Software User Guide

VisNet Design

VisNet Design is EA Technology's LV network design and load flow software. This user guide is intended to introduce the tool. It is aimed at all users, whether migrating from WinDEBUT, another network assessment tool, or with no prior experience. It is recommended that users follow the step-by-step instructions provided when configuring their first network assessment.

As well as step-by-step instructions for using VisNet Design, this User Guide also contains an introduction to the Results Metrics produced by the tool, Frequently Asked Questions and assistance interpreting and resolving error codes.

EA Technology also provide training courses designed to help users to use VisNet Design proficiently. For more information, please see our website or send an email:
www.eatechnology.com
info@eatechnology.com

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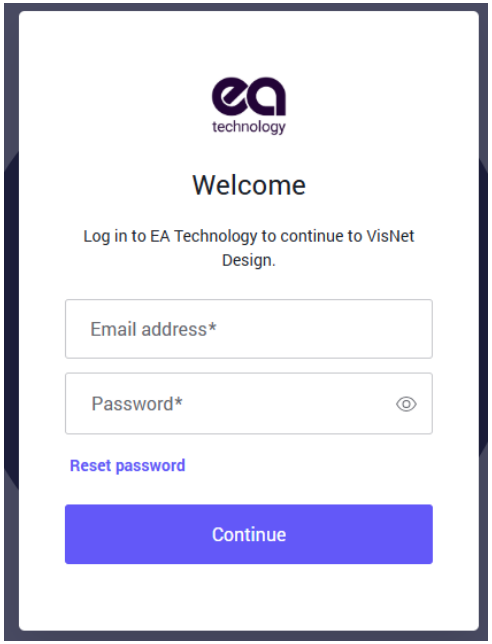
01
Login

Login

To access the tool, the user must first log in. The user will be presented with the login window as shown.

The user must enter their sign in name, usually their email address, and the password that they created as part of the sign-up process. After entering the correct sign in name and password, press the "Continue" button.

The account password can be changed by clicking the "Reset Password" link and following the on-screen instructions.



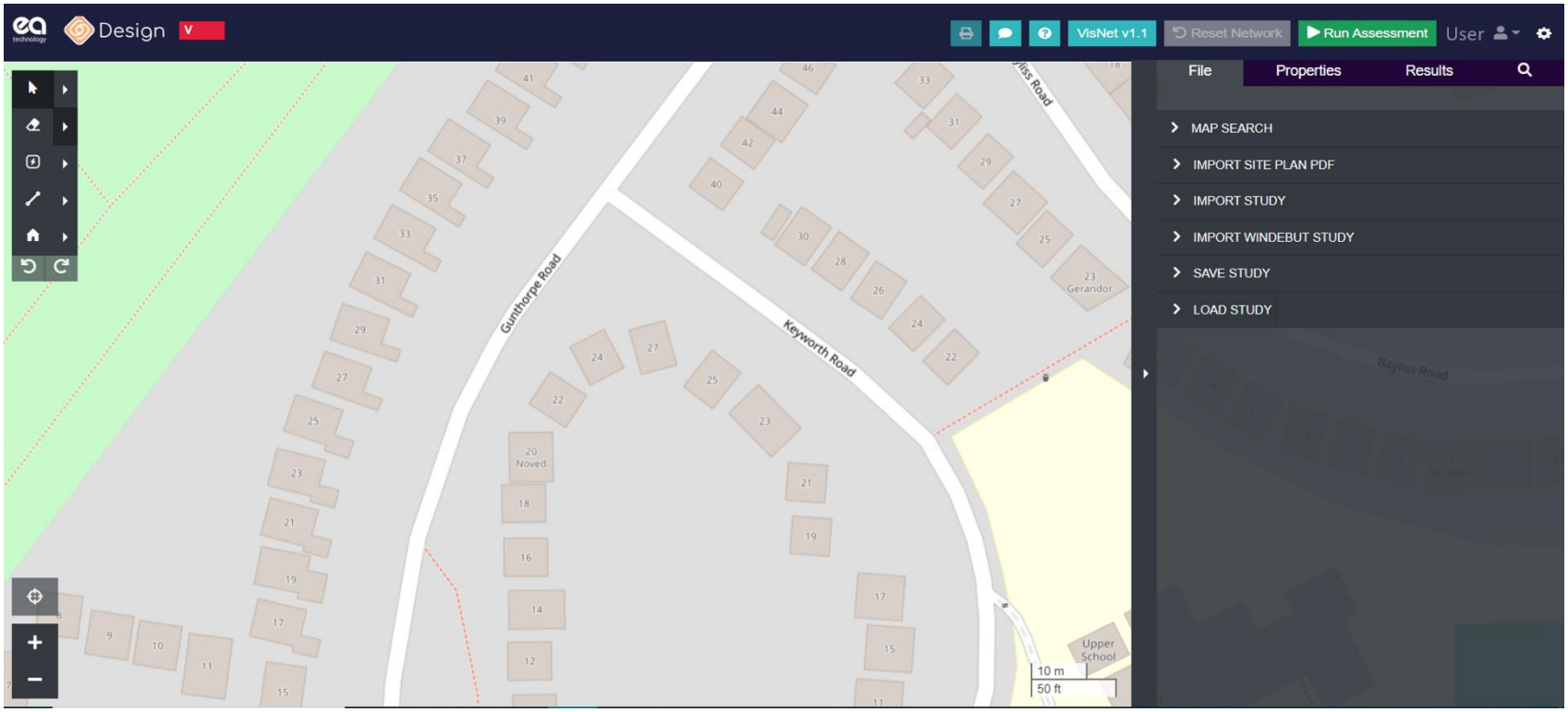
If there are any issues with accessing the tool which are not solved by a password reset, please contact product support.

02

User Interface

User Interface

Once logged-in to VisNet Design, the user is presented with the following interface. The location of the background map may vary depending on the user's configuration setting.

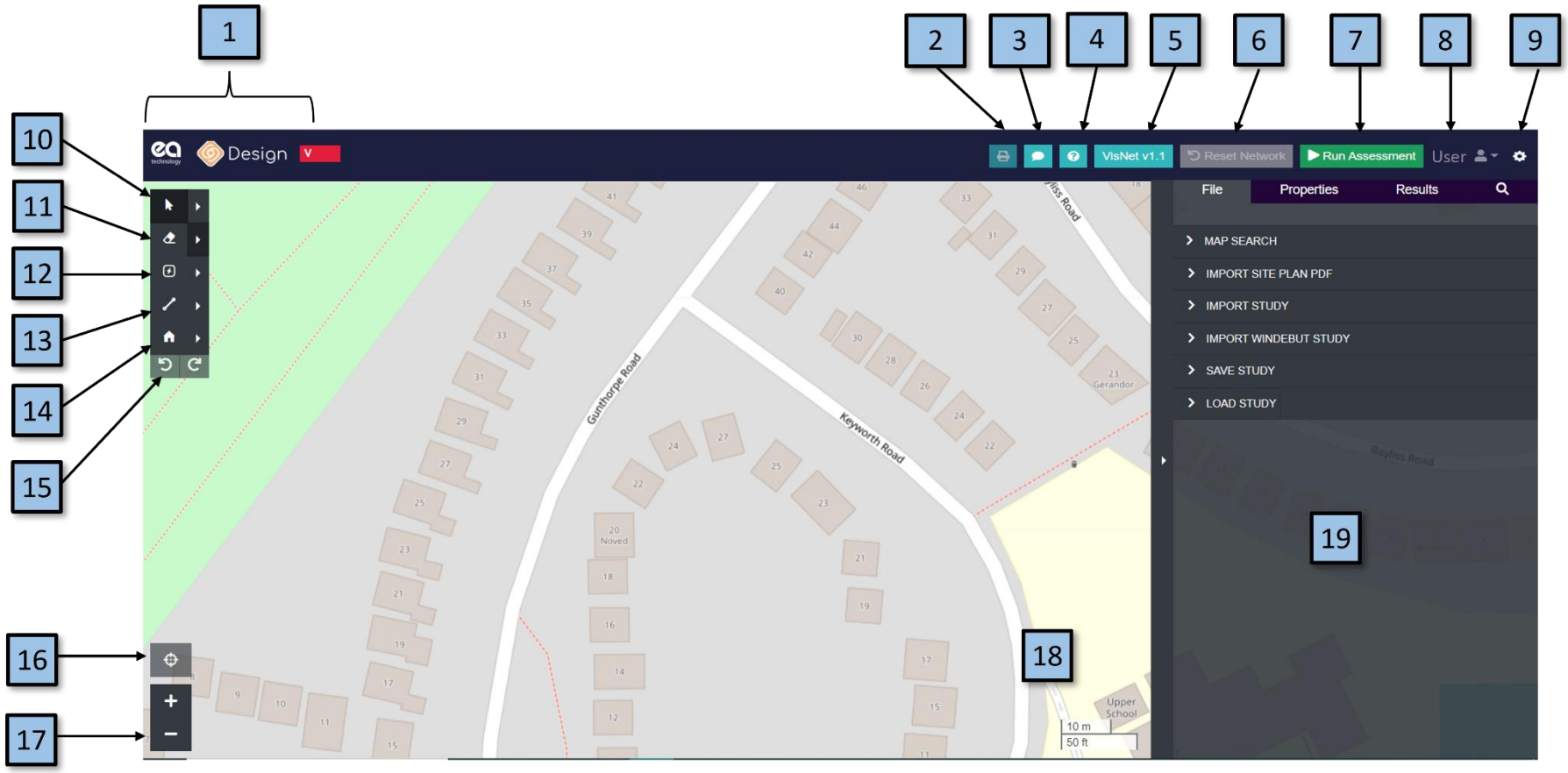


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Description of User Interface components

Description of User Interface components

The image below shows an annotated view of the VisNet Design User Interface, displaying its main components.



1) Header – Header with the tool name, EA Technology logo, and the version number of the software

Functionality Buttons – Situated in the top right-hand corner of the screen.

2) Report Button – Represented by the printer icon. This is unavailable until a network assessment is run. Once a network assessment is available, this button can be used to view a summary report of the network assessment. This summary report may also be printed, including to PDF.

3) Feedback Button – Represented by the speech bubble icon. This button can be used to provide feedback about VisNet Design, e.g., bugs, feature suggestions, or simply general feedback. Users are able to write comments and include a screenshot of the network and/or the network study file and imported file(s) and this will be sent to the team in EA Technology.

4) Help Button – Represented by the question mark icon. This button brings up the User Guide

5) Configuration Button – The icon displays the current configuration being used. This button brings all details of the current configuration and also a list of available configurations to choose from.

6) Reset Network Button – Clears the canvas of any assets that have been placed.

7) Run Assessment Button – Runs an assessment on the network currently displayed on the canvas.

8) User Profile – This displays the name of the current user. This icon can be used to access the user profile management area or to log out.

9) Settings – This button can be used to configure the tool's graphical settings from a drop-down menu.

Drawing Tools – Set of dark grey buttons in the top left-hand corner of the canvas.

10) Select – Represented by the pointer icon. Allows network components to be selected by the user. The dropdown allows the option of selecting either a single component, or a group of components.

11) Delete – Represented by the eraser icon. Allows network components to be removed. The dropdown provides the option of removing either a single component, or a group of components. Deleting a customer object turns the object into a node. In order for nodes to be deleted, all attached cables must first be deleted.

12) Transformer – This button allows the user to model either ground- or pole-mounted transformers.

13) Conductor – This button allows the user to model network nodes, underground cables, and overhead lines. This dropdown also contains the Split tool, which allows a node to be placed on an existing conductor.

14) Connection – This button allows the user to model consumers and generators.

15) Undo/Redo buttons – These two buttons allow the user to undo/redo previous actions.

Resolution Tools

16) Centre button – This button recentres the network design on the map such that the entire network is displayed.

17) Zoom buttons – Plus and minus buttons for zooming the map in and out respectively

18) Scale bar – The scale bar in the bottom right-hand corner of the canvas reflects the distances in the map and automatically adjusts as the zoom buttons are used.

19) Sidebar – The sidebar to the right of the canvas has three tabs: File, Properties and Results.

- File – This tab is used for saving network files either to the cloud database or as downloadable JSON or pdf files. It is also used to load networks previously created using VisNet Design and saved either to the database or the user's PC and to load pdf files of site plans. An option to import locally saved WinDebut study files is also present in the file tab. It further includes a search option for previously saved networks on the database and allows to sort the saved networks according to file name or date of creation. It also contains the Map Search feature, where the user can enter a town name or postcode and press Search to navigate to the chosen location. The file tab also allows to import site plans in the form of pdf files.
- Properties – This tab is used to display and configure the properties of different network components (transformers, conductors, and customers), either before the components are placed on the canvas or when they have been selected using the Select Button.
- Results – This tab allows the user to select which results are displayed by the VisNet Design interface when an assessment is run on a network. It will also display warnings when results exceed specific thresholds.
- Find – This tab allows the user to find any specific asset on the network using the asset label/annotation, object ID, or other key fields.

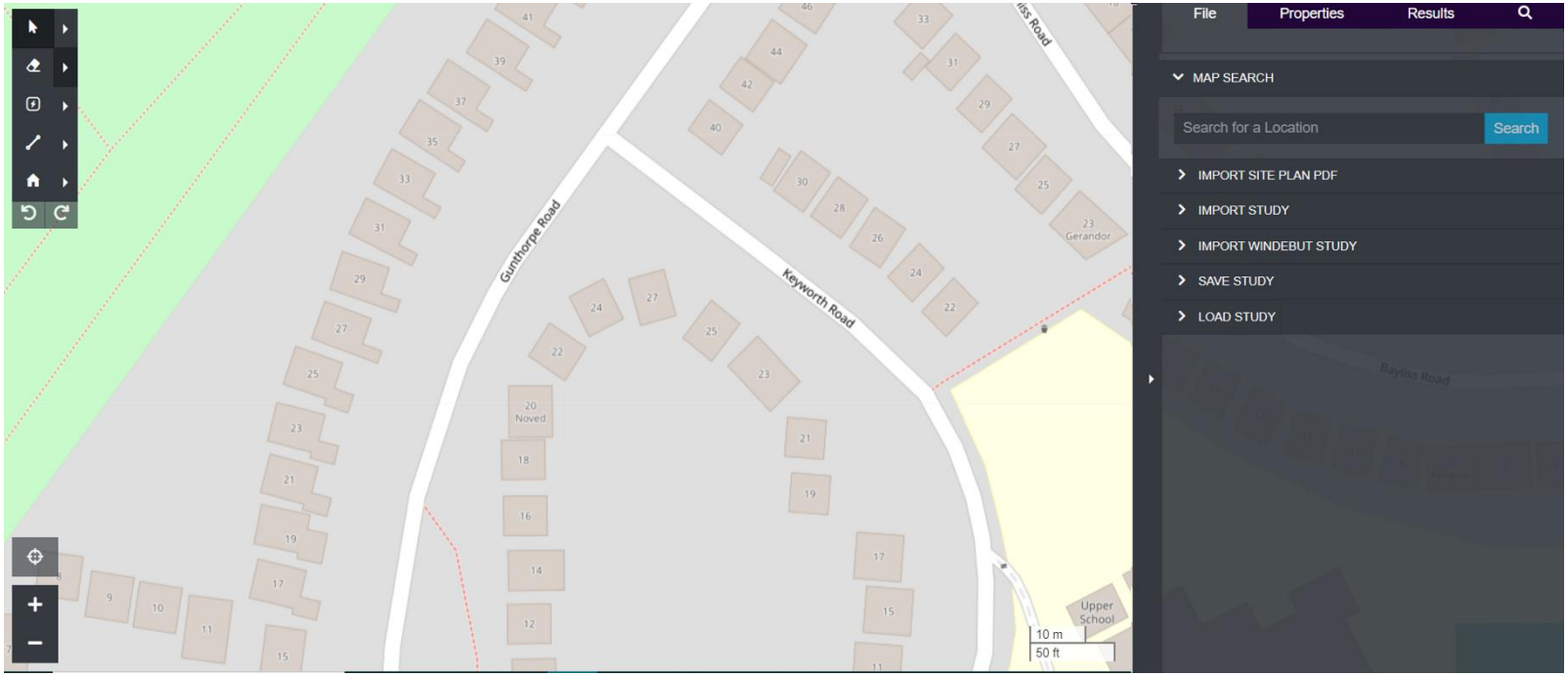
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Step-by-step guide to creating and running a network assessment

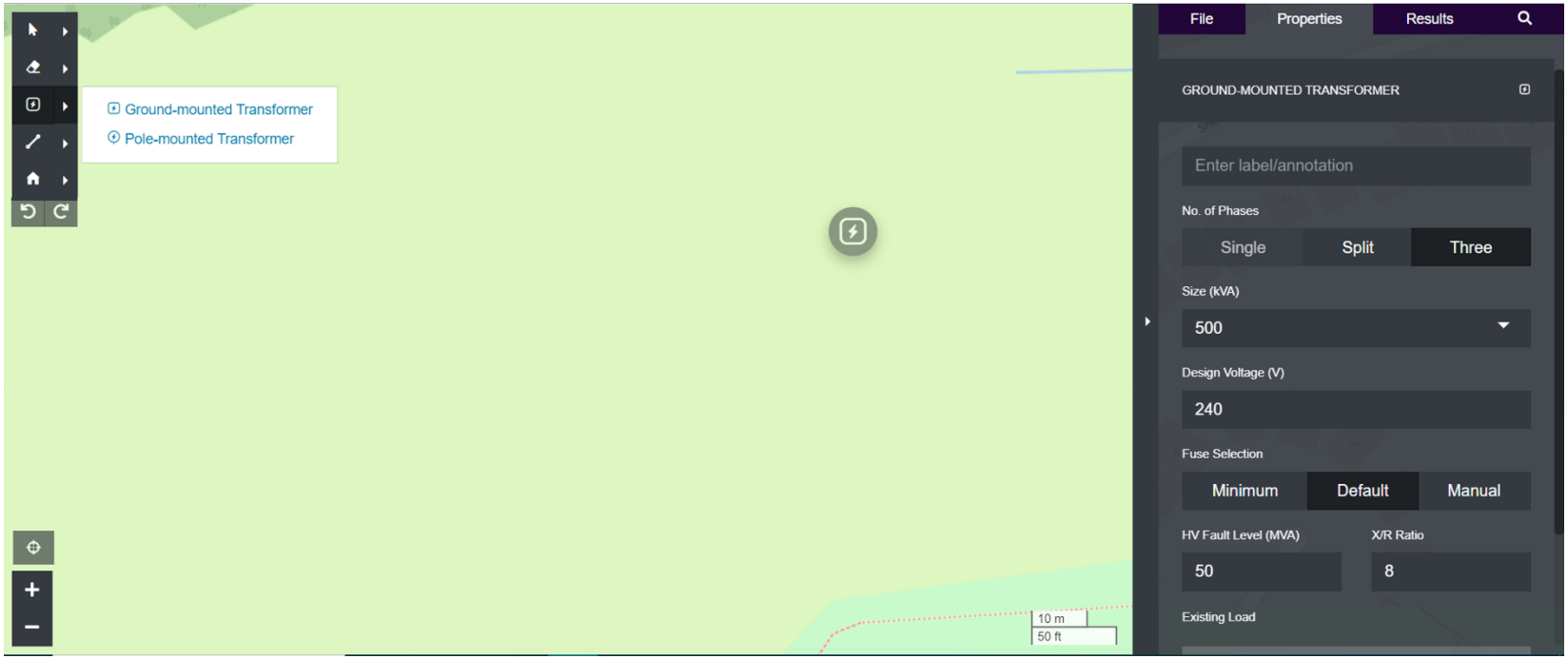
Step-by step guide

The steps below take the user through the process of modelling and performing an assessment on an example electrical network.

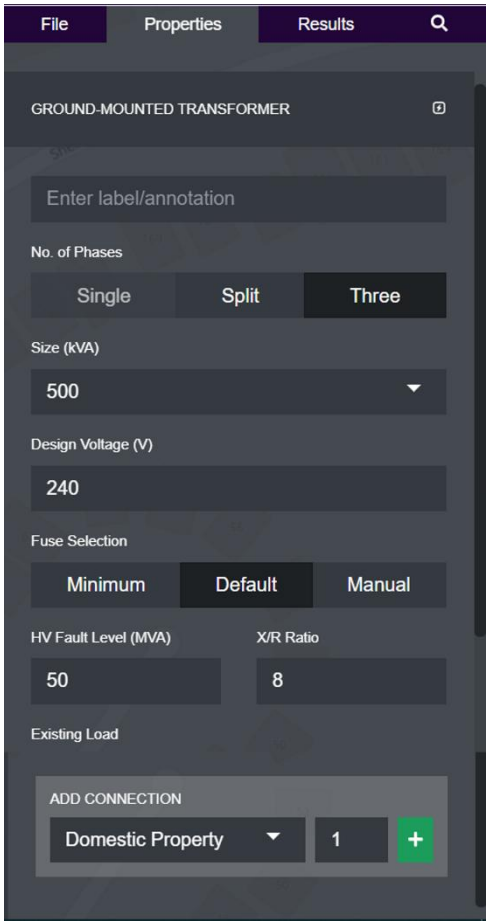
1. Navigate to the location on the background map where the connection design is required. If no specific location is required, any area of the map can be used, or the map can be toggled off in the Settings menu. If a specific location is required, this can be found by either panning the map using the mouse, or by searching the town name or postcode in the 'Map Search' field in the sidebar.



2. Press the 'Transformer' button and choose either a Pole or Ground-mounted transformer. A transformer icon will appear beneath the user's pointer.



3. Use the 'Properties' sidebar to configure the transformer **before** positioning it on the background map.



The topmost box can be used to give the transformer a custom annotation on the canvas by entering text into the box 'Enter label/annotation'.

The size of the transformer can be selected from the dropdown or, if the 'Auto' function is chosen, VisNet Design will calculate an appropriate size of transformer for the network during the assessment. The sizes available depend on the chosen mounting and phase: single, split, or three.

The option called 'Design Voltage' allows the user to set the busbar voltage at the transformer in volts. It is auto populated by VisNet Design with a default value.

The user can alter the method of selecting fuse sizes for each feeder. 'Minimum' allows VisNet Design to pick the smallest safe size of fuse. 'Default' is a pre-chosen fuse size dependent on the transformer rating. 'Manual' allows the user to specify the fuse size.

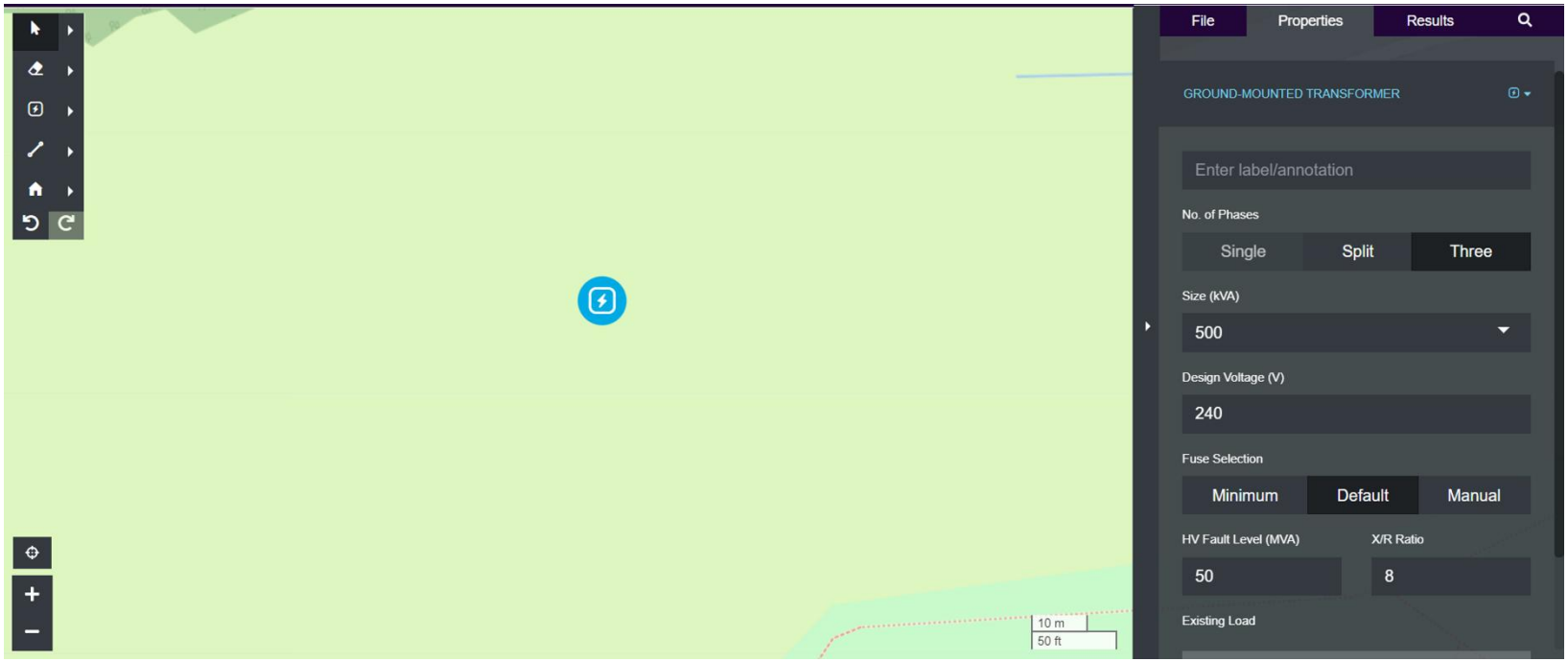
'HV Fault level' is the fault level of the upstream HV network behind the transformer, auto populated by VisNet Design with a default value.

'X/R ratio' is the reactance/resistance ratio of the upstream HV network, auto populated by VisNet Design with a default value.

The user can also add connections to the transformer to simulate existing feeders if it is unnecessary to model all the feeders in detail.

