

C A R L O W
C O U N T Y C O U N C I L
COMHAIRLE CHONTAE CHEATHARLOCHA



County Buildings, Athy Road,
Carlow, R93 E7R7

Oifigí an Chontae, Bóthar Átha Í,
Ceatharlach, R93 E7R7

COMHAIRLE CHONTAE CHEATHARLACH

CARLOW COUNTY COUNCIL

NOISE ACTION PLAN 2018

Executive Summary

This Noise Action Plan has been prepared by Carlow County Council to address environmental noise from major roads with more than three million vehicles per annum. The action planning area covers sections of the M9, N80, R724, R448 R430 & R417. It is a follow up to the 2013 Noise Action Plan which addressed environmental noise from roads with more than three million vehicles per annum and the 2008 Noise Action Plan which addressed environmental noise from roads with more than six million vehicles per annum.

The plan has been prepared in accordance with the requirements of EU Directive 2002/49/EC (known as the Environmental Noise Directive, or “END”), which was transposed into Irish Law by the Environmental Noise Regulations 2006, SI No. 140 of 2006. The aim of the Directive and the Regulations is to provide for the implementation of an EC common approach to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise.

Environmental noise is unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic and noise in agglomerations over a specified size. Types of noise not included in the Regulations are noise caused by the exposed person, noise from domestic activities, noise created by neighbours, noise at workplaces or noise due to military activities in military areas.

According to the World Health Organisation in 2011 “Environmental noise leads to a disease burden that is second in magnitude only to that from air pollution, among environmental factors in Europe”.

Noise Mapping Bodies and Action Planning Authorities were assigned responsibility under the regulations to draw up noise maps for the third round in 2017 and prepare action plans for noise from the following noise sources:

- Sections of rail route above a flow threshold of 30,000 train passages per year. (none in Carlow).
- Major airports with more than 50,000 movements per year (none in Carlow).
- Sections of major roads with a flow threshold of 3 million vehicles per annum.
- Agglomerations with more than 100,000 inhabitants. (none in Carlow).

Transport Infrastructure Ireland (TII) formerly the National Roads Authority (NRA), as the noise mapping body for national roads, has prepared noise maps for the sections of the National roads in Carlow that were confirmed by verified vehicle count data to have more than 3 million vehicles per annum. TII, on behalf of Carlow County Council, also prepared noise maps for Regional roads with more than 3 million vehicles per annum.

TII has estimated from the noise maps and from geodirectory information that approximately 2,906 people living within the action planning area in Carlow may be located in environmental noise bands from 55 to >75dB Lden and that approximately 1,837 people may be located in noise bands from 50 to >70dB Lnight.

The objectives of the plan are to develop a sustainable approach to the planning and management of environmental noise within the region of County Carlow and to reduce the overall number of people exposed to high levels of noise. Management of the existing noise environment may be achieved by prioritising areas for which further assessment and possible noise mitigation may be required. Protection of the future noise environment may be achieved by acoustical planning, which further incorporates noise into the planning process via measures such as land-use planning, development planning, sound insulation measures, traffic planning and control of environmental noise sources.

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1 Introduction

1.1 Background

EU Directive 2002/49/EC (known as the Environmental Noise Directive, or “END”) deals with the assessment and management of environmental noise. The aim of the directive is to “Define a common approach intended to avoid, prevent or reduce on a prioritized basis the harmful effects, including annoyance, due to exposure to environmental noise.” The Directive requires that Member States:

- Undertake strategic noise mapping to determine exposure to environmental noise.
- Ensure information on environmental noise and its effects is made available to the public.
- Adopt action plans, based upon the noise mapping results with a view to preventing and reducing environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health, and to preserving environmental noise quality where it is good.

The Directive defines noise mapping, strategic noise maps and action plans as follows:

Noise Mapping – shall mean the presentation of data on an existing or predicted noise situation in terms of a noise indicator, indicating breaches of any relevant limit value in force, the number of people affected in a certain area or the number of dwellings exposed to certain values of a noise indicator in a certain area.

Strategic Noise Map – shall mean a map designed for the global assessment of noise exposure in a given area due to different noise sources or for overall predictions for such an area.

Action Plans - shall mean plans designed to manage noise issues and effects, including noise reduction if necessary.

END was transposed into Irish Law by the Environmental Noise Regulations 2006. For the purposes of the Directive and Regulations, environmental noise is unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic and noise in agglomerations over a specified size. Types of noise not included in the regulations are noise that is caused by the exposed person, noise from domestic activities, noise created by neighbours, noise at workplaces or noise due to military activities in military areas.

The regulations specify the process to be followed in addressing environmental noise from transport sources as follows:

Round One

Round one provides for noise mapping bodies to make strategic noise maps for the following:

- Major roads with >6 million vehicles per annum.
- Major railways with >60,000 trains per annum.
- Major airports with >50,000 movements per annum.
- Agglomerations with >250,000 inhabitants.

Round Two

Round two provides for noise mapping bodies to make strategic noise maps for the following:

- Major roads (> 3 million vehicles per annum).
- Major railways (defined as > 30,000 trains per annum).
- Major airports with >50,000 movements per annum.
- Agglomerations with > 100,000 inhabitants.

A draft Noise Action Plan was prepared and brought through a Public Consultation process after which the Plan was finalised and approved by Carlow County Council

Round Three

Round three provides for noise mapping bodies to make strategic noise maps for the following:

- Major roads (> 3 million vehicles per annum).
- Major railways (defined as > 30,000 trains per annum).
- Major airports with >50,000 movements per annum.
- Agglomerations with > 100,000 inhabitants.

The final Noise Action Plan is required to be in place by July 2018.

1.2 Roles and Responsibilities of Designated Bodies.

The Regulations designate the EPA as the national authority responsible for overseeing the implementation of the Regulations. The EPA is required to provide advice and guidance to the relevant noise mapping bodies and action planning authorities. The EPA is responsible for reporting to the European Commission the information relating to strategic noise mapping and action planning

Noise Mapping Bodies

Under the Regulations the following organisations have been designated as noise-mapping bodies:

- For the agglomeration of Dublin, Dublin City and County Councils
- For the agglomeration of Cork, Cork City and County Councils.
- For major national roads, Transport Infrastructure Ireland (TII) formerly the NRA, is the noise mapping authority, on behalf of the action planning authority concerned.
- For major non-national roads, each local road authority is the noise mapping authority concerned, therefore Carlow County Council is designated for County Carlow.
- For major airports, the relevant airport authority is the noise mapping body, on behalf of the action planning authority concerned.
- For major railways, Iarnród Éireann or the TII, as appropriate, is the noise mapping body on behalf of the action planning authority concerned.

Action Planning Authorities

Under the Regulations the following organisations have been designated as action planning authorities:

- For the agglomeration of Cork, Cork City Council and Cork County Council;
- For the agglomeration of Dublin, Dublin City Council and the County Councils of Dun Laoghaire/Rathdown, Fingal, and South Dublin;
- For major railways, the local authority or local authorities within whose functional area or areas the railway is located;
- For major roads, the relevant local authority or local authorities within whose functional area or areas the road is located; and
- For major airports, the local authority or local authorities within whose functional area the airport is located

Accordingly, the County Councils are designated as the Action Planning Authorities for all sections of major roads within the functional areas of the County Councils which experience a volume of traffic greater than 3 million vehicle passages per year.

1.3 Preparation of Strategic Noise Maps

Purpose

The purpose of the strategic noise maps is to identify the areas affected by different levels of environmental noise from major roads, railways, airports and agglomerations. The maps are a visual representation of estimated noise contour bands within the action plan area from 55dB L_{den} to greater than 75dB L_{den} , in 5dB bands. The maps have been linked to population data to estimate the numbers of people located in each environmental noise bands. This information is then used to produce noise action plans, which will endeavour to manage existing environmental noise from the major sources and protect the future noise environment.

Identification of areas to be mapped

The following major roads have been identified and included within the strategic noise mapping for County Carlow:

M9 between the boundary with County Kildare at Burtonhall and the boundary with County Kilkenny at Tinnagarney;
N80 between the boundary with County Laois at the River Barrow Bridge crossing and the boundary with County Wexford at Bunclody;
R417, Dublin Street, Carlow;
R417, Burrin Street, Carlow between Tullow Street and Kennedy Avenue
R430, Kennedy Avenue between Potato Market and Barrack Street
R448, Barrack Street, Carlow;
R448, Dublin Road, Carlow;
R448, Kilkenny Road, Carlow (South of Slip Road);
R724, Royal Oak Road, Bagenalstown, Co. Carlow;
R726 Tullow Street, Carlow (at Barrack Street junction).

Preparation

The TII ran computerised noise modelling programmes for the relevant roads with volumes above 3 million vehicles per year. TII generated contour layers for the

following decibel bands for L_{den} and L_{night} :

L_{den} (dB)	L_{night} dB)
55-59	45-49
60-64	50-54
65-69	55-59
70-74	60-64
≥75	65-69
	≥70

L_{den} : (day-evening-night noise rating indicator) shall mean the noise indicator for overall annoyance. This comprises of adding the average value for the 12 hour day time period with the average value of the 4 hour evening period plus a 5 decibel weighting or penalty, and the average value for the 8 hour night time period with a 10 decibel weighting or penalty.

L_{night} : (night-time noise indicator) shall mean the noise indicator for sleep disturbance. This is the average value in decibels for the night time period.

The resultant noise maps are a visual representation of the estimated noise level bands within each action plan area.

1.4 Development of Noise Action Plans.

The action plans refer to places near the major noise sources i.e. major roads, major railways and within any relevant agglomeration. The noise from these sources is regarded as affecting an Action Plan Area if it causes either an L_{den} value of 55dB(A) or greater or an L_{night} value of 45dB(A) or greater anywhere within an area. The Environmental Noise Directive and the Noise Regulations provide for strategic noise maps and action plans to be made available to the general public. They also provide for public consultation on proposed action plans and for the results of public consultation to be taken into account in finalising action plans.

END imposes the following duty on member states in relation to public consultation: Member States shall ensure that the public is consulted about proposals for action plans, given early and effective opportunities to participate in the preparation and review of the action plans, that the results of that participation are taken into account and that the public is informed on the decisions taken. Reasonable time frames shall be provided allowing sufficient time for each stage of public participation. If the obligation to carry out a public participation procedure arises simultaneously from this Directive and any other Community legislation, Member States may provide for joint procedures in order to avoid duplication.

1.5 Implementation of the Action Plan

Mitigation and protection measures of this Action Plan will be implemented if required and if funded, on a prioritised, phased basis over the five-year life of the Plan. Monitoring measures may be undertaken where noise-mapping data must be

verified by measurement prior to the implementation of any corrective action.

2 Existing Noise Management

The Directive aims to prevent and reduce, where necessary, environmental noise through the adoption of action plans. The action plans are to act as a means of managing environmental noise on a local basis taking guidance, where applicable, from local policy, national and EC guidelines and standards.

The EPA's Guidance Note for Noise Action Planning for the first round of the Environmental Regulations 2006 describes the various scenarios and situations under which environmental or community noise which require consideration and management as defined by The International Institute of Noise Control Engineering (I-INCE):

- New roads, railways, airports, industry or recreational activities adjacent to residential properties or noise sensitive premises such as schools, hospitals or recreational spaces;
- New residential properties or noise sensitive premises such as schools or hospitals, adjacent to existing roads, railways, airports, industry or recreational activities;
- The development of mixed residential/commercial use buildings, and multi-part residential buildings;
- The management of noise levels within noise sensitive properties, such as schools and hospitals, to address external noise break-in, as well as room to room transmission and noise levels within public spaces;
- Noisy neighbours, barking dogs;
- Gardening machinery, construction activities, ice cream vans and street cleaning;
- Air-conditioning equipment;
- Public house, night clubs, restaurants or other recreational activities; and
- Industrial operations, workshops and factories.

The list above relates to both environmental and community noise including noise nuisance. The Environmental Noise Regulations are however designed to cover environmental noise as defined as follows:

- Unwanted or harmful sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic, and from sites of industrial activity.

To this effect the scope of the regulations are specific in the areas under which noise management refers to. This action plan is therefore focused on the management of those sources directly applicable to the Regulations. In the case of Carlow County Council, this includes noise emissions from major roads with an annual traffic flow in excess of 3 million vehicles per annum. Whilst human activities associated with community noise and noise nuisance are not included within the regulations, there are a number of policies, regulations and guidance available from local, national and EU level which provide a framework with dealing with environmental and community noise which Carlow County Council can refer to when dealing with planning applications, new developments and where applicable noise nuisance. The following section provides an overview of existing legislation,

guidelines and policies dealing with noise from EU to local level.

EU legislation

The EC is responsible for a number of important elements of legislation which contribute to the overall management of environmental noise. Below lists the other key EC Directives relating to noise which are primarily related to the control of noise emission. Directives are controlled at EU level and are adopted by individual member states as Statutory Instruments.

- Noise operation restrictions at EU airports – EU Regulation 598/2014;
- Outdoor machinery – Directive 2000/14/EC;
- Recreational craft – Directive 2003/44/EC;
- Motor vehicles - Directive 70/157/EEC;
- Motor cycles - Directive 97/24/EC, and;
- Rolling noise from tyres - Directive 2007/46/EC

National Legislation or Guidance

Legislation and guidance within Ireland reflects the requirements of the EC Directives discussed above. In addition to these EC driven regulations, there are other pieces of national legislation or guidance which relate to the management and control of environmental noise.

Environmental Protection Agency Act 1992

This Act identifies noise as a form of environmental pollution and contains provisions for dealing with noise “which is a nuisance or would endanger human health or damage property or harm the environment.” Sections 106 to 108 of the Act are of direct relevance to noise, and may be summarised as follows:

- 106 gives the relevant Minister certain powers to regulate noise that may give rise to a nuisance or be harmful to health or property. These powers may include imposing noise limits, either exceedance values or emission values, controlling sources of noise and the imposition of charges for noise pollution;
- 107 gives powers to local authorities and the EPA to serve notice to take steps to control noise, and;
- 108 sets out a process whereby noise issues may be taken to the District Court, which may make an order requiring that the person or body responsible for the noise takes steps to eliminate or ameliorate the noise in question.

The powers set out within the EPA Act primarily relate to the control of noise nuisance, and therefore provide a mechanism for dealing with neighbourhood noise, music, industry or other such activities.

