eLCAP

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Table of Contents

Introduction To *eLCAP* v1.0

Printable Version of This Help System

Click the following link to open a PDF version of this help system for viewing, downloading and printing.

See the *eLCAP Report* for a detailed discussion of *eLCAP*.

A list of Acronyms is located at the end of the help system.

Technical Overview

The following *link* is a good starting point for a technical discussion of *eLCAP*.

Getting Started

This section presents

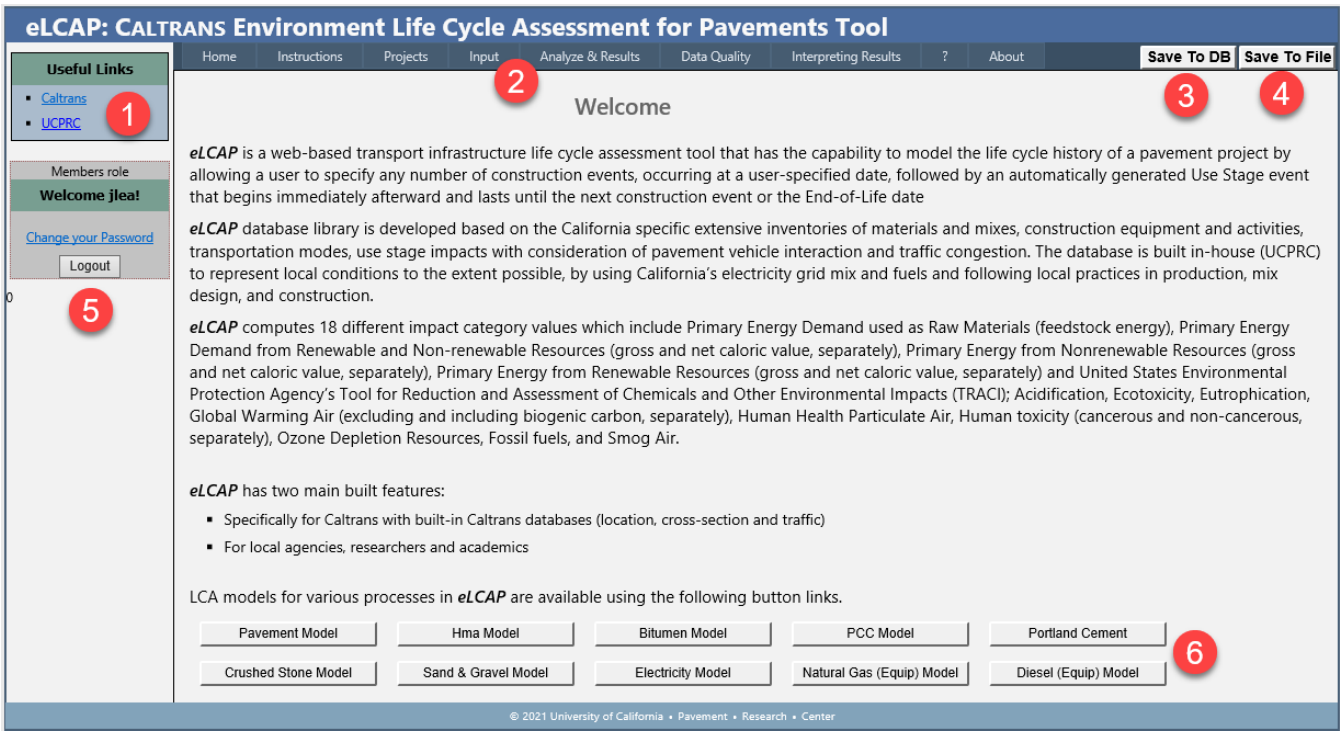
4. User Interface

4.1. Global Controls

Global Controls

The home page for *eLCAP* is shown below. It consists of a left pane with Useful links and login controls, a series of page tabs, and some controls at the upper right and main pane that contains the content of each page as they are selected. The page tabs are disabled until you login.

These global controls are always available regardless of which page you are currently viewing.



Section notes:

1. Useful links
2. Page tabs - you navigate between application pages by selecting a page tab
    - Home - the home page
    - Instructions - basic instructions on how to use *eLCAP*
    - Projects - this page is where you select the current project and trial to use, add/delete projects and trials, etc.
    - Input - there are three pages (three menu items) associated with the Input tab: Manage User Processes, Project Information and Life Cycle
    - Analysis - this page is used to perform an LCA analysis on the pavement project. This is referred to as a "Balance" since *eLCAP* will scale-up upstream flows to satisfy

downstream quantity requirements. See Section 2.1 of the eLCAP Report.

- Data Quality - this page shows data quality assessment of the flow types that are used as input to the various mixes in *eLCAP*
- Interpreting Results - this page provides assistance in understanding the results generated by *eLCAP*
- About - a page that provides information about the status of *eLCAP*

3. Save To DB - selecting this button will save the current data in the UI to the database. You will be asked to confirm this request. *eLCAP* will do an automatic save when you perform an analysis (balance)
4. Save To File - selecting this button will generate a text version (in json format) of your data and allow you to download it to your local hard drive. You can later use the controls on the Projects page to upload this file into *eLCAP* .
5. Login controls - these controls allow you to:
    a. login/logout
    b. change your password
    c. get a temporary password if you have forgotten your current password
6. A series of link buttons that, when selected, will show the LCA model used in *eLCAP*

4.2. Projects Tab

4.2.1. Manage DB Project

Manage Database Projects and Trials

The following controls, located on the **Projects Page**, are used to select and manage *eLCAP* projects and project trials in the *eLCAP* database.

A *eLCAP* "project trial" or just trial, is a specification of a pavement project that can be used for a LCA Analysis (or Balance). A *eLCAP* project trial contains data items such as:

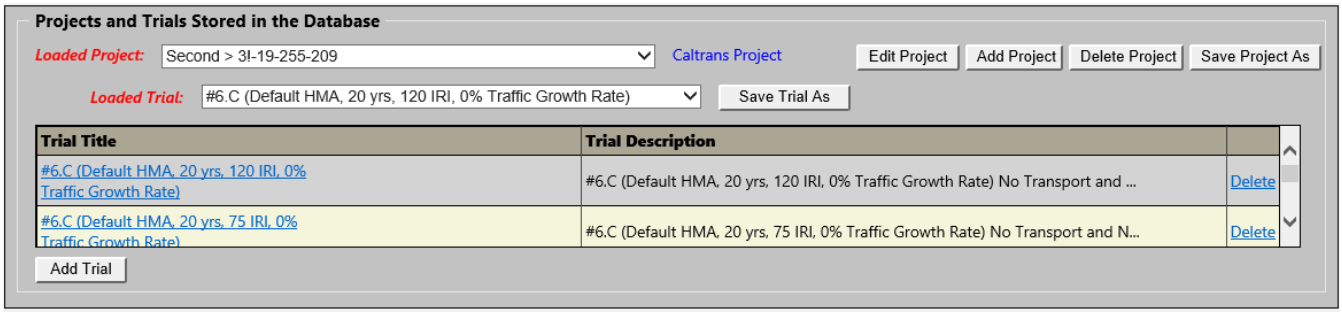
- The start and end location of the pavement project on a route (begin and end postmiles for Caltrans projects and project length for Local Agency projects)
- Traffic loading, e.g., truck load distribution group (a WIM station)
- Climate zone
- Pavement structure, e.g., layer type, material, layer thickness, etc.

eLCAP collects any number of project trials into a a "project" for management purposes. In this way, you can have different configurations, e.g., a 2-layer system, a 3-layer system, different layer materials, etc., for a given roadway project, all collected into a single *eLCAP* project for easy management and logical organization.

eLCAP creates a default project with one default trial when you first login. You use the controls below

to change the default project and trial names and add an appropriate description for both.

You can add any number of additional projects with any number of trials.



The following is a description of the project-related controls:

- Loaded Project dropdown - used to select a *eLCAP* project
- A note (in blue) to indicate if the currently loaded project is on the Caltrans highway system or a Local Agency project
- Edit Project button - used to edit the selected *eLCAP* project
- Add Project - used to add a new *eLCAP* project
- Delete Project - used to delete the selected *CalME* project (*eLCAP* prevents you from deleting all projects)
- Save Project As - used to make a copy of the selected *eLCAP* project, including all of its trials

The following is a description of the trial-related controls:

- Loaded Trial - used to select a trial contained in the selected *eLCAP* project
- Save Trial As - used to make a copy of the selected trial that will be added to the list of trials in the selected *eLCAP* project
- Trial Title hyperlink - used to edit atrial
- Delete button - used to delete a trial

The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

4.2.2. Load a eLCAP Input File

Load a *eLCAP* Input File

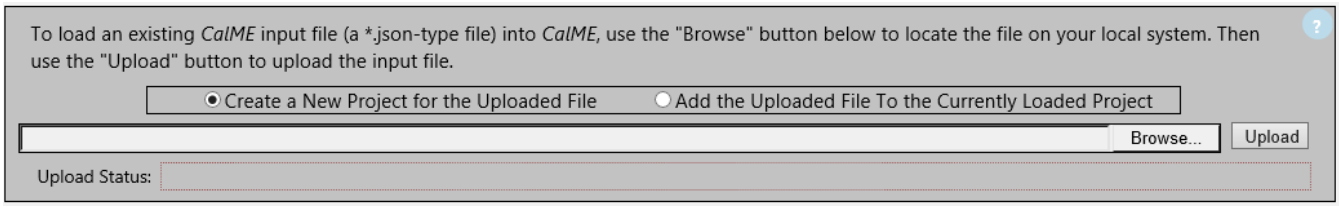
The following controls, located on the **Projects Page**, are used to browse the local computer's file system to locate and select a file that has been saved from within *eLCAP* and load it back into *eLCAP*.

One of the buttons in the upper-right of the *eLCAP* application window allows you to save a text-file version of the database data for the selected project trial to your local computer's file system to act as a backup to the data stored in the *eLCAP* database and for project documentation.

The "Save To File" button generates a json-formatted text file and allows you to download it to your local computer's file system. Once a *eLCAP* input file has been downloaded, you can use the controls described here to select it and upload it back into *eLCAP*.

This is activity is not done very often but can be useful for the following scenarios:

- Something has happened to the database version of the trial data e.g., it has become corrupt, the UCPRC database server had an issue, you made changes to the database version that you would like to revert back to an earlier version, etc. Again, this does not happen very often.
- A colleague has an example trial that you would like to use. In this case, your colleague would export the trial to a file, send it to you, and then you would be able to load it into your database and use it.



The following is a description of the *eLCAP* exported file related import controls:

- Radio buttons to select the destination project for the uploaded file data
  - Create a New Project for the Uploaded File - selecting this option will create a new Project for file data using the name of the project in the file. This is the default action.
  - Add the Uploaded File to the Currently Loaded Project - selecting this option will add the file data to the currently load project
- Browse button - used to locate and select a *eLCAP* exported file on the local computer's file system
- Upload button - used to upload the file to *eLCAP*
- Upload Status area - used to show the status of the file upload process

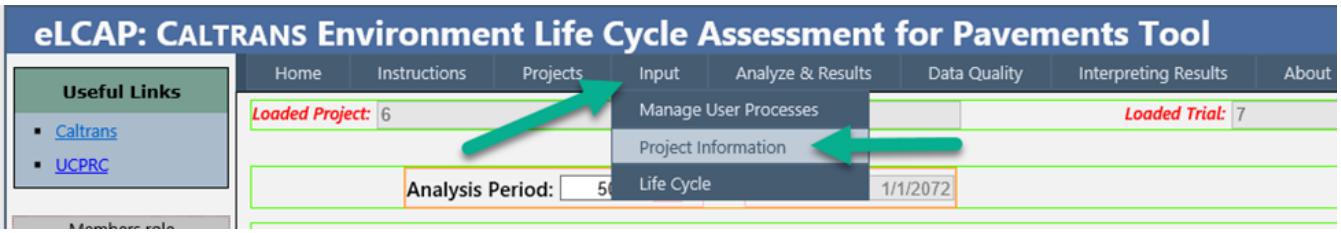
The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

4.3. Input Tab

4.3.1. Project Information

Project Information Page

The following controls are located on the **Input -> Project Information Page.**



The content of this page is *dependent* on the Project Type selected when the project was added.

If the project is located on the Caltrans Highway system, then this page is used to specify:

- Location of the pavement project on a route
- Pavement cross section
- One way traffic (read only)

If the project is not on the Caltrans Highway system (a Local Agency project), then this page is used to specify:

- Project Details
- Traffic
- Pavement cross section

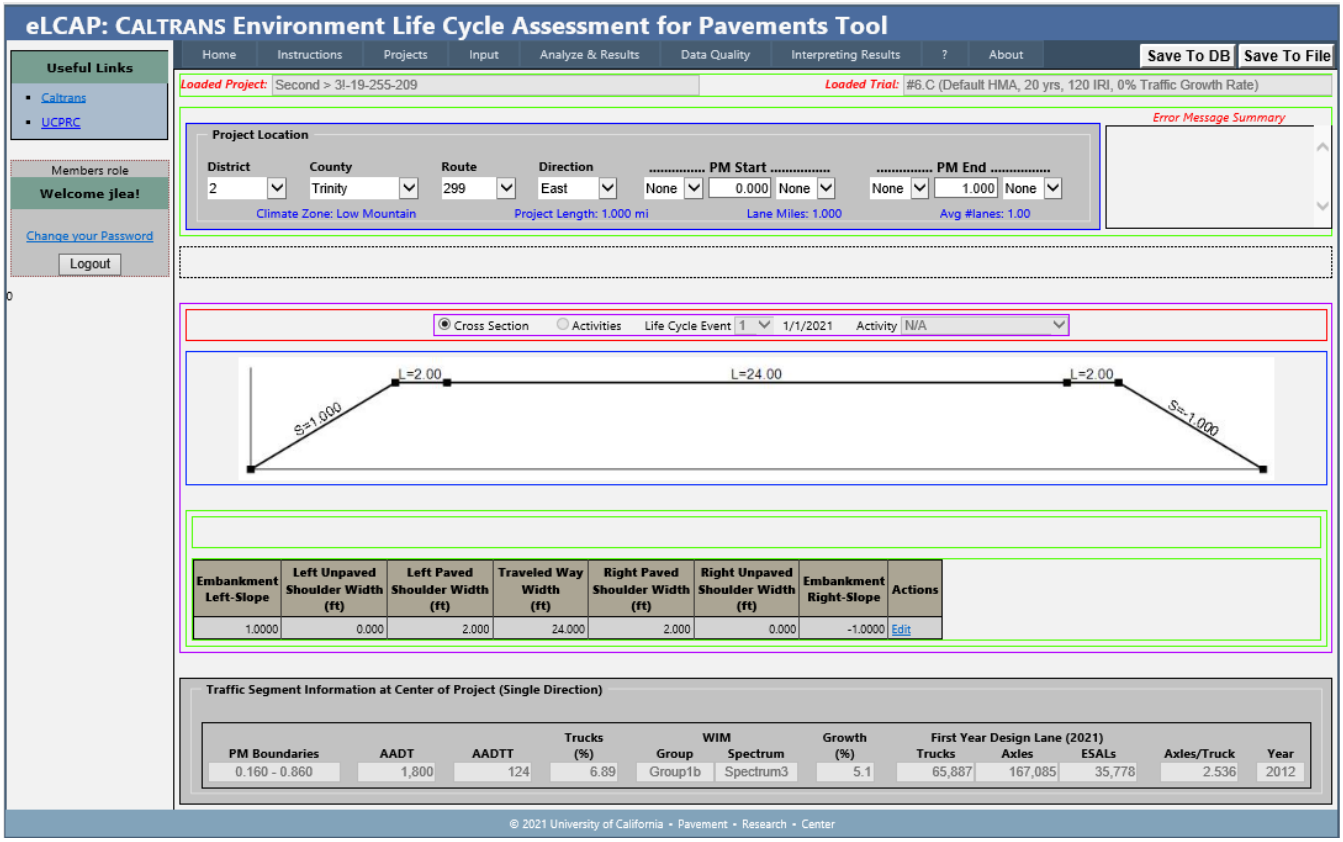
4.3.1.1. On the Caltrans Network

Caltrans Project Information Page

The following controls are located on the **Input -> Project Information Page**.

This page is used to specify the following for a project on the Caltrans highway system:

- Location of the pavement project on a route
- Pavement cross section
- Traffic (read only - informational)



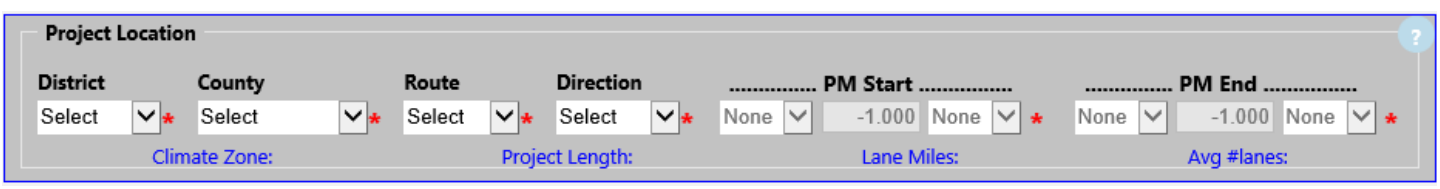
4.3.1.1.1. Location - CT

Location - For a Project Located on the Caltrans Highway System

The following controls, located on the **Input -> Project Information Page**, are used to specify the location of the pavement project on a route in California.

eLCAP uses the location of the project for the following:

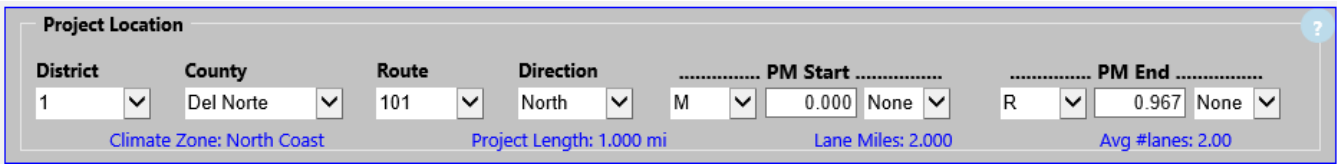
- obtaining the number of lanes of traffic in the direction of the route using the Caltrans Linear Reference System (LRS)
- computing project length and lane miles for material quantities and equipment time of use estimates
- obtaining traffic counts (AADT, AADTT) from the Caltrans traffic database
- determining an appropriate truck load distribution (WIM station)
- determining an appropriate climate zone from the Caltrans Climate Zone map



The red asterisks (*) indicate that a data item is required.

A pavement project is located on a route by the usual: **District-County-Route-Direction**, with **PM Start** and **PM End** of the start and ending of the pavement project. Postmiles (PM) are fully qualified with prefixes and suffixes. Details on postmiles can be found here.

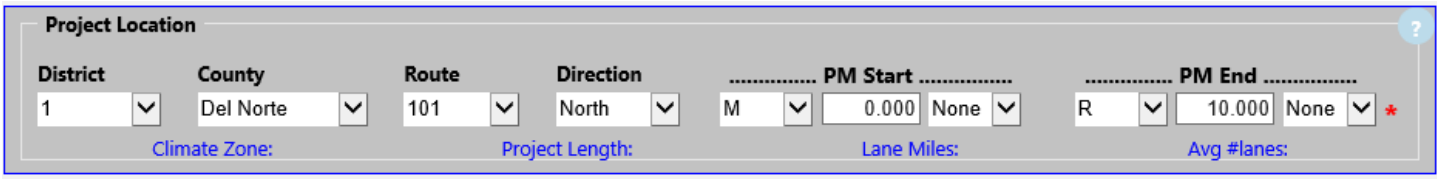
eLCAP assists with the selection of the starting and ending PMs for a new project by assigning the project Start to be the PM of the beginning of the route and the project End to be the PM associated with a project length of 1.0 mile, after a selection for Direction is made. Shown below is what you will see when you select Route 101 North, in Del Norte county.



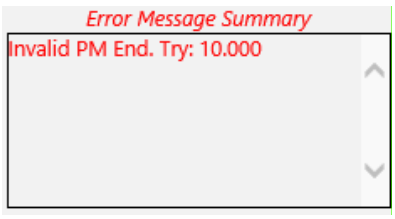
After you select North for Direction, *eLCAP* will generate a Start PM of "M0.000" and a End PM of "R0.967". These PM selections are for the start of Route 101 North in Del Norte county, and the PM associated with a project length of 1.0 miles. The blue text shown below the Start and End PMs shows the length of the project (1.0 miles), the lane miles (2.000) and the average number of lanes for the length of the project (2.00).

