Designing Drain with Different Hydrology Settings

Drain · https://mes100.com/docs/designing-drain-with-different-hydrology-settings/

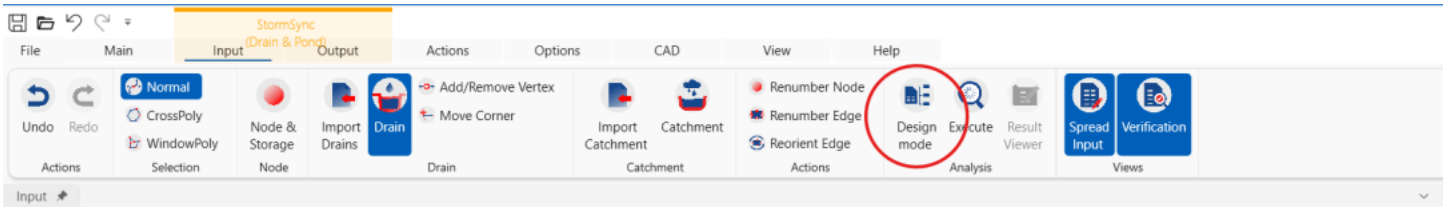
Designing Local Drain and Main Trunk with Different ARI

Engineers typically design drain capacity based on their required level of service. **Localized/normal drains** are typically designed using **lower ARI (e.g.: 10 years)**, since the drains functions to collect runoff from smaller areas/catchments. On the other hand, **main trunks** will use **higher ARI (e.g.: 100 years)** to cater for their large contributing catchment and greater role in conveying accumulated runoff from the upstream.

Setting the ARIs in Design Mode

Both local drains and main trunks can be designed within a single drainage network (i.e.: in a single project file), with different ARIs assigned to each drain. The ARI settings can be found in Design Mode.

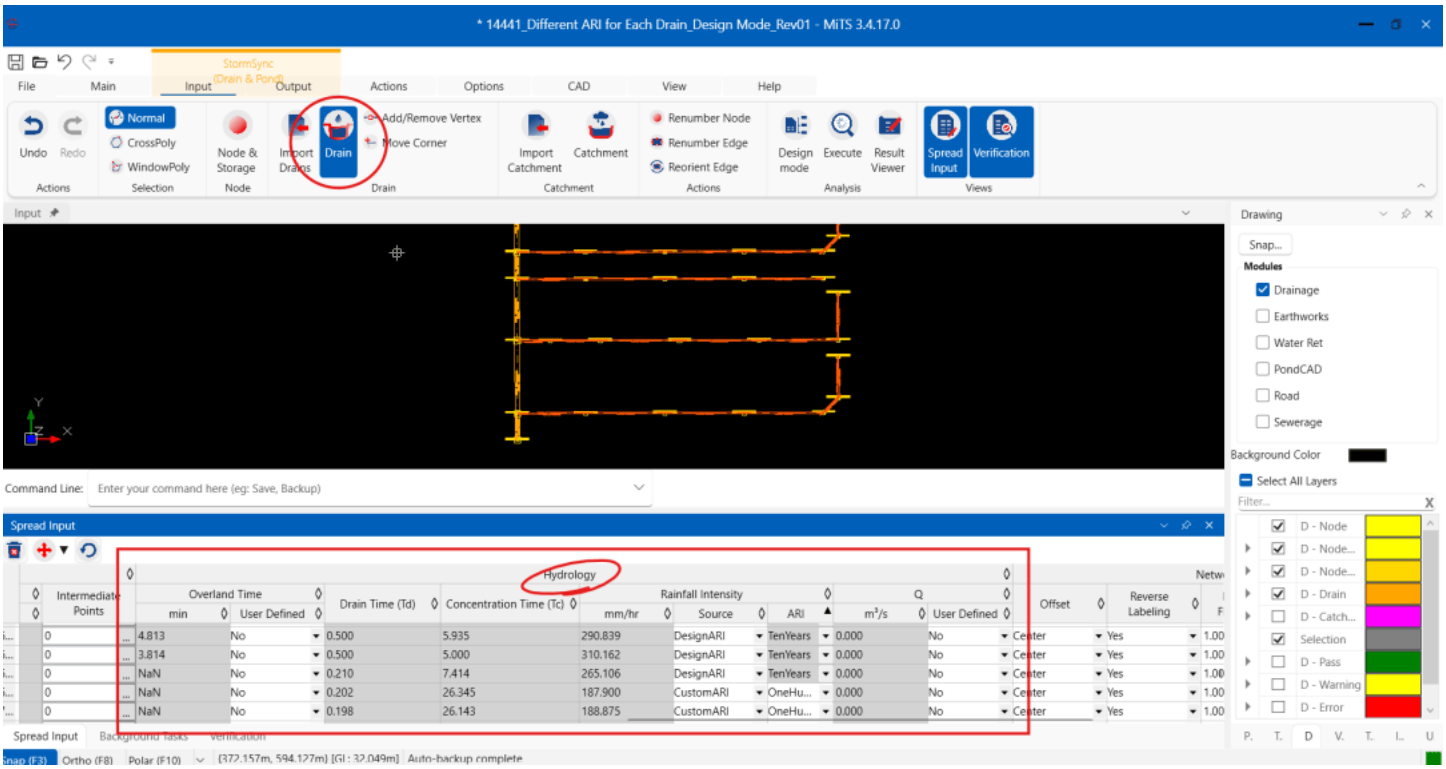
To use the ARI settings, go to StormSync Module and click the button next to **Execute** to switch to *Design Mode*.



Change the Analysis Type to **Design Mode**

Steps

1. Go to StormSync Module. The **Drain** button will be opened by default.
2. From the spread input, find the **Hydrology** group.



