

# **eLCAP**

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# 1. Introduction

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## 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.

## 2. Technical Overview

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# Technical Overview

The following [\*link\*](#) is a good starting point for a technical discussion of *eLCAP*.

## 3. Getting Started

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# Getting Started

This section presents

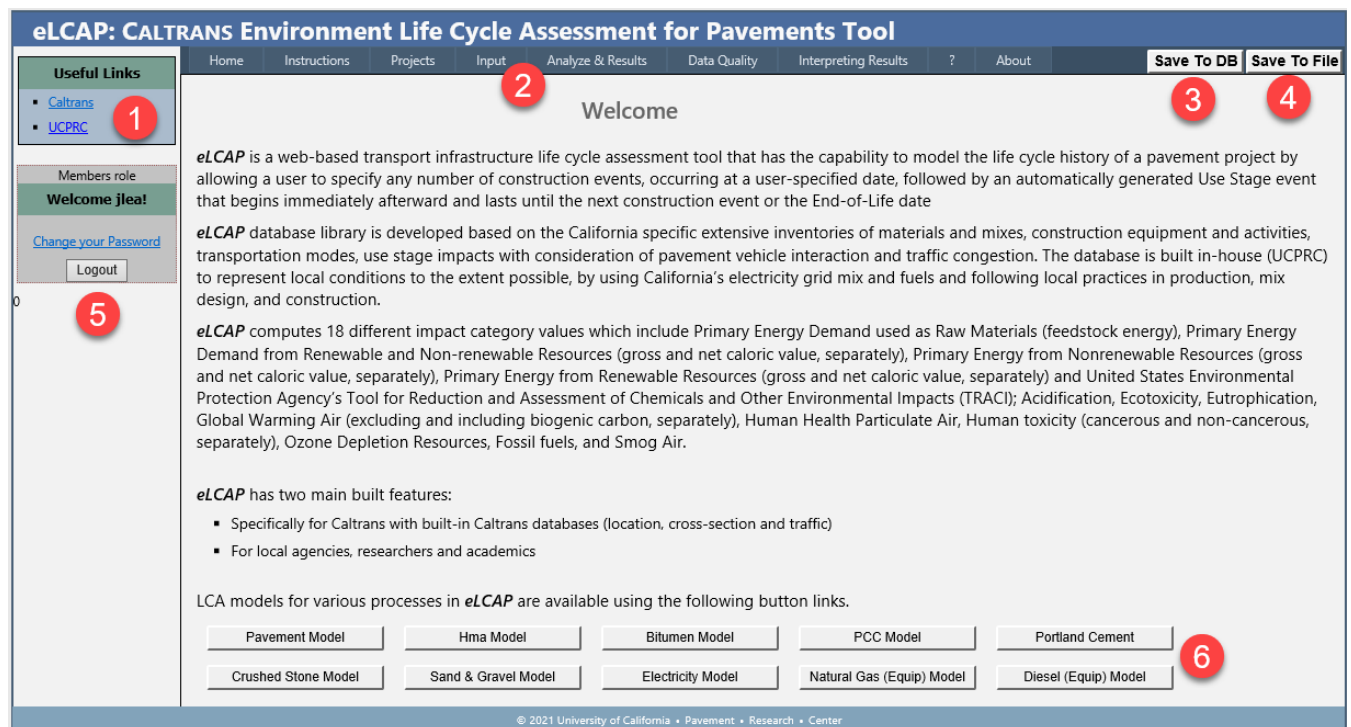
## 4. User Interface

### 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.

**Projects and Trials Stored in the Database**

**Loaded Project:** Second > 3I-19-255-209 Caltrans Project Edit Project Add Project Delete Project Save Project As

**Loaded Trial:** #6.C (Default HMA, 20 yrs, 120 IRI, 0% Traffic Growth Rate) Save Trial As

Trial Title	Trial Description	
<a href="#">#6.C (Default HMA, 20 yrs, 120 IRI, 0% Traffic Growth Rate)</a>	#6.C (Default HMA, 20 yrs, 120 IRI, 0% Traffic Growth Rate) No Transport and ...	<a href="#">Delete</a>
<a href="#">#6.C (Default HMA, 20 yrs, 75 IRI, 0% Traffic Growth Rate)</a>	#6.C (Default HMA, 20 yrs, 75 IRI, 0% Traffic Growth Rate) No Transport and N...	<a href="#">Delete</a>

Add Trial

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 a trial
- 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

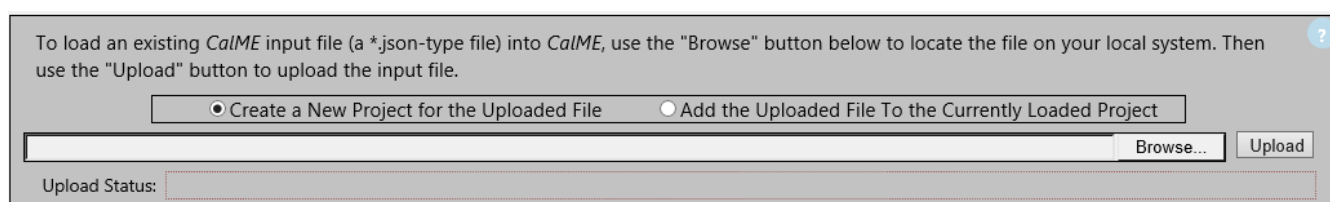
The following controls, located on the **Projects Page**, are used to browse the local computer's file system to locate and select a file that has been saved from within *eLCAP* and load it back into *eLCAP*.

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 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 screenshot shows a control group for uploading files. At the top, a text box explains: "To load an existing *CalME* input file (a \*.json-type file) into *CalME*, use the "Browse" button below to locate the file on your local system. Then use the "Upload" button to upload the input file." To the right of this text is a blue circle with a white question mark. Below the text are two radio buttons: "Create a New Project for the Uploaded File" (which is selected) and "Add the Uploaded File To the Currently Loaded Project". Below these is a text input field with a "Browse..." button to its right. At the bottom right is an "Upload" button. At the bottom left is an "Upload Status:" label followed by a long, empty text box.

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).

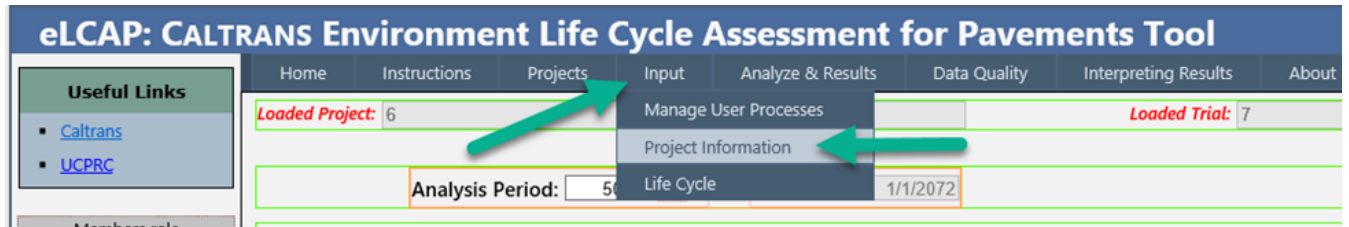
## 4.3. Input Tab

### 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

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## 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)

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Home Instructions Projects Input Analyze & Results Data Quality Interpreting Results ? About Save To DB Save To File

Loaded Project: Second > 31-19-255-209 Loaded Trial: #6.C (Default HMA, 20 yrs, 120 IRI, 0% Traffic Growth Rate)

**Project Location**

District: 2 County: Trinity Route: 299 Direction: East PM Start: 0.000 PM End: 1.000

Climate Zone: Low Mountain Project Length: 1.000 mi Lane Miles: 1.000 Avg #lanes: 1.00

**Cross Section**

Life Cycle Event: 1 1/1/2021 Activity: N/A

Embankment Left-Slope	Left Unpaved Shoulder Width (ft)	Left Paved Shoulder Width (ft)	Traveled Way Width (ft)	Right Paved Shoulder Width (ft)	Right Unpaved Shoulder Width (ft)	Embankment Right-Slope	Actions
1.0000	0.000	2.000	24.000	2.000	0.000	-1.0000	Edit

**Traffic Segment Information at Center of Project (Single Direction)**

PM Boundaries	AADT	AADTT	Trucks (%)	WIM Group	Spectrum	Growth (%)	First Year Design Lane (2021)			Axles/Truck	Year
0.160 - 0.860	1,800	124	6.89	Group1b	Spectrum3	5.1	Trucks	Axles	ESALs	2.536	2012

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#### 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

**Project Location**

District: Select \* County: Select \* Route: Select \* Direction: Select \*

PM Start: -1.000 PM End: -1.000

Climate Zone: Project Length: Lane Miles: Avg #lanes:

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.