You can make changes to the default location for your specific project; generating a default project location gets you up-and-running quickly.

eLCAP will also assist with a manual PM specification, as illustrated below.



If the PM value entered by the user (e.g., 10.000) is not valid, a message in the Error Message Summary text box will be generated.



eLCAP determines the validity of a PM by using the Caltrans Linear Reference System (LRS). The LRS is updated on a regular basis and *eLCAP* uses the latest official release of it.

eLCAP uses the center-point location of the project to determine an appropriate truck load distribution (i.e., a WIM Station) and an appropriate Climate Zone using Caltrans' LRS. The WIM station and climate zone are use during the Use Stage, which occurs between successive construction life cycle events.

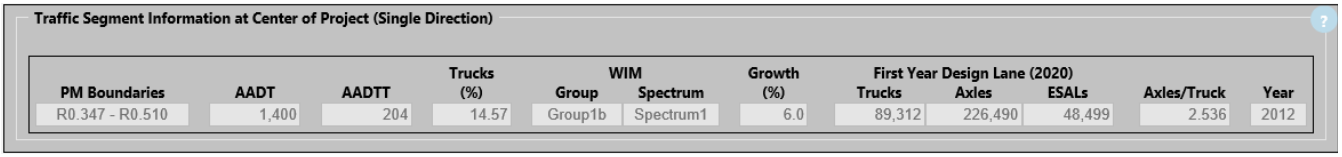
The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

Traffic - For a Project Located on the Caltrans Highway System

The following controls, located on the **Input -> Project Information Page**, are used to view the one-way traffic counts and other traffic data.

eLCAP uses one-way traffic data for the following:

- The effects of the Use Stage, occurring between successive construction events, is modeled by a GHG equation (based on IRI roughness increasing with time) dependent on car and truck volumes for each lane in the project



eLCAP obtains the one-way traffic data by finding the traffic segment in the Caltrans traffic database that contains the PM for the center of the project.

One-way traffic data item:

- PM Boundaries for the traffic segment containing the center of the project
- AADT - average annual daily traffic (cars and trucks)
- AADTT - average annual daily truck traffic
- Percent Trucks - the percentage of trucks in AADT
- WIM - Group and Spectrum (an axle load distribution curve)
- Percent Growth - the percent traffic growth from the latest traffic measurement and the date for the first event. *eLCAP* uses today's date until events have been defined.
- First Year Design Lane: Trucks, Axles and ESALs. *eLCAP* uses today's date until events have been defined.
- The number of axles per truck
- The latest year of traffic data

The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

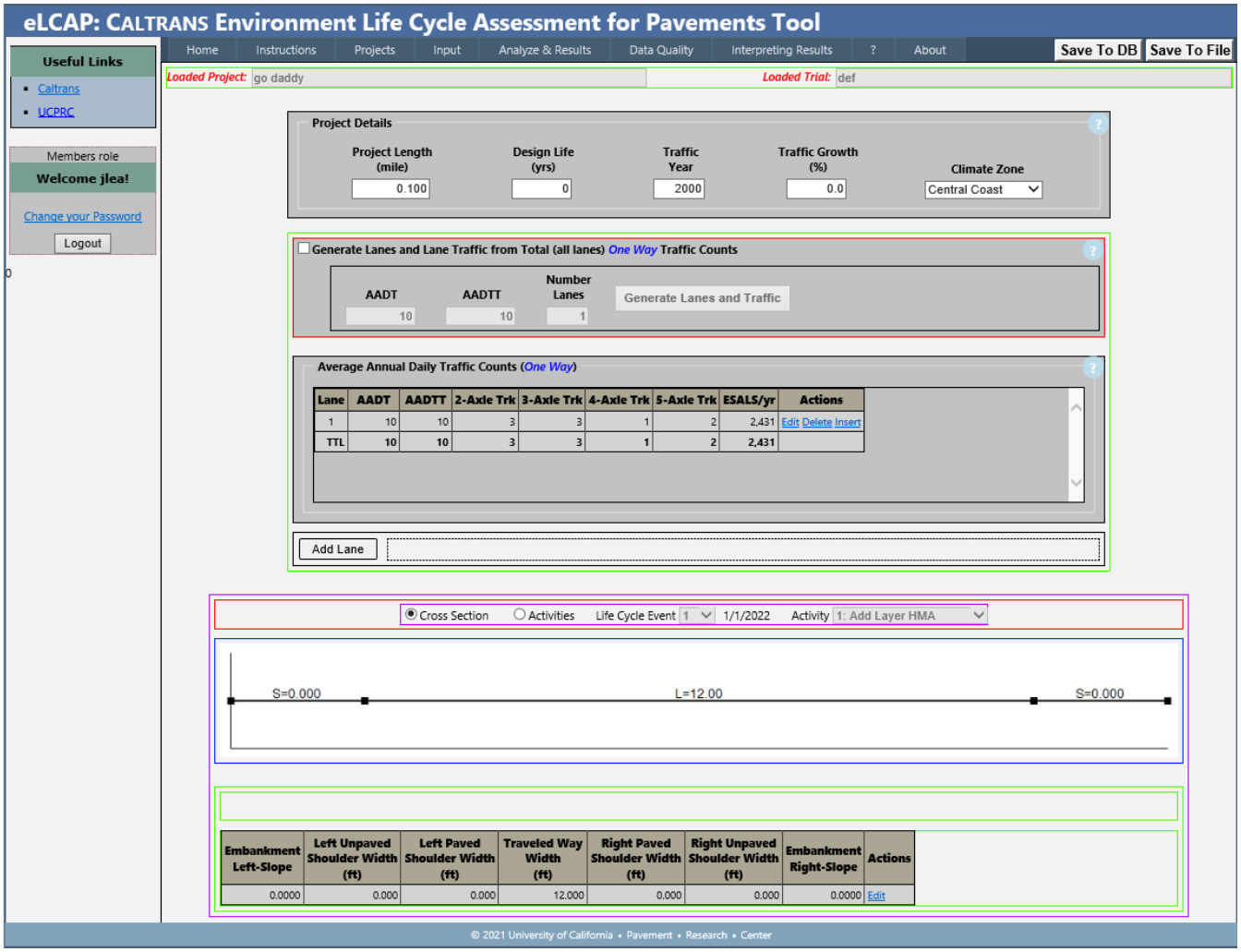
4.3.1.2. Local Agency

Local Agency Project Information Page

The following controls are located on the **Input -> Project Information Page**.

This page is used to specify the following items for a Local Agency Project:

- Project Details
    - Project Length
    - Design Life
    - Year associated with the traffic data
    - Percent traffic growth from the traffic year to the date of the first life cycle event
    - Climate Zone in which the project is located
- Traffic Counts for each lane (two methods)
    - Generate from one-way route traffic counts
    - Explicitly car and truck counts for each lane
- Cross Section segment widths
    - Embankment slope, left and right
    - Unpaved and paved shoulder widths, left and right
    - Traveled Way width



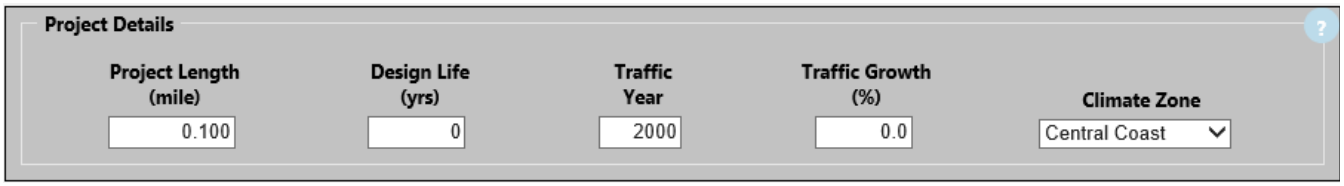
4.3.1.2.1. Project Details - Local

Project Details - For a Project Not on the Caltrans Highway System

The following controls, located on the **Input -> Project Information Page**, are used to specify some details for Local Agency projects.

eLCAP uses the data specified in the Project Details section for the following:

- Project Length - used to compute material quantities and generate construction equipment time of operation estimates
- Design Life - TBD
- Traffic Year - the traffic collection year (or the year it was last verified)
- Traffic Growth - a percent increase in traffic from the Traffic Year to the date for the first event; *eLCAP* uses today's date if no events have been defined
- Climate Zone - specifies the California climate zone in which the project is located



eLCAP uses traffic data (cars and trucks in lanes) and the selected climate zone to select a specific set of equation coefficients used in modeling the growth of IRI over time. The IRI is part of the GHG equation (along with lane-based car and truck counts) used during the Use Stage (see Section 2.7.2 of the eLCAP Report).

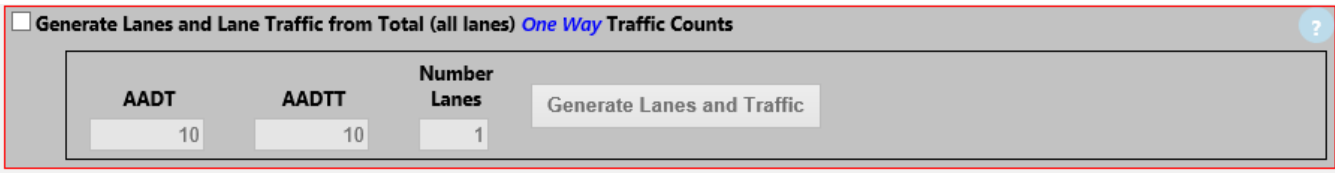
The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

4.3.1.2.2. Traffic - Local

Traffic - For a Project Not on the Caltrans Highway System

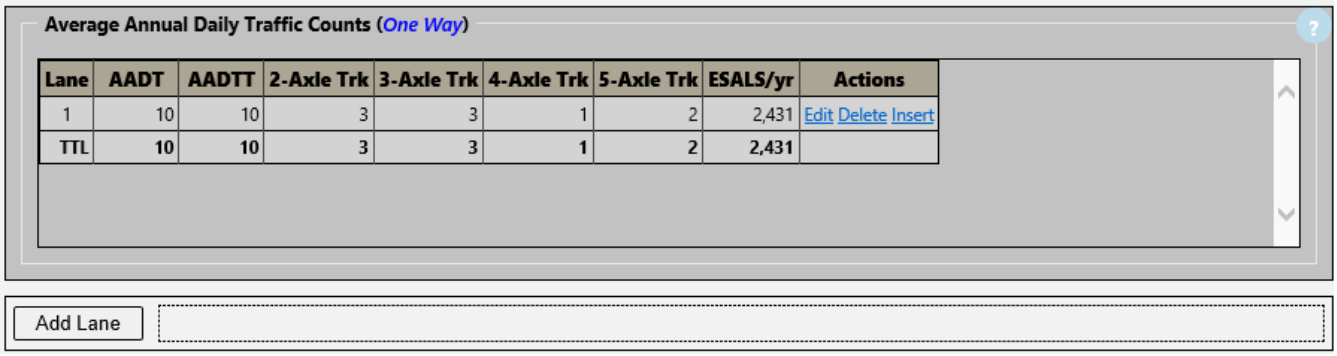
The following controls, located on the **Input -> Project Information Page**, are used to specify lane-based traffic counts for Local Agency projects.

eLCAP uses traffic data (cars and trucks in lanes) and the selected climate zone, to select a specific set of equation coefficients used in modeling the growth of IRI over time. The IRI is part of the GHG equation (along with lane-based car and truck counts) used during the Use Stage (see Section 2.7.2 of the eLCAP Report).



eLCAP provides two methods of specifying lane-based traffic counts:

- Using the controls shown above. First select the checkbox, and then specify AADT, AADTT and the Number of Lanes, and then select the Generate Lanes and Traffic Button. *eLCAP* will use the single-direction, route based AADT and AADTT, and the Number of Lanes to distribute the car and truck counts across each lane and also distribute AADTT into 2, 3, 4 and 5-axle counts for each lane.
- Use the grid below. Select the Add Lane button at the bottom and specify a value for all fields for the lane. Repeat of all lanes.



The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

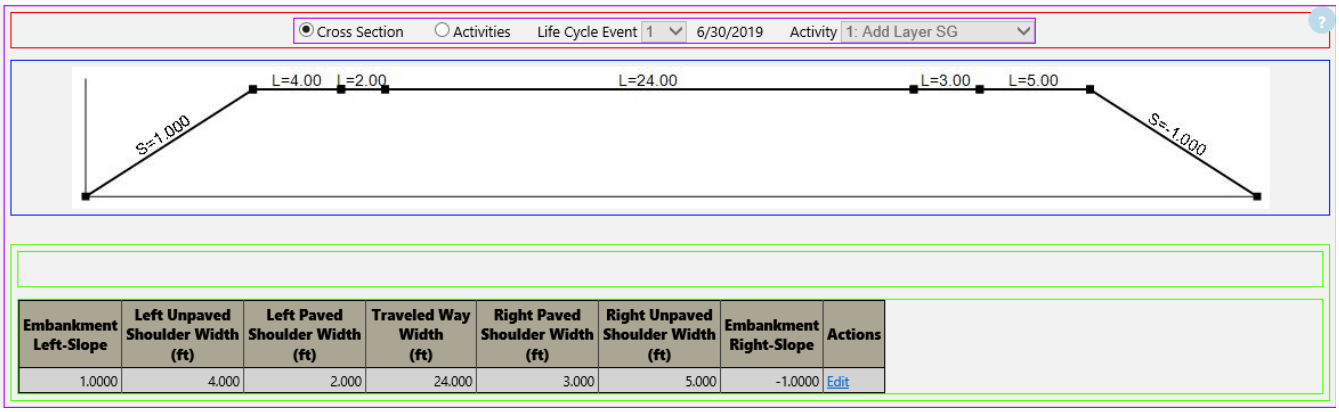
4.3.1.3. Cross Section

Cross Section - For Both a Caltrans and a Local Agency Project

The following controls, located on the **Input -> Project Information Page**, are used to define the roadway cross section.

eLCAP uses the cross section for the following:

- Layer material quantities are computed using the definition of the cross section, the length of the project, the layer thickness and the density of the material

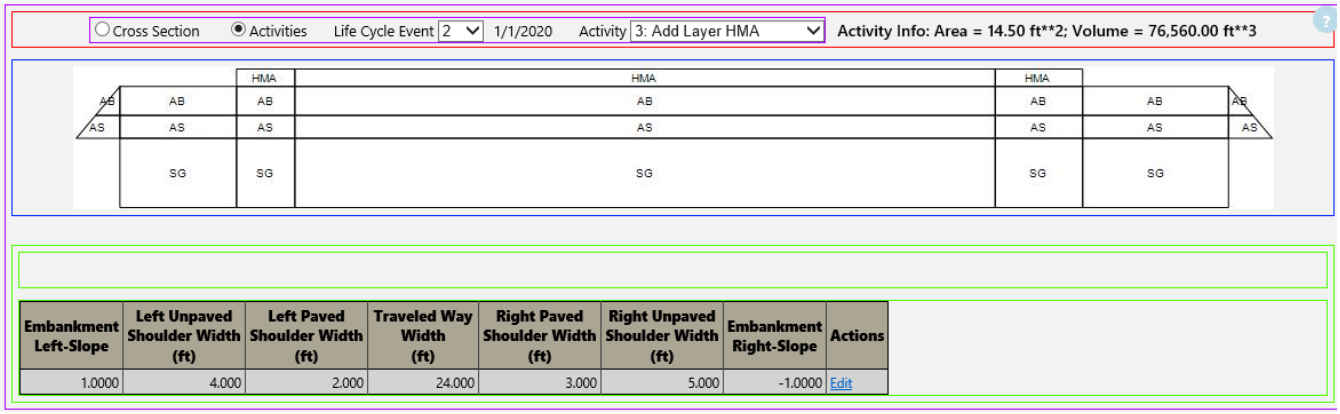


The cross section is defined by:

- The slopes of the embankment, left and right sides
- the unpaved and paved shoulder widths, left and right sides
- The traveled way width

The traveled way is prepopulated using the average number of lanes and the width of a lane (12.0 ft). Selecting the Edit action button puts the row into edit mode and all widths are editable.

The cross section view can be changed to show the activities defined for each life cycle event by selecting the Activities radio button. Once selected, the Life Cycle Event dropdown list and the activity dropdown list become enabled. Selecting an event and an activity will show how the cross section looks for that selection pair.



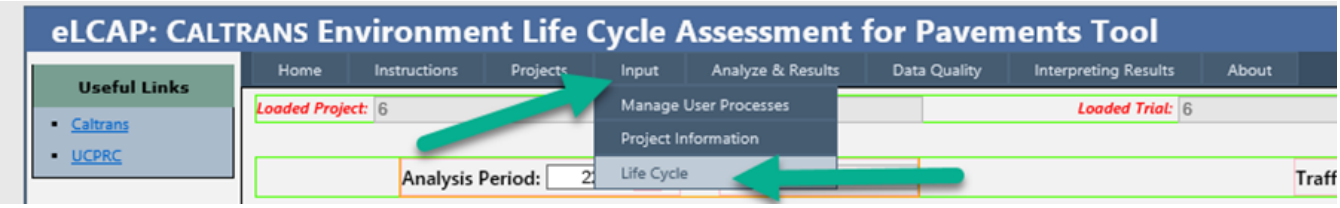
The graphic above is showing the cross section for event 2 (occurring on 1/1/2020) and activity 3 (adding an HMA layer). *eLCAP* also shows the computed cross sectional area (14.5 ft^2) and the volume (76,560.0 ft^3) for the selected event and activity. This volume, along with the material density, is used to compute quantity of material.