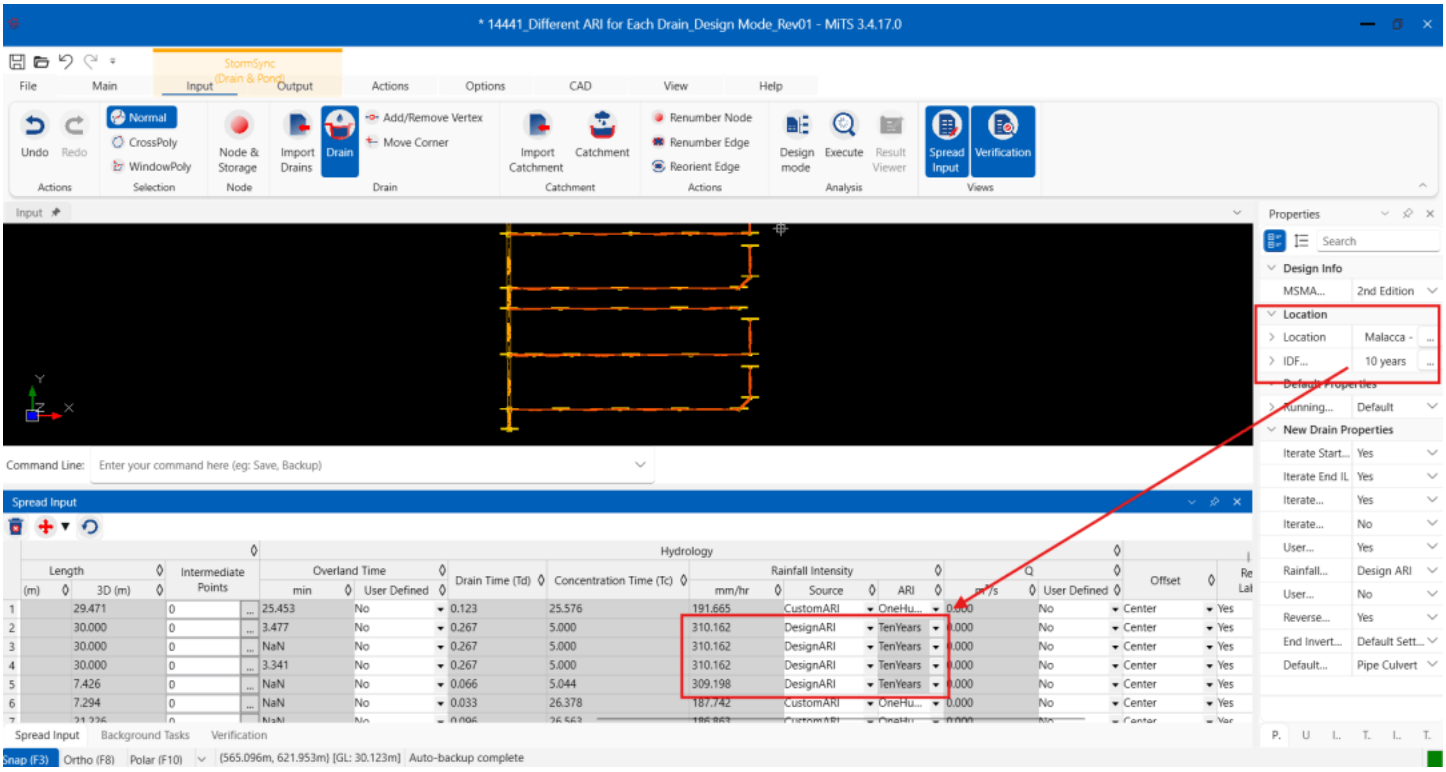
4 options can be selected for peak flow calculation:

Options	Description
Design ARI	Set the drain to follow ARI defined from the RHS Property grid
Custom ARI	Set the drain to use other ARI
User-Defined Rainfall Intensity	Set the drain to use specific rainfall intensity value
User-Defined Flow	Set the drain to use a specified flow rate directly, instead of calculating the flow from rainfall intensity

Use Design ARI for the whole drainage network

This is the default option and is recommended when the whole drain network follow the same design event/ARI.

1. Set the project Design ARI event inside the RHS Property grid.
2. In the drain's **Rainfall Intensity** group, set **Basis** to **Design ARI**.
3. Read the greyed **ARI** cell to confirm the project Design ARI currently applied to that drain. It updates when the project Design ARI changes.
4. Leave **Q → User Defined** as **No**, so MiTS calculates the drain flow from its catchments and the rainfall data.
5. Click Execute to run the Design calculation

