U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Environmental Design Tool (AEDT)

Supplemental Manual

Quick Start Tutorial

March 2020

Purpose

The Federal Aviation Administration Office of Environment and Energy (FAA-AEE) recognizes that the environmental consequences stemming from the operation of commercial aviation – primarily noise, emissions, and fuel consumption – are highly interdependent and occur simultaneously throughout all phases of flight. The Aviation Environmental Design Tool (AEDT) is a software system that is designed to model aviation related operations in space and time to compute noise, emissions, and fuel consumption.

This Quick Start Tutorial was created to be used in conjunction with the AEDT User Manual, providing detailed instructions on building simple noise and emissions studies in AEDT and importing studies created using either the FAA's Integrated Noise Model (INM) or the Emissions and Dispersion Modeling System (EDMS).

This document consists of the following sections:

Section 1. Introduction

Section 2. Getting Started

This section describes starting the AEDT application and the AEDT user interface organization.

Section 3. Quick Start Tutorial

The purpose of this section is to introduce you to the basic features required to run the AEDT application to generate noise and emissions results. AEDT has many additional features and settings that support a wide variety of analyses which are covered in detail in the AEDT User Manual.

This section covers the following:

- Creating a new study

- Adding an existing airport

- Viewing an airport layout

- Creating flight tracks

- Viewing the airport weather data

- Adding receptors and receptor sets

- Adding aircraft operations

- Creating annualizations

- Defining and running metric results

- Viewing noise, emissions and fuel burn output

Section 4. EDMS Study Import

AEDT supports the conversion of EDMS studies into an AEDT study database to support users who wish to model studies created in EDMS using the latest noise and emissions modeling algorithms.

This section provides instruction on how to import an EDMS study into AEDT. This section covers the following:

- How to import an EDMS study
- How to resolve common errors and warnings when translating from EDMS to ASIF XML
- How to resolve common errors and warning when importing an ASIF XML file into AEDT
- How to reimport a corrected ASIF file
- Additional tips on comparing results between EDMS and AEDT

Section 5. INM Study Import

AEDT supports the conversion of INM studies into an AEDT study database to support users who wish to model studies created in INM using the latest noise and emissions modeling algorithms.

This section provides instruction on how to import an INM study into AEDT. This section covers the following:

- How to import an INM study
- How to resolve common errors and warnings when translating from INM to ASIF
- How to resolve common errors and warning when importing an ASIF XML file into AEDT
- How to reimport a corrected ASIF file
- Additional tips on comparing results between INM and AEDT

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1 Introduction

1.1 Overview

This Quick Start Tutorial was created as an extension of the AEDT User Manual for the purpose of:

- Providing detailed instructions on creating a simple noise and emissions studies in AEDT.

- Providing instructions on how to import EDMS studies, including tips on resolving import errors.

- Providing instructions on how to import INM studies, including tips on resolving import errors.

Each section encompasses all of the necessary information to complete the desired task. You do not need to read this document in its entirety to successfully create or import a study; however, it is recommended that you review the Section 2 *Getting Started* prior to using the information in Sections 3 through 5.

This document references portions of the AEDT User Manual, available on the AEDT Support website. This document not contain guidance or policy for regulatory analyses. Guidance documents as well as additional documentation such as the AEDT Technical Manual, AEDT Supplemental Manual: ASIF Reference, and detailed information on select features can be found on the FAA office of environment and energy (AEE) website (https://www.faa.gov/about/office_org/headquarters_offices/apl/research/) and also available on the AEDT Support website (https://aedt.faa.gov/).

The following symbols will appear throughout the document to highlight important information:

Observe warnings to avoid errors in execution and ensure that the intended execution occurs.

Notes contain helpful information and tips regarding the functionality of the tool.

1.2   Technical Assistance

The AEDT Support website, https://aedt.faa.gov/, is the technical support hub for AEDT. Support requests, feedback on issues or bugs, and feature requests should be submitted through this website. The latest AEDT installers and support resources such as documentation and frequently asked questions (FAQ) are also available on the AEDT Support website. Register on the website to purchase products, request support, or submit feedback on AEDT. Additional options for support include:

- E-mail: aedt-support@dot.gov
- Phone: 617-494-2603

Please include the AEDT Administrative File when requesting technical support. Please refer to Section 4.12.2 of the *AEDT User Manual* for instructions on generating the Administrative File.

2 Getting Started

2.1 What is an AEDT Study?

An AEDT study is a collection of user inputs, system data, user settings and computed results. This data is contained in a single SQL Server database with a user specified name.

The study database contains all of the tables required by AEDT. FLEET and AIRPORT system data are added to the study database when the study is created. A study database does not contain external files such as terrain or high-fidelity weather data files.

2.2 Installing AEDT

If AEDT is not already installed, follow the instructions provided with the *AEDT Installation Manual* to install the application and Microsoft SQL Server software, before proceeding. AEDT installer is available for download on the AEDT Support website (Section 1.2).

⚠️ AEDT requires administrative privileges for both 1) installation and 2) execution of the software.

2.3 Starting the AEDT Application

1. On the Desktop, right-click on the AEDT shortcut and click *Run as administrator*.

   AEDT can also be accessed by navigating to the AEDT application folder (e.g., C:\Program Files\FAA\AEDT) and right-clicking on the executable named *AEDT.exe* and selecting *Run as administrator*.

2. If accelerated display is unavailable on the host platform where AEDT is launched, the following warning message will be displayed (Figure 1).
   - Check the *Do not show this message again* checkbox to disable this warning message.
   - Click *Close* to close the dialog.
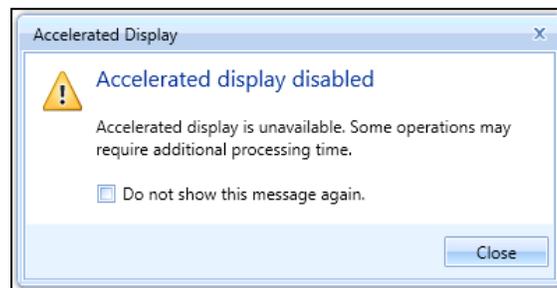
Figure 1. Accelerated Display Warning

When the accelerated display is disabled, rendering map layers (e.g. receptor set layers) may require additional processing time. In some cases, map features may not be highlighted when selected on the map using the Identify tool or through the layer attributes pane.

2.4   AEDT User Interface Organization

The AEDT User Interface is described below (Figure 2):
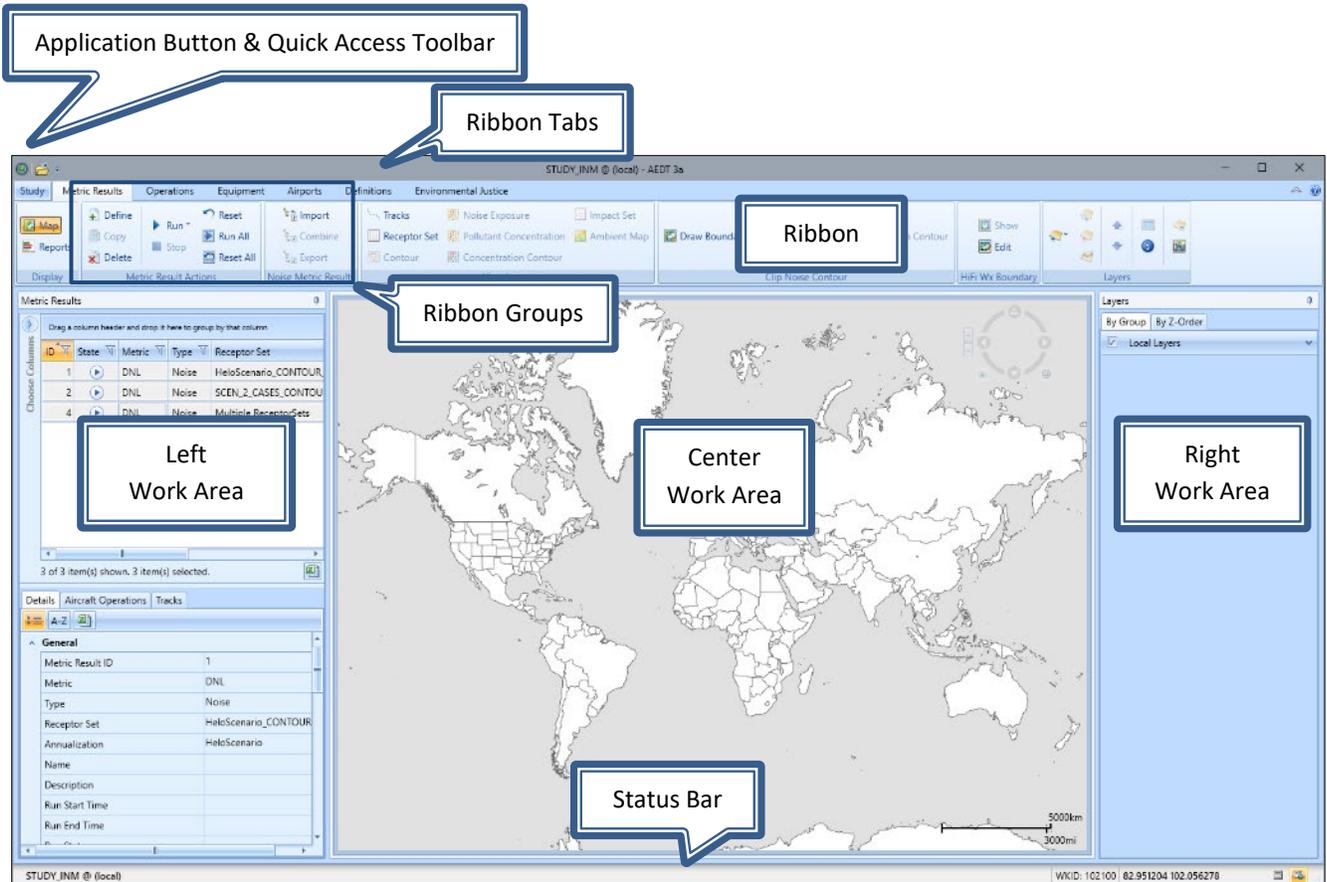
Figure 2. AEDT User Interface Overview

2.4.1   AEDT User Interface – Work Areas

The work areas in the AEDT interface are divided into three sections. While the divisions are consistent between tabs, the content changes as appropriate for each tab.

1. *Left Work Area*

   The left work area contains a list of data available for use in the currently selected tab.

2. *Center Work Area*

   The center work area contains map, detail, or report content, depending on the selected tab and view.

3. *Right Work Area*

   The right work area provides appropriate tools to manage the content in the center work area.

2.4.2   AEDT User Interface – Tabs

AEDT features are organized by tabs as follows:

1. *Study tab*

   The *Study* tab includes the following menu options:

   - *Open*: opens the *Open Study* dialog.
   - *Migrate*: opens the *Migrate Studies* dialog.
   - *Import*: opens the *Import Study* dialog.
   - *Partial Import*: opens the *Import Partial ASIF* dialog.
   - *New*: opens the *Create New Study* dialog.
   - *Delete*: opens the *Delete Study* dialog.
   - *Close*: closes the currently open study.
   - *Recent:* lists recently opened studies.
   - *Tasks:* displays active and completed tasks.
   - *Log:* displays AEDT log messages.
   - *Preferences:* contains system and study settings.
   - *Study Maintenance:* contains study maintenance options.
   - *Help:* displays AEDT version and support information.
   - *Exit:* exits the AEDT application.

2. *Metric Results tab*

   The *Metric Results* tab supports construction and processing of metric result definitions, generation of reports, and generating and viewing result layers.

3. *Operations tab*

   The *Operations* tab supports managing aircraft operations, non-aircraft operations, runup operations, helitaxi operations, and annualizations.

4. *Equipment tab*

   The *Equipment* tab supports managing aircraft equipment, non-aircraft equipment, and equipment groups.

5. *Airports tab*

   The *Airports* tab supports adding airports, viewing airport layouts and editing its components, adding new components in airport layout designer, and creating operation configurations.

6. *Definitions tab*

   The *Definitions* tab supports setting up study data elements including metrics, receptors, receptor sets, operational profiles, and weather and terrain settings. It also supports integration of emissions results from the EPA's Motor Vehicle Emission Simulator (MOVES).

7. *Environmental Justice tab*

   The *Environmental Justice* tab provides access to the environmental justice (EJ) model which uses the U.S. Census, American Community Survey (ACS) [1] to identify and analyze potential minority and/or low-income populations and populations with limited English proficiency.

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[1] For more information on the ACS, please visit: https://www.census.gov/programs-surveys/acs/.
For more specific information on the ACS data structure, see for example
http://www2.census.gov/geo/tiger/TIGER_DP/2013ACS/Metadata/

3 Quick Start Tutorial

The goal of this quick tutorial is to lead you through each step required to generate and view noise and emissions output in AEDT for a single aircraft through a simple example. This example is not intended to represent a real analysis.

3.1 Create a New Study

Begin by creating a new AEDT study:

1. Click the *Study* tab then click *New* to display the *Create New Study* dialog.

2. Enter the name "NoiseAndEmissionsStudy".

3. Enter the description "A simple noise and emissions study". Note that the study description is optional.

4. Enter the name of the desired SQL Server instance in the *Select database server* field.

   To change the SQL Server login credentials:

   a. Click the *Credentials* arrow button.

   b. Select desired authentication mode from the *Authentication* drop-down menu.

      ▪ *Windows Authentication*: The *User name* is pre-populated.

      ▪ *SQL Server Authentication*: Enter the *User name* and *Password*.

   c. Click *Test Connection* to verify that the connection to the database is successful.

5. Click *New* to create a new study (Figure 3).

Study name must be at least five characters long and must not contain periods (.) or spaces.
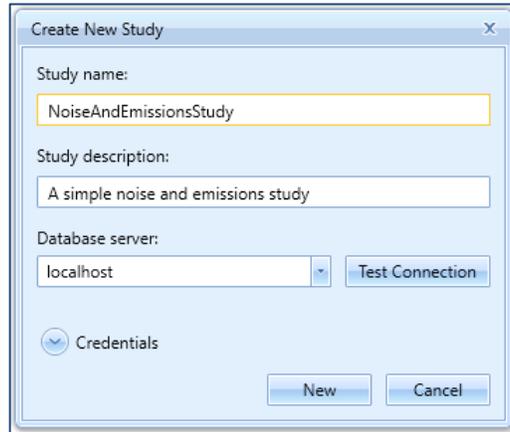
Figure 3. Create New Study Dialog

AEDT will automatically create a new database named "NoiseAndEmissionsStudy" on the specified SQL Server instance. This new study database contains all the necessary tables used by AEDT.

- Fleet data tables (those tables with the prefix "FLT_") in the new study database are automatically populated with data from the FLEET system database.

- Airport data tables (those tables with the prefix "APT_" or "AIRPORT_") in the new study database are not initially populated. The airport related tables are populated when you add an airport from the AEDT *Airports* tab.

Upon creating the new study, the *Metric Results* tab will display the *Map* view (Figure 4).
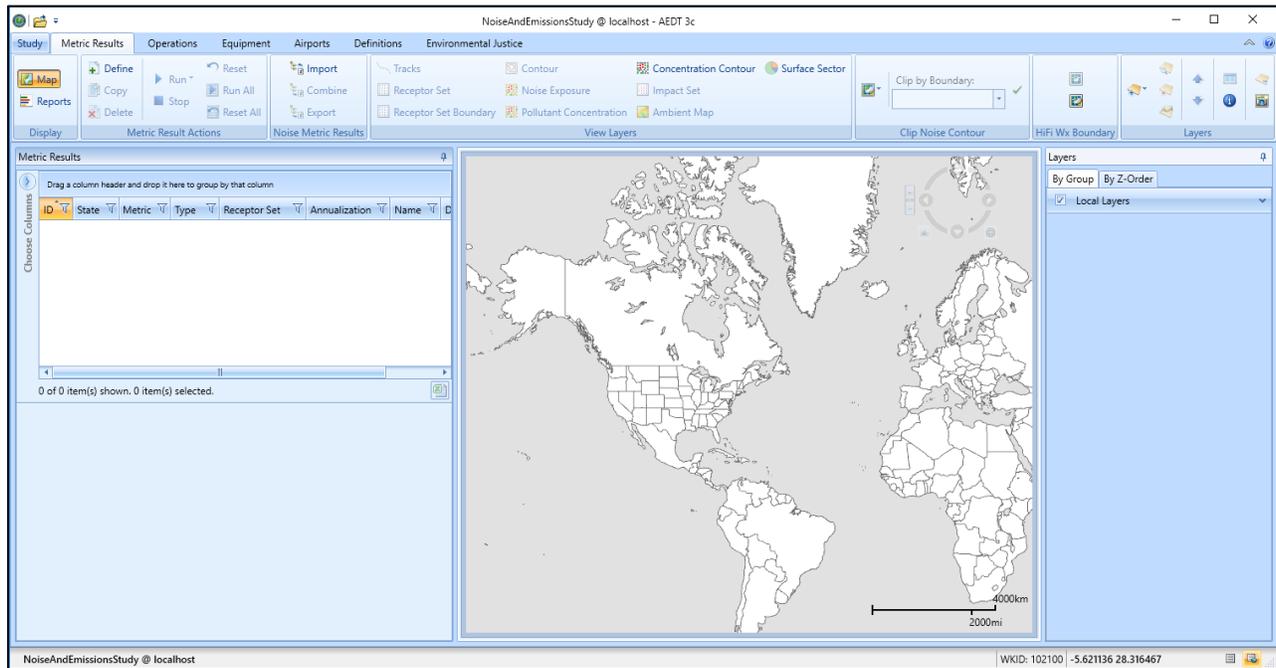
Figure 4. Metric Results Tab

3.2 Add an Airport

1. Click *Add*, then click *Existing Airport*.
2. In the *Add Existing Airport* dialog (Figure 5):
   a. Filter the airports clicking on the filter icon next to the "Preferred Code" column.
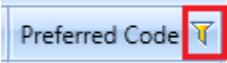
   b. Type in "KSFO" under the first "Contains" dropdown list.
   c. Click the *Filter* button.
   d. Close the *Filter* dialog.
3. Click *Add* to add the selected airport to the study.
4. "*All selected airports were successfully added to the study*" confirmation message will be displayed. Click OK.
5. Once you click OK, you will be returned to the *Map* view under the *Airports* tab.
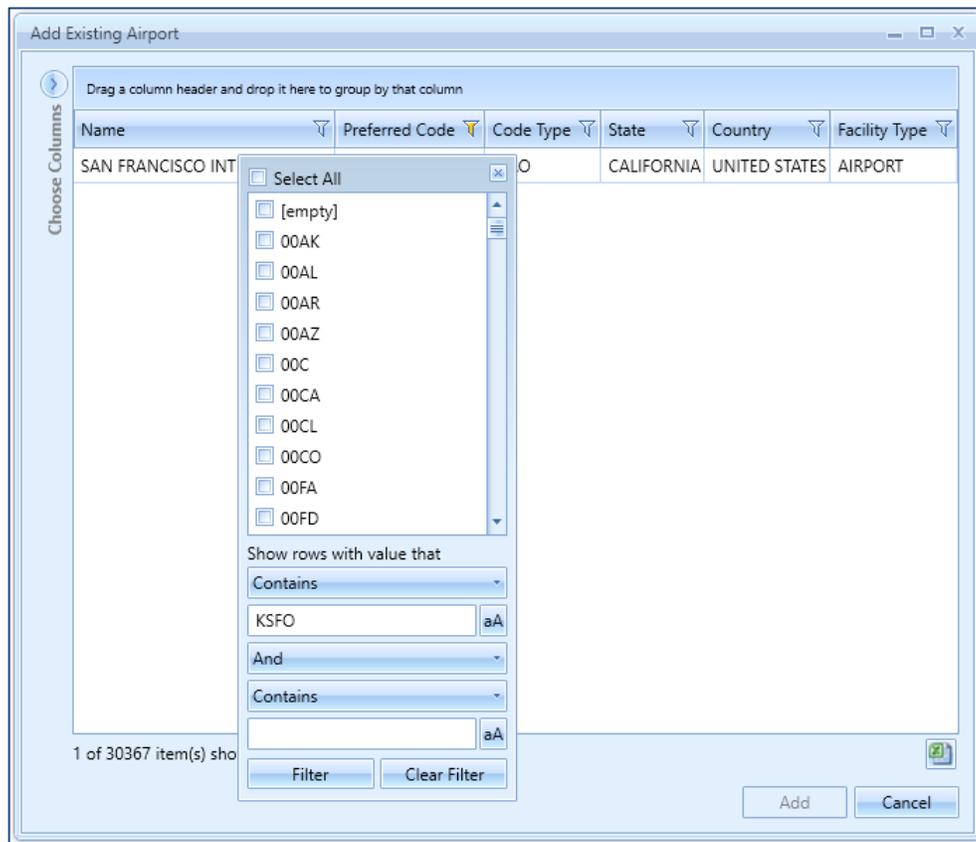
Figure 5. Add Existing Airport Dialog

3.3   View the Airport Layout

Airport layouts

Once you have added an existing airport, default *Airport Layout(s)* will be listed under the airport (Figure 6). An airport layout represents the runway configurations of the airport at a specific point in time. If you added an airport that had runway changes in the past, multiple airport layouts will be listed under the airport.

In a typical noise and emissions study, an airport layout contains runways and tracks. In an emissions dispersion study, an airport layout may also contain other ground elements such as gates, taxiways, and taxipaths.
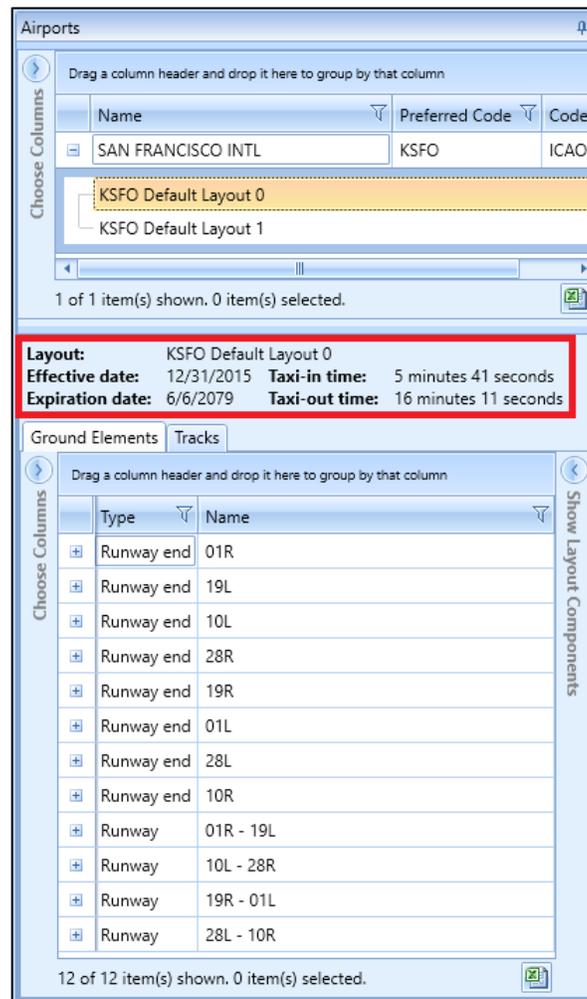
Figure 6. Airport Layout Details Pane

Note that multiple airport layouts are defined for the KSFO airport (Figure 6). This indicates that the airport had runway changes over the years (i.e. runways 01L – 19R and 10R – 28L were extended). The "Default Layout 0" has the most current runway configurations.

- Select the *KSFO Default Layout 0* and note the effective and expiration dates. Then view the runway details in the bottom pane.
- Select the *KSFO Default Layout 1* and note the effective and expiration dates. Then view the runway details in the bottom pane.

For this tutorial, we will only use the "KSFO Default Layout 0".

If your analysis does not need the history of airport layouts and just needs the most current runway information, delete the older airport layouts. Right-click on the airport layout name and click *Delete*.