The Roads Acts 1993 to 2015

The Roads Acts 1993 to 2015 grant powers to the Minister to make regulations

requiring relevant road authorities to take measures to mitigate the effects of road traffic noise. The Act also empowers the Minister to specify limits for road traffic noise which would lead to a requirement for mitigating measures by roads authorities if exceeded.

At present there are no limit values or statutory standards for controlling road traffic noise, or its assessment on either new or existing roads.

Design Manual for Urban Roads and Streets (DMURS) states ‘The main factors which determine the level of road noise and air pollution are traffic volume, speed, levels of congestion and the proportion of HGVs. Many of these issues may be substantially addressed by directing large volumes of traffic (and in particular HGVs) away from cities, towns and villages via Urban Relief Routes and by reducing speeds (see Table 3.2). The creation of a permeable street network which promotes walking, cycling and public transport will also lead to reductions in vehicular traffic and less concentration of traffic and consequently of noise and air pollution’.

SPEED AND NOISE REDUCTION TRAFFIC AND NOISE REDUCTION

Speed Reduction	dB (A) Reduction
from 70-60 km/h	1.8
from 60-50km/h	2.1
from 50-40km/h	1.4

Traffic Volume Reduction	dB (A) Reduction
30%	1.6
40%	2.2
50%	3.0
75%	6.0

Table 3.2 of DMURS

National Roads Authority guidelines

The NRA published a guidance document “Guidelines for the Treatment of Noise and Vibration in National Road Schemes” in 2004, which provides a mechanism for preparing noise impact assessments from new national roads in addition to setting a design goal for same. Although not statutory in nature, this guidance document and the design goal set out has become the standard used throughout Ireland for the design and control of noise from national roads. This document specifies that it is considered appropriate to set the design goal for Ireland as day-evening-night 60dB Lden (free field residential façade criterion). This criterion applies to new national roads and set the following criteria with respect to determining when mitigation measures are deemed necessary. The following three conditions must be satisfied under the NRA guidelines in order for noise mitigation to be provided:

- the combined expected maximum traffic noise level, i.e. the relevant noise level, from the proposed road scheme together with other traffic in the vicinity is greater than the design goal of 60dB Lden;
- the relevant noise level is at least 1dB more than the expected traffic noise level without the proposed road scheme in place, and;
- the contribution to the increase in the relevant noise level from the proposed road scheme is at least 1dB.

The NRA subsequently published “Good Practice Guidance for the treatment of Noise during the Planning of National Road Schemes” which is intended to expand and supplement the advice provided in the above guidelines.

Spatial Planning and National Roads – Guidelines for Planning Authorities states ‘Planning authorities should engage with applicants and their agents to address, as an integral element of their development proposals, potential negative impacts arising from existing or planned national roads. This could include mitigating impacts through appropriate design of buildings, landscaping features and site layout as part of the development proposal.’ Furthermore, ‘The Environmental Noise Regulations, 2006 (S.I. No. 140 of 2006) should be taken into account within the development plan and development management processes, as well as relevant noise maps and noise action plans prepared under the Regulations for specific roads.’ ‘The Regulations apply to national and non-national roads with traffic volumes above a prescribed level. Accordingly, all proposals in respect to noise sensitive developments within the zone of influence of such existing or of planned new roads should identify and implement, where appropriate, mitigation measures in relation to noise and other effects listed above. The costs of implementing the mitigation measures concerned should be borne by the developer’

Planning

Project Ireland 2040, the National Planning Framework, promotes the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life

Local Authorities have it within their powers to set conditions relating to noise as part of a planning permission, however there is currently no national policy or guidance which addresses the issue of noise during planning. The Department of the Environment, Heritage and Local Government (DEHLG) has published the following documents relating to sustainable development in the urban environment:

- Sustainable Urban Housing: Design Standards for New Apartments (Guidelines for Planning Authorities), September 2007;
- Sustainable Residential Development in Urban Areas: Consultation draft guidelines for Planning Authorities, February 2008; and
- Urban Design Manual: A best practice guide (A companion document to the Draft Planning Guidelines on Sustainable Residential Development in Urban Areas), February 2008.

The documents set out above relate more specifically to the emphasis of design and construction of dwelling units in order to ensure a suitable level of sound insulation

is provided to protect the quality of life and amenity in residential units. The documents do not provide any specific design goals which are deemed to be suitable but make reference to Part E of the building regulations.

Building Regulations

The current Irish Building Regulations 2014 Technical Guidance Document E calls for certain constructions to offer “reasonable resistance” to both airborne and impact sound. Part E does not address environmental noise through the building facade from external sources such as aircraft, trains, road traffic or industry. Additional guidance is provided in BS 8233 ‘Sound Insulation and noise reduction for buildings Code of practice and sound control for homes.’

IPPC Licensing

Certain industrial, process and waste facilities are licensed by the EPA through the use of IPPC or waste licences. In 2012, the EPA published a Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) intended to assist licensed sites with the assessment of their potential and actual noise impact on the local environment.

The document provides guidance on survey procedures, data analysis, determining appropriate emission limit values and noise control engineering. This standard supersedes the previous noise guidance documents NG1, NG2 and also the previous versions of NG4. The document contains suggested noise limits of 55 dB(A) L_Ar,T for daytime, 50 dB(A) L_Ar,T for evening and 45dB(A) L_Aeq,T for night-time where a facility is not situated in a “quiet area” as defined in the document or where pre-existing background noise levels are not classified as “low”. In the case where facilities fall into either of the latter categories, lower operational noise levels are set out.

Wind Energy Planning Guidelines

The DEHLG document sets out proposed emission limits for operational wind turbines energy developments. The guideline propose a “lower fixed limit of 45 dB(A) or a maximum increase of 5 dB(A) above background noise at nearby noise sensitive locations”. The latter requirement may be relaxed in areas with low background levels. A fixed limit of 43 dB(A) at night-time is deemed appropriate by DEHLG. The best practice parameter for the assessment of wind turbine noise is LA₉₀(10min). It is important to note that lower daytime limits are called for in areas where pre-existing noise levels are below 30dB(A). In these instances a lower daytime threshold between 35 to 40dB LA₉₀(10mins) should be applied.

Quarries and Ancillary Activities

The Irish Concrete Federation publication “environmental code” contains a discussion of the primary sources of noise associated with quarrying and offers guidance in relation to the correct approach to be followed in respect of assessment and mitigation. Suggested noise limit values are 55dB L_Aeq,1hr and 45dB L_Aeq,15min for daytime and night-time respectively, although it suggests that more onerous values may be considered appropriate in areas with low levels of pre-

existing background noise. In respect of blasting, reference is made to EPA guidance to the effect that “blasting should not give rise to air overpressure values at the nearest occupied dwelling in excess of 125 dB(Lin) max. peak with a 95% confidence limit”.

Health

The World Health Organisation (WHO) has said in 2011 that ‘Environmental noise leads to a disease burden that is second in magnitude only to that from air pollution, among environmental factors in Europe’. The Report ‘Noise in Europe 2014’ EEA no 10/2014 by the European Environment Agency indicated that exposure to noise in Europe contributes to:

- Over 910,000 cases of hypertension caused by environmental noise each year,
- The total number of hospital admissions related to coronary heart disease and stroke is estimated to be 43 000 per year due to noise.
- About 10,000 premature deaths from heart disease & stroke per year could be related to noise exposure

WHO-Europe has more recently published the WHO Environmental Noise Guidelines which includes a review of evidence on the health effects of environmental noise such as: sleep disturbance, annoyance, cognitive impairment, mental health and wellbeing, cardiovascular diseases, etc. The guidelines give recommendations on dealing with noise from road traffic, railway, aircraft, wind turbine and leisure sources.

County Planning Policy

County Development Plan 2015 to 2021

The Carlow County Development Plan **2015 to 2021** sets out objectives in relation to transport, environment and development management which directly and/or indirectly influence the impact of noise.

Development Plan Environmental – Policy 4

It is the policy of Carlow County Council to:

- Have regard to the provisions of the Environmental Protection Agency (EPA) Acts 1992 and 2003 and the Environmental Protection Agency Noise Regulations 1994 when assessing planning applications. Regulate and control activities likely to give rise to excessive noise, other than those activities which are regulated by the Environmental Protection Agency
- Ensure new development does not cause an unacceptable increase in noise levels affecting noise sensitive properties. Proposals for new development with the potential to create excessive noise will be required to submit a construction and/or operation management plan to control such emissions
- Require activities likely to give rise to excessive noise to install noise mitigation measures and monitors. The provision of a noise audit may be required where appropriate
- Ensure that relevant planning applications comply with the provisions of any Noise Action Plan or noise maps relating to the area

- Require an assessment of impact of the developments on noise levels
- Restrict development proposals causing noise pollution in excess of best practice standards

When the County Development Plan is up for review the guidance and objectives in relation to noise can be reviewed and amended as necessary.

3 Description of the Action Planning Area

The Carlow County Council region covers an area of approximately 896km² and is populated by 56,875 people (2016 census). There are a number of towns within the County namely Carlow Town, Tullow, Borris, Bagenalstown which are located off the main national and regional roads.

3.1 Extent of Action Planning Area

Road Network

There is approximately 42km of motorway (M9) which transects the north west of the county and approximately 54km of national roads (N80 and N81) which transect the north east of the county.

A further 1,136 km of regional and local roads make up the remainder of the road network dispersed throughout the county.

The following major roads have been identified and included within the strategic noise mapping for County Carlow:

M9 between the boundary with County Kildare at Burtonhall and the boundary with County Kilkenny at Tinnagarney;

N80 between the county boundary with County Laois at the River Barrow bridge crossing and the county boundary with County Wexford at Bunclody;

R417, Dublin Street, Carlow;

R417, Burrin Street, Carlow between Tullow Street and Kennedy Avenue

R430, Kennedy Avenue between Potato Market and Barrack Street

R448, Barrack Street, Carlow;

R448, Dublin Road, Carlow;

R448, Kilkenny Road, Carlow (South of Slip Road);

R724, Royal Oak Road, Bagenalstown, Co. Carlow;

R726 Tullow Street, Carlow (at Barrack Street junction).

No other noise sources were taken into account.

The strategic noise mapping undertaken by TII included all areas near to the major roads detailed above. In the context of the noise action plan this refers to all areas exposed to noise from the major roads above a level of L_{den} 55 dB(A) or L_{night} 50 dB(A). Appendix V presents maps which show the extent of the areas included within the strategic noise mapping, which are included within the review of noise exposure.

The total length of identified major roads included with in the strategic noise mapping was 55km of national roads (i.e. the N80 and M9) and approximately 18km of regional roads.

Within these areas covered by the strategic noise mapping, the noise action plan

sets out a proposed approach to undertaking a review of the requirement for any necessary noise reduction measures and outlines a method by which noise mitigation measures will be assessed for feasibility. This is in line with the requirements of the Directive and Regulations.

Rail Network

Extents of major railways were identified by Iarnród Éireann and the Railway Procurement Agency for rail lines which exceed 30,000 train passengers per. Passenger number along the Dublin to Waterford railway line which passes through Carlow and Muine Bheag towns do not exceed this threshold value; hence rail maps have not been developed for this region.

Air Transport

No airports are located within County Carlow; hence airports noise mapping is not included in this action plan.

Agglomerations

The agglomeration threshold for the round three for strategic noise mapping is for urban centres with a population of 100,000 and above. No urban centres within the Carlow region meet this threshold level and hence no agglomerations have been mapped in this region or commented on in this Action Plan.

3.2 Description of the Topography / Geographical Location

The areas covered by the strategic noise mapping covers for the majority of the county, a predominately rural environment. This is particularly true for the mapped area along the M9 motorway.

The length of the N80 within County Carlow has been mapped which extends from the Wexford border at Bunclody to the Laois border at the River Barrow. This route is populated by ribbon style housing along its length with clusters of small towns and villages, namely Carrickduff Lower, Kildavin, Ballon and Carlow town.

The regional roads mapped are those in close proximity to Carlow Town suggesting they are along local commuter and retail routes. A small section of the R726 at Bagenalstown has also been mapped. Development along these routes consists of similar ribbon style housing at sections of the route set back from Carlow town. The majority of the regional roads mapped pass through Carlow town and include a mixture of residential, commercial and retail uses in higher densities in this area.

No significant areas of parkland or recreation are noted along the mapped routes.

3.3 Description of the General Population

There are 3 main population centres within the area covered by the strategic noise

mapping and potentially exposed to noise from major roads. These include the towns of Bagenalstown, Ballon and Carlow. The highest density of exposed people is in the roads within and approaching Carlow.

There are however many individual properties and ribbon developments along the N80 and regional roads mapped. For regional and national routes sensitive properties will tend to be exposed to higher levels of road traffic noise due to the proximity to the routes, in many cases facing directly onto the road way.

The construction of the M9 motorway allowed traffic to avoid passing through built-up areas and hence typically affect a lower number of people. In addition, the scheme was designed using the guideline noise levels set out in National Roads Authority document and will have incorporated noise mitigation into its design.

3.4 Location of Noise Sensitive Groups

Certain locations and building uses are considered to be more sensitive to environmental noise pollution than others. The main priority of the Directive is to manage environmental noise exposure in residential areas. The Directive, Regulations and EPA guidance all indicate that the Action Planning Authority should take due consideration of the locations which will be considered to be noise sensitive, if any, in addition to residential dwellings.

Following consideration, it has been determined that for the purpose of the assessment of potential noise mitigation measures under the Action Plan the following locations are considered noise sensitive:

- Residential properties;
- Hospitals, and;
- Schools.

It is important to note that only properties with these uses which are located within the area of strategic noise mapping near to the major roads will be considered in the review of potential noise mitigation measures. Within the county area there will be noise sensitive groups which fall outside the mapped areas and which will not be included within the noise mitigation assessment under the action plan.

The following schools have been identified along the mapped routes as part of the action plan:

- Ballon National School, Main Street, Ballon (N80);
- Askea National School, O'Brien Road, Carlow (N80);
- Askea Gaelscoil Ceatharlach, Post Primary School, O'Brien Road, Carlow (N80);
- Presentation College, Post Primary School, O'Brien Road, Carlow (N80);
- St. Marys National School, Bagenalstown (R724);
- De La Salle College, Post Primary School, Royal Oak Road (R724), Bagenalstown;
- Queen of Universe National School, Royal Oak Road, Muinebheag (R724);

- Carlow Vocational School (Tyndal), Post Primary School, Kilkenny Road, Carlow (R448);
- Institute of Technology, Kilkenny Road, Carlow (R488).

No hospitals were identified along the mapped roads as part of this study.