The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

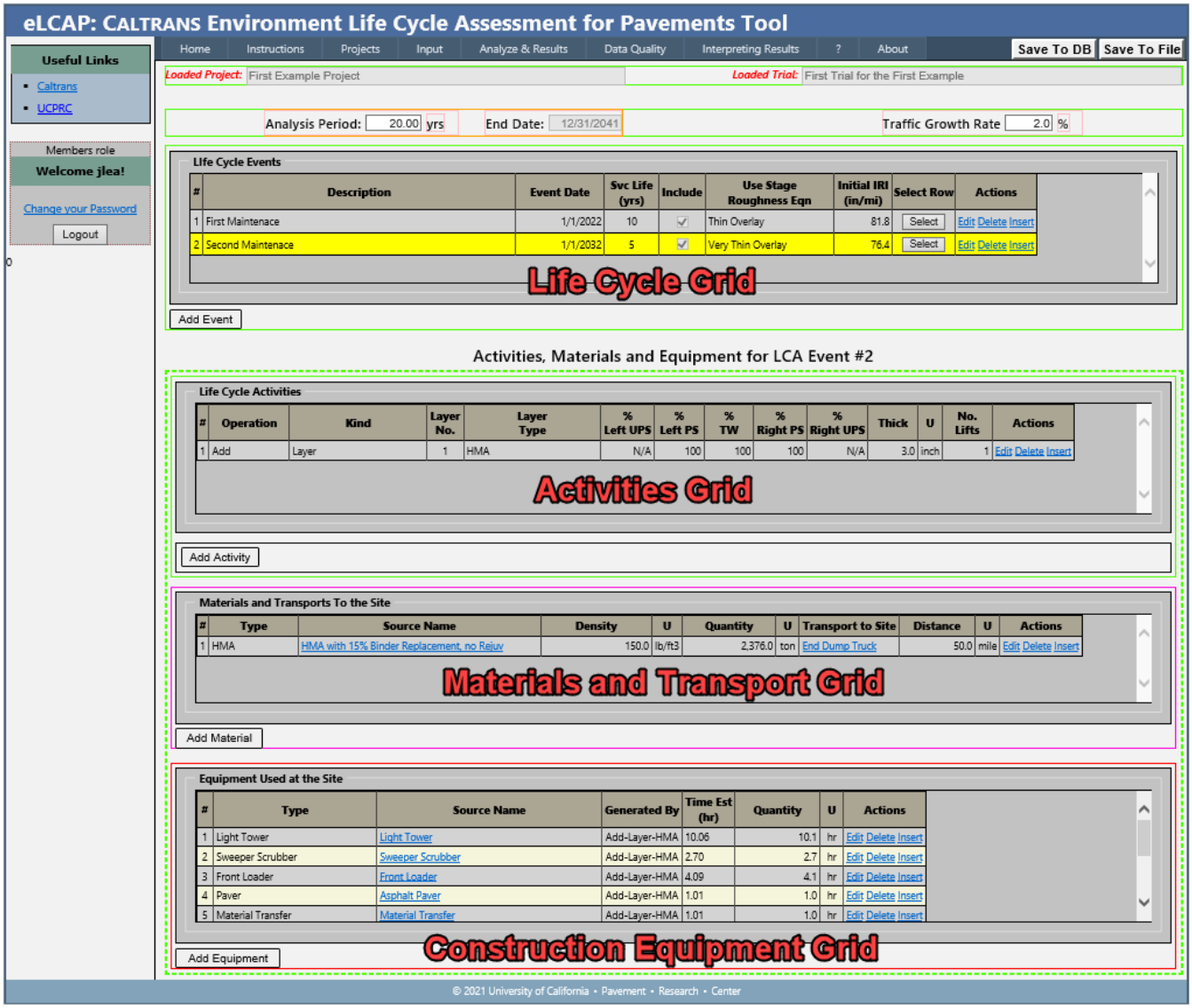
4.3.2. Life Cycle Page

Life Cycle Page

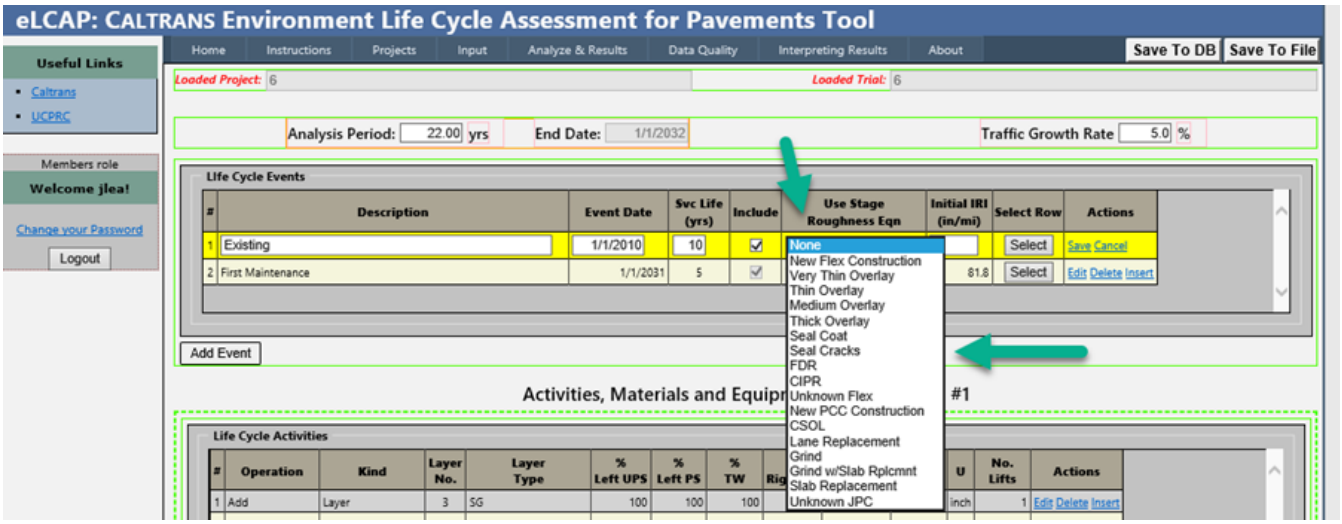
The following controls are located on the **Input -> Life Cycle Page.**



This page is used to define the series of construction events that will model the project's life cycle, along with the activities (adding layers and removing material), materials and lastly construction equipment. The Life Cycle grid is located at the top portion of the Life Cycle page. Each event is a row in the Life Cycle grid. The data in the other three grids are associated with the selected event (shown in yellow). They constitute the details of the event.



A Life Cycle Event is defined by a user supplied description (.e.g., First Maintenance) for the event, the date of the event and the service life of the activities performed for the event. In addition, a selection for the Use Stage Roughness Equation can be made to indicate to *eLCAP* to: (1) include the Use Stage, from the selected construction event to the next construction event, and (2) a treatment selection that is representative of the activities for the event.

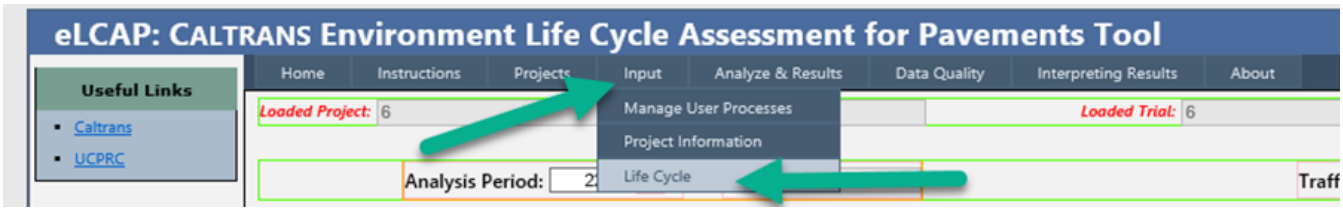


Each of the grids on the life cycle definition page consists of rows and columns. When the page first opens, the rows appear in display mode, allowing data items to be viewed but not edited. To enter editing mode to make changes, the user must click the “Edit” link in a particular row. After making changes, clicking “Save” will keep the changes and clicking “Cancel” will discard them.

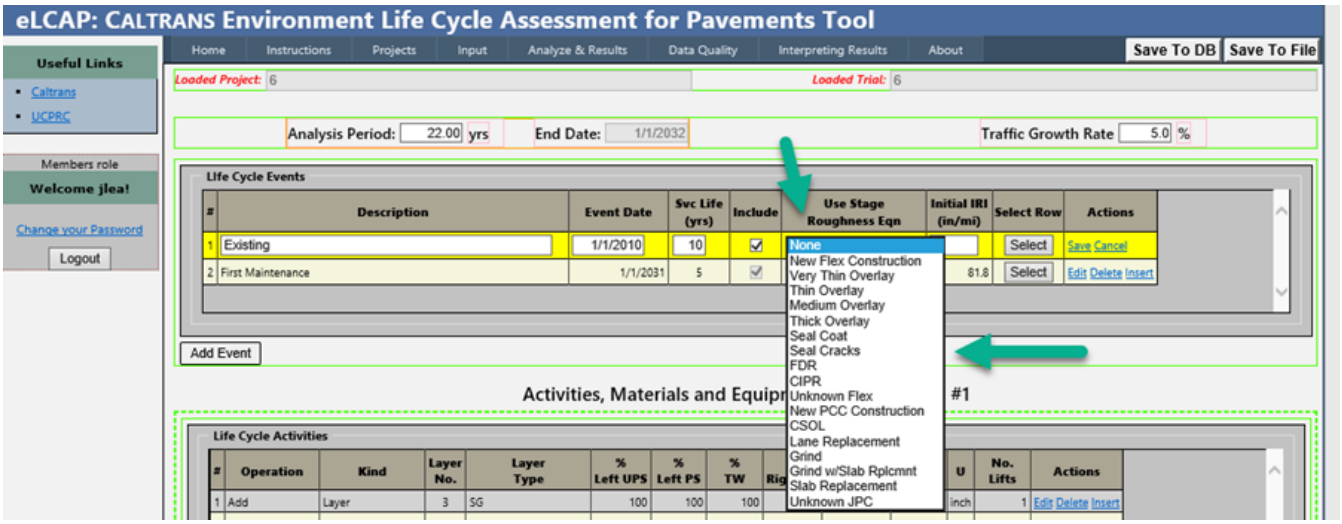
4.3.2.1. Events

Life Cycle Events

The following controls are located on the **Input -> Life Cycle Page.**

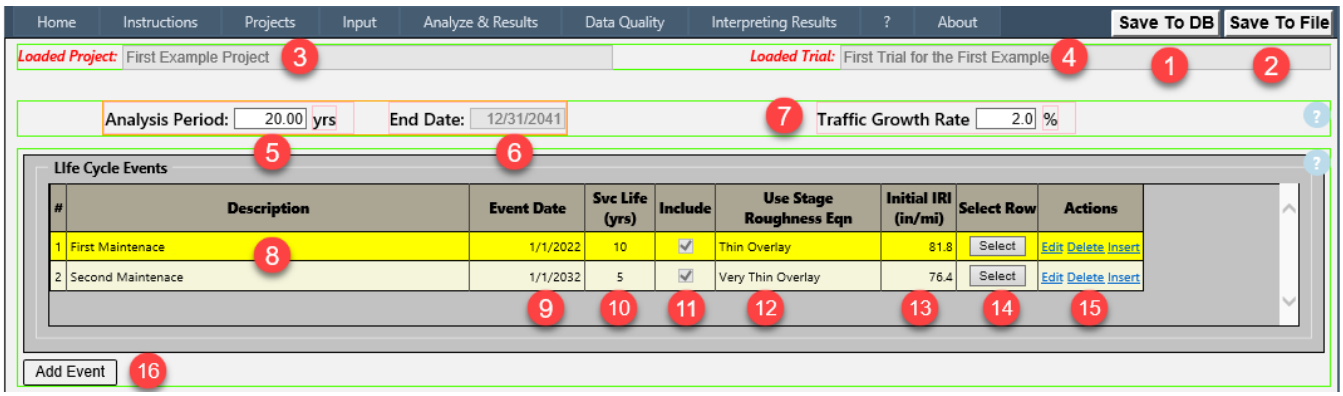


This page is used to define the series of construction events that will model the project’s life cycle, along with the activities (adding layers and removing material), materials and lastly construction equipment. Each event is a row in the Life Cycle grid. The data in the other three grids are associated with the selected event (shown in yellow). They constitute the details of the event.



A Life Cycle Event is defined by a user supplied Description (e.g., First Maintenance) for the event, the date of the event and the service life of the activities performed for the event. In addition, a selection for the Use Stage Roughness Equation can be made to indicate to *eLCAP* to: (1) include a Use Stage from the selected construction event to the next construction event, and (2) a treatment selection that is representative of the activities for the event.

When a life cycle event is added, the activities, materials, and equipment grids will be empty. *eLCAP* uses a default duration of 10 years between successive events to assist in constructing a life cycle. Users can edit the dates as necessary.



The following discusses each control associated with defining the life cycle of a pavement project. Each row in the grid is a single construction event; a Use Stage can be included between successive construction events by making a selection for the Use Stage Roughness Equation.

1. This button saves the project data to the *eLCAP* database. Navigating to the Analysis & Results page does an automatic save to the database.
2. This button saves the project data to a file that can be saved on the local computer.
3. This control shows the currently loaded project.
4. This control shows the currently loaded trial for the project.
5. Supply the number of analysis years.
6. This is computed by *eLCAP* by adding the Analysis Period to the date of the first event.
7. The percent growth in Traffic is applied to traffic counts from the first event onward.
8. Supply a description that represents the activities performed in the event.
9. Supply a Date for the event.

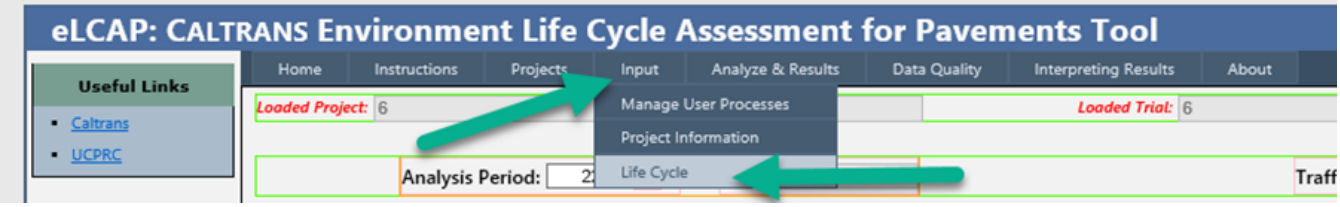
10. Supply a Service Life for the event that represents the expected useful life of the activities performed during the event.
11. This checkbox (checked by default) permits you to remove events from the analysis without having to delete them.

The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

4.3.2.2. Activities

Life Cycle Event Activities

The following controls are located on the **Input -> Life Cycle Page.**



This page is used to define the list of activities for a life cycle event. An activity can be an Add or a Remove. The following is the list of the selection (Kinds) for each:

- *Add*
  - Layer: HMA, PCC, AB, LCB, CTB-Class A, CTB-Class B, ATPB, CTPB, CCPR, FDR, PDR, AS, LTS, CSO, SG
  - Seal Coat: Chip Seal, Slurry Seal, Fog Seal, Cape Seal, Sand Seal, Tack Coat, Prime Coat
  - Reflective Coating: Bisphenol A, Polyester Styrene, Styrene Acrylate
- *Remove*
  - Mill asphalt
  - Mill concrete
  - Grind & Groove
  - Cold plane
  - Excavate
  - Haul Soil

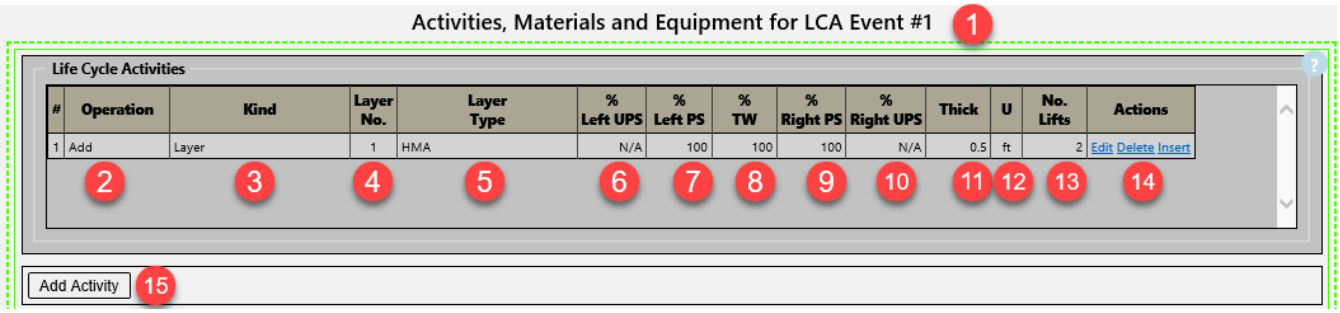
When an activity is defined and saved, *eLCAP* will generate a default material to be used (e.g., a specific kind of HMA when adding an HMA layer) and a list of the construction equipment necessary to implement the activity. *eLCAP* will also compute the quantities of material using the project limits (post mile start/end and number of lanes), the cross section defined on the Project Information page, and the thickness (add layer or remove material) specified for the activity. *eLCAP* will also provide

time estimates for each piece of construction equipment. The default material and the computed material quantities and equipment time estimates may be edited.

You may delete any or all of the items generated for an activity. In addition, you can manually add materials and equipment. In fact, you can skip defining any activities at all and directly add materials and their associated quantities, and equipment and its associated times of operation. But in most cases, defining activities for an event is more efficient than manually building lists of materials and equipment.

Columns 6 - 10 are used to tell *eLCAP* how much of the various cross section widths to include in the analysis for that activity. The default value for these columns is 100%, but you can change it to something less if the situation calls for it. In addition, some of the percentage columns do not apply for some selections and labeled as "N/A". For example, when adding a "paveable" layer such as HMA, the Unpaved Shoulder fields are shown as N/A.

Also, when adding a Seal Coat or a Reflective Coating, the Thickness and Number of Lifts fields are shown as N/A.



The following discusses each control associated with adding activities for an event. Each row in the grid is a single activity for the selected event.

1. This title applies the activity, material and construction equipment grids, emphasizing that these three grids are associated with a specific event.
2. This control lists the valid operations for an activity: Add and Remove.
3. This contents of this control is dependent on the operation; it lists the valid Kind of operations for the selected operation.
4. This grid column is generated by *eLCAP* and it indicates a layer number. When using the Add Activity button, a new activity is added to the bottom of the grid and becomes Layer 1 and the layers above the new layer have their layer numbers incremented by 1. Therefore, it usually easier to construct the pavement cross section from the bottom-most layer. You can get the same effect by using the Insert button in the Actions column. Adding seal coats and reflective coatings does not change the layer numbers.
5. This contents of this control is dependent on the selected Kind of activity.
6. Supply the percent of the Left Unpaved Shoulder (UPS) width to include in the activity.
7. Supply the percent of the Left Paved Shoulder (PS) width to include in the activity.
8. Supply the percent of the Traveled way width to include in the activity.
9. Supply the percent of the Right Paved Shoulder (PS) width to include in the activity.
10. Supply the percent of the Right Unpaved Shoulder (UPS) width to include in the activity.
11. Supply the thickness (for layers and for removing material).

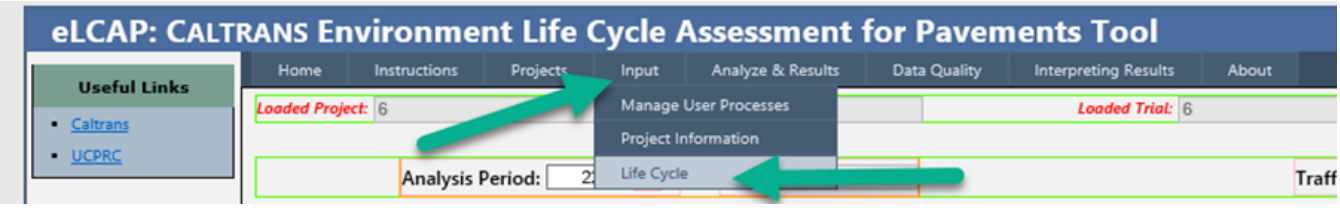
12. Select the units used for thickness.
13. *eLCAP* will compute the number of lifts for you based on the layer type and the thickness of the layer. You may change the generated value.
14. Operations to be applied to the activity (row): Add, Delete, Insert, Cancel and Save.
15. This button is used to add an activity to the end of the bottom of the list.

The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

4.3.2.3. Materials and Transports

Life Cycle Event Materials and Transport

The following controls are located on the **Input -> Life Cycle Page.**

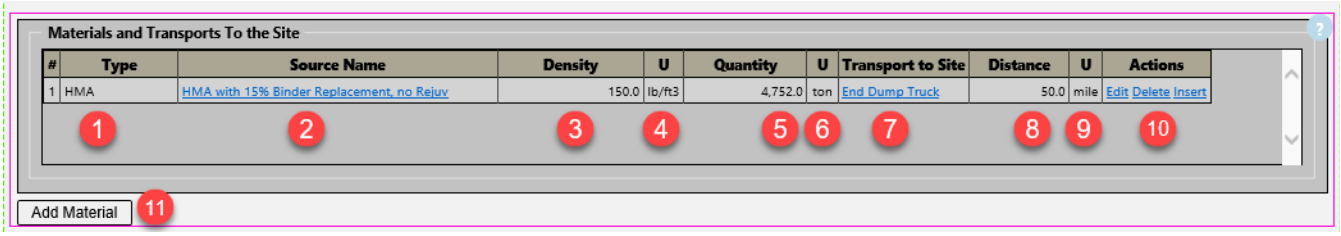


This page shows the *eLCAP*-generated materials, quantities, and means of transport for all activities for the selected event; it also allows a user to manually add and delete materials.

When an activity is defined and saved, *eLCAP* will generate a default material to be used (e.g., a specific kind of HMA when adding an HMA layer) and a list of the construction equipment necessary to implement the activity. *eLCAP* will also compute the quantities of material using the project limits (post mile start/end and number of lanes), the cross section defined on the Project Information page, and the thickness (add layer or remove material) specified for the activity. *eLCAP* will also provide time estimates for each piece of construction equipment. The default material and the computed material quantities and equipment time estimates may be edited.

You may delete any or all of the items generated for an activity. In addition, you can manually add materials and equipment. In fact, you can skip defining any activities at all and directly add materials and their associated quantities, and equipment and its associated times of operation. But in most cases, defining activities for an event is more efficient than manually building lists of materials and equipment.