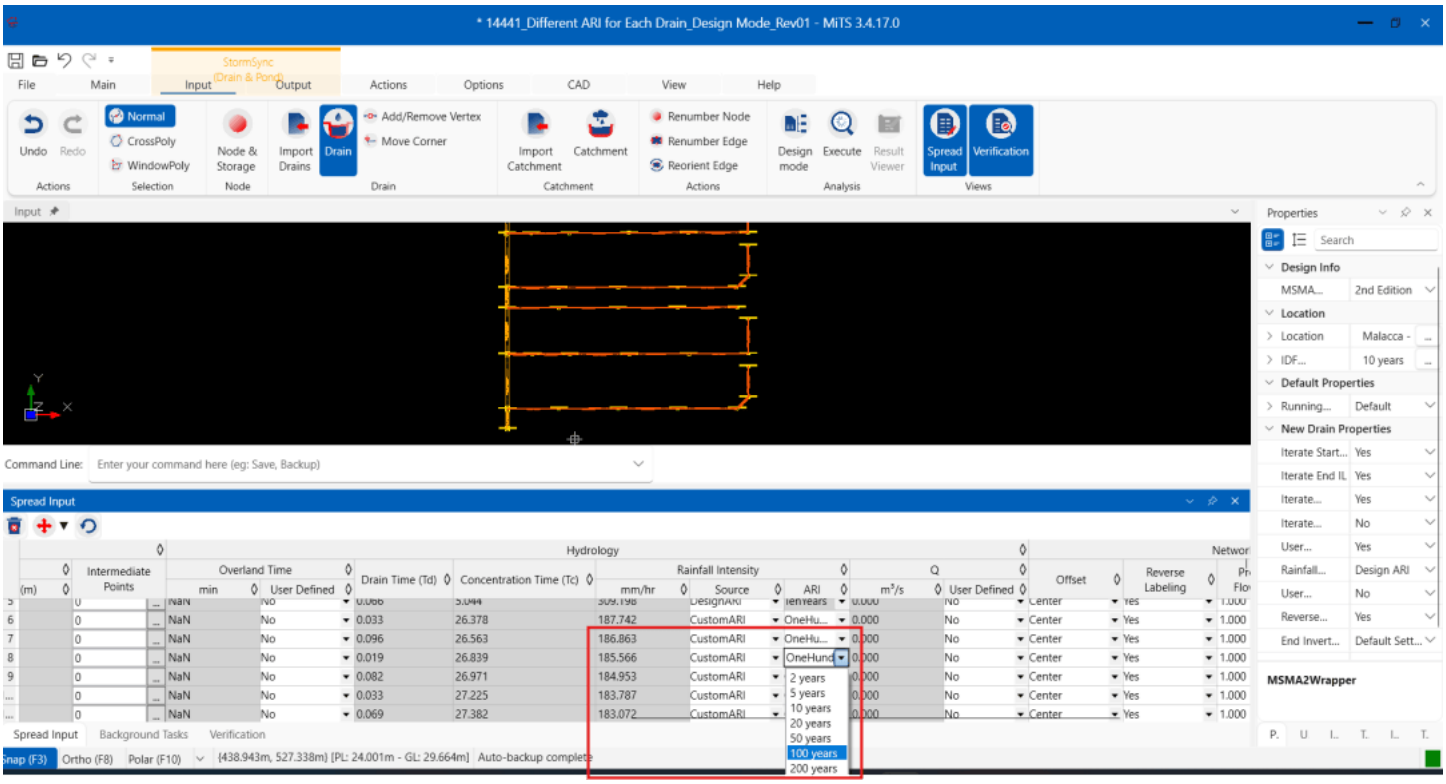


Apply a Custom ARI to specific drain

Use this when certain drains must be checked against a different approved design event while other drains keep the project Design ARI.

1. In that drain's **Basis** cell, select **Custom ARI**.
2. Select the required ARI event from **ARI** cell dropdown.

3. Leave **Q → User Defined** as **No**, so MiTS calculates the drain flow from its catchments and the rainfall data.
4. Click Execute to run the Design calculation



Notes:

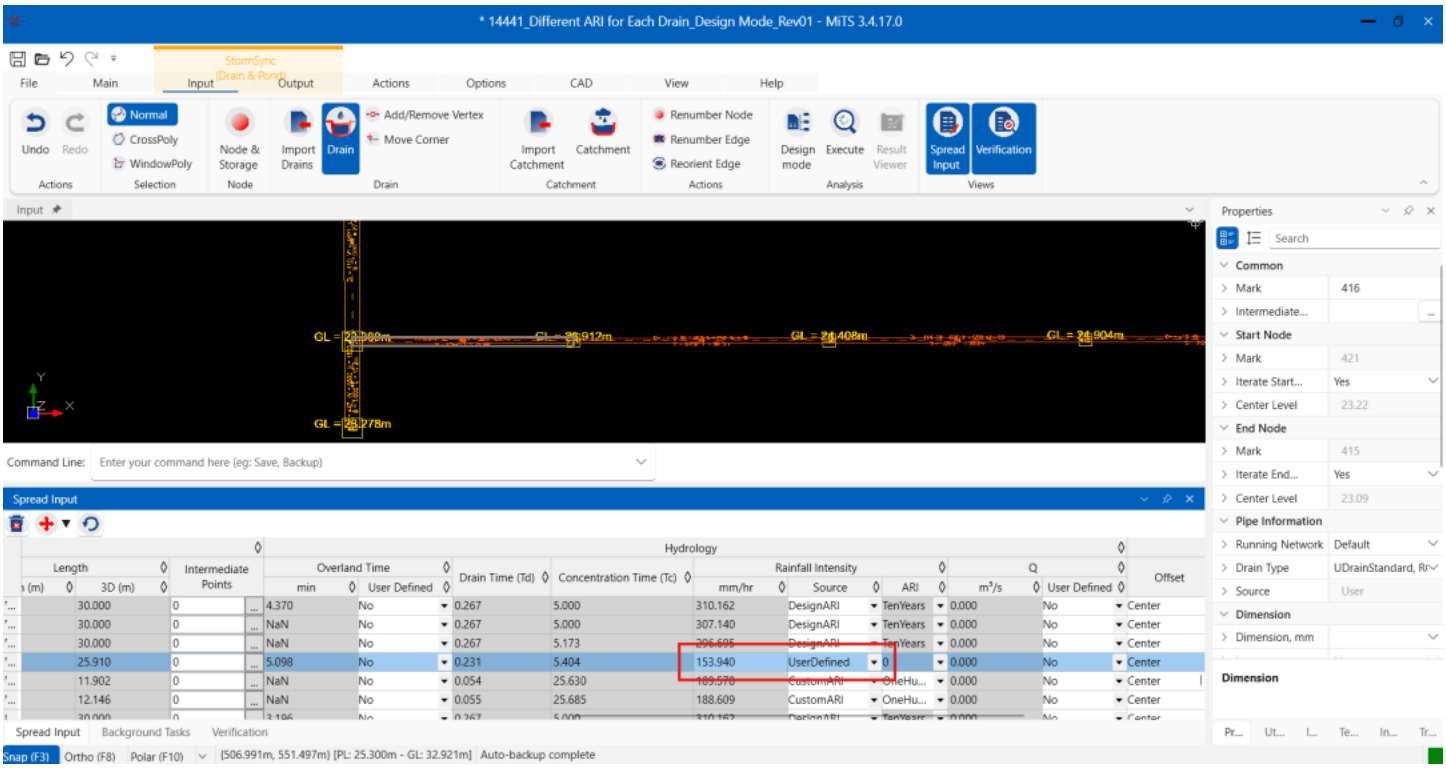
1. The Custom ARI affects only this drain's rainfall-intensity calculation. It does not change the project Design ARI or the source used by neighbouring drains.
2. The Runoff Coefficient must corresponds to the selected Custom ARI. Set the land use coefficient in the Catchment that flows into the drain.
   - If Custom ARI <=10 years, use Minor System Runoff Coefficient.
   - If Custom ARI >10 years, use Major System Runoff Coefficient.