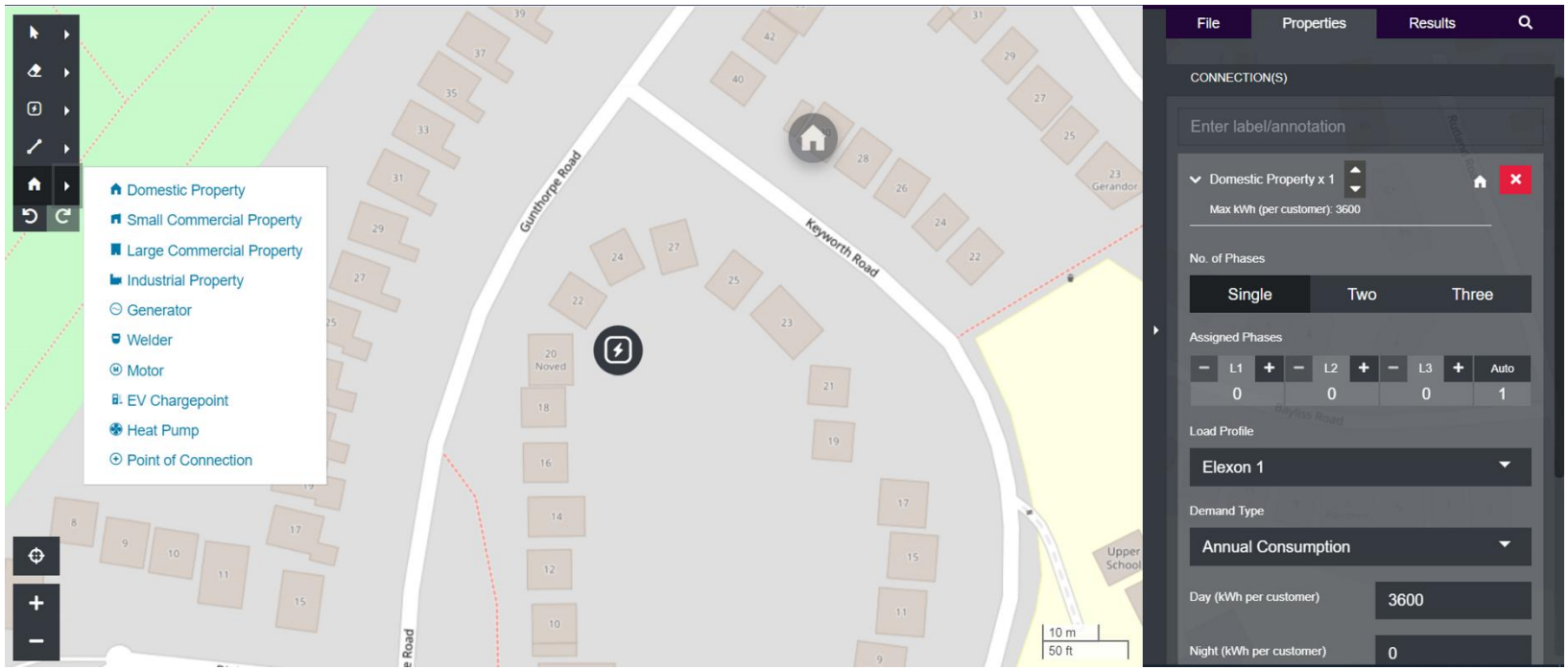
In this example, a three-phase GMT, rated at 500kVA, with default fuse selection has been selected.

4. Place the transformer on the drawing canvas.

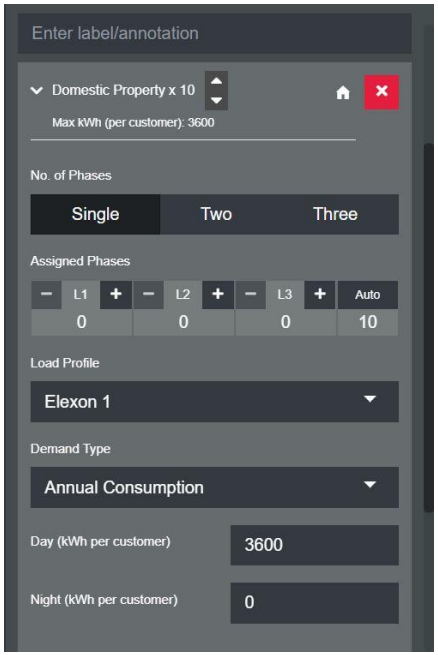


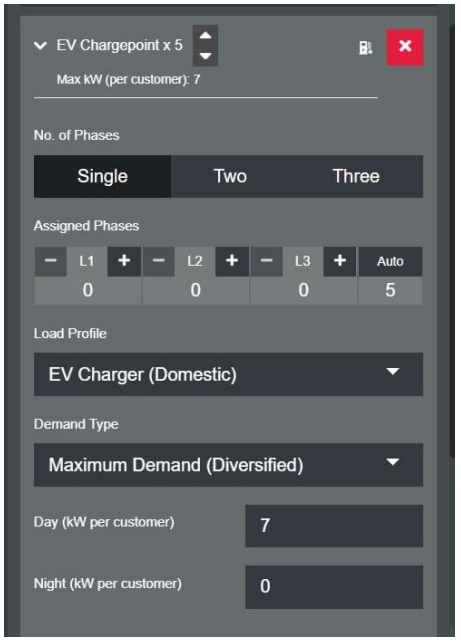
Steps 3 and 4 are interchangeable: properties can be configured after the transformer has been placed on the background map by clicking the transformer with the 'Select' tool. Once the transformer has been placed, swap between 'Pole' or 'Ground-mounted' by using the blue arrow in the top-right corner of the 'Properties' sidebar.

5. Click on the 'Customer' button and select the desired customer type. A customer icon will appear beneath the user's pointer to reflect the customer type chosen.



6. Use the 'Properties' sidebar to select the type and quantity of customer. The quantity of customers can be adjusted using the up and down arrow buttons.





Populate the customer parameters as required.

Alternatively, the user can configure the customer properties after placing the customer, by selecting the customer using the 'Select' button and modifying its properties in the 'Properties' tab of the sidebar.

In the example above, a grouped connection has been selected that includes 10 Elexon 1 customers with 5 Electric Vehicle Charge Points (EVCPs). For multiple properties created together, the displayed properties are used for all of these connections. Adding new customers via the sidebar allows different types of customers to be placed at the same location.

Similarly, to transformers, the customer object can be given a custom label on the canvas by using 'Enter label/annotation' in order to clearly identify specific connections.

The 'No. of Phases' and 'Assigned Phases' properties allows the user to select the phasing of the customer(s), either manually or by selecting 'Auto'. 'Auto' allows VisNet Design to automatically assign the customer to an available phase. For three-phase customers, the user has the option of selecting that the customer's demand be balanced across all three phases. It should be noted that the VisNet Design model does not balance three-phase customers by arbitrarily assigning a phase to have a greater or lesser load. It instead adjusts the expected variance seen across the three phases' demand. For this reason, balancing has no effect on Maximum Demand (Fixed) customers.

The 'Load Profile' drop-down menu allows the user to select an appropriate profile for the selected customer type. Profiles available include the Elexon profiles 1 through 8, in addition to other profiles such as Economy 10, Church, Hotel Pub, EVCP, PV and Heat Pumps. The available profiles depend on the connection type selected.

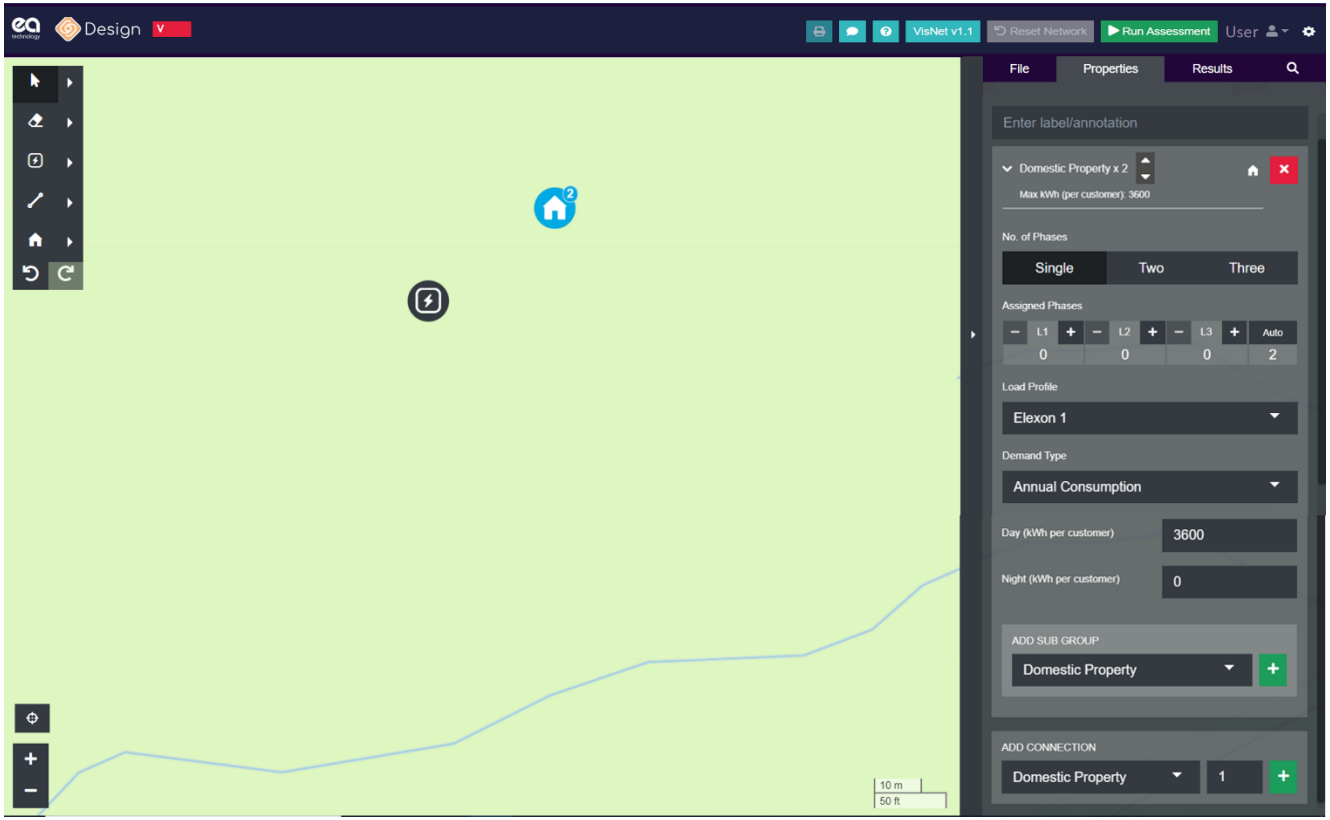
The 'Demand Type' option allows selection of the Demand Type: 'Annual Consumption', 'Maximum Demand (Diversified)' or 'Maximum Demand (Fixed)'.

- For 'Annual Consumption' customers, enter the approximate consumption per year in kWh.
- 'Maximum Demand (Diversified)' models the impact of diversity.
- 'Maximum Demand (Fixed)' customers should be used when diversity modelling is not required for the customer. The appropriate demand figure depends on the selected demand type.

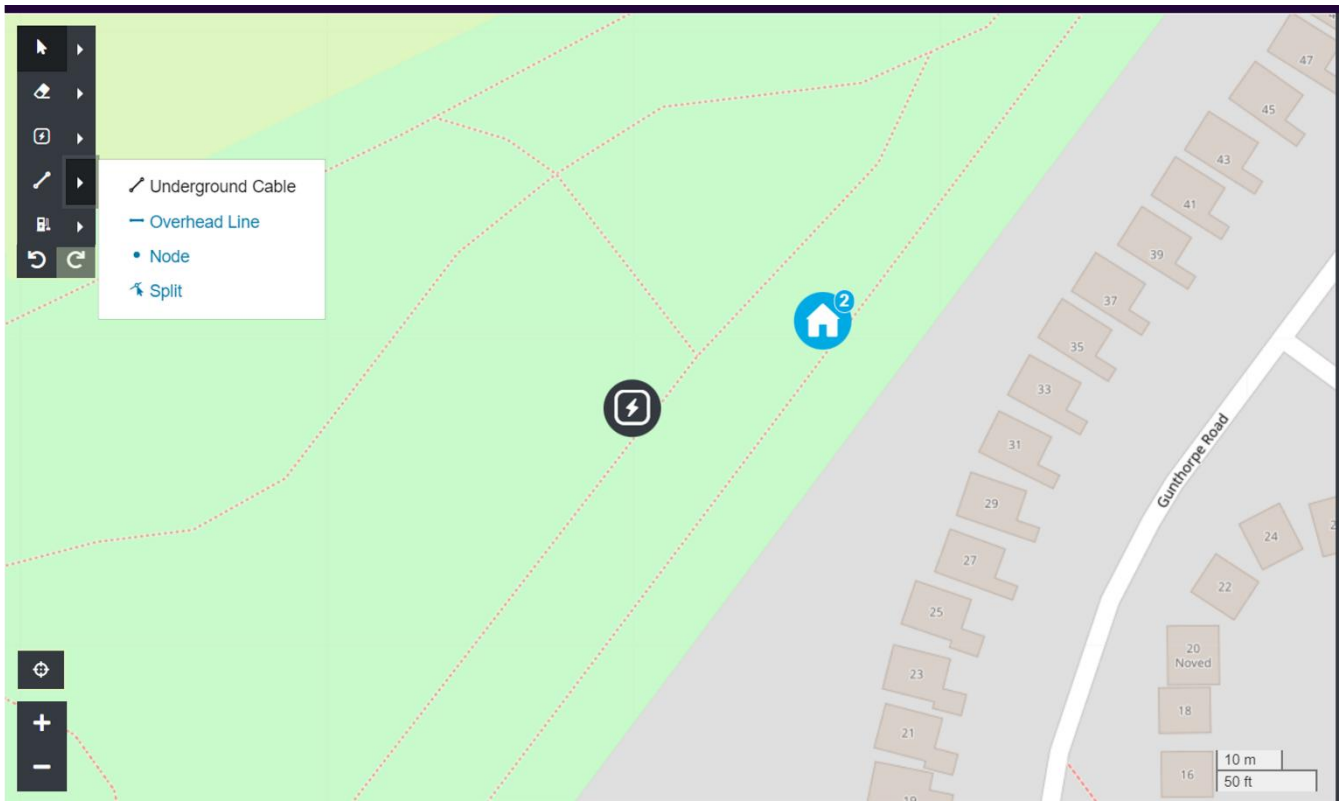
For both Maximum Demand customer types, enter the expected daily maximum demand in kW. Two values can be provided for customer demand: 'Day' and 'Night'. 'Night' is defined as 23:30-07:00. To scale night-time demand proportional to day-time demand, set the 'Night' box to 0. To scale night-time demand independently, enter a separate value in the 'Night' box.

There are two ways of configuring customers at the same location. To add customers which are at the same location but are independent (e.g., flats and a landlord supply), use the 'Add Connection' button at the bottom of the sidebar. This will add a new connection of the desired type. If instead the customers are related (e.g., a house with PV or an EVCP), use the 'Add Sub-Group' option within the parent customer's properties to add the related child customer.

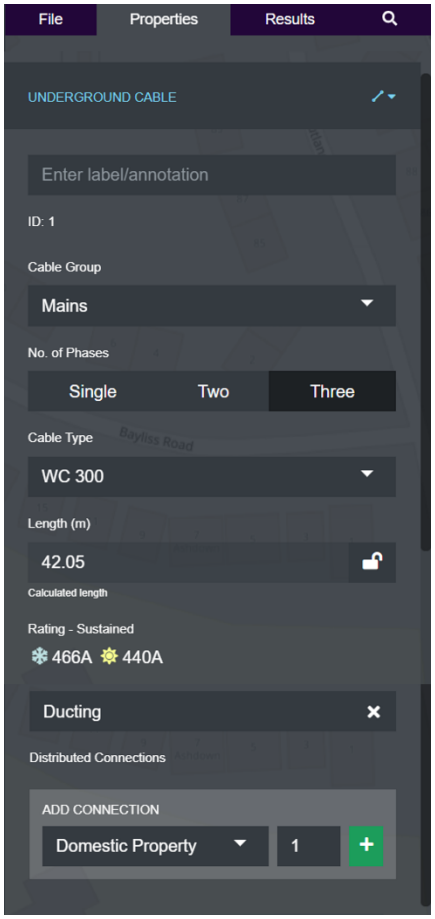
7. Click on 'Canvas' to place the customer(s).



8. Connect the transformer to the customer group. Click on the 'Conductor' button and select either an 'Underground cable' or 'Overhead line'.



9. Configure conductor properties in the 'Properties' sidebar.



Once a conductor has been placed on the canvas, it can be toggled between an 'Underground cable' or 'Overhead line' with the blue arrow in the top-right corner of the 'Properties' sidebar.

Individual conductors can also be given a custom text annotation if required using 'Enter label/annotation'.

The 'No of Phases' property is used to set the conductor phasing, which can be either single phase, two phase or three phase.

The 'Cable Type' property allows the type of conductor to be chosen from a drop-down list of available types. The available list will vary depending on whether the conductor is mains or service, and overhead or underground.

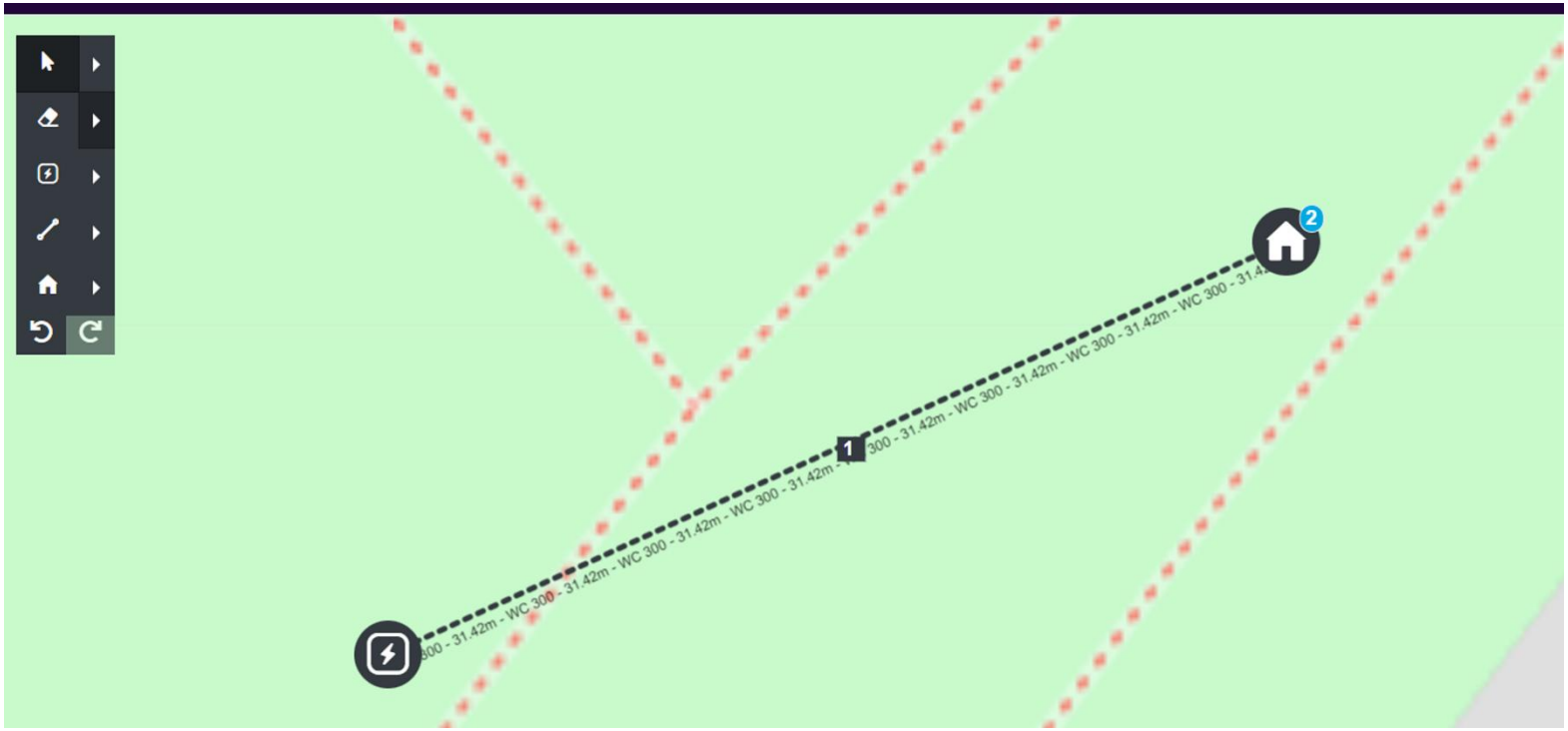
The 'Length' property requires the conductor length in metres. This can be set using two methods. Toggle the 'padlock' icon to the unlocked position to use the Auto conductor length function. This calculates the conductor length automatically, based on the geographical distance covered by the conductor on the background map. Alternatively, the conductor length can be set manually. Manual conductor length is selected by toggling the padlock icon so that it is in the closed position and typing the conductor length.

'Ducting' can be selected if the conductor is ducted, in which case a tick will appear, or deselected if the conductor is not to be ducted, in which case a cross will be present to indicate this. This will de-rate the conductor accordingly.

Distributed consumers can be added to a conductor by selecting a consumer type from the drop-down list and quantity under the 'Add Connection' option at the bottom of the 'Properties' sidebar. VisNet Design will then distribute these connections along the conductor length.

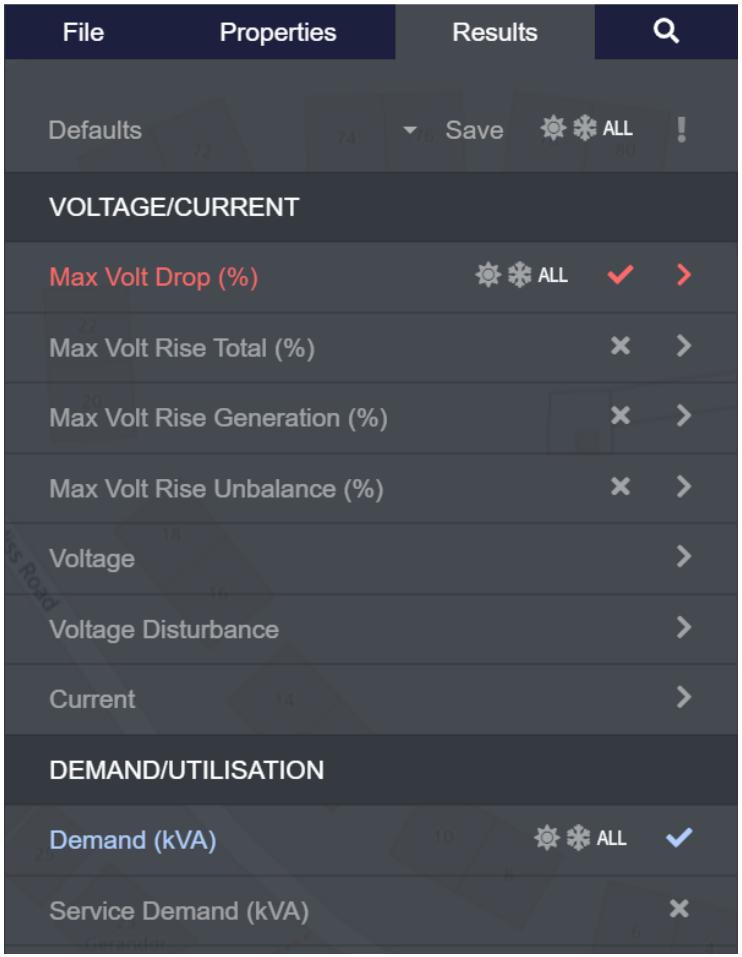
In the 'Settings' menu, the cable types and lengths can be displayed on the canvas by selecting 'Show Cable Labels'.

10. Click on the transformer, then the customer or grouped connection to place the conductor. Conductors can be used to link customers or nodes together or to a transformer but note that the two objects must be placed on the canvas first; it is not possible to add a cable in advance of placing its endpoints. Underground cables are shown by dashed lines, while overhead lines are represented by solid lines. Service cables are thinner than mains cables.



11. Now all the required components (transformer, customer, conductor) are present, click 'Run Assessment' to generate the results.

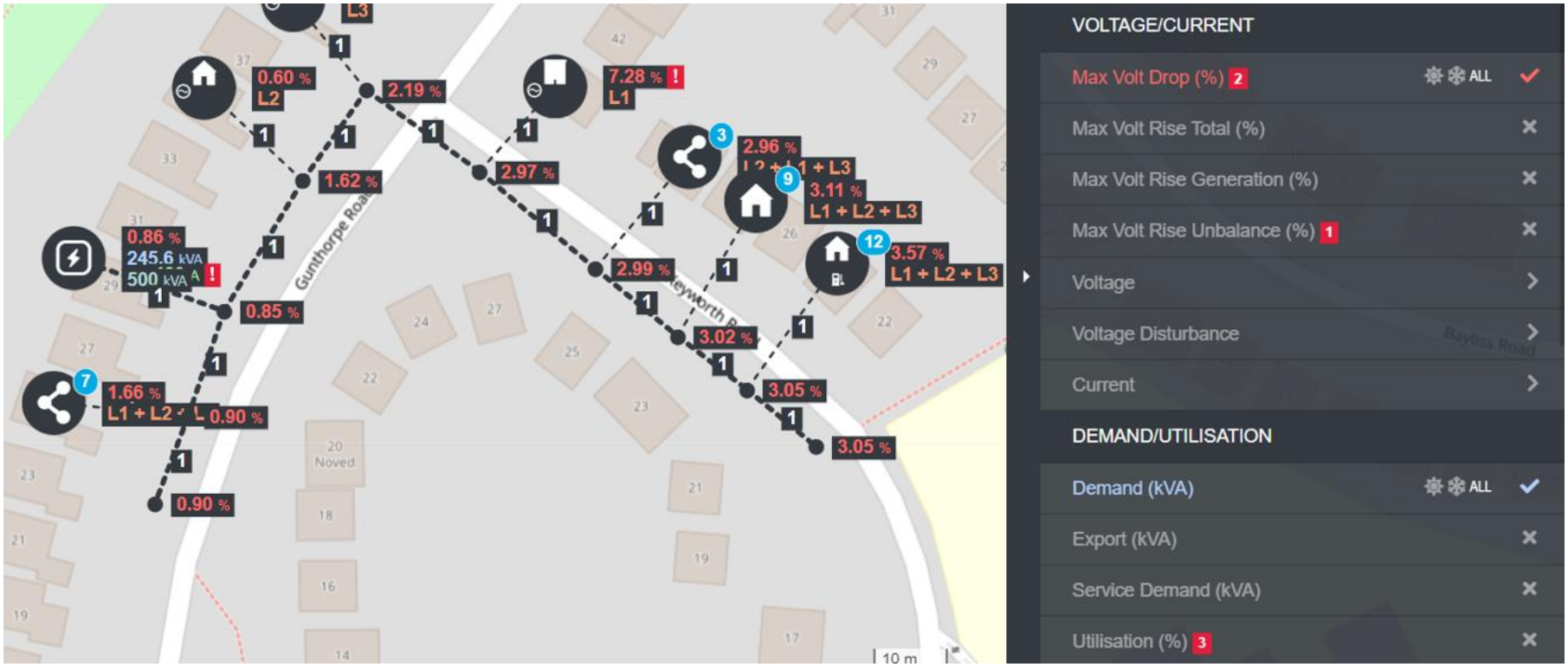
12. Use the 'Results' tab to view results and choose which metrics are being shown on the network.