Clicking the links in the Source Name column will display a form page with the data for the item. For example, if you click the “HMA with 15% Binder Replacement, no Rejuv” in the Source Name column below a form page will be displayed. Listed on that form page will be all the input flows and their associated quantities needed to produce 1 unit of HMA. If the HMA is an *eLCAP* library material, no changes can be made to it, but if the HMA is a user-defined/custom HMA mix, changes can be made.



The following discusses each control associated with adding a material for an event. Each row in the grid is a single material, with or without a transport, for the selected event.

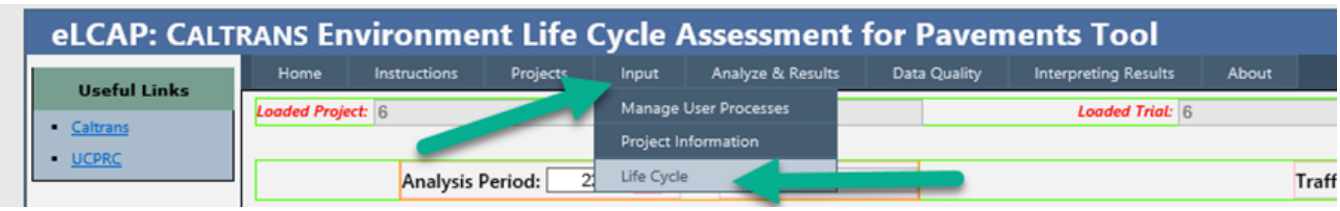
1. This control list the types of a material, e.g., HMA, PCC, AB, etc.
2. This control lists the specific materials for a material type. Clicking the name of the specific material will bring up form showing the flows that go into the material mix.
3. This control gives the material density. This value comes from either the Library material or the user defined mix. In both cases, you may change it when adding it to the material grid.
4. Select the units for the density.
5. Supply a value for the amount of the material to use. This value is computed by *eLCAP*, using the project limits, the cross section and the layer thickness, when the material is generated when adding an activity. It needs to be supplied by the user when manually adding a material.
6. Select the units for the quantity.
7. Select a transport to get the material to the job site. The transport is pre-selected when a material is generated when adding an activity. You need to select a transport when manually adding a material.
8. Supply the two-way distance for the transport.
9. Select the units for the transport distance.
10. Operations to be applied to the activity (row): Add, Delete, Insert, Cancel and Save.
11. This button is used to add a material to the end of the bottom of the list.

The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

4.3.2.4. Construction Equipment

Life Cycle Event Construction Equipment

The following controls are located on the **Input -> Life Cycle Page.**

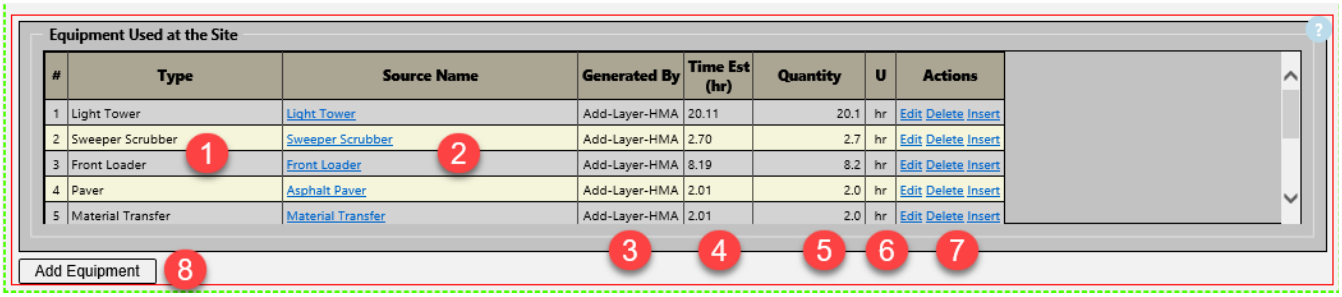


This page shows the *eLCAP*-generated pieces of equipment and times of operation for all activities for the selected event; it also allows a user to manually add and delete equipment.

When an activity is defined and saved, *eLCAP* will generate a default material to be used (e.g., a specific kind of HMA when adding an HMA layer) and a list of the construction equipment necessary to implement the activity. *eLCAP* will also compute the quantities of material using the project limits (post mile start/end and number of lanes), the cross section defined on the Project Information page, and the thickness (add layer or remove material) specified for the activity. *eLCAP* will also provide time estimates for each piece of construction equipment. The default material and the computed material quantities and equipment time estimates may be edited.

You may delete any or all of the items generated for an activity. In addition, you can manually add materials and equipment. In fact, you can skip defining any activities at all and directly add materials and their associated quantities, and equipment and its associated times of operation. But in most cases, defining activities for an event is more efficient than manually building lists of materials and equipment.

Clicking the links in the Source Name column will display a form page with the data for the item. For example, if you click the “Asphalt Paver” in the Source Name column below a form page will be displayed. Listed on that form page will be all the input flows and their associated quantities needed to produce 1 unit of time for the paver. If the paver is an *eLCAP* library equipment, no changes can be made to it, but if the paver is a user-defined/custom paver, changes can be made.



The following discusses each control associated with adding a piece of construction equipment for an event. Each row in the grid is a single piece of equipment, for the selected event.

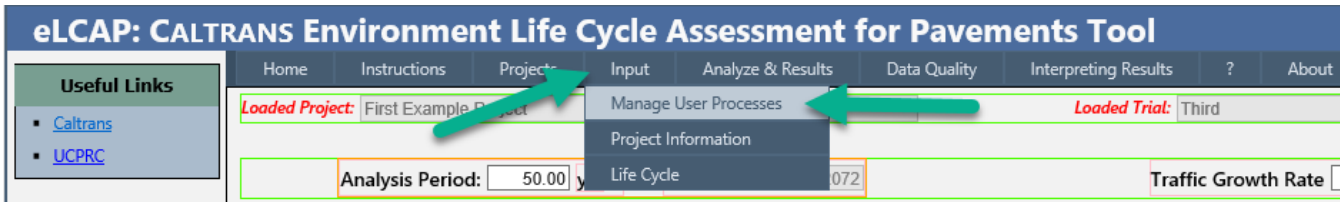
1. This control list the types of a equipment, e.g., Light Tower, Paver, Roller, etc.
2. This control lists the specific equipment for an equipment type. Clicking the name of the specific piece of equipment will bring up form showing the flows that go into the equipment.
3. The value in this column is generated by *eLCAP* to assist in relating which activity generated a particular piece of equipment.
4. The value in the column is generated by *eLCAP* when a piece of equipment is generated when adding an activity.
5. Supply a value for time of operation.
6. Supply the unit for the time of operation.
7. Operations to be applied to the activity (row): Add, Delete, Insert, Cancel and Save.
8. This button is used to add a piece of equipment to the end of the bottom of the list.

The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

4.3.3. Manage User Processes

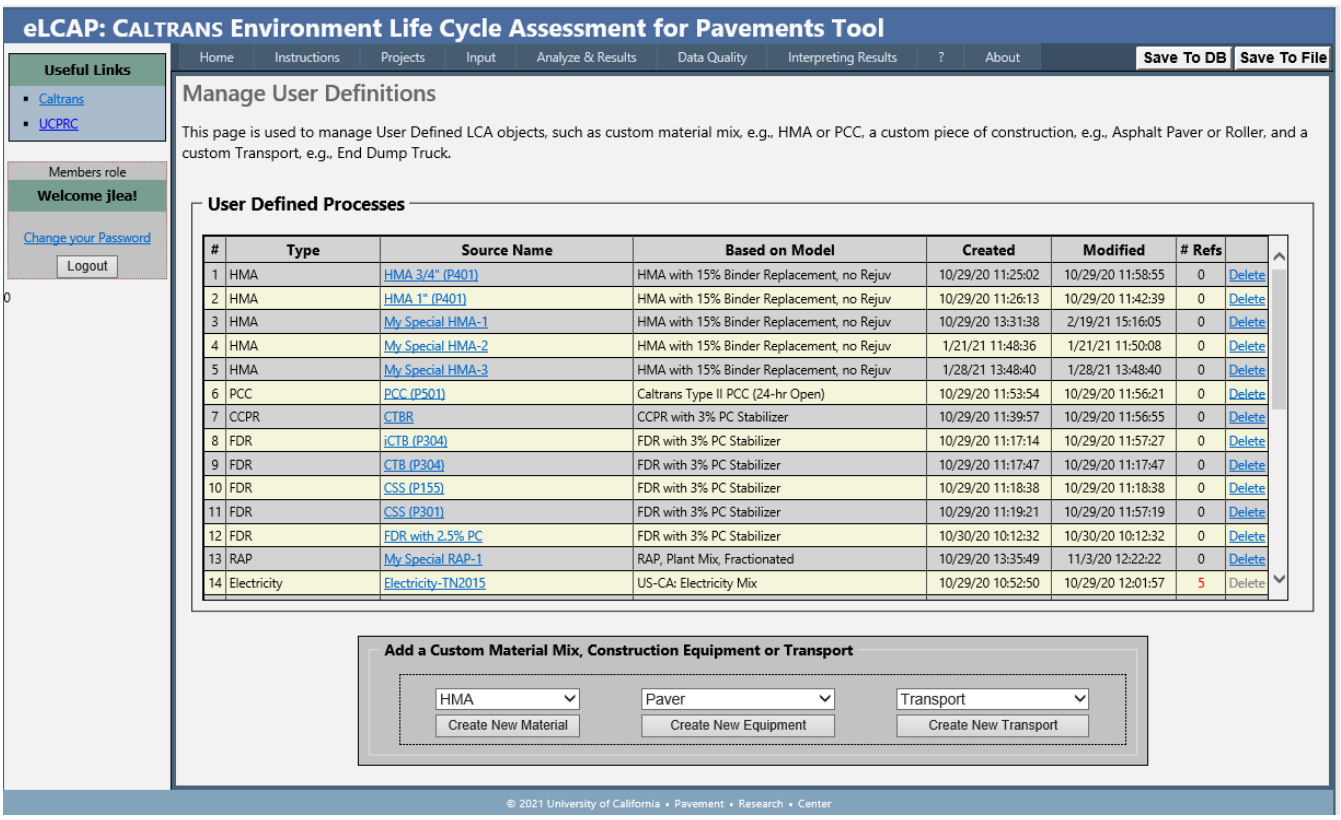
Manage User Processes Page

The following controls are located on the **Input -> Manage User Processes Page**



This page is used to create user or specialized version of library (built-in) material mixes (e.g., HMA, PCC), Equipment (e.g., Pavers, Rollers) and Transports. A user defined process is always based on an existing library process. Once you have created a user defined process, you can use any where a library process is used.

User defined processes are user-based, not project-based, so once you create a user defined process, it can be used in any project trial.



The figure above shows user defined processes in a table. The "Source Name" is the user supplied name for the customized mix (process). The "Based on Model" gives the library process that the user defined process is based on. The table also lists the date-time when the user process was created

and the last time it was modified. The "# Refs" column tells you how many times you have used/referenced a particular user defined process. You may not delete a user defined process if it is being used/referenced.

To create a new user process, click on one of the "Create" buttons.

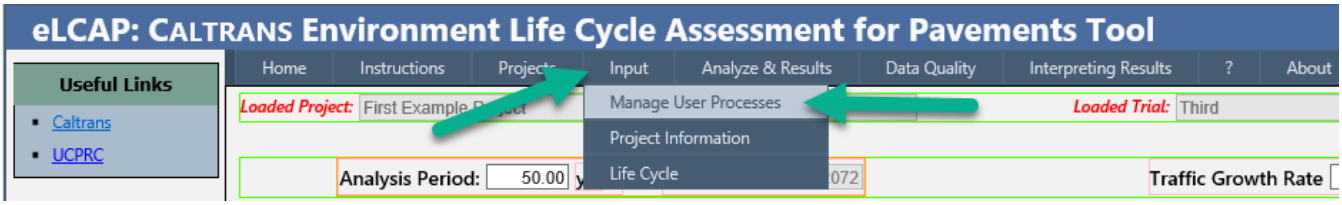
To view an existing user process, click on the link in the "Source Name" column.

Both create and view navigate to the same form page, just in different modes: one for creating or editing, and one for viewing only.

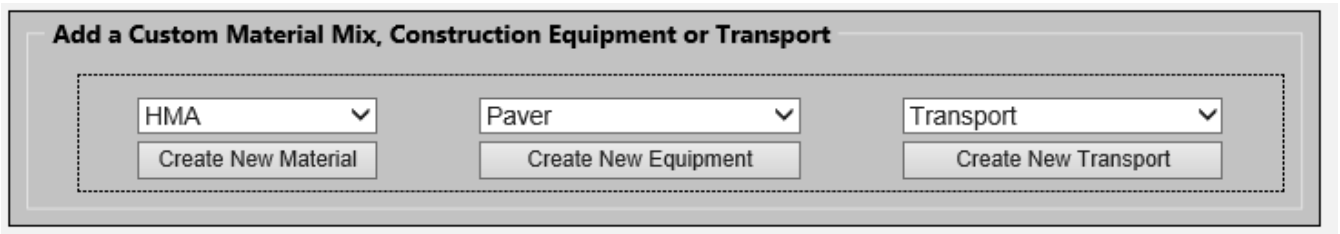
4.3.3.1. Adding a User Defined Object

Adding (and Editing) a User Defined Object (Mix, Transport or Equipment)

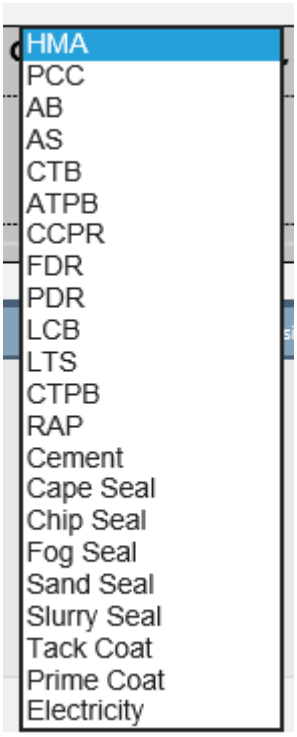
The following controls are located on the **Input -> Manage User Processes Page.**

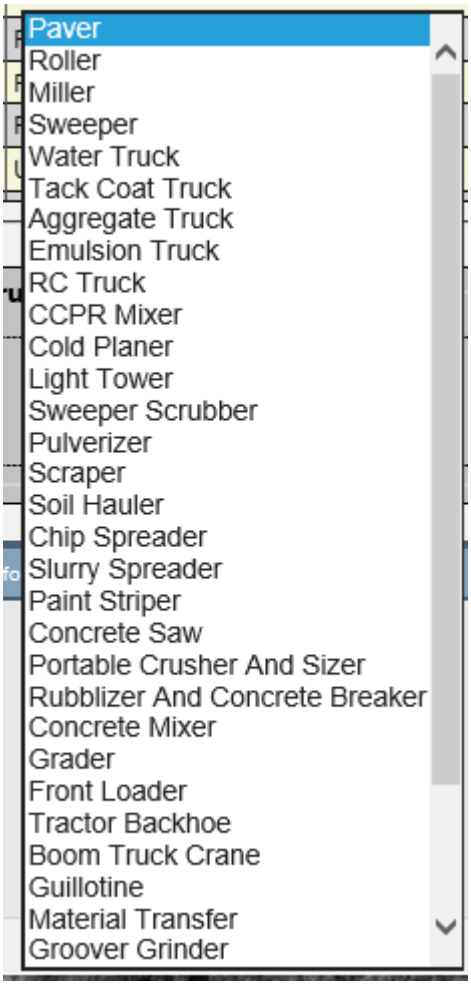


This page is used to create user or specialized version of library (built-in) material mixes (e.g., HMA, PCC), Equipment (e.g., Pavers, Rollers) and Transports. A user defined process is always based on an existing library process. Once you have created a user defined process, you can use any where a library process is used. There are separate controls to add a user defined Material, Equipment and Transport, as shown below.

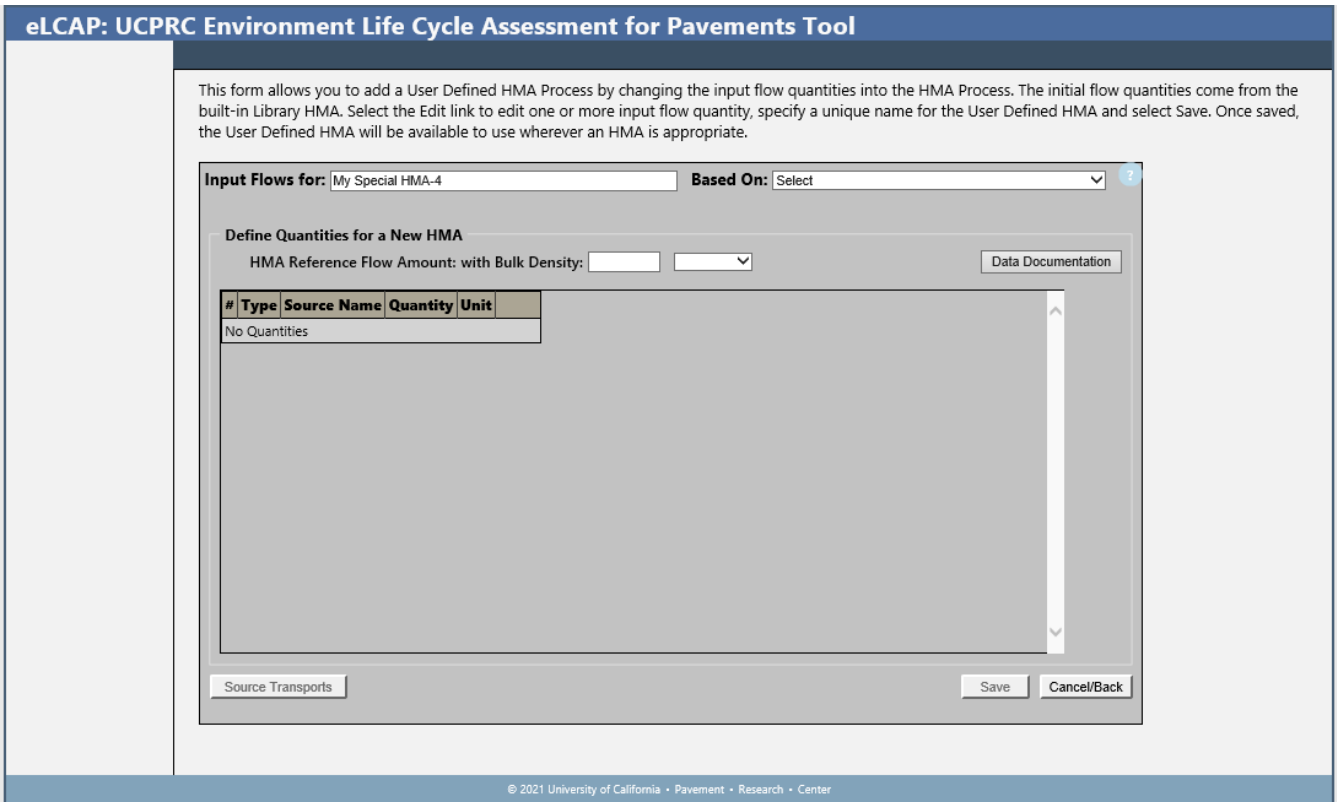


Selecting the Material dropdown control shows the available types of Materials that are available (figure on the left) and selecting the Equipment dropdown control shows the available types of equipment that are available (figure on the right); transport is the only selection available for creating a user defined transport.