Enter a User-Defined rainfall intensity

Use this when the required rainfall intensity is specified directly, rather than selected from an ARI/IDF relationship.

1. Set **Basis** to **User Defined**.

2. Enter value in **Rainfall Intensity (mm/hr)**.
3. Leave **Q → User Defined** as **No**, so MiTS calculates the drain flow from the specified rainfall intensity
4. Click Execute to run the Design calculation



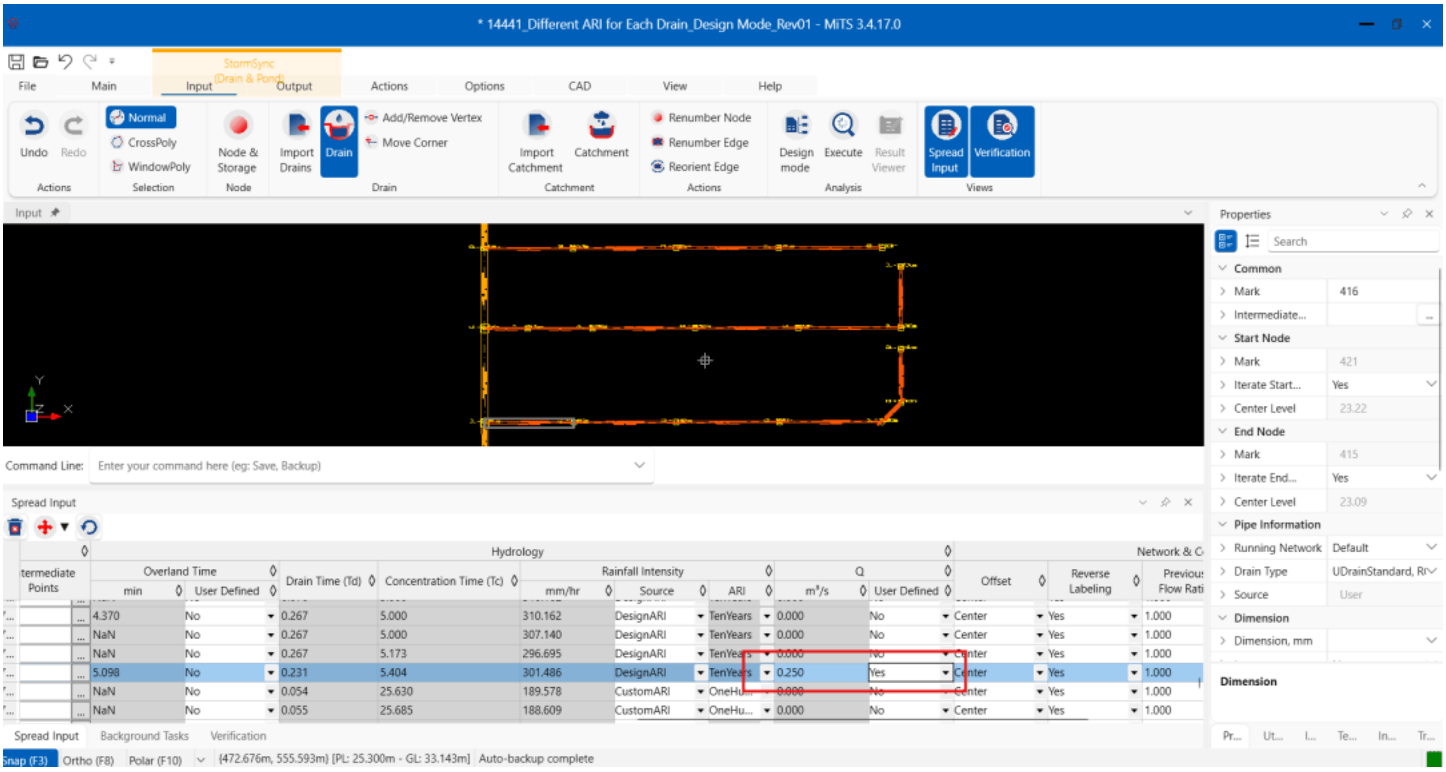
Note:

1. The **ARI** cell is not used when user-defined rainfall intensity is selected. Keep a record of the source of the value in your design documentation or project notes.

Enter a direct flow (Q)

Use a direct Q only when you have a flow value that should replace the rainfall-based contribution for this drain.

1. Set **Q → User Defined** to **Yes**.
2. Enter the required flow in **Q (m³/s)**.
3. Click Execute to run the Design calculation



Notes:

1. Selecting direct flow, Q will grey out the rainfall-intensity Basis, ARI, and intensity cells. This is intentional, as MiTS no longer derive this drain's own contribution from the rainfall data.
2. MiTS still carries flow arriving from upstream drains. The direct Q replaces this drain's own rainfall-derived contribution; it is not a command to discard the rest of the network.

Heads Up!