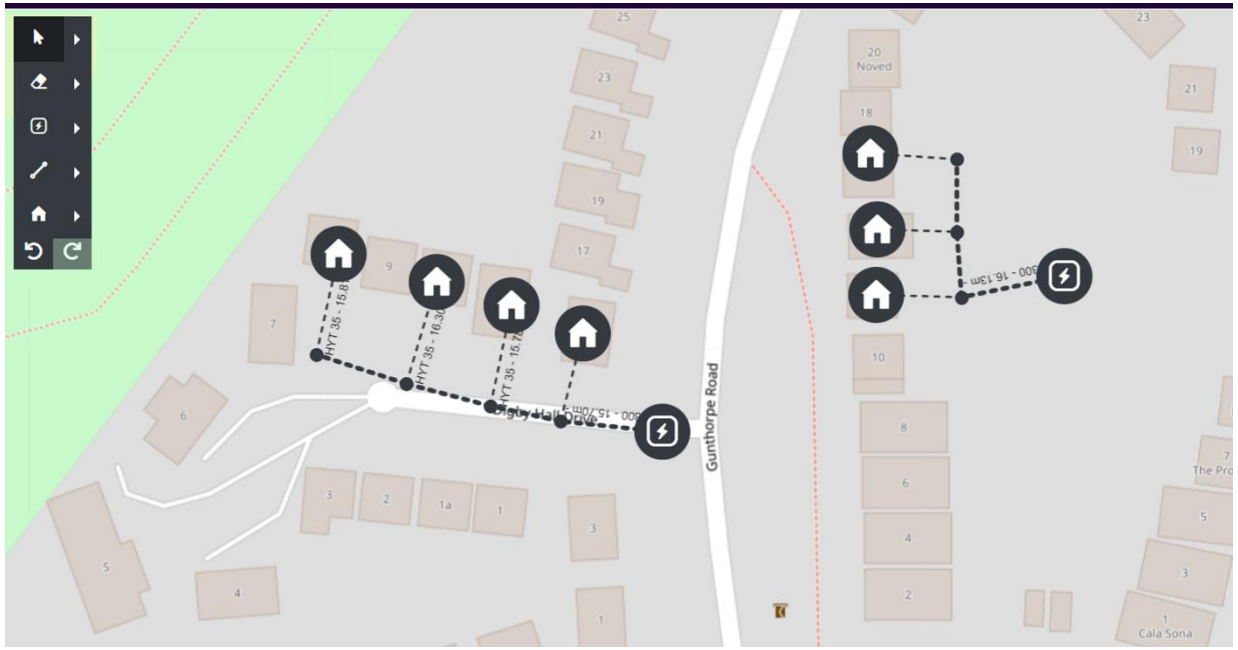
The same colours are used for the text on the 'Results' tab and the results displayed against the network components on the drawing canvas. In this example, 'Max. Volt Drop %' is stated in red and 'Demand' is stated in blue on the tab, and these results will use the same colour on the canvas. Greyed out results on the 'Results' tab are not displayed on the canvas. Results to be displayed on the canvas can be toggled on or off by clicking on the appropriate item in the 'Results' tab. There is a 'Defaults' results group in the 'Results' tab, and users can also 'Save' their preferred configuration as a 'Custom' results group in the dropdown menu to display their chosen results in the tool.

Some result metrics can be selected to show seasonal results. The user can select winter results (snowflake icon) or summer results (sun icon) or all seasons' results (click the word 'ALL'). By default, 'ALL' is selected. Metrics with this functionality are 'Demand (kVA)', 'Utilisation (%)', 'Current' metrics and 'Voltage' metrics. The user can choose to view seasonal results for each result metric individually, or can view the results for the same season for all metrics by selecting the summer/winter/All result options at the top right of the 'Results' tab.

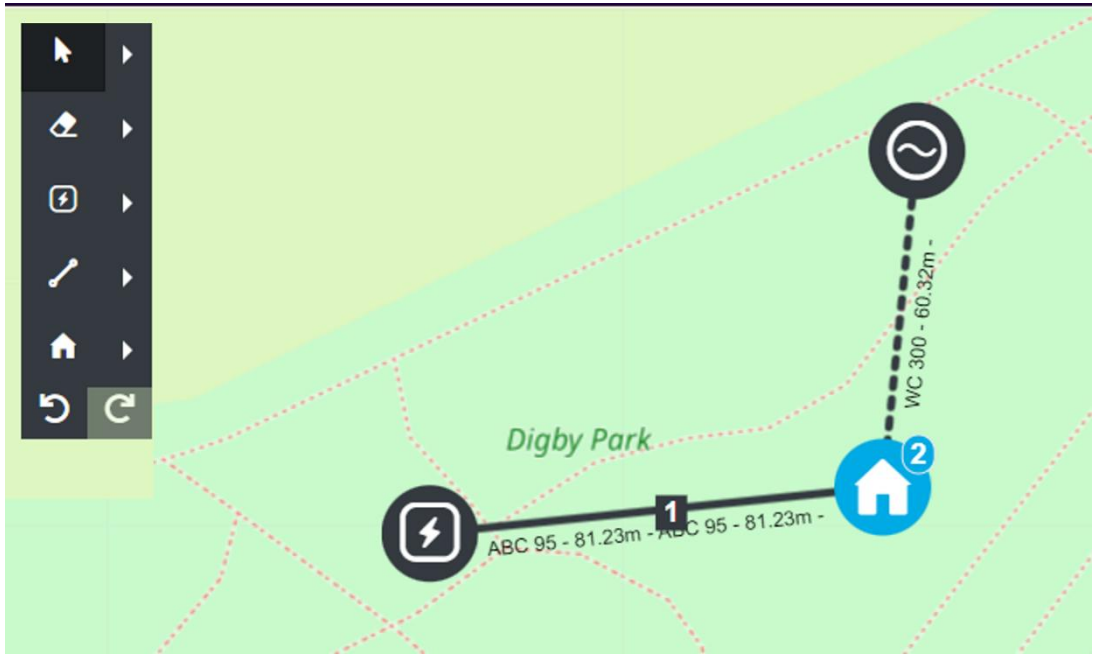
Some pre-defined limits have been set against some result metrics including 'Utilisation (%)', 'Max Volt drop(%)', 'Max Volt Rise (Total/Unbalance/Generation) (%), 'Voltage Disturbance' and 'Impedance'. If any results go over these pre-defined limits, these will be marked with a 'Red exclamation (!)' sign on the map, and the count of out of limit results will be displayed beside the result metrics on the 'Results' tab. To view only all the out of limit results at a time, click on the '!' toggle on the top right corner of the 'Results' tab.



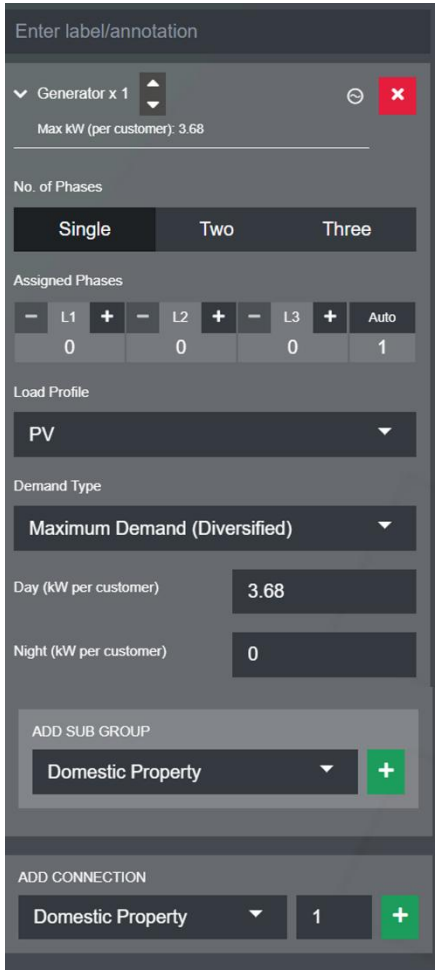
13. To add more than one transformer to the network, click on the 'Transformer' button again and following the same steps, choose and configure the transformer. In case of adding more than one transformer in the network, it is important to remember that each transformer must have at least one customer connected to it, in order to run an assessment. When an assessment is run, individual results will be shown against each transformer network. Similarly, to add more customers to a network, click the 'Customer' button again, and choose the customer type required.



14. Local generation can be added by clicking on the 'Customer' button and selecting 'Generator' from the drop-down list. Click on the map to place the consumer or generator and connect it up to the network with another conductor.



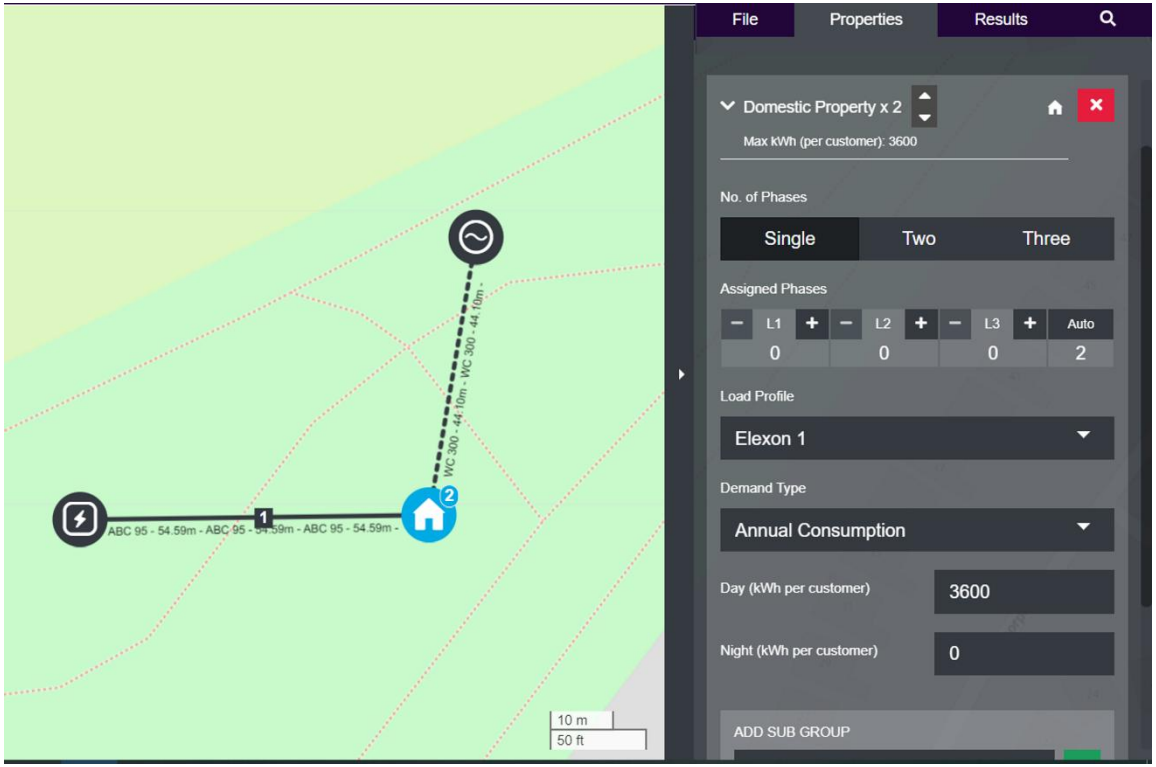
15. Use the 'Select' button to select the generator.



This makes the 'Properties 'sidebar appear. This can be used to configure the properties of the generator. Generators have the same properties as consumers except that for a generator the Demand property reflects export as opposed to import.

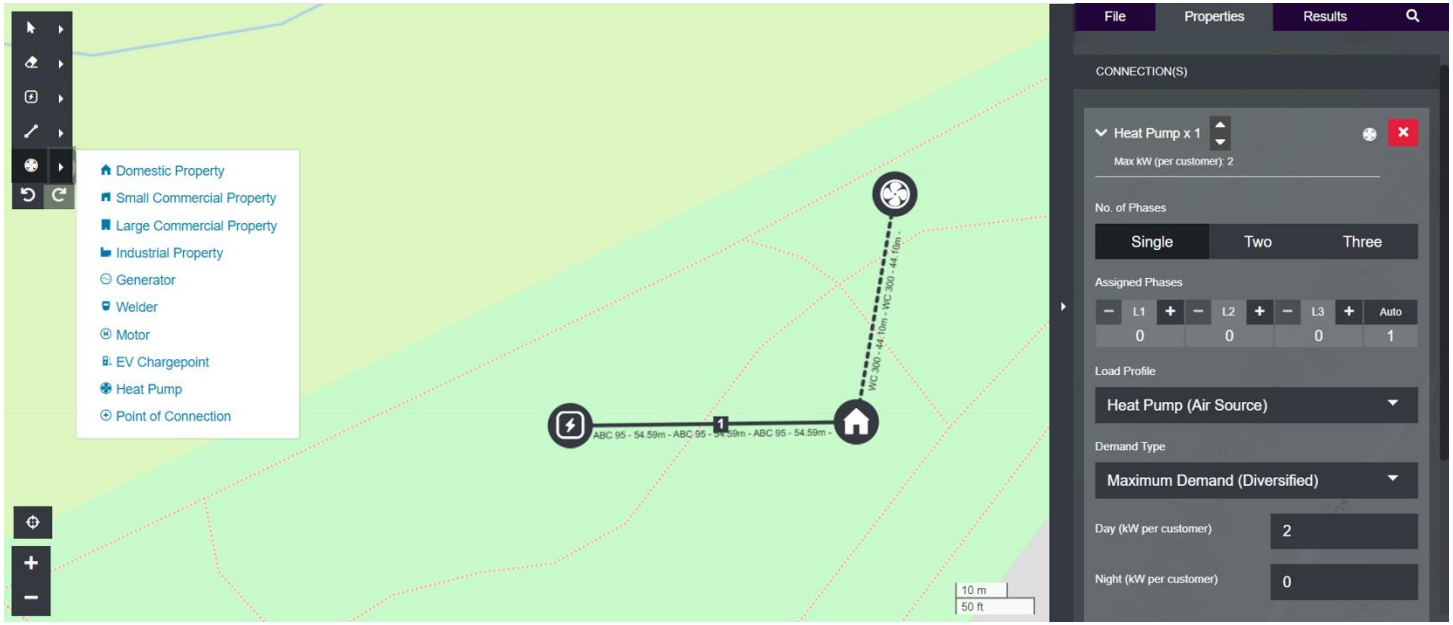
The 'Load Profile' function allows the user to select the generator profile. A specific profile is available for photovoltaic ('PV') generation. There is also a 'Constant' profile, which can be used to model other forms of distributed generation such as micro-wind, micro-hydro or small Combined Heat and Power ('CHP') units. Typically, use this 'Constant' profile to model worst case scenario for the LV network. Worst case can be assessed by entering either the maximum or minimum generated power from the generator depending on whether the concern is voltage rise or voltage drop respectively.

16. To modify or adjust the properties of a customer, select the customer whose properties are to be changed.



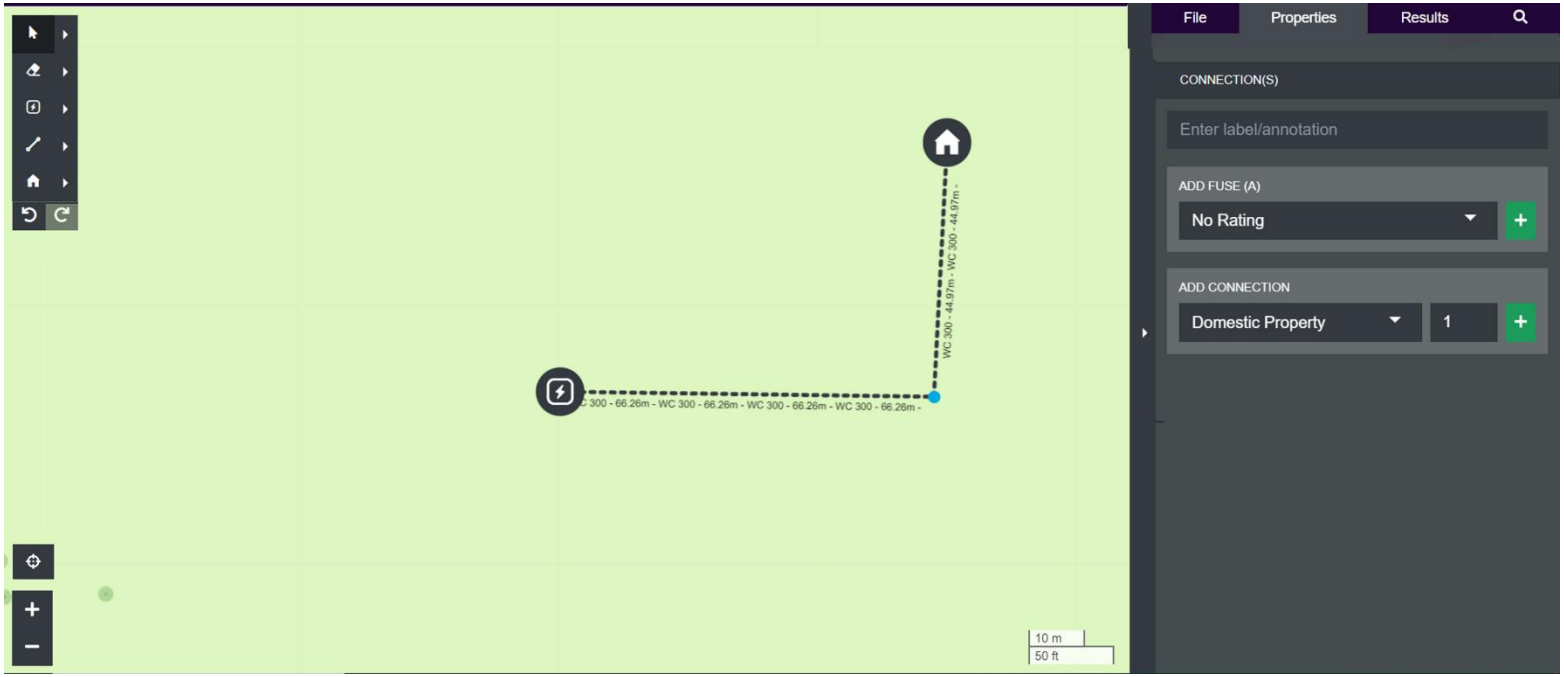
For example, to change the 'Annual Consumption' figures for the domestic properties used, use the 'Select' button and click on the grouped connection containing the domestic properties. Then, in the 'Properties' tab change the 'Annual Consumption' figure to the new value.

17. Heat pumps can be added to the network design by clicking on the 'Customer' button and selecting 'Heat Pump' from the drop-down list. Similar to generators and customers, these can be placed on the map and connected to the network by a conductor.

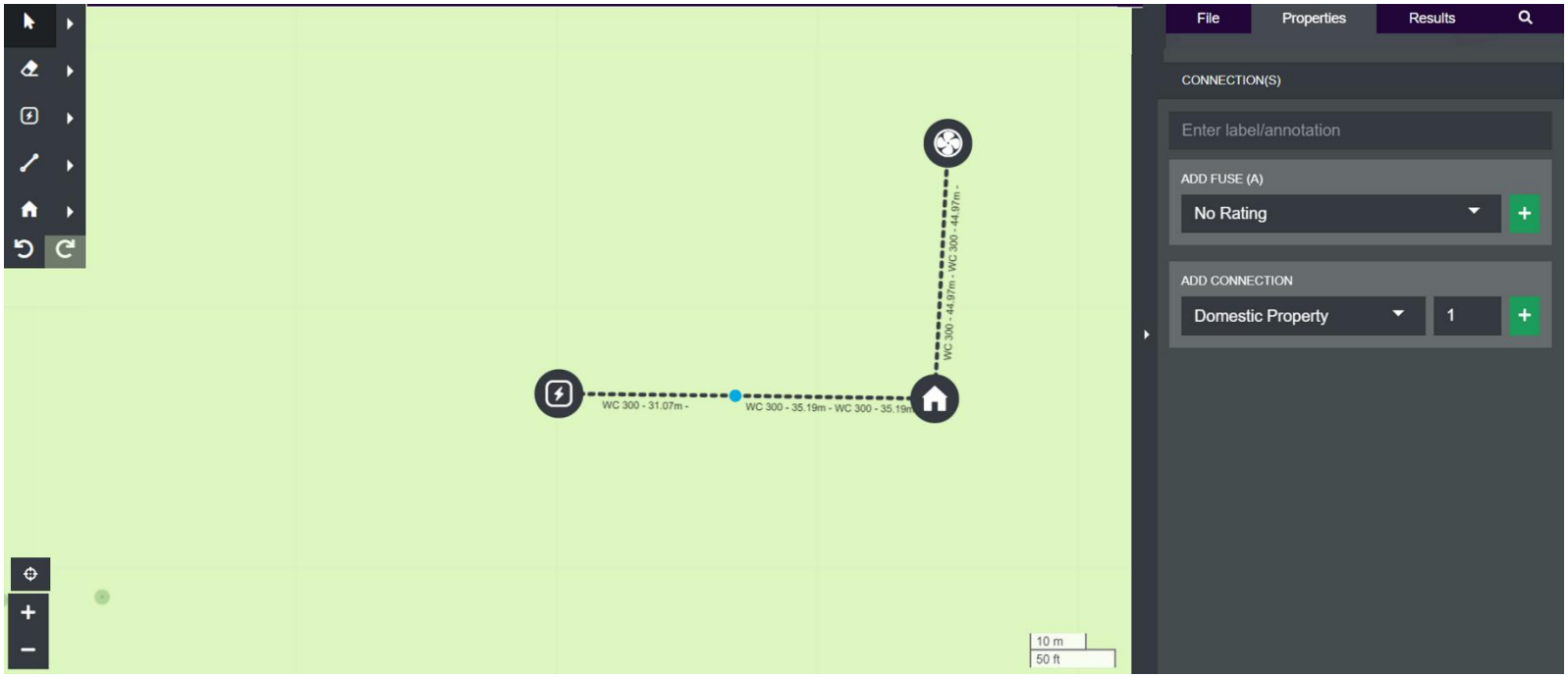


Use the 'Select' button to select the heat pump and to open the 'Properties' tab. This can be used to configure the properties of the heat pump, which are similar to other consumers. The 'Load Profile' function allows to select between an Air Source heat pump profile and a Constant profile, to be used to model worst case scenarios.

18. Additional nodes can also be placed anywhere on the network. To do so, choose the 'Node' option by clicking on the 'Conductor' button. Click anywhere on the map to place the node. Nodes can be connected to consumers and transformers using conductors. Similar to other objects, the node object can be given a custom label on the canvas by using 'Enter label/annotation' in order to clearly identify specific nodes.

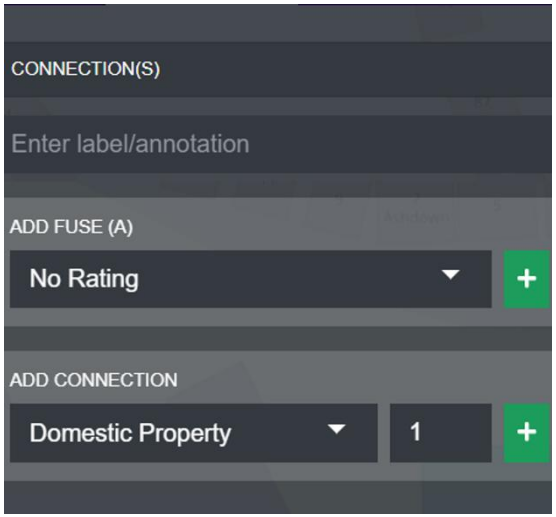


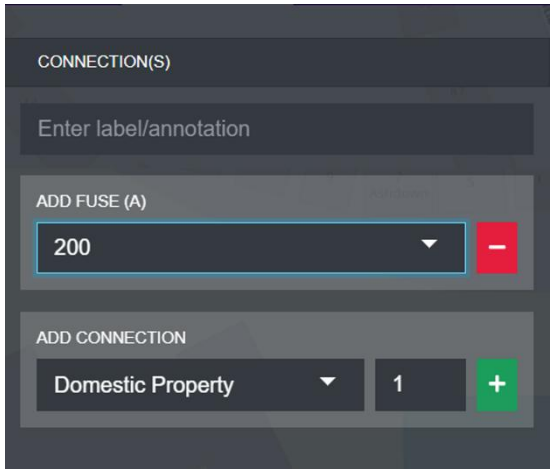
19. To place additional nodes part way along a conductor, choose the 'Split' option by clicking on the 'Conductor' button. To place a node, click on any point along the conductors. This allows to place new nodes anywhere along a conductor without having to re-draw connections.