**Project Location**

District	County	Route	Direction	PM Start	PM End
1	Del Norte	101	North	M 0.000	R 0.967

Climate Zone: North Coast      Project Length: 1.000 mi      Lane Miles: 2.000      Avg #lanes: 2.00

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.

**Project Location**

District	County	Route	Direction	PM Start	PM End
1	Del Norte	101	North	M 0.000	R 10.000 *

Climate Zone:      Project Length:      Lane Miles:      Avg #lanes:

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.

**Error Message Summary**

Invalid PM End. Try: 10.000

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 used 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).

#### 4.3.1.1.2. Traffic - CT

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## 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

Traffic Segment Information at Center of Project (Single Direction)										
PM Boundaries	AADT	AADTT	Trucks (%)	WIM Group	WIM Spectrum	Growth (%)	First Year Design Lane (2020)			Axles/Truck
R0.347 - R0.510	1,400	204	14.57	Group1b	Spectrum1	6.0	Trucks	Axles	ESALs	Year
							89,312	226,490	48,499	2.536
										2012

*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

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# 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

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Home Instructions Projects Input Analyze & Results Data Quality Interpreting Results ? About Save To DB Save To File

Loaded Project: go daddy Loaded Triab: def

**Useful Links**

- Caltrans
- UCPRC

Members role

Welcome jlea!

[Change your Password](#)

[Logout](#)

**Project Details**

Project Length (mile) 0.100 Design Life (yrs) 0 Traffic Year 2000 Traffic Growth (%) 0.0 Climate Zone Central Coast

☐ Generate Lanes and Lane Traffic from Total (all lanes) One Way Traffic Counts

AADT 10 AADTT 10 Number Lanes 1 Generate Lanes and Traffic

Average Annual Daily Traffic Counts (One Way)

Lane	AADT	AADTT	2-Axle Trk	3-Axle Trk	4-Axle Trk	5-Axle Trk	ESALS/yr	Actions
1	10	10	3	3	1	2	2,431	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Insert</a>
TTL	10	10	3	3	1	2	2,431	

Add Lane

☒ Cross Section ☐ Activities Life Cycle Event 1 1/1/2022 Activity 1: Add Layer HMA

S=0.000 L=12.00 S=0.000

Embankment Left-Slope	Left Unpaved Shoulder Width (ft)	Left Paved Shoulder Width (ft)	Traveled Way Width (ft)	Right Paved Shoulder Width (ft)	Right Unpaved Shoulder Width (ft)	Embankment Right-Slope	Actions
0.0000	0.000	0.000	12.000	0.000	0.000	0.0000	<a href="#">Edit</a>

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#### 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

**Project Details**

Project Length (mile)	Design Life (yrs)	Traffic Year	Traffic Growth (%)	Climate Zone
0.100	0	2000	0.0	Central Coast

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](#)).

☐ Generate Lanes and Lane Traffic from Total (all lanes) *One Way* Traffic Counts

AADT	AADTT	Number Lanes
10	10	1

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.

**Average Annual Daily Traffic Counts** (*One Way*)

Lane	AADT	AADTT	2-Axle Trk	3-Axle Trk	4-Axle Trk	5-Axle Trk	ESALS/yr	Actions
1	10	10	3	3	1	2	2,431	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Insert</a>
TTL	10	10	3	3	1	2	2,431	

Add Lane

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

☒ Cross Section ☐ Activities Life Cycle Event 1 6/30/2019 Activity 1: Add Layer SG

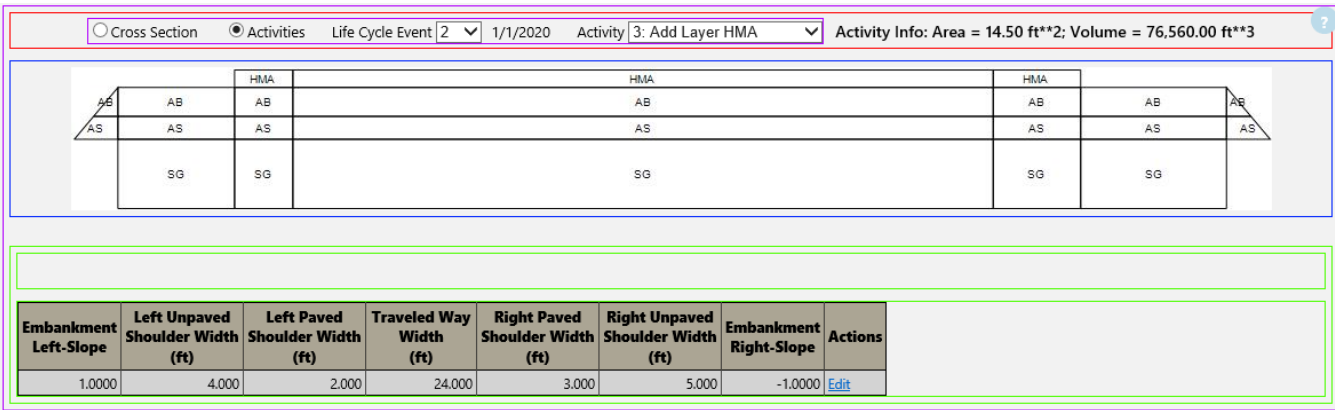
Embankment Left-Slope	Left Unpaved Shoulder Width (ft)	Left Paved Shoulder Width (ft)	Traveled Way Width (ft)	Right Paved Shoulder Width (ft)	Right Unpaved Shoulder Width (ft)	Embankment Right-Slope	Actions
1.0000	4.000	2.000	24.000	3.000	5.000	-1.0000	<a href="#">Edit</a>

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.



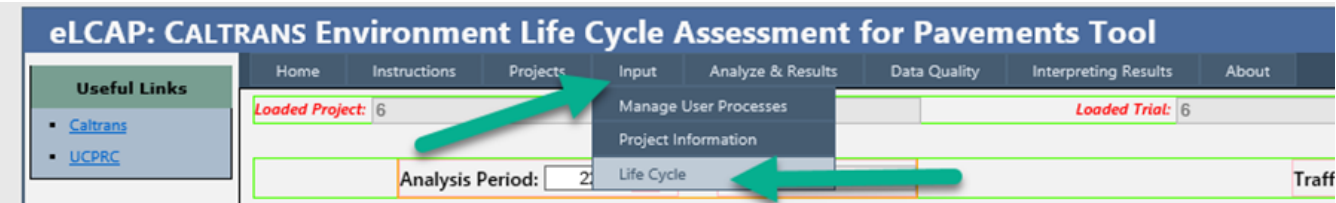
The graphic above is showing the cross section for event 2 (occurring on 1/1/2020) and activity 3 (adding an HMA layer). eLCAP also shows the computed cross sectional area (14.5 ft<sup>2</sup>) and the volume (76,560.0 ft<sup>3</sup>) for the selected event and activity. This volume, along with the material 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.



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Home Instructions Projects Input Analyze & Results Data Quality Interpreting Results About Save To DB Save To File

Loaded Project: 6 Loaded Trial: 6

Analysis Period: 22.00 yrs End Date: 1/1/2032 Traffic Growth Rate: 5.0 %

#	Description	Event Date	Svc Life (yrs)	Include	Use Stage Roughness Eqn	Initial IRI (in/mi)	Select Row	Actions
1	Existing	1/1/2010	10	<input checked="" type="checkbox"/>	None		Select	Save Cancel
2	First Maintenance	1/1/2031	5	<input checked="" type="checkbox"/>	New Flex Construction	81.8	Select	Edit Delete Insert

Add Event

**Activities, Materials and Equipment**

#	Operation	Kind	Layer No.	Layer Type	% Left UPS	% Left PS	% TW	Ris	U	No. Lifts	Actions
1	Add	Layer	3	SG	100	100	100		inch	1	Edit Delete Insert

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**.

**eLCAP: CALTRANS Environment Life Cycle Assessment for Pavements Tool**

Home Instructions Projects Input Analyze & Results Data Quality Interpreting Results About

Loaded Project: 6 Loaded Trial: 6

Analysis Period: 2

Life Cycle

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.

