

Memorandum

Date: 6/30/2021
To: Natalie Porter, El Dorado County and Woodrow Deloria, EDCTC
From: Eric Howard, Fehr & Peers
Subject: **El Dorado County Travel Demand Model User's Guide**

RS19-3865

This user's guide provides step-by-step instructions on how to run the El Dorado County Travel Demand Model (EDCTDM), and details on how to make land use and network changes. A detailed flow chart of the process to update and run an EDCTDM scenario for a project VMT analysis is included in Appendix A. The combination of the EDCTDM's new VMT estimation module and the VMT analysis spreadsheet can be used to summarize the VMT metrics associated with an individual TAZ, the City of Placerville, and Unincorporated El Dorado County. These two tools make it possible to summarize home-based work VMT per worker, home-based VMT per resident, and total VMT per service population using the EDCTDM.

To run the EDCTDM, the user must have the Cube software package installed. The latest updates to the EDCTDM were created and tested using Cube version 6.4.3. Additionally, the user must have ArcGIS installed to use Cube's data manager and to complete the calculations necessary to apply the built environment-based vehicle trip rate reductions (please review the EDCTDM model update memorandum for details on these reductions).

Running the EDCTDM

Step 1: Open the EDCTDM's Cube Catalog

The EDCTDM can be run by unzipping the model package and double-clicking on the Cube Catalog file "EDC_TDM.cat". When the catalog file is first opened you should see a message asking if you would like to update the path for all Applications in the catalog. Click the "Yes" button to allow the catalog to update the relative path information to the new location for the catalog. This step is necessary to run the EDCTDM, but it is only required when EDCTDM is moved into a new folder.

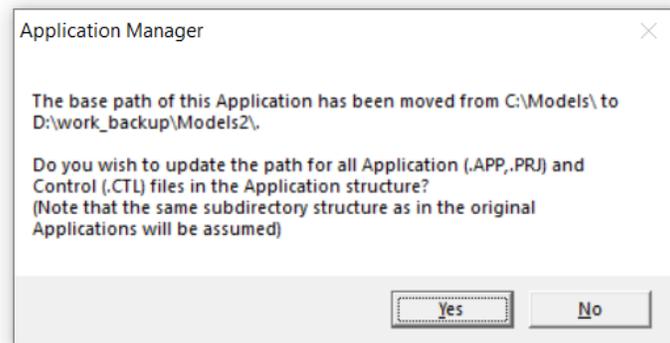


Figure 1: Application manager prompt to update the file paths used by the EDCTDM.