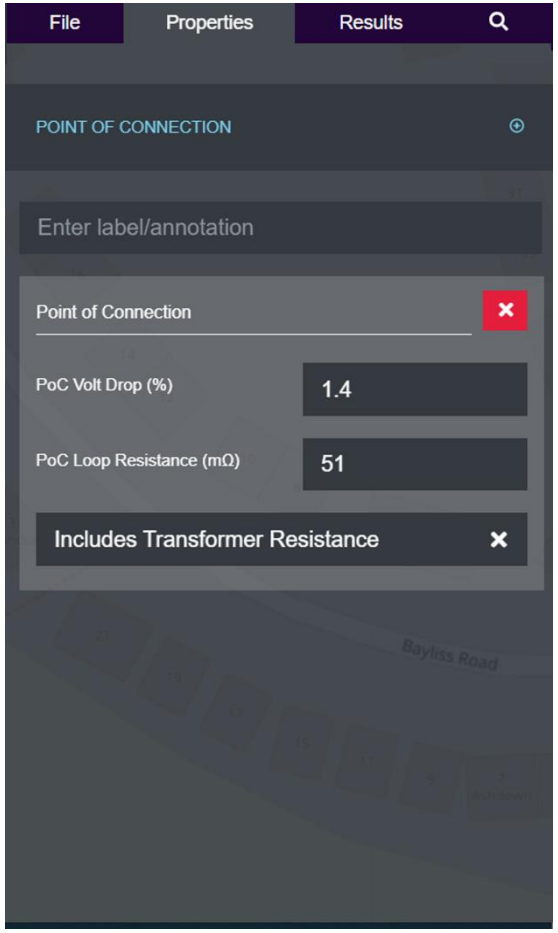
Nodes can also be placed at the end of each conductor simply by double clicking on the desired location on the map. To do so, choose either an 'Underground Cable' or 'Overhead Line' by clicking on the 'Conductor' button. Connect one end of the conductor to a Transformer, Consumer, or any existing node, draw the desired length of cable and double click on the map to place a node at the cable end.

20. Additional fuses can be added in the network at each node. Using the 'Select' button, select the node where a fuse is to be added, to open the 'Properties' tab.
    A fuse can be added by choosing a fuse size from the drop-down list under the 'Add Fuse (A)' option. The added fuse can be deleted using the red 'Delete' button beside the drop-down list. While adding fuses at nodes, it is important to remember that the fuse size selected at the node must not be equal to or larger than the fuse size at the Transformer.



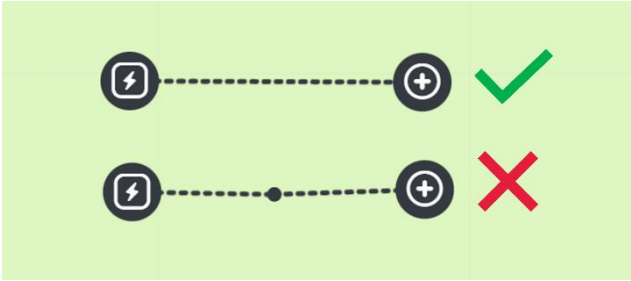


21. To model a point of connection between a large existing network and the new network design, click on the 'Customer' button and choose the 'Point of Connection' option from the drop-down list.



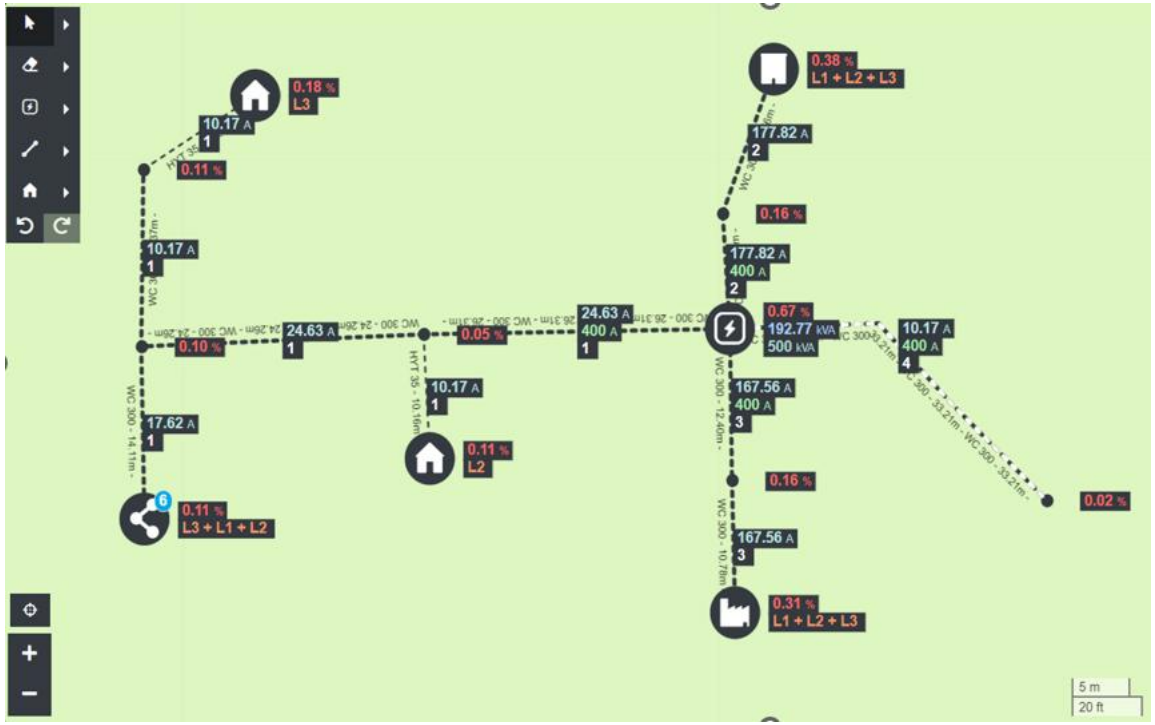
The loop resistance and volt drop at the 'Point of Connection' can be input through the 'Properties' tab. The 'Includes Transformer Resistance' button allows the user to choose whether or not to include the Transformer Resistance with the Point of Connection Loop Resistance. The volt drop is not expected to include the downstream load.

A few design considerations to keep in mind while using the 'Point of Connection' option are that, if used, the PoC object must be the first node after the transformer, and there can be only one PoC object per feeder. Auto transformer sizing is not compatible with PoC objects. The length of the conductor between the transformer and the PoC object is auto calculated, in order for the PoC to have the loop resistance specified. This calculated conductor length overrides both the geography based auto calculated length or any manual conductor length values entered by the user. If 'Includes Transformer Resistance' is turned off (i.e., the PoC Loop Resistance entered by the user does not include transformer resistance), the result displayed on the map will be the value entered at the PoC plus the transformer resistance.



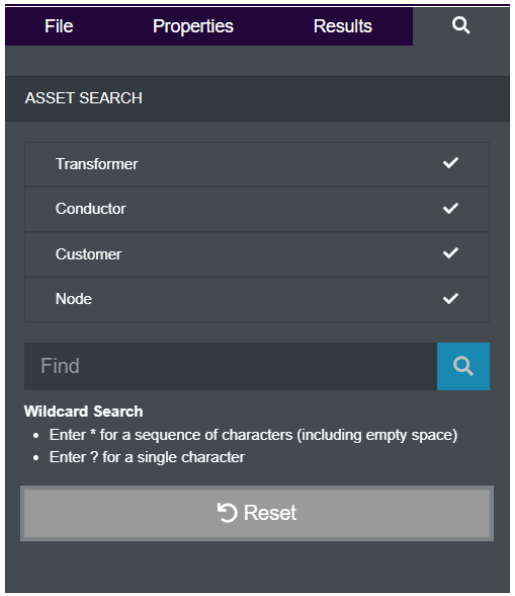
22. Steps 5 to 21 can be repeated to add more feeders supplying more customers from the transformer.

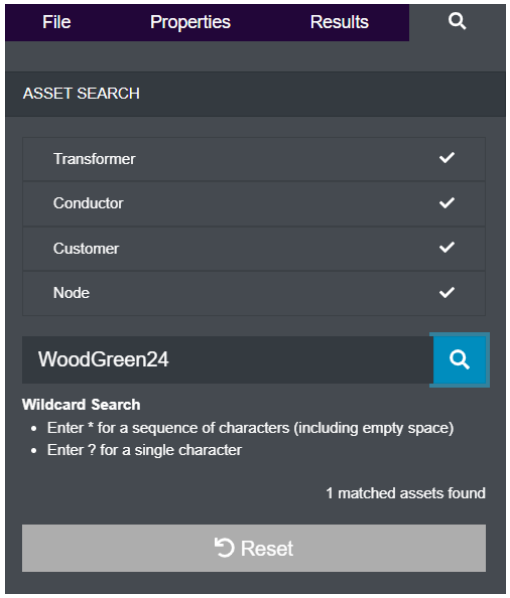
The image below shows an example of a more complex network created and analysed using the same steps outlined above. An assessment has been run on this network.



Results for Max Volt Drop (%), Demand (kVA), Current (A), and Fuse Size (A), as well as each feeder's ID number are shown.

23. To find any specific network asset in a large network, click on the 'Find' tab located at the top beside the Results tab. A list of assets is shown to indicate which assets will be included or excluded from the search. An asset can be toggled on or off by clicking on that certain asset. A search will only be made within the assets that are toggled on.

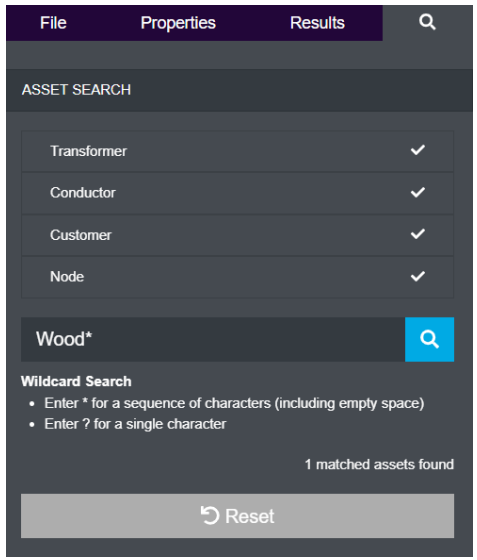


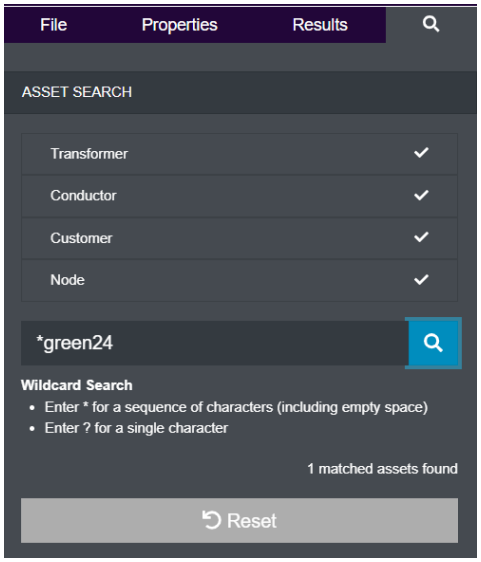


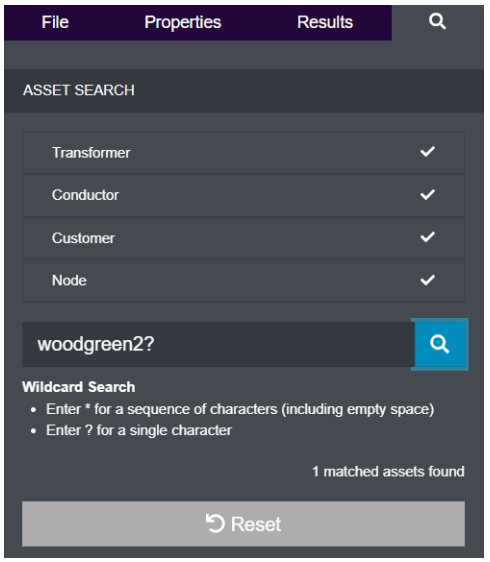
It is possible to find an asset either with the Label/Annotation set at the asset, or by the object ID of the asset.

To find an asset by its Label/Annotation, type the full asset label in the text box and click on the blue 'Find' button. The number of matched assets found will be indicated below the text box, and all matching assets will be highlighted blue on the network.

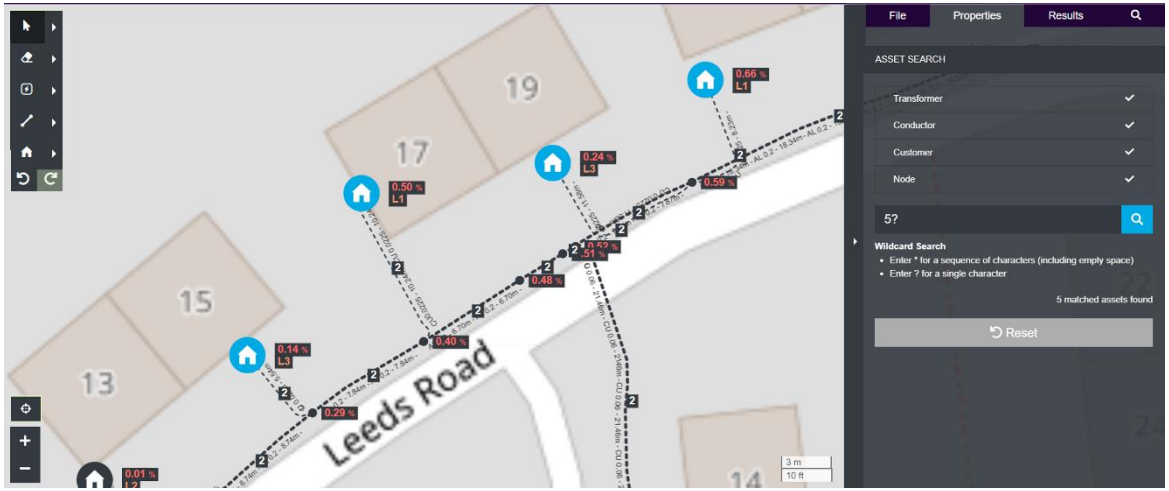
If the full Label/Annotation of the asset is unknown, a partial name search can be made, by using a "*" symbol before or after the partial annotation to indicate a string of unknown characters, or by using a "?" symbol if a single character is unknown. Characters will include alphabets, numbers, special characters, or any empty spaces.







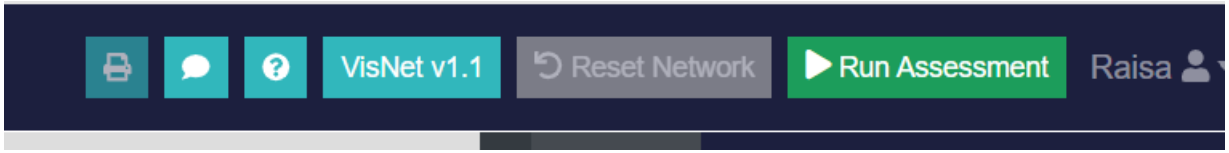
An asset search can also be made by using the object ID of the asset, in the same way as using the Label/Annotation. Enter the full or partial object ID in the text box and click on the blue 'Find' button to find all matching assets in the network.



The example above shows a partial search made with the object ID starting with 5. As a result, all the assets with an object ID staring with 5 (e.g. 50, 51, 52 and so on) have been highlighted on the network.

To reset the search and any asset selections, click on the grey 'Reset' button.

24. To view the details of the configuration that has been used to create and run assessments on a new drawn or imported network, click on the 'Configuration' button on top that displays the configuration number for example "VisNet v1.1".

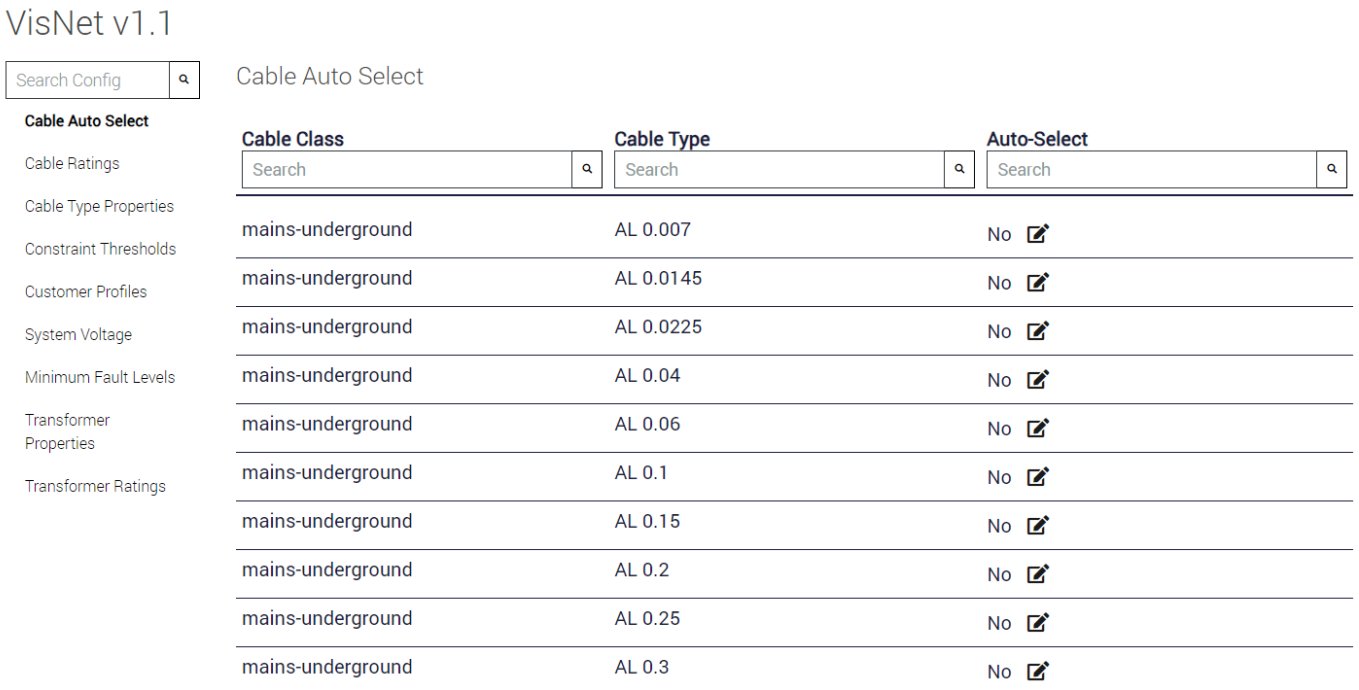


This will open up a new pop-up tab. At the top of the tab, a list of all available configurations is displayed. The list details the configuration version, the release date, and a short description of what changes an up-versioned configuration contains compared to the previous version. Only the latest version of a configuration can be viewed and applied to network studies.
The configuration currently in use is highlighted in bold text and all details of the configuration is displayed below the list by default.
To view the details of a different configuration, click on the 'View' button beside the corresponding configuration name.

View Configuration Properties

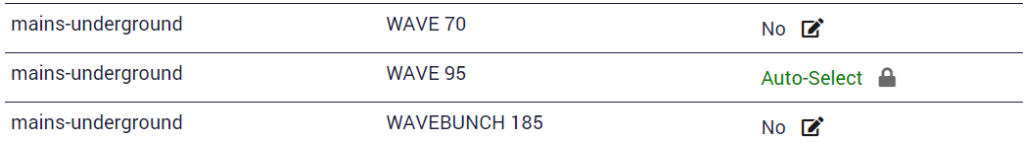
Version	Description	Release Date	
VisNetAUS v1.0	Initial 1.0	12/09/2024	View
NPG v1.2	Update for default Transformer Fuse size	04/09/2024	View
SSEN v1.0	Initial version	25/03/2024	View
SPEN v1.0	Initial version	25/03/2024	View
VisNet v1.1	**Standard settings and parameters, not specific to one network operator** Current	**06/03/2024**	
NIEN v1.1	Updated Transformer Ratings 1.1	14/12/2023	View
NGED v1.1	Domestic winter demand and generator summer generation profiles	05/10/2023	View

The details of the selected configuration will be displayed in a number of tables below the list of configuration names. If required, the users can also override certain values in the configuration tables. Each table contains the following details:

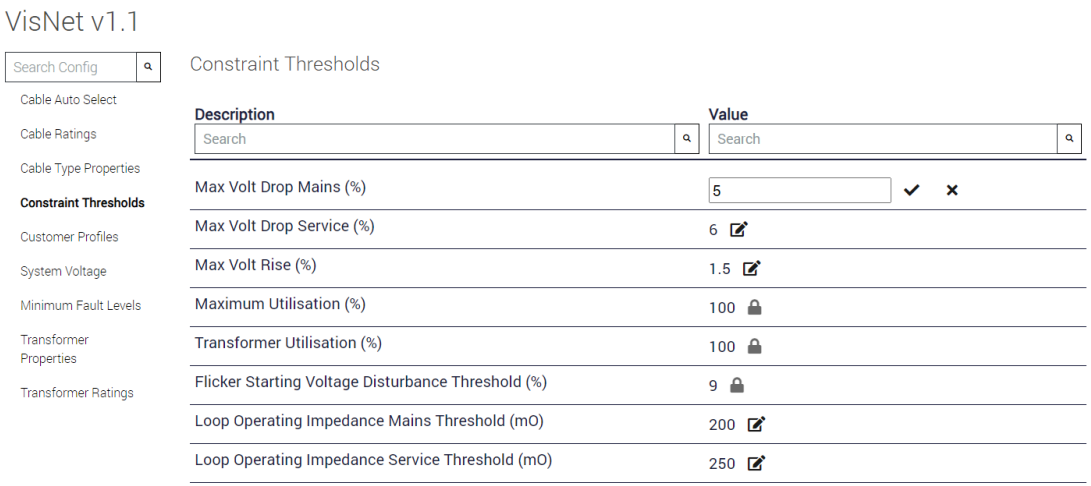


- Cable Auto Select: This table lists all the cables available in the configuration and the "Auto-Select" column in the table indicates which cables will be used by the "auto" cable assignment logic of VisNet Design. The default selection will display as "Auto-Select" in the "Auto-Select" column. Users can also select other cables to be used by the "auto" assignment logic or remove any of the default selections. This can be done by clicking on the black "Edit" button on each row in the "Auto-Select" column. To add any new cable to the auto selection list, click on the corresponding "Edit" button and from the drop-down menu, select "Auto-Select", then click on the black "✓" button. To cancel the selection, click on the black "✖" button. Similarly, to remove any cables from the auto selection list, click on the corresponding "Edit" button and from the drop-down menu, select "No", then click on

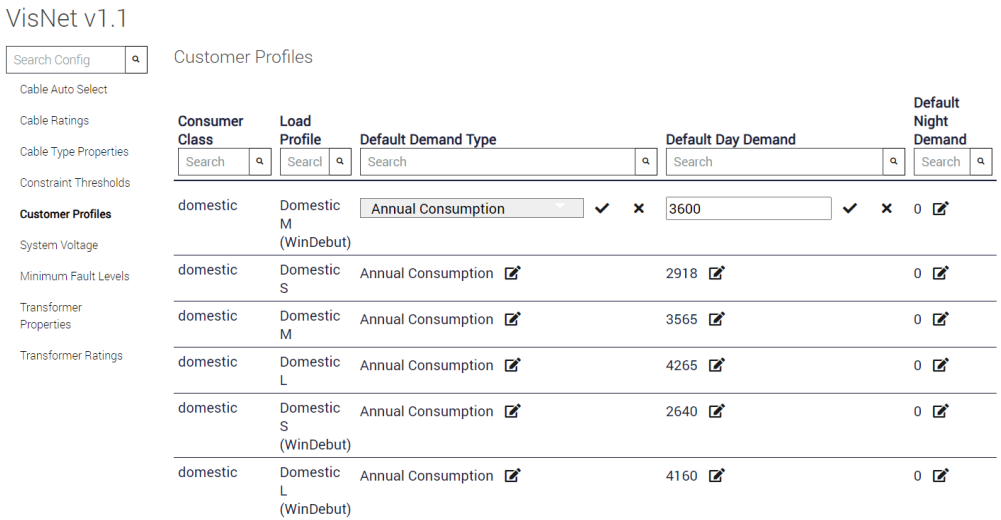
the black "✓" button. To undo any changes made, click on the black "undo" button in the "Auto-Select" column. When removing any cable from the selection list, it is important to remember that at least one cable of each "Cable Class" must remain selected to be used by "auto" cable assignment logic. Hence, the last available cable of any specific cable class cannot be removed from the selection and a "Lock" symbol will appear beside it on the "Auto-Select" column.



- Cable Ratings: This table holds a list of all available cables in that configuration along with the seasonal, sustained and cyclic cable ratings.
- Cable Type Properties: This table displays all relevant cable properties including the different resistance and reactance values for each cable.
- Constraint Thresholds: This displays the various thresholds used in VisNet design for assessment runs. The users are allowed to update the constraints for Max Volt Drop mains/service, Max Volt Rise, and Loop Operating Impedance mains/service thresholds. The updates can be made in the same as discussed above by clicking on the black "Edit" button on each row. The threshold values can be either typed in or can be adjusted by using the up/down arrows and confirm the change by clicking on the black "✓" button. It is important to note that the Max Volt Drop service cannot be lower than the value of Max Volt Drop mains, and similarly the value of Loop Operating Impedance service cannot be lower than the value of Loop Operating Impedance mains. If any of the service thresholds are set to be lower than the mains, then these will default to be equal to the mains threshold values.



- Customer Profiles: This table lists all the available profiles in that configuration and what consumer type the profile can be selected for. It also lists the default Demand Type and Day and Night Demands assigned to each profile. The user can override the default Demand Type or Day/Night Demands by clicking on the black "Edit" button on each row on the corresponding column. To update the Demand Type, click on the corresponding "Edit" button and from the drop-down menu, select the demand type to be assigned, then click on the black "✓" button. To cancel the selection, click on the black "✗" button. The Day/Night demands can be updated by clicking on the black "Edit" button on each row, and the values can be typed in or can be adjusted by using the up/down arrows and confirm the change by clicking on the black "✓" button.



