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Federal Highway Administration

FREQUENTLY ASKED QUESTIONS

TRAFFIC NOISE MODEL 3.1

FHWA-HEP-21-044

FEDERAL HIGHWAY ADMINISTRATION

OFFICE OF NATURAL ENVIRONMENT

Washington, D.C.

INTRODUCTION

In addition to these FAQs, please also note that TNM 3.1 has a **USER MANUAL** and the TNM 3.0 **GETTING STARTED GUIDE** embedded within the software, which may answer some of your questions.

An introductory release webinar is available on the Federal Highway Administration's (FHWAs) Noise Program webpage at https://www.fhwa.dot.gov/environment/noise/training/. The webinar provides some basic information regarding the updates to TNM, and how to get started with using the model.

The FHWA also provides short **HOW-TO VIDEOS** that demonstrate how to accomplish basic tasks in TNM 3.0 on the FHWA YouTube Channel under the 'TNM' Playlist at https://www.youtube.com/playlist?list=PL5_sm9g9d4T3naH9knm5E6SZUpmI_QD3y. These tasks are generally performed in similar ways in TNM 3.1. New videos for TNM 3.1 will be added periodically.

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GENERAL INFORMATION

Usage Policy and Requirements

IS TNM 3.1 REQUIRED FOR USE ON NOISE ANALYSES?

No, TNM 3.1 is available for voluntary use until FHWA updates the noise regulations at 23 CFR 772.

IF I CAN PERFORM AN ACTION IN TNM 3.1, AM I REQUIRED TO USE THE RESULTS IN MY REGULATORY ANALYSIS?

Changes to the TNM software, such as the presentation of results with two decimal places, are independent of regulatory requirements. Always refer to the policies and regulations in your locality for specific rules regarding noise impact analyses.

TNM Basics

WHAT ARE TNM 3.1'S SYSTEM REQUIREMENTS?

For optimal performance please note the following minimum hardware specifications, prior to attempting to install either version of the TNM 3.1 software:

OPERATING SYSTEM:

64-Bit

Windows 7 or higher (not compatible with Mac OS, Unix or Linux)

CPU:

Intel® Core i5 or i7 processor or equivalent

DISK SPACE:

2.0 GB or more of available hard drive space for installation

50 GB or more of available hard drive space for working

RAM:

32.0 GB

GRAPHICS CARD:

Intel® HD Graphics or equivalent

HOW MUCH DOES TNM 3.1 COST?

TNM is provided to the public at no cost. However, the use of the ESRI Plan View Tools requires the purchase of an ESRI Runtime license. Additional information about these two versions of TNM 3.1 is available below under 'Getting Started

Versions'.

WHERE CAN I OBTAIN TNM 3.1?

TNM 3.1 can be obtained from the FHWAs Noise program webpage (https://www.fhwa.dot.gov/environment/noise/traffic_noise_model/).

Software Status and Development

WHAT IS THE MOST RECENT VERSION OF TNM?

The most recent version of TNM is 3.1.7970.37608.

HOW CAN I DETERMINE WHICH VERSION OF TNM 3.1 I AM RUNNING?

The exact version of TNM 3.1 that is running can be determined by clicking the **ABOUT** icon under the **HELP** tab.

