**HIGHLIGHT LEGEND:**

Yellow highlighted text should be replaced with project-specific text.

*Blue highlighted text* is instructional; follow its guidance but delete it from your Work Plan submittal.

Green highlighted sections serve as example text – delete these from your Work Plan submittal but use them as appropriate to craft the appropriate text for your memo.

**Instructions for using this template**

The text provided is suggested, not mandatory. If the information in your submittal is clear, accurate, and compliant with NCDOT Noise Policy and Manual, you can opt to use your own language. However, your Work Plan submittal does need to contain all the pertinent information listed herein, and in the order provided in this Template.

This work plan shall be prepared by a traffic noise analyst prequalified with NCDOT to prepare Traffic Noise Reports (TNRs) and/or Design Noise Reports (DNRs).

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Provide the following in a memorandum format using firm letterhead:

* To and from whom the memo is being sent. All memoranda should be addressed to Tracy Roberts, AICP, NCDOT Traffic Noise and Air Quality Group Leader.
* Firm contact information (name, phone number, and email)
* Date
* Subject (including the project STIP number)

Firm Name prepared the following Noise Analysis Work Plan to meet requirements of NCDOT’s [insert year of the applicable manual – 2016 or 2022] Traffic Noise Manual. This work plan includes a description of the proposed short‐term noise measurement site/s, proposed long-term measurement site/s, noise study areas, analysis (i.e., receptor) locations, a methodology for modeling special land use areas, and a tentative schedule for completing the Traffic Noise Report (TNR)/Design Noise Report (DNR) [select the appropriate report type and delete the other].

**Introduction**

This work plan has been prepared for the preparation of a TNR/DNR [select the appropriate report type and delete the other] for STIP Project X-XXXX, WBS XXXXX.X.X.

[Provide brief project description including location, proposed improvements, number of alternatives, project length, existing (base) year, design year, design speed, and any additional relevant project information. Explain why the project is a Type I for noise study purposes. Indicate the type of environmental document being prepared if TNR.] Federal funds are/are not anticipated.

The project area is composed primarily of single and multi‐ family homes (NAC B), outdoor activity/playground areas (NAC C), places of worship (NAC D), outdoor dining areas (NAC E), and commercial/retail properties (NAC F) [select the appropriate land use types and delete any that are not applicable].

If a project reconnaissance has been conducted, provide pertinent information obtained from the project field review (if applicable).

During field work, properties will be field verified to assess their day‐to‐ day function, correct NAC category, and current address to ensure each land use is modeled appropriately. List project specific locations where information needs to be field checked, for example, duplicate or missing address info, NAC category for uncertain buildings, receptor locations, areas of frequent human use at special land use locations, number of units at multi-family residential buildings, etc.

[This paragraph is only applicable when preparing a DNR] A Traffic Noise Report (TNR) was accepted by NCDOT on date. The TNR identified insert number likely noise walls. A environmental document type was prepared for the project and approved on date. Therefore, the date of public knowledge for this project is date. Any new development in the project area with permits issued before the Date of Public Knowledge will be confirmed during field work and included in the DNR as appropriate.

[This paragraph is only applicable when preparing a DNR] Identify any new noise-sensitive development not included in preliminary noise studies but that was permitted on or before the date of public knowledge. Also describe any new noise-sensitive development that was permitted after the date of public knowledge and is therefore not included in the analysis and identify it on the figures.

The criteria, procedures, and methodology employed for this work plan and subsequent noise analysis will be in accordance with the NCDOT 2022 Traffic Noise Manual (effective October 12, 2022) and the NCDOT 2021 Traffic Noise Policy (effective November 29, 2021). If a different policy/manual is applicable, cite it instead.

Figure 1 shows the project location.

**Noise Measurement Sites**

The proposed noise measurement sites in this work plan are intended to aid in defining the existing noise environment at noise-sensitive receptor sites, define background ambient noise levels where applicable, support determining the worst noise hour, and help in validating the Federal Highway Administration’s (FHWA) Traffic Noise Model (TNM®) Version 2.5 in locations where traffic noise is dominant.

If there are any areas where model validation is not needed, identify them and explain why validation isn’t necessary. Short‐term existing ambient Leq(h) noise level data will be obtained for 20‐minute periods in one-minute increments at number representative areas with two to three (2‐3) simultaneous measurements per representative area to better capture the noise environment and noise propagation characteristics within the project study area. [discuss any long-term measurements, the duration and reason needed. Also state that long-term data will be collected in one-minute increments]. All integrating sound level analyzers (meters) used to obtain existing ambient noise monitoring data will meet ANSI and IEC Type I or Type II specifications. All noise monitoring will be performed in accordance with the NCDOT 2022 Traffic Noise Manual.

Sound level meters will be set to A weighting and will use the slow response setting for traffic noise measurements.