View the airport layout on the map

Right-click on the *KSFO Default Layout 0* from *Airports* pane and click *View Layout*. The selected airport layout (i.e. runways) will be visible on the map (Figure 7).
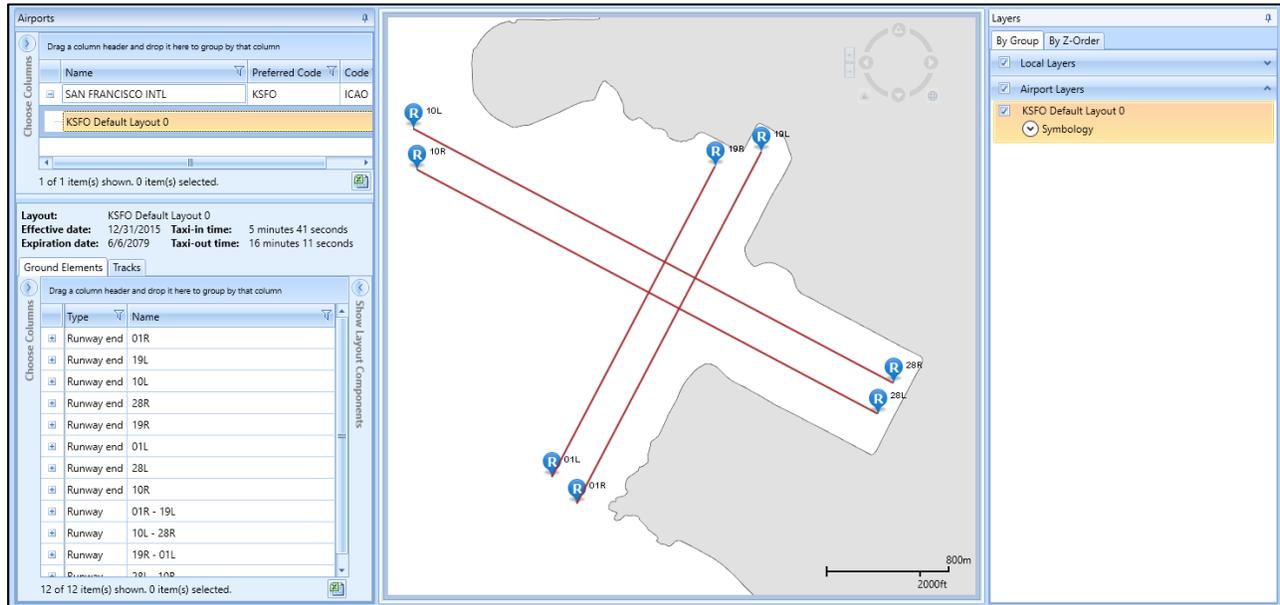
Figure 7. Airport Layout Map View

3.4   Create Flight Tracks

Flight tracks trace the path of the flight trajectory on the horizontal plane. Flight tracks are defined as either as vector-type tracks (consisting of one or more straight or curved segments), or point-type tracks (consisting of an array of x,y points). We will be creating a departure vector track and an arrival point-type track. AEDT automatically extends departure and arrival tracks during flight performance processing, so that the entirety of the vertical profile can be computed. Refer to the *AEDT User Manual*, Section 8.3.6, for more information.

Create a vector-type departure track

In this step, you will create a vector-type departure track with three segments that starts from the runway end **01L**.

1.   Select the *Designer* tab (Figure 8). AEDT will load all of the airport layout features.
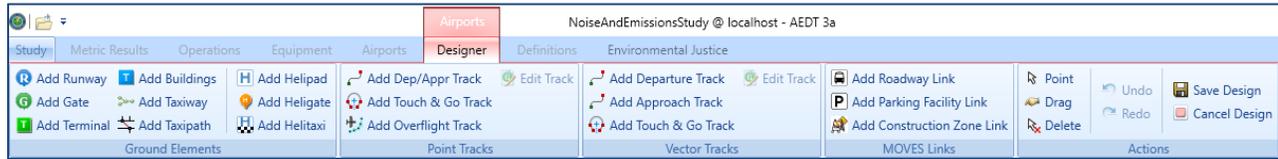
Figure 8. Airports Designer Tab

2. In the *Vector Tracks* ribbon group, click *Add Departure Track* button.
3. The *Create Vector Track* pane will show in the lower right-hand corner. Note that the fields marked with a red (*) are required (Figure 9).
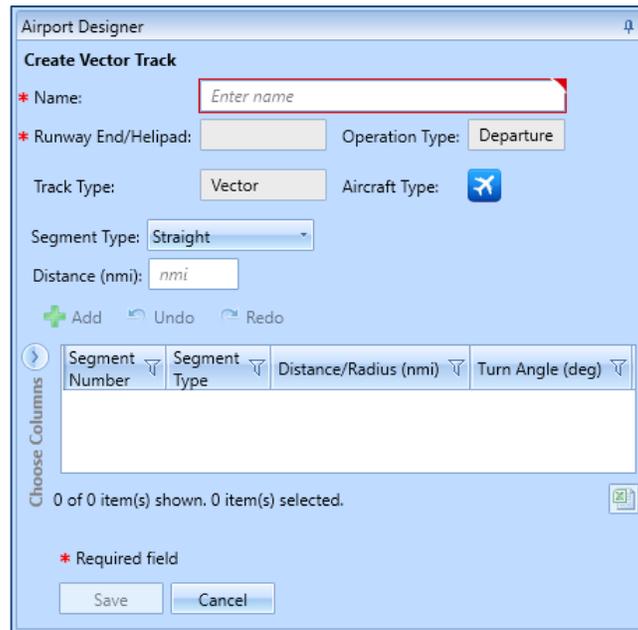
Figure 9. Create Vector Track Pane

4. Enter the name "DepVector_01L".
5. On the Map display, click on the runway end "01L". AEDT will automatically populate the Runway End/Helipad in the *Create Vector Track* pane.
6. From the *Segment Type* dropdown list, select *Straight*, then enter 2 nautical miles for distance. Click *Add* to create the first track segment (segment number 0).
7. You will see the straight track segment on the map. As you add new segments, the map displays them.
8. For the second segment, select *Turn* from the *Segment Type* dropdown list. Enter 2 nmi for *Radius*, "90" degrees for *Angle*. Click *Add* to create segment number 1.
9. For the thrid segment, select *Straight* vector track segment. Enter 2 nautical miles. Click *Add* to create segment number 2*.
10. Click *Save*.

11. AEDT will add this new track to the list of Airport Layout components in the lower left-corner (Figure 10).

Figure 10. Vector Track Details
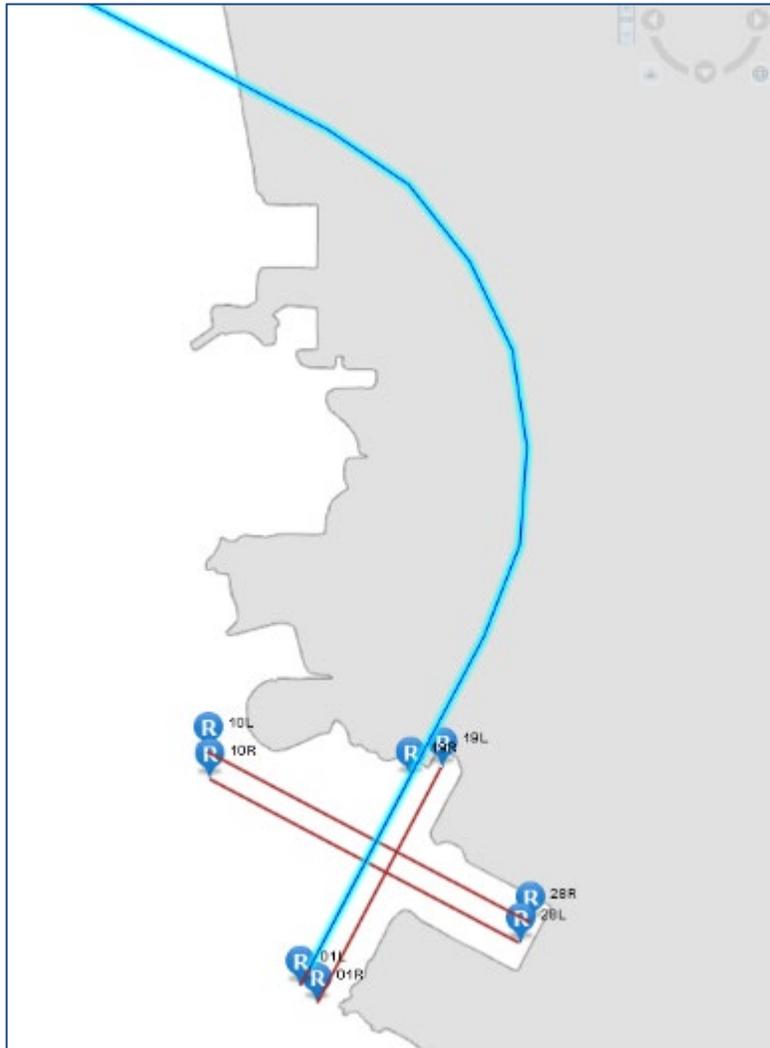
Figure 11. Finished Departure Vector Track

Create a point-type arrival track

In this step, you will create a point-type arrival track that starts out in the airspace and ends in the runway end **19L**.

> Note that you may need to zoom in using your mouse in order to end the track at the target runway end (Figure 12).

1. In the *Point Track* ribbon group, click *Add Dep/App Track* (Figure 8). A pencil icon replaces your mouse cursor.

2. On the *Map*, click on a point away from the target runway end (19L) to set the beginning of your arrival track.
3. Click on desired points between your starting point and the target runway end in order to create a track node.
4. When you are finished defining the track, double-click on the runway end 19L.
5. If you make a mistake, click the *Undo* button in the *Actions* ribbon group.
6. Click *Save Design*.
7. The new Arrival point track has been saved to the layout and added to the list of Layout components. Notice that the track is defined by the latitude and longitude of the points (Figure 13).
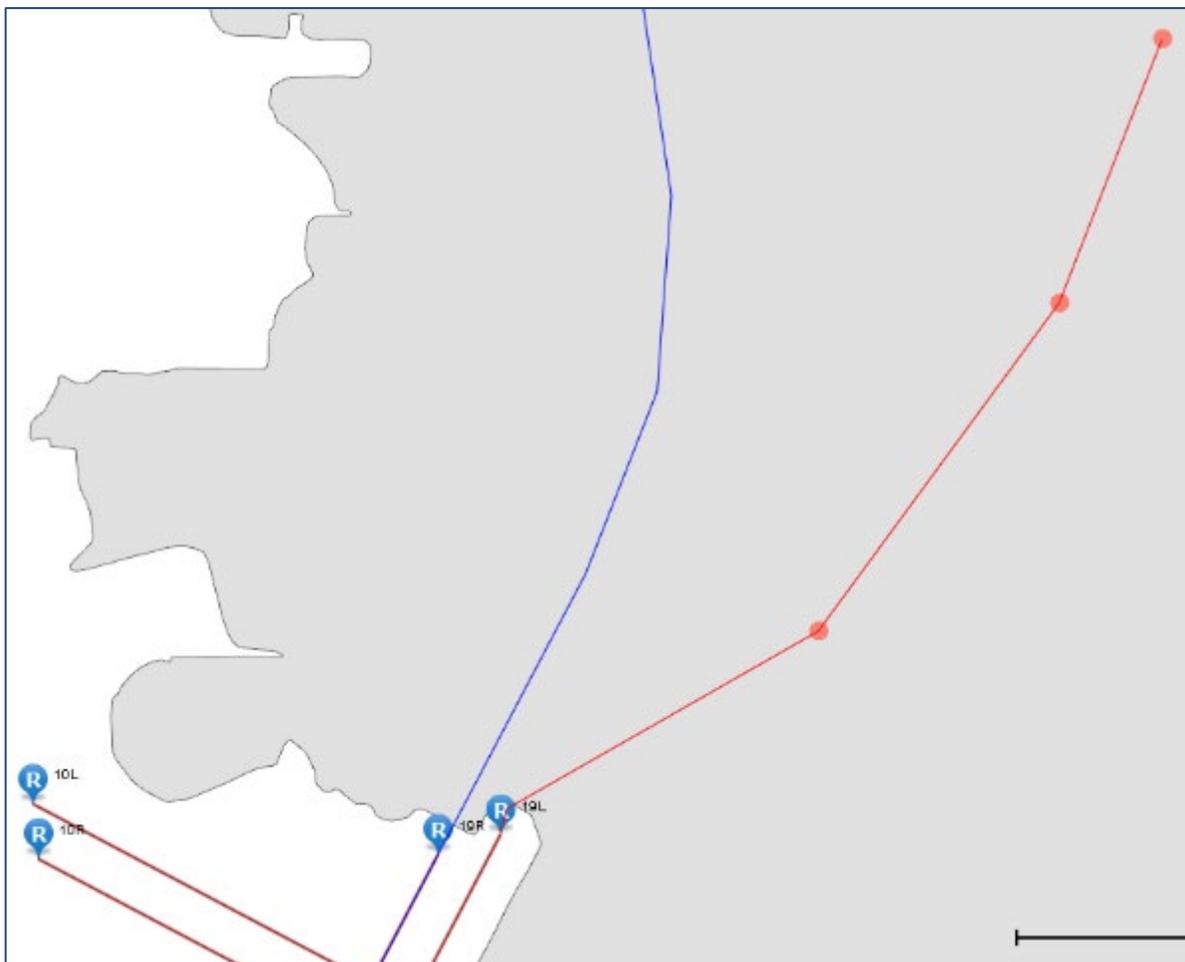
Figure 12. Map of Runway End
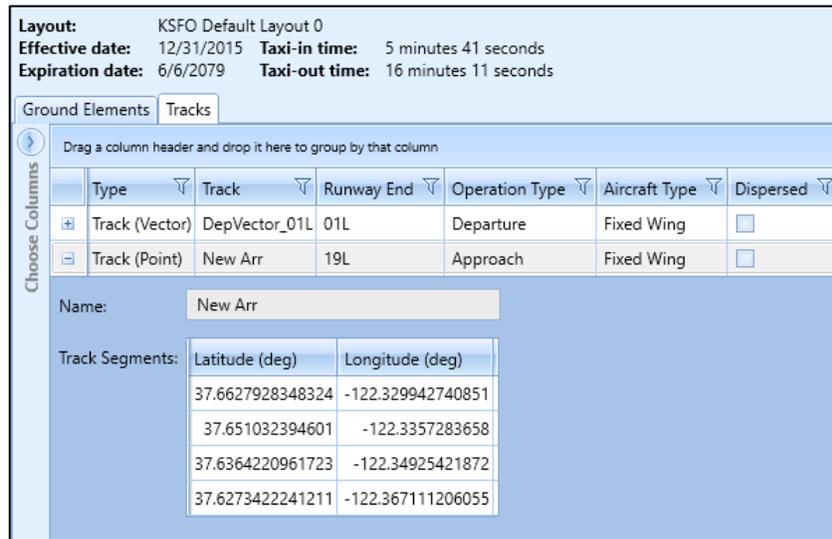
Figure 13. Arrival Point Track

3.5 View Airport Weather

After adding an existing airport, verify the airport weather data in *Definitions* tab (Figure 14).

1. Click the *Definitions* tab, then select *Weather*.
2. From the left-pane, click *Airport weather*.
3. Select the desired airport from the *Airport* dropdown list.
4. View the airport weather data.
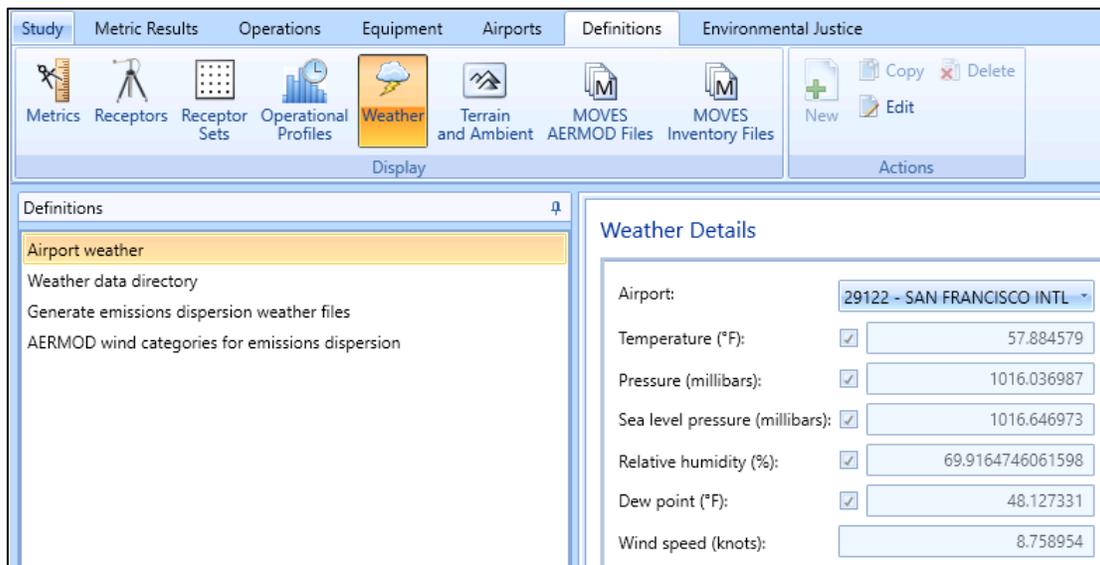
Figure 14. Definitions Tab – Airport Weather

3.6 Add Receptors & Receptor Sets

Receptors define locations where noise or pollutant concentration levels are calculated. A receptor set is a container for one or more receptors. *Receptor(s)* must be added to a *Receptor Set* in order to be used when defining a metric result.

Receptors and Receptor Sets are *not required* for flight performance, fuel burn or emissions specific metric results. They are required for noise or pollutant concentration metric results.

There are two receptor types in AEDT – *Point* and *Grid*. We will create both a Point and a Grid receptor in this section.

Figure 15. Definitions Tab – Receptors

Create a grid receptor

To create a *grid receptor*:

1. Click the *Definitions* tab, then click *Receptors* (Figure 15).
2. Click the *New* button in the *Actions* ribbon group. The *Receptor Details* window will appear (Figure 16).
3. The grid type is set to *Point* by default. Select *Grid* from the *Type* dropdown list.

   In AEDT, the location of a grid type receptor is specified by the lower left (southwest) corner of the grid, which can be defined by specifying the latitude and longitude of the point or as an offset from a location (typically the airport origin).

4. Enter the *Name* "ContourGrid".
5. Enter the "33" for the *X* and *Y* counts. This represents the number of receptor points in the regular grid.
6. Enter "0.5" for the *X* and *Y* spacing. These values represent the spacing between receptor points. Both numbers must be equal in order to generate contours in AEDT.
7. Click "*Match Grid Center to Projection Origin*" button. This will automatically set the *X* and *Y* offset to be "-8". These values indicate the nautical mile offset from the *Grid* origin.
8. The default values in the *Location Info* section are set to the airport origin.
9. By default, the *Restrict by Boundary* is unchecked (not used).

10. Click *Save*.
11. AEDT will display your new receptor on the left hand pane.

Figure 16. Receptor Details – Grid

You can read more about the *Restrict by Boundary* functionality in Section 9.3.2.1 of the *AEDT User Manual*.

Create a point receptor

You will create a single receptor point that can be used in noise and emissions concentrations modeling. You may want to utilize this functionality when analyzing noise at locations points such as schools or hospitals.

To create a *Point Receptor* (Figure 17):

1. Click the *New* button in the *Actions* ribbon group. The *Receptor Details* window will appear.
2. The grid type is set to *Point* by default.

Figure 17. Receptor Details – Point

3. Select "*English*" as units.
4. Leave the Location Info to the default airport origin.
5. Leave the "Height above terrain" set to zero.
6. Click *Save*.

Create a receptor set

To create a *Receptor Set* (Figure 18):

1. From the *Definitions* tab, then select *Receptor Sets*.
2. Enter "ContourReceptorSet" for the *Receptor Set* name.
3. Enter "Receptor Set with a Grid Receptor" for the description.
4. From *Available receptors*, select the "ContourGrid" receptor and click the Arrow button to move it to the *Assigned receptors*.
5. Click *Save*.
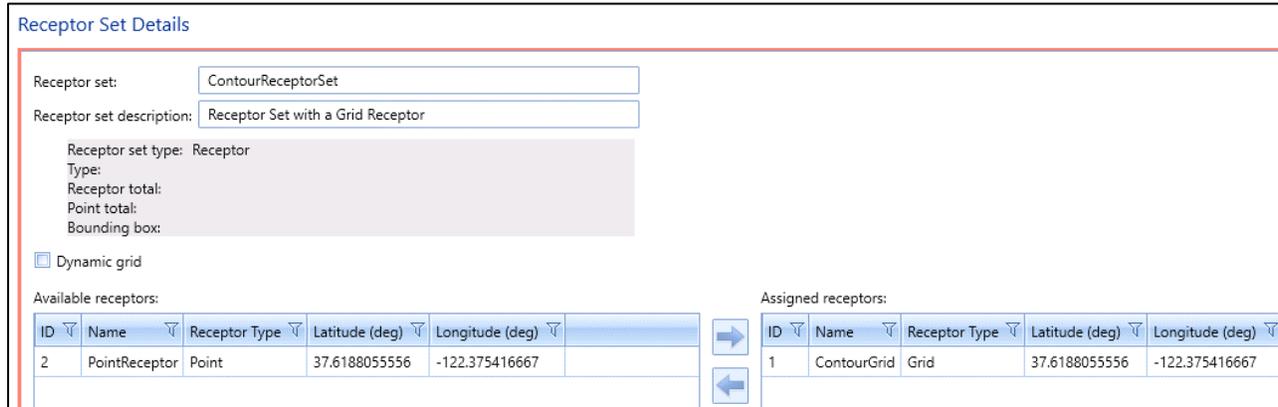
Figure 18. Receptor Set Details

You can read more about the *Restrict Dynamic Grid by Boundary* functionality in Section 9.4.1 of the *AEDT User Manual*.

View receptor set on map

Once the Receptor Set is created, you can view it by clicking the *Map* from the *Display* ribbon group and then clicking *Receptor Set* from the *View* ribbon group (Figure 19).

Figure 19. Map View of Receptor Set

3.7 Set the Default Operation Time

Before adding aircraft operations, assign the default operation date/time in the Study Preferences screen. This setting is used to set the default operation time in the *Create Aircraft/Non-Aircraft/Runup/Helitaxi Operations* wizard

1. Click the *Study* tab, then select *Preferences*, *Study*.
2. In the *Default operation time*, select "8/20/2018 11:00 AM".
3. Click *Save* to apply changes.

3.8 Add Aircraft Operations

AEDT can model several types of Aircraft and Non-Aircraft operations. For our study, we will be creating a single airplane arrival operation and a single airplane departure operations. For additional information on other types of operations, please refer to Section 6.2 of the *AEDT User Manual*.

Add an arrival operation

To add arrival aircraft operation (Figure 21):

1. Click the *Operations* tab and then select *Aircraft* on the *Display* ribbon group.
2. Click *New* on the *Aircraft Actions* ribbon group to open the *Create Aircraft Operations* wizard.
3. Leave the *Operation type* as *Arrival.*
4. Select the "KSFO Default Layout 0" from the airport layout list.
5. Leave the *Operation count* to 1. This represents a single, day time arrival operation of the aircraft, flight profile, and track combination.
6. Click *Next.*
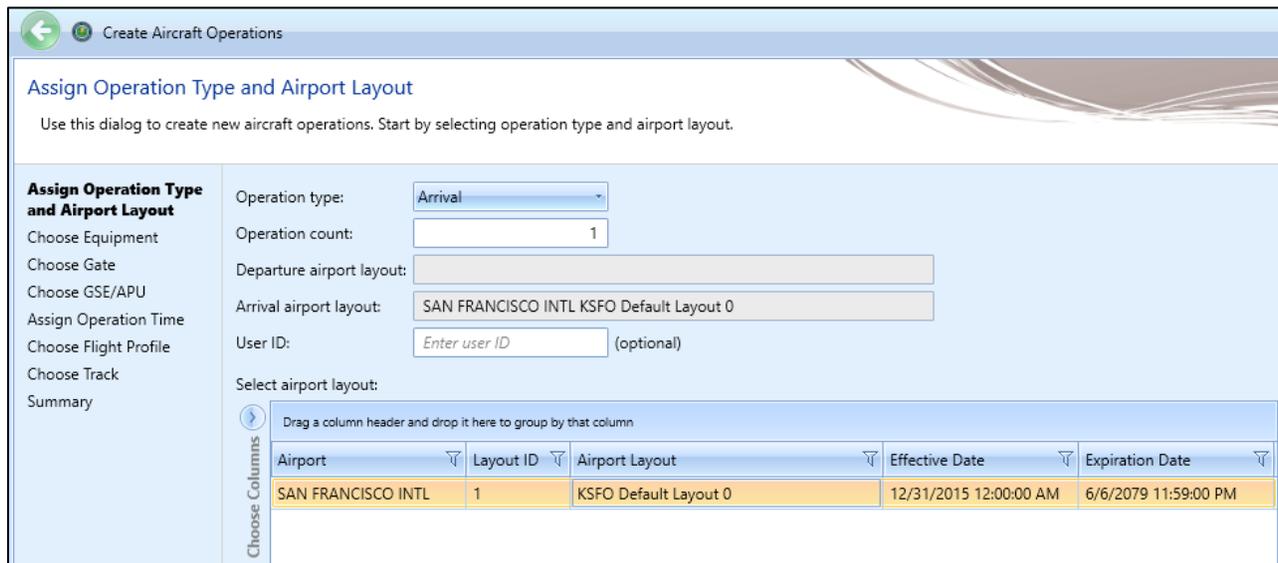
Figure 21. Create Aircraft Operations

7. In the *Choose Equipment* step, click on the filter icon of the first ID column (ANP ID), and enter "737700".
8. Click on the filter icon of the Code column (Engine Code), and enter "3CM030".