The screenshot shows the eLCAP software interface. At the top, there is a navigation bar with tabs: Home, Instructions, Projects, Input, Analyze & Results, Data Quality, Interpreting Results, and About. On the right, there are buttons for 'Save To DB' and 'Save To File'. Below the navigation bar, there are input fields for 'Loaded Project: 6' and 'Loaded Trial: 6'. A section for 'Analysis Period: 22.00 yrs' and 'End Date: 1/1/2032' is shown, along with a 'Traffic Growth Rate' of 5.0%. The main area contains a 'Life Cycle Events' table with columns: #, Description, Event Date, Svc Life (yrs), Include, Use Stage Roughness Eqn, Initial IRI (in/mi), Select Row, and Actions. A dropdown menu is open for the 'Use Stage Roughness Eqn' column, showing options like 'None', 'New Flex Construction', 'Very Thin Overlay', 'Thin Overlay', 'Medium Overlay', 'Thick Overlay', 'Seal Coat', 'Seal Cracks', 'FDR', 'GPR', 'Unknown Flex', 'New PCC Construction', 'CSOL', 'Lane Replacement', 'Grind', 'Grind w/Slab Rplcmnt', 'Slab Replacement', and 'Unknown JPC'. Below the table, there is an 'Add Event' button and a section for 'Activities, Materials and Equipment'.

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 screenshot shows the eLCAP software interface with numbered callouts 1 through 16 highlighting various controls. The callouts are: 1. 'Save To DB' button; 2. 'Save To File' button; 3. 'Loaded Project' field; 4. 'Loaded Trial' field; 5. 'Analysis Period' field; 6. 'End Date' field; 7. 'Traffic Growth Rate' field; 8. 'Description' column in the Life Cycle Events table; 9. 'Event Date' column; 10. 'Svc Life (yrs)' column; 11. 'Include' column; 12. 'Use Stage Roughness Eqn' column; 13. 'Initial IRI (in/mi)' column; 14. 'Select Row' column; 15. 'Actions' column; 16. 'Add Event' button.

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.

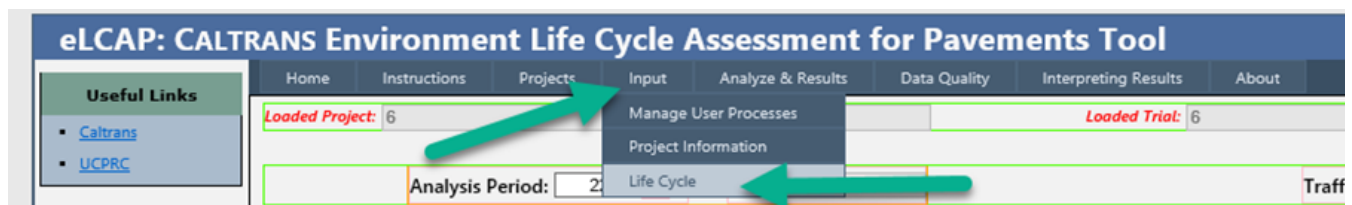
10. Supply a Service Life for the event that represents the expected useful life of the activities performed during the event.
11. This checkbox (checked by default) permits you to remove events from the analysis without having to delete them.

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.

#	Operation	Kind	Layer No.	Layer Type	% Left UPS	% Left PS	% TW	% Right PS	% Right UPS	Thick	U	No. Lifts	Actions
1	Add	Layer	1	HMA	N/A	100	100	100	N/A	0.5	ft	2	Edit Delete Insert

Add Activity

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 is 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).

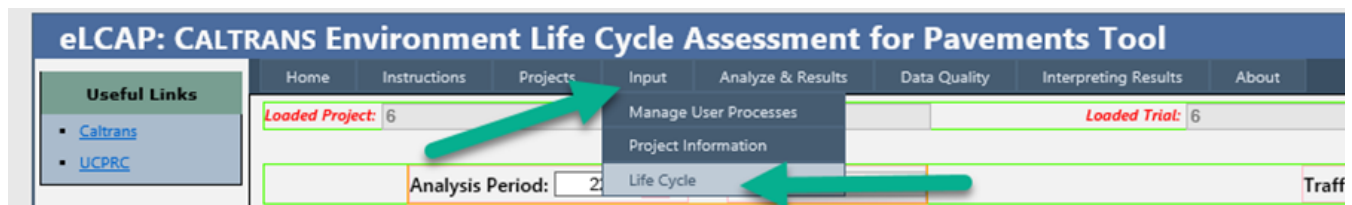
12. Select the units used for thickness.
13. *eLCAP* will compute the number of lifts for you based on the layer type and the thickness of the layer. You may change the generated value.
14. Operations to be applied to the activity (row): Add, Delete, Insert, Cancel and Save.
15. This button is used to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

Materials and Transports To the Site

#	Type	Source Name	Density	U	Quantity	U	Transport to Site	Distance	U	Actions
1	HMA	HMA with 15% Binder Replacement, no Rejuv	150.0	lb/ft3	4,752.0	ton	End Dump Truck	50.0	mile	Edit Delete Insert
1	2	3	4	5	6	7	8	9	10	

Add Material11

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.

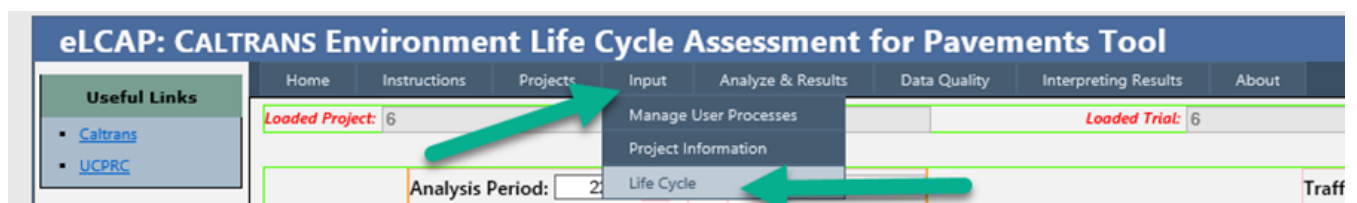
1. This control list the types of a material, e.g., HMA, PCC, AB, etc.
2. This control lists the specific materials for a material type. Clicking the name of the specific material will bring up form showing the flows that go into the material mix.
3. This control gives the material density. This value 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.

Equipment Used at the Site							
#	Type	Source Name	Generated By	Time Est (hr)	Quantity	U	Actions
1	Light Tower	<a href="#">Light Tower</a>	Add-Layer-HMA	20.11	20.1	hr	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Insert</a>
2	Sweeper Scrubber	<a href="#">Sweeper Scrubber</a>	Add-Layer-HMA	2.70	2.7	hr	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Insert</a>
3	Front Loader	<a href="#">Front Loader</a>	Add-Layer-HMA	8.19	8.2	hr	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Insert</a>
4	Paver	<a href="#">Asphalt Paver</a>	Add-Layer-HMA	2.01	2.0	hr	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Insert</a>
5	Material Transfer	<a href="#">Material Transfer</a>	Add-Layer-HMA	2.01	2.0	hr	<a href="#">Edit</a> <a href="#">Delete</a> <a href="#">Insert</a>
<div> <span>Add Equipment</span> </div>							

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.

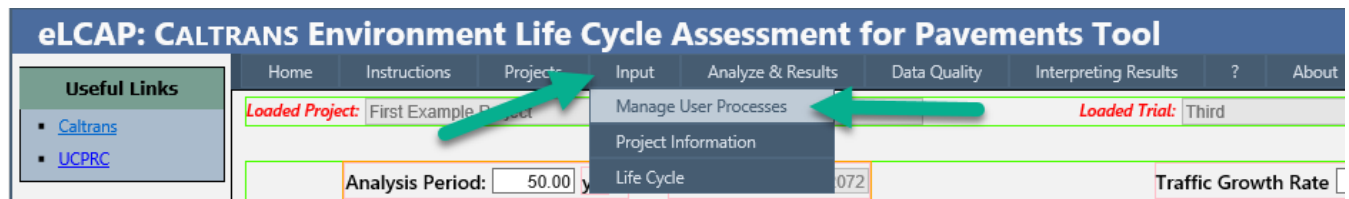
1. This control list the types of a equipment, e.g., Light Tower, Paver, Roller, etc.
2. This control lists the specific equipment for an equipment type. Clicking the name of the specific piece of equipment will bring up form showing the flows that go into the equipment.
3. The value in this column is 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 anywhere 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 screenshot shows the 'Manage User Definitions' page. It includes a sidebar with 'Useful Links' (Caltrans, UCPRC), 'Members role', 'Welcome jleal', 'Change your Password', and 'Logout'. The main content area has a title bar with 'Save To DB' and 'Save To File' buttons. Below the title bar is the 'Manage User Definitions' section, which contains a description: 'This page is used to manage User Defined LCA objects, such as custom material mix, e.g., HMA or PCC, a custom piece of construction, e.g., Asphalt Paver or Roller, and a custom Transport, e.g., End Dump Truck.' Below this is a table titled 'User Defined Processes'.