Step 2: Open the Scenario Manager and Select the Model Scenario to Run

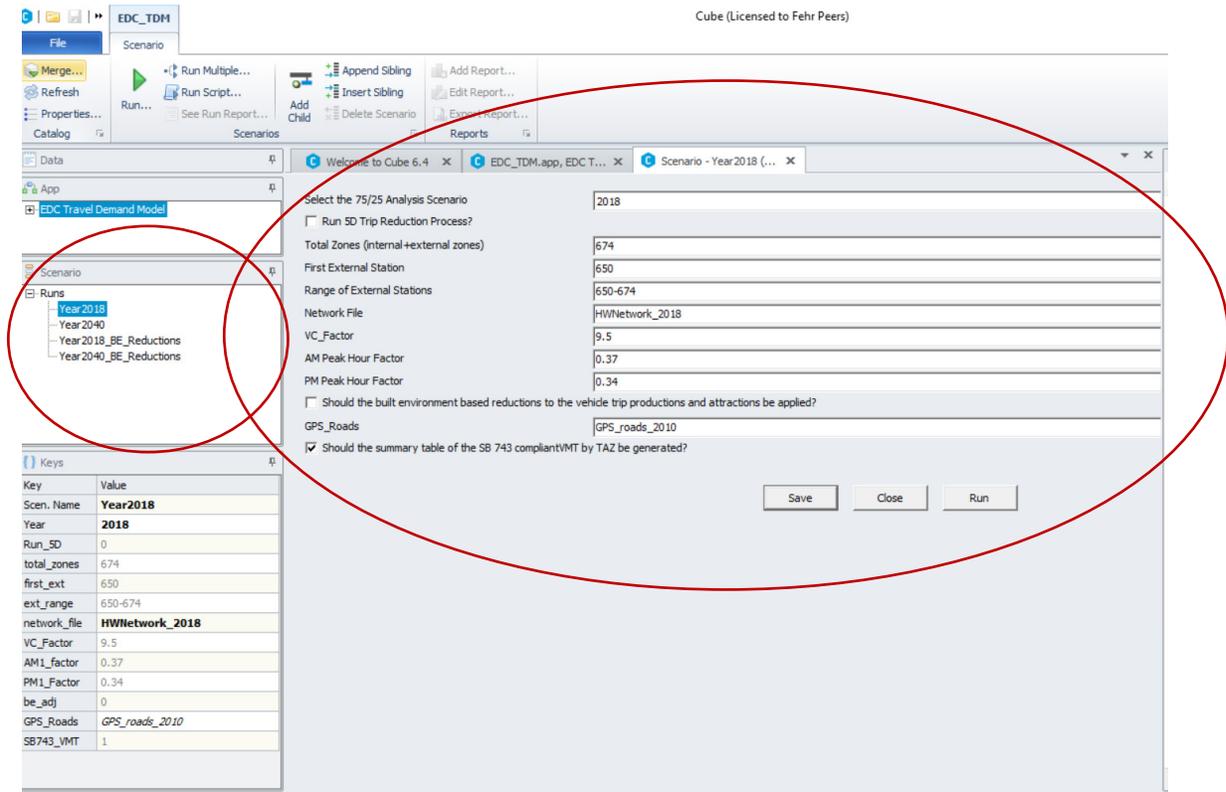
The next step to run the EDCTDM is to select a specific model scenario. The scenario manager can be viewed by clicking on the "Scenario" tab.



Figure 2: Click on the "Scenario" tab to open the scenario manager.



Select a specific scenario to run from the Scenario menu on the left-hand side of screen. After a scenario has been selected click on the green run button to open the input form for the selected scenario. This form allows you to modify the catalog keys used when running the scenario.



Catalog keys are used to set specific parameters used in the model run. These parameters include:

- The analysis year (2018 or 2040)
- A check box to indicate if the original 5D Trip Reductions should be applied
- The total number traffic analysis zones (TAZs) used in the model included the gateway zones
- The number of the first gateway zone
- The range of the gateway zones
- The name of the network feature class
- The V/C factor
- The AM Peak Hour Factor
- The PM Peak Hour Factor
- A check box to indicate if the built environment-based reductions should be applied to the productions and attractions
- The name of the GIS layer that represents the detailed/GPS-based roadway network



- A checkbox to indicate if the SB 743 complaint VMT summaries by TAZ should be generated

Step 3: Save the Scenario Details and Run the EDCTDM

To run the scenario just click on the “Save” button and then the “Run” button.