Sound level meter microphones should be positioned at grazing incidence, or 90 degrees to the direction of the sound source, at a height of 5 feet above the ground.

Simultaneous traffic data will be counted and/or recorded and classified, during each short‐term noise measurement session, at areas near existing traffic noise sources. These counts will be collected to account for auto, medium truck, heavy truck, bus, and motorcycle vehicle mix counts. Actual traffic speeds during each measurement period will be obtained by (pick the appropriate one(s)): driving the project corridor and recording average speed and travel time, utilization of radar guns, other (please specify). Posted speed limits will be recorded on field data sheets for all roadways within the project corridor.

Weather data will be documented in the field by using wunderground.com and accessing the

name of closest station weather monitoring station. In addition, weather data will be supplemented by

utilizing [add additional methods – weather channel app with location service on and/or handheld weather station] to ensure the most accurate data is documented.

The locations of proposed noise measurement sites are shown on Figures2‐1 through 2‐X*.* Table 1identifies the locations of noise measurement sites. It should be noted that address data for monitoring locations were identified using parcel data from source. Areas with duplicate address information or no address information due to multiple dwellings per structure will be field verified. The measurement sites are representative of outdoor conditions for Activity Category B and C land uses, as applicable, in accordance with the 2022 Traffic Noise Manual.

The numbers and locations of the noise measurement sites were determined based on their vicinity to

adjacent noise‐sensitive land uses, topography, and by their relative location to the dominant traffic noise sources and existing roadways along the project corridor. There may be instances where measurement locations must be adjusted due to unforeseen circumstances encountered in the field. Modeling of additional receptors may also be necessary, following initial noise modeling efforts, if the initially identified receptors do not define the outer limits or distances from roadway(s) for which traffic noise impacts are predicted to occur.

**Table 1: Noise Measurement Sites**

|  |  |  |  |
| --- | --- | --- | --- |
| **Measurement Site ID #** | **Measurement Duration** | **Land Use / Activity Category** | **Approximate Address and/or Location** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Property Access and Safety**

While conducting field work, safety will be paramount. Data collection at actual areas of frequent human use may require entering private property. Field staff will never compromise safety. The following will be considered when conducting field work on private property.

* Field staff will not access property that is posted No Trespassing or is marked with threatening language.
* Field staff will make reasonable attempts to obtain verbal approval prior to accessing private property.
* Field staff will use good judgement before entering private property without prior consent. If in doubt, field staff will not enter.
* Under no circumstance will field staff enter private property if they are concerned for their safety.
* Field staff will always wear safety vests.

If the measurement locations identified in this work plan cannot safely be accessed, then field staff will choose an alternate nearby location with similar land use. As a last resort, if private property access is not safe or practicable, then field measurements may be conducted on public property such as highway rights of way and parks.

**Non‐Residential Special Land Uses**

If traffic noise impacts are predicted to occur, equivalent receptors will be calculated per guidance found in the 2022 Traffic Noise Manual for non‐residential land use locations. Potential locations include the following: [list potential locations and land uses].

Equivalent receptors will be used to represent these non-residential land uses in determining any potential noise abatement measure’s feasibility and reasonableness. A grid, or nodal‐type array of receptors shall be used to accurately assess the extent to which larger‐area receptors and/or locations represented by more than one equivalent receptor are impacted. The equivalent number of receptors will be determined by the formula:

Equivalent Receptor = (Person/hours per Year Associated with the Land Use) / (Person/hours per Year Associated with a Single‐Family Residence).

In addition, specific guidance for Activity Categories C, D, and E found in the 2022 NCDOT Traffic Noise Manual will be followed as appropriate. The Daily Hours Used will be the number of hours for which the facility is in operation on a typical day. Information on usage will be obtained from the property owner or management of the facility being evaluated while in the field.

**Traffic**

Traffic volumes will be modeled with a 50-50 directional split. If another split is to be used, specify and give reasons why it is to be used instead of 50-50. Consult the Traffic Noise and Air Quality Group if there are extreme directional splits (65/35 or higher). The worst traffic noise conditions will be

modeled, which is the lesser of the DHV percentage of the AADT or the maximum roadway vehicle

capacity Level of Service C (LOS C) operating at the design speed.

The design year for this project is 20XX with the Existing base year of 20XX. Traffic speeds applied in the Base Year Existing, Design Year No‐Build, and Design Year Build TNM models will be determined using posted or design speeds as directed in the 2022 Traffic Noise Manual. The design speed will be obtained from the project’s roadway design criteria. Because design speeds for the Base Year and No-Build existing roadways is often unknown, using posted speeds for these two modeling scenarios will be acceptable.