4 Responsible Authority for Action Planning

4.1 Name and Contact Details

Carlow County Council,
County Buildings
Athy Road
Carlow
R93 E7R7

Phone: 059 9170300
Email: roads@carlowcoco.ie

4.2 Description of Other Bodies of Relevance

In addition to Carlow County Council, TII is a key body in the role of the strategic noise mapping process. The Environmental Noise Regulations require TII to develop noise mapping for National Roads and Carlow County Council is required to develop noise mapping for regional roads. A centralised approach to noise mapping was adopted which resulted in TII also preparing noise mapping for non-national roads. For non-national major roads within County Carlow, the council provided the relevant traffic flow information and other 'model-ready' information to TII which was then incorporated into the overall strategic map for the county.

4.3 Description of Any Noise Reduction Measures Already in Force within the Action Planning Area, or Projects in Preparation

In the case of roads proposed by the Council, the assessment of noise impact is undertaken in accordance with TII Guidelines. All national roads are designed, where feasible, to meet the following criteria:

- 60dB L_{den} (Free field residential façade criteria)

This is applied both to the year of opening and the design year of the scheme, i.e. 15 years after opening.

Carlow County Council applies the same guidance to the design of Regional roads. In addition, the contract documents for road schemes would specify maximum noise limits such as those set out below, as referenced from the TII guidelines:

Day	Working Hours	Level (dB L_{Aeq})	Maximum (dB L_{Amax})
Monday-Friday	07:00 – 19:00	70	80
Monday-Friday	19:00 – 22:00	60	65
Saturday	08:00 – 16:30	65	75
Sundays & Bank Holidays	08:00 – 16:30	60	65

Current Noise Mitigation Plans

The Council's Development Plan (2015 to 2021) has established a Programme for the construction and upgrade of National and County roads, promotion of public transport and sustainable transport and traffic management in Carlow.

Road Construction

The M9 Motorway scheme between Kilcullen and Waterford has been developed over a number of stages. The last section, Carlow to Knocktopher, was opened in September 2010. The combination of noise mitigation measures (barriers and road surfaces) in addition to the alignment of the road away from high density settlement has provided an improvement to the noise climate at properties along the old N9 road by diverting traffic along its route. This scheme has therefore provided an indirect noise mitigation measure to parts of the population within the county.

Sustainable Modes/ Promotion of Public Transport

Carlow County Council has completed schemes funded under national sustainable transport development policies to reduce reliability on private transport and to encourage sustainable transport means and to promote public transport.

The National Cycle Network Plan produced in 2010 designated a number of cycle corridors throughout the country. Among these corridors, Corridor 10 includes the former N9/N10 National Primary route which links Carlow to Kilkenny. A joint application was submitted with Kilkenny Co. Council seeking funding to provide cycle lanes along both sides of this route. The application was successful, and Corridor 10 was provided in 2013.

The Active Travel Towns Funding Scheme was used to provide 3 main cycling routes, (spines), across Carlow Town – the former N9, the N80 and the Carlow Inner Relief Rd.

5 Summary of Noise Mapping Results

5.1 Overview of the preparation of the noise map

The roads identified as falling above the 3 million threshold have been listed above. A centralised approach to noise mapping of roads over the 3 million threshold was adopted resulting in TII developing noise maps for all roads identified. Traffic surveys, including information on traffic speeds, percentage HGV's, road surface types, road classifications and road width were provided by the Council to TII for Regional roads above the 3 million threshold.

The strategic noise maps were prepared by the TII using the recommended interim method of noise assessment set out in the second schedule of the Regulations. The model used was the UK national computation method "Calculation of Road Traffic Noise (CRTN), Department of Transport-Welsh Office, HMSO, London, 1998", adapted as set out in paragraph 2.1 of Annex II to the Directive. The model took account of information such as traffic flow data, vehicle type data, traffic speed, road width, road incline, road barriers and features which affect the spread of noise such as buildings and the shape of the ground (e.g. earth mounds), and whether the ground is acoustically absorbent (e.g. fields) or reflective (e.g. concrete or water). TII generated maps showing the noise contour bands in 5dB contours from 55dB to ≥ 75 dB for L_{den} and from 45dB to ≥ 70 dB L_{night} .

5.2 Presentation of results

Noise Contour Maps

The strategic noise maps within Carlow are attached in Appendix V. Each map shows contours of different noise bands, identifying areas that are relatively louder or quieter. The noise indicator contours shown on the noise maps are L_{den} and L_{night} . These are defined as follows (more detailed definitions can be found in Appendix I):

L_{day}	The A weighted average sound level over the twelve hour day period of 07:00-19:00
$L_{evening}$	The A weighted average sound level over the 4-hour evening period of 19:00-23:00
L_{night}	The A-weighted average sound level over the 8-hour night period of 23:00-07:00
L_{den}	The day, evening, night rating level. L_{den} is a logarithmic composite of the L_{day} , $L_{evening}$, and L_{night} levels but with a 5 dB(A) weighting added to the $L_{evening}$ value and a 10 dB(A) weighting added to the L_{night} value

The noise levels reflect an annual average 24-hour period. The L_{den} contours shown on the maps range from 55dB to 75dB in 5 contour bands. The L_{night} contours range from 45 dB to 70dB in 5 contour bands. Areas with noise levels of less than 55dB L_{den} and less than 45dB L_{night} are not mapped because these levels are below the

threshold for inclusion under the legislation.

Summary Exposure Statistics

The population exposure methodology was prepared by the EPA during the noise mapping process. The method is described in Guidance Note for Strategic Noise Mapping by the EPA.

In summary, population exposure in each noise contour band was generated by cross referencing geodirectory locations with population data to create a set of population figures for each stretch of major road in the country. A summary report was provided to each local authority to assist in preparation of the action plans. The estimated population exposure results for Carlow are shown below:

L _{den}	Approximate number of People
55 - 59	1,136
60 - 64	1,138
65 - 69	557
70 - 74	75
≥ 75	0

L _{den}	Approximate Area (km ²)	Approximate Number of Dwellings	Approximate Number of People
>55	28	1,220	2,906
>65	6	300	632
>75	0.2	0	0

L _{night}	Approximate number of People
50 - 54	1,042
55 - 59	639
60 - 64	156
65 - 69	0
≥ 70	0

L _{night}	Approximate Area (km ²)	Approximate Number of Dwellings	Approximate Number of People
>50	15	815	1,837
>60	2	92	156
>70	0	0	0

5.3 Limitations of the noise mapping process

The Directive and relevant regulations note that it is a requirement for the strategic noise maps to “provide a representation of the noise levels perceived within that area”. It is important to note, therefore, that the results of the mapping exercise are not to be used as a definitive means for determining specific noise levels at any one

building or residence. The mapping process, whilst following the best practice methodologies for the calculation of road traffic noise, will have an incorporated margin of error associated with potential variation in traffic flows, traffic speeds and topographical information for each mapped area. In addition, a number of assumptions must be made in terms of receiver heights which may not account for noise levels at lower or higher floors of a building. In addition, the presence or absence of screens such as garden walls, fences and other boundary treatments in the model can affect the calculated results. The results as presented are separated into noise contour bands calculated over 10m grids as opposed to individual building facades.

In this instance, the results of the mapping exercise are used as a tool to gain an understanding of the range of noise levels across the mapped area and the approximate number of people exposed to different levels of noise. It is not considered a suitable tool for the derivation of specific noise levels at individual buildings.

6 Identification of areas to be subjected to noise management activities

The results of the strategic noise maps help to provide an indication of the extent of environmental noise exposure within the area of the assessment. The information provides a useful resource of data which can be used in the development of management plans for noise control in target areas.

There are no statutory limits in place in relation to environmental noise exposures at EU or national level. The EPA recommends that the proposed onset levels for assessment of noise mitigation measures for noise due to road traffic should be as follows:

- 70dB, L_{den} and
- 57dB, L_{night}

In order to focus resources on areas in most need of improvement, a decision matrix will be applied. The matrix score is determined based on three variables:

- 1 The calculated environmental noise level from the noise mapping data.
- 2 The type of location e.g. town centre, commercial, residential.
- 3 The noise source i.e. road

1. Calculated environmental noise level

The score under this variable is assigned based on the calculated L_{den} and L_{night} levels for the location.

2. Type of location

This score is assigned based on the type of land use in the area and on the receptor. A higher score is assigned to open countryside on the basis of the expectation that residences in open countryside will have lower ambient noise levels than commercial areas and town centres. A higher score is also assigned to noise sensitive locations because of the requirement for low noise levels for them to function effectively e.g. schools, churches, funeral homes, hospitals, nursing homes.

3. Noise Source

The noise source throughout Carlow is the same for all assessments i.e. noise from major roads.

Data obtained from the matrix tool will enable Carlow County Council to prioritise actions. **A matrix assessment score of 17 or greater will be taken to indicate that the threshold levels may have been exceeded and that the location should be included in the shortlist for further assessment.**

Matrix A: Decision Support Matrix to identify and prioritise noisy areas

Priority Matrix				
Location				
Decision Selection Criteria		Score Range L_{den}	Score Range L_{night}	Sub Total
Noise Band	45-49	4	5	
	50-54	3	4	
	55-59	2	2	
	60-64	1	3	
	65-69	2	4	
	70-74	3	5	
	75-79	4	6	
	≥80	5	7	
Type of Location	Town Centre	1	1	
	Commercial	1	2	
	Residential	2	3	
	Noise Sensitive	3	3	
	Open Countryside	3	3	
	Recreational	2	2	
Type of noise source	Road	3	4	
			Total Score	

Protection Thresholds for Quiet Areas

Under the Regulations it is required to define quiet areas within agglomerations. As there is no qualifying agglomeration within Carlow County, there is no statutory requirement to identify quiet areas within the county. Within the strategic noise mapping area there may however be public open space or recreational areas where it may be deemed desirable to have relatively quiet noise levels. As the identification of quiet areas is a means of ensuring that noise levels are preserved where they are good, it is useful to consider using an objective means to define these areas as part of a management tool.

In the interest of consistency and good practice, Carlow County Council has reviewed the proposals and onset values previously set out within action plans prepared by actionable authorities. These onset values have been derived through a review of current national and international sources on environmental noise and are considered a reasonable means for the first stage of identification of areas where noise preservation may be needed. In this instance, the following onset noise levels for the assessment of noise level preservation where they are good are proposed at:

- 55 dB, L_{den} ; and
- 45 dB, L_{night} .

During the implementation of the Action Plan it is proposed to identify locations in the vicinity of the major roads which have noise levels below these criteria and

review their use. If appropriate or necessary, locations could be identified as quiet areas where the existing noise levels are to be preserved or reduced if possible. The types of public open spaces which could be considered appropriate to include within the assessment include areas such as:

- Recreation areas;
- Playing fields;
- Playgrounds;
- Public parks and gardens;
- Nature reserves;
- Cemeteries;
- River banks, and;
- Canals.

Matrix B: Decision Support Matrix to preserve quiet areas

Priority Matrix				
Location				
Decision Selection Criteria		Score Range L _{den}	Score Range L _{night}	Sub Total
Noise Band	<45	3	4	
	45-49	2	3	
	50-54	1	2	
	55-59	0	0	
Type of Location	Noise Sensitive	3	3	
	Quiet Area	3	3	
	Recreational	2	2	
Type of noise source	Road	3	4	
			Total Score	

The noise maps will be examined to identify any noise sensitive locations situated within the action planning area. Any noise sensitive locations identified will be tested against Matrix 'A' above -to establish whether mitigation measures need to be carried out to improve the existing noise situation. They will also be tested against Matrix 'B' to identify whether protective measures need to be taken to preserve the quiet environment at these locations.

7 Mitigation and Protection Measures:

7.1 General Principle of Action Plan

Carlow County Council has drawn up a number of general principles which it considers the Noise Action Plan aims to support.

- Carlow County Council's Noise Action Plan aims to avoid, prevent and reduce, where necessary, on a prioritised basis the harmful effects, including annoyance, due to long term exposure to environmental noise;
- Carlow County will adopt a strategic approach to managing environmental noise by following a balanced approach which promotes:
 - Noise reduction at source;
 - Land use planning adapted to noise targets;
 - Procedures to reduce noise impact; and
 - Operating restrictions to reduce noise emission.
- Carlow County Council's Noise Action Plan will have regard to the principles of sustainable development and integrate with other strategic policy objectives of Carlow County Council.

7.2 Processing Areas above Onset of Assessment Criteria

Following the prioritisation exercise based upon the results of the strategic noise mapping, areas of priority will be identified which will proceed to the next stage in the process. The aim of this stage is to confirm that the noise levels assessed by the strategic noise mapping are experienced by the properties and population within the areas being addressed.

Prior to the review of potential noise mitigation measures it is considered appropriate to confirm that the noise levels indicated by the strategic noise maps are being experienced by the population within the study area.

This would most likely be undertaken through the use of field survey work to confirm noise levels and to further identify specific areas prior to the commencement of any works (i.e. building uses, location of sensitive facades etc.). In a best practice situation surveys will be undertaken, both prior to and after any actions are carried out, in order to confirm the delivered results.

Once the extent of the existing noise impact has been confirmed for the locations under review, the potential noise mitigation measures would then be investigated, and a cost benefit analysis undertaken for each, with the aim of developing a selection matrix which leads towards a recommendation for action.

7.3 Preservation of Areas below Protection Threshold

Where areas are identified as being below the onset of preservation threshold, they will be considered for review for areas requiring preservation or “quiet areas”. In addition to this, if the locations identified have cultural or amenity value then the planning process will be used to help preserve the nature and level of the existing sound environment.

7.4 Management of Areas between the Thresholds

With the focus on mitigation of noise for the most exposed residents, and preservation through designated quiet areas of the least exposed areas, there is a risk that a large proportion of households or other sensitive locations, which sit between these two categories, are not provided for within the action planning process. It is acknowledged that the Action Plan needs to provide a means of preventing and avoiding long term noise exposure. To this effect, Carlow County Council acknowledge that a key part of noise management and control is regulated through planning and the development of planning guidance which is County based and considers all areas including those which may not be considered as part of this Action Plan. Details on the proposed use of planning are set out in the following sections.

7.5 Overview of Possible Mitigation Measures

Where the decision support matrix analysis identifies locations for which noise mitigation measures may be considered appropriate a review of available measures will then be undertaken.