9. Of the filtered rows, select the record where the Airframe Model is "Boeing 737-700 Series". Click *Next* (Figure 22).
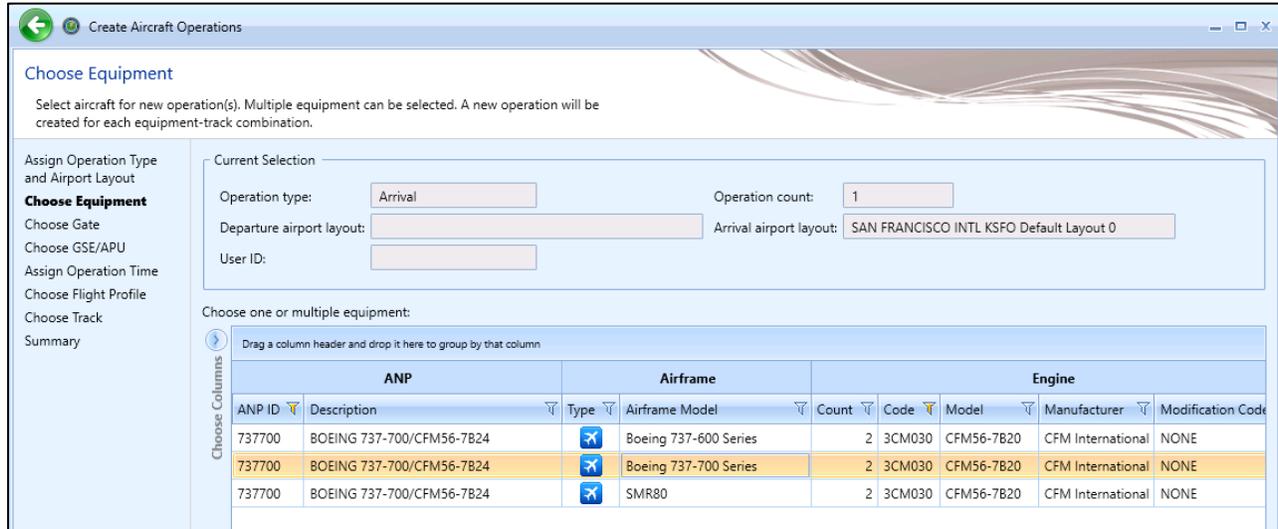
Figure 22. Create Aircraft Operations – Choose Equipment

10. In the *Choose Gate* step, click *Next* to skip this step (you are not assiging a gate in this example). For more information on how to define Gates, see Section 6.2.1.3 of the *AEDT User Manual*.

11. In the *Choose GSE/APU* step, click *Next* to skip this step (you are not assiging GSE/APU in this example). For more information on how to define GSE or APU's, see Section 6.2.1.4 of the *AEDT User Manual*.

12. In the *Assign Operation Time* step, the operation time is set to "8/20/2018 11:00 AM" which you assigned in Section 3.7 (Figure 23). Click *Next.*

The effective and expiration date range of the selected airport layout is displayed. The operation time must fall between this date range.

Operation time is critical for noise metrics and annualization. For example, DNL noise applies a 10 decibel penalty for night time operations.

Figure 23. Create Aircraft Operations – Assign Operation Time

13. In the *Choose Flight Profile* step, select the STANDARD arrival profile for the 737700 (there is only one) and click *Next.*

Figure 24. Create Aircraft Operations – Choose Flight Profile

14. In the *Choose Track* step, select the track named "New Arr" and click *Next*.

Figure 25. Create Aircraft Operations – Choose Track

15. In the *Summary* step, the summary of your input will appear at the top of the window (Figure 26). Click *Create*. Click *Yes* when prompted for confirmation.

Figure 26. Create Aircraft Operations – Summary

Add a departure operation

Create a departure operation by copying the arrival operation that you just created. The Create Aircraft Operations wizard will filter available flight profiles, tracks and other data that are specific to the operation type you are defining.

1. Right-click on the new arrival operation and click *Copy* to open the *Create Aircraft Operations* wizard.
2. In the first step, change the operation type to *Departure*. For the airport layout, select the "KSFO Default Layout 0".
3. In the *Choose Equipment* step, click *Next* since the aircraft 737700 is already selected.
4. In the *Choose Gate* step, click *Next* to skip this step.
5. In the *Choose GSE/APU* step, click *Next* to skip this step.
6. In the *Assign Operation Time* step, accept the default operation time.
7. In the *Choose Flight Profile* step, select the STANDARD departure profile where the stage length is 1.
8. In the *Choose Track* step, select the track named "DepVector_01L".
9. In the *Summary* step, click *Create*. Click *Yes* when prompted for confirmation.

3.9 Create Annualizations

In AEDT, an annualization is a hierarchical grouping of operations associated with the following parameters:

- Time period to be analyzed
- Operations included in the time period
- Weighted groupings of the included operations
- Modeling options for the included operations

Annualization provides a convenient way to adjust contributions of individual operation groups by scaling operations up or down using weightings and to model alternative scenarios from a baseline scenario.

Create a "Baseline" annualization

To create an annualization:

1. Go to *Operations* tab, then select *Annualizations*.
2. Click *New* under *Annualization Actions* ribbon group to open the *Create Annualizations* wizard.
3. In the first step, check *Add new aircraft operation group(s)*, then click *Next* (Figure 27).
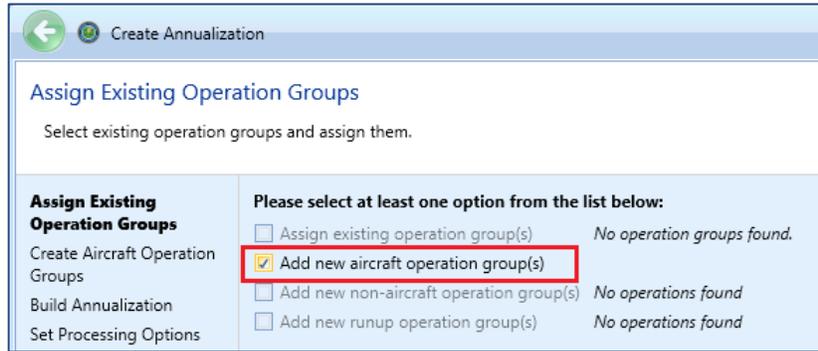
Figure 27. Create Annualization Wizard – First Step

4. The *Create Aircraft Operation Groups* step is where you can include the aircraft operations you previously created that you would like to model. You can create several annualizations by creating new groups and including only the aircraft operations of interest within the specified time period.

5. In the *Add new operation group* text box, enter "737700" and click *Add* (Figure 28).

Figure 28. Create Annualization Wizard – Add New Operation Group Text Box

6. Select the two operations under the *Available Operations* (left-pane); then drag them to the right-pane and drop them under the **737700** operation group.
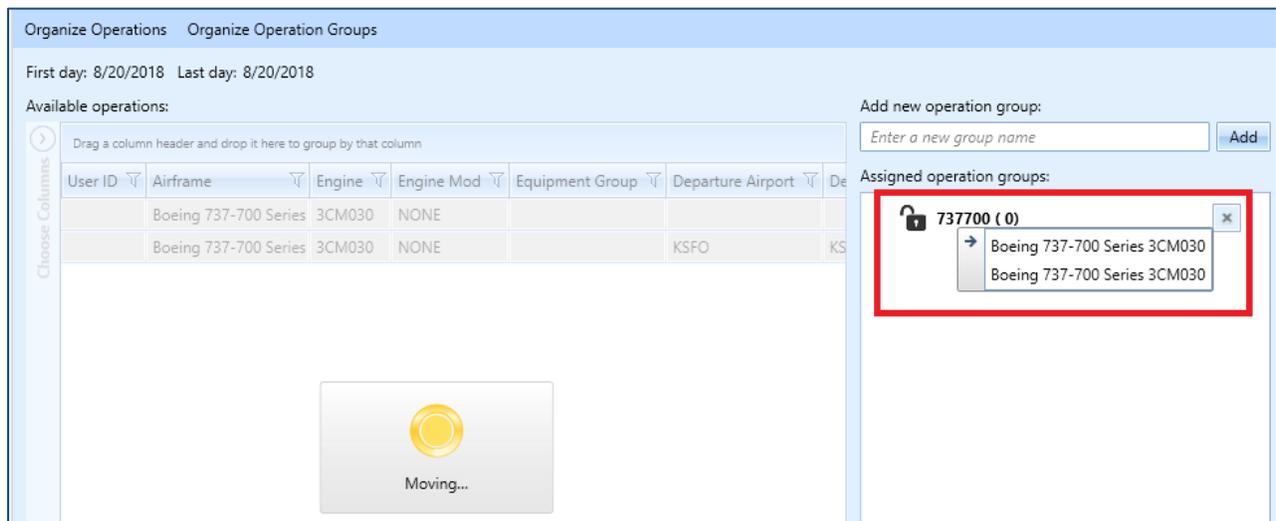
Figure 29. Create Annualization Wizard – Create Aircraft Operation Groups, Drag & Drop
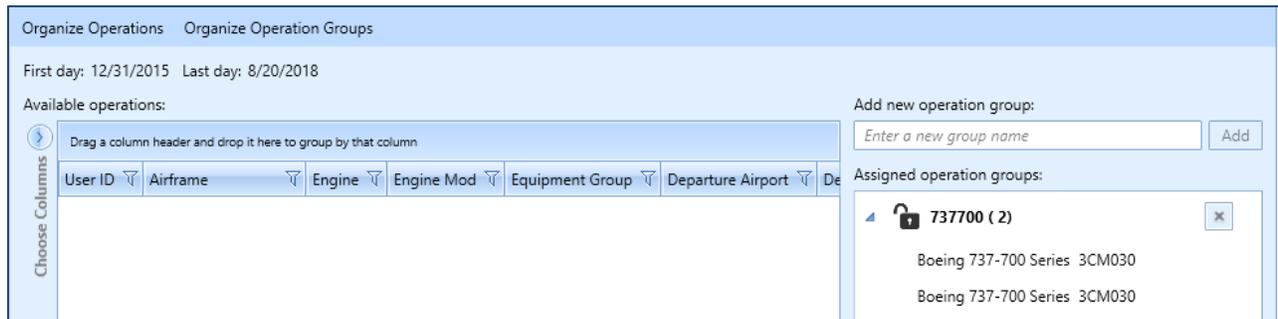
Figure 30. Create Annualization Wizard – Create Aircraft Operation Groups

1. Click *Next*.
2. In the *Build Annualization* step, drag the "737700" group from *Defined operation groups* to the right-pane and drop it under the *Root*.
3. Double-click on the word "Root" to edit and type in "Baseline".
4. Leave the annualization weights to 1.
5. Make sure that the First day and Last day are both set to the default operation date, and that the *Duration* is 24 hours (Figure 31). If the two dates are different, it means that the operation time of one of the aircraft oprerations were not assigned correctly.
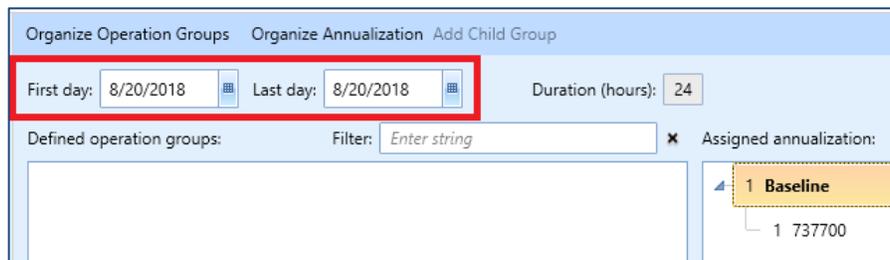
Figure 31. Create Annualization Wizard – Build Annualization

6. Click *Next*.
7. In the *Set Processing Options* step, click *Create*.

Create an "Alternative" annualization

Create a second annualization – this time adjusting the annualization weights in order to see the changes in noise results.

1. Click *New* under *Annualization Actions* ribbon group to open the *Create Annualizations* wizard.
2. In the first step, check *Assign existing operation group(s)*.
3. Select the "737700" group and click on the arrow to move to the *Assigned operation groups*. Click *Next*.

4. In the *Build Annualization* step, drag the "737700" group from *Defined operation groups* to *Assigned Annualization*.
5. Double-click on the word "Root" to edit and type in "Alternative".
6. Click on the "1" next to the word "Alternative" to edit. Enter number "2" (Figure 32).
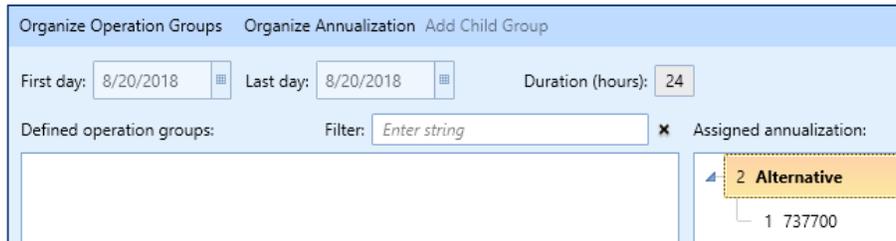
Figure 32. Create Annualization Wizard – Build Annualization

7. Click *Next*, then click *Create*.

This will create an annualization that has the effect of doubling the operation counts that were specified when the operations were created.

Annualization Example

Assume you have grouped all of your airport operations into an arrival group and a departure group. These groups are part of your baseline scenario, which is utilized 75% of the year. Suppose you would like to compare your baseline operating configuration against an alternative. The alternative operating configuration contains the same operation groups as the baseline and is utilized 25% of the year. However, the alternative scenario allows for twice as many arrivals as the baseline.

For this example, you would:

1. Create two operation groups: one for all arrivals and one for all departures.
2. Add both operation groups to an annualization named "Baseline".
3. Set the "Baseline" weighting to 0.75.
4. Create a second annualization named "Alternative".
5. Add both operation groups to the annualization. Set the weighting of the arrival group to "2".
6. Set the "Alternative" weighting to 0.25.
7. Define two identical metric results, one for each annualization.
8. Run metric results and compare noise results.

Please see Section 6.7 of the *AEDT User Manual* for more information on Annualization.

3.10 Define Metric Results

An AEDT Metric Result contains all of the information required for an analyst to generate results in AEDT. Examples of metric result input include: aircraft operations data, flight performance modeling options, result storage options and noise and emissions metric selections.

Create a "Baseline" metric result

To create a metric result for a simple noise and emissions analysis:

1. Go to the *Metric Results* tab.
2. Click *Define* under the *Metric Result Actions* ribbon group to open the *Define Metric Results* wizard.
3. Move the "DNL" metric from the *Available Metrics* to the *Selected Metrics* by using the Arrow button. Click *Next*.
4. Select the "ContourReceptorSet" from the *Available receptor set*, then click the Arrow button to move it to the right-hand pane. Click *Next*.
5. Select the "Baseline" annualization. Click *Next*.
6. The *Set Processing Options* step is where you specify data storage options and many types of modeling options such as performance modeling details, weather usage, and terrain usage. Additional information on these options can be found in the AEDT User Manual.
7. Under *Result Storage Options*, *Emissions*, select *Segment*. Selecting *Segment* will save segment-level emissions results to the study database and allow you to view these in the Emissions Report.
8. Under *Emissions/Performance Modeling Options*, under *Weather Fidelity*, select "Use Airport Weather". When this option is selected, average annual airport weather (specified in the *Definitions* tab, *Weather*, *Airport weather*) is used. If any component of airport weather data is missing (e.g., pressure), AEDT will substitute the missing data with ISA weather.
9. Under the *Metric Result Options*, under *Name*, enter "DNL Baseline".
10. Leave other options as is (Figure 33).

Figure 33. Define Metric Results Wizard – Set Processing Options

11. Click *Next.*
12. In the *Summary* step, click *Create*.

Create an "Alternative" metric result

To create an Alternative metric result:

1. Click on the Baseline metric result, and click *Copy* from the *Metric Results Actions* ribbon group (Figure 34).
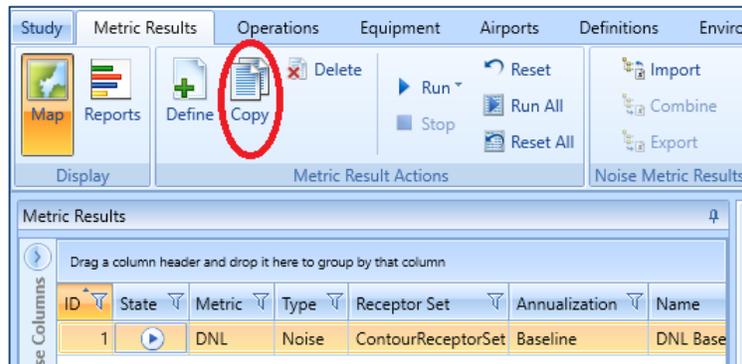
Figure 34. Copy Metric Result

2. In the *Choose Metrics* step, click *Next* since the DNL metric is already selected.
3. In the *Choose Receptor Sets* step, click *Next* since we will use the same receptor set.
4. In the *Select Annualization step,* select the "**Alternative**" annualization. Click *Next*.
5. Under the *Metric Result Options*, under *Name*, enter "**DNL Alternative**".
6. Click *Next* and then click *Create*.

Two metric results should be visible in the upper left *Metric Results* Pane. The lower left *Details* tab provides a summary of the chosen metric result options (Figure 35). The *Aircraft Operations* tab displays the aircraft operations included in the metric result. The *Tracks* tab displays all of the tracks used by the operations in the metric result.
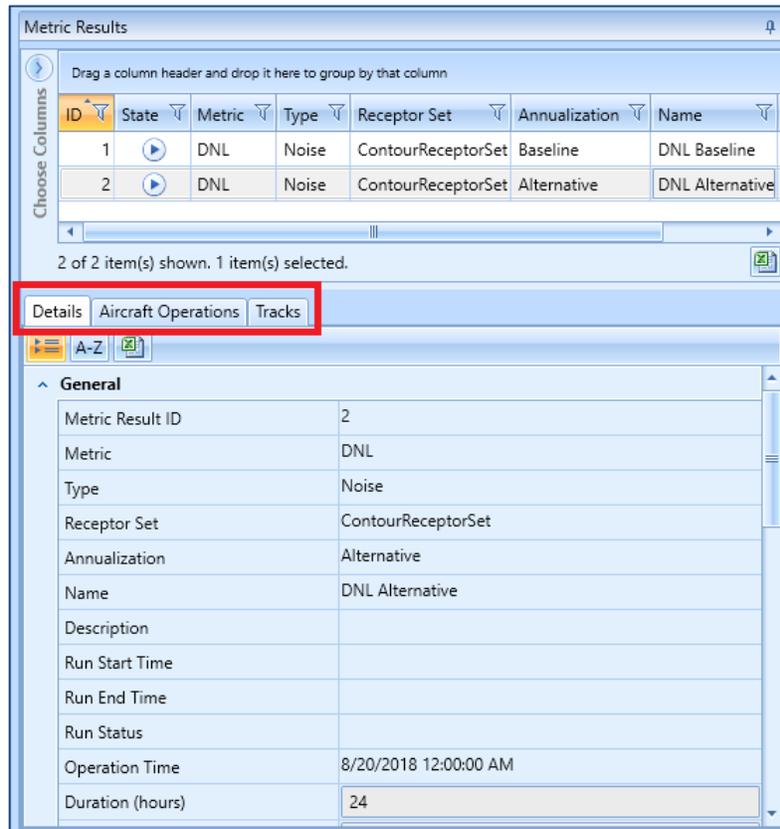
Figure 35. Metric Results Pane and Details Pane

3.11 Run Metric Results

AEDT allows you to select and run more than one metric result at a time. To do this, select *Run All* under the *Metric Result Actions* ribbon group.

As your metric results are being computed, you will see the percent completed under the *State* column. Once the metric results are completed, the *State* column will display a green check (Figure 36). Additionally, you will see a "Task Completed" pop-up message in the lower right corner (Figure 37).
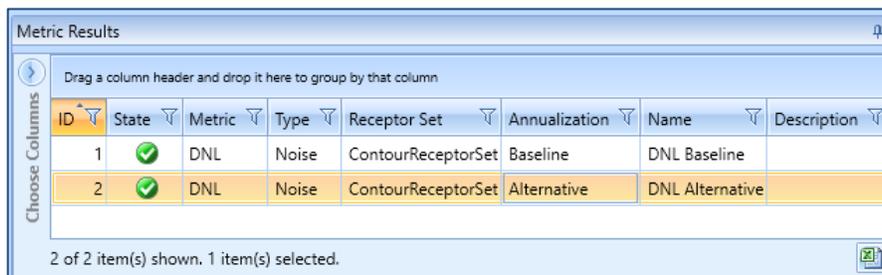
Figure 36. Metric Results Pane
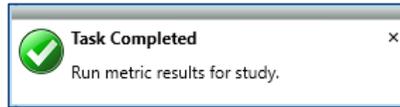
Figure 37. Task Completed Message

3.12 View Output

Noise Contour Layer

To view noise contour layers:

1. Select the Baseline metric result from the *Metric Results* pane.
2. Right-click and click *View Contours*. The *Contour Settings* dialog will be displayed.
3. Set the contour minimum to "50". Click *OK*.
4. Repeat steps 1-3 for the Alternative metric result.

