Round 4 Strategic Noise Mapping of Major Roads

For the fourth round of the

Environmental Noise Regulations 2018

March 2021 (V2)

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This EPA advice note for strategic noise mapping of major roads outlines the various steps involved in the collection, collation and reporting of these datasets to the EPA, and it includes the following information;

Summary
1. Responsible authorities, and relevant contacts
2. Forecast extent of Round 4 (R4) major roads
3. Road traffic data for non-National major roads

Appendix 1; NTA Traffic Survey Database

Appendix 2: Summary of Data Collection and Expansion for Calculation of AADT Non-National and Regional Roads

Appendix 3: Types of Traffic Counts on Non-National and Regional Roads

Appendix 4; Sourcing Road Traffic Data – Options

Summary

The European Communities (Environmental Noise) Regulations 2018, S.I. No. 549 of 2018, implements EC Directive 2002/49/EC (END) on assessment and management of environmental noise in Ireland. The END requires Member States to prepare and publish, every 5 years, strategic noise maps and noise management action plans for transport noise sources (i.e. roads, railways and airports) and industry.

The aim of the END is to provide a common framework to avoid, prevent or reduce, on a prioritised basis, the harmful effects of exposure to environmental noise through the preparation of strategic noise maps and the development and implementation of action plans. We are currently implementing **Round 4** of this noise mapping and action planning cycle (2020–2025).

Under the Regulations, all Local Authorities are responsible for strategic noise mapping of non-National major roads, i.e. all roads with more than 3 million vehicle passages per year. Under the Regulations, NMBs are required to deliver certain reports and data to the EPA acting in its role as national competent authority under the Regulations.

The first reports to be submitted to the EPA under Round 4 were due in March 2020 and covered:

1. Responsible authorities, and relevant contacts
2. Forecast extent of R4 noise mapping

Additionally, in order to reduce the burden on Local Authorities, and improve the efficiency and consistency of the noise maps, it is proposed to undertake the R4 noise mapping using a centralised approach, similar to that used previously for R2 and R3. Under this centralised approach, each Local Authority is required to report certain information in support of the process.

The second reports to be submitted are in support of the R4 centralised approach, they are due in June 2021 and will cover:

3. For all non-National major roads within the Local Authority Area:
    a. Traffic flow data; and
    b. Road infrastructure data.

Details of the contents of these three reports are set out below.

The collection, collation and reporting of these datasets to the EPA and centralised noise mapping project form part of a statutory requirement under the Regulations. The reporting deadlines are either directly set out within the Regulations or have been established by the EPA to ensure that regulatory deadlines can be met by the relevant reporting entity.

Additional support and guidance on these reports can be provided by the EPA on request.

1. Responsible authorities, and relevant contacts

The Regulations designate noise-mapping bodies (NMB) and action planning authorities (APA) for the making of strategic noise maps and action plans.

For the noise mapping of major roads, the Regulations designate the NMBs to be:

- Transport Infrastructure Ireland (nee NRA) for:
  - National roads designated as major roads;
- Local Authorities for:
  - Non-National roads designated as major roads.

The report on authorities responsible for strategic noise mapping of major roads will therefore include TII and all Local Authorities.

The report submitted by the EPA to the EEA uses a pre-defined template called Dataflow 2 (DF2). It requires details of the following for each competent authority:

- Name of Competent Authority
  - To include Organisation name, plus Department & Unit if applicable
- Contact Name
- Address
  - Building Number
  - Street Name
  - City
  - Postal Code
- Telephone
- Fax
- Email

Note 1: The EEA publish the reports on a publicly accessible website. Any details to be included in the report should be considered in light of GDPR. It would be acceptable to include a generic contact name, e.g. Noise Manager, and email address, e.g. noise@localauthority.ie, should the authority have one.

A copy of the current DF2 report may be obtained from the EPA on request.

It was requested that each authority reviewed their relevant details and provided updates to the EPA as necessary prior to 31st March 2020.

2. Forecast extent of R4 major roads

The Regulations define major roads[1] as:

> *"a public road as defined in the Roads Act 1993, as amended, which has more than 3 million vehicle passages per year"*

In practical terms, a designated "major road" could be any section of a National, Regional or Local road with a total annual bi-directional traffic flow across all carriageways during 2021 of more than 3 million vehicle passages per year, or approximately 8,219 per average 24 hours.

> **Note 2:** This is a change from previous rounds of noise mapping. Major roads were previously limited to National and Regional roads, the new definition means that NMBs must also now consider Local roads above 3 million vehicles per year to be major roads to be included in the maps.

Under the Directive, the EPA was to report the forecast extent of R4 major roads to the EEA by 30th June 2020. Therefore, the EPA required reports from each of the NMBs providing details of the sections of roads which they expected to be included as R4 major roads.

The data supplied for each section of major road, forecast as having an annual traffic flow above 3 million vehicle passages, is set out in Table 1.