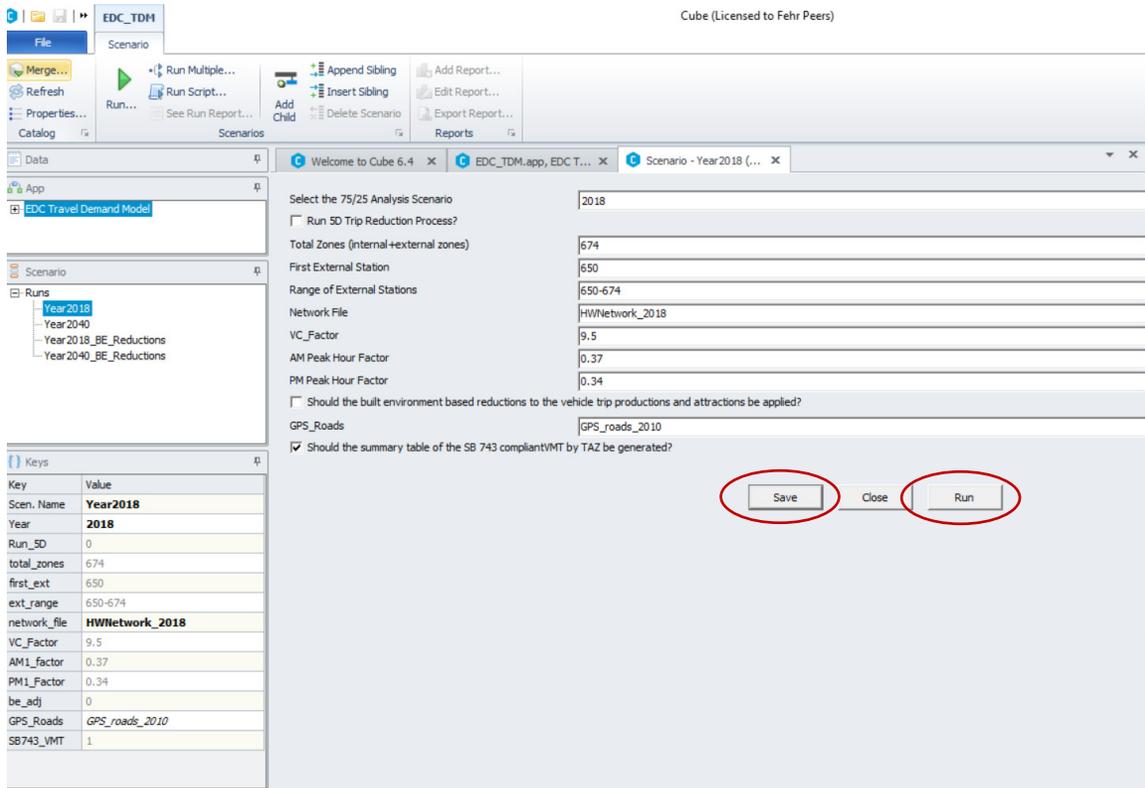


Figure 3: Click on “Save” to save the scenario details and “Run” to run the model scenario.

The results of the model run will be saved in the “Runs” folder inside the cube catalog directory. Inside the “Runs” folder there are scenario specific folders (e.g., “Year2018”, “Year2040”) that contain outputs for the scenario. These outputs include cube network files with the loaded volumes and the various production, attraction, and origin-destination matrices by time-period and trip purpose. If the VMT summary check box was checked in the scenario manager, this folder will also contain the VMT summary output tables by TAZ.

The VMT summary tables include:

- Home-Based Work VMT by TAZ (2018Home_Based_Work_PA_VMT_Summary.dbf) – This table provides a summary of the VMT from home-based work attractions for each TAZ.
- Home-Based VMT by TAZ (2018Home_Based_PA_VMT_Summary.dbf) – This table provides a summary of the VMT from home-based productions for each TAZ



- Total Origin-Destination VMT by TAZ (2018Total_OD_VMT_Summary.dbf) – This table summarizes the total VMT associated with each TAZ.

Step 4: Update the EDCTDM VMT Analysis Excel Workbook

Excel Workbooks that summarize VMT for a single model scenario are included with the EDCTDM files. These workbooks use the VMT summary tables to create both TAZ and jurisdictional-level VMT summary tables. The contents of the three VMT summary output files can be copied into the corresponding sheets within the workbook. Detailed instructions on how to update the Workbook can be found on the “README” sheet in the Workbook.

Making Land Use Changes

Making changes to one of the EDCTDM’s scenarios can be done by modifying the land use file (“2018ZBAS.dbf” or “2040ZBAS.dbf”) associated with the scenario year. The land use files can be found inside the “Runs” folder in the Cube Catalog directory. Each row in these files represents the land uses for a specific TAZ. Table 1 provides a summary of the columns in the land use files. If changes are made to the number of households in the land use files, then the household cross-classification file (“2018HHMV.dbf” or “2040HHMV.dbf”) needs to be updated. Table 2 provides an overview of the data in the cross-classification files.