You will see two noise contour layers in the *Layers* manger, under the *Noise Contour Layers* group as well as on the *Map* view (Figure 38). You can see the differences in the contours between the two annualizations. To toggle the layers, check or uncheck the individual layers.
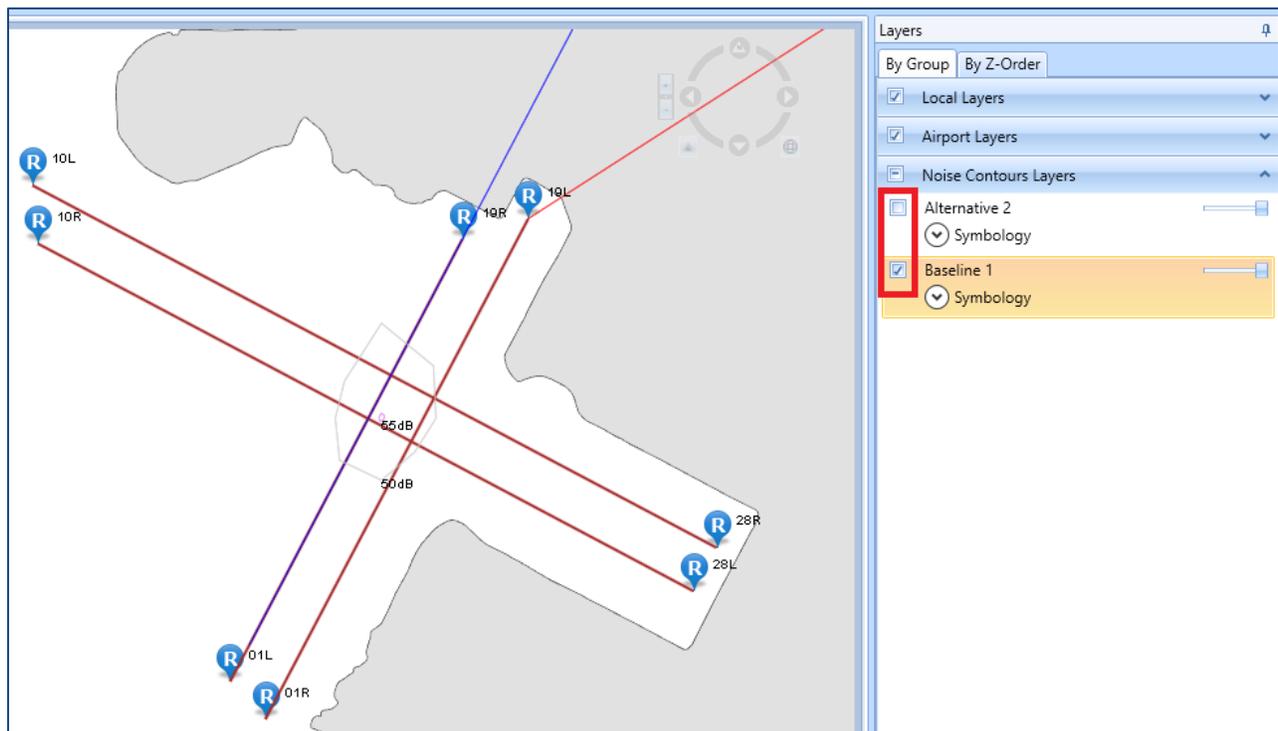
Figure 38. Contour Layers on Map

Each map layer contains a set of *Attributes* that can be accessed by right-clicking on a layer in the *Layers* manager. The *Attributes* display additional information about the layer (Figure 39).
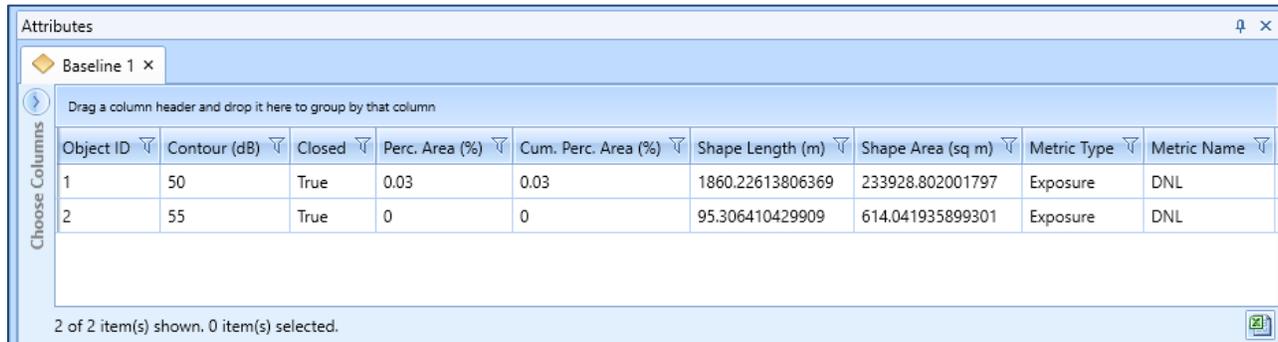
Figure 39. Noise Contour Layer Attributes

Reports

Output reports contain analysis results such as emissions and fuel burn, flight performance, noise at receptor points, population exposure, noise impact, emissions concentrations, and VALE analysis. AEDT reports are in tabular format and can be exported as a comma delimited CSV file for additional post-processing outside of AEDT.

To access reports, click *Reports* in the *Display* ribbon group under the *Metric Results* tab (Figure 40):
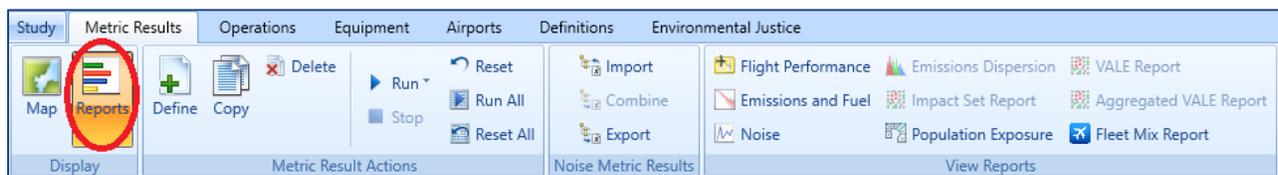
Figure 40. Metric Results Tab – Reports

Noise Report

The AEDT Noise report displays noise values at individual receptor points.

To view the Baseline Noise report:

1. Select the Baseline metric result.
2. Select *Noise* from the *View Reports* ribbon group.
3. The noise report for the baseline metric result is displayed in the center work area.

Emissions and Fuel Burn Report

The AEDT Emissions and Fuel Burn report displays emissions and fuel burn for all of the operations included in the metric result. Depending on the storage type, results can be summed in different ways. Because the "Baseline" and "Alternative" metric results were stored at the *Segment* level, you can view segment-level emissions and fuel burn details.

To view the Emissions Report (Figure 41):

1. Select the Baseline metric result.
2. Click *Emissions and Fuel* from the *View Reports* ribbon group.
3. Select *Operations Detail* under *Group By.*
4. Select *Kilograms* under *Units.*
5. Click *Generate Report.*

Figure 41. Emissions Report (Segment)

Congratulations! You have now successfully:

*   Created a study

*   Added airport data and flight tracks to an airport layout

*   Defined receptors and receptor sets used for noise calculations

*   Added aircraft operations

*   Defined and run metric results

*   Viewed noise contours

*   Generated noise report and emissions report.

For information on how to create other types of studies or exercise modeling options not covered in this document, please refer to the *AEDT User Manual*.

4 Importing EDMS Studies into AEDT

AEDT has the ability to import studies directly through the AEDT application or through an external tool. The following sections describe the process for importing EDMS studies in AEDT.

4.1 AEDT Standard Input File

The AEDT Standard Input File (ASIF) provides a standard file format to allow for the import of data into AEDT. *Study data is converted to the AEDT Standard Input File (ASIF) as part of the study import process.* The ASIF format is based on the XML file format, which is a text-based file format that is readable by both humans and computers.

4.2 Before You Import

As certain EDMS functionality is not yet available in AEDT, there are certain types of data that cannot be imported. Please consult the AEDT User Manual for more information on what functionalities are available.

The following four EDMS study data are placed into an ASIF, but not imported into a study:

- Parking Facilities,
- Roadways,
- Discrete Polar Receptors, and
- Polar Receptor Networks.

If the EDMS export file contains internally inconsistent or invalid data elements such as invalid GSE assignments with invalid fuel types or duplicate instances of the DEFAULT operational profile, the converter will generate an ASIF, but the ASIF file may not import into AEDT. The EDMS export file or the ASIF may need to be manually corrected to address the errors.

4.3 Import an EDMS study through the AEDT Application

Follow the instructions below to import your EDMS study:

1. Open the AEDT application.
2. Click the *Study* tab and click *Import* to display the *Import Study* dialog (Figure 42).
3. Select *EDMS* from the drop-down menu.
   - Click the *Browse* button, navigate to the EDMS study file and select *Open*.
   - Specifying the *Ops schedule folder* or the *Alternate equipment map file* is optional. If desired, check the appropriate checkbox and click the *Browse* button to navigate to the directory.
   - Click *Next.*
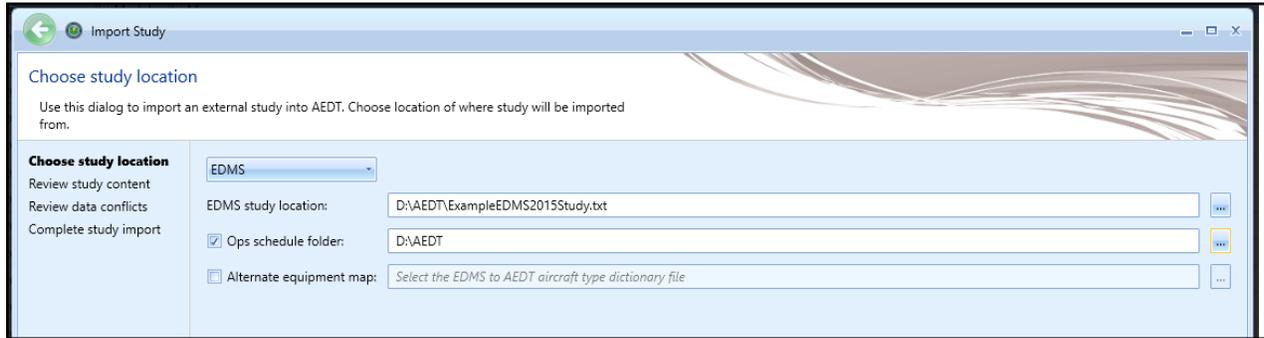
Figure 42. Choose study location

If you receive the following message, select *Close* and then *Cancel* the import (Figure 43). This message indicates errors in the EDMS to ASIF conversion process. ***Please refer to Section 4.4.1 for suggestions on resolving the errors associated with this message.***
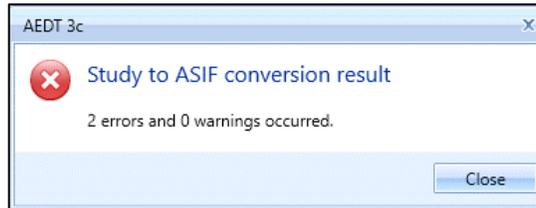
Figure 43. EDMS to ASIF Error warning

4. The *Review study content* step displays validation errors if any.
   - If the "Bad Data Integrity" message appears, click *Cancel* (Figure 44). This message indicates errors in validating the XML file based on the EDMS study data. ***Please refer to Section 4.4.1 for suggestions on how to resolve these data errors.***
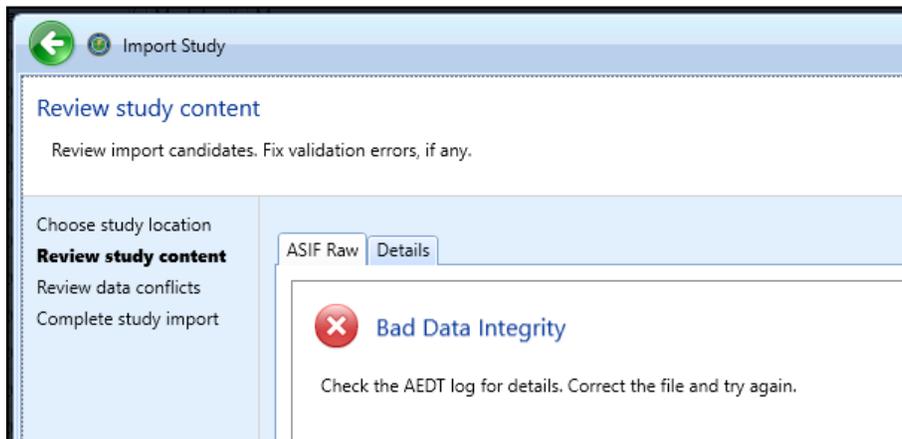
Figure 44. Review study content, Bad data integrity error

- If the message does not appear, the *ASIF Raw* tab will display a summary view of the study.
- The *Details* tab displays a detailed view of the study content, organized by categories. (Figure 45 and Figure 46)
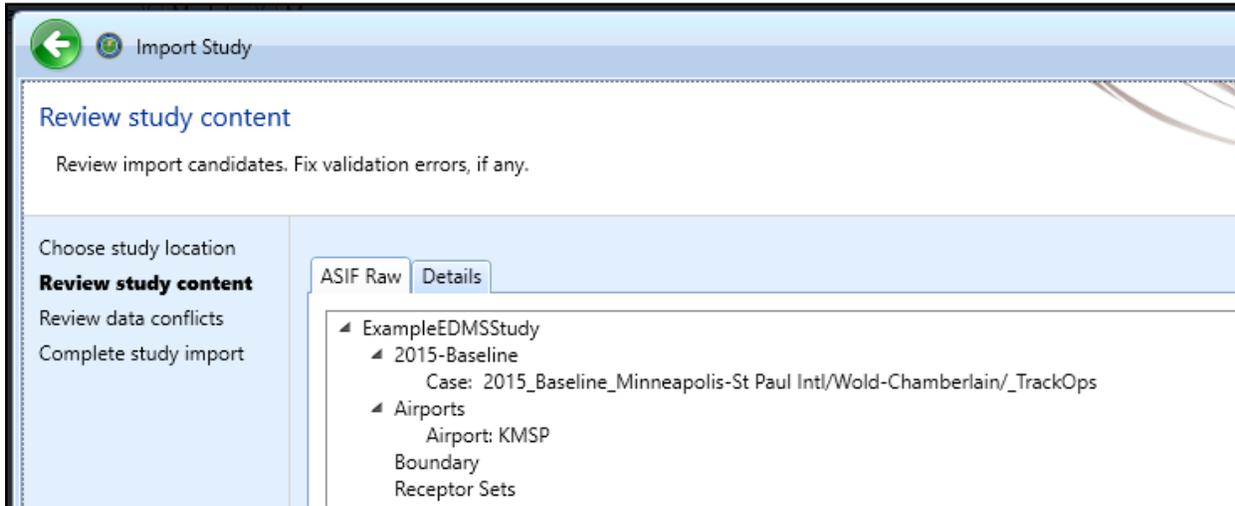
Figure 45. Review study content, ASIF Raw tab
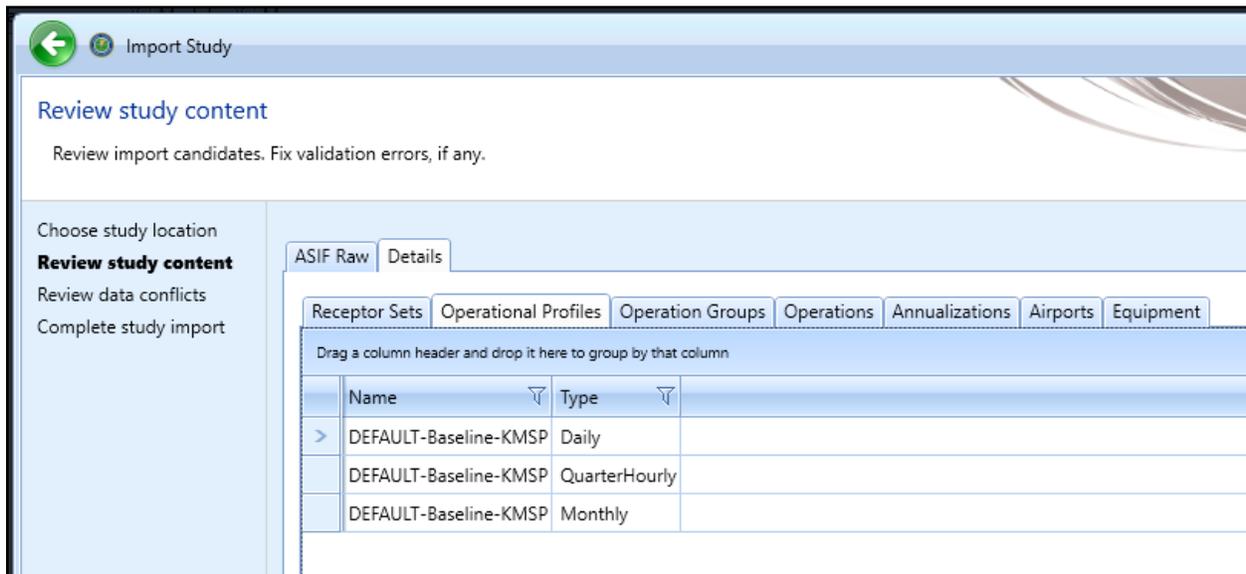
Figure 46. Review study content, Details tab

5. The *Review data conflicts* step displays any conflicts between study airport data and AEDT airport data. (Figure 47) (Note: Latitude/Longitude/Altitude mismatches between EDMS and AEDT airport location data and EDMS airport codes that are not in the AEDT database are identified)

- If no data conflicts are present, AEDT displays *"No data conflicts eligible for revision were found"*.
- If data conflicts are present, review the conflicts reported under *Airport Data Conflicts*. AEDT lists each element in conflict along with the study value and the system value. Select the appropriate option under *Airport Import Resolution* to proceed:
  - *Import file as is*: When selected, the airport data will be imported as defined.
  - *Override mismatched airport data in file with AEDT system data*: When selected, the AEDT system airport data will be used in place of the defined airport data.
- Click *Next*.
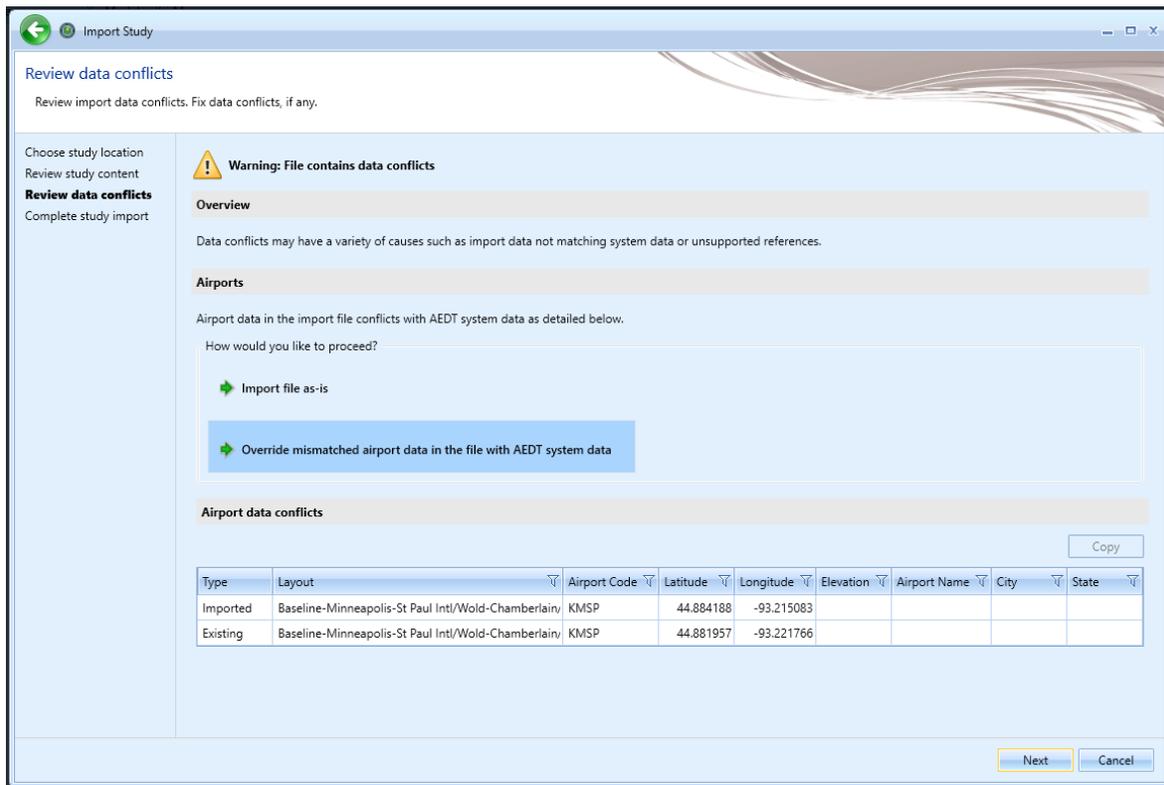
Figure 47. Review data conflicts

6. In the *Complete study import* step, enter a unique *study name.* (Figure 48)
   - Enter a description in the *Study description* if desired.

7. Enter the name of the desired SQL Server instance in the *Select database server* field.
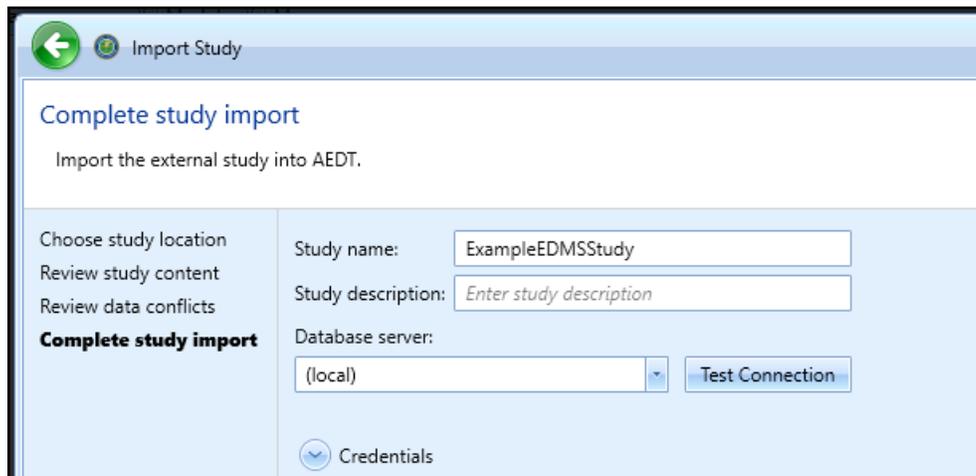
Figure 48. Complete study import

8. Click *Create* to import the study.
9. When the import is complete, the imported study is opened and the *Metric Results* tab is displayed.

> Once imported, update the grid receptor origin according to Section 9.3.2 in the *AEDT User Manual* to match the grid definition in the legacy tool.

4.4   Resolving EDMS to ASIF Import Errors

During the EDMS import process, AEDT converts EDMS study data to the ASIF XML format and then validates the XML file before creating the AEDT study in SQL.

If your study failed to import, you can refer to the AEDT log file for more information (covered in Section 4.10 of the *AEDT User Manual*). To view system status and logged information, click on the *Study* tab and click *Log*. The information shown in the message pane is also written to the *aedt.log* file in the AEDT logs folder (e.g., *C:\AEDT\Logs)*.

There are two categories of errors: those that occur during the EDMS to ASIF XML conversion and those that occur when validating the XML file created during conversion.

EDMS to ASIF conversion error resolutions are described in Section 4.4.1. If you receive EDMS to ASIF related errors and warnings, you will need to fix the errors in the EDMS study related files and try to import again using the instructions in Section 4.3.

ASIF XML validation error resolutions are described in Section 4.4.2. If you receive ASIF XML validation errors, you will need to run the command line EDMS2ASIF program to create an XML file to make your corrections (Section 4.5.1). You will then need to re-import the XML file using the ASIF import instructions in Section 4.5.2.

Text in **CAPS** indicates the study specific data that will be displayed as part of the error message.

4.4.1 EDMS to ASIF XML Conversion Errors

If you encounter errors or warnings during the EDMS to ASIF conversion, you will see a message (Figure 43. EDMS to ASIF Error warning), which displays the number of errors or warnings encountered.

4.4.1.1 Resolving File Import Errors

Import file errors or warnings occur when directories cannot be accessed, files cannot be created, parsed or written. See errors and resolutions below:

1. Error: "EDMS Export Text file *FILENAME* does not exist."

   Resolution: Confirm that the file name input as the EDMS study name is spelled correctly and exists on the disk.

2. Error: "AircraftSchedule directory *DIRECTORYNAME* does not exist."

   Resolution: Confirm that the directory contains the aircraft schedule file referenced in the EDMS study file and that the directory exists on the disk.

3. Error: "Missing output file name parameter"; Error: "Invalid directory for ASIF output file *DIRECTORYNAME*."
   Resolution: These errors indicate a problem creating a temporary ASIF file in the AEDT data directory (e.g., *C:\AEDT*). Confirm that the directory exists and you have write permissions.

4. Error: "unable to open equipment mapping file *'FILEPATH'*: "; Error: "error parsing equipment file *'FILEPATH'*:" *ADDITIONALDETAILS*
   Resolution: Confirm that the directory contains the equipment mapping file and that the file is formatted correctly. Details on formatting errors will be displayed in the error text.

5. Error: "unable to open airports file *'FILEPATH'*: *ADDITIONALDETAILS*
   Resolution: This is an internal error creating an AEDT airport XML file. Confirm that the directory exists and you have read\write permissions.

6. Error: "Exception thrown by importer: + ADDITIONALDETAILS
   Resolution: View additional details for resolution. This error is unlikely to occur.