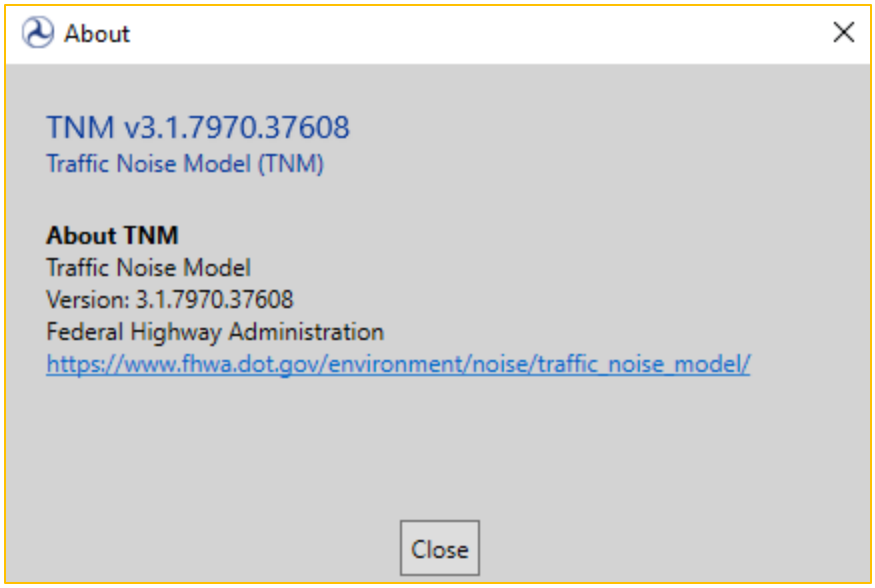

Figure 1 *TNM Version Number Dialog Box*

WHAT UPDATES WERE MADE TO TNM 3.1?

TNM 3.1 includes multiple improvements based on user feedback. For more information please see the **TNM 3.1 FACT SHEET** and the **TNM 3.0 TO TNM 3.1 CHANGE LOG** at TNM V3.1 - Traffic Noise Model - Noise - Environment - FHWA (dot.gov).

HOW OFTEN IS TNM UPDATED?

This depends on the type and complexity of the scheduled update; but the FHWA has scheduled regular updates to the model to respond to user feedback, enhance and add features, and improve the accuracy of the modeling results.

TNM 3.1 improves upon TNM 3.0 in multiple ways including, removal of the database, better barrier analysis workflows, and inclusion of an installer. The next series of updates are already planned and may include additional features such as incorporating RCNM.

HOW OFTEN ARE THE BASEMAPS UPDATED?

This depends on the map developers and creators as the FHWA doesn't own this data. The basemap data requires an internet connection because they are accessed from a server on the supplier side. Maps are updated as often as the developers deem it to be necessary.

WHAT IS THE STATUS OF THE AUTOCAD, MICROSTATION, AND ARCGIS PLUG-INS?

The plugins continue to be available with the functionality that was available during the TNM 3.0's 2017 Draft release.

Technical Assistance

WHERE CAN I OBTAIN A COPY OF THE TNM DOCUMENTS?

Copies of all documents associated with TNM 3.1 can be found on the FHWAs Noise program webpage (https://www.fhwa.dot.gov/environment/noise/traffic_noise_model/tnm_v31/). Available documents are:

- Technical Manual
- Validation Report
- User's Guide (also available inside TNM 3.1 as the Help Menu)
- Getting Started (focused on TNM 3.0, but still generally applicable)
- XML File Format Document Reference Manual
- Fact Sheet
- Change Log

Where can I obtain Technical Support?

The FHWA and the Volpe Center can provide more information and technical support through TNMHelp@dot.gov.

How do I get the log file?

Go to *MyDocuments\TNM\Logs*. For the current log file, search for the file with the extension .log; for past logs go to *MyDocuments\TNM\Logs\Archives* and search for the file with the .log extension for the applicable date.

How can I stay up-to-date with the development status of TNM?

Please sign up for the TNM Interest Group email list through GovDelivery. The link to sign up is available on the Noise Program Homepage https://www.fhwa.dot.gov/environment/noise/.

ACOUSTICS

What modifications and bug fixes have been implemented in TNM 3.1 Acoustics?

No new acoustical modifications have been made to TNM since the TNM 3.0 version release. TNM 3.0 included multiple acoustical updates compared to TNM 2.5. For more information about these changes, please see the TNM 3.0 **FAQs**, **Technical Manual**, and **Validation Report** at TNM Version 3.0 - Traffic Noise Model - Noise - Environment - FHWA (dot.gov).

What modifications and bug fixes have been implemented to the TNM 3.1 Acoustical documentation?

The TNM 3.1 **Technical Manual** includes changes to Table 1 to fix typos related to Motorcycle and Heavy truck sound energy distributions. In the TNM 1.0 **Technical Manual**, upon which the TNM 3.0 **Technical Manual** is based, Table 1 did not match the percentages on the graphs in Figures 36 and 40. The curves in figures 33 to 40 were correct. These match the curves

generated using the values from Table 6, which are those used in the TNM code. Table 1 in the **TECHNICAL MANUAL** now correctly displays the acoustical information that was used in TNM 3.0 and continues to exist in TNM 3.1.

