DANA Tool & TNMAide

National Webinar
September 15, 2021
Outline

• Background & Overview
• Live Demonstration
• Possible Uses
• Future Activities
• Wrap Up
Background & Overview
Introducing DANA Tool & TNMAide...

• Two related tools posted late July:
  • Database for Air Quality and Noise Analysis (DANA) tool
  • Traffic Noise Model Aide (TNMAide)

• Resource to stakeholders for processing traffic data, use is voluntary

• Can be used for air quality and noise applications:
  • Calculating emissions on specific roadways
  • Preparing MOVES inputs
  • Preparing TNM inputs
Additional Background

• Benefits:
  • Utilizes new NPMRDS speed data for air quality and noise analyses
  • Relieves processing burden on analyst and saves time
  • Provides consistency of input data across the country

• Multiple Contractors:
  • Cambridge Systematics/ERG/AECOM: original tool
  • USDOT Volpe Center: beta testing and revisions
# Beta Testers

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<tr>
<th>Agency</th>
<th>DANA Tool</th>
<th>TNMAide</th>
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Accessing the tools

• FHWA (dot.gov) – Environment - Air Quality - Methodologies

Download DANA Tool

There are two installers required to unpack the necessary files to run the DANA tool:
- Unpack DANA TDMG DATA.zip, which will extract the pre-processed TDMG data within the proper folder directory.
- Install DANA TDMG, which will install the DANA tool executable, and extract the rest of the data within the proper folder structure.

In order for the installers to be executed, the following are a list of requirements:
- DANA Tool Interface Guide – Includes sections on background, setup, operating the graphical user interface (GUI), data files, and input/output data specifications.
- DANA Tool Quickstart – Provides a brief overview of the DANA Tool and possible use cases.

• FHWA (dot.gov) – Environment - Noise - Traffic Noise Model

Traffic Noise Model

To comply with 23 CFR, Part 777-17, these versions 3.0 and prior released by the FHWA to the public are used to conduct and disseminate the traffic noise data. The data released uses the Traffic Noise Model (TNM) traffic noise model. The TNM uses real-time measurements of traffic conditions for use in environmental analyses, project or program evaluations, or other uses involving noise and traffic data. The TNM is intended to provide the developer with a resource to stakeholders and use of the tool is voluntary; however, using it may not satisfy all regulatory requirements.

Technical Support

To answer any questions from the respective field, you can contact TSN Tech-Support at techsupport@nhts. To obtain the latest version, please visit the TSN website (http://www.fhwa.dot.gov or TSN-03.2) for the latest versions.
Overview

• DANA Tool Inputs
• DANA Tool Calculations
• DANA Tool Outputs
• TNMAide Inputs
• TNMAide Outputs
DANA Tool Inputs

- **NEI 2017**: MOVES-based emission rates
- **NPMRDS**: Auto and truck speeds by segment
- **HPMS**: Auto and truck volumes by segment
- **TMAS**: Vehicle mix by road type and time period

Combined Database

Note: Historical years only, no forecasting
DANA Tool Calculations

• Tiered process for matching TMAS Counting Stations to NPMRDS links
  • Tier 1: exact roadway match
  • Tier 2: state, county, and route
  • Tier 3: state, urban/rural, and roadway functional class
  • Tier 4: national, urban/rural, and roadway functional class
DANA Tool Outputs

Process 1. Link-level emissions
Process 2-3. MOVES inputs for county level emissions inventories
Process 4. TNMAide inputs to predict worst noise hour
TNMAide Inputs

- Traffic data for one year from DANA
  - AADT
  - Speeds
  - Vehicle Mix
- Roadway characteristics from the User
  - # of lanes
  - median width
  - grade
TNMAide Outputs

- Worst Noise Hour ($L_{EQ}$)
- 24-Hour Metrics ($L_{DEN}$ or $L_{DN}$)
TNMAide

DANA Tool
- AADT
- Speeds
- Vehicle Mix

TNMAide
- Worst Noise Hour ($L_{EQ}$)
- 24-Hour Metrics ($L_{DEN}$ or $L_{DN}$)