4.4.1.2 Resolving EDMS Input Data File Errors (EDMS to ASIF XML)

The following errors are due to incorrectly formatted or populated EDMS study files. Instructions for resolving these errors is based on the EDMS 5.1.4 User Manual, *Appendix B: Import/Export File Format*.

The heading of the relevant section precedes the list of errors related to that section, which can be searched in Appendix B of the EDMS User Manual (e.g., *PROPERTIES_FOR_SCENARIO-AIRPORT-YEAR_COMBINATIONS*):

1. Error: "Unable to find EDMS text file block header, or unrecognized file type"
    Resolution: Confirm that the EDMS study file is properly formatted. The study file must contain a header with either "STUDY_HEADER" or "#Study name" or the file type is not valid (TXT).

2. Warning: "Reading unsupported EDMS version: VERSION".
    Resolution: Confirm that the EDMS study is version is 5.1.3, 5.1.4 or 5.1.4.1. Processing will continue.

    PROPERTIES_FOR_SCENARIO-AIRPORT-YEAR_COMBINATIONS (Appendix B):

3. Error: "Unable to find AirOperation Schedule file '*FILENAME* ' using specified AIRSCHED path 'DIRECTORY'"
    Resolution: Confirm that the schedule file exists at the directory specified in the EDMS study file.

    Resolve airport coordinates

4. Warning: "Unable to find AEDT Airport for runway matching for EDMS airport "AIRPORTCODE".
    Resolution: The warning is logged and processing continues. Airport discrepancies can be resolved by following the mismatched airport instructions during import found in section 2 in this document.

    STATIONARY_SOURCES (Appendix B):

5. Error: "expecting only one coordinate for point stationary source: num=#."
    Resolution: Review the file content to make sure only one coordinate is specified and that the text is formatted correctly.

6. Error: "expecting only one coordinate for volume stationary source: num=#."
    Resolution: Review the file content to make sure only one coordinate is specified and that the text is formatted correctly.

7. Error: "unknown stationary source category: CATEGORY.
   Resolution: An invalid stationary source category was found (valid categories are 0 – 9). Review the file content to locate the CATEGORY value and enter a valid category.

CONFIGURATION_RUNWAYS (Appendix B):

8. Error: "unable to find airport config [AIRPORTCONFIG] for scen=[SCENARIONAME] and airport=[AIRPORTNAME]
   Resolution: Check the CONFIGURATION_RUNWAYS section of the study file for a valid configuration to the scenario/airport combination specified.

QUARTER_HOURLY_PROFILES (Appendix B):

9. Error: "Duplicate quarter hourly profile name >HOURLYPROFILENAME< detected for scenario SCENARIONAME. ";

10. Error: "Unable to find quarter hourly profile with id HOURLYPROFILENAME for scenario airport with id AIRPORTID."
    Resolution: Check the study file for duplicate activity profile names and correct them.

MONTHLY_PROFILES (Appendix B):

11. Error: "Duplicate monthly profile name >MONTHLYPROFILENAME< detected for scenario SCENARIONAME."

12. Error: "Duplicate daily profile name >DAILYPROFILENAME< detected for scenario SCENARIONAME."
    Resolution: Check the study file for duplicate activity profile names and correct them.

DAILY_PROFILES (Appendix B):

13. Error: "Unable to find daily profile with id DAILYPROFILENAME for scenario airport with id AIRPORTID."

14. Error: "Unable to find monthly profile with id MONTHLYPROFILENAME for scenario airport with id AIRPORTID".

Resolution: Verify that the activity profiles are linked to the scenario airport identified in the error message.

AIRCRAFT_OPERATIONS (Appendix B):

15. Error: "Unable to find an activity profile for scenario airport with id AIRPORTID because of null or zero-length operational profile ids".
    Resolution: An activity profile is expected but the operational profile id is missing or null. Verify that the profile id is correctly defined as either quarter hour, daily or monthly.

16. Error: "Unable to find air operation EDMS acid for scen_aprt_id='SCENARIOAIRPORTID', airop line='AIROPLINENUMBER'"
    Resolution: Incorrect aircraft definition. Refer to the file line number for corrections.

17. Error: "Exception reading AirOperations file '*FILENAME* '."
    Resolution: Verify that the file exists on disk. Confirm that the file is formatted correctly.

4.4.2   Resolving Data Integrity Errors (ASIF XML Validation)

The following errors are due to incorrectly populated XML data based on the EDMS study files. They are grouped by the XML section that is being validated. The red text next to the error group refers to the element hierarchy that must be updated.

Details on the structure of the elements are found in the *AEDT Standard Input File (ASIF) Reference Manual Section 6*; however, high-level element diagrams have been recreated here (where practical) (Figure 49 and Figure 50, for example)*.*

Note that additional error information is included in the messages, such as the scenario and case name, which identifies the specific element of the XML that triggered the error or warning. For certain elements, such as scenarios, the references are also validated (e.g., the element case has an element reference that contains a reference scenario).

Some errors have been grouped if the resolution is the same for each error in the set (e.g., "Duplicate name" is resolved by editing with a unique name).
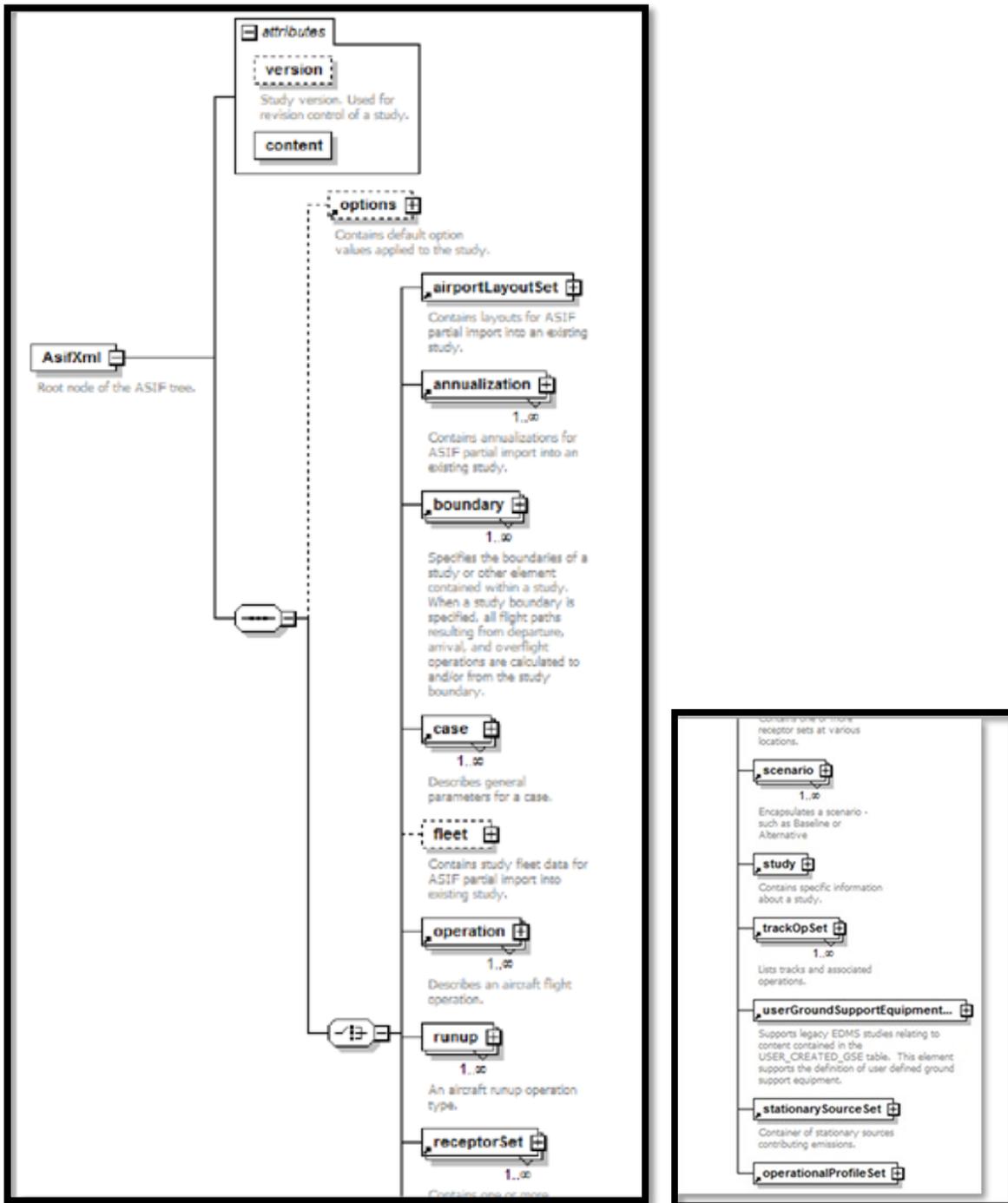
Figure 49. ASIF XML
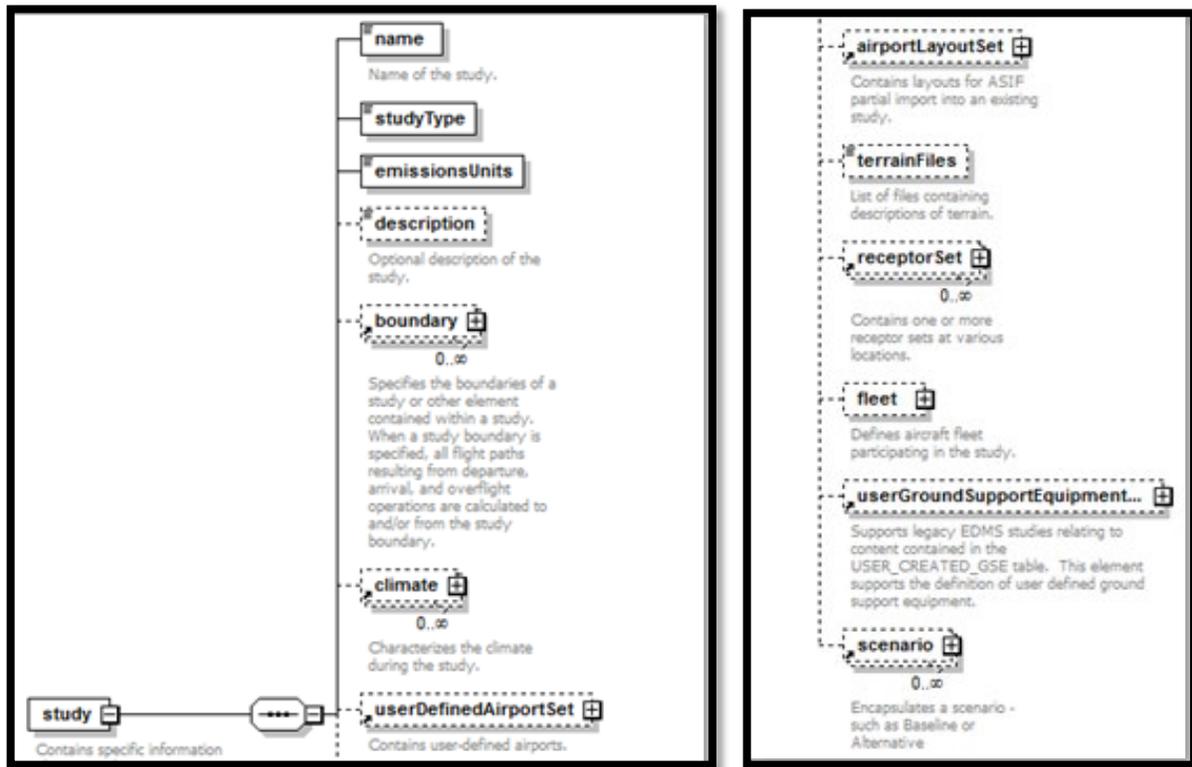
Figure 50. XML study

1. AsifXml/study/userDefinedAirportSet/userDefinedAirport (Figure 51):

   - Error: "User-defined airport must specify country code."
     Resolution: Specify a valid country code.
   - Error: "User-defined airport country code is invalid."
   - Error: "User-defined airport zone is invalid."
   - Error: "User-defined airport system wind rose station ID is invalid."
   - Error: "User-defined airport system weather station ID is invalid."
     Resolution: Confirm that the ID's exist in the AIRPORTS database and are formatted correctly.
   - Error: "User-defined airport code is a duplicate of an existing airport code."
   - Error: "User-defined wind rose station ID must not be a duplicate."
   - Error: "User-defined airport weather station ID must not be a duplicate."
     Resolution: Create a unique id or delete the duplicate record.

Figure 51. XML userDefinedAirportSet

2. AsifXml/study/airportLayoutSet/airportLayoutType (Figure 52):
    The elements in this section are all under the airportLayoutType. **See the *AEDT Supplemental Manual:***
    ***ASIF Reference, Section 6, (search "*complexType airportLayoutType*") to see the full schema.**

    The scenarioAirportLayoutType is a subset of the airportLayoutType (see Figure 52).
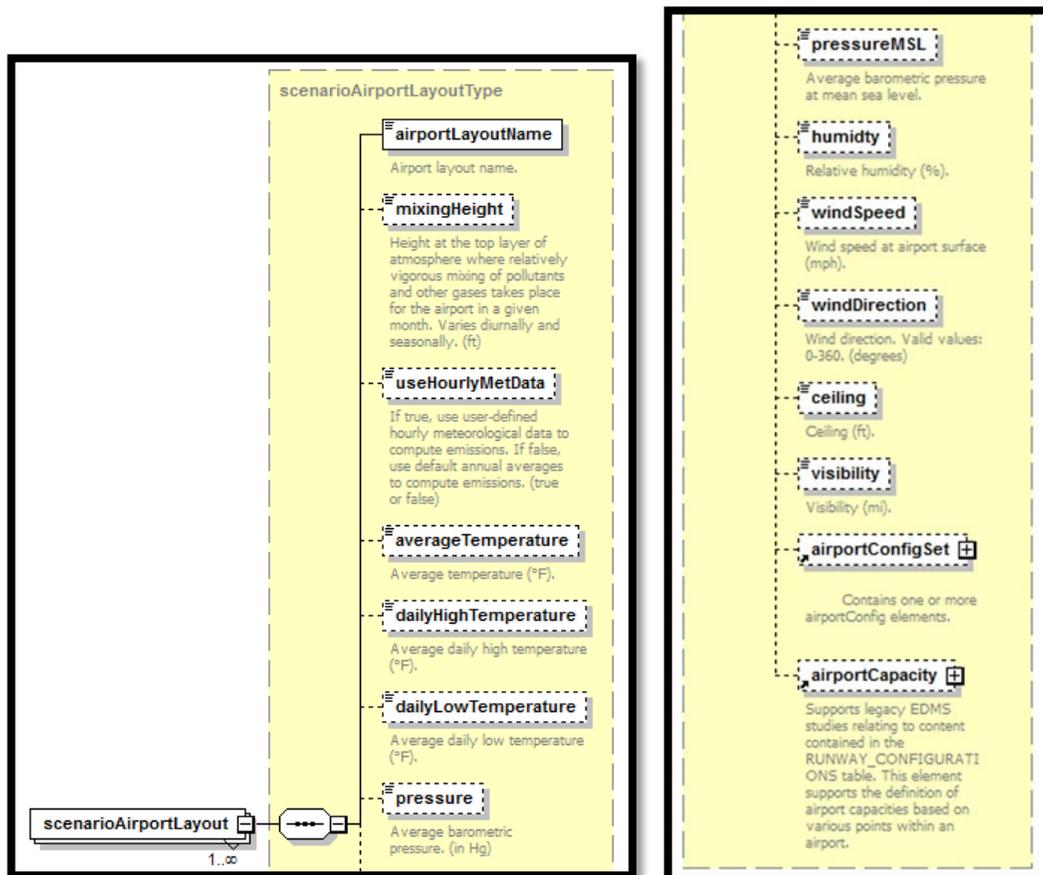
Figure 52. XML element scenarioAirportLayoutType

- /taxipathSet/taxipath:

- Error: "An ambiguous airport reference was specified. More information is required."
- Error: "No airports could be found in the AIRPORTS database for the airport layout."
  Resolution: Confirm that the airport referenced is in the AIRPORTS database and that enough information is defined to distinguish it from a similar airport.
- Error: "Duplicate airport layout names are specified."
- Error: "Duplicate gate names are specified for the airport."
- Error: "Duplicate taxiway names are specified for the airport."
  Resolution: Create a unique name or delete the duplicate record.
- Error: "Taxipath is missing gate for this airport layout."
- Error: "Taxipath is missing runway for this airport layout."
- Error: "Taxipath is missing taxiways for this airport layout."
  Resolution: Defined the missing data.
- Error: "Taxipath contains empty taxiway name for this airport layout."
- Error: "Taxipath contains unknown taxiway for this airport layout."
- Error: "Taxipath contains unknown gate for this airport layout."
- Error: "Taxipath contains unknown runway for this airport layout."
  Resolution: The taxipath element contains data that is not found in the airport layout. Check the airport layout in the EDMS study to make sure all elements are correctly listed in the taxipath element

. /activityProfileSet/activityProfile;
. /monthlyProfileSet/monthlyProfile;
. /quarterHourlyProfileSet/quarterHourlyProfile;
. /dailyProfileSet/dailyProfile:

- Error: "Referenced quarter hourly operational profile in activity operational profile does not exist within the airport layout"
- Error: "Referenced daily operational profile in activity operational profile does not exist within the airport layout"
- Error: "Referenced monthly operational profile in activity operational profile does not exist within the airport layout"
  Resolution: Check that the airport layout contains a reference to your profile. If not, add the appropriate data to the layout or delete the profile.
- Error: "Duplicate quarter hourly operational profile name specified for this airport layout."
- Error: "Duplicate daily operational profile name specified for this airport layout."
- Error: "Duplicate monthly operational profile name specified for this airport layout."
- Error: "Duplicate activity operational profile name specified for this airport layout."
  Resolution: Create a unique profile name.

- /stationarySourceSet/ stationarySource

- Error: "A duplicate stationary source name was specified."
  Resolution: Create a unique stationary source name.
- Error: "Unknown engine code was specified."
  Resolution: Specify a valid engine code.
- Error: "An error in fuel tank choice element was specified."
- Error: "An error in deicing area choice element was specified."
- Error: "An error in boiler/heater choice element was specified."
- Error: "An error in generator choice element was specified."
  Resolution: Refer to the EDMS 5.1.4 User Manual for valid element choices.

3. AsifXml/study/airportConfigurationSet/airportConfiguration

- Error: "Duplicate Airport Configuration Name. Multiple airport configurations with the same name are defined within an airport layout."
- Error: "Duplicate Scenario Airport Configuration Runway Assignment. "
  Resolution: Create unique names or delete duplicate records.
- Error: "Airport configuration's start wind angle is less than its ending wind angle."
- Error: "Airport configuration's max wind speed is less than its min wind angle."
- Error: "Airport configuration's start hour is less than its end hour."
- Error: "Airport configuration's max ceiling is less than its min ceiling."
- Error: "Airport configuration's max visibility is less than its min visibility."
- Error: "Airport configuration's max temperature is less than its min temperature."
  Resolution: Confirm that the range of elements is valid (i.e., maximum cannot be less than the minimum").
- Error: "Unknown Runway for Scenario Airport Configuration Runway Assignment. "
  Resolution: Create or define a valid runway assignment.

4. AsifXml/study/userGroundSupportEquipment

- Error: "A duplicate user-defined GSE name was specified."
- Error: "A wrong user-defined GSE ID was specified (1 to 44 reserved for system GSE)."
- Error: "A duplicate user-defined GSE id was specified."
  Resolution: Create unique names or delete duplicate records.

5. AsifXml/study/receptorSet
- Error: "A duplicate receptor set name was specified."
  Resolution: Specify a unique receptor set name.

6. AsifXml/study/scenario (Figure 53):

- Error: "A duplicate scenario name was specified."
  Resolution: Review and correct the scenario names assigned to the scenario elements.

- Error: "Unknown Scenario Airport Layout. The specified airport layout defined for the scenario has not be defined for the study."
  Resolution: Define and populate the airport layout in the specified scenario airport layout record.

- Error: "Duplicate Scenario Airport Reference. Multiple layouts which reference the same airport are defined within a scenario."
  Resolution: Delete the duplicate airport layout or rename as appropriate.
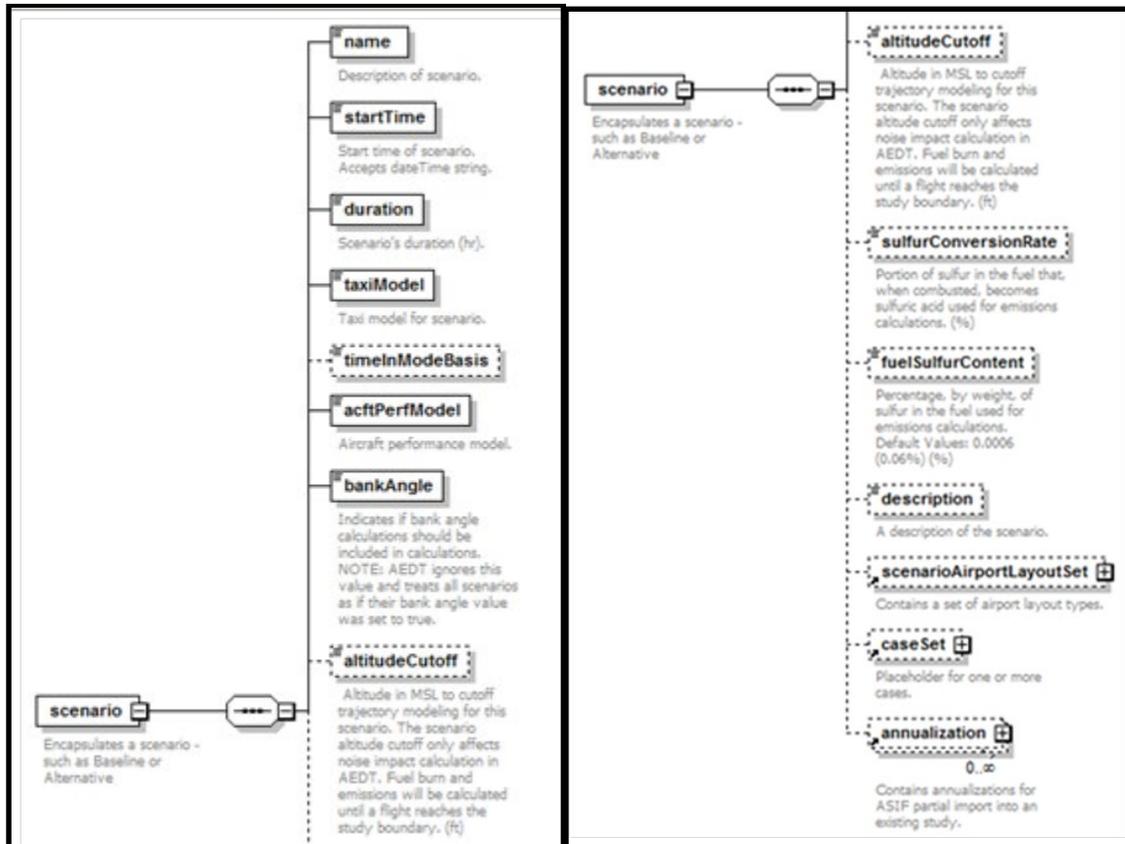
Figure 53. XML element scenario

7. AsifXml/study/scenario/case (Figure 54):

    - Error: "Invalid Case Start Time. A case cannot start before it's owner (scenario or parent case)."
      Resolution: Case start and end times must be within the assigned scenario time span. Locate the cases associated with the named scenario and adjust the start or end time.
      DateTimeFormat: YYYY-MM-DDThh:mm:ss,
      Example: <startTime>2004-01-01T00:00:00</startTime>

    - Error: "Invalid Case End Time. A case cannot end after its owner (scenario or parent case)."
      Resolution: Case start and end times must be within the assigned scenario time span. Locate the cases associated with the named scenario and adjust the start or end time.
      DateTimeFormat: YYYY-MM-DDThh:mm:ss,
      Example: <startTime>2004-01-01T00:00:00</startTime>

Figure 54. XML element case

8. AsifXml/study/scenario/case/reference (Figure 55):
   - Error: "Parent scenario does not exist."
     Resolution: Make sure the parent scenario is defined and valid in the XML scenario element under the reference element in the case.