Guidance on reporting forecast extents of R4 major roads:

- Forecast based on best available data

  The forecast for R4 major roads was to be a best estimate based upon existing information, this included:

  - The R3 major roads extent, see attached "IE_I_DF1_5_MRoad_2015_upd190123.shp";
  - Any relevant traffic models;
  - Traffic data in LGCSB MapRoad or GIS; or
  - LA traffic count data

- Changes since R3[2]

  The forecast for R4 major roads should consider changes since the R3 noise mapping, including:

  - New, altered or closed roads since 2016;
  - National roads re-designated as Regional roads;

[1] How to define a stretch of road that is a "major" road; is a stretch of road defined as being from one junction to another junction? Is there a max. or a min. length of road that categorises it as being one for analysis as a "major" road? What defines the section of the road to be analysed with traffic counters, where is the cut-off?
Please refer to 'Roads in the agglomeration advice note (v2) for some further advice & guidance. *Include link.*

[2] Each LA needs to ensure that Regional roads within their County or those roads that cross County boundaries that are classified as a "major" road, are carrying the required traffic levels to be considered a "major" road. If they have now fallen below the threshold, then these roads should not be mapped in Round 4. However, there may be other Regional roads that have new exceeded the threshold, and these roads should now be identified and mapped for R4.

- Local roads not included during R3; or
- Changes in traffic flows.

- R4 assessment year is 2021

  The nominal assessment year for Round 4 of the strategic noise mapping is 2021, however the data used for the mapping may be up to three years old. In the case of traffic count data which was captured prior to 2021 it should be adapted from the base year to the nominal 2021 assessment year using appropriate traffic growth factors derived from local traffic count data.

- Reporting template

  The reports were to be submitted to the EPA using an ESRI Shapefile template[3]. Table 1 sets out the required content of each of the fields of data within the report. It was requested that the template was completed using the OSI PRIME2 road centrelines, as such all road sections within the attached template should be review and revised, extended, updated, replaced or expanded based on the most recent current OSI PRIME2 datasets.

- 3 million threshold based on total annual flow

  The traffic flow data is to be the total forecast annual flow for 2021 for each section of road i.e. N4, M50. This total annual figure is to include all the vehicles, travelling in both directions, on all of the lanes, across all of the carriageways, which make up the road. This total annual flow figure, for each section of road between main junctions or roundabout, is then compared with the 3 million vehicles per year threshold, and if it is above then that section of road is designated as a major road.

  For example, M50 motorway has two carriageways, with 2 centrelines in OSI PRIME2. If over a particular section there are 1.7 million vehicles/year northbound, and 1.5 million veh/yr southbound the total flow for that section of M50 = 3.2M veh/yr, therefore the road is a major road. In the report the centrelines from PRIME2 will be assigned 1.7m on the northbound carriageway, and 1.5m on the southbound, with both centrelines flagged as major.

  Sections of road may include multiple lanes, and/or multiple carriageways, or slip roads in the case of grade separated junctions. All of these several components within the OSI PRIME2 dataset should be designated collectively as major road, as together make up the section of road carrying a total annual flow above 3 million.

- NMBs to collaborate

  The R3 major roads extents include a number of cases where major road designation changes at Local Authority boundaries, or where roads change from National to non-National roads. It was therefore required that:

  > The noise mapping bodies for national and non-national major roads were to liaise to ensure that the mapping of slip roads, connecting roads, roundabouts and junctions were

[3] Some LAs may not have the necessary software available to work with the ESRI shapefile format, as they may use map info, or autocad etc. Please contact the EPA if you have any issues here.

coordinated to ensure continuity of coverage of the mapping, and consistency of the traffic flow data and modelling data used.

NMBs in adjacent local authority areas, were also to liaise to ensure that the mapping of roads across authority boundaries was coordinated to ensure continuity of coverage of the mapping, and consistency of the traffic flow data and modelling data used.

A copy of the current DF1_5 report for major roads may be obtained from the EPA on request.

It was requested that each authority reviewed their road traffic flow data and provided updates to the EPA as necessary prior to 31st March 2020.

Table 1: Data required for each section of road designated as a major road

Field Name	Field Definition	Methodology
CA Entity Code Mapping (CAECMAP)	Competent Authority Code for R4 Strategic Noise Mapping	Competent Authority Code from DF2 MRoad spreadsheet, e.g. IE_I_camrd36
EU Road ID (EUROADID)	European Road Number used to reference the road, where relevant.	Trans European Road (E-road) Network numbering convention defined by UNECE, as displayed in Euro Route panels on road signs e.g. E201, if applicable.
Road ID (NROADID)	Road Number used within Ireland to reference the road, where relevant.	Defined using the standard Irish road numbering system as used on road sign, e.g. M8, N2, R118.
Road Name (NROADNAME)	Textual Road Name, where relevant.	Road name catalogued by OSI
Annual Traffic Flow (ANUALTFLOW)	The number of vehicle passages in a year on the section of major road.	In the case of a single carriageway road, the bi-directional flow on the section of major road (the minimum flow threshold in the second implementation and thereafter is 3,000,000). In the case of a dual carriageway represented by a pair of OS PRIME2 centrelines, the uni-directional flow on the carriageway of the section of major road (the two road carriageways should total in excess of 3,000,000).
Length (LENGTH)	The actual length of the road link, in meters (not the node to node length).	
Road Start Node (x1) (LOCRDSTNX1)	Geographical co-ordinate in meters, the longitudinal location of the road start node.	Longitude, meters, ITM
Road Start Node (y1) (LOCRDSTNY1)	Geographical co-ordinate in meters, the latitudinal location of the road start node.	Latitude, meters, ITM
Road End Node (x2) (LOCRDEDNX2)	Geographical co-ordinate in meters, the longitudinal location of the road end node.	Longitude, meters, ITM
Road End Node (y2) (LOCRDEDNY2)	Geographical co-ordinate in meters, the latitudinal location of the road end node.	Latitude, meters, ITM
Road Coordinate System (LOCRDCOSYS)	Textual coordinate system name used by the local authority to derive start and end nodes	Irish Transverse Mercator (ITM)
Road Classification (RDCLASS)	The classification of the road section.	National, Regional, Local