#	Type	Source Name	Based on Model	Created	Modified	# Refs	
1	HMA	HMA 3/4" (P401)	HMA with 15% Binder Replacement, no Rejuv	10/29/20 11:25:02	10/29/20 11:58:55	0	Delete
2	HMA	HMA 1" (P401)	HMA with 15% Binder Replacement, no Rejuv	10/29/20 11:26:13	10/29/20 11:42:39	0	Delete
3	HMA	My Special HMA-1	HMA with 15% Binder Replacement, no Rejuv	10/29/20 13:31:38	2/19/21 15:16:05	0	Delete
4	HMA	My Special HMA-2	HMA with 15% Binder Replacement, no Rejuv	1/21/21 11:48:36	1/21/21 11:50:08	0	Delete
5	HMA	My Special HMA-3	HMA with 15% Binder Replacement, no Rejuv	1/28/21 13:48:40	1/28/21 13:48:40	0	Delete
6	PCC	PCC (P501)	Caltrans Type II PCC (24-hr Open)	10/29/20 11:53:54	10/29/20 11:56:21	0	Delete
7	CCPR	CTBR	CCPR with 3% PC Stabilizer	10/29/20 11:39:57	10/29/20 11:56:55	0	Delete
8	FDR	ICTB (P304)	FDR with 3% PC Stabilizer	10/29/20 11:17:14	10/29/20 11:57:27	0	Delete
9	FDR	CTB (P304)	FDR with 3% PC Stabilizer	10/29/20 11:17:47	10/29/20 11:17:47	0	Delete
10	FDR	CSS (P155)	FDR with 3% PC Stabilizer	10/29/20 11:18:38	10/29/20 11:18:38	0	Delete
11	FDR	CSS (P301)	FDR with 3% PC Stabilizer	10/29/20 11:19:21	10/29/20 11:57:19	0	Delete
12	FDR	FDR with 2.5% PC	FDR with 3% PC Stabilizer	10/30/20 10:12:32	10/30/20 10:12:32	0	Delete
13	RAP	My Special RAP-1	RAP, Plant Mix, Fractionated	10/29/20 13:35:49	11/3/20 12:22:22	0	Delete
14	Electricity	Electricity-TN2015	US-CA: Electricity Mix	10/29/20 10:52:50	10/29/20 12:01:57	5	Delete

Below the table is a section titled 'Add a Custom Material Mix, Construction Equipment or Transport'. It contains three dropdown menus: 'HMA', 'Paver', and 'Transport'. Below each dropdown is a button: 'Create New Material', 'Create New Equipment', and 'Create New Transport'.

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.

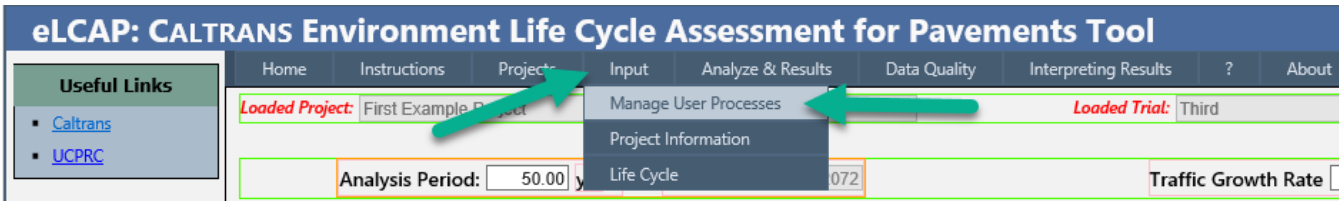
To view an existing user process, click on the link in the "Source Name" column.

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

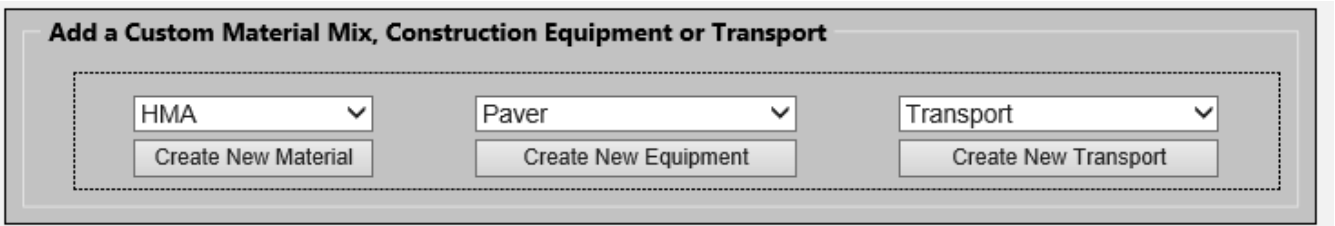
### 4.3.3.1. Adding a User Defined Object

## 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.

HMA

PCC

AB

AS

CTB

ATPB

CCPR

FDR

PDR

LCB

LTS

CTPB

RAP

Cement

Cape Seal

Chip Seal

Fog Seal

Sand Seal

Slurry Seal

Tack Coat

Prime Coat

Electricity

Paver

Roller

Miller

Sweeper

Water Truck

Tack Coat Truck

Aggregate Truck

Emulsion Truck

RC Truck

CCPR Mixer

Cold Planer

Light Tower

Sweeper Scrubber

Pulverizer

Scraper

Soil Hauler

Chip Spreader

Slurry Spreader

Paint Striper

Concrete Saw

Portable Crusher And Sizer

Rubblizer And Concrete Breaker

Concrete Mixer

Grader

Front Loader

Tractor Backhoe

Boom Truck Crane

Guillotine

Material Transfer

Groover Grinder

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

eLCAP: UCPRC Environment Life Cycle Assessment for Pavements Tool

This form allows you to add a User Defined HMA Process by changing the input flow quantities into the HMA Process. The initial flow quantities come from the built-in Library HMA. Select the Edit link to edit one or more input flow quantity, specify a unique name for the User Defined HMA and select Save. Once saved, the User Defined HMA will be available to use wherever an HMA is appropriate.

Input Flows for: My Special HMA-4

Based On: Select

Define Quantities for a New HMA

HMA Reference Flow Amount: with Bulk Density:

Data Documentation

#	Type	Source Name	Quantity	Unit
No Quantities				

Source Transports

Save

Cancel/Back

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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 screenshot shows a software interface for defining HMA quantities. It includes input fields for 'Input Flows for' and 'Based On', a section for defining quantities with a reference flow amount and bulk density, a table of parameters and flows, and buttons for 'Source Transports', 'Save', and 'Cancel/Back'. Red circles with numbers 1 through 11 highlight specific UI elements.

#	Type	Source Name	Quantity	Unit	
1	Parameter	Agg_Crushed	80.330	%	<a href="#">Edit</a>
2	Parameter	Agg_Natural	0.000	%	<a href="#">Edit</a>
3	Parameter	Asphalt_Content	4.000	%	<a href="#">Edit</a>
4	Parameter	Crumb_Rubber	0.000	%	<a href="#">Edit</a>
5	Parameter	Extended_Oil	0.000	%	<a href="#">Edit</a>
6	Parameter	Polymer_Modified	0.000	%	<a href="#">Edit</a>
7	Parameter	RAP	15.670	%	<a href="#">Edit</a>
8	Parameter	Rejuv_BTX	0.000	%	<a href="#">Edit</a>
9	Parameter	Rejuv_Bio	0.000	%	<a href="#">Edit</a>
10	Electricity	<a href="#">US-CA: Electricity Mix</a>	7.6319e-03	MJ	<a href="#">Edit</a>
11	RAP	<a href="#">RAP, Plant Mix, Fractionated</a>	0.157	kg	<a href="#">Edit</a>
12	Natural_Gas	Natural Gas Combusted in Industrial Equipment	1.0326e-02	m3	<a href="#">Edit</a>
13	Diesel_from_industrial_equipment	Diesel Combusted in Industrial Equipment	0.0000e00	m3	<a href="#">Edit</a>
Total Demand			100.000	%	

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.