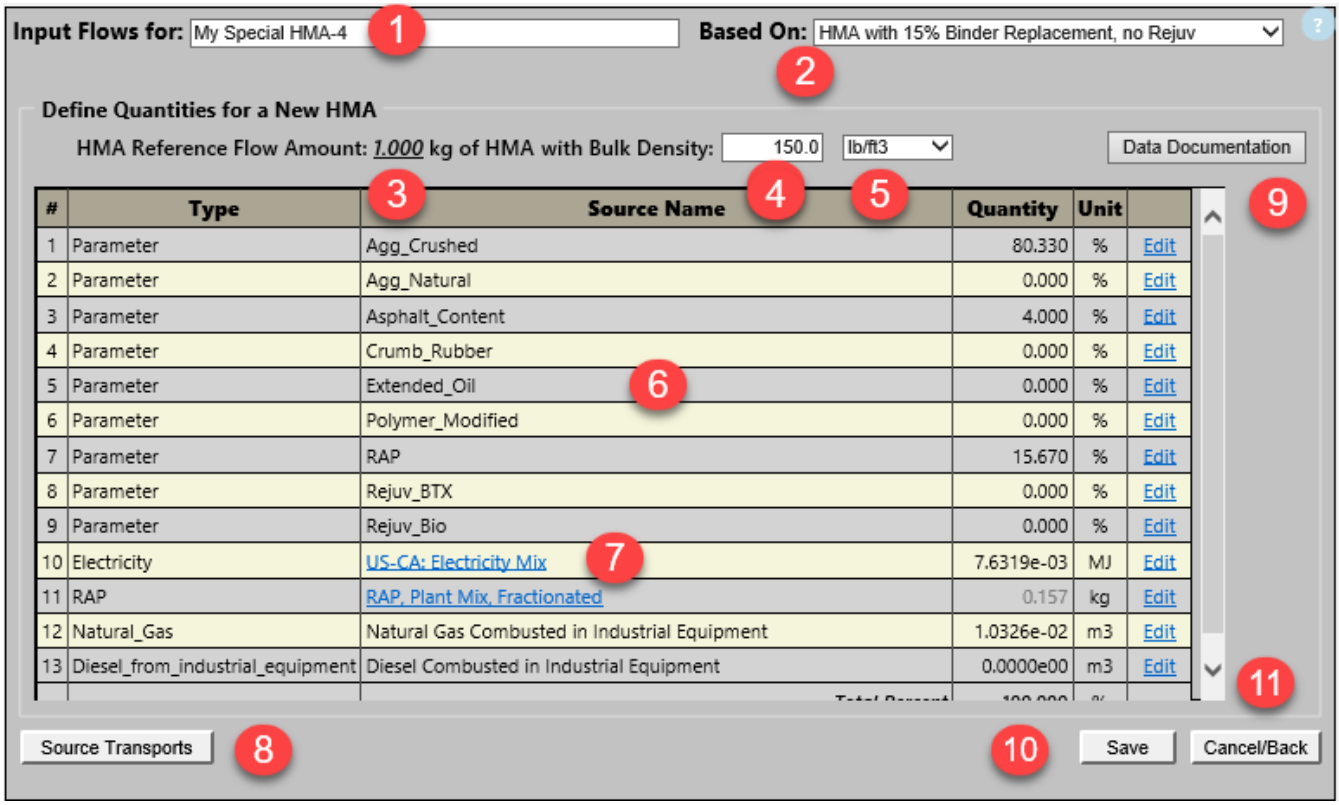




Selecting HMA and clicking on "Create New Material", for example, will bring up the following page.



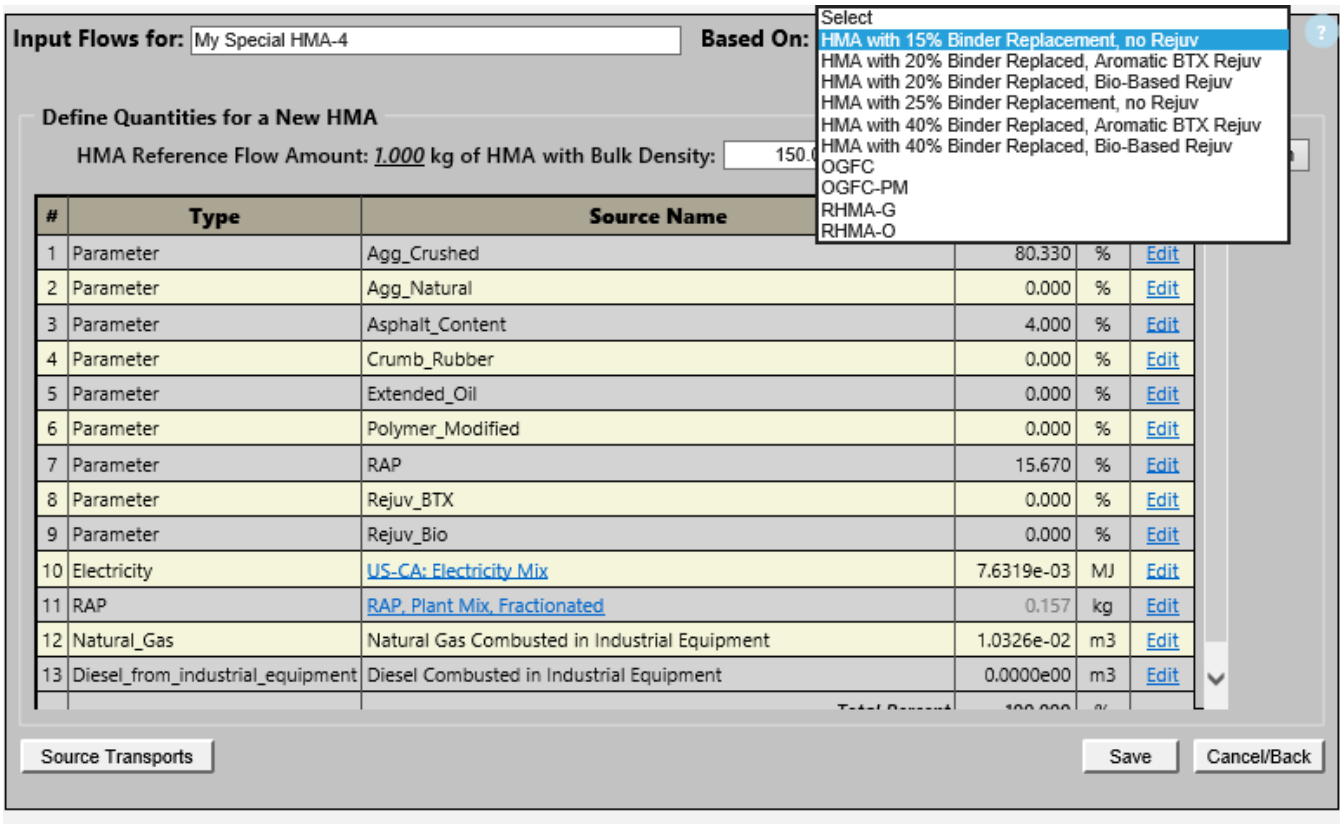
eLCAP supplies a default name for your custom mix, based on the current number of existing custom mix for the selected type. In the case shown above, there are three existing custom HMA mixes with "My Special HMA" in its name. Making a selection for "Based On" will show the following.



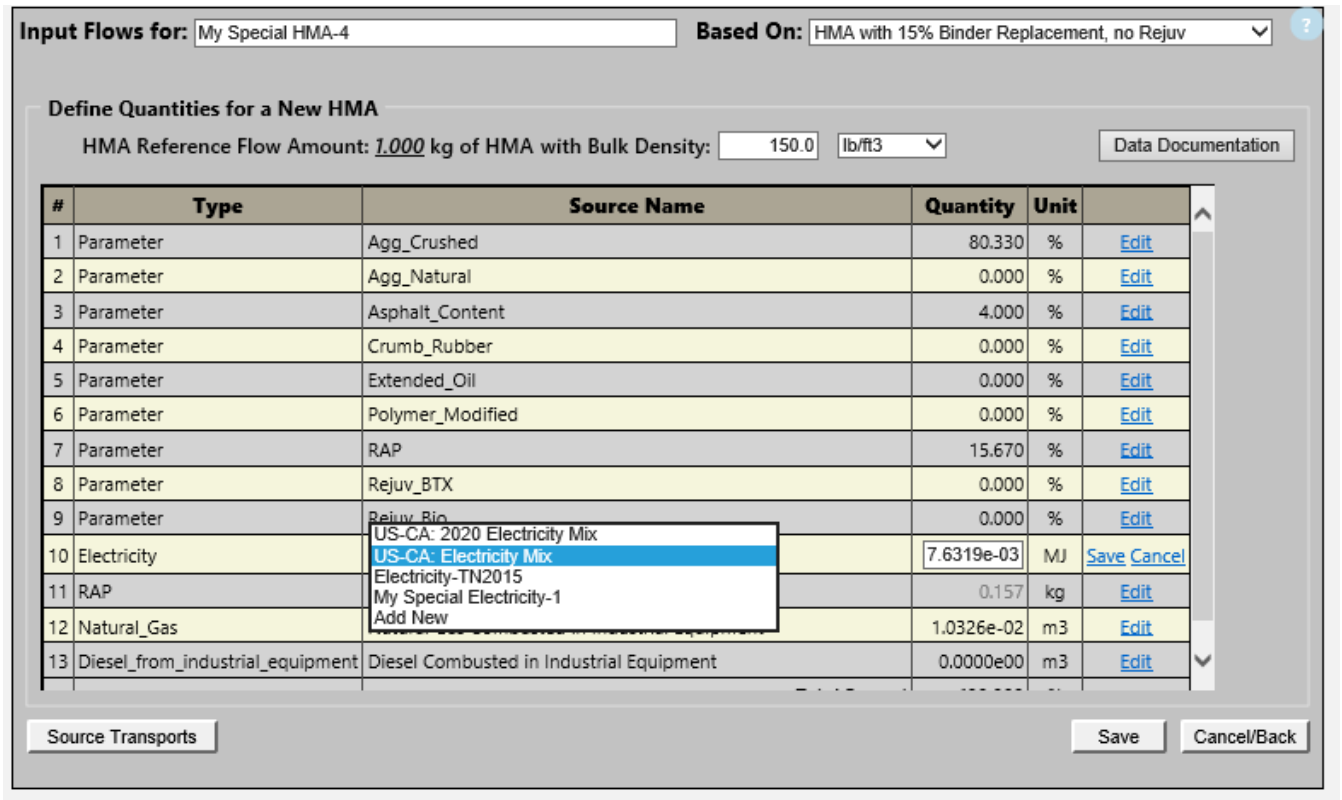
The following discusses each control associated with Adding (and Editing) or a user defined mix or viewing a library mix.

1. Supply a name for the user defined mix. *eLCAP* will supply a default name but you may change it. The name must be unique; *eLCAP* will not allow you to save a new custom mix with a name that already exists.
2. This dropdown control (shown below) allows to select one the library mixes as a basis of your new custom mix.
3. This label is informing you that the listed parameters and flows in the grid, with their associated quantities and units, are needed to produce 1 kg of MHA.
4. This control shows the bulk density of the selected library mix; you may change this value.
5. This dropdown control allows you to specify the units associated with the bulk density.
6. This grid (table) lists the parameters and flows, and their quantities and units; selecting edit for row allows you to make changes to the quantity. Select save or cancel for the row when finished editing the row.
7. When the "Source Name" string is a hyperlink (shown in blue), you may (1) select it to see the parameters and flows that go into producing 1 unit of the selected link's product and (2) select another library or user defined mix for the flow or create a new custom mix. This is shown below.
8. Selecting this button will bring up the Source Transports Page.
9. Selecting this button will bring up the Data Documentation Page.

Selecting the "Based On" dropdown.



Selecting the Edit button for a row and then the dropdown in the "Source Name" dropdown.



The question mark in the blue circle in the upper-right of the control group allows you to get help on the controls (this topic).

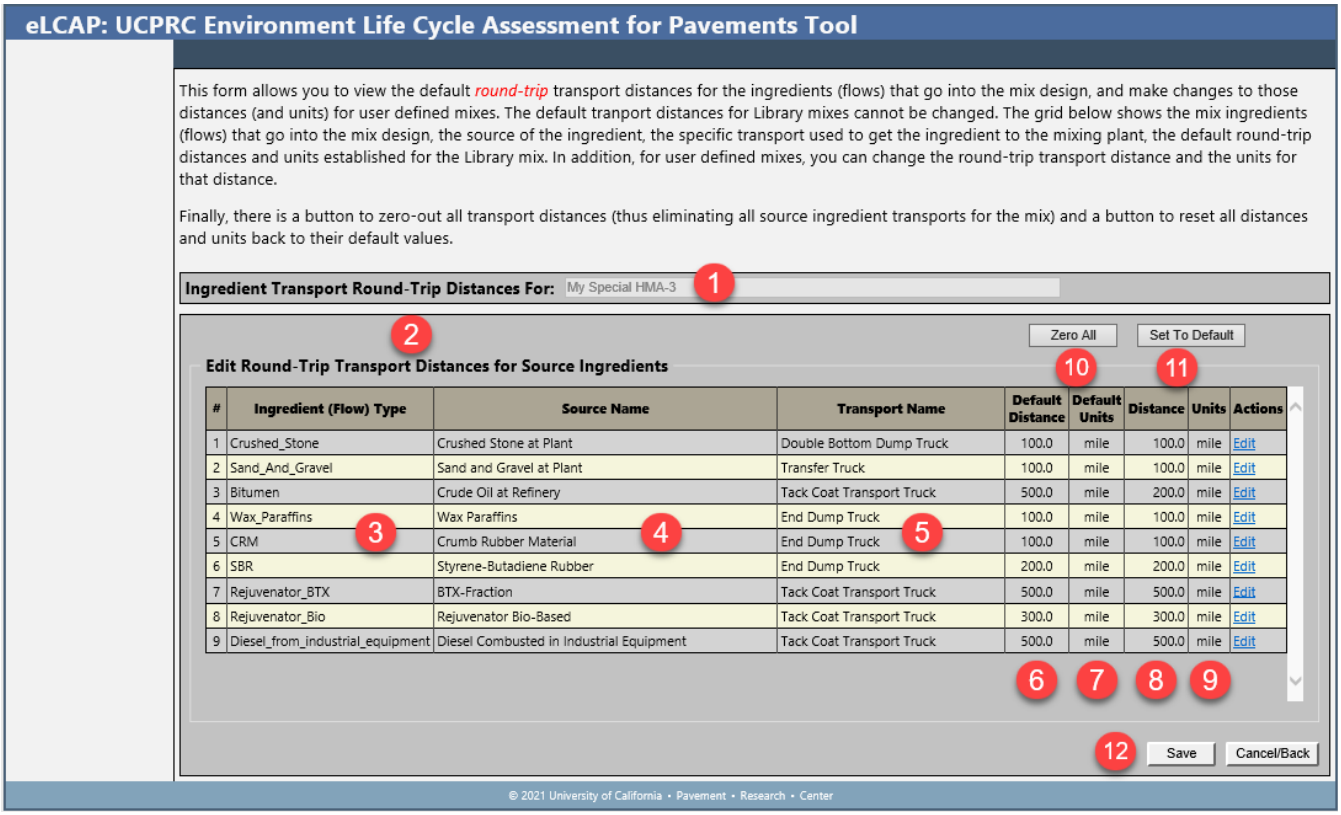
4.3.3.2. Source Transports

Source Transport Page

The following controls are located on the Source Transport Page

This page is shown by selecting the Source Transport button when adding or editing a user defined material mix. This button is disabled when adding/editing a user defined equipment and transport.

This page lists the input flows (ingredients) that go into a mix and the name of the transport and ***round-trip*** distance used to get the ingredient material to the mixing plant. You may change the round-trip distance for user defined mix ingredients, but you may not make any changes to library mixes.



The following discusses each control associated with the transports used to get mix ingredients to the mixing plant. Recall that ***round-trip*** distances may only be changed for user defined mixes, not library mixes.

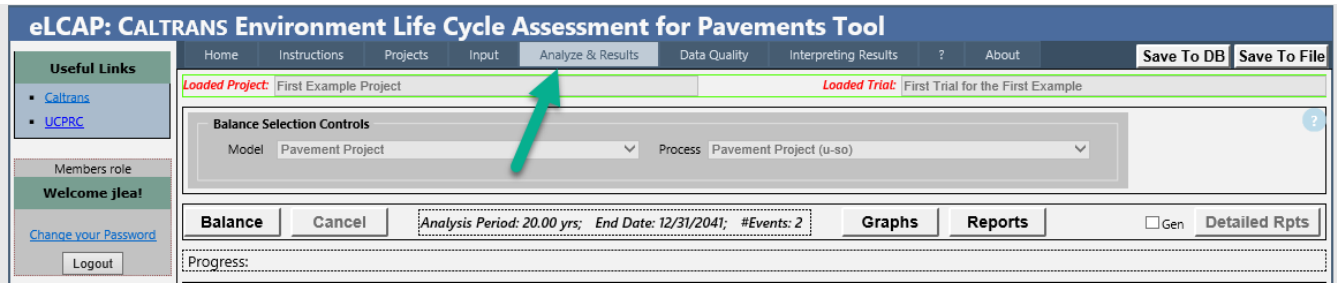
1. This controls shows the name of the material mix.
2. This label emphasizes that the transport distances are ***round-trip*** distances.
3. This column shows the ingredient (flow) type.
4. This column shows the specific of the mix ingredient.
5. This column shows the name of the transport.
6. This column shows the default ***round-trip*** distance.

7. This column shows the units for the default ***round-trip*** distance.
8. This column is used to change the value of the default ***round-trip*** distance to a different value.
9. This column is used to change the units for the ***round-trip*** distance.
10. This button is used to zero-out the ***round-trip*** distance for all ingredients.
11. This button restores the **round-trip** distance for all ingredients back to their default setting.
12. These two buttons allows you to save or cancel the changes.

4.4. Analysis Tab

Analysis & Results Page

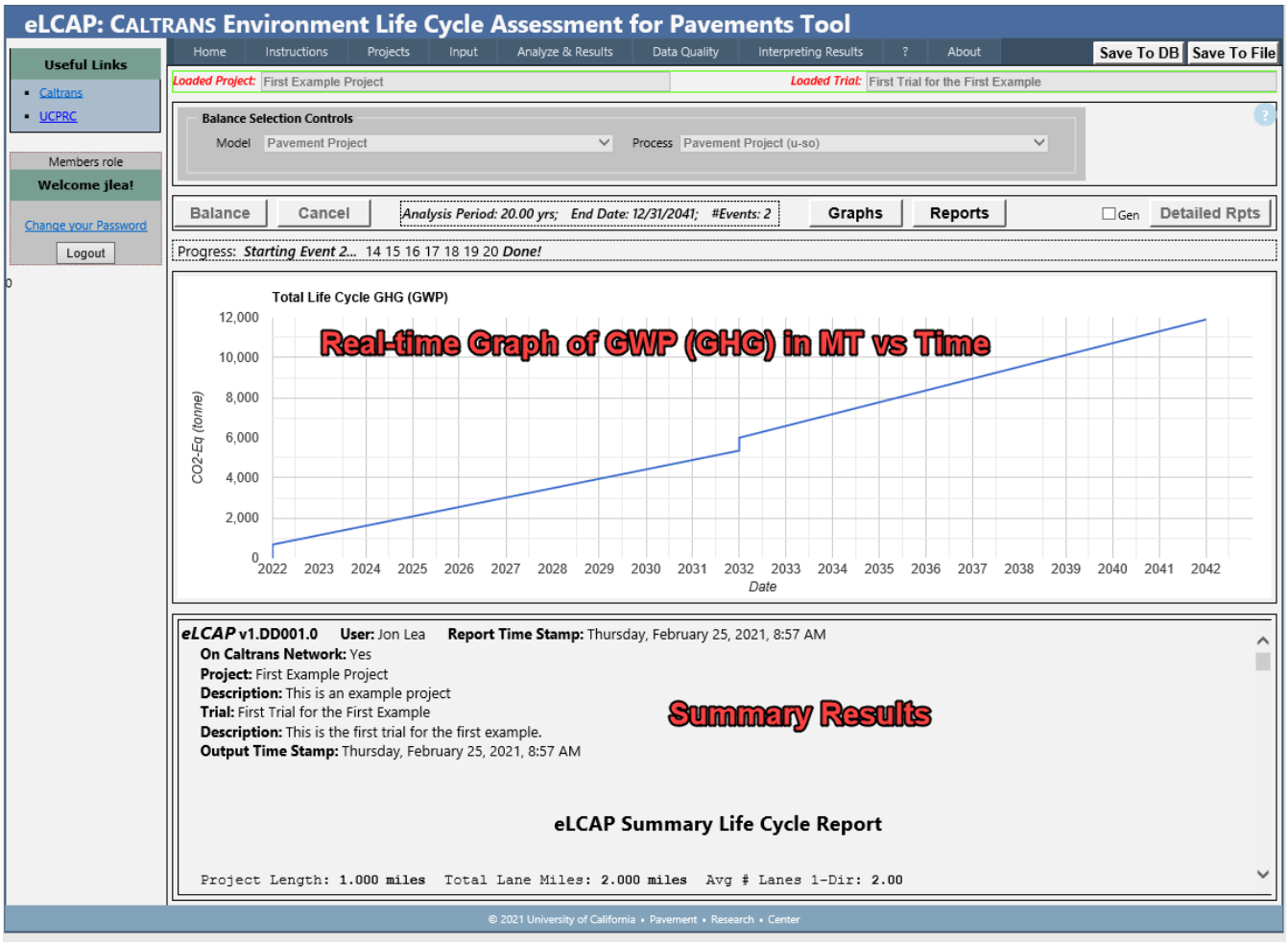
The following controls are located on the **Analysis & Results Page.**



This page is used to perform a LCA analysis, also referred to as "Balance", since the process of solving the LCA model is basically scaling upstream flows according to downstream material needs. When that process is finished, then all flows and processes, are in balance. See Section 2.1 of the eLCAP Report for more details on Balancing a LCA model.