3. Road traffic data for non-National major roads

In order to reduce the burden on Local Authorities, and improve the efficiency and consistency of the noise maps of major roads across Ireland, it is proposed to undertake the R4 noise mapping using a centralised approach, similar to that used previously for R2 and R3. Under this centralised approach, each Local Authority is required to report certain information in support of the process. This information is then used to extend the TII noise models of National major roads to include non-National major roads.

Following on from the forecast of R4 major roads at the end of March 2020, Local Authorities are required to collect and collate detailed traffic flow and road infrastructure data to enable the strategic noise maps to be developed accurately. These second data reports are due in **December 2021** and will cover:

- For all non-National major roads within the Local Authority Area:
    - Traffic flow data; and
    - Road infrastructure data.

Following submission of the forecast for extents of major roads, Local authorities had 15 months to prepare detailed road traffic flow data, and detailed data on road infrastructure. This provided sufficient time to undertake traffic counts and road surveys in order to provide robust information to form the basis of the R4 strategic noise mapping.

> **Note 3:** It is expected that during the completion of the detailed traffic flow dataset, there may be changes to the forecast extents as the final datasets for noise mapping are prepared. LAs may find additional roads need to be added, or some roads may need to be removed as they are no longer be above the flow threshold. This is considered normal, and all changes in extent should be documented and included in the final dataset reported in **December 2021** as required.

Guidance on reporting road traffic data for non-National major roads:

- **Traffic flow data**

  Strategic noise maps are to represent the annual average day during 2021.

  > **Note 2:** It is accepted that this will include lower than typical levels of road traffic flow being experienced due to the Coronavirus pandemic.
  >
  > **Note 3:** Data used for the R4 strategic noise mapping may be up to 3 years old. It is therefore acceptable to use road traffic flow data as the basis for the R4 noise mapping if it has been factored to represent the annual average 2021 situation.

  The R4 major roads noise maps should be based upon the best available traffic flow information, this should include:

    - The R4 major roads forecast extents;
    - Any relevant live traffic count site data, such as TII count sites;
    - Any relevant traffic models, such as the NTA regional traffic models;
    - Any data from traffic control systems, such as SCATS or SCOOTS;
    - Traffic data in LGCSB MapRoad or GIS;
    - Historic traffic count data; and

- New traffic count data.

Traffic flow data should be assigned to each section of road centreline, with an average hourly flow during each of the day, evening and night periods, for each of the vehicle classes in the CNOSSOS-EU methodology.

Note 4: The source of traffic flow data, e.g. R3, models, counts etc, should be documented and reported alongside the final dataset, along with details of any scale factors or growth factors used in preparing the final dataset.

- **Vehicle categories**

For R4 a new common EU noise calculation methodology is being used, CNOSSOS-EU 2015, which is different from the UK CRTN 1988 method used for previous noise mapping, and also commonly used for noise assessments in Ireland. The CNOSSOS-EU method groups road vehicles into different classes than CRTN, which means that even where R3 road traffic flow data is available, it will need to be re-assessed to derive traffic flow values for the new CNOSSOS-EU vehicle classes.

The CNOSSOS-EU vehicle classes are shown in Figure 1 below.

Figure 1: CNOSSOS-EU vehicle classes[4]

Category	Name	Description		Vehicle category in EC Whole Vehicle Type Approval (1)
1	Light motor vehicles	Passenger cars, delivery vans ≤ 3,5 tons, SUVs (2), MPVs (3) including trailers and caravans		M1 and N1
2	Medium heavy vehicles	Medium heavy vehicles, delivery vans > 3,5 tons, buses, motorhomes, etc. with two axles and twin tyre mounting on rear axle		M2, M3 and N2, N3
3	Heavy vehicles	Heavy duty vehicles, touring cars, buses, with three or more axles		M2 and N2 with trailer, M3 and N3
4	Powered two-wheelers	4a	Two-, Three- and Four-wheel Mopeds	L1, L2, L6
		4b	Motorcycles with and without sidecars, Tricycles and Quadricycles	L3, L4, L5, L7
5	Open category	To be defined according to future needs		N/A

(1) Directive 2007/46/EC of the European Parliament and of the Council of 5 September 2007 establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (OJ L 263, 9.10.2007, p. 1).
(2) Sport Utility Vehicles.
(3) Multi-Purpose Vehicles.

Note 5: For the purpose of traffic flow collection, Category 5 will be used to count the number of electric and hybrid (EV & HV) light vehicles within the traffic flow, if the data is

[4] LA traffic counts from the previous 3 years may have been done with reference to the NTA specifications and vehicle classification? However, the CNOSSOS-EU vehicle classifications is now a mandatory requirement.

available. EV & HV vehicle counts will be most relevant to low speed roads, below approximately 40 km/h, at medium and high speeds EV & HV noise emission will be the same as Category 1 light vehicles.