WHAT MODIFICATIONS AND BUG FIXES HAVE BEEN IMPLEMENTED IN TNM 3.1 DATA MODEL THAT COULD AFFECT THE ACOUSTICAL RESULTS?

The data model for TNM 3.1 was updated with improved error checking and error handling compared to TNM 3.0. This allows TNM 3.1 to provide results for those project models that would have errored out in TNM 3.0. This change addresses situations where TNM 3.0 could not calculate certain project models. The results from TNM 3.1 would be the same as TNM 3.0, had TNM 3.0 enforced the same model and been capable of providing those results.

GETTING STARTED

Versions

HOW MANY VERSIONS OF TNM 3.1 ARE THERE?

There is one model with the basic structure of an acoustics library, a GUI that allows user input, and a data structure that stores the GUI inputs and acoustic outputs.

There are two (2) versions of this TNM 3.1 available for download. They differ in what software underlies certain Graphical User Interface (GUI) views, and whether there is an ongoing fee to the end user or not.

Both versions use the same acoustical library and algorithms; provide equivalent results; and use the same underlying software for the GUIs 3D View, Section (or Cut) View, Report view Legend, Edit, and Object Details pane. As such, they are considered to be one model with different GUI tools implemented for the end user.

WHAT ARE THE DIFFERENCES BETWEEN THE TWO VERSIONS OF TNM 3.1?

The main differences are costs to the end user, and the aesthetics in the GUIs various views for the project. Both versions will provide the same acoustical results.

One version relies on ESRIs proprietary software to render the Basemap and Plan View; as well as to implement Bookmarks, Annotations, and Geocoding. This version of TNM 3.1 requires the end user to provide their own ArcGIS Standard Runtime License (ArcGIS WPF 10.2.2). This can be obtained from ESRI for a fee. Users should check with their organization to verify whether they have such a license already available.

The other version of TNM 3.1 has no costs to the end user. The Department of Transportation already paid the upfront costs for the software that renders the Basemap and Plan View in this

version. Bookmarks and Annotations are not currently supported in this version, but may be added during a later development cycle. This version also allows the user to switch from aerial views to other map views, such as terrain, without needing to close and reopen the software.

Installation

How do I install and open the license-free version of TNM 3.1?

This is the default version of TNM 3.1 and it will launch once you run the Installer unless you have inserted your own ESRI license information.

For more information please see the '*01a Installation with Installer*' and '*02 Versions*' video tutorials on the FHWAs YouTube Channel https://www.youtube.com/playlist?list=PL5_sm9g9d4T3naH9knm5E6SZUpmI_QD3y.

How do I install and open the ESRI version of TNM 3.1?

To use your existing ESRI license, you must input the license information so TNM recognizes it, otherwise TNM will launch to the default, license-free, version. You will need an ArcGIS Runtime WPF 10.2.2. FHWA does not provide ESRI licenses for use.

For more information please see the '*01a Installation with Installer*' and '*02 Versions*' video tutorials on the FHWAs YouTube Channel https://www.youtube.com/playlist?list=PL5_sm9g9d4T3naH9knm5E6SZUpmI_QD3y.

GRAPHICAL USER INTERFACE (GUI)

INTERACTING WITH TNM

Importing an Existing Project

Can TNM 2.5 runs be used in TNM 3.1?

TNM 2.5 runs can be used directly in TNM 3.1 by using the TNM 2.5 to TNM 3.0 Conversion Tool.

Where do I download the TNM 2.5 to TNM 3.0 Conversion Tool?

The TNM 2.5 to TNM 3.0 Conversion Tool is available for download from the FHWAs Noise program webpage (https://www.fhwa.dot.gov/environment/noise/).

How do I use the TNM 2.5 to TNM 3.0 Conversion Tool?

Instructions for installation and use are included in the readme file. There is also a video demonstrating how to use this tool in the FHWA's YouTube Channel TNM Playlist: https://www.youtube.com/playlist?list=PL5_sm9g9d4T3naH9knm5E6SZUpmI_QD3y.

USING MAP PROJECTIONS FROM TNM 2.5 IN TNM 3.1:

WHAT IS A PROJECTION?