Basic workflow:

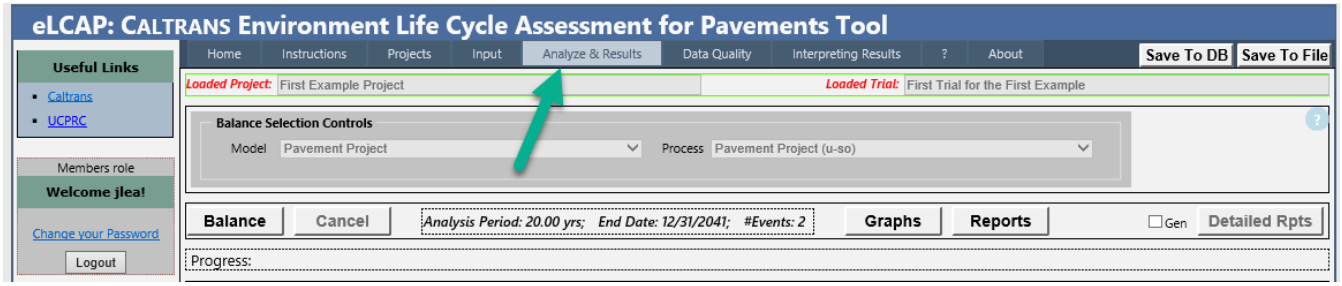
1. Locate your project
2. Define the cross section
3. Define the life cycle (events, activities, materials and equipment)
4. Navigate to this page
5. Select the Balance button
   a. Progress can be seen in the message area
   b. Real-time display of GHG (GWP) in MT vs time is shown in the graph area
   c. Review the summary results, shown in the bottom pane, after the analysis is complete
6. Select the Graphs button and review all results
7. Select the Reports button and generate reports for review or downloading



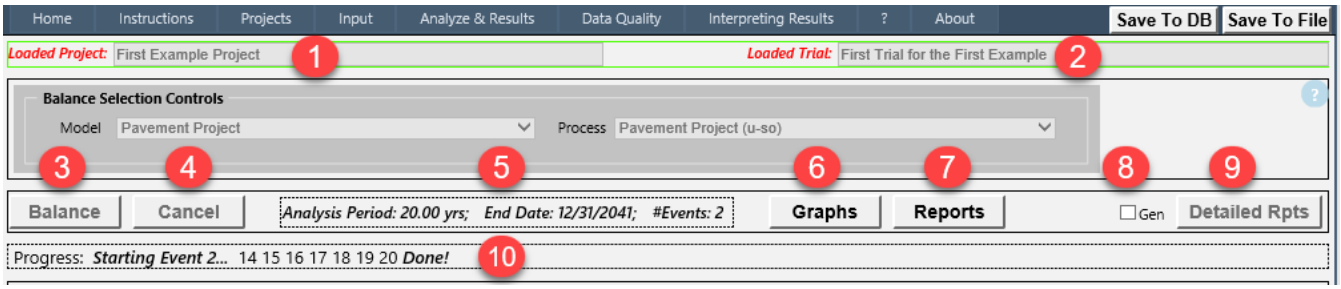
4.4.1. Performing an Analysis

Performing an Analysis and Getting Results

The following controls are located on the **Analysis & Results Page.**



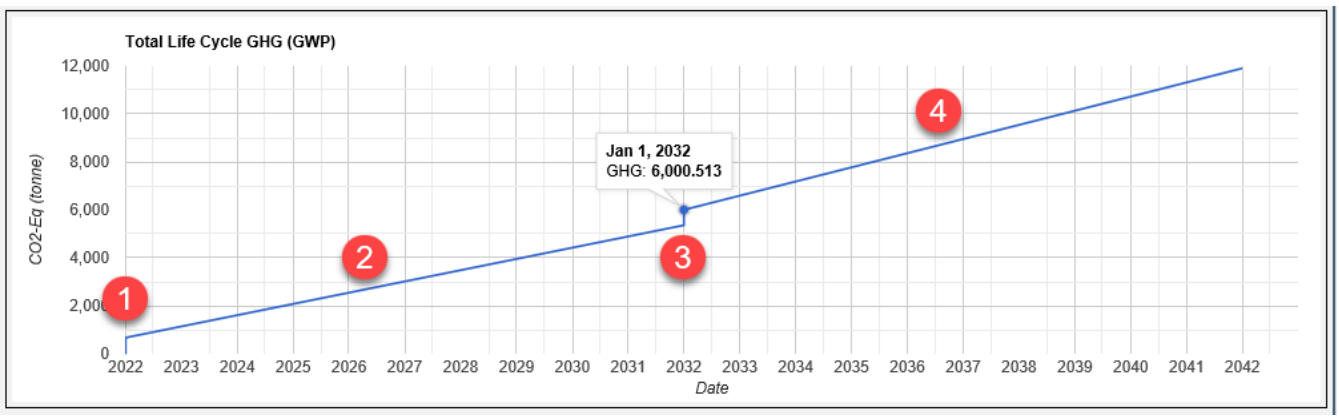
This page is used to perform a LCA analysis, also referred to as "Balance", since the process of solving the LCA model is basically scaling upstream flows according to downstream material needs. When that process is finished, then all flows and processes, are in balance. See Section 2.1 of the eLCAP Report for more details on Balancing a LCA model.



The following discusses each control:

1. This control shows the currently loaded project.
2. This control shows the currently loaded trial for the project.
3. This button starts the analysis (Balance). Once selected, *eLCAP* builds a LCA model from all user supplied input data and starts the balancing process, starting with the right-most process (the Pavement Project process) and begins the flow scaling process for each of the flows going into the Pavement project, such as HMA, PCC, Paver_Time, etc. Once that process is finished, *eLCAP* computes the 18 different impact factors, such as GWP (GHG) from the scaled flows. This model generation, flow scaling and computing impacts tasks is done for each event define in the life cycle.
4. This button is used to cancel the balancing process.
5. This area shows a high-level summary of your project.
6. Once the balancing process is complete, this button becomes enabled, allowing you to generate graphs of the results.
7. Once the balancing process is complete, this button becomes enabled, allowing you to generate reports of the results.
8. Checking this checkbox before starting a balance will instruct *eLCAP* to generate several, detailed result reports which can be downloaded using the Detailed Rpts button
9. This button allows you to download the detailed reports generated if the checkbox (8) was checked before starting the analysis.
10. This message area shows the progress of the balancing, in seconds.

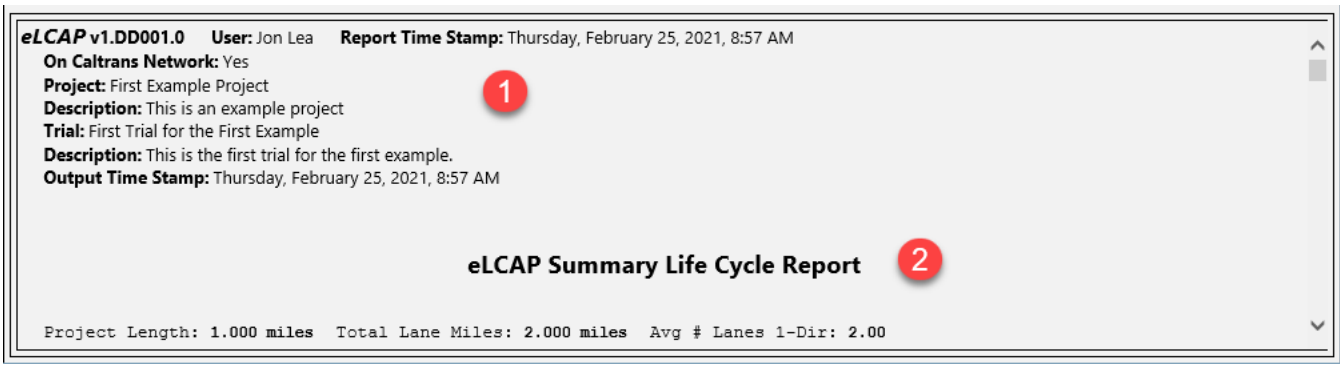
As the balancing process is progressing, the graph area shows a real-time plot of the total GHG (GWP) in MT vs Time. Holding the mouse cursor at any point on the curve will bring up a pop-up window, showing the the point's X- and Y-values (date and GWP).



The following discusses the labeled areas above:

1. This vertical line represents the GWP (GHG) for the first event, which includes all materials, transports and construction equipment defined for the first event.
2. This sloped line, going from the first construction event to the second, represents the Use Stage results, which is based on the growth of IRI overtime and the amount of traffic (cars and trucks) and its growth over time. The slope of the line depends on: (1) the treatment selected in the Use Stage Roughness Eqn control on the Life Cycle page and (2) the level of traffic and its growth over time. If a Use Stage has not been included between construction events then the slope of the line will be horizontal.
3. This vertical line represents the GWP (GHG) for the second event, which includes all materials, transports and construction equipment defined for the second event.
4. This sloped line, going from the second construction event to the end of the analysis period, represents the Use Stage.

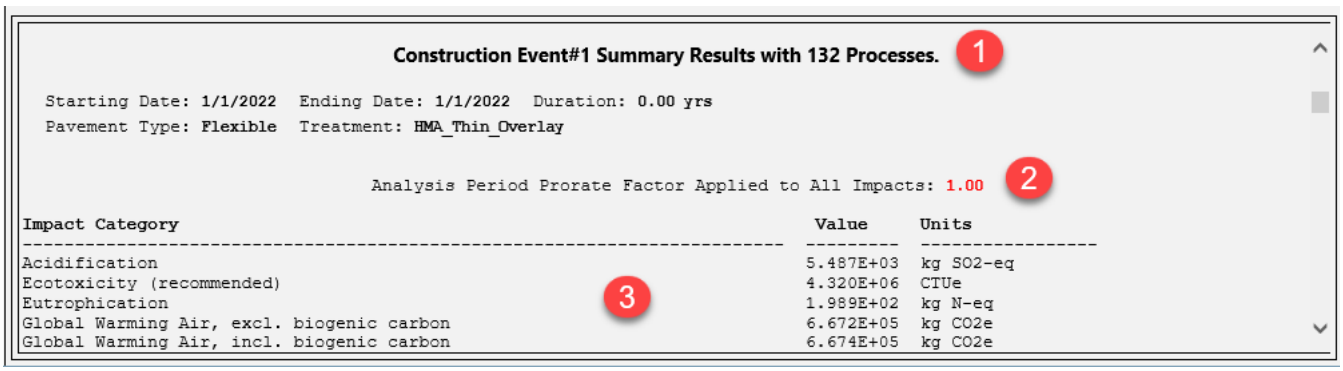
After the analysis finishes, a summary report is displayed in the bottom scrollable text for your review.



The top of the summary report is shown above.

1. This section gives information about the version of *eLCAP*, the name of the user and the date the report was generated. It also indicates the kind of project (Caltrans or Local Agency) and the name and description of the project and trial. Finally, it shows the date the output was generated.

The rest of the report for the first event is shown below.



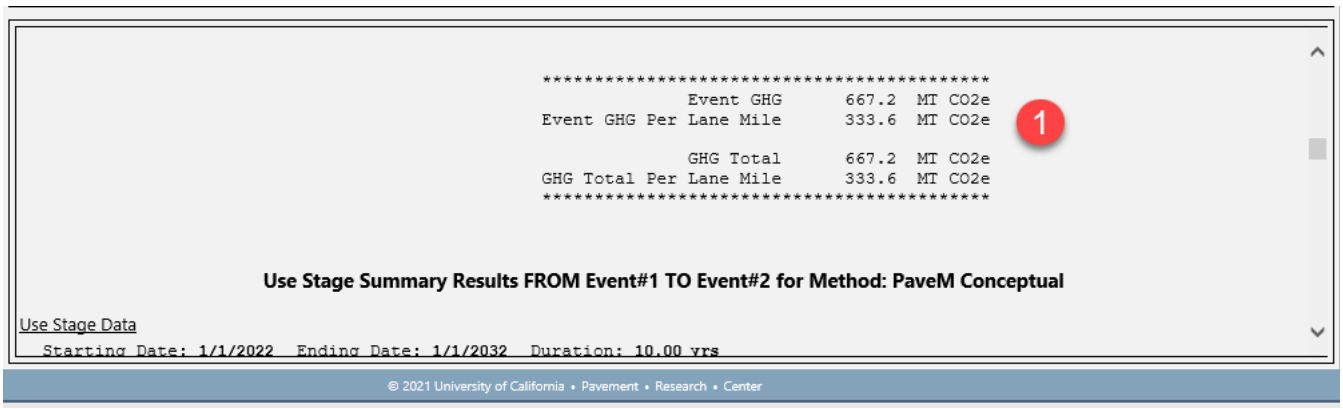
The table of impact factors for the first event is shown above.

1. The title for the following table of results. The number of processes listed in the table title indicates that *eLCAP* generated 132 processes for construction event 1, resulting from the materials, transports and pieces of construction equipment contained in the first event. Just

below the title is the date of the event, the pavement type and treatment selected for the Use Phase.

2. This note indicates that computed impact factors have not been scaled down (since the scale factor is 1.0) because the Analysis Period is after the Service Life for the event.
3. This is the table of results, one line for each of the 18 impact factors computed by *eLCAP*. Each line has the name of the impact factor, the value and the units associated with the impact factor.

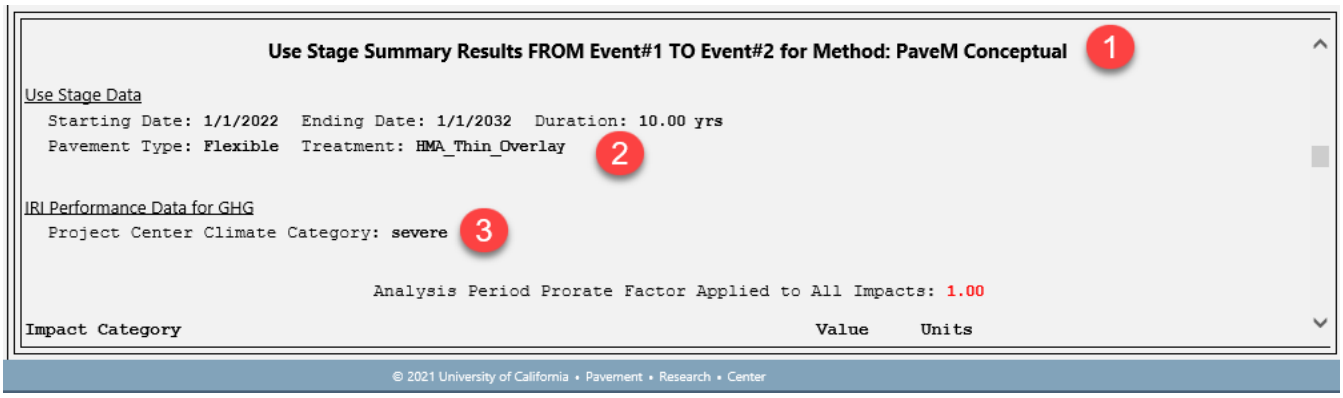
Just below the table of impact factors are event GHG results and running life cycle GHG totals.



The event and running life cycle GHG totals are shown above.

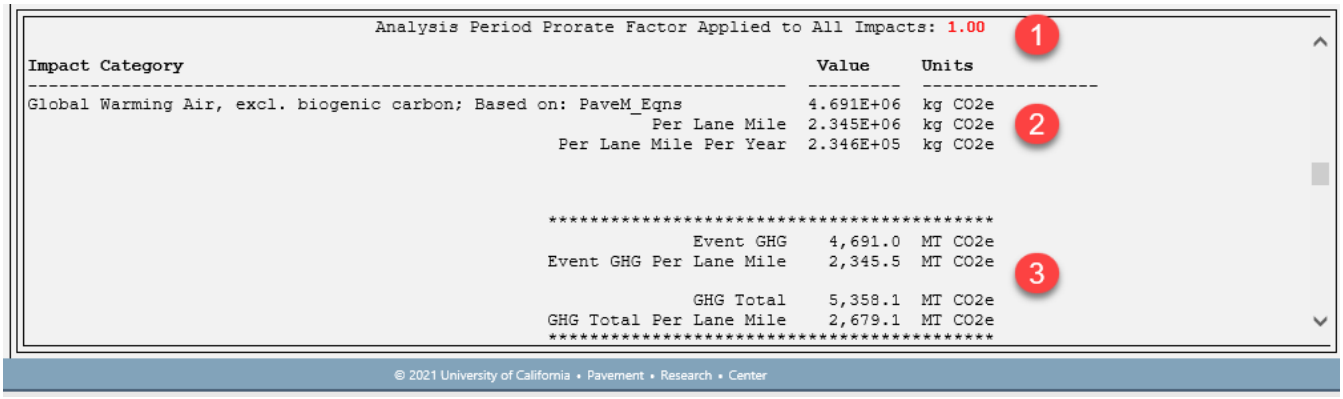
1. The first two lines are GHG impact values for the event and then per lane mile. The next two lines are the same but are running life cycle totals.

Following the first event results are results for the second event. This event is the Use Stage event going between the first and second construction events.



The first section of the Use Stage results is shown

1. The first two lines

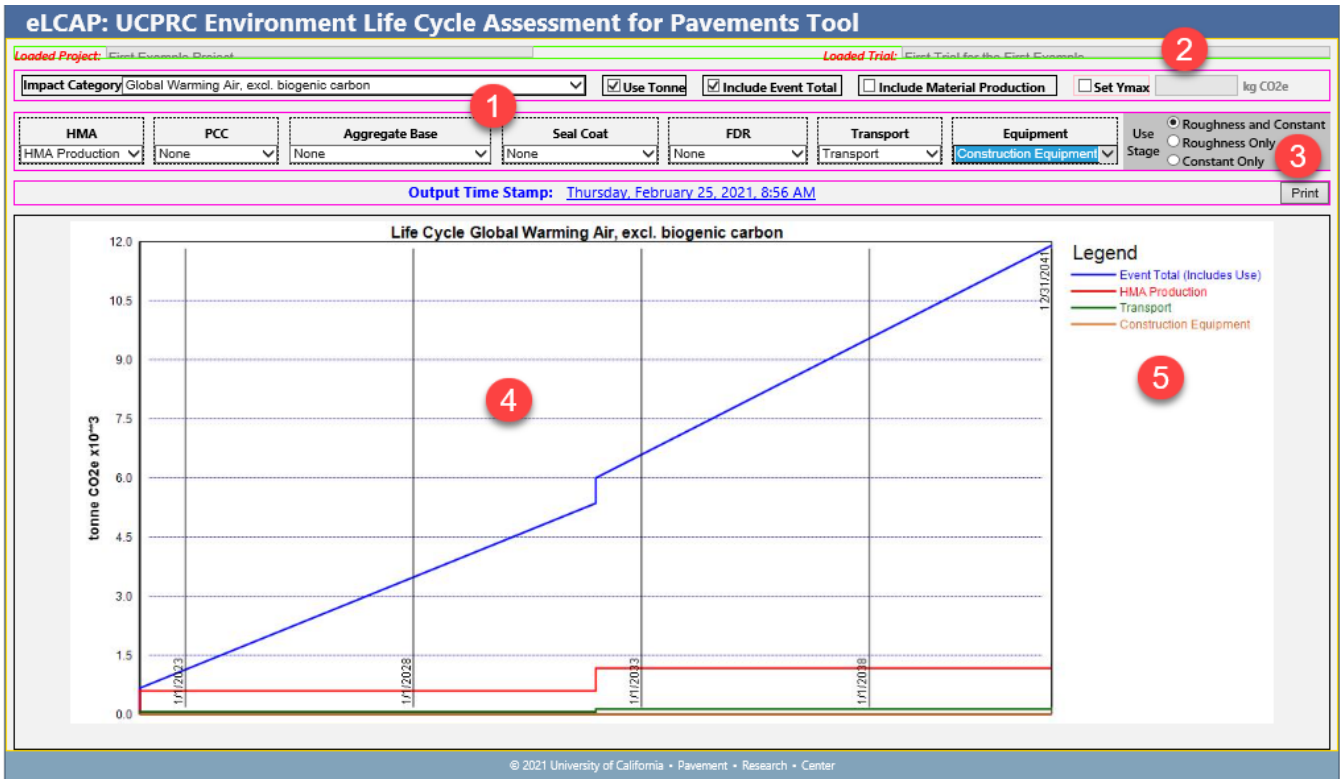


4.4.2. Graphs

Graphing Results

The following controls are located on the **Graph Page.**

This page is shown when the Graph button is selected on the Analyze & Results Page. It is used to view, on an XY plot, a variety of Impact results.