- **R4 assessment year is 2021**

  The Directive and Regulations are clear that the assessment is to be carried out for the "proceeding year" with regard to the reporting in 2022, therefore the Round 4 strategic noise mapping is to reflect the annual average situation during 2021.

  It may be the case that annual average 2021 road traffic flows could be lower than 2018 or 2019 due to the potential ongoing effects of the Covid-19 situation. This does not mean that traffic counts undertaken during 2021 are not "valid", rather they will help the R4 mapping more accurately reflect the 2021 situation than using traffic count data from prior to 2020.

  Data used for the mapping may be up to three years old. In the case of traffic count data which was captured prior to 2020 it should be adapted from the base year to the nominal 2021 assessment year using appropriate traffic growth factors derived from local traffic count data.

  Traffic flow data may be held in different formats, including 24 hours, 18 hours, AADT, am peak, pm peak, off peak, weekday, weekend, 7 day etc. It is commonly required to apply factors to flows to provide a common base situation and undertake linking of traffic flow data to the road centreline geometry.

- **Traffic speed**[5]

  The vehicle speed assigned to each section of road should be:

  - Mean traffic speed per time period, i.e. day, evening and night; and
  - Mean traffic speed per vehicle Category, in km/h;
  - If actual traffic speed is not available, speed limit values may be assigned.

  Note 6: The source of speed data, e.g. actual mean speed, estimated, or speed limits, should be documented and reported alongside the final dataset.

- **Direction of travel**

  The CNOSSOS-EU methodology includes a correction to the noise emission to account for the effect of the road gradient. The gradient of the road, and the subsequent noise correction, are automatically determined by the calculation software. However, for this to function correctly in the case of a 1-way road, or carriageway on a dual-carriageway or motorway, it is required to know the direction of vehicle travel compared to the direction of digitisation of the road centreline. Ideally the polyline is digitised in the same direction as the vehicles travel, if not the

[5] Most traffic count surveys are undertaken using Automatic Traffic Counters (ATCs) that record vehicle speeds, but it is more difficult to extract the speeds per vehicle type? In this case, the average speed of vehicles on a stretch of road should suffice.

road centreline's direction of digitisation could be reversed in GIS, or the Direction attribute could be used to inform the noise calculation software.

- **Road surface and age**

  The CNOSSOS-EU methodology includes a correction to the noise emission to account for the effect of the road surface. The default database within CNOSSOS-EU is based upon the fourteen road surface types defined within the national method used within the Netherlands. It is understood that TII have an ongoing process which aims to establish CNOSSOS-EU corrections for each of the road surfaces typically in use on National roads in Ireland.

  The Dutch and Irish road surfaces have been combined to produce lookup Table 3 from which the value of the Surface attribute in the report should be selected. It is recommended in the first instance that one of the Irish road surfaces is selected which best matches the section of road in question, where this is not possible the most appropriate Dutch surface should be selected.

  Where information is available, the age of the road surface since it was first laid should be included.

- **Junction type**

  The CNOSSOS-EU methodology includes a correction to the noise emission to account for the effects of acceleration and deceleration within 100m of crossings with traffic lights and roundabouts. For road centrelines within 100m of the intersection at traffic light junctions or roundabouts, the junction type should be identified. This will require the road centreline to be split in GIS 100m from the traffic light junction or roundabout. It is not necessary to identify the location of light controlled pedestrian crossings.

  The correction includes the effect of change in speed when approaching or moving away from a crossing or roundabout, therefore the mean vehicle speed per category should not be amended near junctions.

- **Reporting template**

  The reports should be submitted to the EPA using the an ESRI Shapefile template. Table 2 sets out the required content of each of the fields of data within the report. It is requested that the template is completed using the OSI PRIME2 road centrelines, as such all road sections within the attached template should be review and revised, extended, updated, replaced or expanded based on the most recent current OSI PRIME2 datasets.

- **NMBs to collaborate**

  The R3 major roads extents include a number of cases where major road designation changes at Local Authority boundaries, or where roads change from National to non-National roads. It is therefore required that:

  > The noise mapping bodies for national and non-national major roads are to liaise to ensure that the mapping of slip roads, connecting roads, roundabouts and junctions is coordinated to ensure continuity of coverage of the mapping, and consistency of the traffic flow data and modelling data used.

NMBs in adjacent local authority areas, are also to liaise to ensure that the mapping of roads across authority boundaries is coordinated to ensure continuity of coverage of the mapping, and consistency of the traffic flow data and modelling data used.

A copy of the report template for major roads may be obtained from the EPA on request.

It is requested that each authority undertakes appropriate steps to collect, confirm and collate the detailed traffic flow and road data required for noise mapping, and provides updates into the centralised process by **31st December 2021**.

Further information and guidance on the collection and preparation of data for strategic noise mapping can be found in the **EPA Guidance Note on Strategic Noise Mapping, Version 2, August 2011**, available at:

http://www.epa.ie/pubs/advice/noisemapping/epaguidancenoteforstrategicnoisemapping.html

Table 2: Data required for each section of road designated as a major road.