Table 1: Land Use File Summary

Land Use Category	Description	Notes
Z	Unique identifier for each TAZ	-
C	Constant, with a value set to 2	-
HH	Total households	The value in this column must equal the total of SFHH, MFHH, and MHHH
RET	Number of retail employees	-
NRET	Number of nonretail employees	The value in this column should equal the sum of OFF, MED, EDU, and MO
COLL	Number of college students	-
K12	Number of K-12 students	-
PTIME	Terminal time of Production end of the TAZ	-
ATIME	Terminal time for Attraction end of TAZ	-
PARK	Parking Cost	This value should be equal to zero for all TAZs in the EDCTDM
DAVIS	If in Davis = 1, Not in Davis = 0	This value should be equal to zero for all TAZs in the EDCTDM
PEI	Pedestrian Environment Index - Ratio of attractiveness of walking or bicycling	-
TGDIST	Model districts used in the trip generation calculations	-
OFF	Number of office employees	-
MED	Number of medical employees	-
EDU	Number of educational employees	-
MO	Number of manufacturing/other employees	-
SFHH	Number of single-family households	-
MFHH	Number of multifamily households (2-4 units per building)	-
MHHH	Number of multifamily households (5+ units per building)	-



Table 2: Household Cross-Classification File Summary

Cross-classification Variable	Description
ZONES	TAZ identifier
PERSONS	Number of persons/residents
WORKERS	Number of residents who are workers
INCOME	Household income category
HHLDS	Number of households within the TAZ that have same persons, workers, income characteristics

Updates to household cross-classification file should be made using the best information available on the number of residents, workers, and income of the households in each TAZ. However, sometimes this level of information is not available for proposed land uses projects. If the dwelling units being added to a TAZ are generally consistent with the type of dwelling units that are already in the TAZ (e.g. you are adding single-family homes to a TAZ with single-family homes, or you are adding a mix of housing types to a TAZ that has a mix of single-family and multifamily homes), then you can proportionally increase the cross-classification file so the total number of households in the TAZ matches the new total that is being added to the land use file. If the housing types being added are substantially different then what is currently present in the TAZ and you do not have additional information on the household characteristics, then update the cross-classification file using information from a TAZ that has a similar housing mix to the proposed project.

Adding a New TAZ

The EDCTDM are includes extra zones (TAZ number 629 to 649) that can be repurposed to represent a proposed land use project. The centroid locations for the repurposed TAZs should be moved to the proposed project's location and connected to the model network. Additionally, the GIS Layer that represents the TAZ boundaries should be updated to reflect the changes. The boundary layer ("taz_boundary") can be found inside the "BE_Data.gdb" file geodatabase inside the Geodatabase folder in the Cube Catalog directory. The boundary layer is used to calculate the some of the built environment metrics used in the vehicle trip rate reduction process. The boundary layer must be updated if the built environment reductions are being applied.