The following discusses each control on the Graph Page.

1. These controls allow you to:

   a - Select one of the 18 computed Impact Categories

   b - View the results in metric tonnes, selected by default

   c - Include a graph line for the total event results, selected by default

   d - Include a graph line for total Material Production

   d - Select one of several options when displaying HMA graph lines

   e - Select one of several options when displaying PCC graph lines

   f - Select one of several options when displaying AB graph lines

   g - Select one of several options when displaying Seal Coat graph lines

   h - Select one of several options when displaying FDR graph lines

   i - Select one of several options when displaying Transport graph lines

   j - Select one of several options when displaying Equipment graph lines

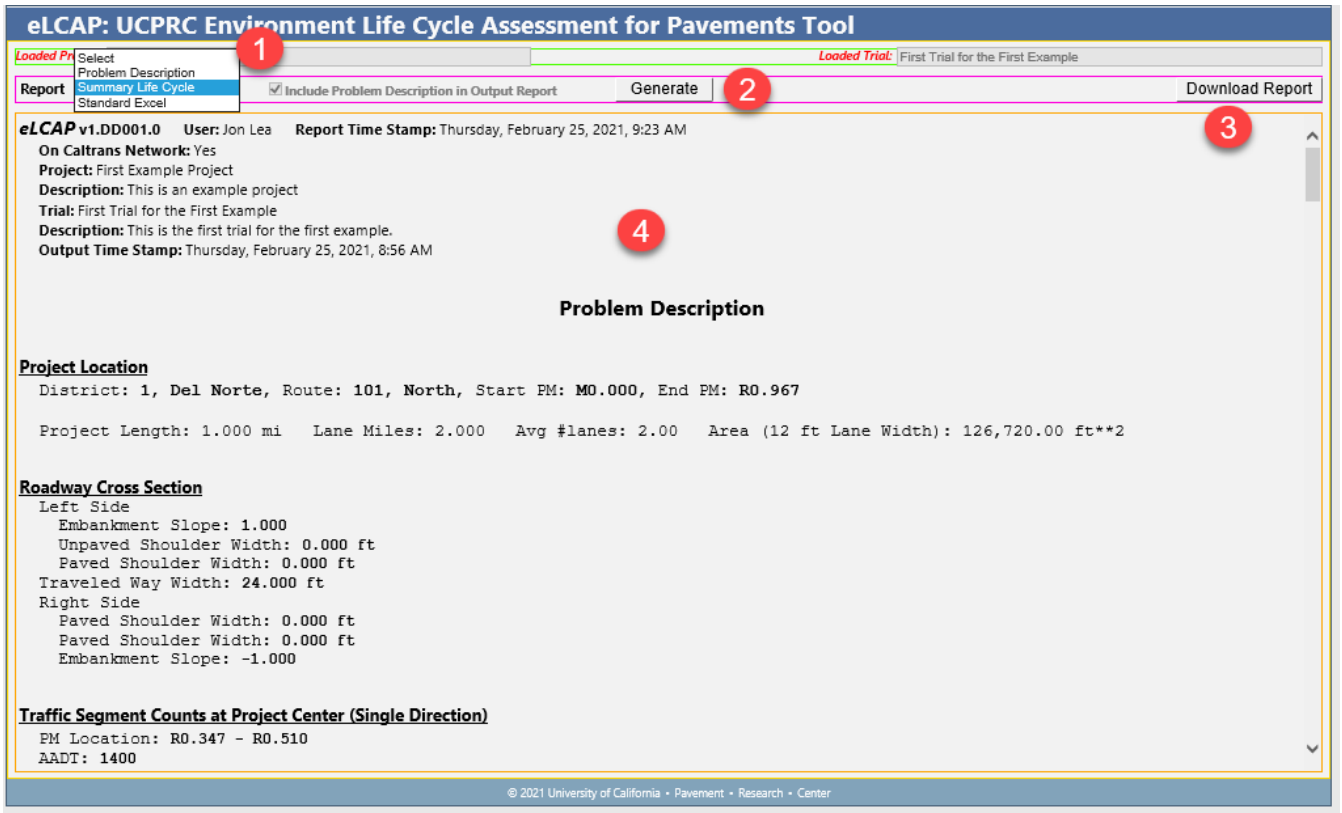
2. This checkbox and field allow you to set a Y-max value that will be used when generating all graphs

3. This set of radio buttons allow you to include some or all of the components in the IRI roughness equation used to compute GHG for the Use Stage. see Section 2.7.2 of the eLCAP Report.

4. Graph area

5. Graph legend

4.4.3. Reports


eLCAP: UCPRC Environment Life Cycle Assessment for Pavements Tool
Loaded Pr
Select
Problem Description
Summary Life Cycle
Standard Excel
1
Loaded Trial:
First Trial for the First Example
Report
Include Problem Description in Output Report
Generate
2
Download Report
3
eLCAP v1.DD001.0 User: Jon Lea Report Time Stamp: Thursday, February 25, 2021, 9:23 AM
On Caltrans Network: Yes
Project: First Example Project
Description: This is an example project
Trial: First Trial for the First Example
Description: This is the first trial for the first example.
Output Time Stamp: Thursday, February 25, 2021, 8:56 AM
4
Problem Description
Project Location
District: 1, Del Norte, Route: 101, North, Start PM: M0.000, End PM: R0.967
Project Length: 1.000 mi Lane Miles: 2.000 Avg #lanes: 2.00 Area (12 ft Lane Width): 126,720.00 ft**2
Roadway Cross Section
Left Side
Embankment Slope: 1.000
Unpaved Shoulder Width: 0.000 ft
Paved Shoulder Width: 0.000 ft
Traveled Way Width: 24.000 ft
Right Side
Paved Shoulder Width: 0.000 ft
Paved Shoulder Width: 0.000 ft
Embankment Slope: -1.000
Traffic Segment Counts at Project Center (Single Direction)
PM Location: R0.347 - R0.510
AADT: 1400
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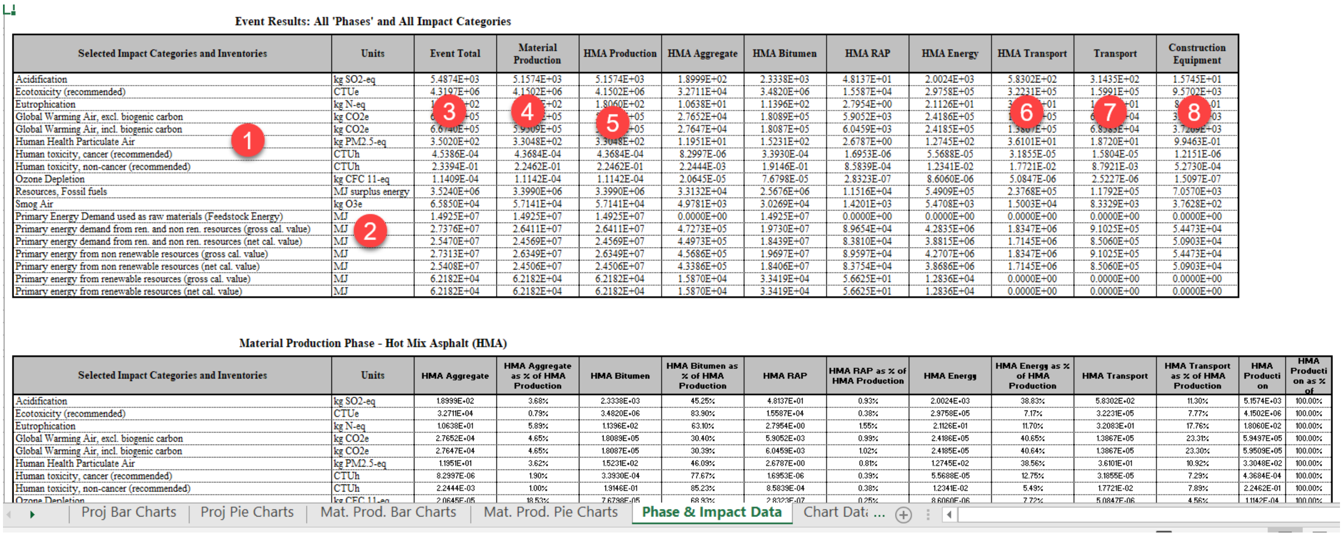


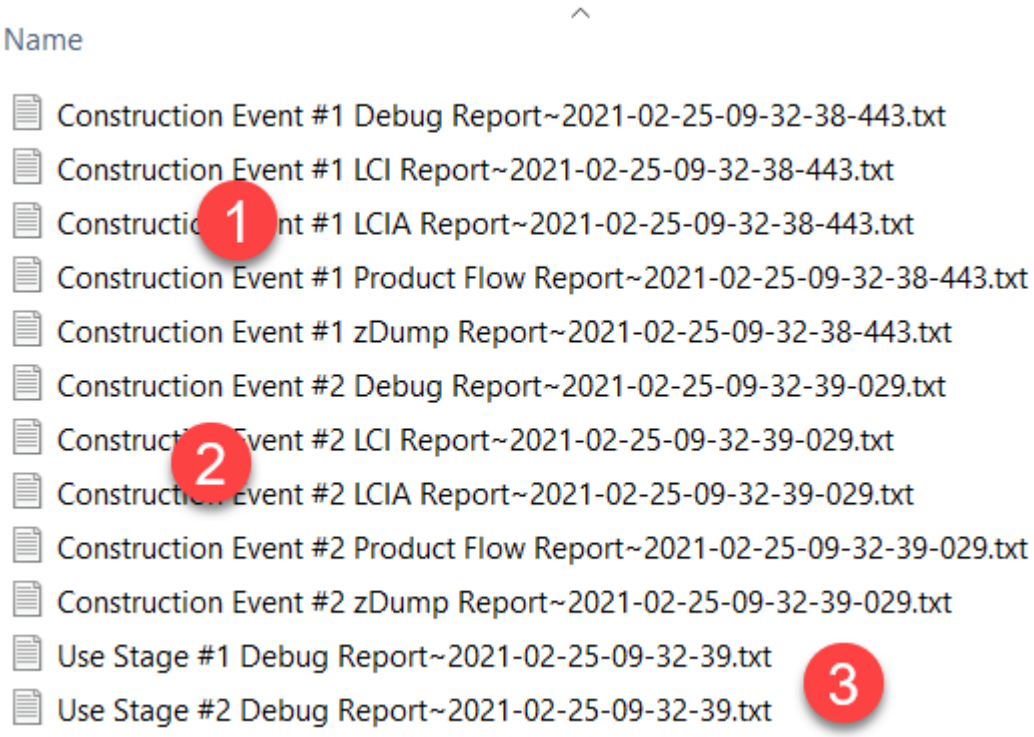
Event Results: All 'Phases' and All Impact Categories

Selected Impact Categories and Inventories	Units	Event Total	Material Production	HMA Production	HMA Aggregate	HMA Bitumen	HMA RAP	HMA Energy	HMA Transport	Transport	Construction Equipment
Acidification	kg SO2-eq	5.4874E+03	5.1574E+03	5.1574E+03	1.8999E+02	2.3338E+03	4.8137E+01	2.0024E+03	5.8302E+02	3.1435E+02	1.5745E+01
Ecotoxicity (recommended)	CTUe	4.3197E+06	4.1502E+06	4.1502E+06	3.2711E+04	3.4820E+06	1.5587E+04	2.9758E+05	3.2231E+05	1.5991E+05	9.5702E+03
Eutrophication	kg N-eq	[illegible]	[illegible]	1.8060E+02	1.0638E+01	1.1396E+02	2.7954E+00	2.1126E+01	[illegible]	[illegible]	[illegible]
Global Warming Air, excl. biogenic carbon	kg CO2e	[illegible]	[illegible]	[illegible]	2.7652E+04	1.8089E+05	5.9052E+03	2.4186E+05	[illegible]	[illegible]	[illegible]
Global Warming Air, incl. biogenic carbon	kg CO2e	6.6740E+05	5.9509E+05	[illegible]	2.7647E+04	1.8087E+05	6.0459E+03	2.4185E+05	[illegible]	[illegible]	[illegible]
Human Health Particulate Air	kg PM2.5-eq	3.5020E+02	3.3048E+02	3.3048E+02	1.1951E+01	1.5231E+02	2.6787E+00	1.2745E+02	3.6101E+01	1.8720E+01	9.9463E-01
Human toxicity, cancer (recommended)	CTUh	4.5386E-04	4.3684E-04	4.3684E-04	8.2997E-06	3.3930E-04	1.6953E-06	5.5688E-05	3.1855E-05	1.5804E-05	1.2151E-06
Human toxicity, non-cancer (recommended)	CTUh	2.3394E-01	2.2462E-01	2.2462E-01	2.2444E-03	1.9146E-01	8.5839E-04	1.2341E-02	1.7721E-02	8.7921E-03	5.2730E-04
Ozone Depletion	kg CFC 11-eq	1.1409E-04	1.1142E-04	1.1142E-04	2.0645E-05	7.6798E-05	2.8323E-07	8.6060E-06	5.0847E-06	2.5227E-06	1.5097E-07
Resources, Fossil fuels	MJ surplus energy	3.5240E+06	3.3990E+06	3.3990E+06	3.3132E+04	2.5676E+06	1.1516E+04	5.4909E+05	2.3768E+05	1.1792E+05	7.0570E+03
Smog Air	kg O3e	6.5850E+04	5.7141E+04	5.7141E+04	4.9781E+03	3.0269E+04	1.4201E+03	5.4708E+03	1.5003E+04	8.3329E+03	3.7628E+02
Primary Energy Demand used as raw materials (Feedstock Energy)	MJ	1.4925E+07	1.4925E+07	1.4925E+07	0.0000E+00	1.4925E+07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
Primary energy demand from ren. and non ren. resources (gross cal. value)	MJ	2.7376E+07	2.6411E+07	2.6411E+07	4.7273E+05	1.9730E+07	8.9654E+04	4.2835E+06	1.8347E+06	9.1025E+05	5.4473E+04
Primary energy demand from ren. and non ren. resources (net cal. value)	MJ	2.5470E+07	2.4569E+07	2.4569E+07	4.4973E+05	1.8439E+07	8.3810E+04	3.8815E+06	1.7145E+06	8.5060E+05	5.0903E+04
Primary energy from non renewable resources (gross cal. value)	MJ	2.7313E+07	2.6349E+07	2.6349E+07	4.5686E+05	1.9697E+07	8.9597E+04	4.2707E+06	1.8347E+06	9.1025E+05	5.4473E+04
Primary energy from non renewable resources (net cal. value)	MJ	2.5408E+07	2.4506E+07	2.4506E+07	4.3386E+05	1.8406E+07	8.3754E+04	3.8686E+06	1.7145E+06	8.5060E+05	5.0903E+04
Primary energy from renewable resources (gross cal. value)	MJ	6.2182E+04	6.2182E+04	6.2182E+04	1.5870E+04	3.3419E+04	5.6625E+01	1.2836E+04	0.0000E+00	0.0000E+00	0.0000E+00
Primary energy from renewable resources (net cal. value)	MJ	6.2182E+04	6.2182E+04	6.2182E+04	1.5870E+04	3.3419E+04	5.6625E+01	1.2836E+04	0.0000E+00	0.0000E+00	0.0000E+00

Material Production Phase - Hot Mix Asphalt (HMA)

Selected Impact Categories and Inventories	Units	HMA Aggregate	HMA Aggregate as % of HMA Production	HMA Bitumen	HMA Bitumen as % of HMA Production	HMA RAP	HMA RAP as % of HMA Production	HMA Energy	HMA Energy as % of HMA Production	HMA Transport	HMA Transport as % of HMA Production	HMA Production	HMA Production as % of
Acidification	kg SO2-eq	1.8999E+02	3.68%	2.3338E+03	45.25%	4.8137E+01	0.93%	2.0024E+03	38.83%	5.8302E+02	11.30%	5.1574E+03	100.00%
Ecotoxicity (recommended)	CTUe	3.2711E+04	0.79%	3.4820E+06	83.90%	1.5587E+04	0.38%	2.9758E+05	7.17%	3.2231E+05	7.77%	4.1502E+06	100.00%
Eutrophication	kg N-eq	1.0638E+01	5.89%	1.1396E+02	63.10%	2.7954E+00	1.55%	2.1126E+01	11.70%	3.2083E+01	17.76%	1.8060E+02	100.00%
Global Warming Air, excl. biogenic carbon	kg CO2e	2.7652E+04	4.65%	1.8089E+05	30.40%	5.9052E+03	0.99%	2.4186E+05	40.65%	1.3867E+05	23.31%	5.9497E+05	100.00%
Global Warming Air, incl. biogenic carbon	kg CO2e	2.7647E+04	4.65%	1.8087E+05	30.39%	6.0459E+03	1.02%	2.4185E+05	40.64%	1.3867E+05	23.30%	5.9509E+05	100.00%
Human Health Particulate Air	kg PM2.5-eq	1.1951E+01	3.62%	1.5231E+02	46.09%	2.6787E+00	0.81%	1.2745E+02	38.56%	3.6101E+01	10.92%	3.3048E+02	100.00%
Human toxicity, cancer (recommended)	CTUh	8.2997E-06	1.90%	3.3930E-04	77.67%	1.6953E-06	0.39%	5.5688E-05	12.75%	3.1855E-05	7.29%	4.3684E-04	100.00%
Human toxicity, non-cancer (recommended)	CTUh	2.2444E-03	1.00%	1.9146E-01	85.23%	8.5839E-04	0.38%	1.2341E-02	5.49%	1.7721E-02	7.89%	2.2462E-01	100.00%
Ozone Depletion	kg CFC 11-eq	2.0645E-05	18.53%	7.6798E-05	68.93%	2.8323E-07	0.25%	8.6060E-06	7.72%	5.0847E-06	4.56%	1.1142E-04	100.00%

4.4.4. Detailed Reports

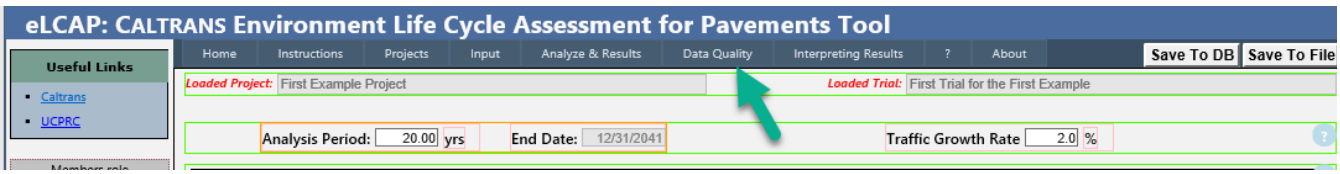


4.5. Data Quality Tab

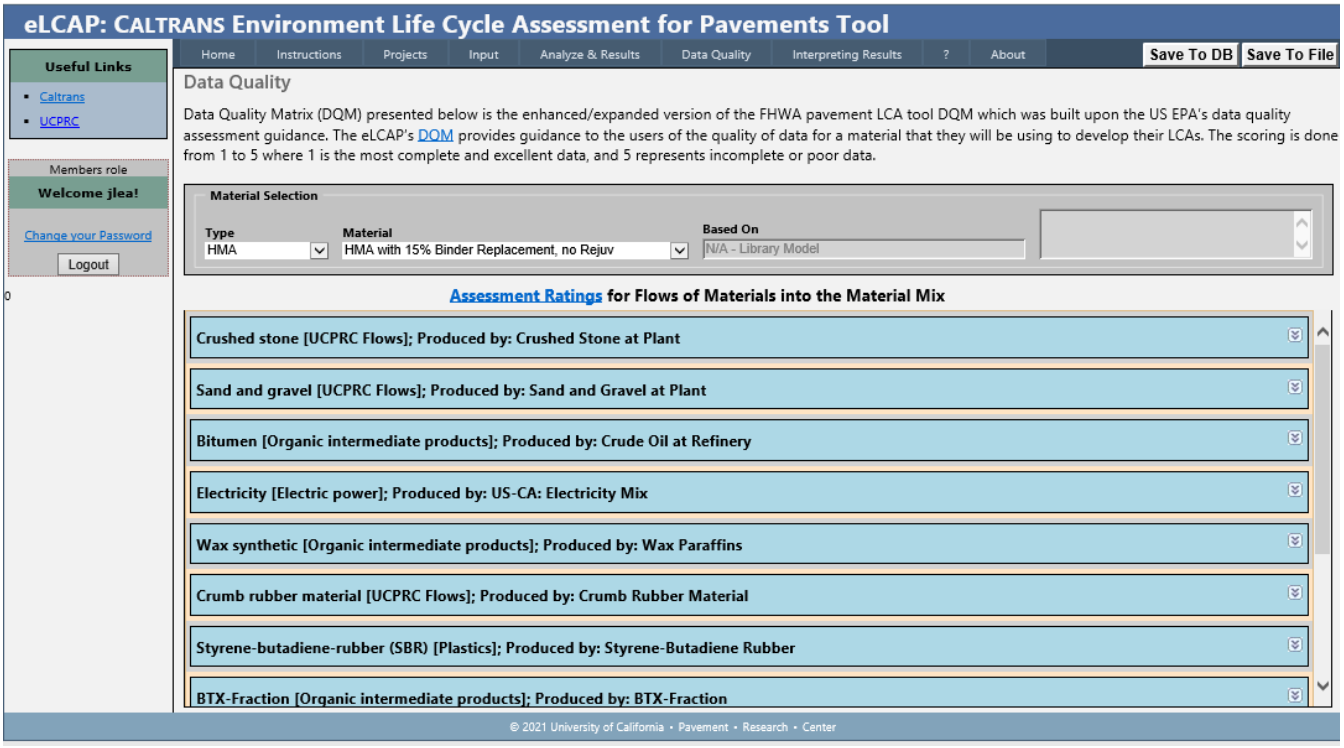
Data Quality Page

The following controls are located on the Data Quality Page.