- System Voltage: This displays the system voltage that will be applied at assessment runs if the configuration is applied.
- Minimum Fault Levels: This table holds the corresponding minimum fault current value (A) at which each specified fuse can be operated safely for each of the available cables.
- Transformer Properties: This table displays a list of all available transformer in that configuration all relevant transformer properties including the resistance, reactance and maximum fuse rating values for each transformer. It also indicates which transformers the "auto-select" logic of VisNet Design will choose from if a transformer size is selected to be "auto" assigned. The users can override the transformer "Auto-Select" list in the exact same was as the "auto-selection" list of cables described above. Similar to cables, at least one auto-select transformer must be available for each transformer Mount-Phase combination.
- Transformer Ratings: This holds the seasonal, sustained and cyclic transformer ratings.

Once a new configuration is selected, the 'View' button changes to a green 'Apply' button. If required by clicking on the 'Apply' button, the new configuration can be applied to new network drawings.

Version	Description	Release Date	
VisNetAUS v1.0	Initial 1.0	12/09/2024	View
NPG v1.2	Update for default Transformer Fuse size	04/09/2024	View
SSEN v1.0	Initial version	25/03/2024	View
SPEN v1.0	Initial version	25/03/2024	View
VisNet v1.1	**Standard settings and parameters, not specific to one network operator** Current	**06/03/2024**	View
NIEN v1.1	Updated Transformer Ratings 1.1	14/12/2023	Apply
NGED v1.1	Domestic winter demand and generator summer generation profiles	05/10/2023	View

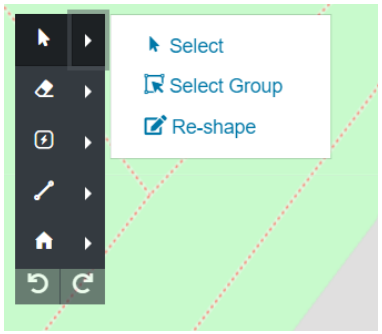
A new configuration cannot be applied to a network once it has already been drawn on the canvas, or to previously saved and imported networks. It can only be applied to a new network before drawing. Similarly, the local overrides assigned by the user will only be applied to the network elements that are drawn after the updates have been made to the configuration table(s), and the configuration will only reset to the default values once the user reloads the site. The changes made to the configuration will also be saved when the user saves the network as a JSON file or in the VisNet Design cloud database.

05

Selecting, Editing, Deleting, Saving, Importing and Feedback functions

Selecting Components

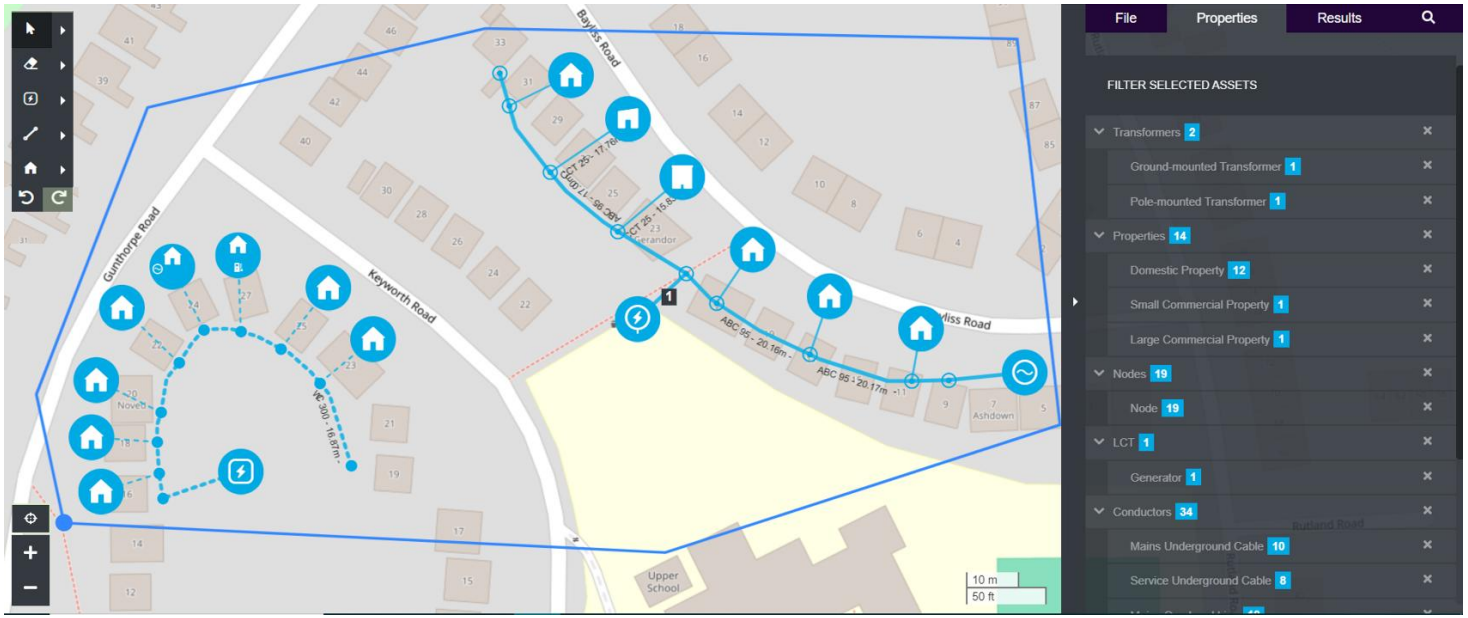
Opening the dropdown on the 'Select' tool provides two options for selecting objects.



The top 'Select' option is the default setting. This allows the user to click on a single object and select just that object. A single object can also be selected by clicking on the displayed results against that object, after running an assessment.

The second 'Select Group' option allows the user to select multiple objects at the same time. This can be done in two ways, first, by drawing a polygon on the map which would select all the objects that are completely within it. Alternately, the user can click on each object to be selected while pressing the 'Shift' key on the keyboard, to select multiple objects around the map.

At any point in drawing a network, the user can press the 'ESC' key on the keyboard to deselect any/all chosen assets or to swap from any drawing tool to the 'Select' option.

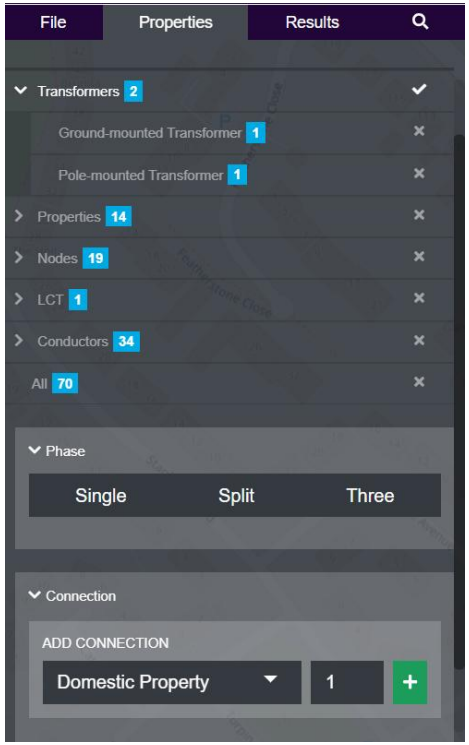


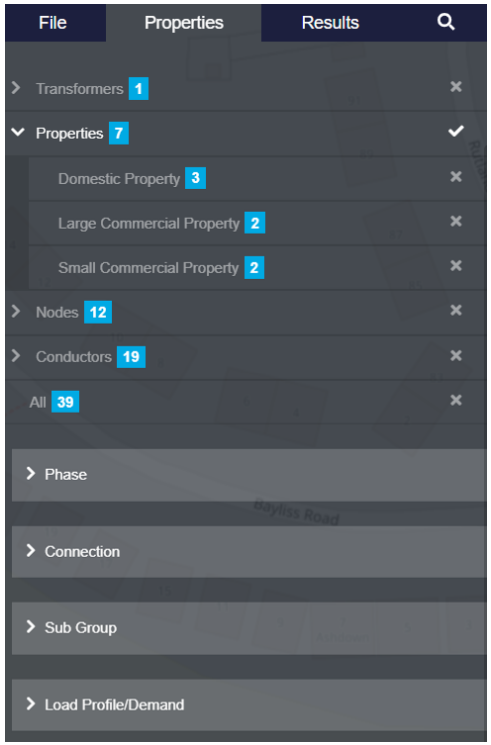
The 'Select Group' option allows the user to update a number of different properties based on the selection. It also shows the count of each type of asset within the selection.

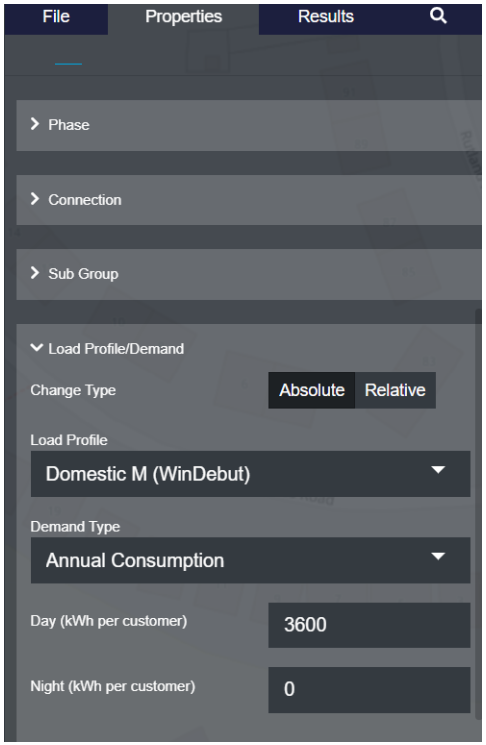


Each of the assets can be toggled on or off by clicking on the asset name. To select or deselect all the assets at a time, click on the "All" asset option at the bottom. When "All" assets are selected, the phases of all the selected assets can be changed at a time, by clicking on the "Phase" dropdown. This will give the regular phase selection options of Single, Two or Three phase. After selecting the desired phase, click on the green "Confirm" button to apply the changes.

Any transformers present within the selection area can be selected by clicking on the “Transformers” dropdown menu. If both ground mounted and pole mounted transformers are present in the selection, both types can either be selected at the same time by using the “Transformers” dropdown, or each type can be selected individually by clicking on the corresponding transformer toggle. Under the transformer selection, there is the option to change the phases of all selected transformers in a similar method as discussed above. There is also the option to add customers at all the selected transformers by clicking on the “Connection” dropdown and choosing the desired customer type. This will then allow to configure any customer properties as usual. All changes will be applied only after clicking on the green “Confirm” button. Multiple changes can be confirmed at the same time or individually.





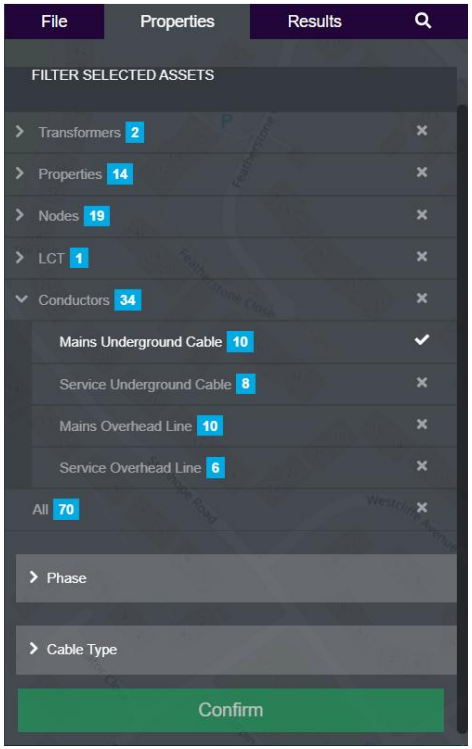


Similar to transformers, all the different customers present within the selection area can be selected at a time by toggling on the “Properties” dropdown. Individual customer types can also be selected by clicking on the specific customer toggles for Domestic, Commercial, or

Industrial customers. All of the customer options will allow to change the phase of the selected customers or add any new connections or sub-groups to all selected customers, as well as apply a percentage uplift (both positive and negative) to the Demand of each customer. If any of the individual customer types are selected, then the users will also be allowed to update the Load profile, Demand Type and Day/Night demands by clicking on the "Load Profile/Demand" drop-down and selecting the "Absolute" option. Alternately by selecting the "Relative" option, a percentage (Demand) uplift can be added to the existing demands of the customers. Any changes made and confirmed here will be applied to all the selected customers of that type only.

The process will also be the same for any LCT customers (Generators, EV Chargers or Heat Pumps) selected from the "LCT" dropdown. For the LCTs, in case of applying a percentage uplift, the user will have to select "Generation" uplift instead of "Demand".

Any nodes within the selection area can be selected by clicking on the "Nodes" dropdown or the "Node" toggle below it. New customers can be added to all selected nodes by clicking on the "Connection" dropdown and selecting and configuring the customers as before.



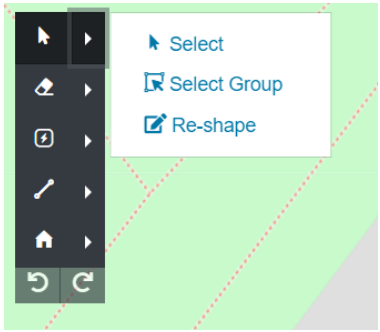
To select and update all the conductors in the selection area, click on the "Conductors" dropdown. This will give the option to update the phases of all the conductors of all types, both mains and services. If any of the individual conductor toggles are selected, e.g. "Mains Underground Cable", this will give the option to update the phases of all the conductors of the selected type. The cable types can also be updated by selecting the "Cable Type" option and choosing a cable type from the dropdown menu. The cable type will be applied to all the selected conductors on clicking the "Confirm" button.

Network Editing Tools

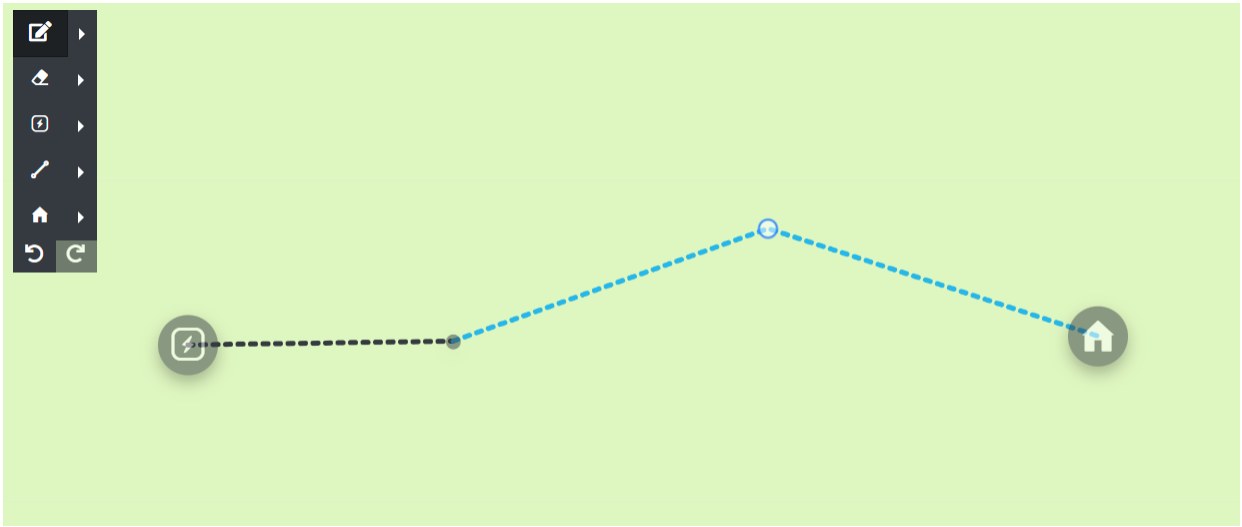
VisNet Design allows the user to edit the network drawings by reshaping cables and moving objects, and also allows to undo and redo actions.

Re-shaping Cables

Opening the dropdown on the 'Select' tool provides the 'Re-shape' option. This allows the user to change the shape of any existing cable on the network, such that the path of the cable can be changed to fit the design, without having to re-draw the cable.



To re-shape cables, select the 'Re-shape' option, and click on any point on the cable to be re-shaped. A white 'Anchor point' will appear along the cable where clicked. Click and drag this anchor point to reshape the cable as required. The user can click and drag any point on the cable in this way to adjust the shape of the cable in any way required. Any objects or nodes connected to the cable will not be automatically moved from its original position. If the length of the cable being re-shaped had been entered manually, this length will not be automatically updated to match the changed route. Auto-calculated cable lengths will be adjusted accordingly.

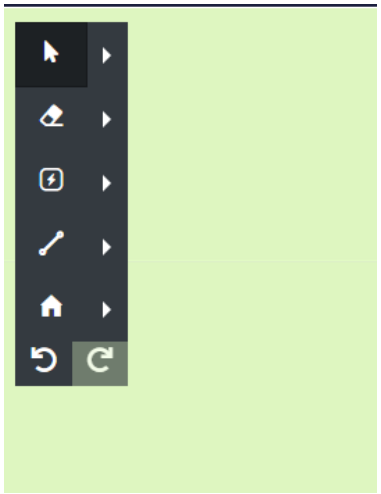


Moving Objects

To move any existing objects on the map, use the 'Select' option to click on any object including transformers, nodes and consumers and drag to move to the desired position. Objects without any cables connected will move independently. Any cables connected to the moved objects will also be moved to new positions relative to the object. Similar to re-shaping cables, the if any cables are moved along with the objects, the cable lengths will only be auto adjusted if these are auto calculated lengths.

Undo-Redo Actions

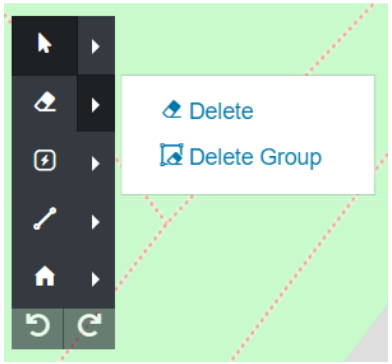
'Undo' and 'Redo' buttons are available along with other drawing tools on the far left of the screen.



The 'Undo' and 'Redo' buttons allow the user to undo the last 5 actions and redo the last 5 undo-ed actions. The 'Redo' button remains greyed out until any action is undo-ed. Undo-Redo can be applied on all actions including drawing network components, moving objects or reshaping cables, deleting objects, or changing properties of objects. Undo or redo will not apply to changing which results are displayed, importing studies, changing any settings, changing map zoom levels or panning the map. It is also possible to Undo or Redo actions by pressing 'CTRL + Z' keys on the keyboard for Undo and 'CTRL + Y' keys for Redo.

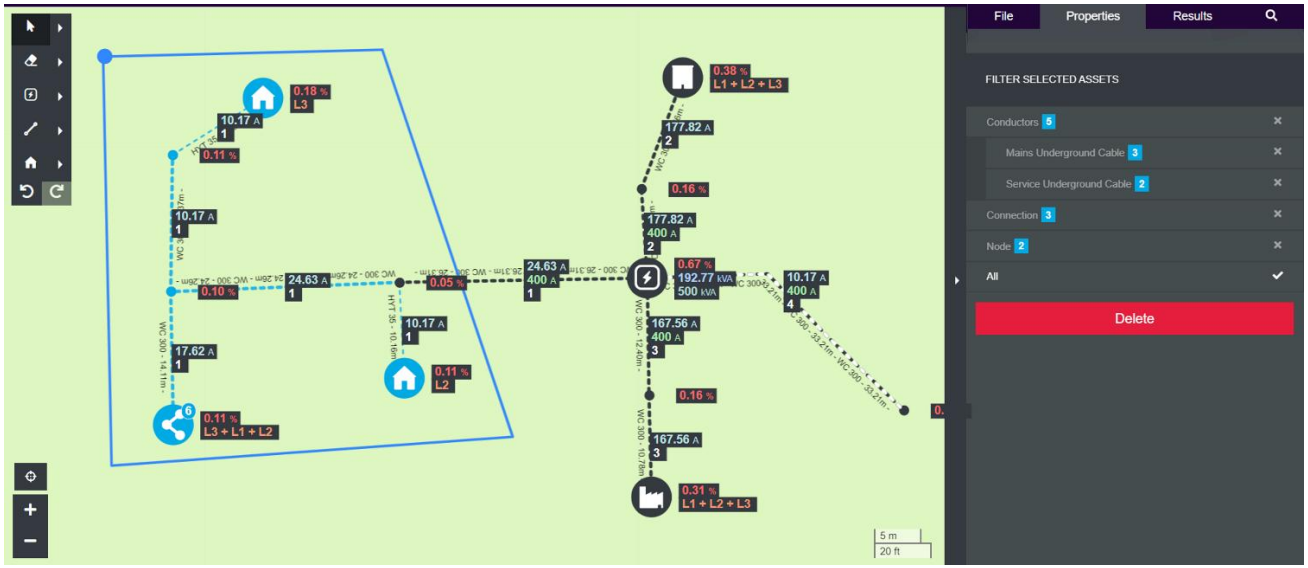
Deleting Components

Opening the dropdown on the 'Delete' tool provides two options for selecting objects for deletion.



Again, the top option is the default setting. Clicking on an object removes just that object. Individual objects can also be deleted simply by clicking on the object and pressing the 'Delete' key on the keyboard.

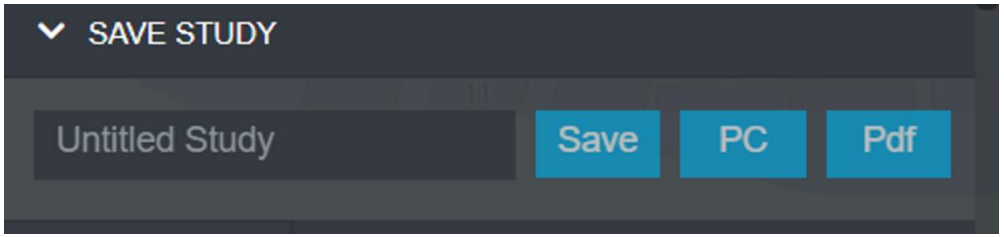
The second option allows the user to delete multiple objects at a time. This can be done in two ways. The user can draw a polygon, and the sidebar will provide options of items that can be deleted. The user can select the options to be deleted from those provided, then delete all those objects by pressing the red 'Delete' button. This can be all objects in the polygon, or just a subset such as all of the customers. Alternately, the user can click on multiple objects around the map that is to be deleted while pressing on the 'Shift' key on the keyboard, and then pressing the 'Delete' key (on the keyboard) to delete all selected objects.



Saving a Network Study

Once a network has been created, it can be saved. Select the 'File' tab of the sidebar and under 'Save Study' type the file name. Once a network name has been entered, the 'Save' button will become available. Press the 'Save' button to save the network to the VisNet Design cloud database, which is a secured database, and each company will have their separate databases only shared between the users of the company.

The network data can also be saved as json file by pressing the 'PC' button. Alternatively, a screenshot of the network, including any displayed results, can be captured using the 'PDF' button.



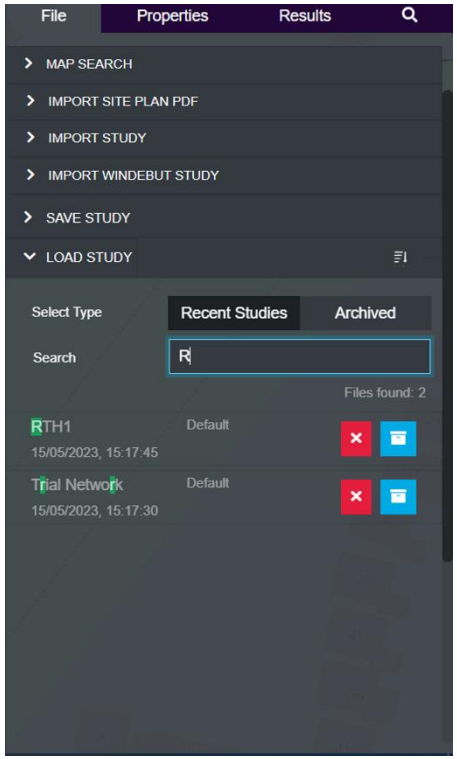
Printing Network Studies

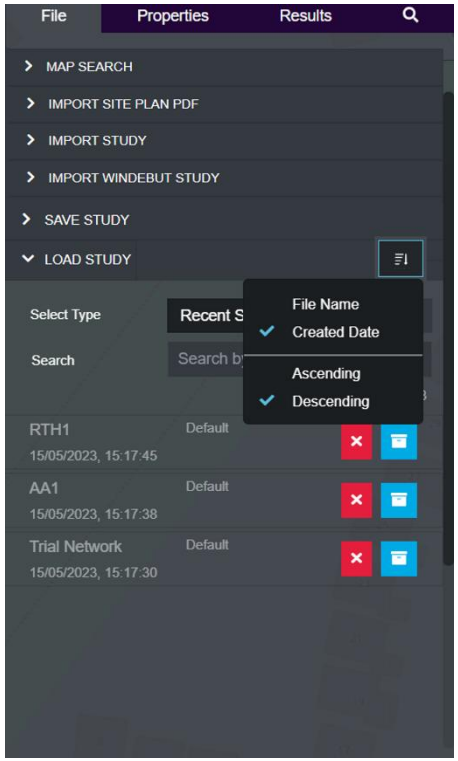
After creating a network, a copy of the network and the network assessment results can be viewed using the 'Report' button. This feature creates a printable page containing the network that was assessed, transformer data, conductor data, customer data, results of the network analysis, and notes of system parameters and constraint thresholds. Any out of limit results will be highlighted red on this report.