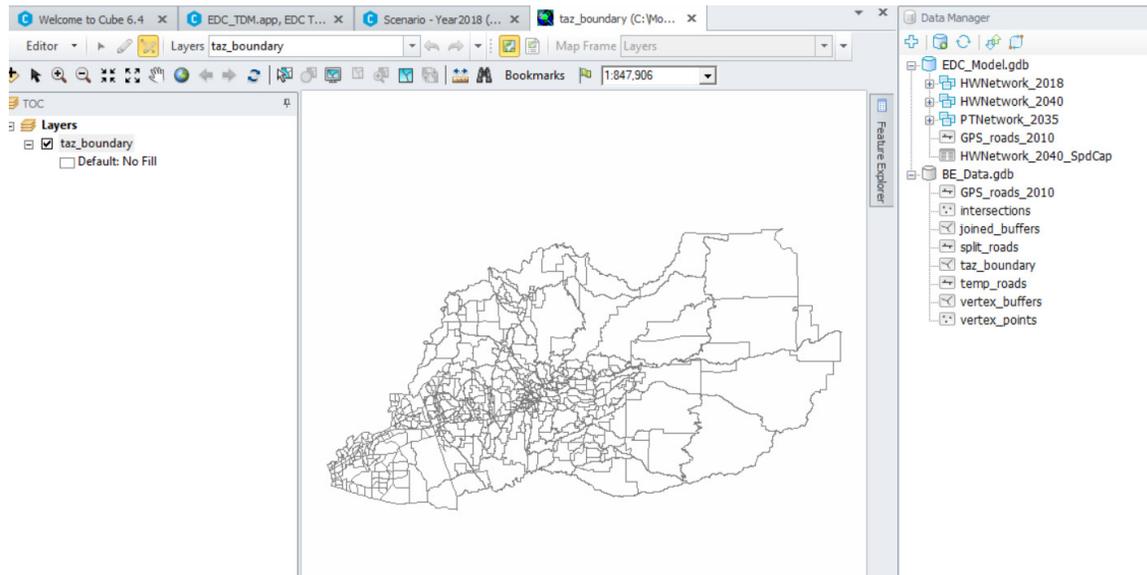


Figure 4: TAZ boundary layer

Modifying the Model Network

The Data Manager within EDCTDM's Cube Catalog can be used to make edits to the model network. The built-in editing tools can be used to create or modify network links and nodes. Additionally, the editing tools can be used to modify the characteristics of the network links including the link distance, number of lanes, capacity classification, speeds, HOV, and bicycle lanes. Please note that link distances are not automatically updated by default, so the distances will have to be calculated for any new links or any links whose shape has been modified. Also, it is important to confirm that the "EDC_Model" file geodatabase being shown in the Data Manager is the one that corresponds to the Cube Catalog directory that you are working on. The Data Manager by default references the last geodatabase that was opened, which may or may not be the geodatabase in the Cube Catalog that you currently have open.

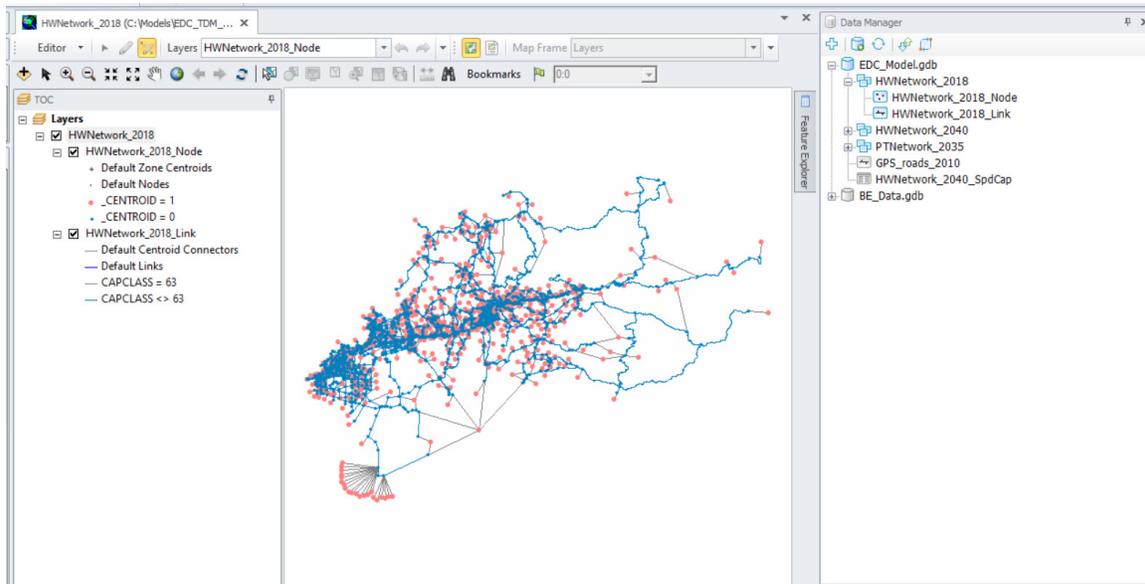


Figure 5: Example showing the model network and the data manager

If you are planning on using the built environment vehicle trip rate reductions, consider making updates to the GPS-based roads GIS layer too. This layer represents the true shape of the roadways within the EDCTDM boundary area, and it is used to calculate the intersection density metric used in the trip rate reduction calculations.