Input Flows for:  Based On: Select  
HMA with 15% Binder Replacement, no Rejuv  
HMA with 20% Binder Replaced, Aromatic BTX Rejuv  
HMA with 20% Binder Replaced, Bio-Based Rejuv  
HMA with 25% Binder Replacement, no Rejuv  
HMA with 40% Binder Replaced, Aromatic BTX Rejuv  
HMA with 40% Binder Replaced, Bio-Based Rejuv  
OGFC  
OGFC-PM  
RHMA-G  
RHMA-O

Define Quantities for a New HMA

HMA Reference Flow Amount: 1.000 kg of HMA with Bulk Density:

#	Type	Source Name	Quantity	Unit	
1	Parameter	Agg_Crushed	80.330	%	<a href="#">Edit</a>
2	Parameter	Agg_Natural	0.000	%	<a href="#">Edit</a>
3	Parameter	Asphalt_Content	4.000	%	<a href="#">Edit</a>
4	Parameter	Crumb_Rubber	0.000	%	<a href="#">Edit</a>
5	Parameter	Extended_Oil	0.000	%	<a href="#">Edit</a>
6	Parameter	Polymer_Modified	0.000	%	<a href="#">Edit</a>
7	Parameter	RAP	15.670	%	<a href="#">Edit</a>
8	Parameter	Rejuv_BTX	0.000	%	<a href="#">Edit</a>
9	Parameter	Rejuv_Bio	0.000	%	<a href="#">Edit</a>
10	Electricity	<a href="#">US-CA: Electricity Mix</a>	7.6319e-03	MJ	<a href="#">Edit</a>
11	RAP	<a href="#">RAP, Plant Mix, Fractionated</a>	0.157	kg	<a href="#">Edit</a>
12	Natural_Gas	Natural Gas Combusted in Industrial Equipment	1.0326e-02	m3	<a href="#">Edit</a>
13	Diesel_from_industrial_equipment	Diesel Combusted in Industrial Equipment	0.0000e00	m3	<a href="#">Edit</a>

Source Transports [Save](#) [Cancel/Back](#)

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

Input Flows for:  Based On: HMA with 15% Binder Replacement, no Rejuv

Define Quantities for a New HMA

HMA Reference Flow Amount: 1.000 kg of HMA with Bulk Density:  lb/ft3 [Data Documentation](#)

#	Type	Source Name	Quantity	Unit	
1	Parameter	Agg_Crushed	80.330	%	<a href="#">Edit</a>
2	Parameter	Agg_Natural	0.000	%	<a href="#">Edit</a>
3	Parameter	Asphalt_Content	4.000	%	<a href="#">Edit</a>
4	Parameter	Crumb_Rubber	0.000	%	<a href="#">Edit</a>
5	Parameter	Extended_Oil	0.000	%	<a href="#">Edit</a>
6	Parameter	Polymer_Modified	0.000	%	<a href="#">Edit</a>
7	Parameter	RAP	15.670	%	<a href="#">Edit</a>
8	Parameter	Rejuv_BTX	0.000	%	<a href="#">Edit</a>
9	Parameter	Rejuv_Bio	0.000	%	<a href="#">Edit</a>
10	Electricity	<span style="border: 1px solid black; padding: 2px;">US-CA: 2020 Electricity Mix US-CA: Electricity Mix Electricity-TN2015 My Special Electricity-1 Add New</span>	7.6319e-03	MJ	<a href="#">Save</a> <a href="#">Cancel</a>
11	RAP		0.157	kg	<a href="#">Edit</a>
12	Natural_Gas		1.0326e-02	m3	<a href="#">Edit</a>
13	Diesel_from_industrial_equipment	Diesel Combusted in Industrial Equipment	0.0000e00	m3	<a href="#">Edit</a>

Source Transports [Save](#) [Cancel/Back](#)

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.

**eLCAP: UCPRC Environment Life Cycle Assessment for Pavements Tool**

This form allows you to view the default **round-trip** transport distances for the ingredients (flows) that go into the mix design, and make changes to those distances (and units) for user defined mixes. The default transport distances for Library mixes cannot be changed. The grid below shows the mix ingredients (flows) that go into the mix design, the source of the ingredient, the specific transport used to get the ingredient to the mixing plant, the default round-trip distances and units established for the Library mix. In addition, for user defined mixes, you can change the round-trip transport distance and the units for that distance.

Finally, there is a button to zero-out all transport distances (thus eliminating all source ingredient transports for the mix) and a button to reset all distances and units back to their default values.

**Ingredient Transport Round-Trip Distances For:**

**Edit Round-Trip Transport Distances for Source Ingredients**

Zero All Set To Default

#	Ingredient (Flow) Type	Source Name	Transport Name	Default Distance	Default Units	Distance	Units	Actions
1	Crushed_Stone	Crushed Stone at Plant	Double Bottom Dump Truck	100.0	mile	100.0	mile	<a href="#">Edit</a>
2	Sand_And_Gravel	Sand and Gravel at Plant	Transfer Truck	100.0	mile	100.0	mile	<a href="#">Edit</a>
3	Bitumen	Crude Oil at Refinery	Tack Coat Transport Truck	500.0	mile	200.0	mile	<a href="#">Edit</a>
4	Wax_Paraffins	Wax Paraffins	End Dump Truck	100.0	mile	100.0	mile	<a href="#">Edit</a>
5	CRM	Crumb Rubber Material	End Dump Truck	100.0	mile	100.0	mile	<a href="#">Edit</a>
6	SBR	Styrene-Butadiene Rubber	End Dump Truck	200.0	mile	200.0	mile	<a href="#">Edit</a>
7	Rejuvenator_BTX	BTX-Fraction	Tack Coat Transport Truck	500.0	mile	500.0	mile	<a href="#">Edit</a>
8	Rejuvenator_Bio	Rejuvenator Bio-Based	Tack Coat Transport Truck	300.0	mile	300.0	mile	<a href="#">Edit</a>
9	Diesel_from_industrial_equipment	Diesel Combusted in Industrial Equipment	Tack Coat Transport Truck	500.0	mile	500.0	mile	<a href="#">Edit</a>