Field Name	Field Definition	Methodology
Group Name (GRPNAME)	Group	Major Road NonMajor Road
Group ID (GRPID)	Group ID	1 = Major Road 2 = NonMajor Road
CA Entity Code Mapping (CAECMAP)	Competent Authority Code for R4 Strategic Noise Mapping	Competent Authority Code from DF2 MRoad spreadsheet, e.g. IE_I_camrd36
EU Road ID (EUROADID)	European Road Number used to reference the road, where relevant	Trans European Road (E-road) Network numbering convention defined by UNECE, as displayed in Euro Route panels on road signs e.g. E201, if applicable
Road ID (NROADID)	Road Number used within Ireland to reference the road, where relevant	Defined using the standard Irish road numbering system as used on road sign, e.g. M8, N2, R118
Road Name (NROADNAME)	Textual Road Name, where relevant	Road name catalogued by OSI
Annual Traffic Flow (ANUALTFLOW)	The number of vehicle passages in a year on the section of major road	In the case of a single carriageway road, the bi-directional flow on the section of major road (the minimum flow threshold in the second implementation and thereafter is 3,000,000). In the case of a dual carriageway represented by a pair of OS PRIME2 centrelines, the uni-directional flow on the carriageway of the section of major road (the two road carriageways should total in excess of 3,000,000)
Length (LENGTH)	The actual length of the road link, in metres (not the node to node length)	
Road Start Node (x1) (LOCRDSTNX1)	Geographical co-ordinate in metres, the longitudinal location of the road start node	Longitude, meters, ITM
Road Start Node (y1) (LOCRDSTNY1)	Geographical co-ordinate in meters, the latitudinal location of the road start node	Latitude, meters, ITM
Road End Node (x2) (LOCRDEDNX2)	Geographical co-ordinate in meters, the longitudinal location of the road end node	Longitude, meters, ITM
Road End Node (y2) (LOCRDEDNY2)	Geographical co-ordinate in meters, the latitudinal location of the road end node	Latitude, meters, ITM

Field Name	Field Definition	Methodology
Road Coordinate System (LOCRDCOSYS)	Textual coordinate system name used by the local authority to derive start and end nodes	Irish Transverse Mercator (ITM)
Road Classification (RDCLASS)	The classification of the road section	National, Regional, Local
Direction (DIR)	Direction of travel	0 = for regular 2-way road 1 = 1-way flow with direction of digitization of polyline -1 = 1-way flow against direction of digitization of polyline
Surface (SURFACE)	Road surface type[6]	See **Table 3** for road surface types
Age of Surface (AGESURF)	Age of road surface	Number of years since road surface was laid, or 0 if not known
Junction Type (JTYPE)	Type of junction	0 = not a junction 1 = traffic light crossing 2 = roundabout
Junction Type Name (JTYPENAME)	Text name of junction type	None = JTYPE 0 Crossing = JTYPE 1 Roundabout = JTYPE 2
Junction Distance (JDIST)	Distance from centre of segment to junction node	<100 m, correction is applied >100 m, correction = 0
Vehs C1 Day (Q_1_D)	Vehicles per hour, Category 1, Daytime	Light vehicles per hour, Daytime
Speed C1 Day (V_1_D)	Average speed, Category 1, Daytime	Light vehicles km/h, Daytime
Vehs C1 Eve (Q_1_E)	Vehicles per hour, Category 1, Evening	Light vehicles per hour, Evening
Speed C1 Eve (V_1_E)	Average speed, Category 1, Evening	Light vehicles km/h, Evening
Vehs C1 Ngt (Q_1_N)	Vehicles per hour, Category 1, Night	Light vehicles per hour, Night

[6] Some LAs would have more standardised road types (a more simplified list) for Irish roads, so if that is the case for your LA, then these may have to suffice. However, the categories listed above is the preferred option.

Field Name	Field Definition	Methodology
Speed C1 Ngt (V_1_N)	Average speed, Category 1, Night	Light vehicles km/h, Night
Vehs C2 Day (Q_2_D)	Vehicles per hour, Category 2, Daytime	Medium heavy vehicles per hour, daytime
Speed C2 Day (V_2_D)	Average speed, Category 2, Daytime	Medium heavy vehicles km/h, daytime
Vehs C2 Eve (Q_2_E)	Vehicles per hour, Category 2, Evening	Medium heavy vehicles per hour, Evening
Speed C2 Eve (V_2_E)	Average speed, Category 2, Evening	Medium heavy vehicles km/h, Evening
Vehs C2 Ngt (Q_2_N)	Vehicles per hour, Category 2, Night	Medium heavy vehicles per hour, Night
Speed C2 Ngt (V_2_N)	Average speed, Category 2, Night	Medium heavy vehicles km/h, Night
Vehs C3 Day (Q_3_D)	Vehicles per hour, Category 3, Daytime	Heavy vehicles per hour, daytime
Speed C3 Day (V_3_D)	Average speed, Category 3, Daytime	Heavy vehicles km/h, daytime
Vehs C3 Eve (Q_3_E)	Vehicles per hour, Category 3, Evening	Heavy vehicles per hour, Evening
Speed C3 Eve (V_3_E)	Average speed, Category 3, Evening	Heavy vehicles km/h, Evening
Vehs C3 Ngt (Q_3_N)	Vehicles per hour, Category 3, Night	Heavy vehicles per hour, Night
Speed C3 Ngt (V_3_N)	Average speed, Category 3, Night	Heavy vehicles km/h, Night
Vehs C4a Day (Q_4A_D)	Vehicles per hour, Category 4a, Daytime	Mopeds per hour, Daytime
Speed C4a Day (V_4A_D)	Average speed, Category 4a, Daytime	Mopeds km/h, Daytime
Vehs C4a Eve (Q_4A_E)	Vehicles per hour, Category 4a, Evening	Mopeds per hour, Evening
Speed C4a Eve (V_4A_E)	Average speed, Category 4a, Evening	Mopeds km/h, Evening
Vehs C4a Ngt (Q_4A_N)	Vehicles per hour, Category 4a, Night	Mopeds per hour, Night
Speed C4a Ngt (V_4A_N)	Average speed, Category 4a, Night	Mopeds km/h, Night