Searching and Sorting Saved Network Studies

A network that has been saved to the VisNet Design cloud database can be accessed later by scrolling through the list of networks on the 'File' tab under 'Load Study'. Alternatively, the network can also be searched and selected by typing the name of the study in the search bar on the 'Load Study' tab, under 'Recent Studies'. The saved networks can also be deleted by clicking the 'Red Cross' button beside the study name or can be archived by clicking on the 'Folder' icon. All archived networks can be accessed later by clicking on 'Archived' button under 'Load Study' tab. The networks saved in the cloud database can be sorted for easy searching based on the file names or date of creation by

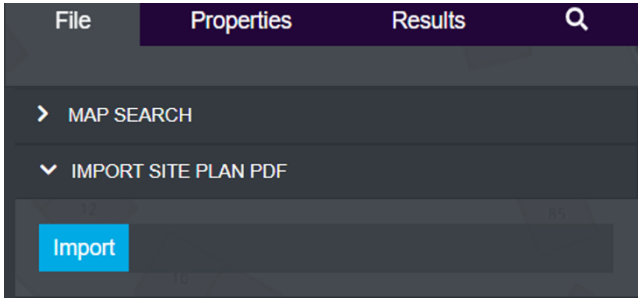
clicking on the 'Menu' icon on the right-hand corner of the 'Load Study' tab. Networks saved within a shared or private folder can also be separately sorted by using the 'Select Folder' option.





Import Site Plan

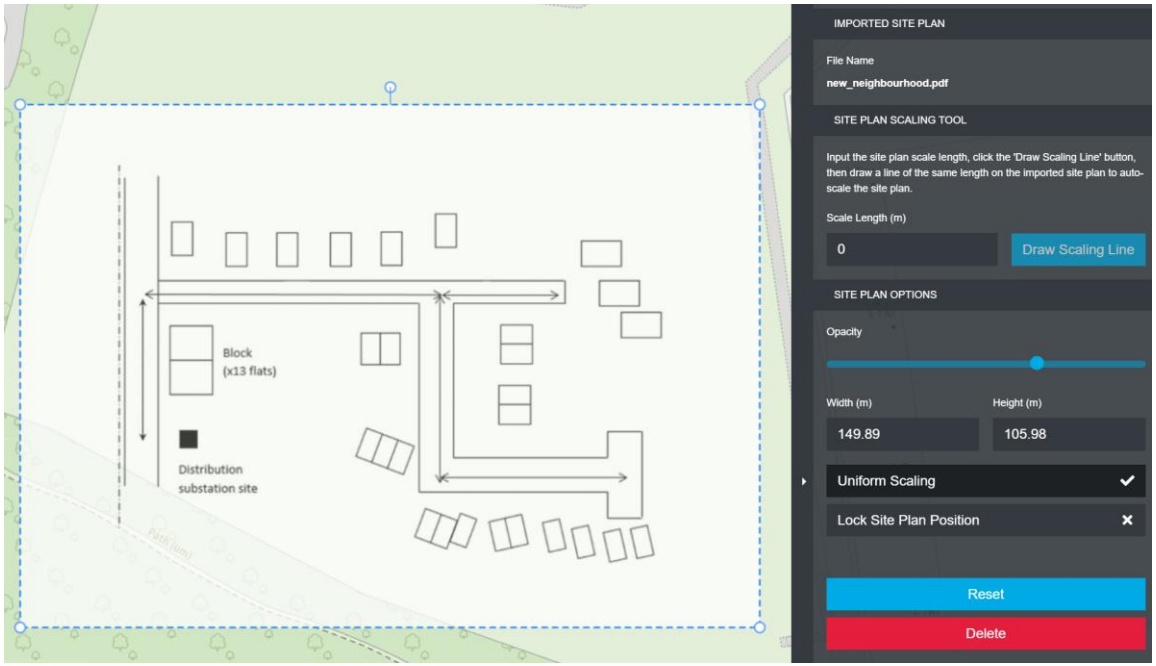
A site plan that has been saved as a pdf can be loaded on to VisNet Design through the 'Import Site Plan PDF' option under the 'File' tab.



The pdf can be imported by clicking on the 'Import' button and selecting a previously saved site plan. The imported site plan will be loaded on to the current position on the map in VisNet Design. To import the site plan at any specific map location, manually scroll through the map to the desired position or use the 'Map Search' option under the 'File' tab to move to the desired location and click 'Import' to import the site plan. Alternatively, once a site plan is loaded on to VisNet Design, click on the site plan to select and drag it to change its position on the map.

The imported site plan can be resized/reshaped by clicking and dragging any of the four corners of the site plan. The site plan can also be resized using the 'Width' and 'Height' input boxes on the 'Properties' tab. If the 'Uniform Scaling' toggle under the 'Properties' tab is turned on, the aspect ratio of the site plan will be maintained while resizing using the input boxes or manually. If the toggle is turned off, the site plan can be resized freely. It is possible to rotate the site plan by clicking on the small circle on the top middle. The opacity of the site plan can be adjusted using the 'Opacity' scale under the 'Properties' tab. The imported site plan can be reset to the original state (i.e., any changes made will be reverted like rotation or change in position/size etc.) by clicking on the 'Reset' button in the 'Properties' tab. To delete the site plan, using the 'Select' option, click on the site plan to select it and click on the red 'Delete' button in the 'Properties' tab.

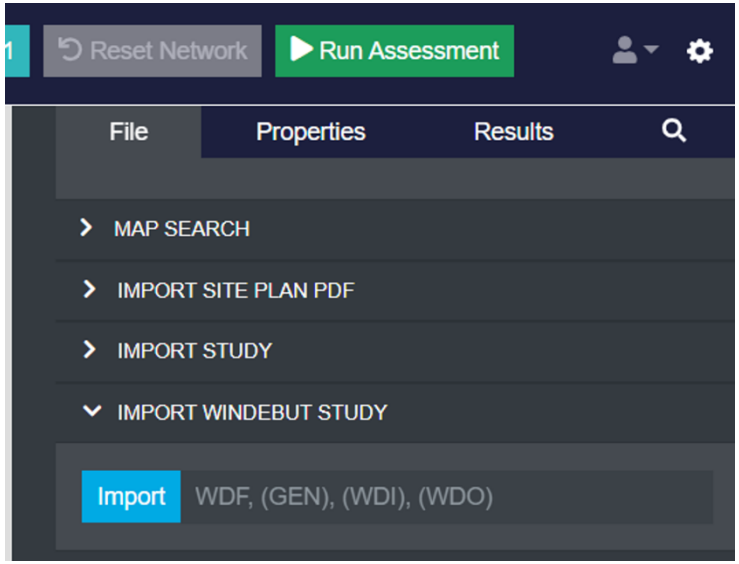
The imported site plan can be automatically resized the site plan to match the scale of the map by using the 'Scale Site Plan' tool in the 'Properties' tab. To do this, the user can import the site plan onto the map, click two points on the site plan, and enter the real-world distance between them. This will automatically resize the site plan to match the scale of the map.

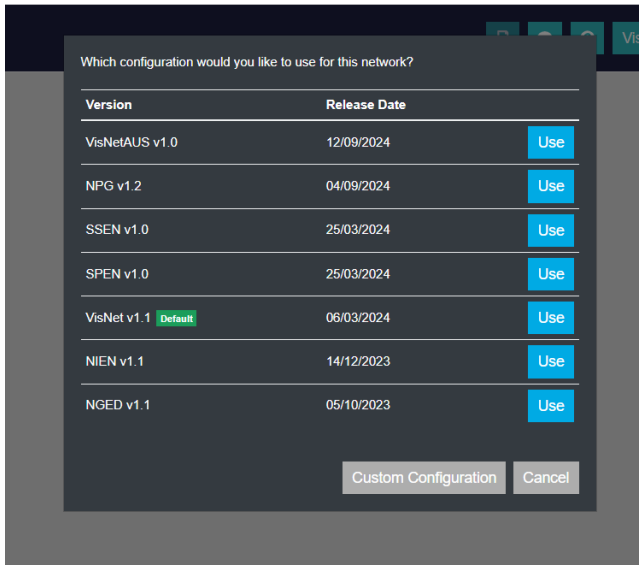


It is possible to draw new network components over the site plan, however, it is not possible to make any kind of connections between the site plan and any other network component. It is also important to remember that only a single site plan can be imported at a time, and if the pdf file consists of multiple pages, only the first page will be loaded on to VisNet Design. Similar to other network components, the site plan will be saved as part of the study when the study is saved as a pdf or saved in the VisNet Design cloud database. But it will not be saved as part of the study if it is saved in JSON format.

Import WinDebut Study Files

A WinDebut study that has been locally saved on the users device can be imported into VisNet Design using the 'Import WinDebut Study' option under the 'File' tab.



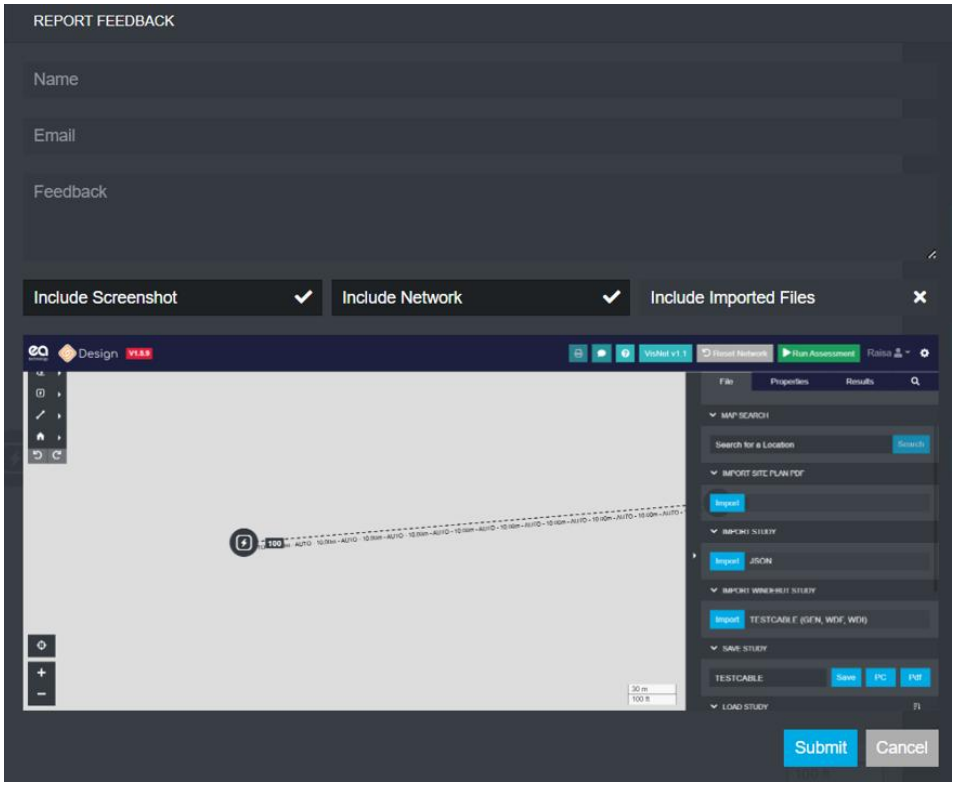


On clicking the 'Import' button, up to four different WinDebut files with the extensions: .WDF, .WDO, .WDI and .GEN. can be uploaded to VisNet Design. WinDebut files with any other extensions cannot be loaded. When importing the files the users will be prompted to select a configuration (based on different DNO clients or VisNet Design Default), that will be used to import and run an assessment on the WinDebut network. To import and run the network correctly, it is necessary to select the same configuration as was used to create the WinDebut study. If no client specific or custom configuration was used to create the WinDebut studies (i.e. the study was created in WinDebut standard without any configuration changes), then use the configuration labelled as "VisNet", when importing the study to VisNet Design.

The configurations can be selected by clicking on the 'Use' button beside the corresponding configuration. If unsure about which configuration was used to create the WinDebut study, or if the corresponding WinDebut configuration had been significantly edited, then

use the 'Custom Configuration' button to allow VisNet Design to create and use a custom configuration to import that specific WinDebut study.
In order to import a WinDebut study using a predefined configuration, it is mandatory to upload the WDF file. If the WinDebut network contains any Generators, to be able to view the Generators in VisNet Design, it is also mandatory to upload the GEN file. To import a WinDebut study using a "Custom" configuration, the WDO file must also be uploaded, along with the WDF (and/GEN) file. Uploading the WDI file is entirely optional. It is recommended to upload this if the WinDebut study file contains any auto sized transformers.
Once a WinDebut study is imported to VisNet Design, it can be edited, and assessments can be run in the same way as other VisNet Design study files.

Feedback



Feedback about VisNet Design is strongly encouraged!

Whether reporting a bug, suggesting an enhancement, telling us what you like or a general comment, we'd love to hear what you think about VisNet Design. Feedback will be passed to the development team at EA Technology. All feedback is logged, and issues are prioritised for resolution.

Please provide feedback using the 'Feedback' button in the top right-hand corner of the screen.

Clicking the 'Feedback' button brings up the dialog box below.

Enter your name, email address and comment(s). Select whether you want to include a screenshot of the network, and the network json file. (These are selected by default). It is particularly useful to include these if you are reporting a bug because they allow us to replicate the issue to investigate its cause. You can also include the imported json/WinDebut study file(s) by clicking on the "Include Imported Files" option. This is not selected by default, but we would suggest users to select this option particularly when reporting issues regarding WinDebut imports.

06

Guide to Results Metrics

Guide to Results Metrics

VisNet Design can provide many results metrics. This section is a guide to the definition of each of these metrics.

It should be noted that only one parameter from each drop-down menu can be selected for display on the canvas at any time.

Some metrics, such as 'Current' results, require a minimum level of zoom to be displayed.

Voltage/Current

Max Volt Drop (%)	Maximum Voltage Drop as a percentage at transformers, customers, and nodes
Max Volt Rise Total (%)	Maximum Voltage Rise as a percentage at transformers and customers. Total volt rise is the expected worst-case volt rise on the network from all causes
Max Volt Rise Generation (%)	Maximum Volt Rise due to generators only
Max Volt Rise Unbalance (%)	Maximum Volt Rise due to unbalance of consumers only
Voltage	
Max Voltage	Maximum Voltage across all three phases at customers and nodes
L1 Max Voltage	Maximum Phase 1 Voltage at customers and nodes
L2 Max Voltage	Maximum Phase 2 Voltage at customers and nodes
L3 Max Voltage	Maximum Phase 3 Voltage at customers and nodes
Min Voltage	Minimum Voltage across all three phases at customers and nodes
L1 Min Voltage	Minimum Phase 1 Voltage at customers and nodes
L2 Min Voltage	Minimum Phase 2 Voltage at customers and nodes
L3 Min Voltage	Minimum Phase 3 Voltage at customers and nodes
Voltage Disturbance	
P28 Voltage Drop	Voltage disturbance or "Flicker", at a node due to a disturbing load on the network, as a percentage
P28 Transformer Primary	Voltage disturbance seen at the primary winding of the transformer
P28 Transformer Secondary	Voltage disturbance seen at the secondary winding of the transformer
P28 Limit	Maximum permissible voltage disturbance from a disturbing load

Total During Starting Current	Total network voltage drop during the start-up of a disturbing load (%)
Max Current	Maximum current running through a conductor across all three phases
Min Current	Minimum current running through a conductor across all three phases
L1 Max Current	Maximum Phase 1 current running through a conductor
L2 Max Current	Maximum Phase 2 current running through a conductor
L3 Max Current	Maximum Phase 3 current running through a conductor

Demand/Utilisation

Demand (kVA)	Maximum demand on a substation
Service Demand (kVA)	Maximum demand on a service cable
Utilisation (%)	Maximum utilisation of asset as a percentage relative to the asset rating

Impedance

Resistance (mΩ):	
Loop (fault)	Loop resistance while network is in fault state. Displayed at customers and nodes
Loop (operating)	Loop resistance while network is in operating state. Displayed at customers and nodes
Phase (fault)	Phase resistance while network is in fault state. Displayed at customers and nodes
Phase (operating)	Phase resistance while network is in operating state. Displayed at customers and nodes
Source Loop (operating)	Loop resistance including HV resistance of source, while network is in operating state. Displayed at customers and nodes
Source Phase (operating)	Phase resistance, including HV resistance of source, while network is in operating states Displayed at customers and nodes
Source Phase-Phase (operating)	Phase-to-phase resistance, including HV resistance of source, while network is in operating state. Displayed at customers and nodes
Reactance (mΩ)	

Loop (fault)	Loop reactance while network is in fault state. Displayed at customers and nodes
Loop (operating)	Loop reactance while network is in operating state. Displayed at customers and nodes
Phase (fault)	Phase reactance while network is in fault state. Displayed at customers and nodes
Phase (operating)	Phase reactance while network is in operating state. Displayed at customers and nodes
Source Loop (operating)	Loop reactance including HV reactance of source, while network is in operating state. Displayed at customers and nodes
Source Phase (operating)	Phase reactance, including HV reactance of source, while network is in operating states. Displayed at customers and nodes
Source Phase-Phase (operating)	Phase-to-phase reactance, including HV reactance of source, while network is in operating state. Displayed at customers and nodes

Impedance (mΩ)

Conductor Loop (fault)	Loop impedance of a conductor at fault state. Displayed at customers and nodes.
Conductor Phase (fault)	Phase impedance of a conductor at fault state. Displayed at customers and nodes
Loop (fault)	Loop impedance while network is in fault state. Displayed at customers and nodes
Loop (operating)	Loop impedance while network is in operating state. Displayed at customers and nodes
Phase (fault)	Phase impedance while network is in fault state. Displayed at customers and nodes
Phase (operating)	Phase impedance while network is in operating state. Displayed at customers and nodes
Source Loop (operating)	Loop impedance including HV impedance of source, while network is in operating state. Displayed at customers and nodes
Source Phase (operating)	Phase impedance, including HV impedance of source, while network is in operating states. Displayed at customers and nodes
Source Phase-Phase (operating)	Phase-to-phase impedance, including HV impedance of source, while network is in operating state. Displayed at customers and nodes

Faults/Fusing

Fuse Size (A):	Fuse size for each feeder leaving the transformer

Fault Current

Fault Current – ph-earth (kA)	Phase-Earth fault current
Fault Current – ph-ph (kA)	Phase-Phase fault current
Fault Current – 3ph (kA)	3-phase fault current

Network

Identifiers

Labels	Custom text annotations against transformers, conductors, and customers
Object IDs	Unique Identifying numbers given to each transformer and customer / node
Feeder ID	Unique Identifying numbers given to each feeder out of the transformer
Phasing	Visible for each Customer. Label of the phase(s) that supply the customer
Transformer Rating (kVA):	Transformer rating in kVA.
Consumers Downstream	Count of parent connections downstream of a conductor
Consumers Upstream	Count of parent connections elsewhere on the feeder
Phases Available	Number of available phases on each conductor

07

Requirements and Scope to Run a Network Assessment

Requirements and Scope for a Network Assessment

VisNet Design has a number of requirements and conditions that must be met to successfully run a network assessment. These include:

- VisNet Design cannot currently assess meshed networks .
- Networks cannot contain loops.
- Networks must be fully connected.
- Networks must contain at least one customer or generator.
- Networks can only have one motor or one welder. Networks cannot contain both a motor and a welder.

08

Frequently Asked Questions

Frequently Asked Questions

EA Technology provide training courses designed to help users to use VisNet Design proficiently. For more information, please see our website or email: info@eatechnology.com

Question List

Functionality

Can VisNet Design be used to model distributed generation?

Can VisNet Design model distributed customers?

Can VisNet Design model customers with Electric Vehicle Charge Points (EVCPs) or PV generation?

What are grouped connections?

How can I change parameters for customers / transformers / conductors?

Why are the customer properties not changing?

How does the Delete button work?

Why can't VisNet Design model meshed networks?

Can VisNet Design model networks containing loops?

Results

Why does the network analysis fail when I press the "Run Assessment" button?

I do not understand what some of network results mean. Where can I find out?

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Where does my feedback go and how is it dealt with?

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Can I change the system constraints?

Can I add new conductor types or modify existing conductor type's parameters?

Can I modify customer profiles or add new profiles?

Import Site Plan as Background

How do I scale the imported site plan pdf using the scale site plan tool?

Point-of-Connections (PoC)

What do I need to consider when modelling the Point-of-Connections (PoC)?

WinDebut Imports

Can I import WinDebut Files in VisNet Design?

What WinDebut files are required to import a WinDebut network in VisNet Design?

What configuration will the WinDebut imports use?

Can I update and save WinDebut imports in VisNet Design?

Miscellaneous

Is VisNet Design touchscreen friendly?

On what browsers is VisNet Design supported?

Can I share my network with others?

Why should I use (or upgrade to) VisNet Design?

VisNet Design is producing an error that I don't understand and that hasn't been covered in this document. Please advise.

Answers

Functionality

Can VisNet Design be used to model distributed generation?

Yes. A PV profile is included within VisNet Design as the default generator type. VisNet Design also provides a 'Constant' flat profile to facilitate worst case modelling for other intermittent sources of local generation such as small-scale micro wind turbines. Generators are available from the drawing tools on the left-hand side of the user interface. VisNet Design enables customers and generators to be grouped together, allowing modelling of energy prosumers (energy producers and customers). This can be done by placing a customer on the canvas, then selecting the customers and selecting 'Add Sub-Group' Generator. This is explained in more detail in steps 13 and 14 of the step-by-step User Guide.

Can VisNet Design model distributed customers?

VisNet Design can be used to model distributed customers (i.e., customers distributed along conductors in the network). This can be done by placing a conductor, then selecting the conductor and using the 'Add Connection' section of the sidebar. This can be used to place multiple customers, including generators, and even customers of different types along its length.

Can VisNet Design model customers with Electric Vehicle Charge Points (EVCPs) or PV generation?

Yes. The best way to model these scenarios is to use the 'Add Sub-Group' section of the right-hand sidebar when the customer is selected. This is explained in more detail in step 5 of the step-by-step User Guide.

What are grouped connections?

Grouped connections are points on the network where more than one type of customer or generator are placed together at the same location. This might be a customer with a generator, for example a domestic Elexon 1 profile customer with a PV array. It can also be used to model different types of customers at one location such as a mixture of Elexon 1 and Elexon 2 customers in a block of flats. There are also parent/child grouped connections, or sub-groups, in which multiple connections are associated with each other. A common application of sub-grouped connections is to model a domestic, commercial or industrial customer where EV charger(s) are installed.

How can I change parameters for customers / transformers / conductors?

There are two ways to do this. If you have already placed the network component, then press the 'Select' button and then click on the network asset that you want to edit the details for. This will bring up the 'Properties' tab on the right-hand sidebar. In the 'Properties' sidebar you can change the numbers of assets, designate phasing (or set to 'Auto Phase'), change profiles for customers or conductor types for conductors, and change the asset demand/generating power. You can also add new connections (for example different customer types) or sub-groups (for example to model PV arrays or EVCPs) using the 'Properties' sidebar. Step 15 of the User Guide shows how this method can be used to change properties associated with customers.

Alternatively, when placing a network component, its properties can be set before placing it on the canvas. This can be done by selecting the type of network component to be placed, then going to the 'Properties' sidebar and adjusting the properties as above, then clicking on the canvas to place the network component. This method can be especially efficient if you want to place multiple assets with the same property values on the canvas.

Please note that some values that are fixed for a particular network asset cannot be changed in the 'Properties' sidebar. For example, conductor resistances per unit length, or customer profiles. Modifying these properties require changes to the configuration file.

Why are the customer properties not changing?

This is most likely to be because if a new connection is being added, the 'Properties' side tab is by default for the to-be-added connection, not the one which has just been placed. To edit an existing customer (or generator, transformer or conductor) use the 'Select' button to select the customer that you want to change. The 'Properties' tab will appear, where you can then make changes. Please see the above question for more details about how to change properties for network assets.

How does the Delete button work?

When the 'Eraser' icon is selected, clicking on a network asset will remove it. For example, by clicking on a customer, that customer will be removed from the network and the canvas. Similarly, when the 'Eraser' is selected, a conductor can be clicked to remove it from the network and the canvas. Conductors without nodes/transformers/customers at either end will cause an assessment error.

Nodes/transformers/customers cannot currently be placed on the end of an existing conductor. See the User Guide for more information.

In order to delete a node, first all the connected conductors must be deleted, to prevent islanding a conductor end.

Why can't VisNet Design model meshed networks?

VisNet Design uses the DEBUT method to analyse networks. Unfortunately, DEBUT does not currently support meshed networks.

Can VisNet Design model networks containing loops?

Unfortunately, currently VisNet Design does not support modelling networks that contain loops.

Results

Why does the network analysis fail when I press the "Run Assessment" button?

There may be several reasons for this. Error messages returned when the network assessment is run can be used to help identify the reason(s) for the assessment failure. For help interpreting the message codes, please refer to the message codes appendix . Typical reasons for a network assessment failure include not having all the components required of a network (transformers, conductor, and customer as a minimum), or the network not being fully connected.

Another common reason for an assessment failure is incompatible phasing information being provided. Incompatible phasing is any network layout where the phasing information is not a physically valid allocation. For example, if a domestic customer is allocated a three-phase supply but has been connected to a single-phase pole mounted transformer, this would be an invalid arrangement and would cause an error.

A network assessment failure may also occur if the network type to be modelled isn't supported by the current version of VisNet Design. It is important to note the scope of the VisNet Design tool, listed in the VisNet Design User Guide. The functionality of the tool will increase as the tool develops. Attempting to use the tool to model network types that are not yet supported (for example meshed networks or networks containing loops) will result in network assessments failing. We are keen to improve VisNet Design to meet all our users' requirements so please use the 'Feedback' button to tell us your suggestions!

If a network assessment fails that, and you want to report the issue, please use the 'Feedback' button to do this.

I do not understand what some of network results mean. Where can I find out more?

Please refer to the Section 'Guide to Results Metrics' of this User Guide. If you have read this and still have questions, please contact us at VisNet Design support email address: product-support@eatechnology.com.

Can I change the results displayed when a Network Assessment is run?