Save Cancel/Back

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

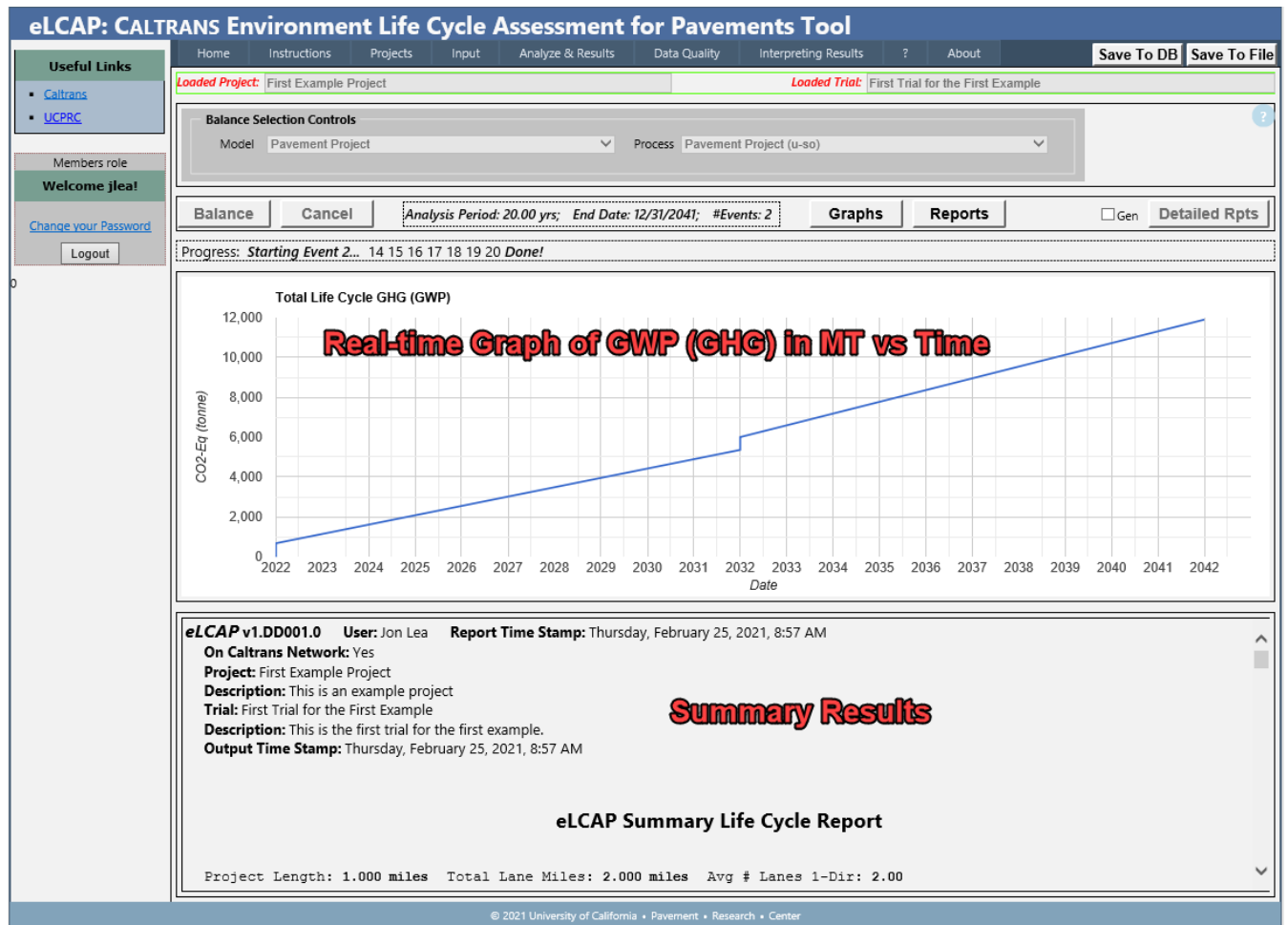
# Analysis & Results Page

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:

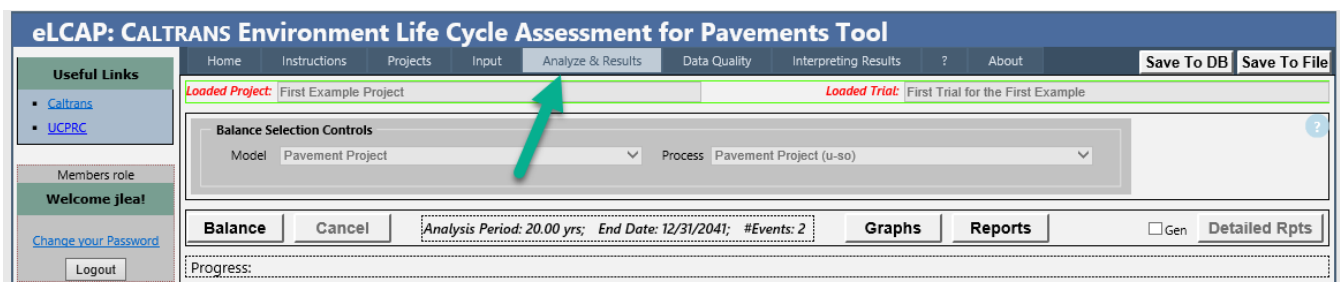
1. Locate your project
2. [Define the cross section](#)
3. [Define the life cycle](#) ([events](#), [activities](#), [materials](#) and [equipment](#))
4. Navigate to this page
5. Select the Balance button
  - a. Progress can be seen in the message area
  - b. Real-time display of GHG (GWP) in MT vs 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



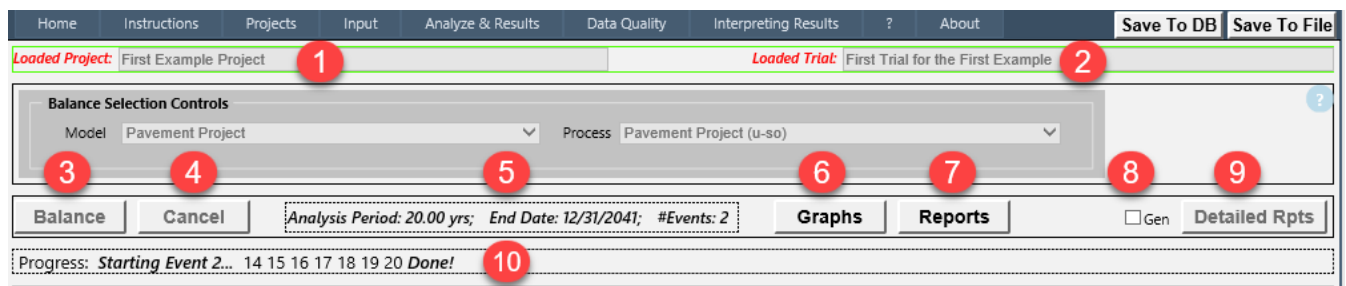
#### 4.4.1. Performing an Analysis

## Performing an Analysis and Getting Results

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



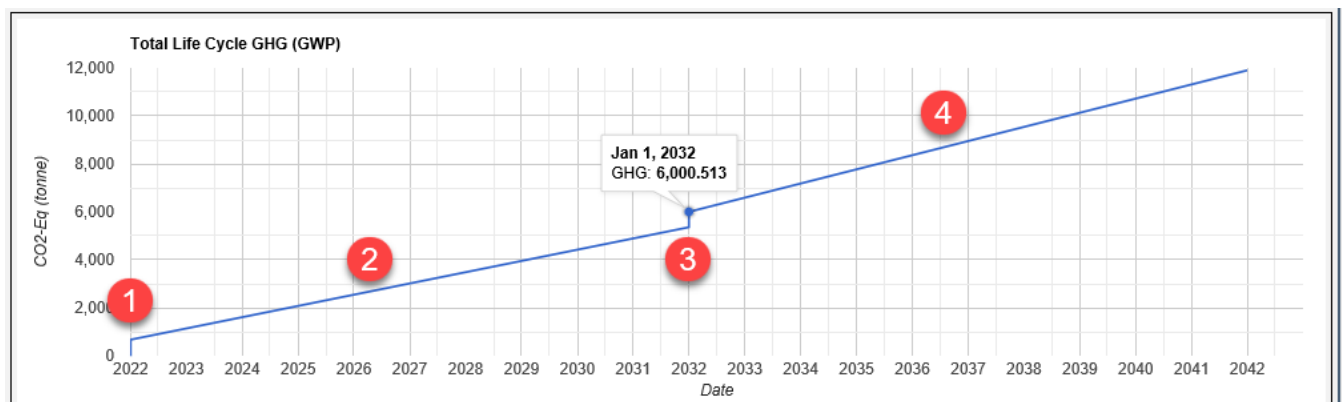
This page is used to perform a LCA analysis, also referred to as "Balance", since the process of solving the LCA model is basically scaling upstream flows according to downstream material needs. When that process is finished, then all flows and processes, are in balance. See Section [2.1 of the eLCAP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

**eLCAP v1.DD001.0**   **User:** Jon Lea   **Report Time Stamp:** Thursday, February 25, 2021, 8:57 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, 8:57 AM

**eLCAP Summary Life Cycle Report**

Project Length: 1.000 miles   Total Lane Miles: 2.000 miles   Avg # Lanes 1-Dir: 2.00

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.

**Construction Event#1 Summary Results with 132 Processes.**

Starting Date: 1/1/2022   Ending Date: 1/1/2022   Duration: 0.00 yrs  
Pavement Type: Flexible   Treatment: HMA\_Thin\_Overlay  
  
Analysis Period Prorate Factor Applied to All Impacts: 1.00

Impact Category	Value	Units
Acidification	5.487E+03	kg SO2-eq
Ecotoxicity (recommended)	4.320E+06	CTUe
Eutrophication	1.989E+02	kg N-eq
Global Warming Air, excl. biogenic carbon	6.672E+05	kg CO2e
Global Warming Air, incl. biogenic carbon	6.674E+05	kg CO2e

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.

*****			
Event GHG	667.2	MT	CO2e
Event GHG Per Lane Mile	333.6	MT	CO2e
*****			
GHG Total	667.2	MT	CO2e
GHG Total Per Lane Mile	333.6	MT	CO2e
*****			
Use Stage Summary Results FROM Event#1 TO Event#2 for Method: Pavem Conceptual			
Use Stage Data			
Starting Date: 1/1/2022 Ending Date: 1/1/2032 Duration: 10.00 yrs			

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.