In the case of Carlow County Council, the source of noise, which this action plan is based, relates to road traffic, hence mitigation measures have been focused on reducing the exposure to this noise. Consideration should therefore be given to the main sources which make up road traffic noise. The level of road traffic noise at a building or receiver is dependent on a number of factors including, the traffic volumes, speeds, gradient, surface type, screening and the distance from the source.

The key basis for noise management and mitigation is based on the following approaches:

- Reduction of noise source
- Reduction of noise across its propagation path and;
- Reduction of noise at the receiver.

In terms of the options available to Carlow County Council, a number of options in each category above will fall out of the control of the Council. Using the three key principals for noise minimisation above, the main options for consideration are discussed in the following sections.

Some of the key options for noise reduction from road traffic noise are governed by EU and National policies for example setting of engine and tyre noise limits are controlled at EU level and adopted nationally. Directive 2007/46/EC listed in Section 2 provides maximum noise levels from tyres to comply with more stringent limits on rolling noise as previously set out in Directive 2001/43/EC. These limits began to take effect in November 2012 with all new tyres and vehicles being required to meet the limits by 2016.

National and regional policies such as setting national noise limits for road traffic noise and setting national and regional transport policies fall outside the scope of the Council.

Measures which are available at a local level to Carlow County Council are set out below:

- Planning zones as part of strategic developments and local area plans; including siting noise sensitive zoned areas away from planned road corridors and other major noise sources;
- Planning restrictions or control measures for sensitive developments close to existing high trafficked roads.
- Review and enforcement of speed limits;
- Traffic re-routing in urban areas, development of pedestrian zones;
- Developing heavy goods cordons;
- Replacement of local authority diesel vehicles with Compressed natural gas, hybrid or electric;
- Night time delivery restrictions or limits;
- Road re-surfacing;
 - Smoothing broken surfaces;
 - Use of low noise road surfaces on higher speed routes of non-national roads;
- Façade insulation requirements:
 - Enhanced glazing as a mitigation measure;
 - Building construction detailing for new developments exposed to environmental noise;
- Noise barriers.

As part of the noise action plan, the options which are available to the Council will be reviewed and incorporated where possible into existing maintenance programmes or where applicable be adopted as part of possibilities for future development policies.

Research has been undertaken within EC funded projects looking into the design of noise mitigation measures and estimates of the extent of costs and benefits. The conclusion is often that there is no single solution which provides the optimal

solution, rather a range of measures, each of which may provide an incremental improvement in the situation.

These actions against noise will be considered during the assessment of possible noise mitigation for sites identified through the decision support matrix. Through the Noise Action Plan they should be encouraged to be considered within local and regional development plans, road maintenance proposals and the planning process.

7.6 Assessment of Options

For the locations under review a list of potential noise mitigation actions will be drawn up. In order to undertake an assessment of feasibility and develop a prioritised list of actions, a cost-benefit analysis will be undertaken in order to maximise value for money and deliver benefit from investment.

The cost-benefit analysis will address lifetime construction and maintenance cost against noise reduction benefit. The extent of noise reduction may be a reasonably simple assessment if global source related measures are being considered, or may be more detailed and complex if specific local measures are being reviewed. Assessment of noise benefit may involve the use of the strategic noise models to undertake scenario testing to determine estimates of the noise reduction from identified design options. However, there are a number of potential noise reduction measures which can be difficult to assess within the current calculation models, such as enhanced barrier design and many quiet pavement surfaces for example.

7.7 Planning for Noise Management

In terms of future developments, the planning system is one of the key factors which have influence on the control of noise issues before they arise and or to improve an existing situation.

The areas which are typically important in terms of planning and noise relate to bringing people to noise and bringing noise to people. Whilst there does tend to be procedures, policies and guidelines for the latter (both locally within the development plan and nationally at guidance level), the former tends to be overlooked more commonly during the planning process. Developments which involve new housing, hospitals, schools etc. close to existing roads can experience high noise levels which have not been planned for in the project design or construction stage.

In order to successfully use the planning process to help avoid, or reduce, noise exposure in a consistent manner, it is considered appropriate for assessments and relevant guidance on noise exposure levels be considered within the proposal and design stage of any relevant planning applications.

In the scenario where new residential properties, or other noise sensitive premises, are introduced into an existing climate of environmental noise, there is currently no clear guidance. Carlow County Council will seek to comply with any best practice

standards which may be introduced in this area to mitigate any potential adverse impacts arising from noise.

In the scenario where new, or altered, sources of noise are introduced to existing noise sensitive locations, there are currently a number of guidance documents and planning policies on national and local level which cover some of the situations which may arise, as discussed in Section 2. Where existing guidance does not cover the situation under consideration, Carlow County Council will determine the format of assessment that it would consider appropriate.

It is currently envisaged that the guidance is likely to formalise the approaches to noise impact assessment which are already widely used throughout Ireland. These are frequently based upon assessment methods within the UK, such as BS 4142 for the assessment of industrial noise, BS 5228 for construction noise or MPS2 for mineral extraction sites. Whilst the control of external levels of environmental noise constitutes one aspect of noise management within planning, and aims to provide benefit to amenity spaces, the control of noise levels within residential properties, and other noise sensitive premises, also plays an important role.

In the scenario where new noise sensitive premises are introduced to locations already exposed to levels of long term environmental noise likely to be above the thresholds of interest within the Regulations, i.e. 55 dB L_{den} and 50 dB L_{night} , it is considered appropriate to consider aiming to achieve target internal noise levels within noise sensitive rooms, such as living rooms and bedrooms.

In the case of new developments, these targets could be introduced through the use of appropriate planning conditions, and possibly some form of pre-completion testing as used in a number of other EU countries. The choice of targets for internal noise levels could be informed by the WHO Guidelines from 2000, or BS 8233, whilst the assessment of façade noise insulation capabilities could be undertaken using the methods set out within BS 8233.

8. Public Participation.

This plan was been made available to the public in draft form as an important stage in the development of the Noise Action Plan. Within the public consultation Carlow County made copies of the Draft Noise Action Plan available to access by the public within Public Libraries within Carlow County, and by placing an electronic version on the County website.

In addition, a number of statutory bodies and stakeholder organisations have been approached directly and requested to provide review and feedback on the proposals set out within the Draft Noise Action Plan. The stakeholders approached are:

Department of the Environment, Heritage and Local Government
Department of Transport, Tourism & Sport
Department of Education
Environmental Protection Agency
Laois County Council
Kildare County Council
Kilkenny County Council
Wexford County Council
Wicklow County Council
Mid-East Regional Authority
An Taisce
Institute of Public Health
Transport Infrastructure Ireland

All comments and reviews are welcome for this Plan and will, where relevant, be taken into consideration when finalising the final document. Where suggestions and comments have not been included, we will set out reasoned justification on the public file.

9 Implementation Programme

9.1 Roles and Responsibilities

Under the Environmental Noise Regulations, 2006, the TII (formerly NRA) is the noise mapping body for major national roads in Carlow. Carlow County Council is the noise mapping body for major non-national roads in the County. Carlow County Council is the Action Planning Authority for major roads in Carlow. The volumes of rail traffic in the county are below the thresholds for noise mapping and so the Regulations do not apply to this area at present.

Carlow County Council is responsible for preparation of this Noise Action Plan and for meeting the stated objectives of the plan, including implementing measures to improve existing noise levels at a local level (if appropriate) and identifying and implementing measures for the protection of the future environment from road noise.

Carlow County Council is also responsible for identifying major non-national roads that fall under the second phase of implementation of the regulations (i.e. more than 3 million vehicles per annum) and ensuring that noise mapping is carried out for these roads. TII is the noise mapping body for major National Roads under this second phase of implementation of the regulations on behalf of Carlow County Council.

9.2 Targets and Objectives:

It is the aim of this Action Plan to manage environmental noise from major roads, to protect good satisfactory noise environments where they exist and to protect the quality of the future noise environment by acoustical planning. The 2013 Action Plan included a Programme of works for 2013 to 2016. The road data collection elements of the programme were implemented. Cooperation with the EPA and TII in the production of the Noise Mapping and Draft Noise Action Plan 2018 also took place.

9.3 Programme of Works

Year one to two (2018 to 2019):

Apply the matrix assessment to identify from noise maps specific areas for which further assessment may be warranted (i.e. monitoring).

Year Two (2019):

Initiate monitoring in specific areas if required, to determine existing noise levels in dB(A). Identify appropriate mitigating measures for specific locations for which corrective measures are required.

Year three to four (2020 to 2021):

Commence implementation of the relevant actions as outlined in section 7, where

necessary.

Ensure that adequate traffic flow data is collected for all roads in the county.

Communicate with Iarnród Éireann to receive updates on rail transport figures.

9.4 Evaluation, Review and Corrective Action Programmes

The Council will review the effectiveness of noise action planning activities on an on-going basis. This will be done by performing an annual review of the progress made in relation to planned activities. The effectiveness of these measures at combating local environmental noise exposure will also be considered. If necessary, adjustments may be made to the schedule and nature of planned activities in order to better meet the goals of the Action Plan. This will be largely governed by available funding.

Where possible a monitoring programme will be established at those areas which have been designed a high priority resulting from the application of the decision matrix process.

The evaluation process can be measured by assessing the number of people who will benefit from the proposed mitigation. The successful outcome of the evaluation and review will be a reduction in the overall number of people exposed to road traffic noise above the onset threshold value. At present it is not possible to determine the number of people who will benefit from the potential mitigation measures as this is dependent on the sections of road where mitigation is possible, the extent of measures involved and the density of people along these routes.

10. Financial Provisions

10.1 Budgetary Provisions

Financial provisions have not been made available at national level to fund any noise assessment measures, mitigation measures or additional noise mapping requirements resulting from implementation of this action plan. Staff resources have not been increased to assist in implementation of the plan. Because of the lack of these resources, any mitigation measures must be strictly prioritised.

10.2 Cost Benefit Analysis

The position of the EC working group on health and socio-economic valuation of noise recommends the following in relation to road noise:

- For road transport, the (interim) use of the median value change in noise perceived by households of €25 per dB (L_{den}), per household per year. The validity range of this interim value is between 50/55 L_{den} and 70/75 L_{den} and it should be adjusted as new research on the value of noise becomes available.
- The estimate of the change should apply at all initial noise levels, and regardless of the size of any change brought about;

As a preliminary step in carrying out cost benefit analysis on possible noise mitigation measures, Carlow County Council propose to assign the monetary benefit to noise mitigation measures as recommended above €25 per dB (L_{den}) per household per year. The number of households in the immediate area that would potentially benefit from a particular mitigation measure will also be factored into the analysis.

11 Summary and Conclusions

The plan has set out an overview of the requirements of the Regulations, a summary of existing noise control statutory and non-statutory guidelines and reviews the results of the strategic noise mapping within Carlow County.

A total of 10 sections of road have been mapped as part of the strategic noise mapping process consisting of approximately 55km of national roads (The M9 and the N80) and approximately 18km of non-national roads.

The population density along the routes mapped is centred largely towards Carlow Town Centre where a number of routes interact. For sections of road outside of Carlow town, the population density is more sparsely dispersed comprising mainly of ribbon style development and small clusters of built up areas in smaller towns and villages along mapped roads. The lowest density of the population mapped is along the M9 motorway which has been constructed away from built up areas to a larger extent

The Noise Action Plan has set out the proposed onset of assessment threshold values for L_{den} and L_{night} which will be used as an evaluation tool to identify locations exposed to existing levels of environmental noise which may be considered for noise management and or reduction.

The Noise Action Plan sets out a range of potential noise mitigation measures which can be used by the council as part of future management, maintenance and policy developments subject to cost benefit analysis and funding. In addition, the Plan proposed to incorporate specific guidance values and procedures for dealing with noise during the planning stage of new or altered developments.

Appendix I

Glossary of acoustic and technical terms

Acoustical Planning: Controlling future noise by planned measures such as land-use planning, systems engineering for traffic, traffic planning, abatement by sound-insulation measures and control of noise sources.

Agglomeration: a dense urbanized area having a population of greater than 100,000 persons.

Decibel (dB): A unit of measurement of sound. When measuring environmental noise, an “A” weighting network is used (called dB(A)) which filters the frequency of the sound to mimic human hearing, which is most sensitive to frequencies between 500Hz and 5,000Hz. The decibel scale is logarithmic. If two noise sources emit the same sound level (eg 80dB(A)), the combined sound level from the two sources is 83dB(A) and not 160dB(A). The human perception of “loudness” is that a 10dB increase in sound level is perceived as being twice as loud. A 3dB increase, which is a doubling of the sound level, is perceived as a barely perceptible change in loudness. A decibel level of zero represents absolute silence. A level of 140dB(A) would cause ear pain.

The table below gives examples of the relationship between the subjective valuation of noise and the actual objective levels (taken from the END Briefing note of the 07/02/08):

Noise Level dB (A)	Description
120	Threshold of Pain
95	Pneumatic drill (at 7m distance)
83	Heavy diesel lorry (40km/h at 7m distance)
81	Modern twin-engine jet (at take-off at 152m distance)
70	Passenger car (60km/h at 7m distance)
60	Office environment
50	Ordinary conversation
40	Library
35	Quiet bedroom
0	Threshold of hearing

Daytime: Between the hours of 7am and 7pm

DB(Lin)max peak: Instantaneous Maximum Peak sound pressure measured in decibels on a sound level meter, without the use of a frequency weighting system. Used to measure air overpressure levels from blasting.

Evening time: Between the hours of 7pm and 11pm **Environmental Noise:** Shall mean unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic, and from sites

of industrial activity such as integrated pollution prevention and control licensed industries.

Hertz: Unit of frequency of sound.

IPPC Licence: Integrated Pollution Prevention and Control Licence (obtained from EPA).

L_{den}: (day-evening-night noise rating indicator) shall mean the noise indicator for overall annoyance. This comprises of adding the average value for the 12-hour day time period with the average value of the 4 hour evening period plus a 5 decibel weighting or penalty, and the average value for the 8 hour night time period with a 10 decibel weighting or penalty.

L_{day}: (day-noise indicator) shall mean the noise indicator for annoyance during the day period. This is the average value in decibels for the daytime period

L_{evening}: (evening-noise indicator) shall mean the noise indicator for annoyance during the evening period. This is the average value in decibels for the evening time period.

L_{night}: (night-time noise indicator) shall mean the noise indicator for sleep disturbance. This is the average value in decibels for the night-time period.

Major road: a national or regional road with more than 3 million vehicles per annum.

Major railway: A railway line, which has more than 30,000 train passages per year.