Check your design before using direct Q

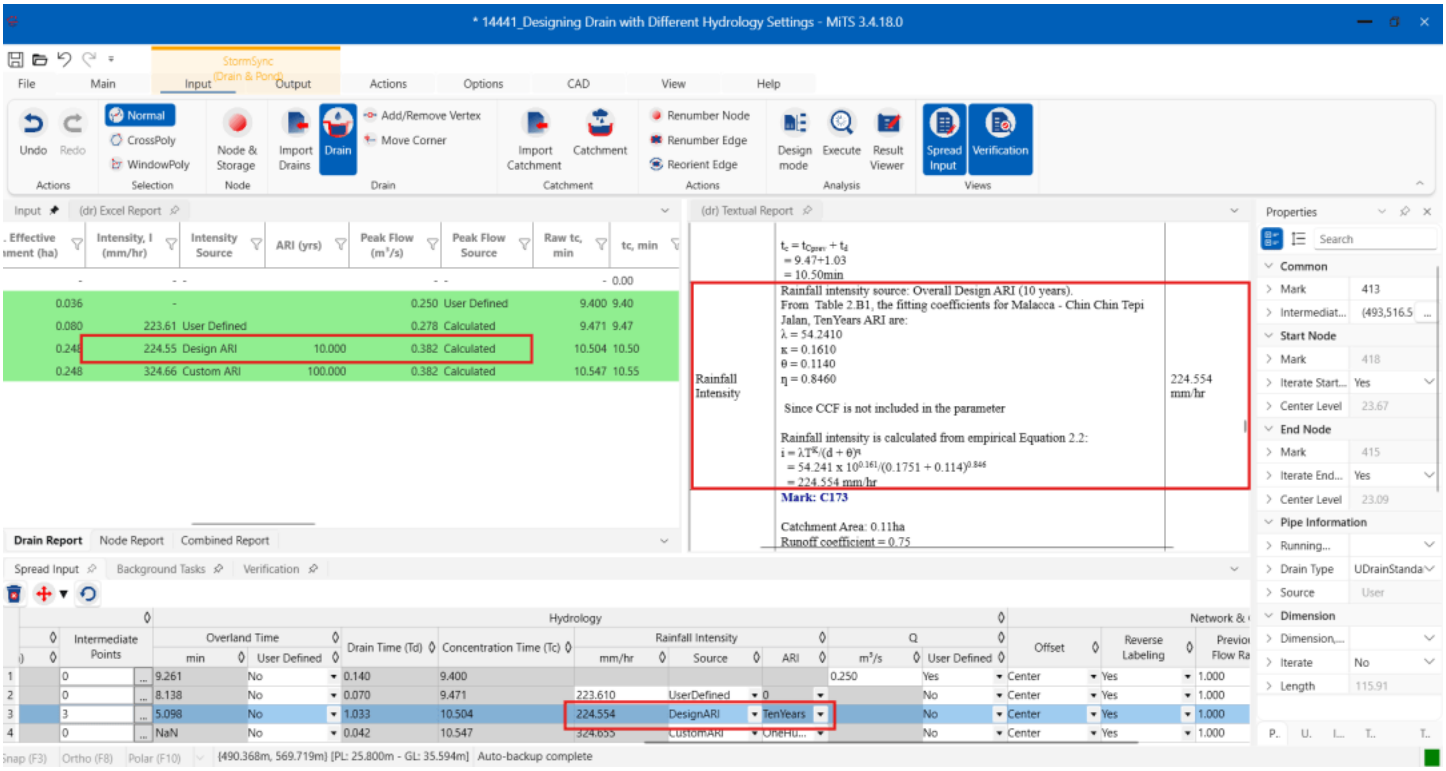
Direct Q should only be used intentionally, when the designer has a known flow value. Before using it, **confirm the flow value, units, design event/ARI, and its source/authority.** Using **direct Q will override the normal runoff calculation.** It should not be used as a shortcut when the catchment or runoff setup is missing or incomplete.

Result and Report

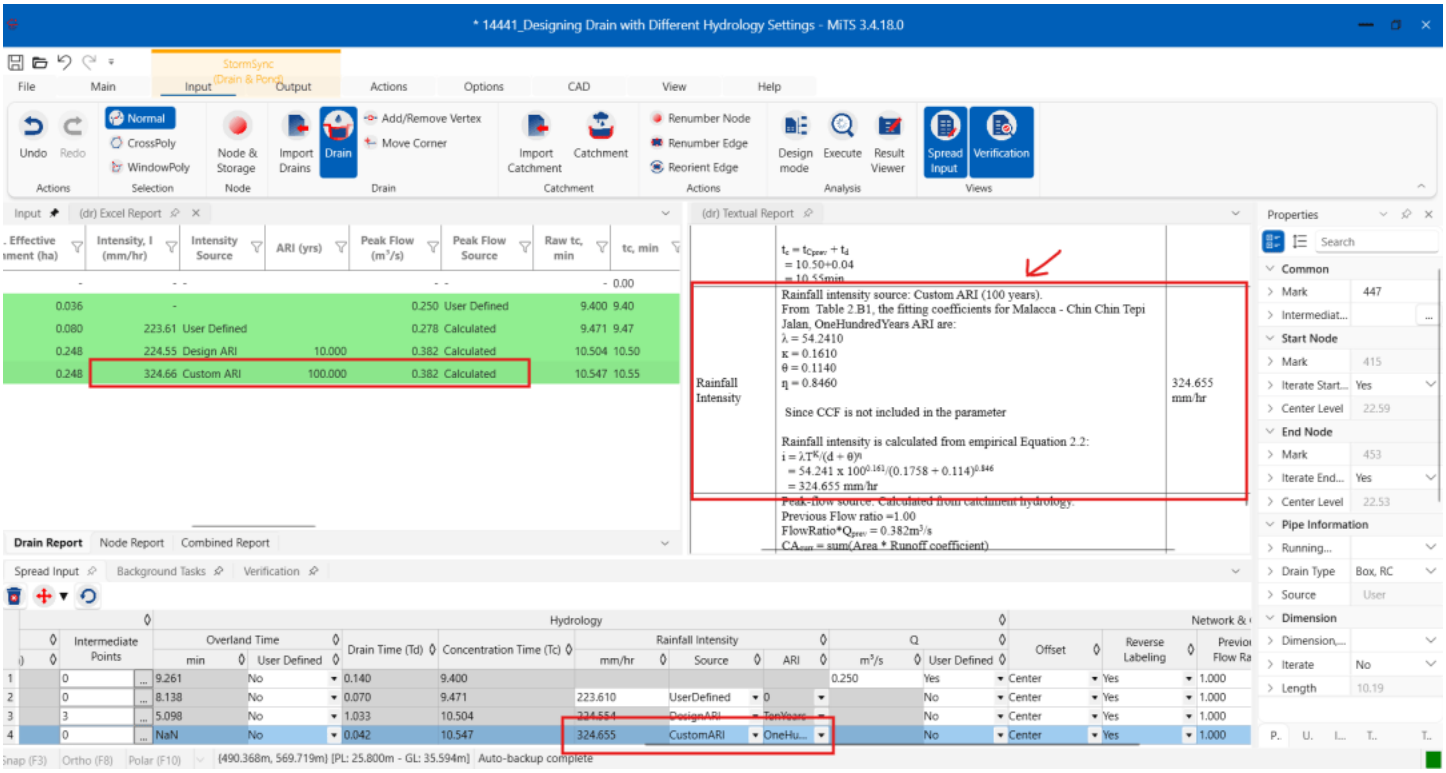
1. Click Execute to run the Storm Design calculation.