- Error: "Referenced scenario does not exist."
  Resolution: Make sure the referenced scenario is defined and valid in the XML scenario element under the reference element in the case.
- Error: "Referenced case does not exist for reference scenario."
  Resolution: Make sure the referenced case exists (refCase) in the referenced scenario (refScenario) is defined and valid in the XML reference element.
- Error: "Referenced case name is a duplicate of an existing case name in parent scenario."
  Resolution: Make sure the referenced case exists (refCase) in the referenced scenario (refScenario) is defined and valid in the XML reference element.
- Error: "Parent scenario has missing airport layouts."
  Resolution: Verify that the parent scenario is linked to a valid airport layout (refScenario).
- Error: "Case name matches scenario name."
  Resolution: Enter unique names for the reference case and scenario.
- Error: "A duplicate case name was specified for given scenario."
  Resolution: Enter unique names for the reference cases within the referenced scenario.

Figure 55. reference -> case and scenario

9. AsifXml/trackOpSet/track (Figure 56):
   - Error: "Invalid backbone track, insufficient nodes."
   - Error: "Invalid backbone track. The dispersion weight must be between 0.0 and 1.0."
   - Error: "Invalid backbone track. The sum of the dispersion weight(s) must equal 1.0."
     Resolution: Dispersion weights represent the percentage of operations assigned to a backbone and subtrack. These must equal 1.0. Individual backbone and subtrack weights must be between 0 and 1 and contain at least two nodes. Confirm that your backbone and subtracks are defined correctly according to these parameters.
   - Error: "Track has subtracks with invalid track type"
   - Error: "Track has subtracks that does not match the track type"

Resolution: Each subtrack must be of the same type as the backbone track and the valid track types are A (approach), D (departure), V (overflight) and T (touch-and-go). Confirm all of the subtracks are defined correctly.

- Error: "No matching/ambiguous airport code was found for track."
- Error: "Invalid track runway."
- Error: "TrackOpSet has a sensor path with an operation that is missing an arrival or departure airport."
  Resolution: Confirm that any airport and runway references are linked to valid IATA airport codes and runway identifiers.

11. AsifXml/study/scenario/case/trackOpSet (or AsifXml/study/scenario/case/reference/refcase/trackOpSet)

- Error: "TrackOpSet has no track or sensor paths.”
- Error: "TrackOpSet has no air operation.”
  Resolution: Add a valid track, air operation or sensor path.

12. AsifXml/study/scenario/case/reference/refcase/trackOpSet/track

- Error: "Unknown track reference airport layout."
- Error: "Unknown track reference."
- Error: "Unrecognized aircraft."
- Error: "Unrecognized APU."
  Resolution: Define or correct unknown data in the *track* element.
- Error: "Referenced track does not contain matching track."
- Error: "Referenced track arrival airport does not match arrival operation airport."
- Error: "Referenced track arrival airport runway does not match arrival operation airport runway."
- Error: "Referenced track departure airport does not match departure operation airport."
- Error: "Referenced track departure airport runway does not match departure operation airport runway."
- Error: "Referenced track arrival airport does not match touch and go operation airport."
- Error: "Referenced track arrival airport runway does not match touch and go operation airport runway."
- Error: "Referenced track departure airport does not match circuit operation airport."
- Error: "Referenced track departure airport runway does not match circuit operation airport runway."
- Error: “MESSAGE in FAA.AEE.AEDT.ASIF.ASIFImporter.AsifStudyValidator.validateAsifTrkOpSetTrackRefAirport(). This can happen if <arrivalAirport> and <arrivalRunway> are specified for a departure operation; or if <departureAirport> and <departureRunway> are specified for an arrival operation."

Resolution: The *track airport*/*runways* in the *trackOpSet/track* must match the values referenced by the *case*/*operation*s. Correct the mismatched data.

Figure 56. XML element track

13. AsifXml/study/scenario/case /operation (Figure 57 and Figure 58):
   - Warning: "Operation id OPERATIONID has invalid value OPERATIONTIME for either operation onTime or operation offTime. Setting to NULL"
     Resolution: Make sure the onTime or offTime is valid in the case time period. Make sure the time is formatted correctly.
     DateTimeFormat: YYYY-MM-DDThh:mm:ss
     Example: <startTime>2004-01-01T00:00:00</startTime>
   - Error: "Invalid track op type. An arrival operation must be placed on an arrival track."
   - Error: "Invalid track op type. A departure operation must be placed on a departure track."
   - Error: "Invalid track op type. A TGO or circuit operation must be placed on a TGO track."
   - Error: "Invalid track op type. An overflight operation must be placed on an overflight track."
     Resolution: Confirm that the track type (A,D,T,V) matches the operation type (A,D,F,V) in the *operation* element.
   - Error: "Invalid Air Operation Time. An air operation cannot start before its case effective date."
   - Error: "Invalid Air Operation Time. An air operation cannot end after its case expiration date."

Resolution: Compare the air operation time in the element *operation* to the case start and end times in the element *case*.

Figure 57. element operation. 1 -> 2 -> 3
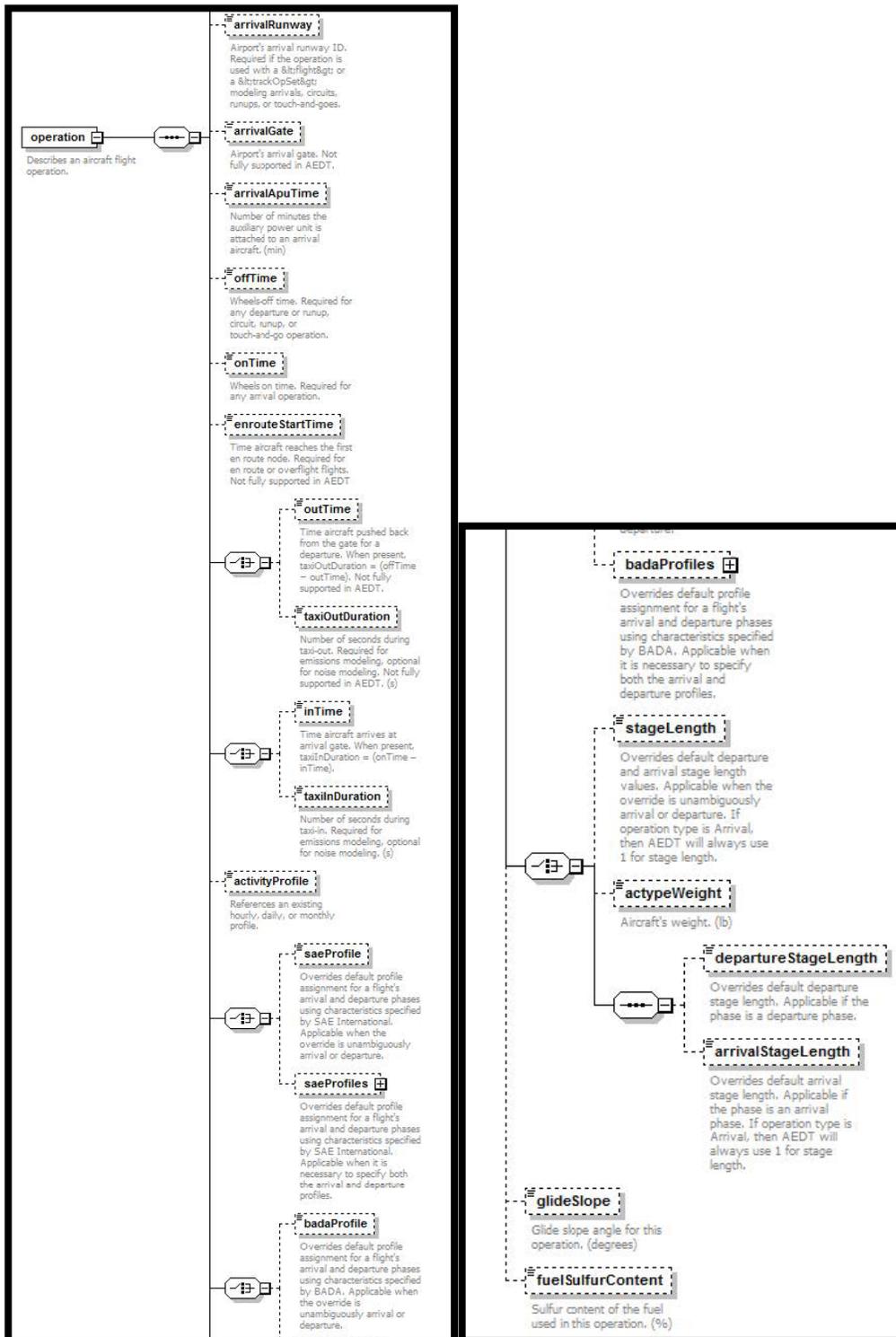
Figure 58. element operation. 4 -> 5

4.5   Importing an EDMS study using an external tool (EDMS2ASIF)

It is recommended to import your study using the instructions in Section 4.3. However, if you encounter errors during the EDMS file import, see the instructions below for creating an ASIF XML file (Appendix C.2 of the *AEDT User Manual* is reproduced below)

4.5.1   Creating an ASIF XML from an EDMS study

To convert an EDMS study to ASIF format:

1. Navigate to the AEDT application directory (for example, C:\Program Files\FAA\AEDT).

2. Double-click the EDMS2ASIFv2.exe to open the EDMS to ASIF Converter (Figure 59).

3. In the EDMS Export File Path, click Browse and navigate to the directory containing the EDMS export file.

4. In the ASIF File Path field, click Browse, and navigate to the directory to store the new ASIF file, and type a file name. The file name must end in ".xml".

5. [Optional] If the EDMS study is schedule-based, the operations schedule file is required. To include the operations schedule, check the Ops Schedule Folder checkbox. If the schedule file is in the same directory as the EDMS export file, the directory does not need to be specified. If the schedule file is in a different directory, click Browse, and navigate to the directory containing the aircraft schedule file.

6. [Optional] To include the alternate equipment map, check the Alt. Equipment Map checkbox and click Browse, and navigate to the directory containing the file.

7. Select the appropriate origin from the following options:

    a. Use EDMS Airport Lat/Lon Coordinates as the origin (0,0): When selected, the EDMS airport coordinates given in the EDMS export file will be used as the origin to project/transform all the EDMS x/y coordinates to coordinates in latitude/longitude.

    b. Automatically Deduce Lat/Lon Coordinates for EDMS (0,0) Point: When selected, the converter will automatically deduce the latitude/longitude coordinates that were used as the basis for the origin (0,0) of the EDMS coordinate system. The converter uses the known latitude/longitude coordinates of runway ends that can be matched to existing AEDT runway ends to determine the EDMS origin.

      c.   User-Specified Coordinates for (0,0): When selected, AEDT will use the entered latitude/longitude coordinates of the point that represents the origin (0,0) of the EDMS coordinate system for this study.

8.   Click Generate ASIF file to convert the EDMS study to an ASIF.

9.   The conversion is complete when the following message is displayed: Your study was successfully converted.
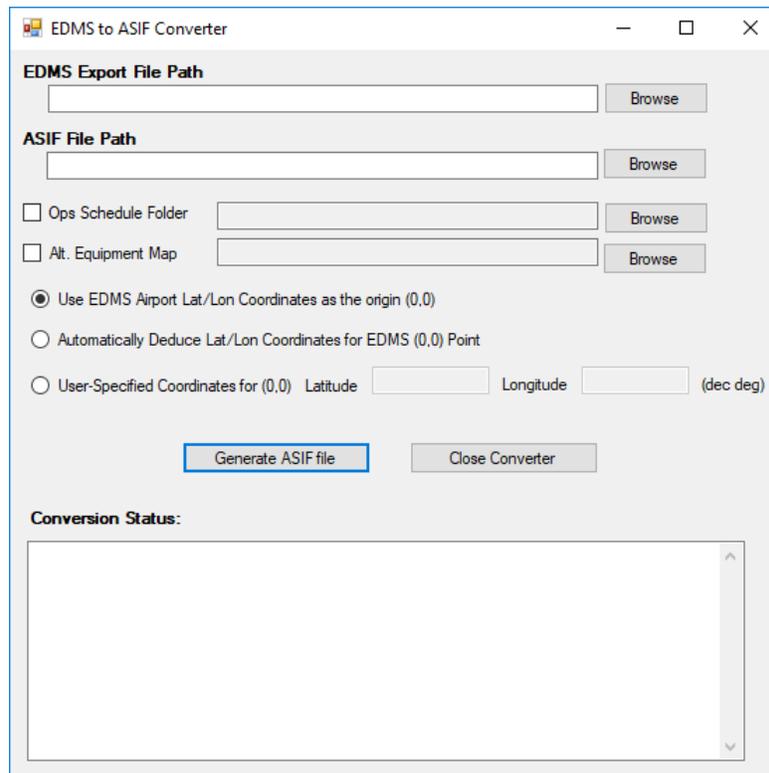
Figure 59. EDMS to ASIF Converter

The log file for the EDMS to ASIF Converter is located in the AEDT logs folder (e.g., *C:\AEDT\Logs\EDMS2ASIFConverterLog.txt*).

4.5.2   Re-importing the ASIF file

Once you have corrected the errors in your XML file, you will need to import the file using the ASIF import functionality. You may need to repeat the process outlined below until your XML still contains errors.

Follow the instructions below to import your corrected ASIF XML file:

1.   Click the Study tab and click Import to display the Import Study dialog.

2. Select ASIF from the drop-down menu.
3. Click the Browse button, navigate to the ASIF file and select Open. Click Next.
4. The Review study content step displays validation errors if any. Click Next.
5. The Review data conflicts step displays any conflicts between study airport data and AEDT airport data. Click Next.
6. In the Complete study import step, enter a unique study name or accept the default name.
7. Enter the name of the desired SQL Server instance in the Select database server field.
8. Click Create to import the study.

4.6   Comparing EDMS Results in AEDT

After importing your study into AEDT and generating results, you may notice differences in the computed emissions values. This is expected due to the updated algorithms and data in AEDT. However, if you wish to approximate EDMS results in AEDT, the information below will help explain expected differences or offer suggestions on minimizing differences between the two models.

AEDT computes emissions for the full trajectory of each operation, unlike EDMS which computes emissions up to the mixing height. In order to view analogous emissions in AEDT, follow the instructions in Section 5.9.2 of the *AEDT User Manual* for selecting emissions by mode.

4.6.1   Emissions Methodology Differences

4.6.1.1   *FOA Methodology for Particulate Matter*

The Committee on Aviation Environmental Protection (CAEP) developed the first-order approximation (FOA) methodology to compute aircraft engine particulate matter (PM) emissions below the mixing height.

AEDT 3c uses the FOA 4.0 methodology to calculate volatile PM (below the mixing height) and non-volatile PM (regardless of altitude). EDMS uses FOA 3.0A for U.S airports and FOA 3.0 for airports outside of the U.S.; the FOA 3.0A methodology is a modification of FOA 3.0 developed by the Federal Aviation Administration (FAA) and the Environmental Protection Agency (EPA):

- FOA 3.0: Applies to all airports. Sulfur-to-Sulfate Conversion Rate: 2.4 %. Fuel Sulfur Content: 600 ppm.
- FOA 3.0A: Applies to U.S. airports. Sulfur-to-Sulfate Conversion Rate: 5 %. Fuel Sulfur Content: 680 ppm.

Due to the different FOA methodologies, differences in reported PM emissions between EDMS and AEDT 3c are expected.

4.6.1.2   Particulate Matter Categorization

The aircraft emissions module used by EDMS calculates four types of emissions:

- Non-Volatile PM (nvPM): Synonymous with black carbon. AEDT has many more options available for nvPM calculation than does EDMS.
- Volatile Sulfate PM (PMSO): Computed from fuel sulfur content and sulfur-sulfate conversion rate. Differs slightly between FOA 3.0 (now 4.0) and FOA 3.0A.
- Volatile Fuel Organics (PMFO)
- Volatile Lubrication Oil PM (PMLO): Computed only for climb-out and takeoff flight modes and only for FOA 3.0A.

EDMS includes PMLO emissions in the reported PMFO emissions totals, if any PMLO is computed. EDMS sums nvPM, PMSO, and PMFO (including any PMLO) and reports these as both PM_{10} and $PM_{2.5}$ (PM <10 micrometers and PM <2.5 micrometers in aerodynamic diameter, respectively) for aircraft emissions.

AEDT 3c also sums nvPM, PMSO, PMFO, and PMLO and reports this sum as PM_{10} and $PM_{2.5}$, but AEDT 3c does not include PMLO in the separately reported PMFO totals or reports PMLO separately from PM_{10} and $PM_{2.5}$. AEDT 3c does report the other three PM components (i.e., nvPM, PMFO, and PMSO).

4.6.1.3   Airport Weather

Airport weather is used to compute both aircraft performance and aircraft emissions results in EDMS and AEDT. Different weather parameters between the EDMS and AEDT databases will lead to performance and emissions differences.

4.6.2   Aircraft Performance Input Differences

4.6.2.1   Airport Definition

EDMS flight operations can be defined within a study that does not contain any runways. In such a case, EDMS constructs a default runway with one runway end located at the airport's location (latitude, longitude, elevation) and with the other runway end at the identical latitude and elevation but with a longitude with an added 0.01°.

Given the many distinct data sources from which analysts can derive airport data, a real-world airport's location can be slightly different between AEDT and EDMS. When converting an EDMS study into AEDT, you have the option to use the AEDT database airport data or the EDMS database airport. By selecting *Import file as-is*, the EDMS airport definition will be retained.

4.6.2.2   Single-Airport Weather

When annual average weather is used in EDMS, a flight operation's performance calculations are performed using the annual average weather parameters of the airport to which the flight operation is tied.

When annual average weather is used in AEDT, the default setting is to use the annual averages of the *nearest study airport* to the flight operation being calculated. In AEDT, set the weather fidelity to use single airport (Section 5.2.4.3 of the *AEDT User Manual*).

The use of multi-airport weather in AEDT will result in differences due to the averaging of yearly weather data in AEDT.

4.6.2.3   Bank Angle

The EDMS call to the aircraft performance module specifies that bank angle performance corrections not be applied when computing flight performance results for an airplane operation.

AEDT applies bank angle corrections to performance computations by default, but allows you to specify whether or not to use bank angle. Since EDMS uses straight ground tracks when computing aircraft performance, bank angle corrections have little effect on performance results.

To eliminate the effect of bank angle, uncheck *Use Bank Angle* in the *Study* tab, *Preferences*, *Study* screen (Section 4.11.2 of the *AEDT User Manual*).

4.6.2.4   Taxi Time-in-Mode Fuel Flow

When the time-in-mode option is selected for determination of taxi times (i.e., when not using delay and sequence computation of taxi times), EDMS (Equation 1) and AEDT (Equation 2) differ slightly as to the fuel flow rate of aircraft engines during taxiing.

$$f = \frac{UA\_RWf\_ID \; * \; 1.1 \; * \; \delta}{\theta^{3.8}}$$ **Eq. 1**

$$f = UA\_RWf\_ID$$ **Eq. 2**

where

UA_RWf_ID Unadjusted idle fuel flow rate (kg/s)

$\delta = \frac{p}{p_{ISA,MSL}}$ Pressure ratio (ratio of local pressure and ISA MSL pressure)

$$\theta = \frac{T}{T_{ISA,MSL}}$$ Temperature ratio (ratio of local temperature and ISA MSL temperature)

4.6.3 Aircraft Performance Computation Differences

4.6.3.1 Truncation at Mixing Height

EDMS truncates computed flight profile performance results at the mixing height of the scenario-airport pair, AEDT does not and will produce and report emissions for an entire flight. In order to compare results for only the portion of the flight below the mixing height in AEDT, follow the instructions for viewing the AEDT Emissions Report, by mode, in Section 5.9.2 of the *AEDT User Manual*.

4.6.3.2 Fuel Flow Rate Computation Methodology

For terminal-area operations of the types available in EDMS (i.e., arrival, departure, touch-and-go), AEDT has three different fuel flow rate methodologies available for fuel flow rate and fuel burn computations:

- ANP: Based on ANP thrust-specific fuel consumption (TSFC) coefficients. For terminal-area operations, this methodology is generally used when ANP TSFC coefficients are available for an operation's ANP aircraft.
- BADA: Based on BADA fuel coefficients. For terminal area operations, this methodology is used when the ANP methodology could not be used (e.g., due to the unavailability ANP TSFC coefficients).
- BFFM2: Based on ICAO engine unadjusted fuel flow rate coefficients. This methodology is used when neither the ANP nor the BADA methodology could be used to determine fuel flow rates and fuel burn.

EDMS uses the BADA methodology for fuel flow rate and fuel burn computations, except in certain instances where BFFM2 is used (when ANP and BADA cannot be used to determine fuel flow). Since AEDT's preferred methodology for terminal-area fuel flow (ANP) is not the single fuel flow rate methodology available to EDMS (BADA), it is possible for analogous EDMS and AEDT aircraft operations to use different methodologies for fuel flow rate computations.

4.6.4 EDMS vs AEDT Database Differences

The AEDT database contains several parameters that have been updated according to more recent ICAO standards. Where possible, you may create user defined versions of aircraft using the partial import functionality to allow you to match the relevant data in AEDT to your EDMS study. Differences between the two databases have been noted for certain aircraft parameters including:

1. Unadjusted Fuel Flow Rate
2. Total Hydrocarbon Raw Indices
3. Smoke Number
4. Mixed Turbo-Fan & Bypass Ratio

5. BADA Fuel Coefficients

5   Importing an INM study

AEDT has the ability to import studies directly through the AEDT application or through an external tool. The following sections describe the process for importing INM studies in AEDT.

5.1   AEDT Standard Input File

The AEDT Standard Input File (ASIF) provides a standard file format to allow for the import of data into AEDT. *Study data is converted to the AEDT Standard Input File (ASIF) as part of the study import process.* The ASIF format is based on the XML file format, which is a text-based file format that is readable by both humans and computers.