Major Airport: A civil airport, which has more than 50,000 movements per year, excluding those movements purely for training purposes on light aircraft; in this context, a movement means a single take-off or landing of an aircraft.

Night time: Between the hours of 11pm and 7am

Noise annoyance: Noise annoyance is defined by the World Health Organisation (WHO) as 'a feeling of displeasure evoked by noise'¹⁶.

Peak Particle Velocity (ppv): Peak particle velocity is a measure of vibration magnitude, which is the maximum rate of change of ground displacement with time, usually measured in mm/sec.

Appendix II

Bibliography

- 1 Directive 2002/49/EC relating to the assessment and management of environmental noise.
- 2 SI 140 of 2006, Environmental Noise Regulations 2006.
- 3 EPA Guidance Note for Noise Action Planning, EPA Version 2 August 2011, Revised Section 10 October 2017, Updated sections February 2018.
- 4 CSO Census data 1996, 2002, 2006, 2011, 2016 www.cso.ie
- 5 TII Expansion Factors for Short Period Traffic Counts
- 6 Quarries and Ancillary Activities: Guidelines for Planning Authorities, DOEHLG April 2004.
- 7 Carlow County Development Plan 2015-2021
- 8 WHO Estimating the Burden of disease from Environmental Noise 2012
- 9 RIVM Health Implication of Road, Railway and Aircraft Noise in the EU 2014
- 10 CEDR Technical Report 2017-01

Appendix III

Details of Public Consultation

Carlow County Councillors were presented with the Draft Plan at the November 2018 meeting of Carlow County Council. The draft plan was also presented to Members of the Transportation, Environment and Water Services SPC and Members of the Economic Development, Enterprise Support and Planning SPC.

The Public Consultation process commenced with the publication of a notice in the Carlow Nationalist newspaper on 20th November 2018. The closing date for receipt of submissions was 7th January 2019, one submission was received.

The draft plan and associated maps were available for inspection at the following locations for the duration of the public consultation process:

Carlow County Council, County Buildings, Athy Road, Carlow
McGrath Hall, Bagenalstown
Tullow Civic Offices
Carlow County Library, Tullow Street, Carlow
Wexford County Council branch Library, Bunclody

The plan was also accessible on the Council website: www.carlow.ie.

A report on the submission received was presented to the Meeting of Carlow County Council on 14th January 2019. The report included amendments identified by the EPA as part of their review of the Draft Noise Action Plan. The amended plan was adopted by Members

Appendix IV

Details of Public Consultation Advert

**COMHAIRLE CHONTAE CHEATHARLACH
CARLOW COUNTY COUNCIL****ENVIRONMENTAL NOISE REGULATIONS, 2006 (S.I. No. 140 of 2006)****NOTICE OF PUBLIC CONSULTATION ON DRAFT NOISE
ACTION PLAN 2018 IN RESPECT OF COUNTY CARLOW**

Carlow County Council invites submissions from the public on the draft Noise Action Plan 2018, prepared under SI No. 140 of 2006, to address noise from major transport sources.

This is a strategic plan to address noise from major roads in Carlow. The plan excludes noise from domestic activities, noise created by neighbours, noise at workplaces or noise inside a means of transport or due to military activities in military areas.

The main purpose of the plan is to inform and consult the public about exposure to noise from major roads and the corrective measures that may be considered to address these issues.

The draft plan and associated maps will be available for inspection at the following locations for a period not less than four weeks beginning on the date of publication of this notice:

Carlow County Council, County Buildings, Athy Road, Carlow
McGrath Hall, Bagenalstown
Tullow Civic Offices
Carlow County Library, Tullow Street, Carlow
Wexford County Council branch Library, Bunclody

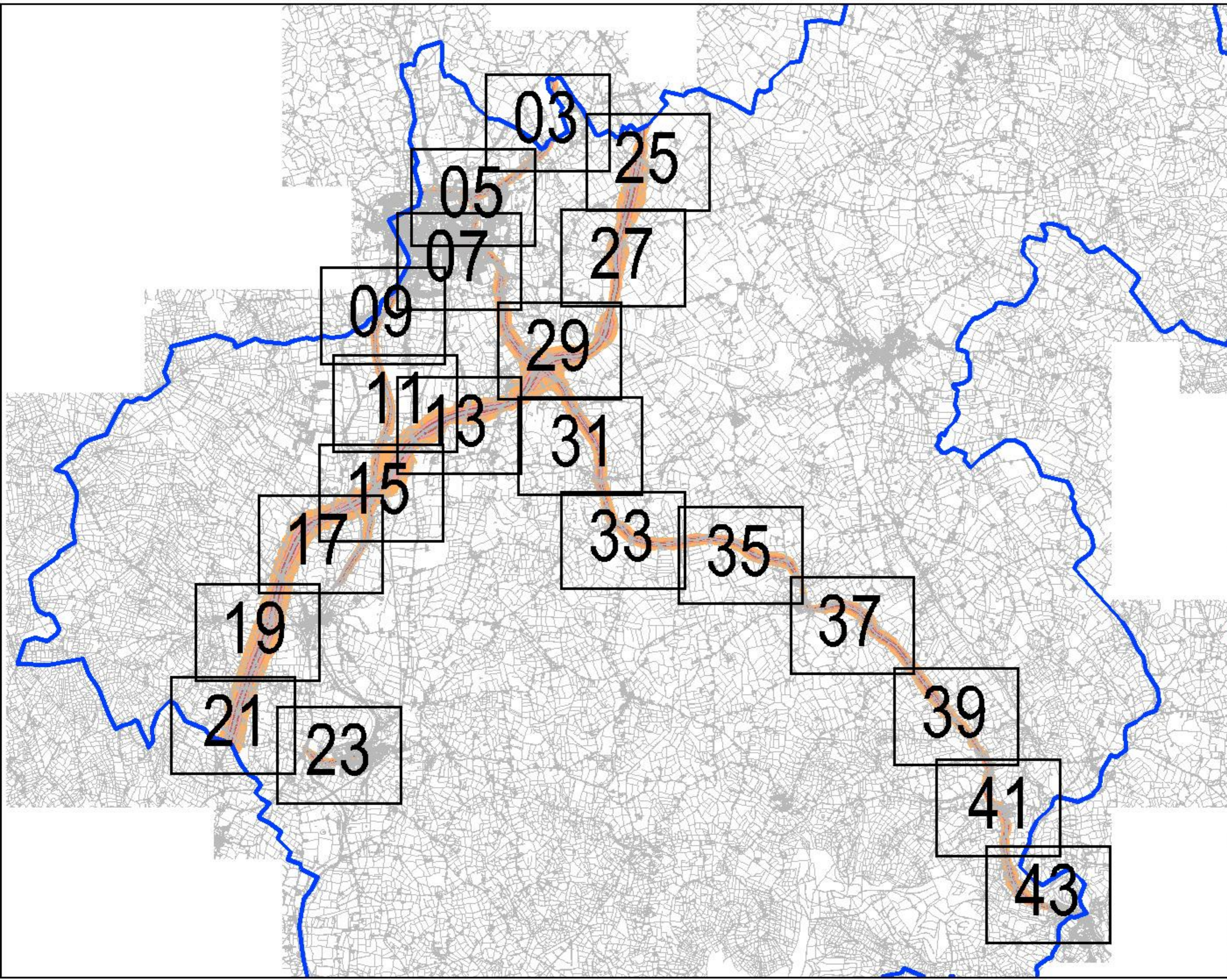
The plan may also be accessed on the Council website: www.carlow.ie.

Submissions or observations on the draft plan are invited from the general public. These submissions may be made in writing to:

Senior Engineer,
Transportation Section,
Carlow County Council,
Council Offices,
Athy Rd,
Carlow,
Co. Carlow.

or by email to seniorengineer@carlowcoco.ie up to and including 07/01/2019

Appendix V
Strategic Noise Maps



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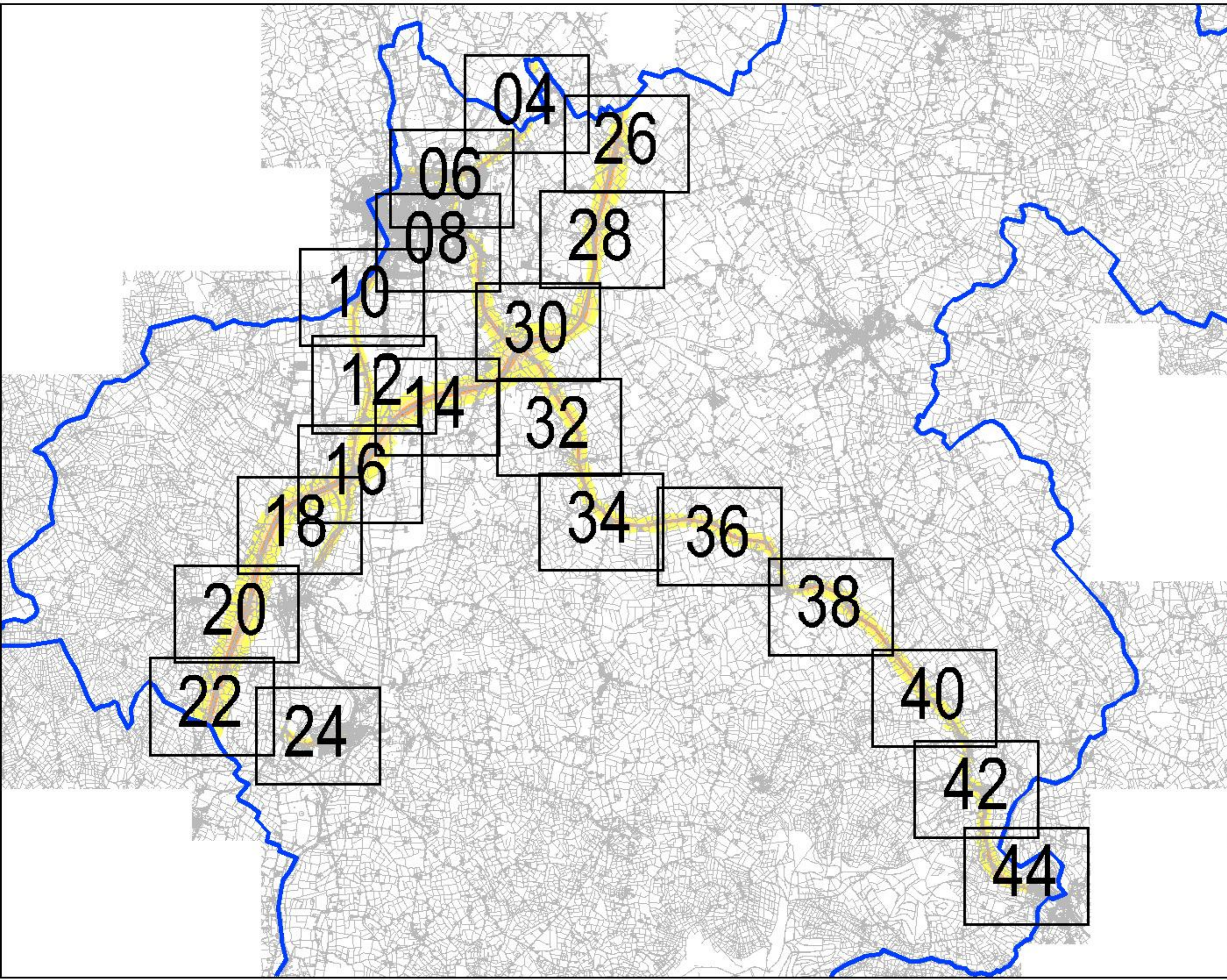

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Tiles: **L 001 TILE
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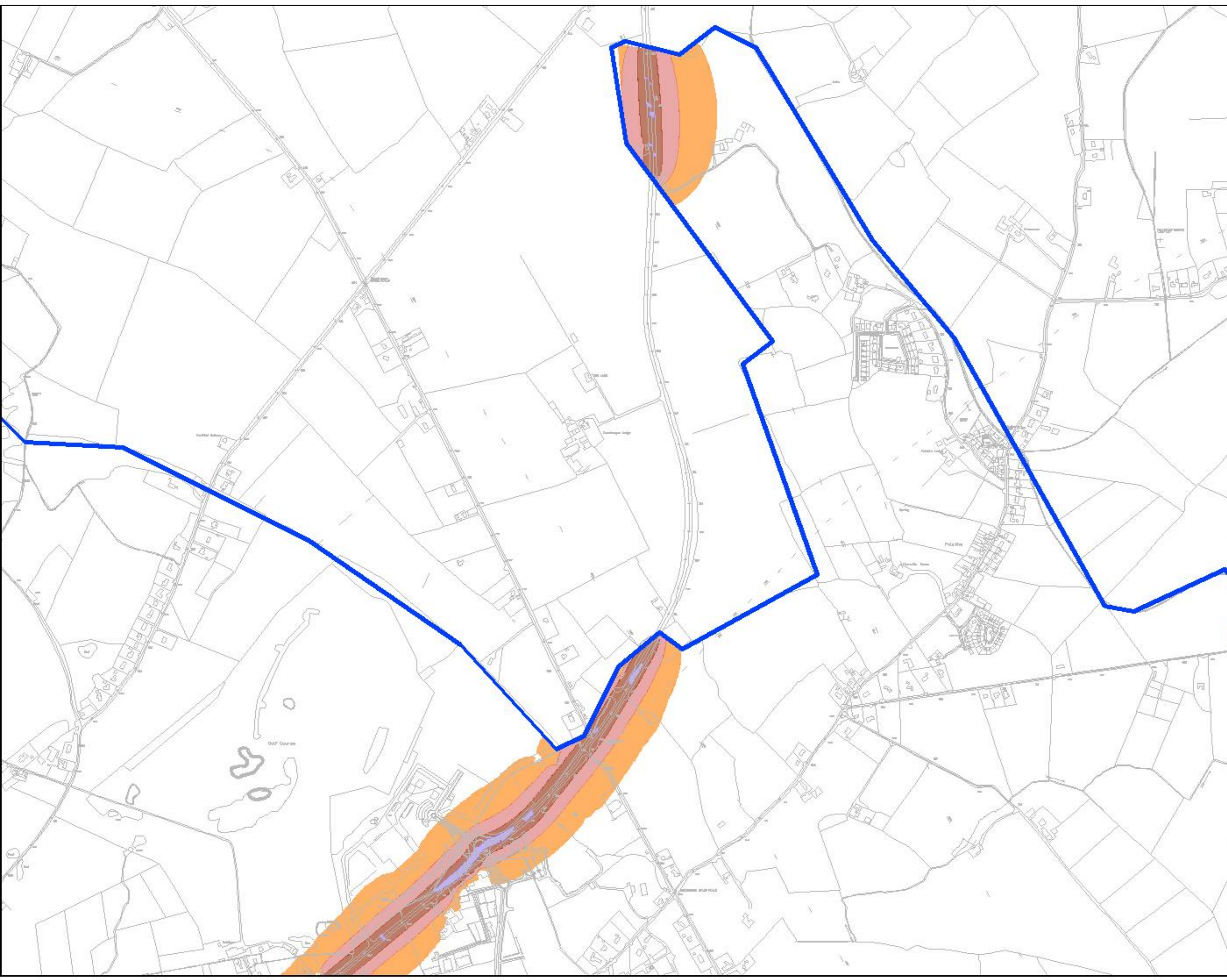
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Noise Zone dB	
55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	


