0 | 207.252 | 0.000 | 0.000 | 15.4 | 108.641 | OK |
| 2.0 years: 30 mins: Summer: +0 % | 561.80 | 0.70 | 160.9 | 234.496 | 0.000 | 0.000 | 17.4 | 138.161 | OK |
| 2.0 years: 30 mins: Winter: +0 % | 561.87 | 0.77 | 178.1 | 262.104 | 0.000 | 0.000 | 19.1 | 162.878 | OK |
| 2.0 years: 60 mins: Summer: +0 % | 561.91 | 0.82 | 199.6 | 279.891 | 0.000 | 0.000 | 20.4 | 188.202 | OK |
| 2.0 years: 60 mins: Winter: +0 % | 561.98 | 0.89 | 169.9 | 307.814 | 0.000 | 0.000 | 30.8 | 209.517 | OK |
| 2.0 years: 120 mins: Summer: +0 % | 561.98 | 0.88 | 142.2 | 354.480 | 0.000 | 0.000 | 29.3 | 207.395 | OK |
| 2.0 years: 120 mins: Winter: +0 % | 562.04 | 0.94 | 134.7 | 329.153 | 0.000 | 0.000 | 41.6 | 247.420 | OK |
| 2.0 years: 240 mins: Summer: +0 % | 562.01 | 0.91 | 106.8 | 317.761 | 0.000 | 0.000 | 35.5 | 364.276 | OK |
| 2.0 years: 240 mins: Winter: +0 % | 562.05 | 0.95 | 89.1 | 333.914 | 0.000 | 0.000 | 44.2 | 411.738 | OK |
| 2.0 years: 360 mins: Summer: +0 % | 562.01 | 0.91 | 85.9 | 318.874 | 0.000 | 0.000 | 38.1 | 423.703 | OK |
| 2.0 years: 360 mins: Winter: +0 % | 562.03 | 0.94 | 67.5 | 328.132 | 0.000 | 0.000 | 41.0 | 406.354 | OK |
| 2.0 years: 480 mins: Summer: +0 % | 562.00 | 0.91 | 71.5 | 316.819 | 0.000 | 0.000 | 34.7 | 468.567 | OK |
| 2.0 years: 480 mins: Winter: +0 % | 562.01 | 0.92 | 59.0 | 320.737 | 0.000 | 0.000 | 37.1 | 536.322 | OK |
| 2.0 years: 960 mins: Summer: +0 % | 561.96 | 0.86 | 45.1 | 297.861 | 0.000 | 0.000 | 26.9 | 581.719 | OK |
| 2.0 years: 960 mins: Winter: +0 % | 561.95 | 0.85 | 33.2 | 283.759 | 0.000 | 0.000 | 25.0 | 662.910 | OK |
| 2.0 years: 1440 mins: Summer: +0 % | 561.91 | 0.81 | 34.0 | 276.644 | 0.000 | 0.000 | 20.1 | 655.818 | OK |
| 2.0 years: 1440 mins: Winter: +0 % | 561.86 | 0.76 | 24.6 | 259.235 | 0.000 | 0.000 | 18.9 | 745.791 | OK |

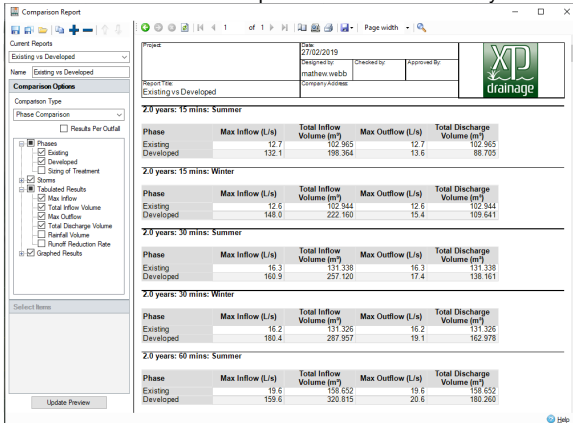
- Viewing a long section Profile of the entire Treatment Train is often the easiest way to check the volume performance on a site. The **Profiles > Show Profile** can be selected under the **Results** ribbon. The Profile animation playback is located at the bottom of the Profile view. Change the Storm Selection to the 240 mins Winter event and you can see the basin filling.



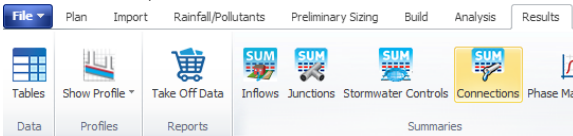
14. A quantified comparison between the **Existing** and **Developed** Phases can be made using the **Phases Report** option under the **Results** ribbon.



15. Fill out the **Comparison Report** window as below, then select the **Update Preview** button to display both tabular and graphical comparisons. By scrolling down through the storm events, you will find whether or not the **Developed** conditions design meets or exceeds the **Existing** site discharge therefore we will have to size our treatment system to try and reduce these rates to existing site conditions. Depending on how the initial Treatment Train was laid out, small differences between the comparisons shown below may be observed.



16. We can also look at the results for our connections, to see how well they are coping with the flows. To do this, select **Connections** from the **Summaries** section of the **Results** tab.