2. Open the Excel Report to view the reported **Intensity Basis, effective ARI, and peak-flow source** for the edited drain.
3. Open the detailed textual calculation report to view the same rainfall intensity basis and whether the **rainfall intensity** or **Q** is calculated or user-specified.

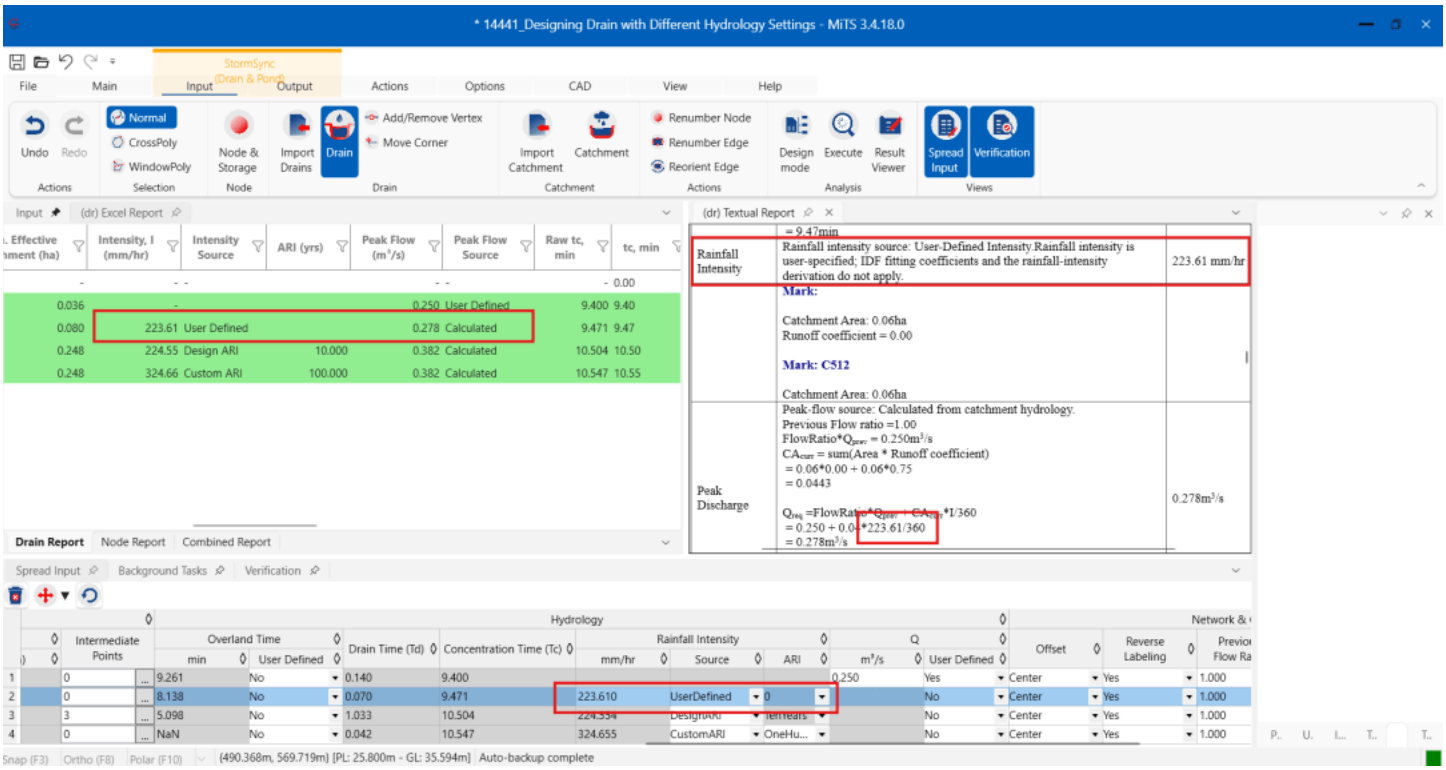
Design ARI



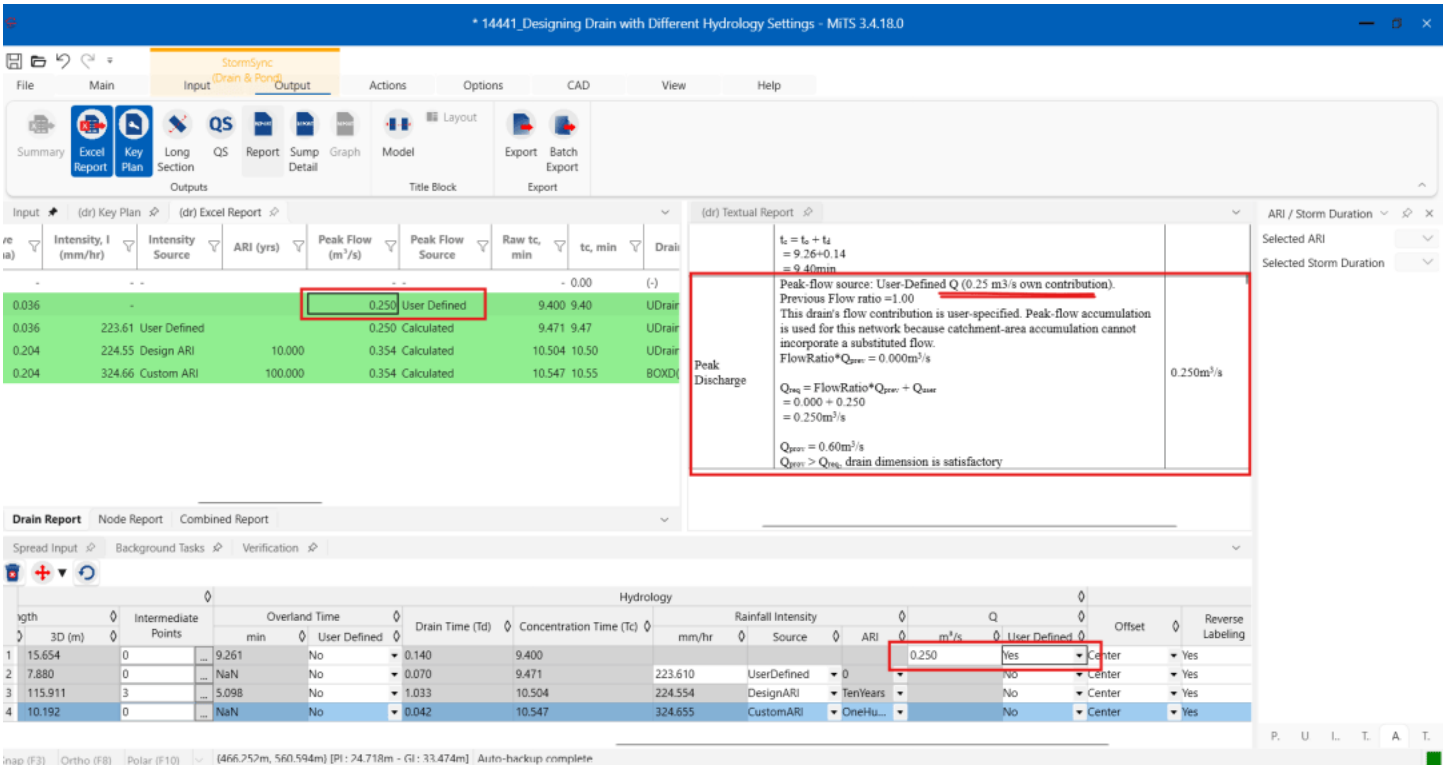
Custom ARI



User-Defined Rainfall Intensity



User-Defined Q

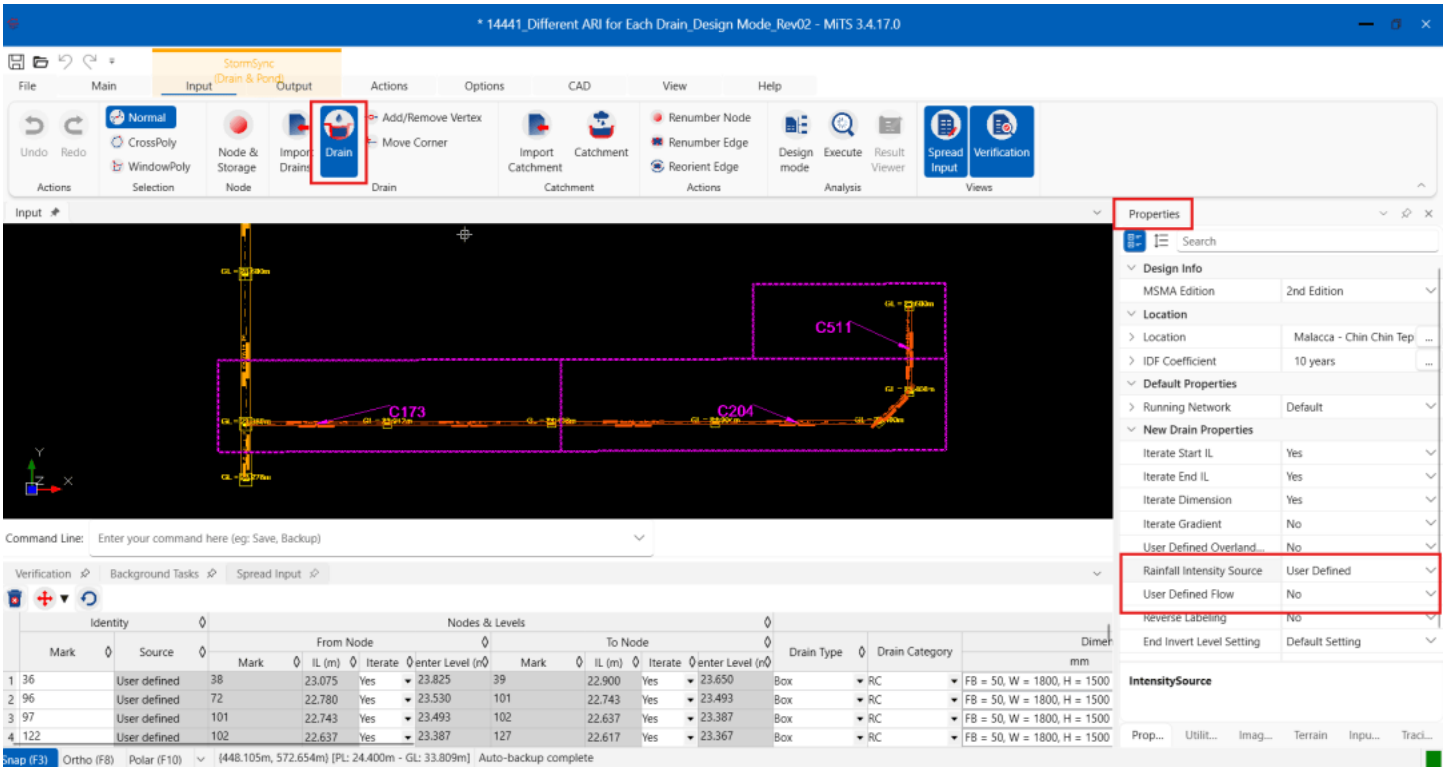