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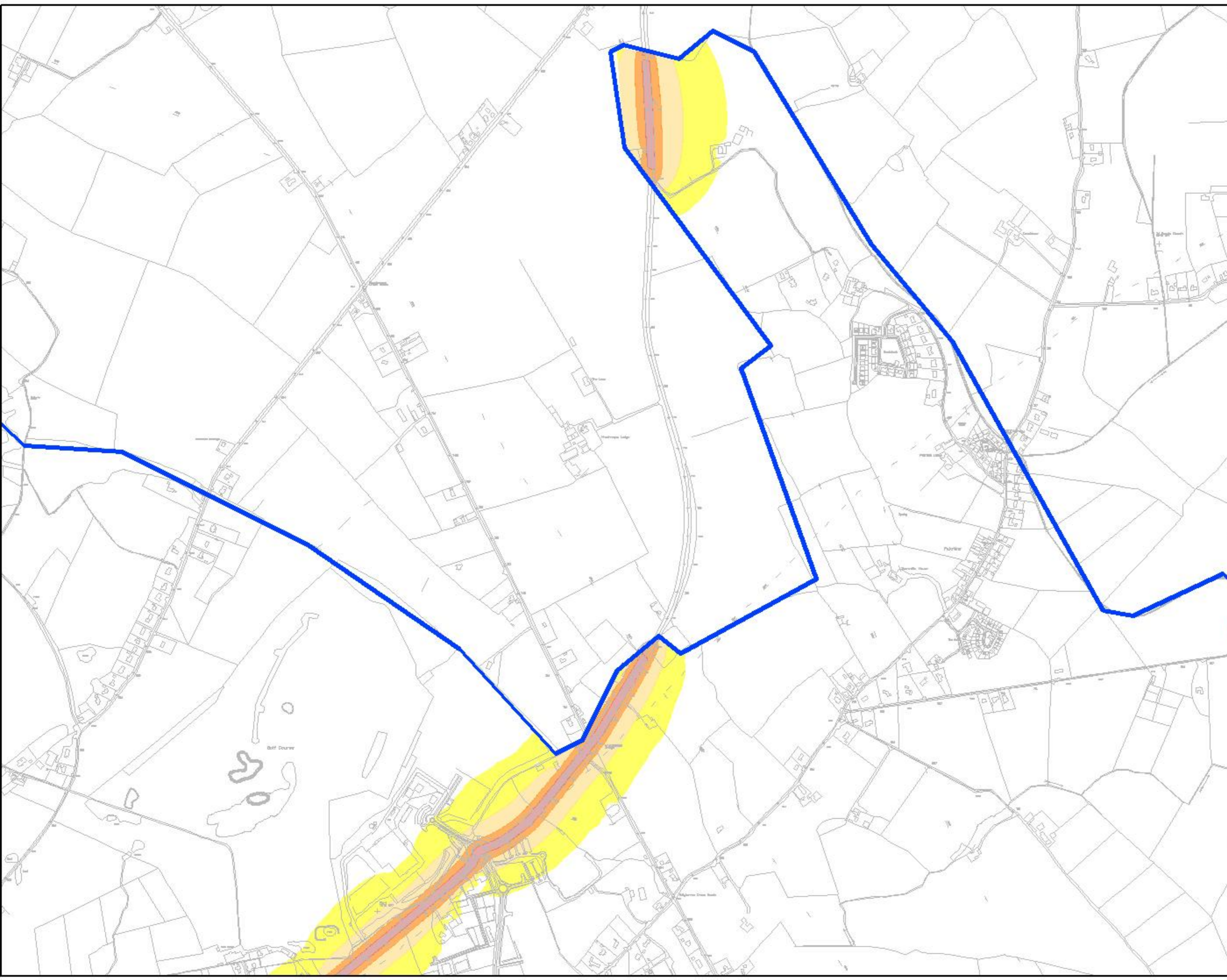

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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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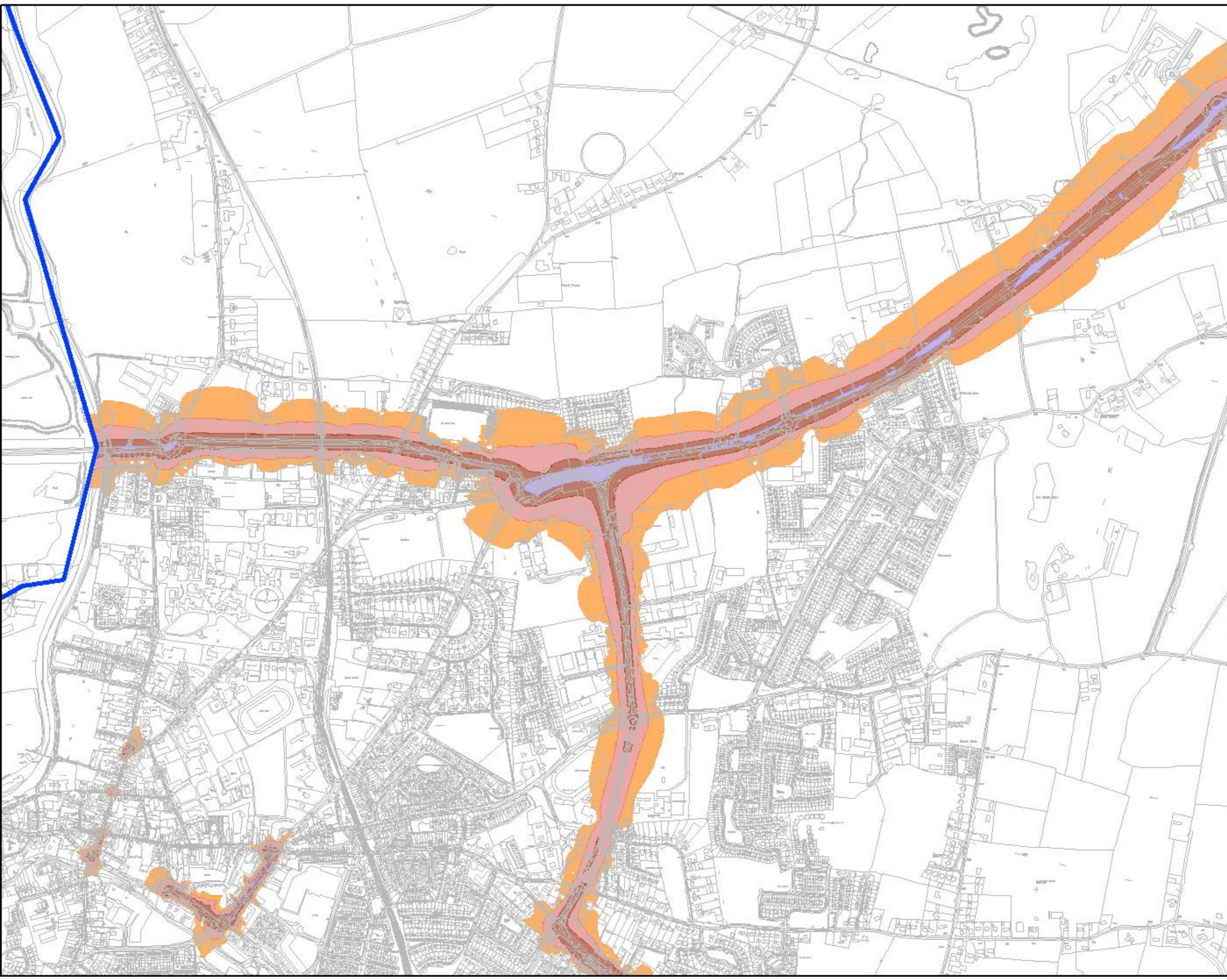
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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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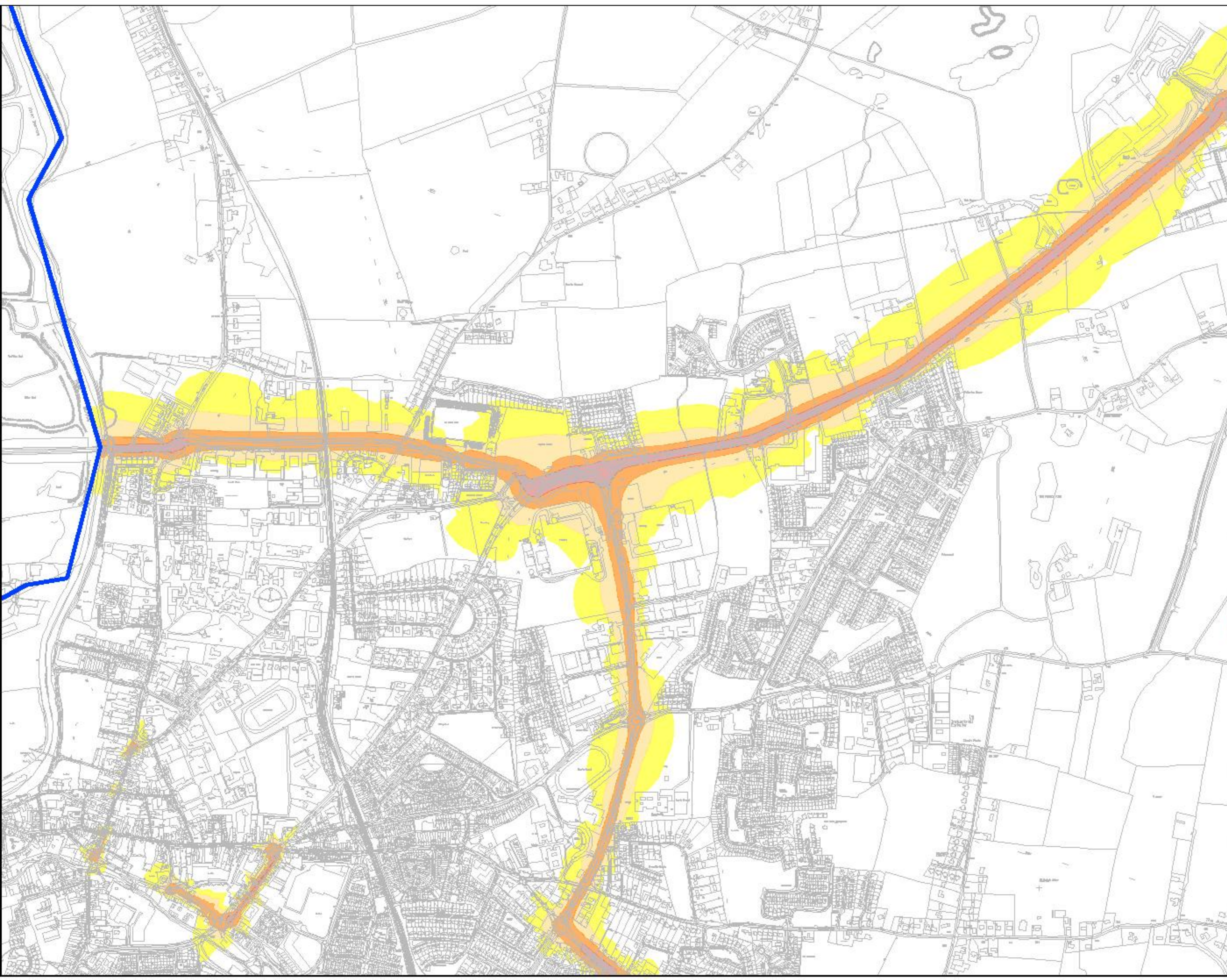
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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
≥ 75	

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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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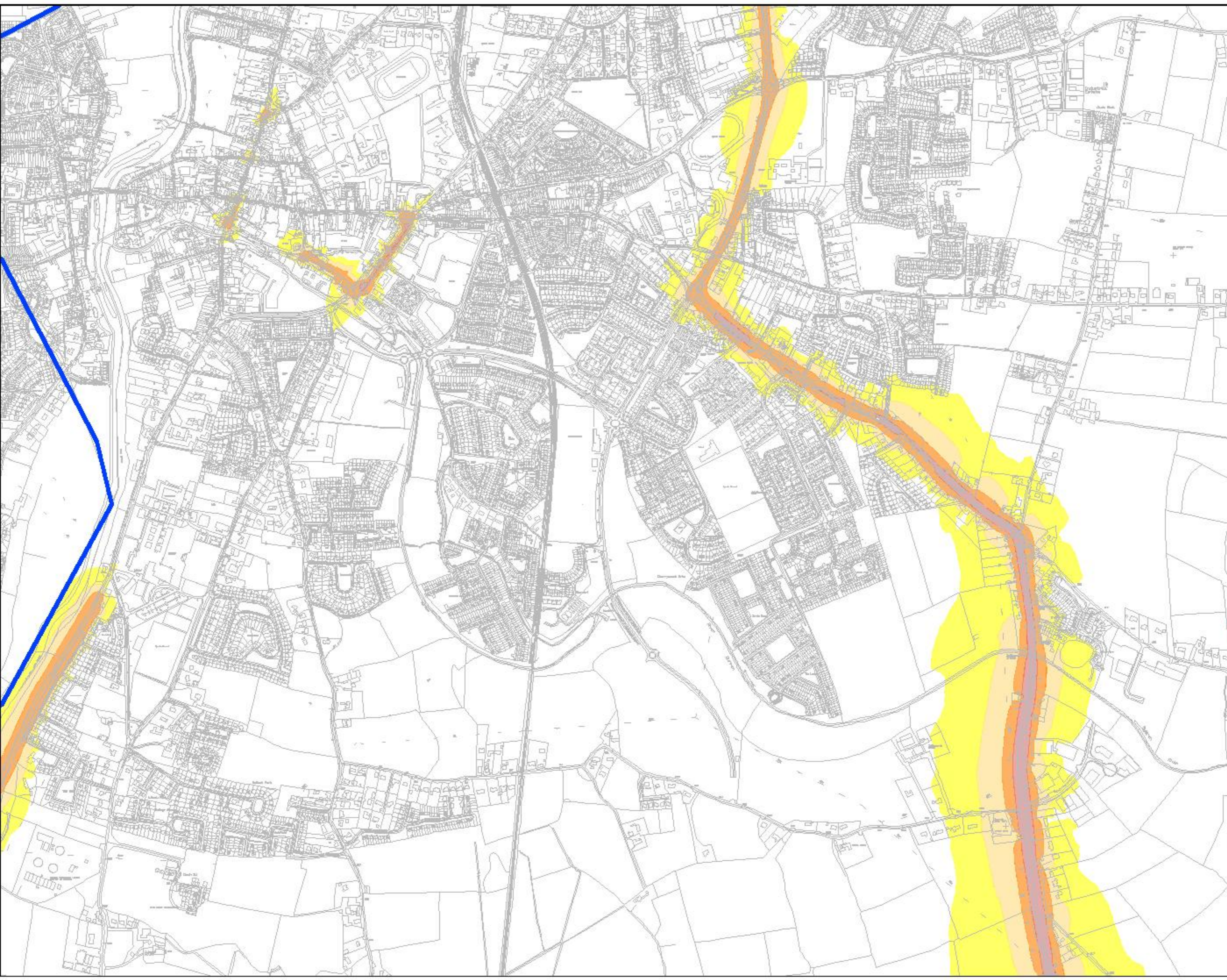
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Noise Zone dB