Yes. This is done by navigating to the 'Results' tab in the right-hand sidebar. Greyed-out result parameters can be displayed on the network by clicking on the parameter. This will then display the results in the same colour as they are shown on the VisNet Design drawing canvas. Similarly, results no longer of interest can be removed from the canvas by clicking on the parameter. The coloured parameter will then turn grey and be removed from the results on the canvas.

What do the red exclamation marks on the User Interface and results tab mean?

Red explanation marks or flags are used to visually alert the user when network assessment results exceed pre-set network constraints. Network constraints, such as the maximum permissible voltage drop, or voltage rise are set in the configuration files. Constraint thresholds applied for any network assessment can be viewed by selecting the 'Report' icon and scrolling down in the 'Results' page to the 'Constraint Thresholds' parameters.

Feedback

Can I report bugs or suggest enhancements?

Yes, this is encouraged. The 'Feedback' button in the top right-hand corner of the user interface provides the most efficient mechanism to do this. When reporting bugs, it is useful to include the network json file and screenshot to help the VisNet Design development team investigate the issue. For more information about how to use the 'Feedback' function, please see the User Guide .

Where does my feedback go and how is it dealt with?

Feedback is processed by the development team at EA Technology. All feedback submitted using the 'Feedback' button is read and regularly reviewed.

Configuration

How do I configure VisNet Design?

VisNet Design is configured with default settings appropriate for use with LV networks. The back-end configuration is intended to be standardised and as simple to use as possible. The functionality to modify system constraint values, customer properties, and auto-selection of cables and transformers is available through the “Configuration” button in the UI, as discussed in step 24 of User Guide .

Can I change the system constraints?

Please refer to *How do I Configure VisNet Design.*

Can I add new conductor types or modify existing conductor type’s parameters?

VisNet Design does not currently allow this functionality. But the users can update the auto selection cable list as discussed in step 24 of User Guide.

Can I modify customer profiles or add new profiles?

VisNet Design does not currently allow this functionality. But the users can update the Demand Type and Day/Night Demand to be used by each profile as discussed in step 24 of User Guide.

Import Site Plan as Background

How do I scale the imported site plan using the scale site plan tool?

The imported site plan can be automatically resized the site plan to match the scale of the map by using the ‘Scale Site Plan’ tool in the ‘Properties’ tab. To do this, the user can import the site plan onto the map, click two points on the site plan, and enter the real-world distance between them. This will automatically resize the site plan to match the scale of the map.

Point-of-Connections (PoC)

What do I need to consider when modelling the Point-of-Connections (PoC)?

A few design considerations while using the Point of Connection option are that, if used, the 'Point of Connection' object must be the first node after the transformer, and there can be only one PoC object per feeder. Auto transformer sizing is not compatible with PoC objects. The length of the conductor between the transformer and the PoC object is auto calculated, in order for the PoC object to have the loop resistance specified. This calculated conductor length overrides both the geography based auto calculated length or any manual conductor length values entered by the user. If 'Includes Transformer Resistance' is turned off (i.e., the PoC Loop Resistance entered by the user does not include transformer resistance), the result displayed on the map will be the value entered at the PoC plus the transformer resistance.

WinDebut Imports

Can I import WinDebut Files in VisNet Design?

VisNet Design allows users to import WinDebut files. Please refer to the 'Import WinDebut Study Files' section in User Guide for the step-by-step instructions.

What WinDebut files are required to import a WinDebut network in VisNet Design?

In order to import a WinDebut study using a predefined configuration, it is mandatory to upload the WDF file. If the WinDebut network contains any Generators, to be able to view the Generators in VisNet Design, it is also mandatory to upload the GEN file. To import a WinDebut study using a "Custom" configuration, the WDO file must also be uploaded, along with the WDF (and/GEN) file. Uploading the WDI file is entirely optional. It is recommended to upload this if the WinDebut study file contains any auto sized transformers.

What configuration will the WinDebut imports use?

The user can select a predefined DNO configuration or use the VisNet Design Default configuration to import the WinDebut networks. It is also possible to use "Custom" configuration if the specific configuration is unknown.

Can I update and save WinDebut imports in VisNet Design?

All WinDebut files once imported, can be edited and saved similar to regular VisNet design studies.

Miscellaneous

Is VisNet Design touchscreen friendly?

Yes, VisNet Design has been designed to work on a touchscreen. It doesn't use the right mouse button, and mouse clicks can be replaced with a touchscreen tap anywhere within the application. It can run on any internet connected device with a reasonably sized screen (typically it will be used on a tablet, laptop or desktop PC).

What browsers support VisNet Design?

VisNet Design is supported by the latest version of the following browsers: Chrome, Edge, and Safari.

Firefox support is likely to be included in a future release.

Can I share my network with others?

Networks can be saved as a json file (saved by default to your downloads folder) by pressing the 'JSON' button on the 'File' sidebar. The json files can be passed to others, who can use the import function to load the network. The 'PDF' button in the 'File' sidebar captures a screenshot of the network but does not allow the network to be reproduced. This functionality should not be used if you want to save a network or share a network with others.

If your company has multiple users subscribed, networks can be shared to the cloud by pressing the 'Save' button in the 'File' sidebar. Cloud files are then accessible by anyone in a company's group.

Why should I use (or upgrade to) VisNet Design?

VisNet Design enables rapid, intuitive modelling of LV networks compatible with the most commonly used web browsers. It provides a modern, mobile friendly, touchscreen enabled replacement to WinDEBUT. VisNet Design is available via a flexible, subscription-based licensing system.

VisNet Design has many new features, such as grouped and distributed connections, parent and child functionality, configurable seasonality, ducted adjustment, fuse calculation options, sustained and cyclic ratings and auto cable length. It includes methodology improvements compared to its predecessors for voltage rise, flicker and distributed connections.

Future enhancements of VisNet Design will include new functionality and increased scope to further improve your user experience. Please help us by telling us about the future enhancements you would like to see using the 'Feedback' button in the tool.

VisNet Design Error Message Codes

The message codes appendix. Explains the errors code a VisNet Design user may encounter when using VisNet Design. This appendix may be helpful if you experience an error which is not self-explanatory or answered in the Frequently Asked Questions.

09

Contact Us

Contact Us

Feedback, enhancement requests, bug reporting and general comments about VisNet Design can be provided by using the 'Feedback' button from within the VisNet Design product.

Alternatively, we can be contacted using the VisNet Design support email address: support@eatechnology.com.

For general enquiries, or if you are interested in buying licenses for VisNet Design, please contact: sales@eatechnology.com

EA Technology also provide training courses for VisNet Design. For more information, please see our website or email: info@eatechnology.com

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Error Message Codes

Error Message Codes

Network assessments may fail for various reasons. If a network assessment fails, then an error message will be displayed on the VisNet Design user interface. If there are multiple instances of the same error type in the network, the number of instances will be shown at the end of the error code in the form "{error code} x {N}", for N instances of {error code}. The table below outlines possible error messages and contains suggestions for how to resolve the issues causing the network assessment to fail.

Message	Suggestion
{0}	An unknown error occurred. Please contact the system administrator.
{0} is missing required property: {1}	Populate the missing property {1} of network component {0}.
Cannot determine {0} distance from transformer	Please check the cable lengths of your network design. Ensure all cable lengths are positive (non-zero) values.
Cannot determine if this {0} can be allocated to phase 1	An error occurred while allocating phases. Please check the network design, paying particular attention to phasing. Check network component {0}
Cannot determine if this {0} can be allocated to phase 2	An error occurred while allocating phases. Please check the network design, paying particular attention to phasing. Check network component {0}.
Cannot determine if this {0} can be allocated to phase 3	An error occurred while allocating phases. Please check the network design, paying particular attention to phasing. Check network component {0}.
Cannot determine the number of {0} phases	An invalid number of phases was detected. Please check the network design. Pay particular attention to phasing.

Message	Suggestion
Conducting section has less than two terminals	Ensure all conductors (cables) run from a transformer / node / consumer to another transformer / node / consumer.
Conducting section has more than two terminals	Ensure all conductors (cables) run from a transformer / node / consumer to another transformer / node / consumer and run only between two network components.
Consumer Node must be added to an existing line segment	An islanded consumer was detected. Please check the network design to ensure all consumers are connected to a feeder.
Could not match cable type	An invalid cable type was detected. Please check all cables are assigned as a valid cable type.
Debut API returned HTTP {0}	A server error occurred, please contact the system administrator.
Distributed energy consumer assigned to missing branch	Distributed energy consumers must be assigned to a branch of the network. Please check the network design to ensure that this is the case.
Design voltage is greater than system fault voltage	The design voltage entered is greater than the default system fault voltage of 260V. Select ok to continue with the higher design voltage. Otherwise, select cancel and change the design voltage at the transformer.
Energy Consumer ID does not exist as a terminal	There is an invalid consumer ID. Try replacing each consumer in turn. If this error persists, please contact the system administrator.
Exception occurred while calculating Flicker MXD	Please contact the system administrator

Message	Suggestion
Exception occurred while calling Debut API	A server error occurred, please contact the system administrator.
Flicker efficiency cannot be null or zero	Check the efficiency property of any welder or motor in the network is populated and non-zero.
Flicker rating cannot be null or zero	Check the flicker rating of any welder(s) or motor(s) is populated and non-zero.
Fuse size at Node must be smaller than Fuse size at Transformer	Check the fuse size set at the nodes and set the fuse size to a lower value than the transformer.
Generating Unit ID does not exist as a terminal	There is an invalid generator ID. Try replacing each generator in turn. If this error persists, please contact the system administrator.
Generator Node must be added to an existing line segment	An islanded generator was detected. Please check your network design to ensure all generators are connected to a feeder.
HTTP POST-request task failed	A network error occurred. Please check your network connection.
HTTP POST-response task failed	A server error occurred, please contact the system administrator.
Missing file request	A server error occurred, please contact the system administrator.
Missing or blank contact name	Provide a contact name in the feedback form
Missing or blank email address	Provide an email address in the feedback form

Message	Suggestion
Missing or blank feedback content	Ensure body of feedback form is populated.
Missing or blank network content	A server error occurred, please contact the system administrator.
Missing or blank network name	A server error occurred, please contact the system administrator.
Missing or blank username	A server error occurred, please contact the system administrator.
Must be exactly one auto Phase property	Ensure that your network design contains only one auto Phase property.
Network cannot contain both motors and welders	Ensure the network does not contain both motors and welders.
Network contains {0} unidentified item {1}	{0} unidentified item {1} was found on the network. Try removing and replacing the network item to see if this resolves the issue.
Network contains a loop	There is a closed section in the network. Try removing cables in the looped section of network.
Network contains duplicate identifiers	Network identifiers (IDs) are given to all feeders, transformers and consumers. Try removing network components and replacing them in turn to see if this resolves the issue.
Network does not have a power transformer	Ensure the network contains a power transformer.

Message	Suggestion
Network does not have enough energy consumers	Try modelling a network with at least one consumer
Network does not have enough power transformers	Ensure the network contains one power transformer.
Network has multiple power transformers	Ensure the network contains only one power transformer.
Network has too many energy consumers	Try modelling a network with fewer energy consumers.
Network has too many motors	Try modelling a network with fewer motors.
Network has too many power transformers	Ensure the network contains only one power transformer.
Network has too many welders	Try modelling a network with fewer welders.
No feeder fuse size selected	Check that a fuse size has been selected for each feeder leaving the transformer.
No phase capacity	An invalid phase capacity was assigned. Please check the phase capacity and phase allocation of the network design.
No suitable Transformer found for this configuration	Please check the size of the selected transformer is appropriate, and that the transformer is connected to the network appropriately.

Message	Suggestion
Node fully restricted by downstream phasing-requirements	Check phasing downstream
Number of {0} phases must be 'SINGLE', 'TWO' or 'THREE'	Check the number of phases option for generators and industrial consumers are set to either 'SINGLE', 'TWO', or 'THREE'.
Phase {0} not available	The specified phase {0} is not available. Please check the phasing of the network design.
Phase 1 consumers must be zero for a distributed energy consumer	Distributed energy customers must be automatically assigned to phases. Please remove any manually specified phase information.
Phase 1 weighting must be between 1 and 99	Check the specified phase 1 weighting and ensure it takes a value between 1 and 99.
Phase 2 consumers must be zero for a distributed energy consumer	Distributed energy customers must be automatically assigned to phases. Please remove any manually specified phase information.
Phase 2 weighting must be between 1 and 99	Check the specified phase 2 weighting and ensure it takes a value between 1 and 99.
Phase 3 consumers must be zero for a distributed energy consumer	Distributed energy customers must be automatically assigned to phases. Please remove any manually specified phase information.

Message	Suggestion
Phase 3 weighting must be between 1 and 99	Check the specified phase 3 weighting and ensure it takes a value between 1 and 99.
Phase allocation method must be 'Cyclic' or 'Random'	Ensure that the phase allocation method is set to either ‘Cyclic’ or ‘Random’.
Phase auto consumers cannot be zero for a distributed energy consumer	Please ensure distributed energy customers are assigned to automatic phasing.
Phase weighting must add up to 100 when unbiased is set to true	Ensure that the specified phase weighting sum to a total of 100 (assuming unbiased is set to be true).
Power transformer does not exist as a terminal	VisNet Design cannot find a power transformer. Ensure one power transformer is connected to the network.
Too many manually allocated phases	Check the manual phase allocation. This error may occur when consumers have been allocated too more distinct phases than the transformer provides or to a phase not supplied by the upstream cables.
Too many phases on a downstream component	Check that components on multiple phases downstream are fed by appropriately phased cables and transformer upstream, with at least as many phases in the upstream components as the downstream components.
Unreachable network element discovered	An islanded network component was found on the network. Please check the network design to ensure all components are connected to a feeder.

Message	Suggestion
Welder rating unit is missing	Assign welder rating units to all welders.
Unable to import WinDebut file. WDO file must be provided when auto-detecting the configuration	The user selected “Custom Configuration” when importing the WinDebut files but did not upload a WDO file. Please upload WDO file if a custom configuration is to be used to import the study file.
Unable to import WinDebut file. No Consumers in WDO files	The user selected “Custom Configuration” when importing the WinDebut files, but the uploaded WDO file does not contain a list consumers. Please ensure the WDO file contains a list of consumers if “Custom Configuration” is to be used or try to import the WinDebut study using one of the existing configurations.

11

Improvements to Transformer Volt Drop and Volt Rise Calculations

Improvements of Transformer Volt Drop and Volt Rise Calculations in VisNet Design

What is the Update?

We have recently improved the accuracy of the transformer volt drop and rise calculations in VisNet Design. The original equations, inherited from the original 1980s Debut, have been missing a factor of reactance in one of the terms. This has now been updated, and the improved equation will be included in the next release.

The simplified form of the equation is shown below, in which:

- U_{Tx} is the transformer utilisation,
- $R_{\%}$ and $X_{\%}$ are the percentage resistance and reactance respectively,
- φ is the phase angle of the demand,
- The reactance factor of $X_{\%}$ is newly added (marked in red).

$$\text{Transformer Volt Drop } (\%) = U_{Tx}R_{\%}\cos\varphi + U_{Tx}X_{\%}\sin\varphi$$

The majority of the magnitude comes from these two terms, and the additional terms have not been changed. The full form of the equation can be made available on request.

This update enhances accuracy, particularly for larger transformers where reactance is often much greater than resistance. By including this reactance factor, the voltage impact of transformers can be better reflected. It is noted that feeder-level calculations remain unaffected, as the influence of reactance at feeder level is minimal. It is also on our roadmap to bring in full reactive power calculations to both VisNet Design and VisNet Connect products.

What is the Impact of the Update?

The value of the missing factor of $X_{\%}$ is between 3**%** and 8**%** for the available range of transformers. This increases the size of the second term, and therefore the scale of the volt drop or rise calculated across the transformer.

If the transformer volt drop or rise spillover is turned on, there is more likely to be a knock-on effect on the feeders. The greater the transformer volt drop or rise, the more likely it is above the threshold (2% for drop, 0% for rise) beyond which the difference is cascaded down to be added to feeder-level volt drop or rise results.

What Options are available in response to this Update?
The following options are available in response to this change:

- **(1) No action:**
    - Accept the improved accuracy in the updated results.

- **(2) Adjust transformer spillover setting:**
    - It is possible to turn off the transformer spillover thresholds, so that the transformer and feeder results are calculated independently.
    - The thresholds could also be increased so spillover is less likely.
    - Please note that either of these changes would be applied companywide to all your users, and would involve customised configuration update requiring additional development effort and cost.
- **(3) Adjust power factor**
    - The power factor applied during the transformer volt drop and rise calculations could also be adjusted if required. The default power factors used are 0.95 for volt drop, and 1.0 for volt rise.
    - Please note that either of these changes would be applied companywide to all your users, and will involve customised configuration update requiring additional development effort and cost.

12

VisNet Design Profile Graphs

Profile Description

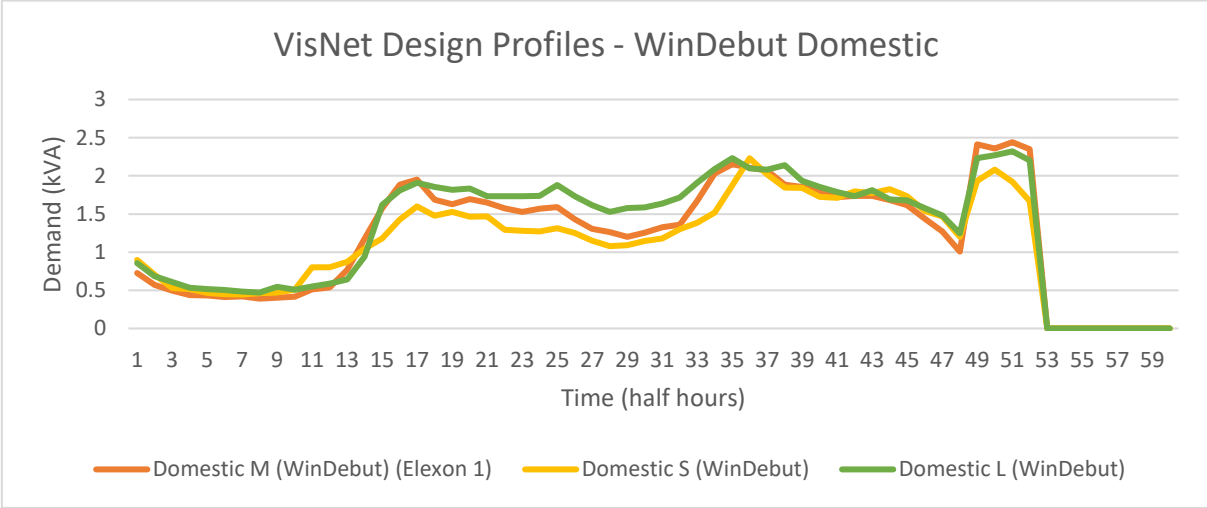
Profile Name	Default Demand Type	Default Demand Unit (kWh/kW)	Description
Domestic M (WinDebut)	Annual consumption	Day: 3600 Night: 0	These are unrestricted (medium consumption) domestic consumers
Domestic Electric Heating	Annual consumption	Day: 3500 Night: 8000	These are domestic economy 7 consumers with Electricaire central heating. (Economy 7 offers cheaper rates during (7) off peak hours, usually midnight till 7.00 am.)
Shop	Annual consumption	Day: 20000 Night: 0	These are non-domestic unrestricted consumers. These are used in WinDebut as small estate shops, hence the name.
Shop Electric Heating	Annual consumption	Day: 20000 Night: 15000	This indicates non-domestic economy 7 consumer. These are used in WinDebut as small estate shops with economy 7 rates.
Industrial Low Load Factor	Maximum Demand (Diversified)	Day: 100 Night: 0	These are non-Domestic Maximum Demand Customers with a Peak Load Factor of less than 20%. This is similar (not an exact match but close) to IDFLLF profile in WinDebut.

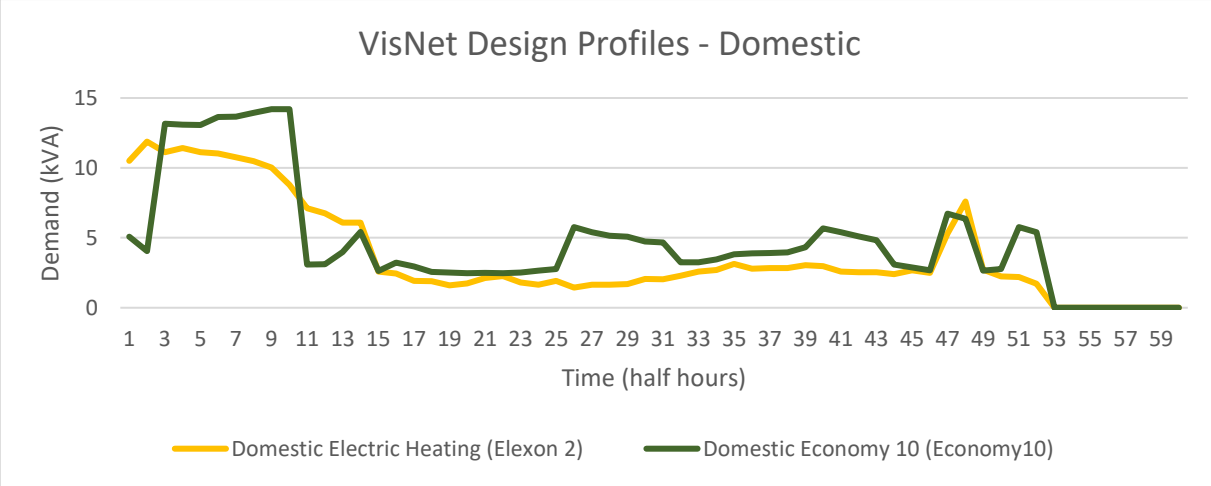
Industrial Med Load Factor	Maximum Demand (Diversified)	Day: 100 Night: 0	These are non-Domestic Maximum Demand Customers with a Peak Load Factor between 20% and 30%. This is similar (not an exact match but close) to INFLMF profile in WinDebut.
Industrial High Load Factor	Maximum Demand (Diversified)	Day: 100 Night: 0	These are non-Domestic Maximum Demand Customers with a Peak Load Factor between 30% and 40%. This is similar (not an exact match but close) to INFHLF profile in WinDebut.
Industrial XHigh Load Factor	Maximum Demand (Diversified)	Day: 100 Night: 0	These are non -Domestic Maximum Demand Customers with a Peak Load Factor over 40%
Hotel Pub	Annual consumption	Day: 30000 Night: 0	Hotels, pubs and similar
Church	Annual consumption	Day: 10000 Night: 10000	Church and other religious institutions
Domestic Economy Ten	Annual consumption	Day: 3600 Night: 10000	This is a restricted domestic consumer with Economy 10 tariff, where similar to Economy 7, the rates are lower for seven hours during the night, and an additional three hours during the day, usually in the afternoon.
School	Annual consumption	Day: 20000 Night: 0	This indicates the profile for a small school.
Office	Annual consumption	Day: 30000 Night: 0	This is the profile for a small scale office/ commercial space.
Domestic S (WinDebut)	Annual consumption	Day: 2640 Night: 0	These are unrestricted (low consumption) domestic consumers
Domestic L (WinDebut)	Annual consumption	Day: 4160 Night: 0	These are unrestricted (high consumption) domestic consumers

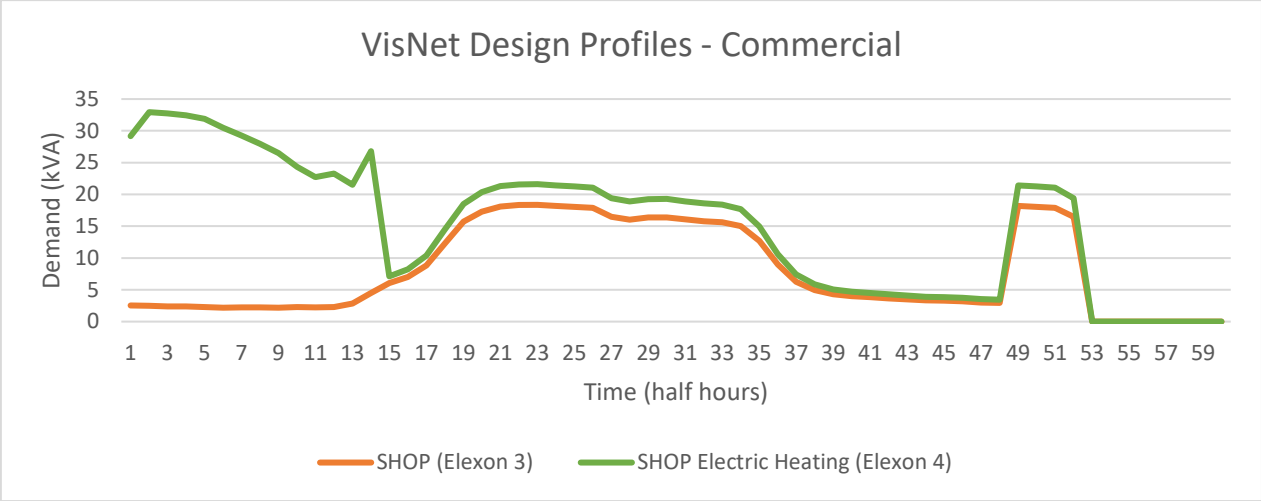
Domestic S	Annual consumption	Day: 2918 Night: 0	This is an average low consumption domestic house. This profile has been collected from ENA EREC P5 Issue 6 (2017). This is a more modern but less conservative version of the corresponding WinDebut profile.
Domestic M	Annual consumption	Day: 3565 Night: 0	This is an average medium consumption domestic house. This profile has also been collected from ENA EREC P5 Issue 6 (2017).
Domestic L	Annual consumption	Day: 4265 Night: 0	This is an average high consumption domestic house, similarly, collected from ENA EREC P5 Issue 6 (2017).
PV	Maximum Demand (Diversified)	Day: 3.68 Night: 0	This is a summer only PV generator profile, with no diversity.
EV Charger (Domestic)	Maximum Demand (Diversified)	Day: 7 Night: 0	This EV charger profile had been developed as part of the Electric Nation project, with data collected from full battery EVs and 7kW chargers
EV Charger (Time of Use Tariff)	Maximum Demand (Diversified)	Day: 7 Night: 0	This is a similar profile derived from the Electric Nation Project, but with the energy consumption being based on a time of use tariff.
Heat Pump (Air Source)	Maximum Demand (Diversified)	Day: 5 Night: 0	This profile is based on open-source data from the CLNR (Customer-Led Network Revolution) project.