Adding in a New Scenario

Step 1: Create the Land Use and Network Files for a New Scenario Year

Follow the processes listed above to modify the existing land use and network files to represent the conditions associated with the new scenario. Make sure that the names of the land use and household files begin with the scenario year (e.g., 2020HHMV.dbf and 2020ZBAS.dbf for files used in a new 2020 scenario year).



Step 2: Add the New Scenario Year to the Cube Catalog Key

Add a new scenario year to the Cube Catalog key by right clicking on the year in the "Keys" menu and click on "Properties". This will open the Edit Key dialog box, and you can add a new scenario year as an option by clicking on the "Add" button in the "List of Allowed Values". In the "Value" text box add your new scenario year, and then click on the "OK" button twice to save the new scenario year as an option that can be used in the scenario manager.

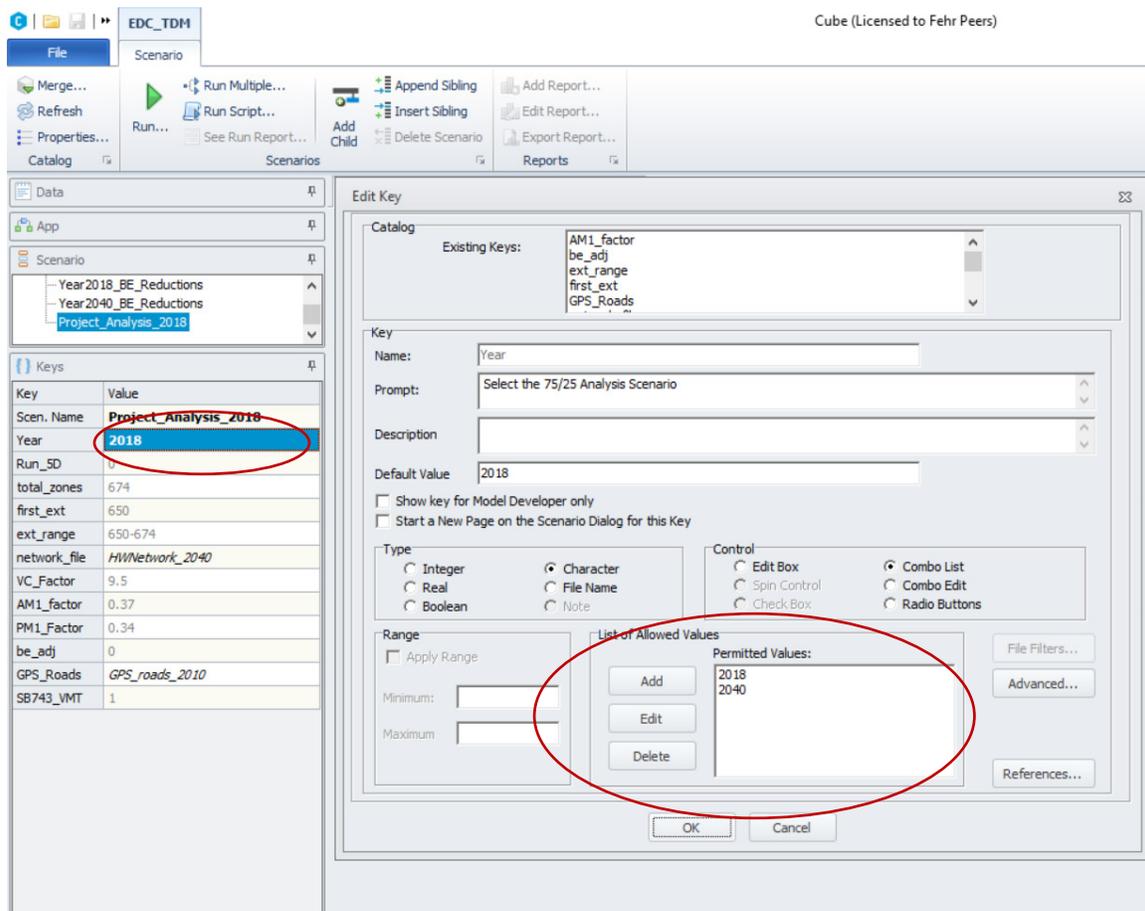


Figure 6: Add the new scenario year to the "Year" key



Step 3: Create a New Scenario Using the Scenario Manager