5.2   Before You Import

AEDT can generally import INM studies if the study is valid in the INM 7.0d software program. However, there are several things to verify or correct before you attempt to import your study:

1. AEDT does not process noise grids using the recursive grid functionality as in INM. AEDT will automatically define all INM contour grids as fixed grids. Please see Section 9.4.1 in the *AEDT User Manual* for information on the dynamic grid functionality that has replaced INM recursive grids.
2. You must run each scenario in your INM study to generate contours. The importer reads data from the operations data (ops_calc.dbf) which is generated when processing data for a scenario run.
3. The conversion of user-defined aircraft and profiles in INM studies are not supported and may require extra user actions. The INM to ASIF Converter will populate the <aircraft> element with stub data that will cause ASIF import to fail. It will also populate the <anpAirplane> element data to include flaps, thrust, and profiles. Once an INM study has been converted to ASIF, you must edit the converted study to either replace the INM user-defined aircraft with a system AEDT aircraft, or create new user defined AEDT aircraft.
4. Airport codes in the converted ASIF file may need to be manually updated to the standard AEDT airport codes in order to be successfully imported into AEDT.
5. Annualizations are not imported into AEDT but can be partially imported at a later time.
6. INM studies can contain incomplete study data. The following INM elements will be skipped if they are missing data:
    a. Tracks without track segments
    b. Noise identifiers without NPD curves
    c. Aircraft profiles without steps or procedures

5.3   Importing an INM Study in the AEDT Application

Follow the instructions below to import your INM study:

1. Open the AEDT Application.
2. Click the *Study* tab and click *Import* to display the *Import Study* dialog (Figure 60).
3. Select *INM* from the drop-down menu.
   - Click the *Browse* button, navigate to the INM study file and select *Open*.
   - Click *Next.*
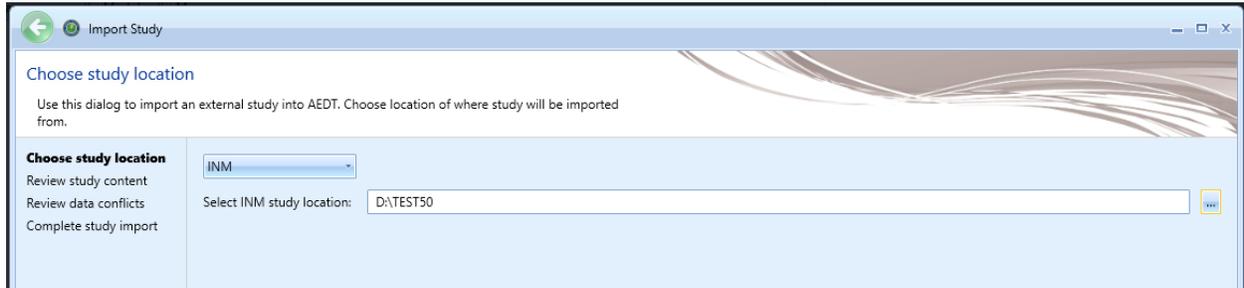
Figure 60. Choose study location

If you receive the following message, select *Close* and then *Cancel* the import. This message indicates errors in the INM to ASIF conversion process (Figure 61). ***Please refer to Section 5.4 for suggestions on resolving the errors associated with this message.***
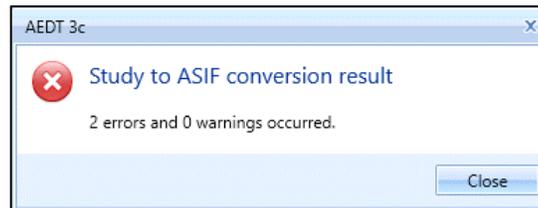
Figure 61. INM to ASIF Error & Warning

4. The *Review study content* step displays validation errors if any (Figure 62).
   - If the "Bad Data Integrity" message appears, click *Cancel*. This message indicates errors in validating the XML file based on the INM study data. ***Please refer to Section 5.4 for suggestions on how to resolve these data errors.***
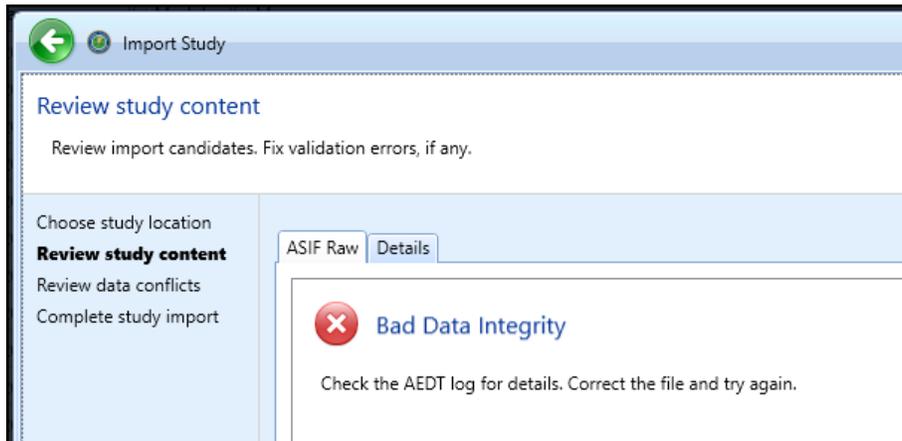
Figure 62. Review study content – Bad data integrity

- If the message does not appear, the *ASIF Raw* tab will display a summary view of the study (Figure 63).
- The *Details* tab displays a detailed view of the study content, organized by categories (Figure 64).
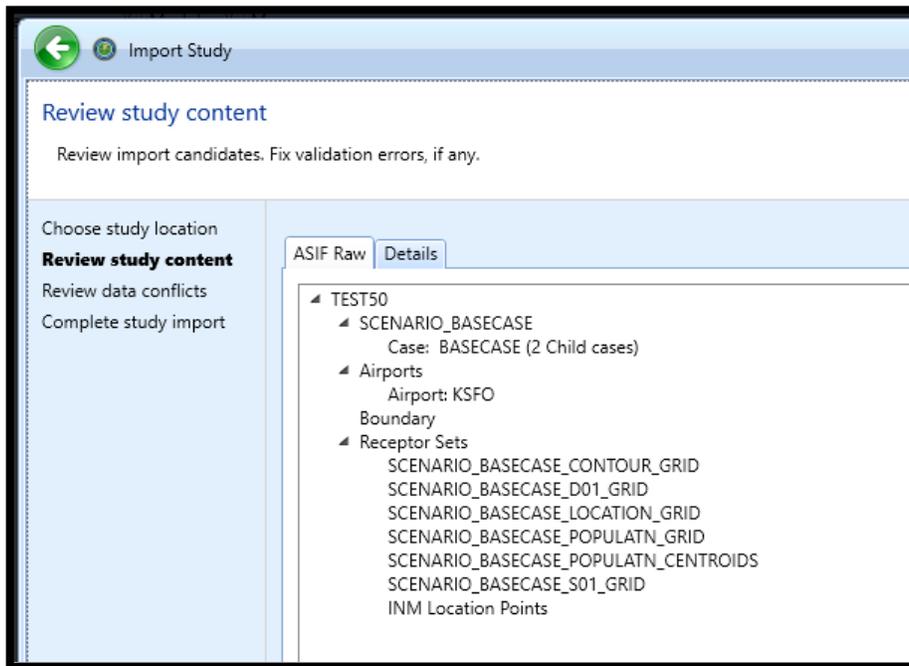
Figure 63. Review study content – ASIF Raw tab
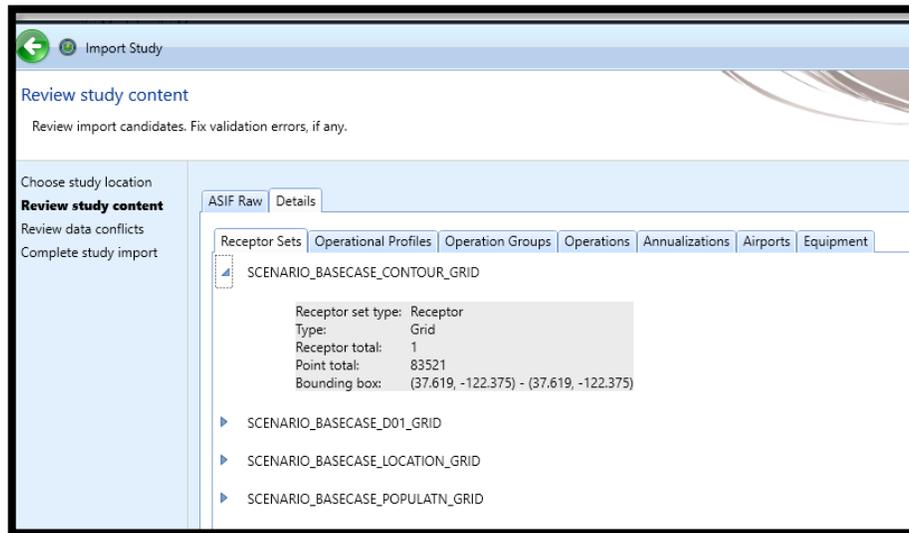
Figure 64. Review study content – Details tab

5. The *Review data conflicts* step displays any conflicts between study airport data and AEDT airport data (Figure 65).

    *   If no data conflicts are present, AEDT displays *"No data conflicts eligible for revision were found"*.
    *   If data conflicts are present, review the conflicts reported under *Airport Data Conflicts*. AEDT lists each element in conflict along with the study value and the system value. Select the appropriate option under *Airport Import Resolution* to proceed:
        *   *Import file as is*: When selected, the airport data will be imported as defined.
        *   *Override mismatched airport data in file with AEDT system data*: When selected, the AEDT system airport data will be used in place of the defined airport data.
    *   Click *Next*.
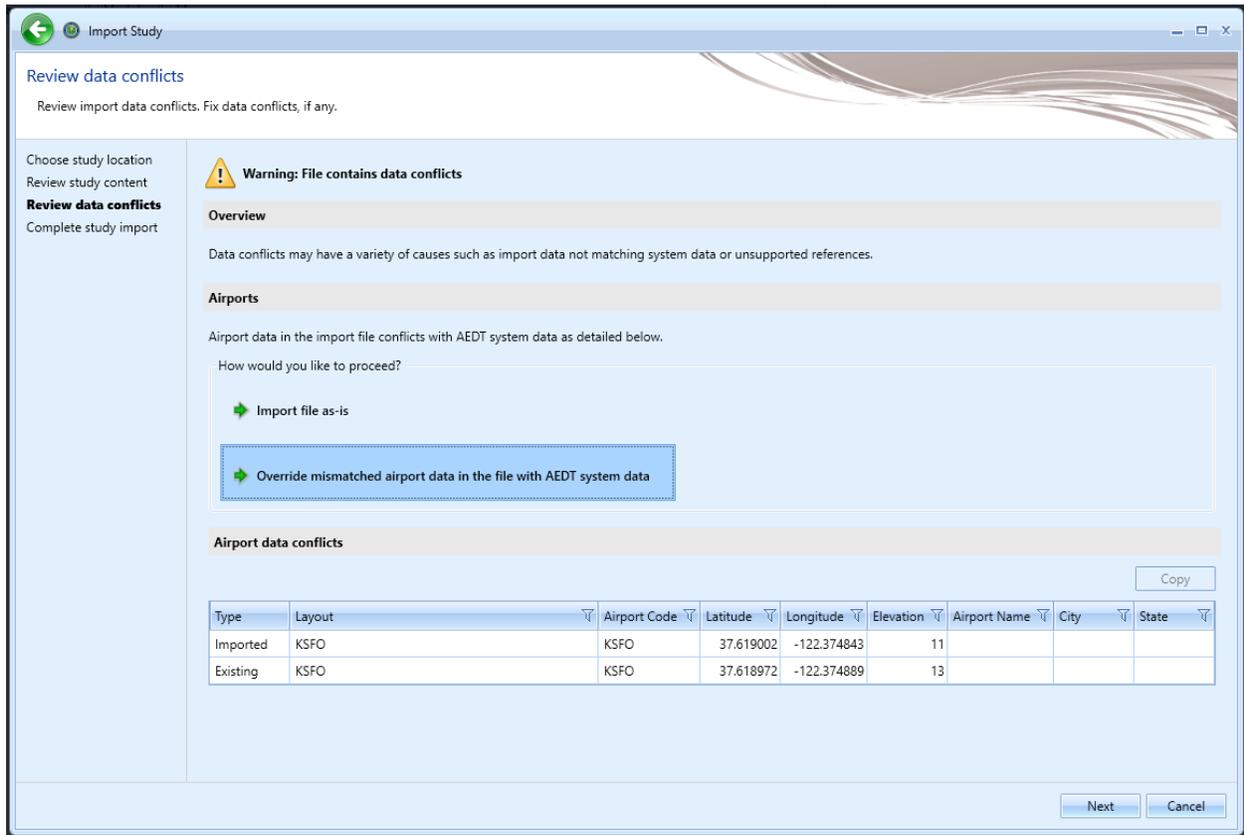
Figure 65. Review data conflicts

6. In the *Complete study import* step, enter a unique *study name* (Figure 66)*.*
   - Enter a description in the *Study description* if desired.

7. Enter the name of the desired SQL Server instance in the *Select database server* field.
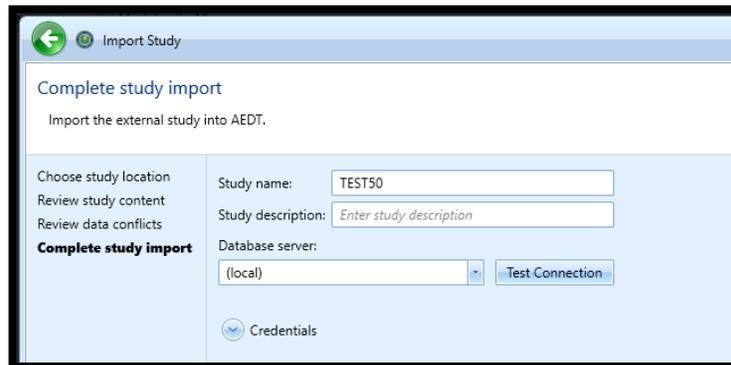
Figure 66. Complete study import

8. Click *Create* to import the study.

9. When the import is complete, the imported study is opened and the *Metric Results* tab is displayed.

> Once imported, update the grid receptor origin according to Section 9.3 in the *AEDT User Manual* to match the grid definition in the legacy tool.

5.4   Resolving Import Errors

During the INM import process, AEDT converts INM study data to the ASIF XML format and then validates the XML file before creating the AEDT study in SQL.

If your study failed to import, you can refer to the AEDT log file for more information (covered in Section 4.10 of the *AEDT User Manual*). To view system status and logged information, click on the *Study* tab and click *Log*. The information shown in the message pane is also written to the *aedt.log* file in the *C:\AEDT\Logs* folder.

There are two categories of errors: those that occur during the INM to ASIF XML conversion and those that occur when validating the XML file created during conversion.

INM to ASIF conversion error resolutions are described in Section 5.4.1. If you receive INM to ASIF related errors and warnings, you will need to fix the errors in the INM study related files and try to import again using the instructions in Section 5.5.2.

ASIF XML validation error resolutions are described in Section 5.4.2. If you receive ASIF XML validation errors, you will need to run the INM2ASIF program to create an XML file to make your corrections (See Appendix C.1 of the *AEDT User Manual* for instructions on how to run the tool). You will then need to re-import the XML file using the ASIF import instructions in Section 5.5.2.

Text in **CAPS** indicates the study specific data that will be displayed as part of the error message.

5.4.1   INM to ASIF XML Conversion Errors

If you encounter errors or warnings during the INM to ASIF conversion, you will see a message (Figure 61. INM to ASIF Error & Warning), which displays the number of errors or warnings encountered.

5.4.1.1   Resolving File Import Errors

Import file errors or warnings occur when directories cannot be accessed, files cannot be created, parsed or written. See errors and resolutions below:

Invalid directory or missing files:

1. "Conversion halted. Invalid directory for INM study ' DIRECTORYPATH '."

2. "Conversion halted. Directory DIRECTORYPATH does not contain an INM study (missing study.inm)."
3. "Invalid INM study folder specified. Unable to open study file 'STUDYINMFILEPATH'."
4. "Invalid INM study folder specified. Unable to open study file 'STUDYCSVFILEPATH'."

Resolution: Confirm that the directory input exists on disk and that the study.inm and study.csv files exist in the directory. Make sure the files are not opened in another application.

Unable to open files:

1. "Unable to open aircraft file 'aircraft.dbf'."
2. "Unable to open aircraft substitution file 'acft_sub.dbf'."
3. "Unable to open nois grp file 'nois_grp.dbf'."
4. "Unable to open NPD curve file 'npd_curv.dbf'."
5. "Unable to open profile file 'profile.dbf '."
6. "Unable to open procedure file 'procedur.dbf'."
7. "Unable to open profile file 'profile.dbf'."
8. "Unable to open profile points file 'prof_pts.dbf'."
9. "Unable to open flaps file 'flaps.dbf'."
10. "Unable to open thr_jet file 'thr_jet.dbf'."
11. "Unable to open thr_prop file 'thr_prop.dbf'."
12. "Unable to open thr_gnrl file 'thr_gnrl.dbf'."
13. "Unable to open runway file 'runway.dbf'."
14. "Unable to open runway end file 'rwy_end.dbf'."
15. "Unable to open grid file 'grid.dbf'."
16. "Unable to open population points file 'pop_pts.dbf'."
17. "Unable to open location points file 'loc_pts.dbf'."
18. "Unable to open scenario file 'scenario.dbf'."
19. "Unable to open scenario cases file 'scen_par.dbf'."
20. "Unable to open ops calc file 'ops_calc.dbf'."
21. "Unable to open rnup calc file 'ops_rnup.dbf'."
22. "Unable to open track file 'track.dbf'."
23. "Unable to open track segments file 'trk_segs.dbf'."
24. "Unable to open ops calc file 'ops_calc.dbf'."
25. "Unable to open ops rnup file 'ops_rnup.dbf'."
26. "Unable to open track file track.dbf."
27. "Unable to open track segments file trk_segs.dbf."

Resolution: Critical INM study files cannot be accessed. Confirm that the files exist in the directory specified in the import and that you can open them (using Excel). Confirm that the files are not opened by another process.

5.4.1.2   Resolving INM Input Data File Errors (INM to ASIF XML)

The following errors are due to incorrectly formatted or populated INM study files. Instructions for resolving these errors is based on the *INM 7.0d User Manual, Appendix E*.

Errors reading aircraft data:

1. "Unable to query acft_sub data."
   Resolution: Confirm that the acft_sub.dbf data exists if the aircraft is defined in the ops_calc.dbf file.

2. "Error occurred while aircraft data. + MESSAGE"
   Resolution: This error occurs due to unanticipated problems parsing the aircraft.dbf file. The MESSAGE should provide additional data on how to resolve.

3. "Unable to query aircraft."
   Resolution: Confirm that the aircraft.dbf data exists if the aircraft is defined in the ops_calc.dbf file.

4. "Unable to add ANP airplane 'AIRPLANENAME' because it references a bad noise id 'NOISEIDENTIFIER'."
   Resolution: The noise identifier linked to the airplane is invalid. This can occur when a user has edited the INM study aircraft.dbf file. Locate the invalid record in the INM aircraft.dbf file and modify the noise identifier to a valid one.

Errors reading profile data:

5. "Error occurred while reading profile data. + MESSAGE"
   Resolution: This error occurs due to unanticipated problems parsing the profile.dbf file. The MESSAGE should provide additional data on how to resolve.

6. "Unable to query profile data."
   Resolution: Confirm that the profile.dbf data exists for the aircraft/profile combination as defined in the ops_calc.dbf file.

7. "Error occurred while reading procedure step data. + MESSAGE"
   Resolution: This error occurs due to unanticipated problems parsing the profile.dbf file. The MESSAGE should provide additional data on how to resolve.

8. "Unable to query procedure step data."

Resolution: Confirm that the procedur.dbf data exists if profile data is defined in the profile.dbf file.

Errors reading noise data:

9. "Error occurred while reading noise group data: MESSAGE"
    Resolution: This error occurs due to unanticipated problems parsing the nois_grp.dbf file. The MESSAGE should provide additional data on how to resolve.

10. "Unable to query noise group data."
    Resolution: Confirm that the nois_grp.dbf data exists if the noise identifier is used by aircraft in the aircraft.dbf file.

11. "Error occurred while reading noise curve data for noise id 'NOISEID': MESSAGE"
    Resolution: This error occurs due to unanticipated problems parsing the npd_curv.dbf file. The MESSAGE should provide additional data on how to resolve.

12. "Unable to query noise curve data for noise id 'NOISEID'."
    Resolution: Confirm that the npd_curv.dbf data exists if the noise data is defined in the nois_grp.dbf file.

Errors reading case data:

13. "Error occurred while reading case data. + MESSAGE"
    Resolution: This error occurs due to unanticipated problems parsing the case.dbf file. The MESSAGE should provide additional data on how to resolve.

14. "Unable to query case data."
    Resolution: Confirm that the case.dbf file in the INM study is populated.

Errors reading track data:

15. "Unsupported track segment type SEGMENTTYPE in track TRACKNAME subtrack SUBTRACKID."
    Resolution: The track segment types are either 'P' for Point or 'V' for vector. If the track segment is Vector, the types can be either 'L' for left or 'R' for right turns. Confirm that the trk_segs.dbf file has valid segment types.

5.4.2   Resolving Data Integrity Errors (ASIF XML Validation)

The following errors are due to incorrectly populated XML data based on the INM study DBF files. They are grouped by the XML section that is being validated. The red text next to the error group refers to the element hierarchy that must be updated.

Details on the structure of the elements are found in the *AEDT Standard Input File (ASIF) Reference Manual Section 6,* however, the high-level element diagrams have been recreated here (where practical).

Note that additional error information is included in the messages, such as the scenario and case name, which identifies the specific element of the XML that triggered the error or warning. For certain elements, such as scenarios, the references are also validated (e.g., the element case has an element reference that contains a reference scenario).

Some errors have been grouped if the resolution is the same for each error in the set (e.g., "Duplicate name" is resolved by editing with a unique name).
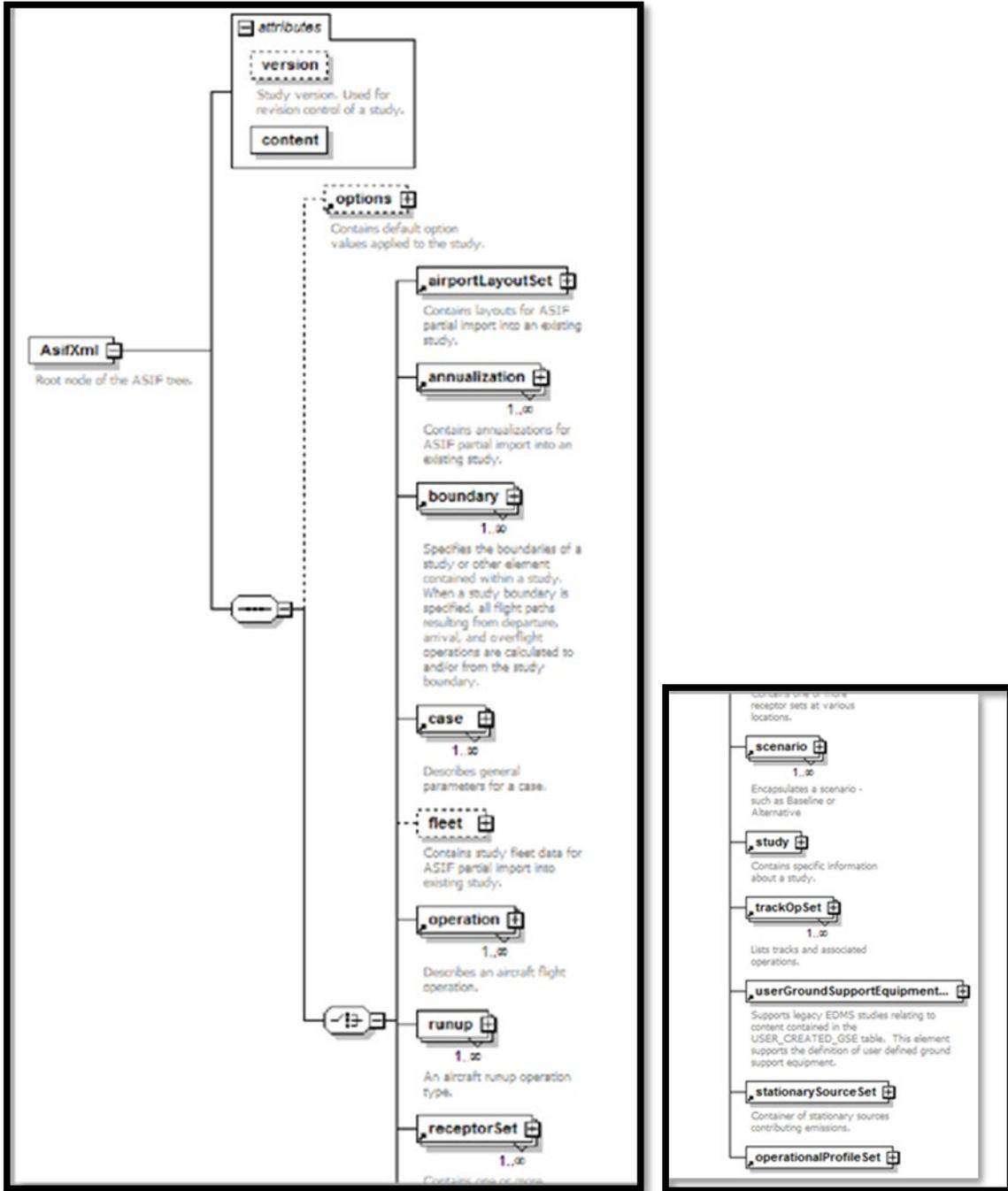
Figure 67. ASIF element – AsifXml
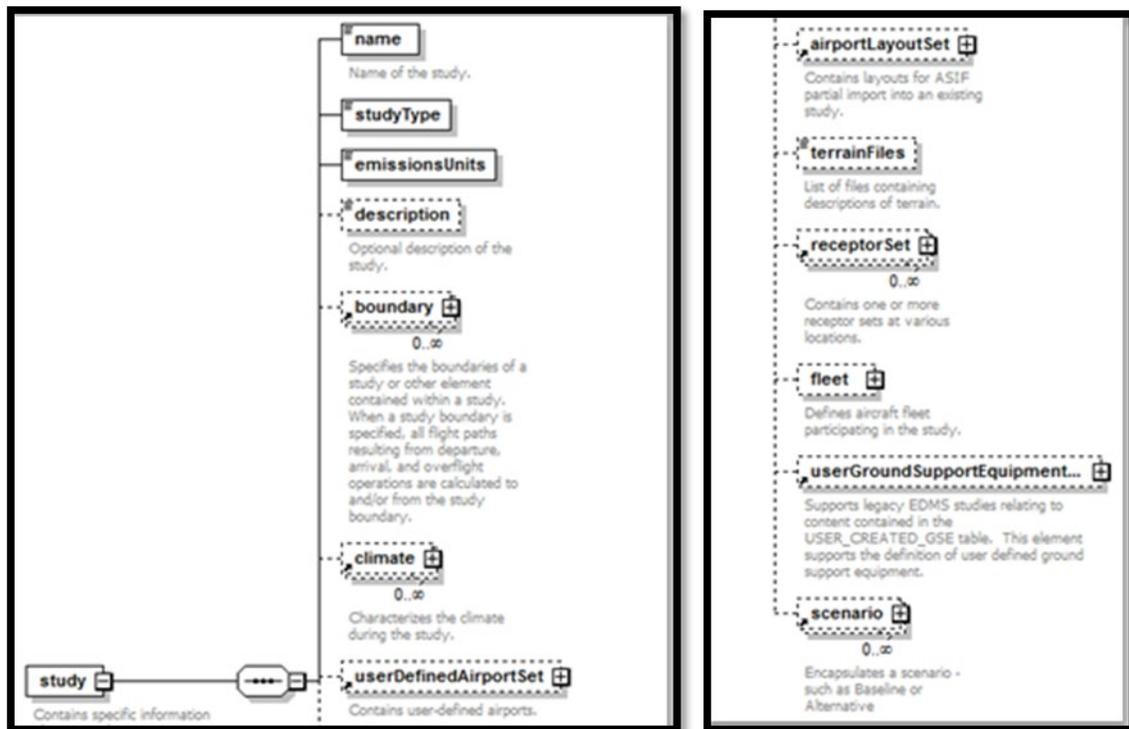
Figure 68. ASIF element – study

10. AsifXml/study/userDefinedAirportSet/userDefinedAirport (Figure 69):
- Error: "User-defined airport must specify country code."
  Resolution: Specify a valid country code.
- Error: "User-defined airport country code is invalid."
- Error: "User-defined airport zone is invalid."
- Error: "User-defined airport system wind rose station ID is invalid."
- Error: "User-defined airport system weather station ID is invalid."
  Resolution: Confirm that the ID's exist in the AIRPORTS database and are formatted correctly.
- Error: "User-defined airport code is a duplicate of an existing airport code."
- Error: "User-defined wind rose station ID must not be a duplicate."
- Error: "User-defined airport weather station ID must not be a duplicate."
  Resolution: Create a unique id or delete the duplicate record.