TNM
Noise Results by Receptor
Live Demonstration
1. Main Graphical User Interface (GUI)

DANA Tool Screenshots

2. Selecting a state

3. Input file selection
DANA Tool Screenshots

5. GUI appearance during processing

6. Example Warning Message

7. Example Process Log Messages

8. Example Error Message in Process Log
DANA Tool Screenshots

9. TMC Selection Tool

10. TMC Selection Tool Message

TMC Selection Complete

TMC Selection Results saved to Final Output/TMC_Selection/TMCs_MIDDLSEK_I-93_NB.txt
Possible Uses
### Process 1: Link-Level

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<th>Annual Summary Outputs (csv file)</th>
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<td>Speeds</td>
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<td>Vehicle Mix (two classification schemes)</td>
<td>Link Length (miles)</td>
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<td>Emission rates for 9 pollutants</td>
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- **Possible uses:**
  - Planning analyses to identify high emissions locations
  - Plan for highway projects or other mitigation measures
Process 2-3: MOVES County-Level Inputs

The following MOVES county-level input files can be created:

- Considers VMT from all roadway functional classes (Process 2):
  - Vehicle Type VMT
  - Road Type Distribution
  - Hour VMT Fraction
  - Day VMT Fraction
  - Month VMT Fraction

- Considers speeds only from the National Highway System (NHS) (Process 3):
  - Average Speed Distribution

Possible Uses: Various purposes (mobile source air toxics analysis, greenhouse gas analysis, etc.)
Example MOVES County Level Inputs

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Process 4: TNMAide Inputs/TNMAide

• Possible Uses
  • Identification of Worst Noise Hour for NEPA noise analysis
  • Noise levels 50 ft. from a basic roadway
Future Activities
Training Videos

1. Overview of DANA tool
2. Overview of TNMAide
3. Running DANA Tool for MOVES County Level Inputs
4. Running DANA + TNMAide for TNM inputs
User Feedback

• **Survey** on future enhancements

• **GitHub** – click on “Issues” tab and then green button for “New Issue”

• Send feedback through our help email
  
  [DANAHelp@dot.gov](mailto:DANAHelp@dot.gov)
DANA Tool Second Release

- Potential Improvements
  - Improve accuracy of calculations
  - Lower computer memory requirements
  - GUI and usability improvements
  - Fewer processing steps
- Improvements implemented will be based on user feedback
- Latest TMAS data (2020)
Wrap Up
Wrap Up

• Help Inboxes
  • *DANA Tool: DANAhelp@dot.gov*
  • *TNMAide: TNMHelp@dot.gov*

• Training videos coming out soon

• User feedback on enhancements, fill out survey

• Send bugs and user issues to help inboxes.
Questions?

• Contact info:
  • DANA Tool:
    • David Kall
    • david.kall@dot.gov
  • TNMAide:
    • Aileen Varela-Margolles
    • a.varela-margolles@dot.gov
Extra Slides
Note: Alaska, Hawaii, and Puerto Rico also have TMC shapefiles that are not shown here.
TMAS Traffic Monitoring Stations

Tableau map of TMAS permanent sites in the US:
https://explore.dot.gov/#/views/2020CCSSiteMap/Series1?iid=1
Building a Combined Database

- HPMS data already conflated onto NPMRDS network
- Four tiers of matching TMAS point data to NPMRDS line network
  - Tier 1: Near exact location match
  - Tier 2: Matching on county and route
  - Tier 3: Matching on statewide average by functional class
  - Tier 4: Matching on national average by functional class
- Lookup classification data by peaking, month, weekday/weekend, and hour
DANA Tool Input Data Flow
Default Emission Rates from National Emissions Inventory (NEI) 2017

• MOVES-based emission rates

• Representative county approach considers variations of:
  • Meteorology
  • Fuels
  • Inspection/Maintenance Programs

• Process 1 looks up link-level emission rates in default table by:
  • County
  • Roadway type
  • Average speed
  • Month
  • Day type
  • Hour of the day
Example of Representative County Approach

Note: NEI 2017 was used, but this example map is from NEI 2014.