**Noise from Other Modes of Transportation (Aircraft Noise and Rail / Transit Noise)**

If there is a secondary transportation noise source within the project study area, it needs to be identified. If there are none, state this. Provide the name of the airport and/or rail line (e.g. Norfolk Southern, CSX, etc.) and describe the location and which NSA it is located in. For rail noise, provide a table like the one below. Information on rail activity can be obtained from Jim Harris in the NCDOT Rail Division. For transit, contact the owner /operator of the facility.



**Modeling Procedures**

All first, second, and third row buildings will be modeled as barriers as well as any other buildings that may be acoustically important to the accuracy of the model. The height of single‐story house building barriers will be modeled at 10 feet and two‐story buildings will be modeled at 20 feet, respectively. Building barriers will be modeled with a flat, not sloping, top. TNM roadways will be modeled per individual lane and shoulders will be modeled as their own separate TNM roadway element. Local, neighborhood roadways will be modeled. All roadways shall extend an appropriate distance from the last receptor. Large parking lots will be modeled as ground zones with the description of pavement if they intervene between the roadway and a noise sensitive receptor.  Existing, permanent bodies of water intervening between the roadway and noise sensitive receptors will be modeled as ground zones with the description of water and will be modeled with a terrain line outlining the shore. Tree zones will not be modeled in the Base Year Existing, Design Year No‐Build, and Design Year Build models.  Flow control functions within TNM will be modelled, as appropriate. Terrain lines will be modeled based on the existing topography and will be used to represent the proposed cut and fill lines associated with the proposed improvements.

Receptor elevation data and any other TNM objects modeled outside the project location survey data will be obtained from Digital Elevation Models downloaded from NC OneMap, county-level contour data, or the National Map databases. Receptors will be placed approximately 10 feet from the corner of the representative structure closest to the primary traffic noise source unless frequent outdoor use is closer to the primary traffic noise source. Multi‐story areas of frequent human use (i.e., balconies) will be modeled based on guidance in the 2022 Traffic Noise Manual.

Identify undeveloped lands where no building permits have been issued and where noise level contours are anticipated.

**Existing Noise Walls**

Identify the number of existing noise wall(s) in the project study area. If there are none, state this. Describe their locations and show them on the figures. State that existing noise wall(s) will be evaluated following guidance contained in Appendix D “Noise Analysis Procedure for Noise Study Areas With Existing Noise Walls” of the 2022 NCDOT Traffic Noise Manual.

**Parallel Barrier Analysis**

If necessary, Parallel Barrier Analyses (PBAs) will be conducted per guidance in the 2022 Traffic Noise Manual.

**Schedule:**

• Monitoring (weather permitting): date

• Validation Models and Draft Validation Report: date

• Draft Traffic Noise Report/Design Noise Report [select the appropriate report type and delete the other]: date

• Final Traffic Noise Report/Design Noise Report [select the appropriate report type and delete the other]: date

A Right‐of‐Entry letter will be obtained from NCDOT prior to initiation of field work.

**Attachments:**

Figure 1 ‐ Regional Location Map

Figures 2‐1 through 2‐X ‐ Detailed Study Area Maps with Noise Measurement Locations, NSAs, and Receptors

**The following items should be included at the end of this document:**

* Project Mapping, including:
	+ Aerial photography basemap
	+ Project mapping representing entire project (study area) on one image (Vicinity Map)
	+ All project maps shall include a title block, legend (as applicable), properly oriented north arrow, logical scale (or denoted as being not to scale), and map creation date.
	+ Proposed spatial limits of traffic noise study area that generally follow guidance from Table 7.1 of the 2022 Traffic Noise Manual (may need to be expanded following the initial noise modeling effort if the outer limit of predicted traffic noise impacts and/or benefits is not defined).
	+ Noise Study Area boundaries shown
	+ Include local road names and interstate and/or US/NC route designations
	+ Receptors indicating field measurement locations shall be shown with a solid white circle.
	+ Include all proposed analysis (receptor) locations and the associated noise abatement criteria (NAC) activity category for each location - black dots for NAC F and other Non-Noise Sensitive land uses.
	+ (For DNR only). New development permitted after the DOPK is clearly identified and labeled.
	+ Work plan figures can ultimately be used as the figures for the traffic noise report or design noise report. Suggest orienting the figures the same way that the roadway plans follow the alignments. Limit overlapping and duplicating receptors on multiple figures. Match lines are encouraged.
	+ Label schools, places of worship, parks, apartment complex and subdivisions names, large businesses, lakes, rivers, railroads, airports, etc.
	+ If design files are available, show the proposed design.
	+ If design files are available, reference in -L-line, Y-line and Ramp (as applicable) alignments and station labels for all project roadways, with an entry in the legend, for the Detailed Study Area Maps.

Quality Control Checklist **[to be submitted *as a separate file* with the initial work plan only and completed/signed by an individual prequalified by NCDOT as a TNR/DNR reviewer].**

Comment Response Matrix **[to be submitted *as a separate file* with each revised version of the work plan].**