45 to 49	
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Noise Zone dB

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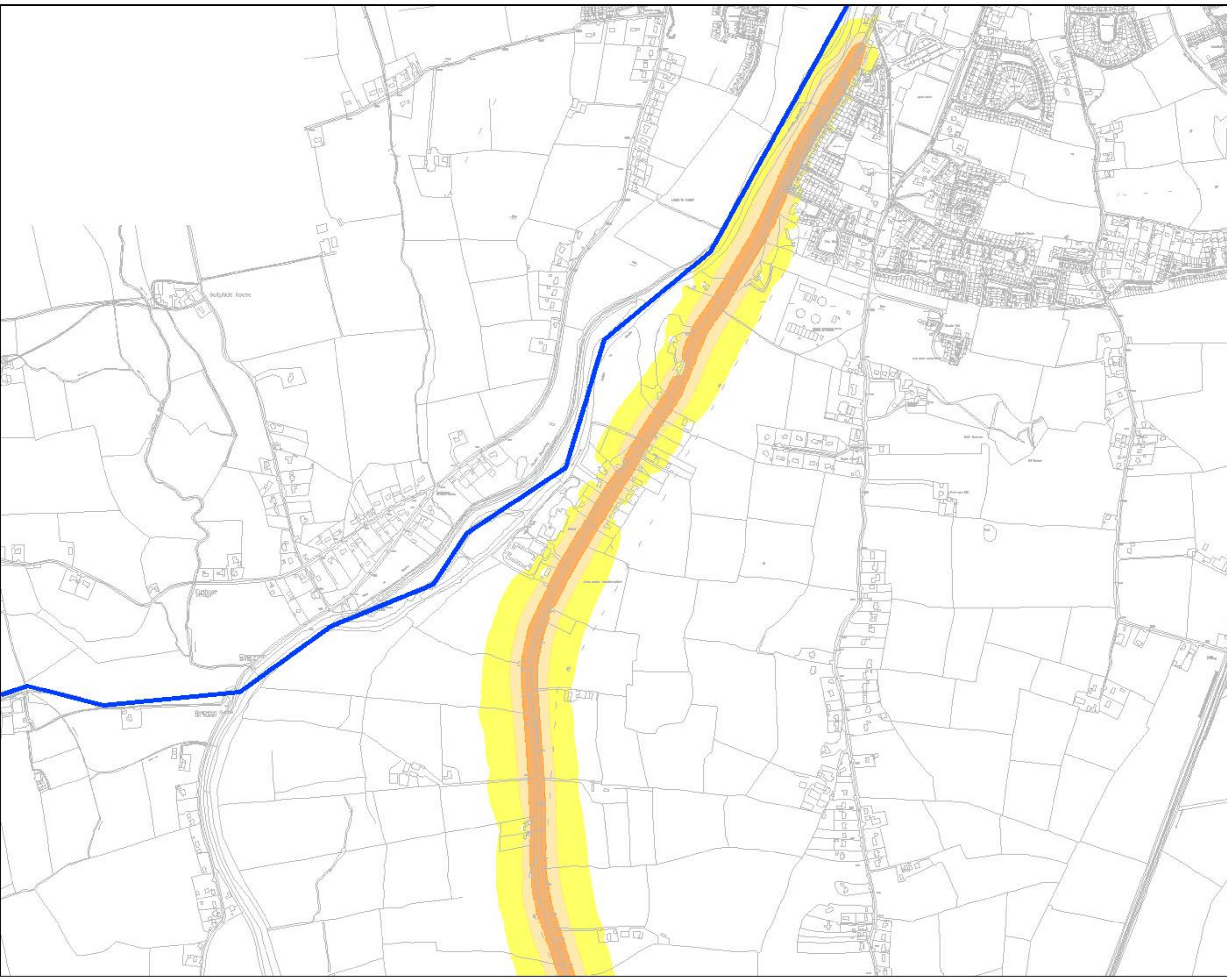
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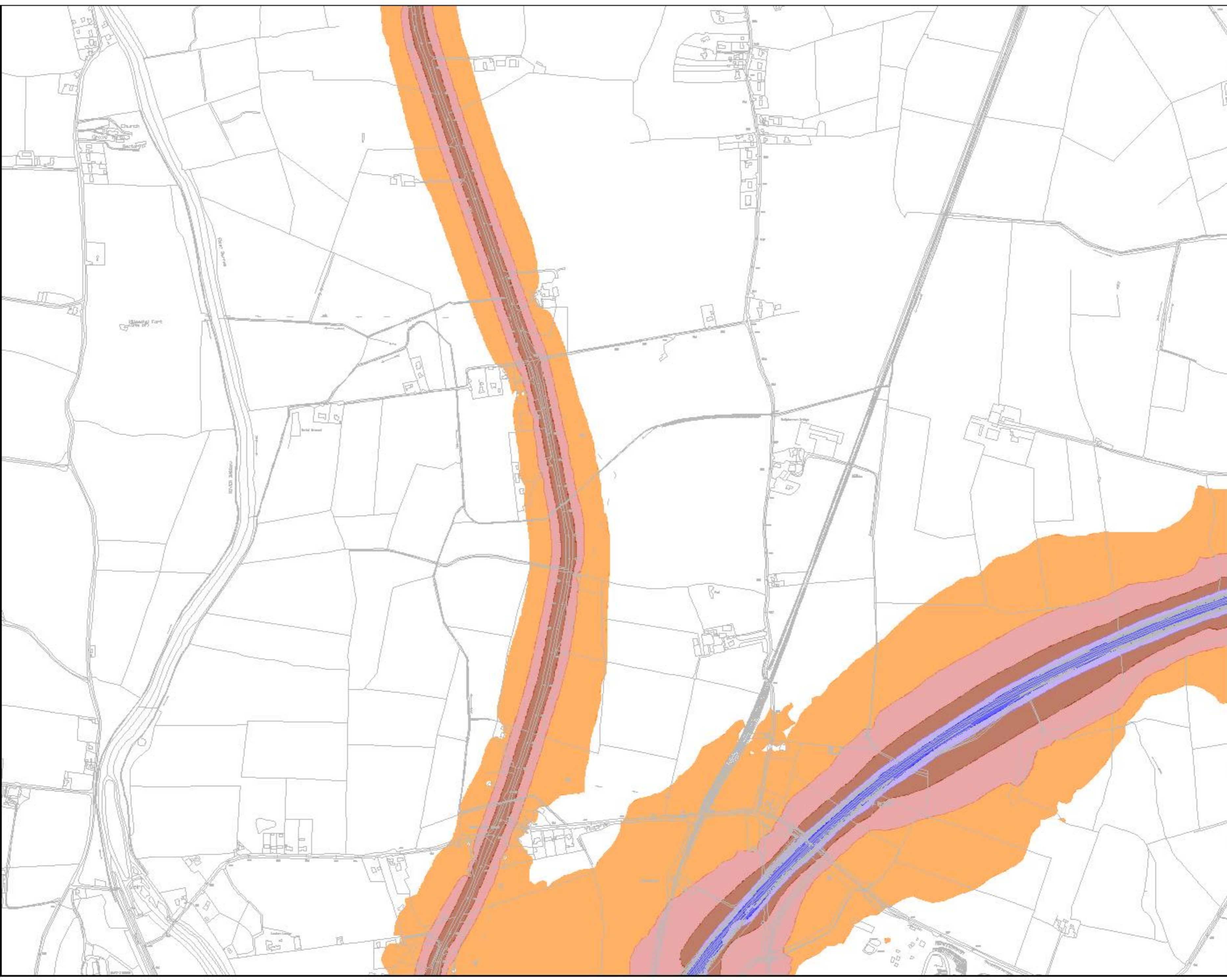
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Noise Zone dB

55 to 59	
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65 to 69	
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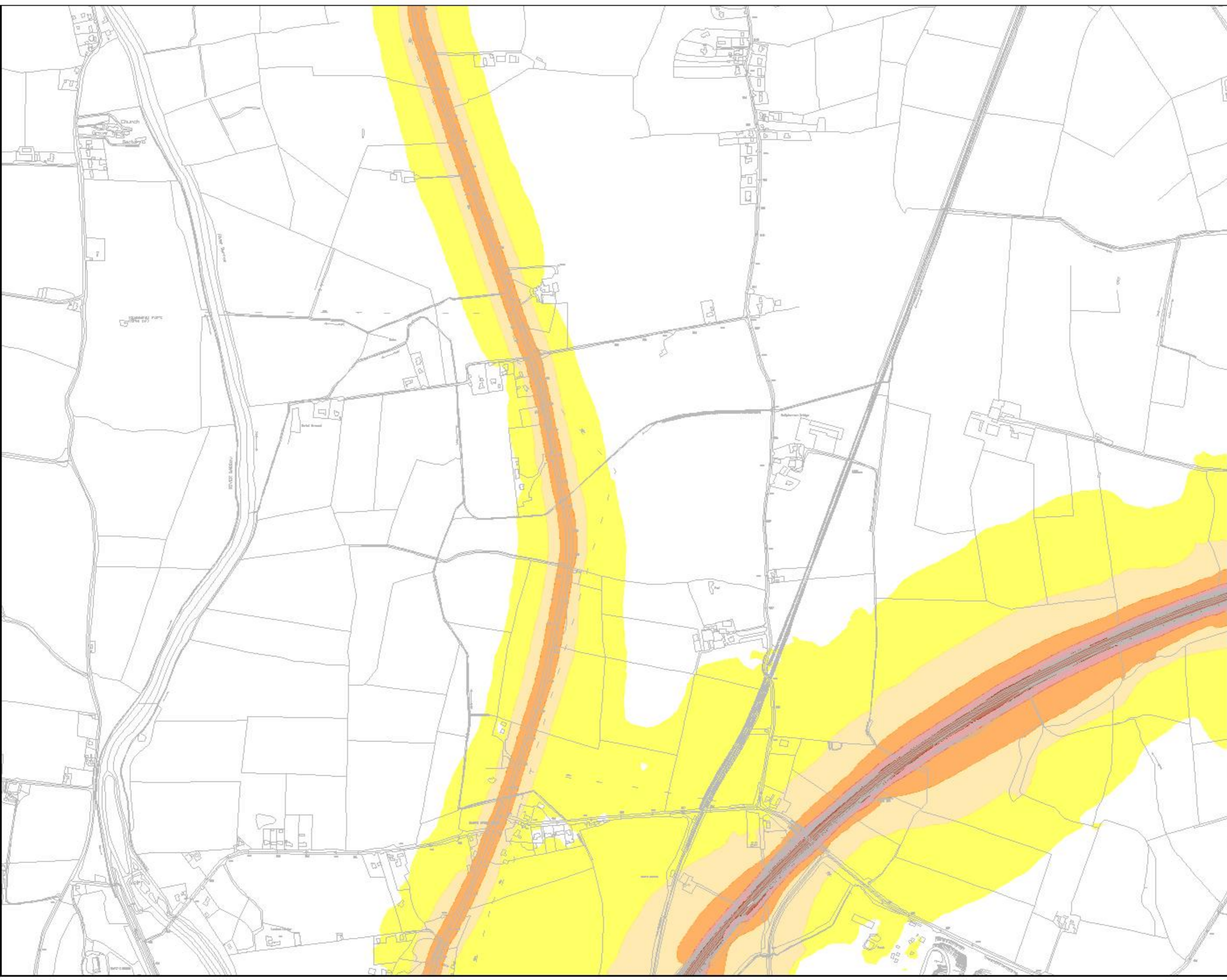
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45 to 49	
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60 to 64	
65 to 69	
> 75	