This page is shown by either selecting the Data Documentation button when viewing a library mix, or adding or editing a user defined material mix, or by selecting the "Data Quality" menu shown below.



This page lists the input flows (ingredients) that are needed to produce the mix, as shown below. When you navigate to this page using the Data Documentation button, *eLCAP* preselects the Type and Material. When you navigate via the Data Quality menu, you will need to select a material type and a specific material.



To view the rating assessment for a specific flow, click on the name of the flow.

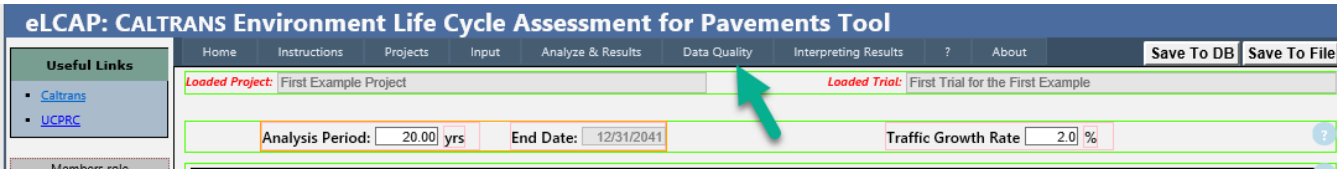
To view the Assessment Rating table, click on the Assessment Ratings link.

4.5.1. Viewing Assessment Data for Input Flows

Viewing Data Quality Assessment Data for Material Mix Input Flows

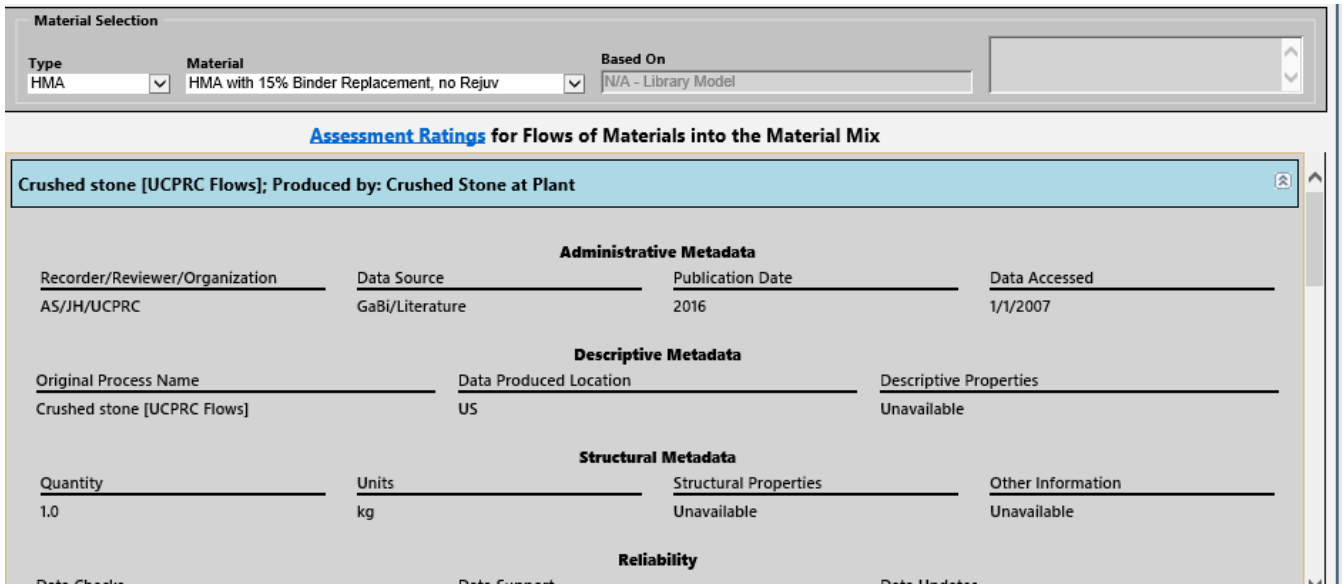
The following controls are located on the Data Quality Page.

This page is shown by either selecting the Data Documentation button when viewing a library mix or adding or editing a user defined material mix, or by selecting the "Data Quality" menu shown below.



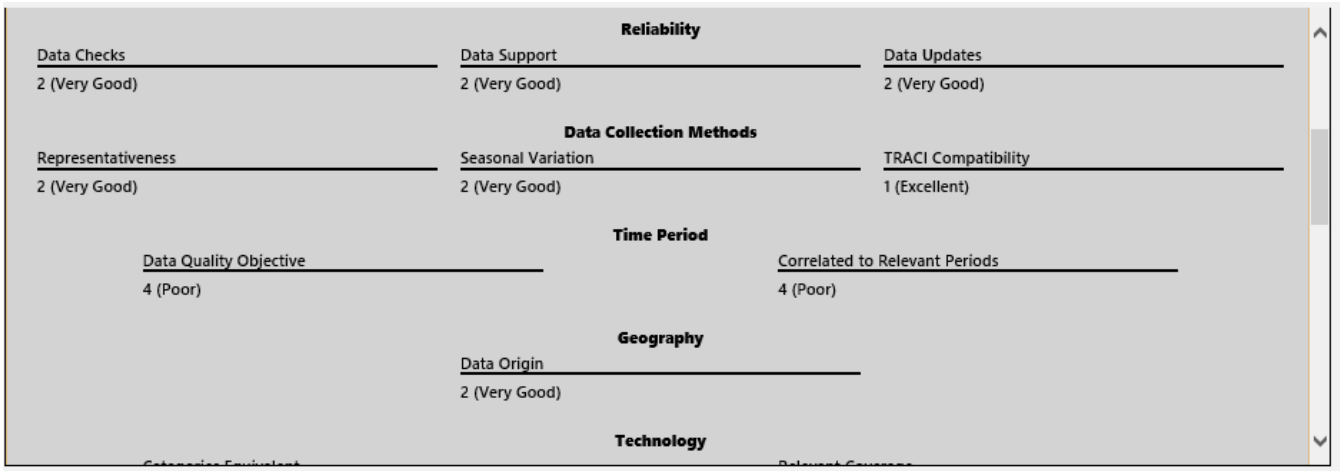
This page lists the input flows (ingredients) that are needed to produce the mix, as shown below. When you navigate to this page using the Data Documentation button *eLCAP* preselects the Type and Material. When you navigate via the Data Quality menu, you will need to select a material type and a specific material.

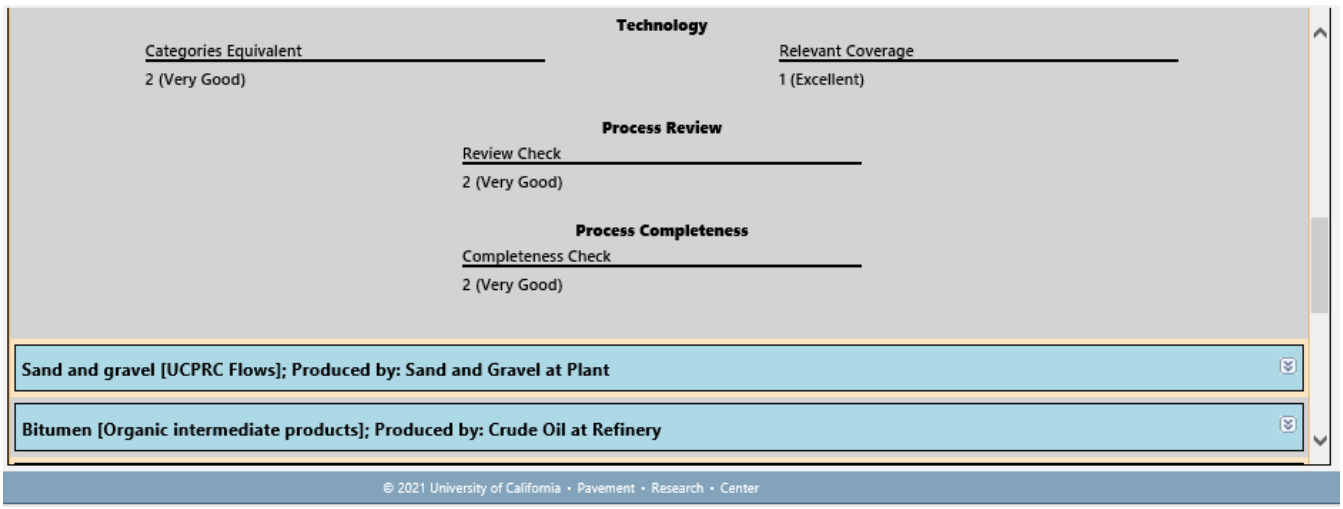
To view the rating assessment for a specific flow, click on the name of the flow.



The beginning of the assessment ratings for a flow are high level metadata for the input flow: Administrative, Descriptive and Structural.

The following data quality assessment areas are: Reliability, Data Collection Methods, Time Period, Geography, Technology, Process Review and Process Completenss.





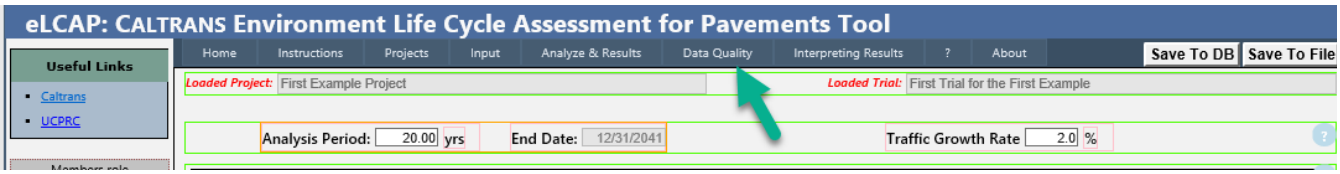
The details of the data quality areas and the specifics of the ratings are located in the Assessment Ratings topic.

4.5.2. Assessment Ratings

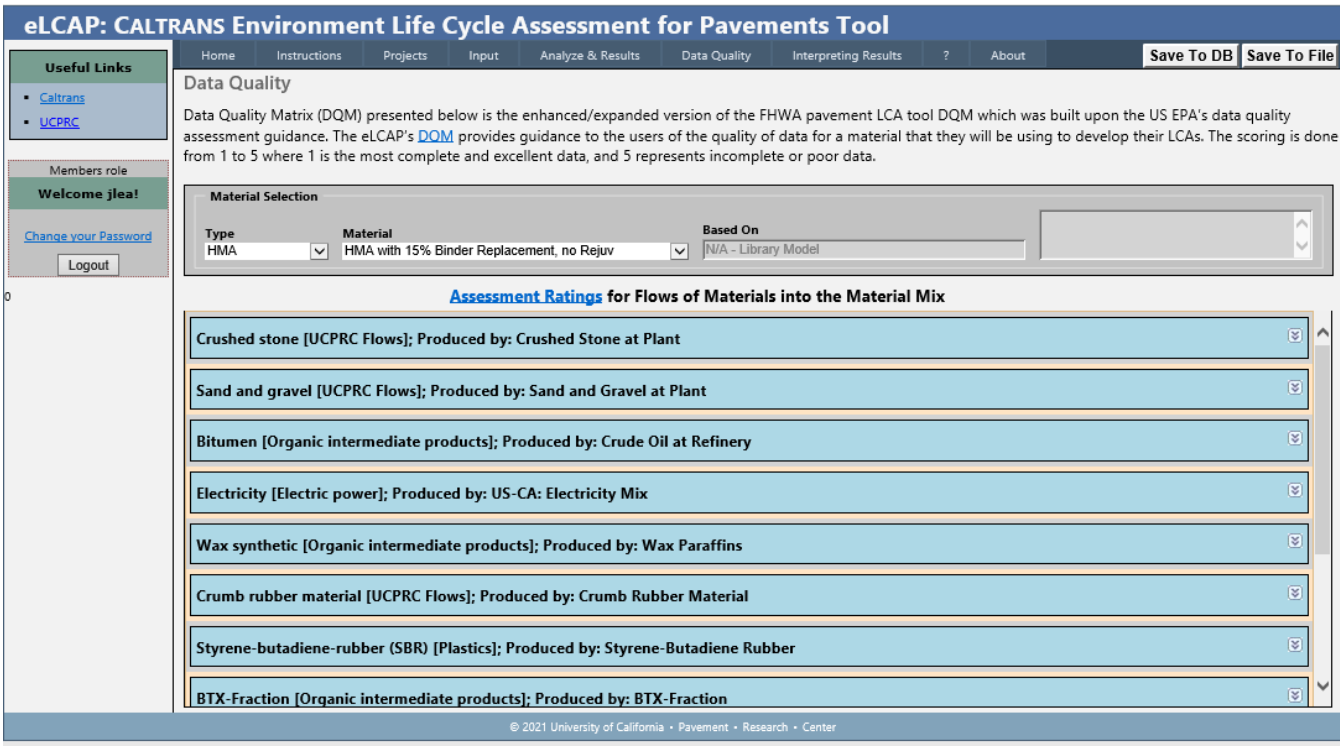
Assessment Ratings Matrix

The following controls are located on the Data Quality Page.

This page is shown by either selecting the Data Documentation button when viewing a library mix or adding or editing a user defined material mix, or by selecting the "Data Quality" menu shown below.



This page lists the input flows (ingredients) that are needed to produce the mix, as shown below. When you navigate to this page using the Data Documentation button, *eLCAP* preselects the Type and Material. When you navigate via the Data Quality menu, you will need to select a material type and a specific material.



To view the Assessment Rating table, click on the Assessment Ratings link.

			High score				Low Score
Quality Indicators	**Indicator Sub-categories**	**Indicator Description**	**1 (Excellent)**	**2 (Very Good)**	**3 (Good)**	**4 (Poor)**	**5 (Unsatisfactory)**
Reliability	**Data Checks**	Is the inventory data checked for mass/ energy balance, recalculation etc.?	Verified data based on measurements	Verified data based on a calculation or non-verified data based on measurements	Non-verified data based on a calculation	Documented estimate	Undocumented estimate
	Data Support	What is the status quo for the ownership and continuous support of data?	Hosts and Owns	Owns but does not host	Hosts but does not owns	Hosts and owns partially	Does not host or own
	Data Updates	Is the data regularly updated?	Regular Updates	Less frequent updates	No Updates	-	-
Data Collection Methods	**Representativeness**	How representative is the data of the market?	Representative data from >80% of the relevant market, over an adequate period	Representative data from 60-79% of the relevant market , over an adequate period **OR** representative data from >80% of the relevant market, over a shorter period of time	Representative data from 40-59% of the relevant market, over an adequate period **OR** representative data from 60-79% of the relevant market, over a shorter period of time	Representative data from <40% of the relevant market, over an adequate period of time **OR** representative data from 40-59% of the relevant market, over a shorter period of time	Unknown **OR** data from a small number of sites and from shorter periods
	Seasonal Variations	Does the data capture seasonal variations?	Seasonal variations captured	Seasonal variation not captured	-	-	-
	TRACI Compatibility	How compatible is the life-cycle inventory data with TRACI 2.1 impact assessment method?	100% TRACI compatible	75% TRACI compatible	50% TRACI compatible	25% TRACI compatible	TRACI uncompatible
Time Period	**Data Quality Objective**	How well is the time period the data correlated with the data quality objective?	Less than 3 years of difference	Less than 6 years of difference	Less than 10 years of difference	Less than 15 years of difference	Age of data unknownor more than 15 years
	Correlated to Relevant Periods	Has the data been adjusted for the relevant time period?	Data **fully** adjusted for relevant time periods of analysis	Data fully adjusted for relevant time periods but with **medium** level of uncertainity	Data fully adjusted for relevant time periods but with **high** level of uncertainity	**Some** data adjusted for relevant time periods but with **high** level of uncertainity	Data **unadjusted** for relevant time periods
Geography	**Data Origin**	How well is the geography of the data correlated with the data quality objective?	Data from same resolution **AND** same area of study	Within one level of resolution **AND** a related area of study	Within two levels of resolution **AND** a related area of study	Outside of two levels of resolution **BUT** a related area of study	From a different or unknwn area of study

5. Acronyms

The following is a list of Acronyms used in *eLCAP*.

AADT	Annual Average Daily Traffic
AB	Aggregate Base
AS	Aggregate Sub-base
ATPB	Asphalt-Treated Permeable Base
BPA	Bisphenol A
CCPR	Cold Central Plant Recycling
CRM	Crumb Rubber Modifier
CSA	Calcium Sulfoaluminate (cement type)
CTB	Cement-Treated Base
CTPB	Cement-Treated Permeable Base
DB	Data Base
DQM	Data Quality Matrix
EE	Engineered Emulsion
eLCAP	Environmental Life Cycle Assessment for Pavements
ESAL	Equivalent Single Axle Load
FA	Foam Asphalt
FDR	Full Depth Reclamation
GHG	Greenhouse Gas
GWP	Global Warming Potential
HMA	Hot Mix Asphalt
LCB	Lean Concrete Base
LTS	Lime-Treated Subgrade
MTV	Material Transfer Vehicle
OGFC	Open-Graded Friction Course
OGFC-PM	Polymer Modified Open-Graded Friction Course
PC	Portland Cement
PCC	Portland Cement Concrete
PDR	Partial Depth Reclamation
PM	Post-Mile
RAP	Reclaimed Asphalt Pavement
RHMA-G	Rubberized Hot Mix Asphalt-Gap Graded
RHMA-O	Rubberized Hot Mix Asphalt-Open Graded
SBR	Styrene Butadiene Rubber
SCM	Secondary Cementitious Materials
TRACI	Tool for Reduction and Assessment of Chemicals and Other Environmental Impa

UCPRC	University of California Pavement Research Center
WIM	Weigh-in-motion