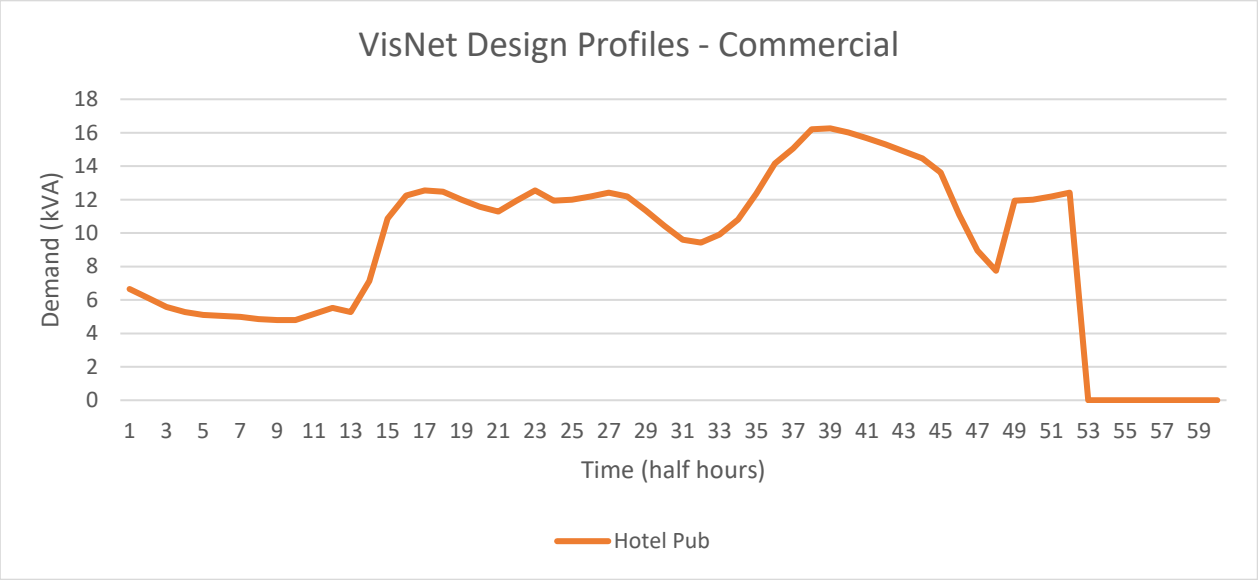
Profile Graphs

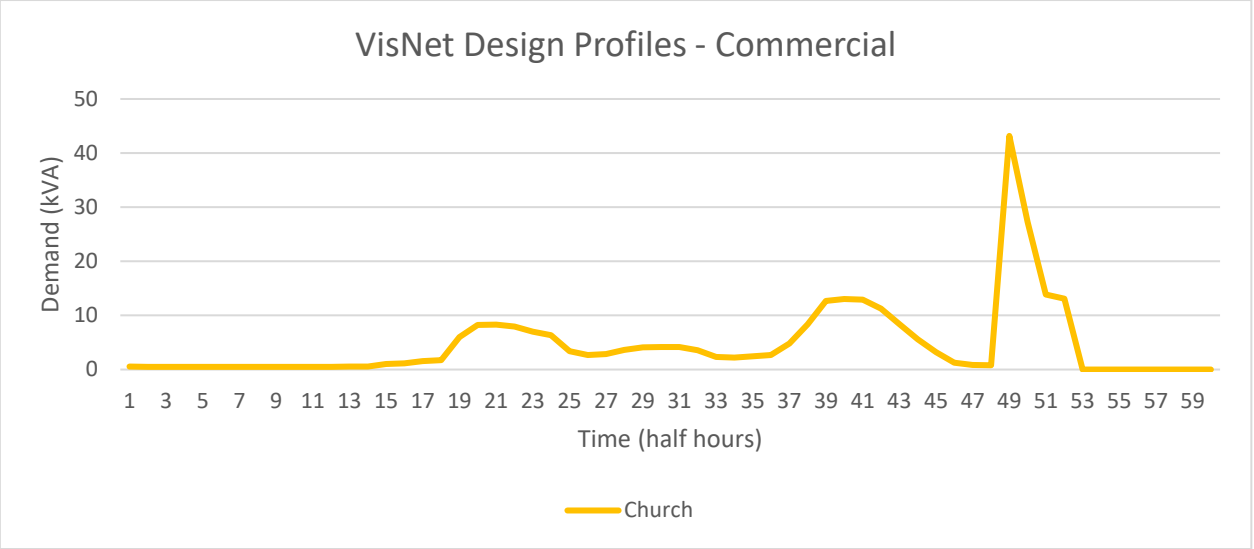
All profiles are scaled according to the default demand sizes listed above.

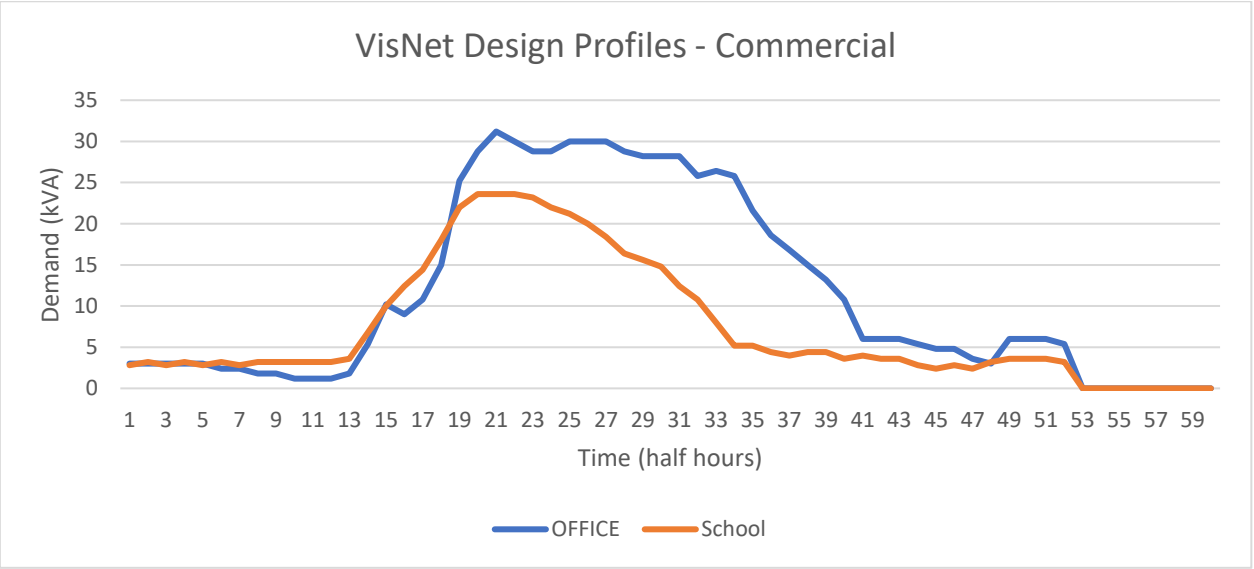


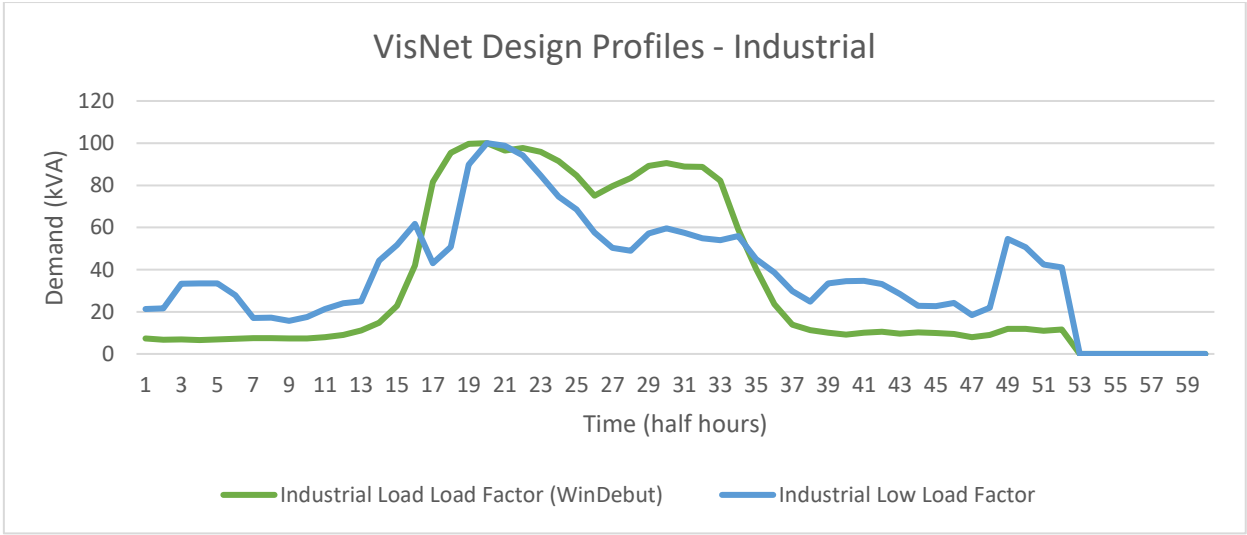


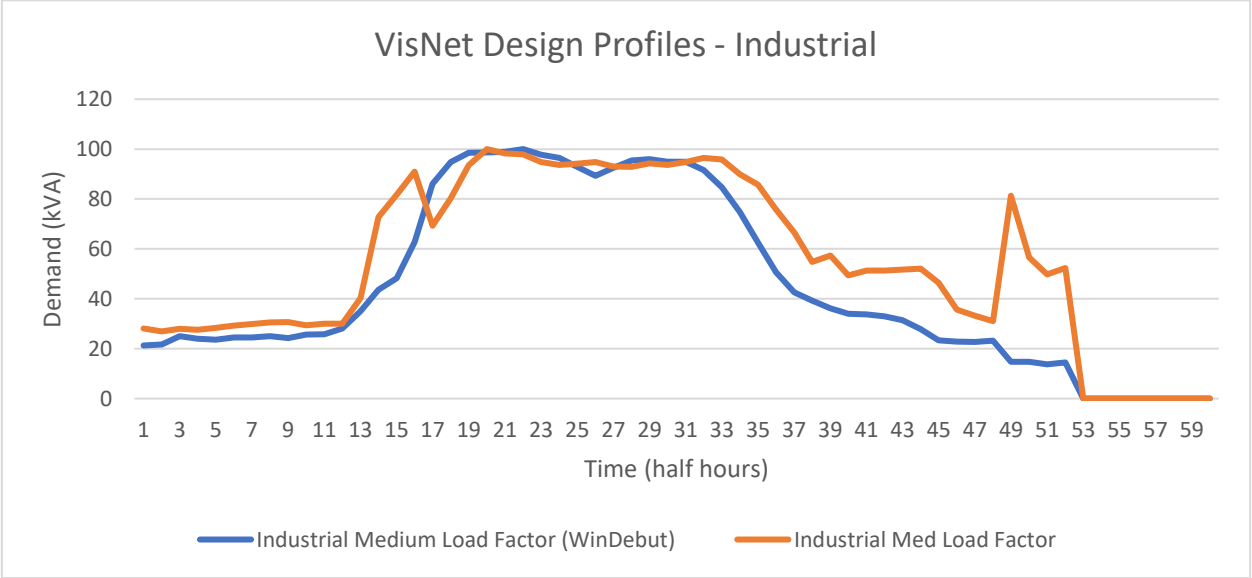

VisNet Design Profiles - Commercial
Demand (kVA)
35
30
25
20
15
10
5
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
SHOP (Elexon 3)
SHOP Electric Heating (Elexon 4)

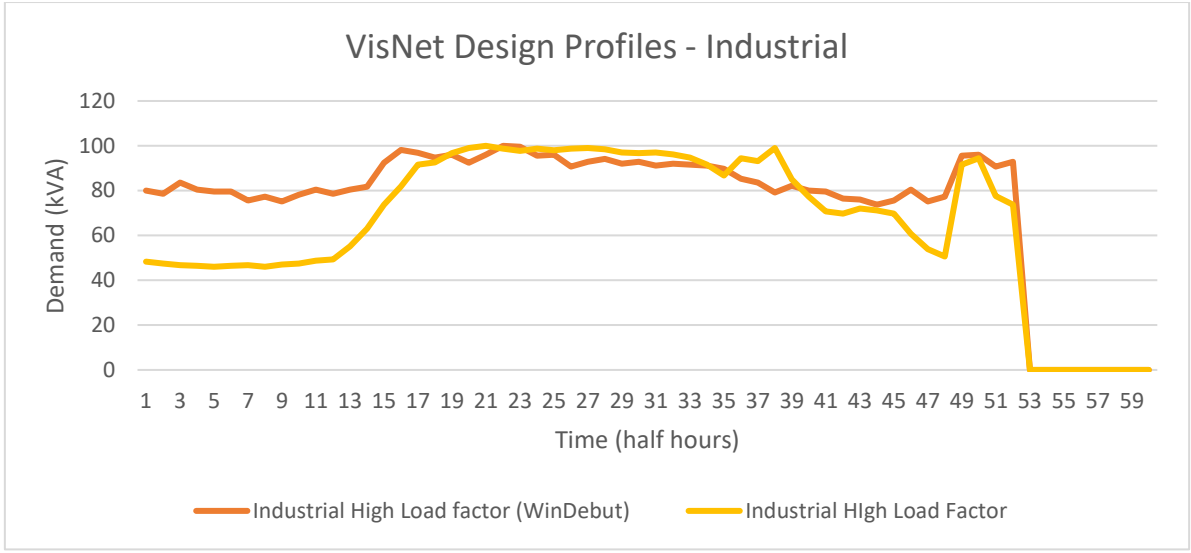

VisNet Design Profiles - Commercial
Demand (kVA)
18
16
14
12
10
8
6
4
2
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
Hotel Pub

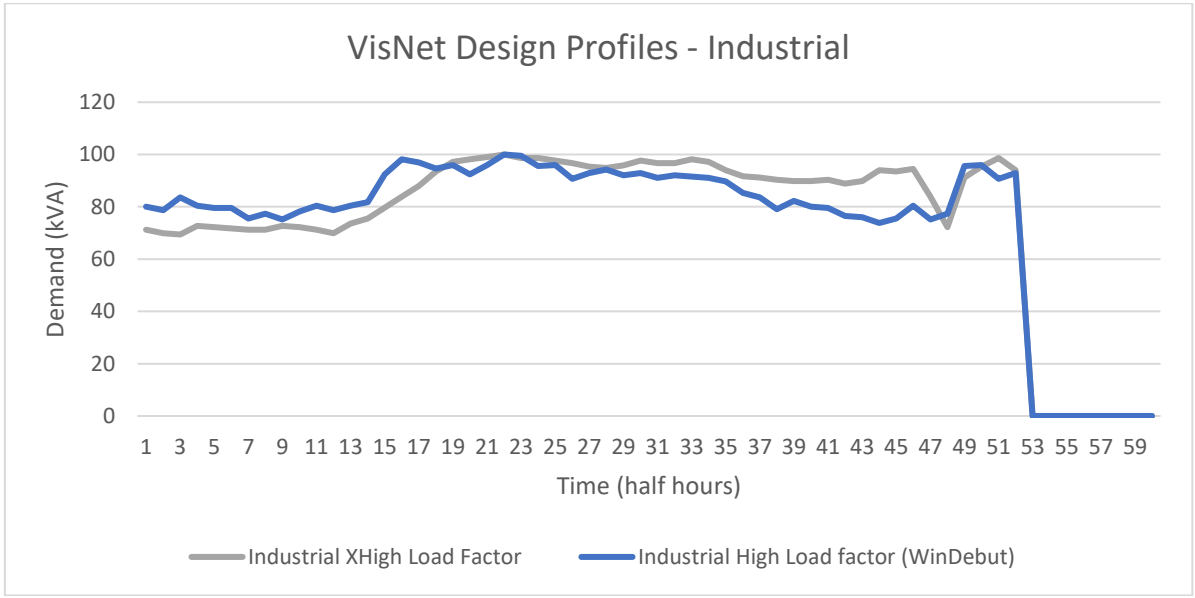

VisNet Design Profiles - Commercial
Demand (kVA)
50
40
30
20
10
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
Church

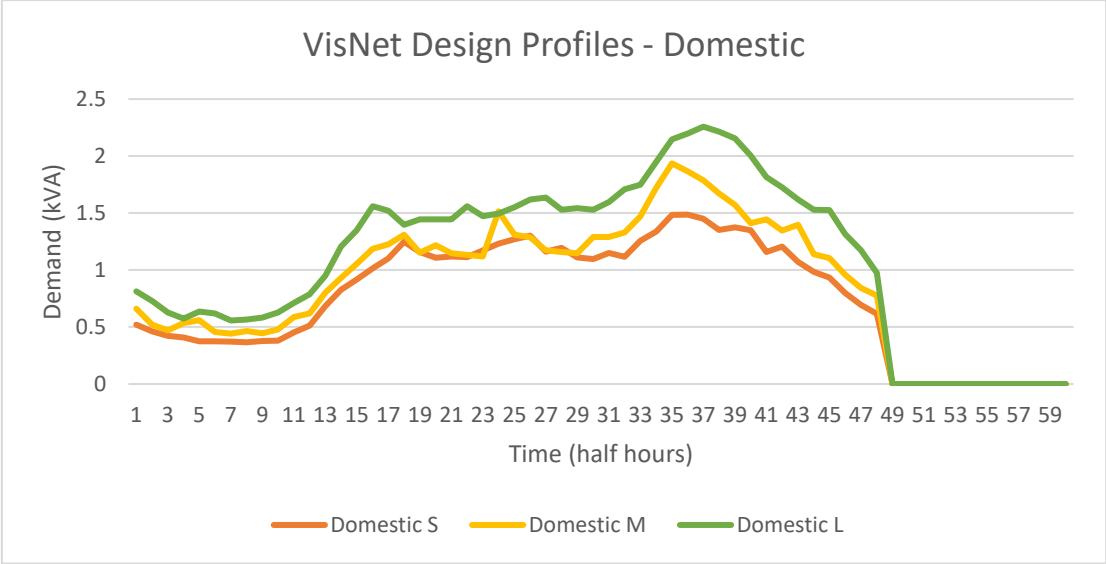

VisNet Design Profiles - Commercial
Demand (kVA)
35
30
25
20
15
10
5
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
OFFICE
School

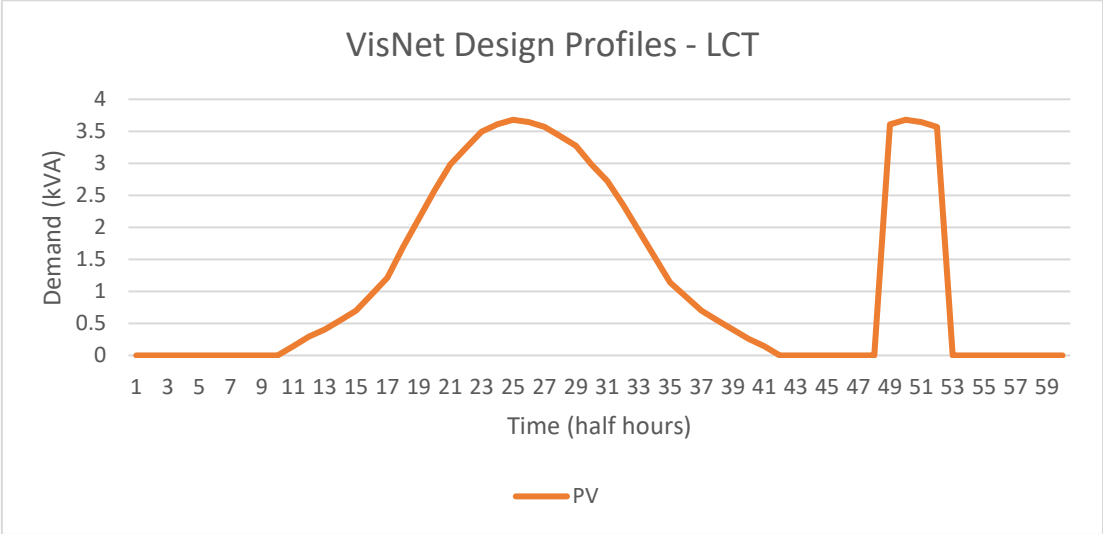

VisNet Design Profiles - Industrial
Demand (kVA)
120
100
80
60
40
20
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
Industrial Load Load Factor (WinDebut)
Industrial Low Load Factor

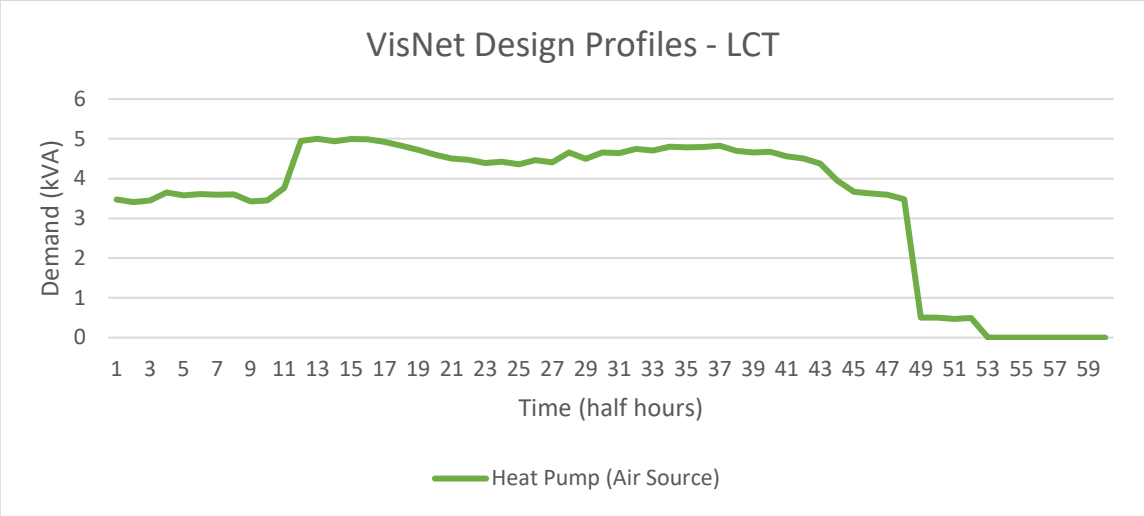

VisNet Design Profiles - Industrial
Demand (kVA)
120
100
80
60
40
20
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
Industrial Medium Load Factor (WinDebut)
Industrial Med Load Factor

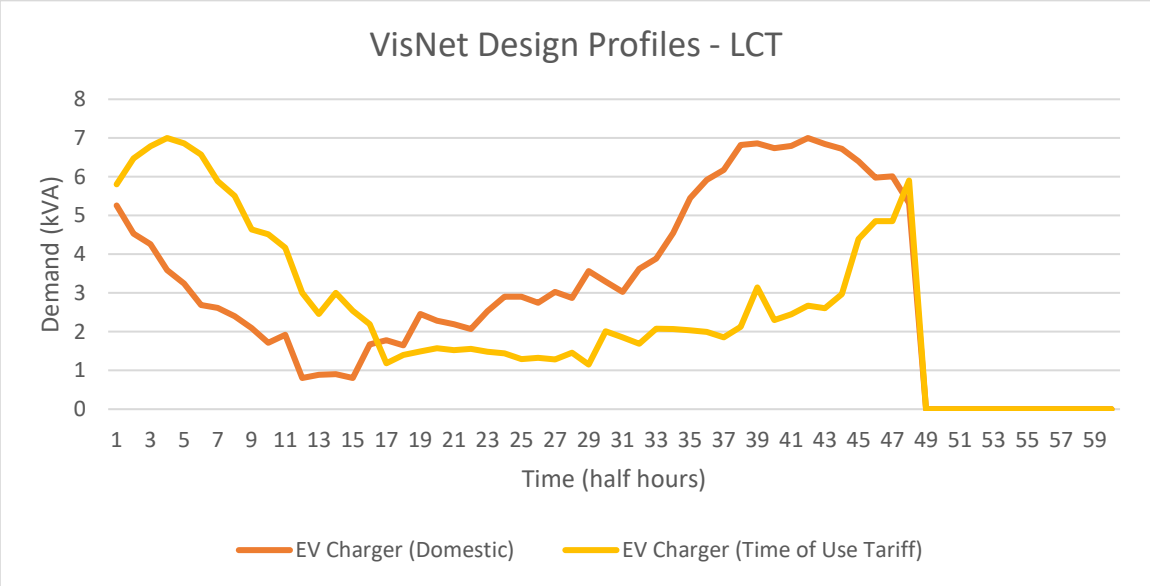

VisNet Design Profiles - Industrial
Demand (kVA)
120
100
80
60
40
20
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
Industrial High Load factor (WinDebut)
Industrial HIgh Load Factor


VisNet Design Profiles - Industrial
Demand (kVA)
120
100
80
60
40
20
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
Industrial XHigh Load Factor
Industrial High Load factor (WinDebut)


VisNet Design Profiles - Domestic
Demand (kVA)
2.5
2
1.5
1
0.5
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
Domestic S
Domestic M
Domestic L


VisNet Design Profiles - LCT
Demand (kVA)
4
3.5
3
2.5
2
1.5
1
0.5
0
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
PV


VisNet Design Profiles - LCT
Demand (kVA)
0
1
2
3
4
5
6
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
Heat Pump (Air Source)


VisNet Design Profiles - LCT
Demand (kVA)
0
1
2
3
4
5
6
7
8
1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59
Time (half hours)
EV Charger (Domestic)
EV Charger (Time of Use Tariff)



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