Field Name	Field Definition	Methodology
Vehs C4b Day (Q_4B_D)	Vehicles per hour, Category 4b, Daytime	Motorcycles per hour, Daytime
Speed C4b Day (V_4B_D)	Average speed, Category 4b, Daytime	Motorcycles km/h, Daytime
Vehs C4b Eve (Q_4B_E)	Vehicles per hour, Category 4b, Evening	Motorcycles per hour, Evening
Speed C4b Eve (V_4B_E)	Average speed, Category 4b, Evening	Motorcycles km/h, Evening
Vehs C4b Ngt (Q_4B_N)	Vehicles per hour, Category 4b, Night	Motorcycles per hour, Night
Speed C4b Ngt (V_4B_N)	Average speed, Category 4b, Night	Motorcycles km/h, Night
Vehs C5 Day (Q_5_D)	Vehicles per hour, Category 5, Daytime	EV & HV per hour, Daytime
Speed C5 Day (V_5_D)	Average speed, Category 5, Daytime	EV & HV km/h, Daytime
Vehs C5 Eve (Q_5_E)	Vehicles per hour, Category 5, Evening	EV & HV per hour, Evening
Speed C5 Eve (V_5_E)	Average speed, Category 5, Evening	EV & HV km/h, Evening
Vehs C5 Ngt (Q_5_N)	Vehicles per hour, Category 5, Night	EV & HV per hour, Night
Speed C5 Ngt (V_5_N)	Average speed, Category 5, Night	EV & HV km/h, Night

Note; Those highlighted in yellow relate to traffic flow.

Table 3: Road surface types

Surface	Description	Methodology
R_NL00	NL reference road surface	RIVM proposed amendments to CNOSSOS-EU
R_NL01	NL 1-layer ZOAB	RIVM proposed amendments to CNOSSOS-EU
R_NL02	NL 2-layer ZOAB	RIVM proposed amendments to CNOSSOS-EU
R_NL03	NL 2-layer ZOAB (fine)	RIVM proposed amendments to CNOSSOS-EU
R_NL04	NL SMA-NL5	RIVM proposed amendments to CNOSSOS-EU
R_NL05	NL SMA-NL8	RIVM proposed amendments to CNOSSOS-EU
R_NL06	NL brushed down concrete	RIVM proposed amendments to CNOSSOS-EU
R_NL07	NL optimized brushed down concrete	RIVM proposed amendments to CNOSSOS-EU
R_NL08	NL fine broom concrete	RIVM proposed amendments to CNOSSOS-EU
R_NL09	NL worked surface	RIVM proposed amendments to CNOSSOS-EU
R_NL10	NL hard elements in herring-bone	RIVM proposed amendments to CNOSSOS-EU
R_NL11	NL hard elements not in herring-bone	RIVM proposed amendments to CNOSSOS-EU
R_NL12	NL quiet hard elements	RIVM proposed amendments to CNOSSOS-EU
R_NL13	NL Thin layer A	RIVM proposed amendments to CNOSSOS-EU
R_NL14	NL Thin layer B	RIVM proposed amendments to CNOSSOS-EU
R_IE01	IE hot rolled asphalt (HRA)	TII road pavement acoustic performance
R_IE02	IE old HRA good condition	TII road pavement acoustic performance
R_IE03	IE old HRA poor condition	TII road pavement acoustic performance
R_IE04	IE SMA-IE14	TII road pavement acoustic performance
R_IE05	IE old SMA-IE10	TII road pavement acoustic performance
R_IE06	IE old SMA-IE14	TII road pavement acoustic performance
R_IE07	IE old porous asphalt	TII road pavement acoustic performance
R_IE08	IE new SMA with rubber filler (RARX)	TII road pavement acoustic performance
R_IE09	Old IE-TSCS14	TII road pavement acoustic performance
R_IE10	IE new Surface Dressing on Regional roads	RMO road pavement acoustic performance

Appendix 1: Types of Traffic Counts on Non-National and Regional Roads

For the R4 strategic noise models, traffic flow data will be required for the majority of roads in agglomerations (> 80,000 vehicle passages per year, AADT >200) and major roads outside agglomerations (> 3 million vehicle passages per year, AADT > 8,219).

The traffic flow data can be divided in to two parts, summary data (the annual traffic flow) and more detailed averaged hourly traffic flow data (number of vehicles and speed) based on vehicle type for day-, evening- and night-time[7]. Below focusses on the existing types of traffic counts for urban and rural traffic settings.

Traffic counting can be undertaken manually, or more conveniently by automatic traffic counters. In urban areas where there is greater than approximately 3,000 vehicle passages in a twelve hours period then automatic traffic counters are more suited than carrying out manual traffic counts.