TNM 3.1 incorporates a variety of common projection options in both versions, including a Cartesian coordinate system that incorporates the flat plane found in earlier versions of TNM.

Generally speaking, a projection is: A method by which the curved surface of the earth is portrayed on a flat surface. This generally requires a systematic mathematical transformation of the earth's graticule of lines of longitude and latitude onto a plane. Some projections can be visualized as a transparent globe with a light bulb at its center (though not all projections emanate from the globe's center) casting lines of latitude and longitude onto a sheet of paper. Generally, the paper is either flat and placed tangent to the globe (a planar or azimuthal projection) or formed into a cone or cylinder and placed over the globe (cylindrical and conical projections). Every map projection distorts distance, area, shape, direction, or some combination thereof[1].

WHY DO TNM 2.5 RUNS LOAD INTO TNM 3.1 IN A DIFFERENT LOCATION ON THE MAP?

TNM 2.5 projects imported into 3.1 will load into a location relative to the Cartesian map's reference coordinates, unless a projection is selected. If a projection is selected, then the run should show up in the correct location on the basemap in TNM 3.1. Incorrect location due to the Cartesian map's reference coordinate system has no effect on the noise level results.

ARE THE TNM 2.5 NOISE LEVEL RESULTS INVALID IF THE INPUT OBJECTS ARE NOT ALIGNED WITH THE BASEMAP IN TNM 3.1?

The TNM 2.5 results are invalidated because TNM 3.1 uses different acoustics. The results will be recalculated using TNM 3.0 acoustics rather than TNM 2.5 acoustics. For more information regarding the difference in reported noise levels in TNM 2.5 vs TNM 3.0 (and by extension TNM 3.1), please see the TNM 3.0 **VALIDATION REPORT**.

The coordinates of the geometry in relation to each other will not be affected, and thus the noise levels results will not change solely because the input objects do not align with the basemap.

HOW CAN WE SPECIFY A PROJECTION WHEN IMPORTING A TNM 2.5 XML WITH COORDINATES BASED ON A SPECIFIC STATE PLANE PROJECTION?

[1] https://support.esri.com/en/other-resources/gis-dictionary/search/

When TNM 3.1 imports a TNM 2.5 XML, TNM 3.1 will automatically detect an XML file without a projection and prompt the user to supply one. The User should select the projection that was used to create the TNM 2.5 model from the available list.

CAN CUSTOM PROJECTIONS BE BROUGHT INTO TNM 3.1?

Many state projections are available in the tool from which you can build a new project. Manually creating projections is not supported. However, TNM 3.1 now allows the user to make adjustments to existing State Plane projections.

CAN PROJECTIONS BE MODIFIED IN TNM 3.1?

Yes, projections can be adjusted with either a scale or offset to an existing State Plane projection.

WHICH PROJECTION SHOULD I USE?

The projection option you use depends on the project. It is important to always use the same projection for a specific TNM case. You only have to set the projection of a case when you create it, or if you import a .**XML** file.

CAN WE IMPORT TNM 3.0 MODELS?

Yes, TNM 3.0 projects can be imported into TNM 3.1 by first exporting the project from TNM 3.0 using the existing TNM 3.0 XML export functionality. Once imported, these files are then readable TNM 3.1.

Creating a New Project

HOW DO YOU CREATE A MODEL?

Please see the TNM 3.0 **GETTING STARTED** document inside TNMs **HELP MENU** or separately at FHWAs Noise program webpage (https://www.fhwa.dot.gov/environment/noise/).

HOW DO I DIGITIZE A TNM OBJECT IN THE PLAN VIEW?

Please see the TNM 3.0 **GETTING STARTED** document inside TNMs **HELP MENU** or separately at FHWAs Noise program webpage (https://www.fhwa.dot.gov/environment/noise/). There is also a How-to Video playlist at the FHWAs YouTube Channel https://www.youtube.com/playlist?list=PL5_sm9g9d4T3naH9knm5E6SZUpmI_QD3y.

HOW CAN I ENTER LARGE AMOUNTS OF DATA INTO TNM 3.1?

Users can copy and paste all data by first copying the original data and then selecting the intended destination cells in TNM 3.1. The exception to this is the traffic data in the Object Details Pane.