Set defaults for new drains

If most new drains will start with the same hydrology choice, set the new-drain defaults before creating/importing them from the RHS Property grid, or in the Project Settings:

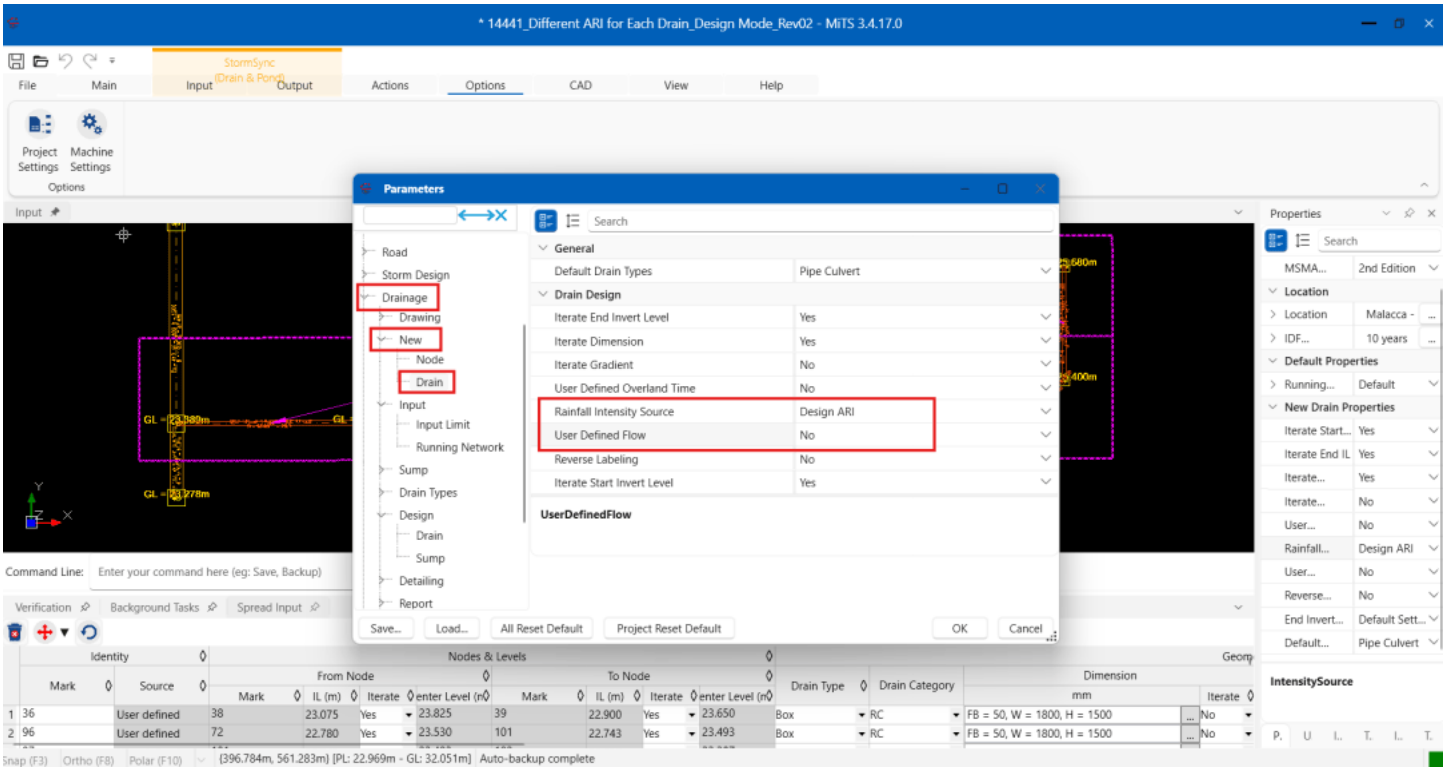
Change the default in the RHS Property grid

1. Click **Drain** button (without selecting any drain), and click Properties at the RHS Grid
2. Set **Intensity Basis** and **User Defined Flow** as required.
3. Then create new drains.



Change the default in the Project Settings

1. Open the drain-input defaults in the Project Parameters.
    - Go to Options > Project Settings > Drainage > New > Drain
2. Set **Intensity Basis** and **User Defined Flow** as required.
3. Click OK, then create new drains.



Notes:

Existing drains retain their current settings; changing the defaults does not update existing drains.

Related



Ngu Soon Hui

I'm the Benevolent Dictator for Life for MiTS Software cum Editor of this website. Read more here.

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