Figure 69. ASIF element – userDefinedAirportSet

11. AsifXml/study/receptorSet:
    - Error: "A duplicate receptor set name was specified."
      Resolution: Specify a unique receptor set name.

12. AsifXml/study/scenario (Figure 70):
    - Error: "A duplicate scenario name was specified."
      Resolution: Review and correct the scenario names assigned to the scenario elements.
    - Error: "Unknown Scenario Airport Layout. The specified airport layout defined for the scenario has not be defined for the study."
      Resolution: Define and populate the airport layout in the specified scenario airport layout record.
    - Error: "Duplicate Scenario Airport Reference. Multiple layouts which reference the same airport are defined within a scenario."
      Resolution: Delete the duplicate airport layout or rename as appropriate.
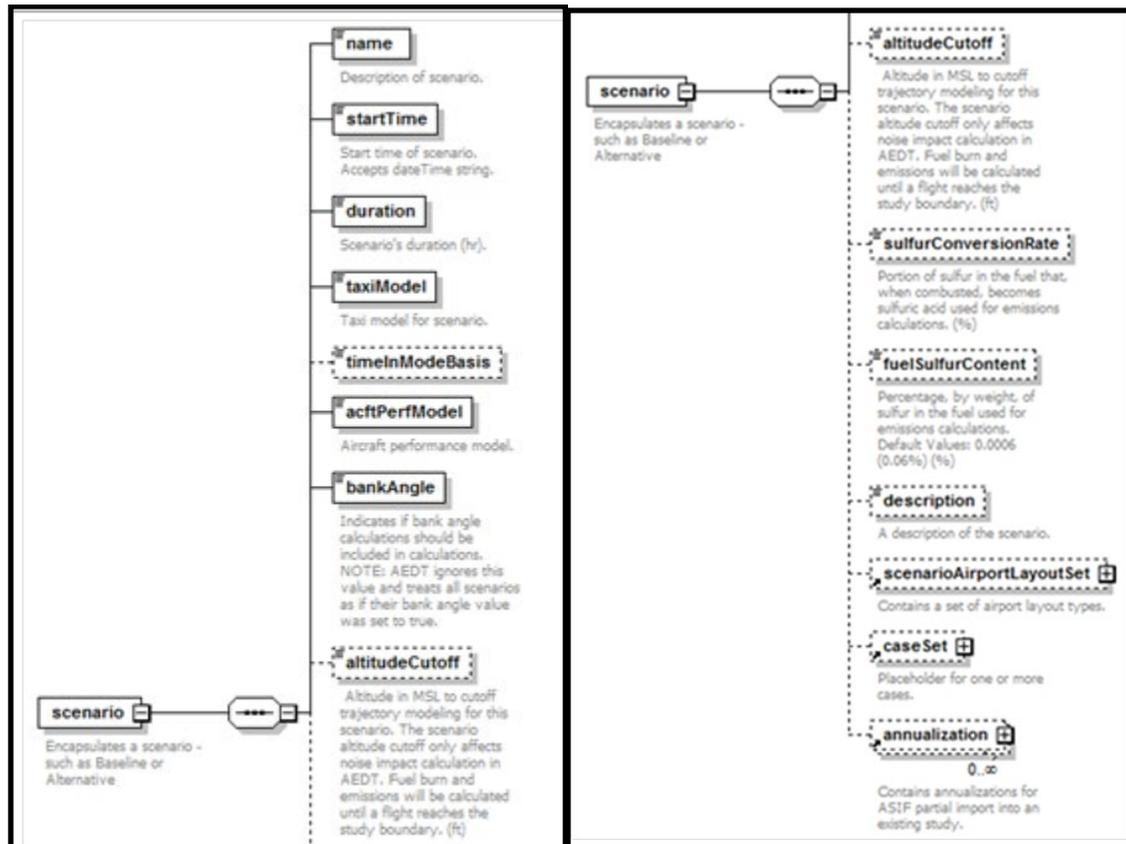
Figure 70. ASIF element – scenario

13. AsifXml/study/scenario/case (Figure 71):
    - Error: "Invalid Case Start Time. A case cannot start before it's owner (scenario or parent case)."
      Resolution: Case start and end times must be within the assigned scenario time span. Locate the cases associated with the named scenario and adjust the start or end time.
      DateTimeFormat: YYYY-MM-DDThh:mm:ss, **Example**: <startTime>2004-01-01T00:00:00</startTime>
    - Error: "Invalid Case End Time. A case cannot end after its owner (scenario or parent case)."
      Resolution: Case start and end times must be within the assigned scenario time span. Locate the cases associated with the named scenario and adjust the start or end time.
      DateTimeFormat: YYYY-MM-DDThh:mm:ss, **Example**: <startTime>2004-01-01T00:00:00</startTime>

Figure 71. ASIF element – case

14. AsifXml/study/scenario/case/reference (Figure 72):
    - Error: "Parent scenario does not exist."
      Resolution: Make sure the parent scenario is defined and valid in the XML scenario element under the reference element in the case.

- Error: "Referenced scenario does not exist."
  Resolution: Make sure the referenced scenario is defined and valid in the XML scenario element under the reference element in the case.
- Error: "Referenced case does not exist for reference scenario."
  Resolution: Make sure the referenced case exists (refCase) in the referenced scenario (refScenario) is defined and valid in the XML reference element.
- Error: "Referenced case name is a duplicate of an existing case name in parent scenario."
  Resolution: Make sure the referenced case exists (refCase) in the referenced scenario (refScenario) is defined and valid in the XML reference element.
- Error: "Parent scenario has missing airport layouts."
  Resolution: Verify that the parent scenario is linked to a valid airport layout (refScenario).
- Error: "Case name matches scenario name."
  Resolution: Enter unique names for the reference case and scenario.
- Error: "A duplicate case name was specified for given scenario."
  Resolution: Enter unique names for the reference cases within the referenced scenario.

Figure 72. reference -> case and scenario

15. AsifXml/trackOpSet/track (Figure 73):
    - Error: "Invalid backbone track, insufficient nodes."
    - Error: "Invalid backbone track. The dispersion weight must be between 0.0 and 1.0."
    - Error: "Invalid backbone track. The sum of the dispersion weight(s) must equal 1.0."
      Resolution: Dispersion weights represent the percentage of operations assigned to a backbone and subtrack. These must equal 1.0. Individual backbone and subtrack weights must be between 0 and 1 and contain at least two nodes. Confirm that your backbone and subtacks are defined correctly according to these parameters.
    - Error: "Track has subtracks with invalid track type"
    - Error: "Track has subtracks that does not match the track type"
      Resolution: Each subtrack must be of the same type as the backbone track and the valid track types are A (approach), D (departure), V (overflight) and T (touch-and-go). Confirm all of the subtracks are defined correctly.

- Error: "No matching/ambiguous airport code was found for track."
- Error: "Invalid track runway."
- Error: "TrackOpSet has a sensor path with an operation that is missing an arrival or departure airport."
  Resolution: Confirm that any airport and runway references are linked to valid IATA airport codes and runway identifiers.

14. AsifXml/study/scenario/case/trackOpSet (or AsifXml/study/scenario/case/reference/refcase/trackOpSet)
    - Error: "TrackOpSet has no track or sensor paths."
    - Error: "TrackOpSet has no air operation."
      Resolution: Add a valid track, air operation or sensor path.

15. AsifXml/study/scenario/case/reference/refcase/trackOpSet/track
    - Error: "Unknown track reference airport layout."
    - Error: "Unknown track reference."
    - Error: "Unrecognized aircraft."
      Resolution: Define or correct unknown data in the *track* element.
    - Error: "Referenced track does not contain matching track."
    - Error: "Referenced track arrival airport does not match arrival operation airport."
    - Error: "Referenced track arrival airport runway does not match arrival operation airport runway."
    - Error: "Referenced track departure airport does not match departure operation airport."
    - Error: "Referenced track departure airport runway does not match departure operation airport runway."
    - Error: "Referenced track arrival airport does not match touch and go operation airport."
    - Error: "Referenced track arrival airport runway does not match touch and go operation airport runway."
    - Error: "Referenced track departure airport does not match circuit operation airport."
    - Error: "Referenced track departure airport runway does not match circuit operation airport runway."
    - Error: "MESSAGE in FAA.AEE.AEDT.ASIF.ASIFImporter.AsifStudyValidator.validateAsifTrkOpSetTrackRefAirport(). This can happen if <arrivalAirport> and <arrivalRunway> are specified for a departure operation; or if <departureAirport> and <departureRunway> are specified for an arrival operation."
      Resolution: The *track airport/runways* in the *trackOpSet/track* must match the values referenced by the *case/operation*s. Correct the mismatched data.

Figure 73. ASIF element – track

16. AsifXml/study/scenario/case /operation (Figure 74 and Figure 75):
    - Warning: "Operation id OPERATIONID has invalid value OPERATIONTIME for either operation
      onTime or operation offTime. Setting to NULL"
      Resolution: Make sure the onTime or offTime is valid in the case time period. Make sure the time
      is formatted correctly.
      DateTimeFormat: YYYY-MM-DDThh:mm:ss
      Example: <startTime>2004-01-01T00:00:00</startTime>
    - Error: "Invalid track op type. An arrival operation must be placed on an arrival track."
    - Error: "Invalid track op type. A departure operation must be placed on a departure track."
    - Error: "Invalid track op type. A TGO or circuit operation must be placed on a TGO track."
    - Error: "Invalid track op type. An overflight operation must be placed on an overflight track."
      Resolution: Confirm that the track type (A,D,T,V) matches the operation type (A,D,F,V) in the
      operation element.
    - Error: "Invalid Air Operation Time. An air operation cannot start before its case effective date."
    - Error: "Invalid Air Operation Time. An air operation cannot end after its case expiration date."
      Resolution: Compare the air operation time in the element *operation* to the case start and end
      times in the element *case*.

userType

User-defined aircraft type. Cannot be an aircraftType. Not fully supported in AEDT.

userParam

User-defined parameter associated with the operation. Not fully supported in AEDT.

departureAirport ⊞

Departure airport's ICAO code. Required if the operation is used with a <flight> or <operation> element. Also required if used with a <trackOpSet> modeling departures, circuits, runups, or touch-and-goes.

departureRunway

Airport's departure runway ID. Required if the operation is used with a <flight> or a <trackOpSet> modeling departures, circuits, runups, or touch-and-goes.

departureGate

Airport's departure gate. Not fully supported in AEDT.

departureApuTime

Number of minutes the auxiliary power unit is attached to a departing aircraft. (min)

arrivalAirport ⊞

Arrival airport's ICAO code. Required if the operation is used with a <flight> or <operation> element. Also required if used with a <trackOpSet> modeling arrivals, circuits, runups, or touch-and-goes.

arrivalRunway

Airport's arrival runway ID. Required if the operation is used with a <flight> or a <trackOpSet> modeling arrivals, circuits, runups, or touch-and-goes.

specific AirOperation is more valuable than another or that there will be no intent to distinguish one AirOperation over another, then the suggested approach is to just set the UserID field to unique number or set of characters. This will allow the user to distinguish the AirOperations if the need ever arises. Nevertheless, one can leave all the id fields empty or non-unique set of ids; however, in doing so, the user will be forced to use other identifying fields of the AirOperation if they should ever want to distinguish between AirOperations.

aircraftType ⊞

Type of aircraft in the flight.

cruiseAltitude

Override aircraft cruise altitude for this operation. (ft)

numOperations

Number of operations comprising this operation.

opType

carrier

Carrier flying the flight. Not fully supported in AEDT.

flightNumber

Flight number. Not fully supported in AEDT.

tailNumber

Flight's tail number. Not fully supported in AEDT.

id

User specified identifier for the operation. One purpose served by this field is to allow the user to tie the AEDT AirOperations back to some original data source by setting the id field to an identifying identifier from the original data source. Another purpose is to set each ID to a project-specific value for each AirOperation. The ID field is used in several AEDT lists and reports that print out the AirOperations. In addition, the Impact Evaluation dialog uses the ID as its main method of distinguishing AirOperations when allowing the user to pick and choose operations to be moved to alternative flight tracks. If, however, the user has no outside data sources that need to be tied to the AEDT AirOperations, or if each AirOperation is identical in the sense that no specific AirOperation is more valuable than another or that there will be no intent to distinguish one AirOperation over another, then the suggested approach is to just set the UserID field to unique number or set of characters. This will allow the user to distinguish the

**Figure 74. ASIF element – operation. 1 -> 2 -> 3**
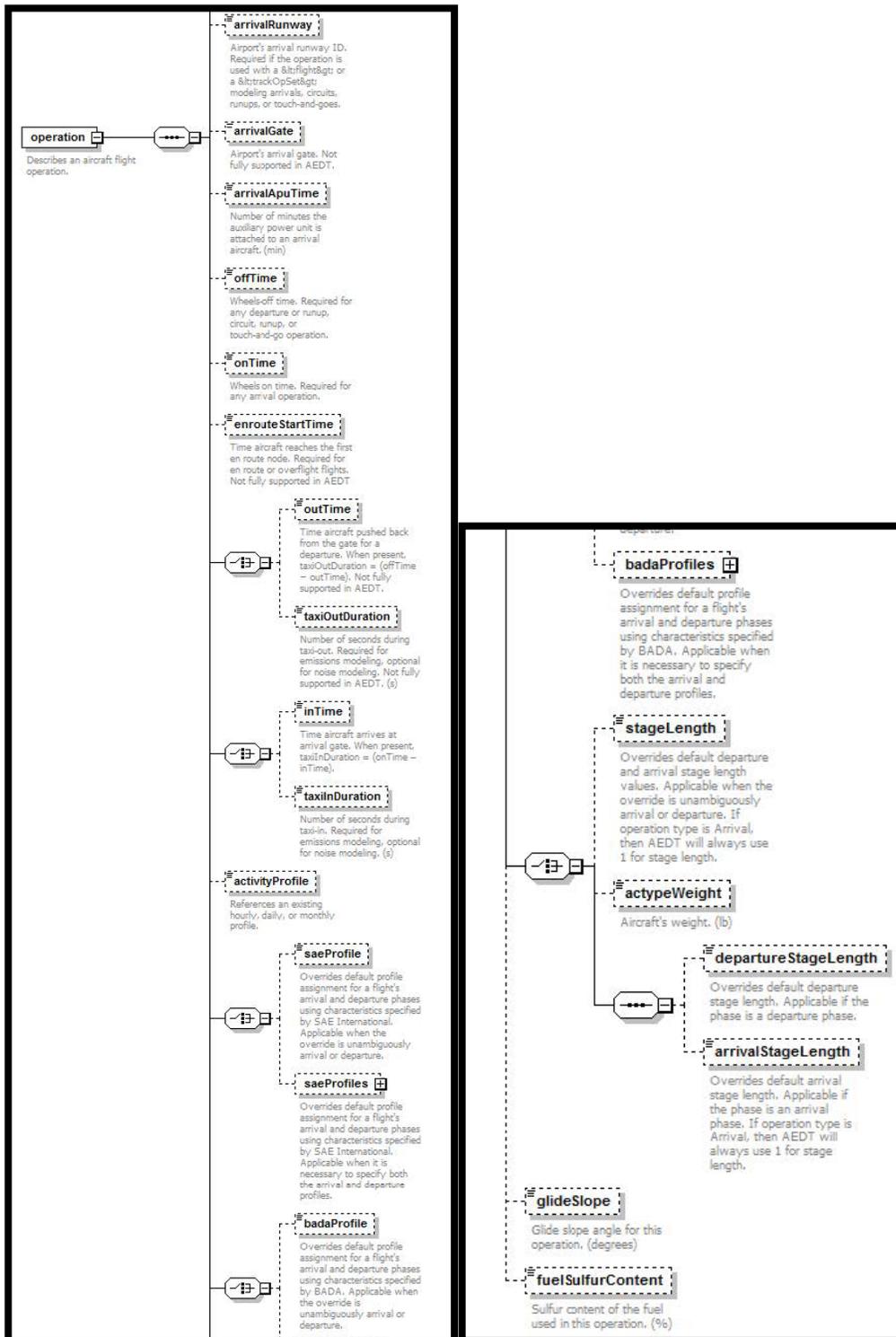
Figure 75. ASIF element – operation. 4 -> 5

5.5   Importing an INM study using an external tool (INM2ASIF)

It is recommended to import your study using the instructions in Section 5.3. However, if you encounter errors during the INM file import, see the instructions below for creating an ASIF XML file (Appendix C.1 of the AEDT User Manual is reproduced below)

5.5.1   Creating an ASIF XML from an INM study

To convert an INM study to ASIF format:

1.   Navigate to C:\Program Files\FAA\AEDT directory.

2.   Double-click the INM2ASIF.exe to open the INM to ASIF Converter.

3.   In the INM Study Path field, click Browse and navigate to the directory containing the INM study.

4.   In the ASIF File Path field, click Browse, and navigate to the directory to store the new ASIF file, and type a file name. The file name must end in ".xml".

5.   Click Generate ASIF file to convert the INM study to an ASIF.

6.   The conversion is complete when the following message is displayed: Your study was successfully converted.
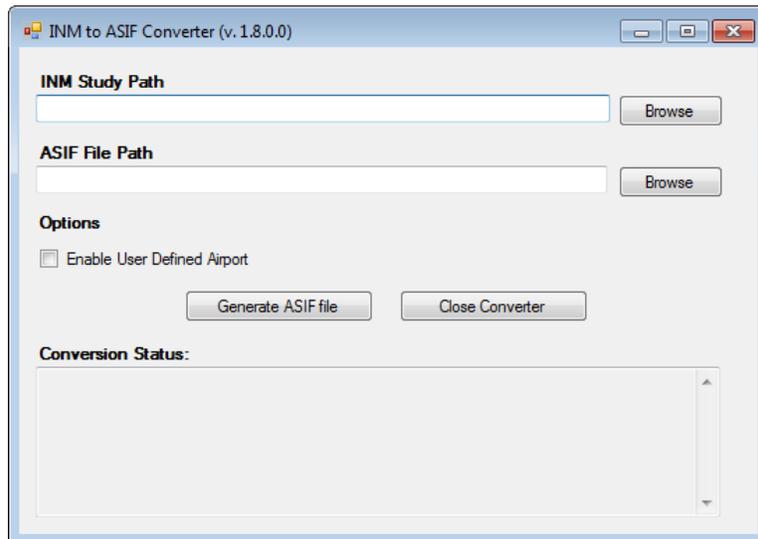
Figure 76. INM to ASIF Converter

The log file for the INM to ASIF Converter is located in the AEDT logs folder (e.g., *C:\AEDT\Logs\INMASIFConverterLog.txt*).

5.5.2 Re-importing the ASIF file

Once you have corrected the errors in your XML file, you will need to import the file using the ASIF import functionality. You may need to repeat the process outlined below until your XML still contains errors.

Follow the instructions below to import your corrected ASIF XML file:

1. Click the Study tab and click Import to display the Import Study dialog.
2. Select ASIF from the drop-down menu.
3. Click the Browse button, navigate to the ASIF file and select Open. Click Next.
4. The Review study content step displays validation errors if any. Click Next.
5. The Review data conflicts step displays any conflicts between study airport data and AEDT airport data. Click Next.
6. In the Complete study import step, enter a unique study name or accept the default name.
7. Enter the name of the desired SQL Server instance in the Select database server field.
8. Click Create to import the study.

5.6 Comparing INM Results in AEDT

After importing your study into AEDT and generating results, you may notice differences in the computed noise values. This is expected due to the updated algorithms and data in AEDT. However, if you wish to approximate INM results in AEDT, the information below will help explain expected differences or offer suggestions on minimizing differences between the two models.

5.6.1 Single-Airport Weather

When weather is used in INM, a flight operation's performance calculations are performed using the weather parameters of the INM study airport.

When annual average weather is used in AEDT, the default setting is to use the annual averages of the *nearest study airport* to the flight operation being calculated.

To model weather using the INM parameters, update the Weather Fidelity option in AEDT to use single airport weather (Section 5.2.4.3 of the *AEDT User Manual*).

5.6.2 Bank Angle

AEDT applies bank angle corrections to performance computations by default, but allows you to specify whether or not to use bank angle. If you do not wish to use bank angle in AEDT, you can eliminate the effect of bank angle in AEDT by unchecking *Use Bank Angle* in the *Study* tab, *Preferences*, *Study* screen (Section 4.11.2 of the *AEDT User Manual*).

Note that there have been updates to the bank angle algorithm in AEDT which might result in performance differences when bank angle is being compared between models.

5.6.3   Atmospheric Absorption

When defining metric results in AEDT, you can select the atmospheric absorption model in the *Set Processing Options* step of the *Define Metric Results* wizard (Section 5.2.4.4 of the *AEDT User Manual*):

- *Atmospheric absorption type*: When selected, AEDT includes the effects of atmospheric absorption on noise according to the selected option:
  - *Unadjusted (SAE-AIR-1845 atmosphere)*: AEDT uses the atmospheric absorption according to SAE-AIR-1845 and noise data are unadjusted for study-specific atmospherics.
  - *SAE-ARP-866A*: noise data are adjusted for temperature and relative humidity values (study. specific airport conditions) according to the methods specified in SAE-ARP-866A.
  - *SAE-ARP-5534*: noise data are adjusted for temperature, relative humidity, and atmospheric pressure values (study-specific airport conditions) according to the methods specified in SAE. ARP-5534.

This is analogous to the *Modify NPD Curves* in INM. If you checked the *Modify NPD Curves* box for your INM case, select *SAE-ARP-866A* in the *Set Processing Options* window in AEDT *Define Metric Results* wizard. If unchecked, select *Unadjusted.*