ARE X, Y, AND Z COORDINATES INCLUDED WHEN PASTING THE ROADWAY COORDINATES INTO TNM 3.1 FROM OTHER SOURCES?

Yes, location information for objects can be pasted into TNM from other sources. Any object coordinates, including z elevations, can be copied into TNM all at once from spreadsheets. With a large number of coordinates to replace, it may take a minute or two for TNM to update all the data.

The easiest way to create objects with a large number of points is to use the mouse to arbitrarily create an object with the correct number of points, while not worrying about the geometry. Then you can copy the data from the spreadsheet into TNM by highlighting the cells that you want to replace: X, Y, Z or any combination of these, and pasting these using 'ctrl-v' on your keyboard.

WHY CAN'T I COPY/PASTE TRAFFIC DATA?

TNM 3.1 does not support this functionality. However, users can copy the data for a given segment down to populate the table in the Traffic Tab. Users cannot copy lane data to another lane.

Analyzing a Project

ARE THE TNM 3.1 MODEL RUN TIMES LONGER THAN FOR TNM 2.5?

The runtimes for TNM 3.1 can be longer or shorter than for TNM 2.5 depending on project complexity and user system capabilities. TNM 3.1 should run faster than TNM 3.0 since the data saving and loading structure has been improved.

In addition, in the early modeling stages, computation time can be further reduced by using the parallel processing beta feature in TNM 3.1. *Note that this beta feature should not be used to compute final noise levels reported for regulatory analyses.*

CAN I RUN MULTIPLE VERSIONS OF TNM ON MY COMPUTER?

Yes, both TNM 2.5 and 3.1 can be run on the same computer at the same time.

CAN I RUN MULTIPLE INSTANCES OF TNM 3.1 ON MY COMPUTER?

Yes, multiple instances of TNM 3.1 can be run on the same computer at the same time.

CAN I COMPUTE MULTIPLE RUNS AT THE SAME TIME ON MY COMPUTER?

Yes, to compute multiple runs at the same time on the same computer, use the Batch Tool.

WHERE CAN I FIND THE BATCH TOOL?

The Batch Tool is installed in the same folder as the main TNM 3.1 program when using the TNM Installer. The default folder is *C:\Users\<user.name>\appdata\local\TNM*.

WHAT CAN I DO IF MY PROJECT WON'T RUN, OR MY RECEIVERS WON'T CALCULATE?

You can help identify the issue by slightly moving the receiver point or removing all instances of one object type (such as barriers or terrain lines) at a time. This can help pinpoint what is causing the error. If you still require assistance please contact TNMHelp@dot.gov.

What TNM Objects are included in the sightline check?

The line of sight check feature accounts for receivers, barriers, and roadway segments. Terrain lines are not included.

Does TNM automatically invalidate barrier designs and their results when input objects are changed?

Yes. The Barrier Design Analysis is only available when valid results are present.

Noise Contours:

What noise levels do the colors represent?

Levels are shown from highest (red) to lowest (green).

Can the contour layer be moved so that objects "underneath" the contours, like receivers, can be seen even when the Contour layer is set to 0% transparency?

Not at this time, the only way to show the data layers under the Contours layer is through the use of the transparency feature.

Saving and Sharing a Project

Where is the model saved?

The model is saved wherever the user specifies. The location can be in a local directory or a shared network drive.

Where are 1/3 Octave Band results saved?

The 1/3 octave band data is automatically exported to the documents\TNM\temp\<user-specified project name>. The filename is thirdoct.csv. The main results are also saved in the folder selected during project setup.

Where are contour results saved?

Contour results are automatically saved/exported to the following directory: Documents\TNM\Temp\project_name\ASCII_text_file.asc.

How do I share a model with another person?

TNM 3.1 uses **.XML** to create, import and export files. Users can interact with this file outside of TNM. After exporting, you can transfer the file to the other person who can import the file into TNM on another computer.

HOW CAN CONTOUR RESULTS BE EXPORTED?

This file can be imported to ESRI GIS software, if the file name adheres to the following ESRI file naming conventions:

- No spaces and no special characters (except an underscore _)
- Do not start file names with a number or underscore
- Keep the filename short (16 characters is advised)