Use Stage Summary Results FROM Event#1 TO Event#2 for Method: Pavem Conceptual			
Use Stage Data			
Starting Date: 1/1/2022 Ending Date: 1/1/2032 Duration: 10.00 yrs			
Pavement Type: Flexible Treatment: HMA_Thin_Overlay			
IRI Performance Data for GHG			
Project Center Climate Category: severe			
Analysis Period Prorate Factor Applied to All Impacts: 1.00			
Impact Category	Value	Units	

The first section of the Use Stage results is shown

1. The first two lines

Analysis Period Prorate Factor Applied to All Impacts: 1.00		
Impact Category	Value	Units
Global Warming Air, excl. biogenic carbon; Based on: Pavem_Eqns	4.691E+06	kg CO2e
Per Lane Mile	2.345E+06	kg CO2e
Per Lane Mile Per Year	2.346E+05	kg CO2e
*****		
Event GHG	4,691.0	MT CO2e
Event GHG Per Lane Mile	2,345.5	MT CO2e
*****		
GHG Total	5,358.1	MT CO2e
GHG Total Per Lane Mile	2,679.1	MT CO2e
*****		

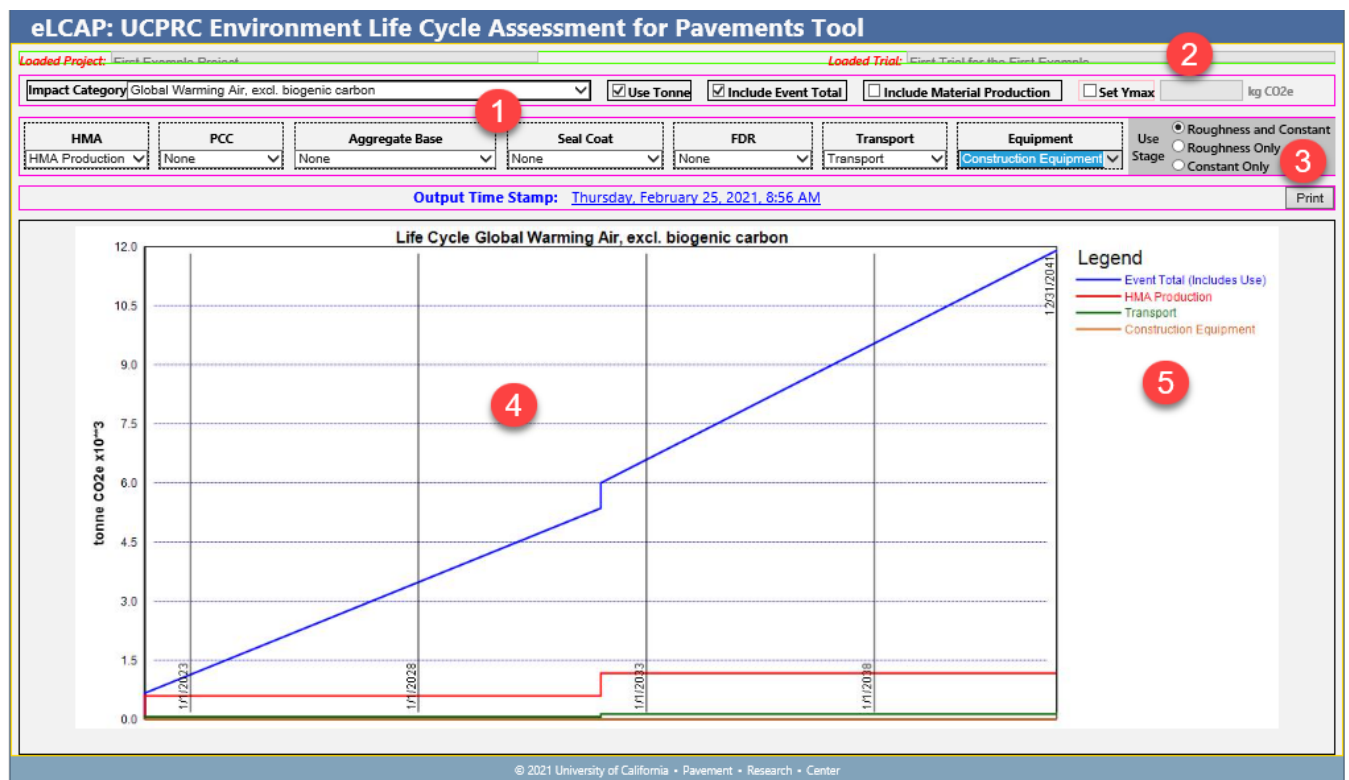
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## 4.4.2. Graphs

# 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

Loaded Problem Description

Report

Summary Life Cycle

Standard Excel

1

Loaded Trial: First Trial for the First Example

2

Include Problem Description in Output Report

Generate

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 SO <sub>2</sub> -eq	5.487E+03	5.157E+03	5.157E+03	1.899E+02	2.333E+03	4.813E-01	2.002E+03	5.830E+02	3.143E+02	1.574E+01
Ecotoxicity (recommended)	CTUe	4.320E+06	4.150E+06	4.150E+06	3.271E+04	3.482E+06	1.558E-04	2.975E+05	3.232E+05	1.599E+05	9.570E+03
Eutrophication	kg N-eq	1.989E+02	1.806E+02	1.806E+02	1.063E+01	1.139E+02	2.795E-00	2.112E+01	3.27E+01	1.751E+01	8.176E-01
Global Warming Air, excl. biogenic carbon	kg CO <sub>2</sub> e	6.672E+05	5.950E+05	5.950E+05	2.765E+04	1.808E+05	5.905E+03	2.418E+05	1.388E+05	6.858E+04	3.727E+03
Global Warming Air, incl. biogenic carbon	kg CO <sub>2</sub> e	6.674E+05	5.951E+05	5.951E+05	2.764E+04	1.808E+05	6.045E+03	2.418E+05	1.388E+05	6.858E+04	3.727E+03
Human Health Particulate Air	kg PM <sub>2.5</sub> -eq	3.502E+02	3.305E+02	3.305E+02	1.195E+01	1.523E+02	2.678E+00	1.743E+02	3.610E+01	1.672E+01	9.946E-01
Human toxicity, cancer (recommended)	CTUh	4.539E-04	4.368E-04	4.368E-04	8.299E-06	3.395E-04	1.695E-06	5.568E-05	3.183E-05	1.580E-05	1.215E-06
Human toxicity, non-cancer (recommended)	CTUn	2.339E-01	2.246E-01	2.246E-01	2.244E-03	1.914E-01	8.583E-04	1.234E-02	1.772E-02	8.792E-03	5.279E-04
Ozone Depletion	kg CFC 11-eq	1.141E-04	1.114E-04	1.114E-04	2.064E-05	7.679E-05	2.832E-07	8.606E-06	5.084E-06	2.522E-06	1.509E-07
Resources, Fossil fuels	MJ surplus energy	3.5240E+06	3.3990E+06	3.3990E+06	3.312E+04	2.567E+06	1.151E+04	5.490E+05	2.376E+05	1.179E+05	7.057E+03
Smog Air	kg O <sub>3</sub> e	6.5850E+04	5.7141E+04	5.7141E+04	4.9781E+03	3.0269E+04	1.4201E+03	5.470E+03	1.5003E+04	8.3330E+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	9.1023E+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	9.1023E+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	1.3836E+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	1.3836E+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 on as % of	HMA Production on as % of
Acidification	kg SO <sub>2</sub> -eq	1899E+02	3.68%	2.230E+03	45.25%	4.813E-01	0.03%	2.002E+03	38.63%	5.830E+02	11.20%	5.874E+03	100.00%
Ecotoxicity (recommended)	CTUe	3.271E+04	0.78%	3.482E+06	83.80%	1.558E-04	0.35%	2.975E+05	7.07%	3.232E+05	7.77%	4.950E+06	100.00%
Eutrophication	kg N-eq	1.063E+01	0.89%	1.139E+02	63.90%	2.795E+00	1.95%	2.112E+01	11.70%	3.27E+01	17.76%	1.080E+02	100.00%
Global Warming Air, excl. biogenic carbon	kg CO <sub>2</sub> e	2.765E+04	4.65%	1.808E+05	30.40%	5.905E+03	0.99%	2.418E+05	40.68%	1.388E+05	23.31%	5.949E+05	100.00%
Global Warming Air, incl. biogenic carbon	kg CO <sub>2</sub> e	2.764E+04	4.65%	1.808E+05	30.38%	6.045E+03	1.02%	2.418E+05	40.64%	1.388E+05	23.30%	5.950E+05	100.00%
Human Health Particulate Air	kg PM <sub>2.5</sub> -eq	1.834E+01	3.62%	1.523E+02	46.89%	2.678E+00	0.81%	1.743E+02	38.56%	3.610E+01	10.82%	3.304E+02	100.00%
Human toxicity, cancer (recommended)	CTUh	8.299E-06	1.80%	3.395E-04	77.07%	1.695E-06	0.39%	5.568E-05	12.70%	3.183E-05	7.23%	4.260E-04	100.00%
Human toxicity, non-cancer (recommended)	CTUn	2.244E-03	0.10%	1.914E-01	85.23%	8.583E-04	0.38%	1.234E-02	5.43%	1.772E-02	7.89%	2.246E-01	100.00%
Ozone Depletion	kg CFC 11-eq	2.064E-05	0.15%	7.679E-05	69.40%	2.832E-07	0.25%	8.606E-06	7.72%	5.084E-06	4.56%	1.141E-04	100.00%