In highly urbanised areas[8] (e.g. city centres) then there may be an existing network of permanent automatic traffic counters (e.g. SCATS or SCOOT). These systems have the advantage of providing continuous counting of the traffic on selected roads for the entire year. Permanent automatic traffic counting provides accurate annual traffic flow values. However, in urbanised and even highly urbanised areas where there are permanent automatic counters then there may not be a traffic count for each road necessary. Under these circumstances then advanced data analysis may be required, such as carrying out *Origin-Destination (O-D)* studies. *Origin-Destination* studies are performed to determine traffic patterns and consider external to internal, internal to external, external to external and internal to internal vehicle movements in relation to the study area.

In rural areas, and urban areas where there are no permanent or temporary automatic traffic counters, then manual counts may be more appropriate. For low volume roads the variability in traffic flow from day to day can be very high, and short counting periods can introduce high errors in estimates. Variability can occur for example due to peak (congestion) and inter-peak times or seasonal variations.

The accuracy of traffic counts is improved as the count duration increases, when the count is undertaken in more than one period of the year and on roads with higher traffic volumes. Improved accuracy can be achieved by using local knowledge to determine whether there are days within the week or periods during the year when the flow of traffic is particularly high or low. Counting on *exceptional days* can have a significant impact on accuracy. Factors may include:

- Public Holidays;
- people travelling to and from urban areas for the weekend;
- wet weather effecting the desire to travel or flooding.

[7] The data that requires collection regarding traffic flow is highlighted in yellow in Appendix 1 (from EPA document *Environmental Noise Directive – R4 Strategic Noise Mapping Major Roads*.

[8] In Ireland, a highly urbanised area would typically be defined as a population > 100,000 people, while urban areas could be defined as a population from 10,000 - 100,000 people, and a rural area could be defined as a population of <10,000 people. However, these are very much arbitrary classifications, and it would be up to each LA to decide on their own classification depending on the size and population of the County (also population density)?

Short-term manual counts can cover a large network in a limited time. Counts from automatic traffic counters can then be used to establish adjustment factors to estimate annual traffic flow at the manual count sites. A common expanding method for estimating AADT is the factoring method. In this case, automatic traffic count sites are first manually classified into different groups based on similarities in traffic characteristics of roads. A seasonal factor category can then be assigned to each automatic traffic count station according to the site locations, assuming that seasonal variability and traffic characteristics at the short-term and automatic traffic count sites are similar in the same geographic area. However, the optimal number of groups and the way of assigning short counts to the seasonal factor groups is important.

Alternatively, short-term manual counts can be used to estimate annual traffic flows using expansion factors, for example using the *Generic Expansion Factor Method* (*PE-PAG-02039 Expansion Factors for Short Period Traffic Counts*, TII) based on the geographic region and the time of day, day of the week and month of the year. Again, the consideration of *exceptional days* is important for the accuracy of estimates.

For the purpose of carrying out traffic counts for the Round 4 strategic noise mapping, further considerations need to be given to the estimation of day-, evening- and night-time traffic counts by vehicle type and the collection of speed data (if possible).

See **Table 2** in main section above. Data required for each section of road designated as a major road. Those highlighted in yellow relate to traffic flow.

Appendix 2: Summary of Data Collection and Expansion for Calculation of AADT Non-National and Regional Roads

1. TII Guidance

(i) PE-PAG-02039 Expansion Factors for Short Period Traffic Counts

The *Generic Expansion Factor Method* outlined in this guidance document is to be used on sample datasets of traffic information (short traffic counts) – this method will develop an annual traffic flow profile that considers the time of day, day of the week and the month of the year. This allows for short period traffic counts to be extrapolated to any period of the year or to AADT. Short period traffic counts are for **less than 14 days** duration. This method should only be used for "high level studies" and not for project appraisals, otherwise use the method outlined in PE-PAG-02038 *Estimating AADT on National Roads*.

Factors which influence the generation of indices for expansion of short period traffic counts are:

- Geographical location
- Month of the year
- Day of the week
- Seasonality

Short period traffic counts should not be used on routes that experience congestion, as the results can be skewed. Also, the method is not appropriate for tolled routes.

The method basically consists of the calculation of a "P" factor (based on "peakiness" of the traffic count over a certain period which will produce a 24-hour average. Expansion factors are then used to produce a WADT (Weekly Average Daily Traffic – this is for Monday to Sunday). These expansion factors or indices are contained in Appendix B of this Guidance document. Geography is also not a factor when converting from a 24 hour estimate to the WADT. The WADT figure is then converted to AADT and these indices are based on seasonality (July/ August are not good months for counts). These indices or conversion to AADT are contained within Appendix C of the document.

In general, short period counts can be 6-hour, 12-hour, 24 hour or even 7 days in length. The advice in the guidance document is that these short period counts will only give an indicative estimate of AADT but if more detailed estimates are required, the *Localised Period Count* outlined in PE-PAG-02038 should be used.

The expansion factors produced within this TII Guidance document are to within 95% confidence level. **Note 7:** the use of single hour counts will not produce reliable results, the longer the count time period, the more reliable the results.

(ii) PE-PAG-02038 Estimating AADT on National Roads

If AADT data is to be used in project appraisals, then the *Localised Period Count* as outlined in this TII guidance document is to be used. This method uses local traffic counts (undertaken for a period of **not less than 14 days**) during a neutral period of time, combined with permanent TII traffic monitoring units (TMUs) to estimate AADT. This longer-term calculation for AADT is used in traffic models, road planning and pavement design. If the analysis is to be used for some form of capital investment, the localised period count method is the most appropriate.