A new scenario can be added to the Cube Catalog by using the add child and sibling scenario tools, which can be found under the “scenario” tab. Each of these tools will provide a dialog box to input a name for the new scenario. A new folder will be added under the “Runs” folder in Cube Catalog directory to store the outputs from the model run.



Figure 7: Add a new scenario to the scenario manager

The new scenario will be added to the scenario list, and the scenario manager dialog box will open for the new scenario. From this dialog box you can specify the year for your new scenario and review the input parameters. Verify the “Network File” is the network that should be used with the new scenario. Then click “Save” and then “Run” to run the new scenario.

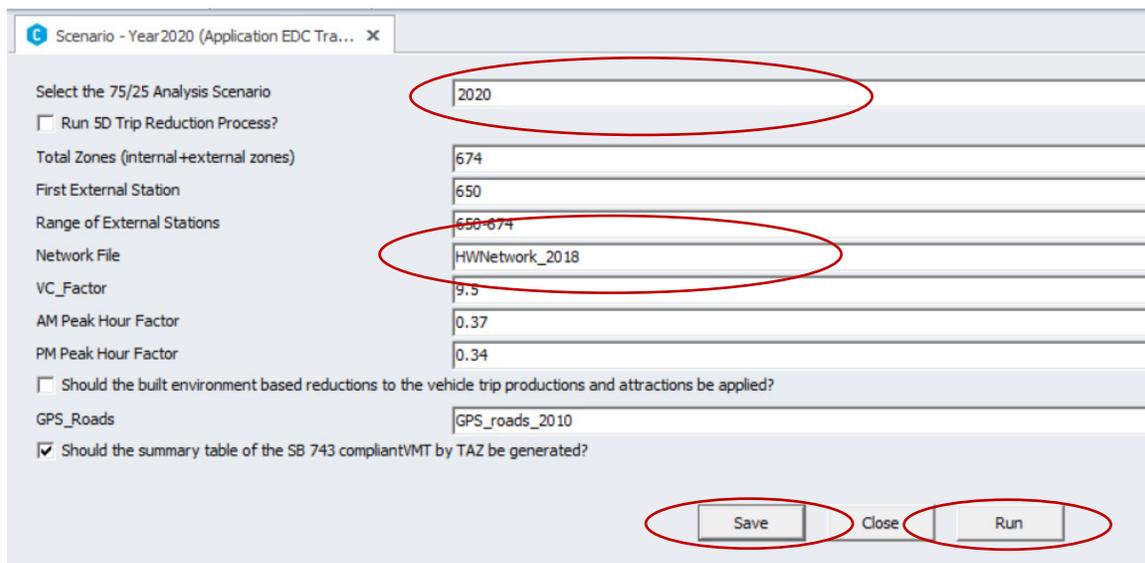


Figure 8: Update the scenario manager



The outputs from the model run will be saved in a new folder within the "Runs" folder in the Cube Catalog directory. The name of this folder will match the name of the new scenario. If the new scenario was created as a child of an existing scenario, then the output folder can be found in the folder with the same names as the parent scenario.

Appendix A: How to Update and Run the EDCTDM Model for a VMT Analysis