## 4.4.4. Detailed Reports

Name

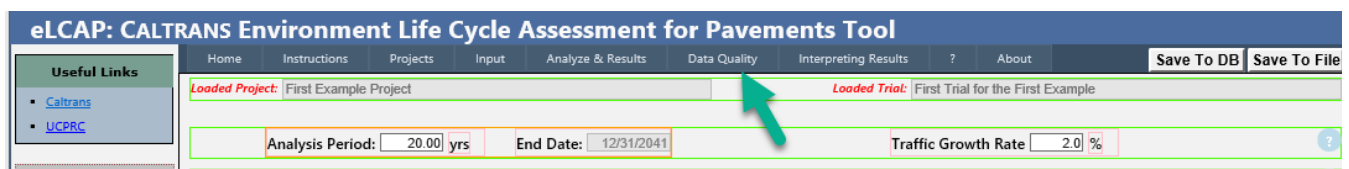
- Construction Event #1 Debug Report~2021-02-25-09-32-38-443.txt
- Construction Event #1 LCI Report~2021-02-25-09-32-38-443.txt
- Construction Event #1 LCIA Report~2021-02-25-09-32-38-443.txt
- Construction Event #1 Product Flow Report~2021-02-25-09-32-38-443.txt
- Construction Event #1 zDump Report~2021-02-25-09-32-38-443.txt
- Construction Event #2 Debug Report~2021-02-25-09-32-39-029.txt
- Construction Event #2 LCI Report~2021-02-25-09-32-39-029.txt
- Construction Event #2 LCIA Report~2021-02-25-09-32-39-029.txt
- Construction Event #2 Product Flow Report~2021-02-25-09-32-39-029.txt
- Construction Event #2 zDump Report~2021-02-25-09-32-39-029.txt
- Use Stage #1 Debug Report~2021-02-25-09-32-39.txt
- Use Stage #2 Debug Report~2021-02-25-09-32-39.txt

## 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.

**Material Selection**

Type: HMA Material: HMA with 15% Binder Replacement, no Rejuv Based On: N/A - Library Model

**Assessment Ratings for Flows of Materials into the Material Mix**

**Crushed stone [UCPRC Flows]; Produced by: Crushed Stone at Plant**

Administrative Metadata			
Recorder/Reviewer/Organization	Data Source	Publication Date	Data Accessed
AS/JH/UCPRC	GaBi/Literature	2016	1/1/2007

Descriptive Metadata		
Original Process Name	Data Produced Location	Descriptive Properties
Crushed stone [UCPRC Flows]	US	Unavailable

Structural Metadata			
Quantity	Units	Structural Properties	Other Information
1.0	kg	Unavailable	Unavailable

**Reliability**

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 Completeness.

Reliability		
Data Checks	Data Support	Data Updates
2 (Very Good)	2 (Very Good)	2 (Very Good)

Data Collection Methods		
Representativeness	Seasonal Variation	TRACI Compatibility
2 (Very Good)	2 (Very Good)	1 (Excellent)

Time Period	
Data Quality Objective	Correlated to Relevant Periods
4 (Poor)	4 (Poor)

Geography	
Data Origin	
2 (Very Good)	

**Technology**

Technology	
Categories Equivalent	Relevant Coverage
2 (Very Good)	1 (Excellent)

Process Review	
Review Check	
2 (Very Good)	

Process Completeness	
Completeness Check	
2 (Very Good)	

**Sand and gravel [UCPRC Flows]; Produced by: Sand and Gravel at Plant**

**Bitumen [Organic intermediate products]; Produced by: Crude Oil at Refinery**

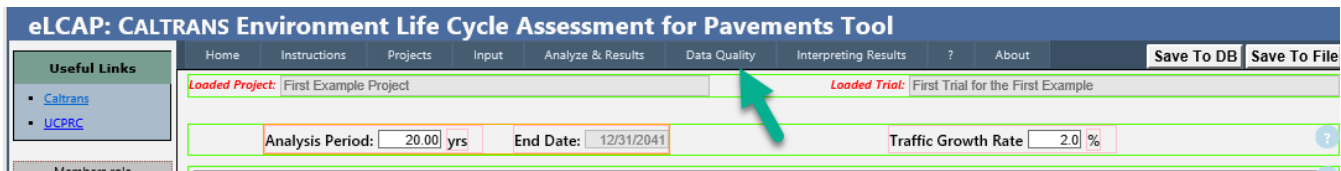
The details of the data quality areas and the specifics of the ratings are located in the [Assessment Ratings](#) topic.

### 4.5.2. Assessment Ratings

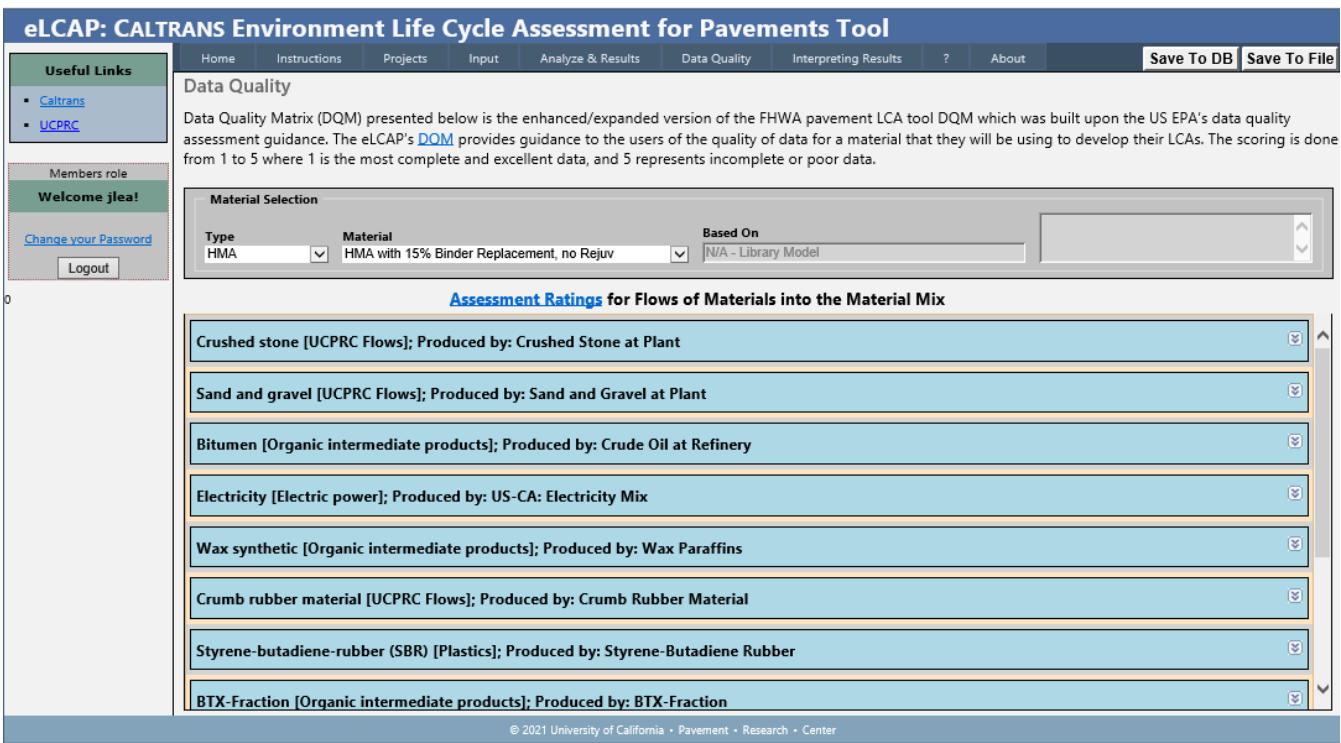
## Assessment Ratings Matrix

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 incompatible
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 unknown or 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 uncertainty	Data fully adjusted for relevant time periods but with high level of uncertainty	Some data adjusted for relevant time periods but with high level of uncertainty	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 unknown area of study

## 5. Acronyms

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

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

<b>UCPRC</b>	University of California Pavement Research Center
<b>WIM</b>	Weigh-in-motion