This method consists of the collection of a localized period count of at least 14 days in length. These localized period counts can then be used to estimate traffic flows for that time period and this flow is then extrapolated to AADT using a selection of TII permanent counters in the region and a regression analysis. The regression analysis is used to predict AADT on the basis of influential variables e.g. peak hour flows (this can be done in excel).

2. NTA Guidance

The NTA has a regional modelling system in place which comprises of 5 regional transport models which is centered on the 5 main urban areas of Dublin, Cork, Galway, Limerick and Waterford. Very little guidance on the models is available on the website, but they are based on the 2016 Census data and they produce a detailed representation of travel demand for 4 time period (AM, Inter-peak, OM and off peak). See Data Request Process in appendix 4 below.

3. CSO POWSCAR – Place of Work, School or College Census of Anonymised Records

Again, this dataset is based on the 2016 Census and it only relates to the inflow and outflow of work-related commuting to and from a county as a whole.

4. PE-PAG-02016 Project Appraisal Guidelines Unit 5.2 Data Collection

This document outlines the factors to be taken into consideration for data collection relating to AADT.

Data is to be collected during neutral periods (e.g. Monday to Friday, avoid Winter months and bank holidays etc.). The survey should outline specifications relating to vehicle categories, PCU's etc. All data should be logic checked to ensure no major anomalies.

Data collection for AADT is usually using ATCs (Automatic Traffic Counters) with 7 classifications[9]:

(i) Motorbikes
(ii) Cars
(iii) Light Goods Vehicles
(iv) Bus
(v) Other Goods Vehicle 1
(vi) Other Goods Vehicle 2
(vii) Caravans

The normal practice for ATCs is that the survey is conducted over 2 weeks and counters are not to be placed on congested routes.

[9] The CNOSSOS-EU vehicle classes outlined in Figure 1 above should be used where feasible.

Appendix 3: Sourcing Road Traffic Data – Options

Traffic Data – National Roads

The TII Traffic Data website presents data collected from the TII traffic counters located on the National Road Network.

The Website uses a dynamic mapping interface to allow the User to access data in a variety of report formats; https://www.tii.ie/roads-tolling/operations-and-maintenance/traffic-count-data/

- Approx. 400 counters along the network
- Real time information
- CNOSSOS categories --- yes

Non-national roads

- Some local authorities carry out annual traffic counts e.g. Galway and Limerick, while some Regional LAs do their own traffic counts but this information is not generally made available.

DCC SCATS network

- Extensive throughout the city and agglomeration – 'data rich'.
- Generates a lot of useful data, however, requires processing.
- 2019 SCATS data should be available.

NTA Data

- Centralised database of traffic surveys – not just Dublin centric
    - Capital projects including MetroLink, BusConnects, DART+, Luas Finglas, Cork LRT and others (periodic counts)
- NTA Transport model for the national network
    - Regional models, Updates

TII National Transport Model (NTpM) for the national network:
"an all-Ireland strategic multi-modal transport model that can be used to assess and evaluate the impact of transport infrastructure, policy, demand management initiatives and strategic development plans at a local, regional and national level"

The NTpM is maintained by the Strategic & Transport Planning (STP) section of TII & incorporates separate models for car traffic, freight, national rail and inter-urban bus, along with an innovative transport behaviour model which allows future transport and environmental impacts to be quantified.
A full update of the NTpM is undertaken every 5 years following the publication of the results of the CSO Census of Ireland. The latest Census was undertaken in April 2016.

Inter-urban focus

Traffic Data Hierarchy for gaps

a) Use the NTA traffic count database.
b) Use SCATS data (processing required)
c) Gap analysis modelling; use a mix of TII & NTA models.
    - Can look to interpolate between two models, using a base year (2016) and a model projection (2030)?
    - Use available data first then infill with models after.

Appendix 4: NTA Traffic Survey Database

Data Request Process

Introduction

https://mytrafficcounts.com/contains a repository of Automatic Traffic Count (ATC), Junction Turning Counts (JTC), and origin-destination (O/D) surveys collated from private and public sources including the NTA's Traffic Survey database. Data from the National Transport Authority (NTA) database is available free of charge to be used by stakeholders working on public projects, this data is denoted by purple coloured points of interest on the map.

Requesting and receiving data:

In order to request details and access to the data please follow the steps below[10]:

1. Open the https://mytrafficcounts.com/ website and click on Historical Traffic Counts.
2. Select survey points of interest (please note NTA Surveys are denoted by a purple circle whereas all others are denoted in red), selected circles will turn green.
3. Once the survey points of interest are selected, click on "Request Data" in the top right corner of the screen and complete the data request form. Where the data is required for a public project please insert the Project title and relevant contact point.
4. A support representative will email the requester back within 48hours providing specific details such as survey type, classifications, dates etc.
5. Once data is approved for sharing, it will be shared directly with the requesters account on the Core data portal, access credentials at info@idasoltd.com for those not already registered on the system
6. Data will be provided in the format initially provided by the survey company. Development is ongoing to bring the data to a common format, once this work is complete, data will be provided in the NTA standard format.

[10] You can email Counts@nationaltransport.ie to request the relevant information and templates.