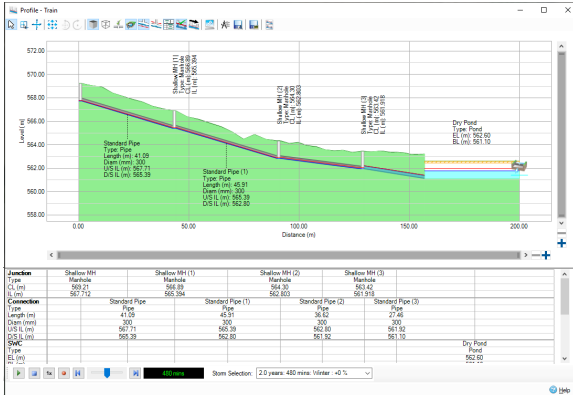
17. This then opens up the following window that displays the status in the pipes for either all items or specific connections. As we only have one flow path it does not matter if the **Select Filter** option is selected as **All Items** or **Flow Path**.

| Connection | Connection Type | From | To | Upstream Crown Level (m) | Max US Inflow Level (m) | Max Flow Depth (m) | Discharge Volume (m³) | Max Velocity (m/s) | Flow Capacity | Max Flow (L/s) | Status |
|-------------------|-----------------|----------------|----------------|--------------------------|-------------------------|--------------------|-----------------------|--------------------|---------------|----------------|--------|
| Standard Pipe | Pipe | Shallow MH | Shallow MH (1) | 562.21 | 561.21 | 0.10 | 354,711 | 3.1 | 0.23 | 61.3 | OK |
| Standard Pipe (1) | Pipe | Shallow MH (1) | Shallow MH (2) | 566.69 | 565.49 | 0.13 | 364,711 | 2.2 | 0.23 | 61.3 | OK |
| Standard Pipe (2) | Pipe | Shallow MH (2) | Shallow MH (3) | 564.30 | 562.96 | 0.15 | 530,448 | 2.5 | 0.51 | 89.1 | OK |
| Standard Pipe (3) | Pipe | Shallow MH (3) | Dry Pond | 563.42 | 562.08 | 0.30 | 530,333 | 2.2 | 0.46 | 89.1 | OK |

The Critical Storm for pipes can be determined by selecting **Critical Storm** at the top of the window. This allows you to analyse which storms provide the worst conditions for the pipes in your network.

| Connection | Storm Event | Connection Type | From | To | Max Level (m) | Max Depth (m) | Max Flow (L/s) | Max Volume (m³) | Max Flooded Volume (m³) | Total Lost Volume (m³) | Max Outflow (L/s) | Total Discharge Volume (m³) | Status |
|-------------------|-------------------------------------|-----------------|----------------|----------------|---------------|---------------|----------------|-----------------|-------------------------|------------------------|-------------------|-----------------------------|--------|
| Standard Pipe | 2.0 years 480 mins Winter -4.1 Pipe | Shallow MH (1) | Shallow MH (1) | Shallow MH (2) | 562.21 | 567.31 | 0.14 | 189.031 | 3.1 | 0.47 | 124.0 | OK | |
| Standard Pipe (1) | 2.0 years 480 mins Winter -4.1 Pipe | Shallow MH (1) | Shallow MH (2) | Shallow MH (3) | 564.03 | 565.43 | 0.21 | 197.933 | 2.4 | 0.47 | 124.0 | OK | |
| Standard Pipe (2) | 2.0 years 480 mins Winter -4.1 Pipe | Shallow MH (2) | Shallow MH (3) | Shallow MH (3) | 564.03 | 562.86 | 0.38 | 287.788 | 2.5 | 1.54 | 183.0 | OK | |
| Standard Pipe (3) | 2.0 years 480 mins Winter -4.1 Pipe | Shallow MH (3) | Dry Pond | | 564.03 | 562.86 | 0.38 | 287.466 | 3.0 | 0.36 | 178.1 | Surgeport | |

18. Navigate back to the **Profile** view of the flow path and select any storm. Use the **Playback Animation** toolbar to view the inundation across the system. Note the red horizontal lines indicate the **Maximum Hydraulic Grade Line (HGL)** for the elements within the system.



19. We can also run simulations for the 1:30 year storms, which can be done by changing the rainfall in **Analysis Criteria**. Change the rainfall to **FSR 30** and rerun the analysis.

20. After running the analysis the **Stormwater Controls Summary** window is automatically displayed, within this window we can select **Critical Storm**, just like with the pipes, to show us the worst case scenario.

| Stormwater Control | Storm Event | Max Level (m) | Max Depth (m) | Max Inflow (L/s) | Max Residual Volume (m³) | Max Flooded Volume (m³) | Total Lost Volume (m³) | Max Outflow (L/s) | Total Discharge Volume (m³) | Status |
|--------------------|---------------------------------|---------------|---------------|------------------|--------------------------|-------------------------|------------------------|-------------------|-----------------------------|--------|
| Dry Pond | 30.0 years 120 mins Winter -4.1 | 562.38 | 1.29 | 223.3 | 462.797 | 0.000 | 0.000 | 156.7 | 614.119 | OK |