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Noise Zone dB

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60 to 64	
65 to 69	
70 to 74	
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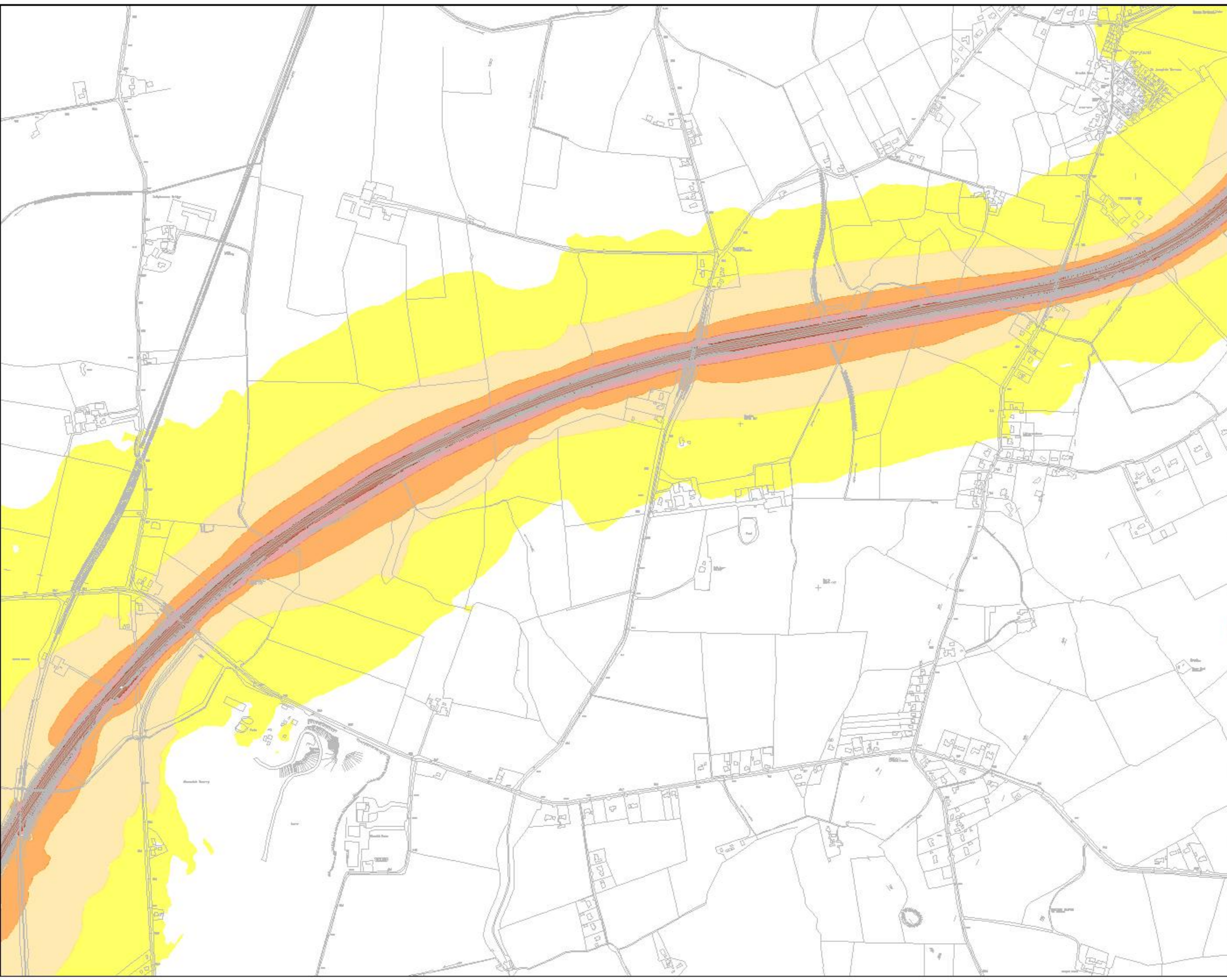
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Noise Zone dB

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55 to 59	
60 to 64	
65 to 69	
≥ 75	

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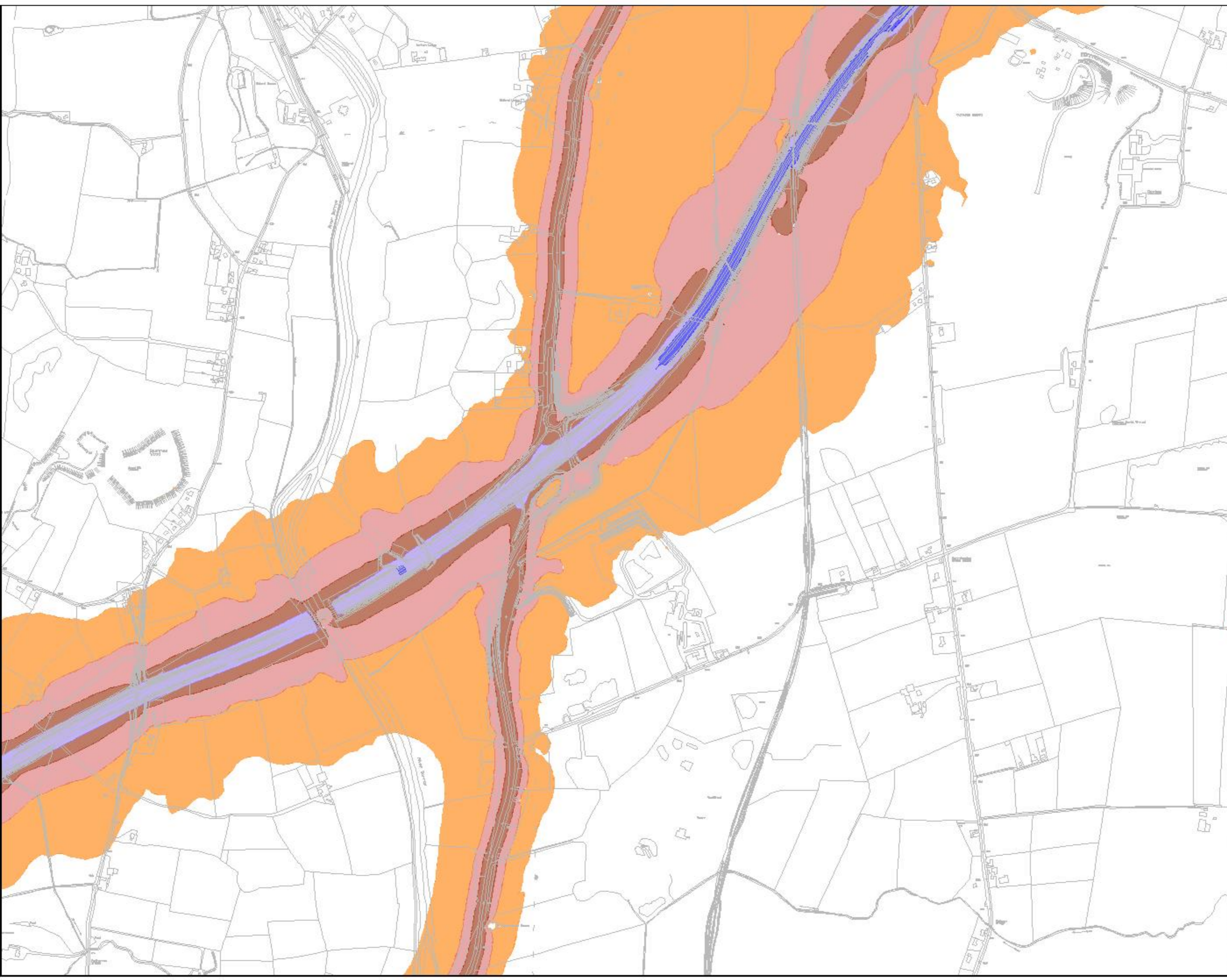
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Project: **NOISE MAPPING**






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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	


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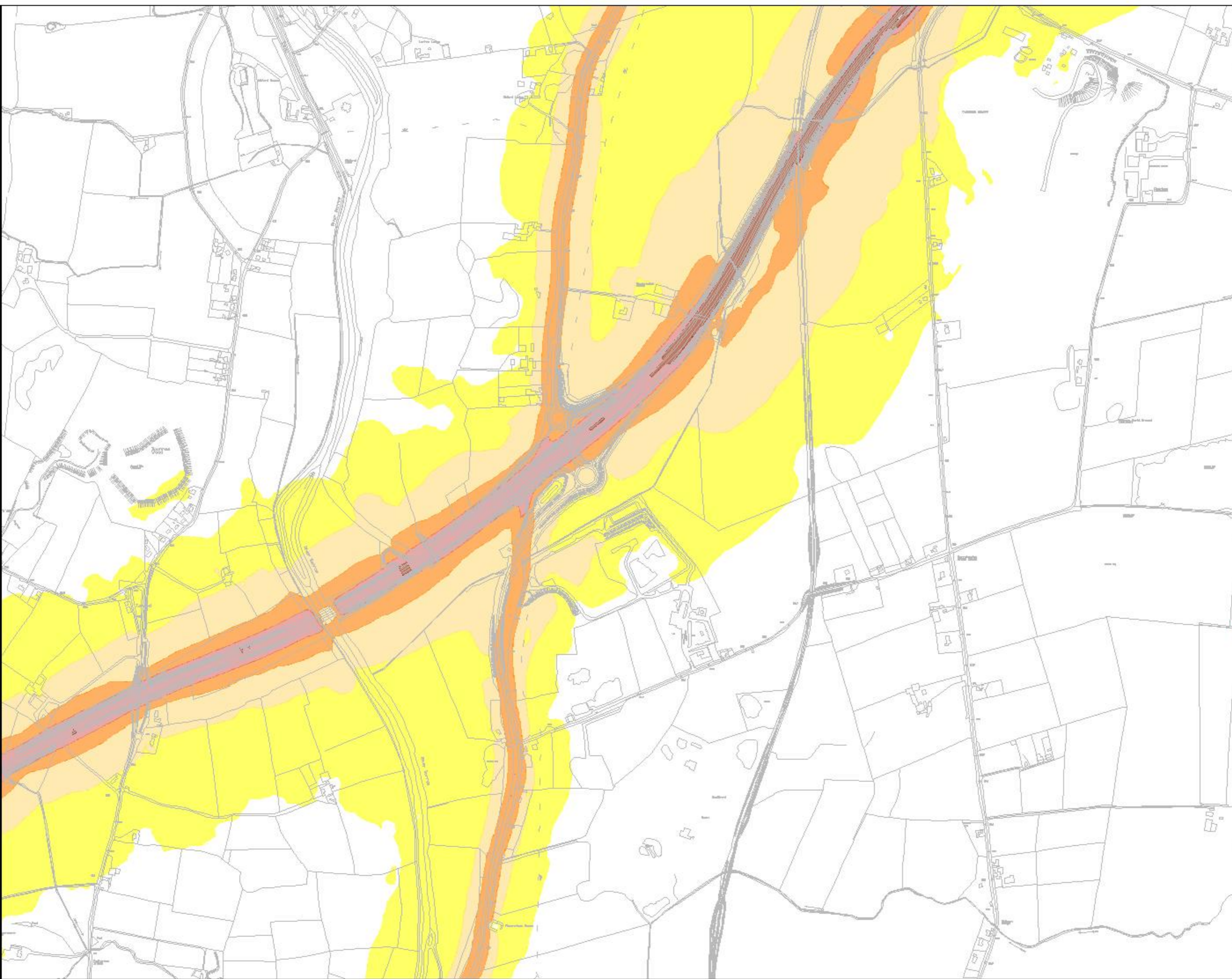

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50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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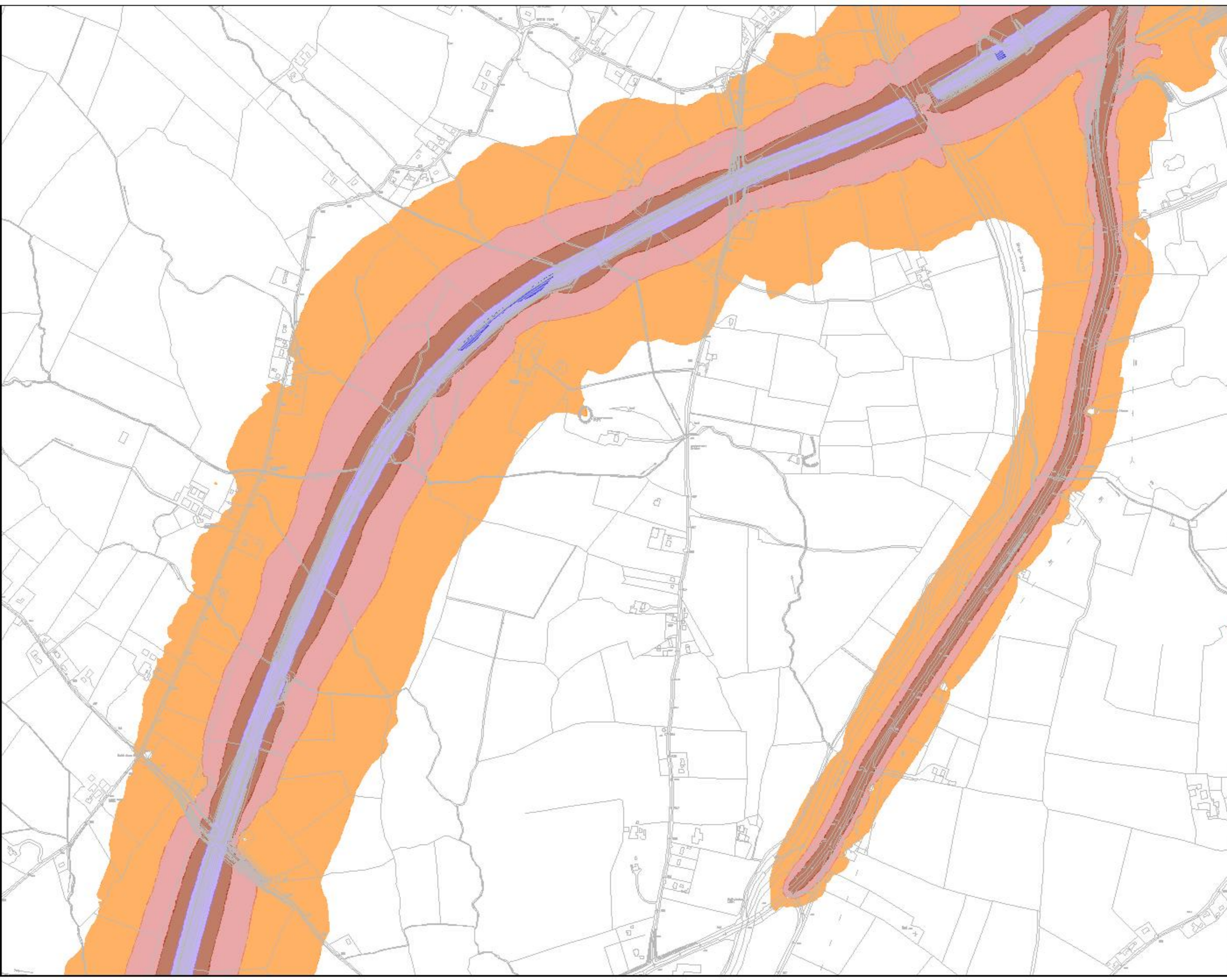
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Project: NOISE MAPPING

Title: L 1022

Drawn by:	RD	Job File:	201816
Checked by:	P.P.	Drawn by:	IFFR/CADRE/ICE
Approved by:	D.P.	Drawn by:	IFFR/CADRE/ICE
Scale:	1:1000	Project No:	2018NAP16
Date:	2018/03/05	Page:	0



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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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Rev	2018/01	HTA ISSUE	Dir
File	2018/01	2018/01	2018/01

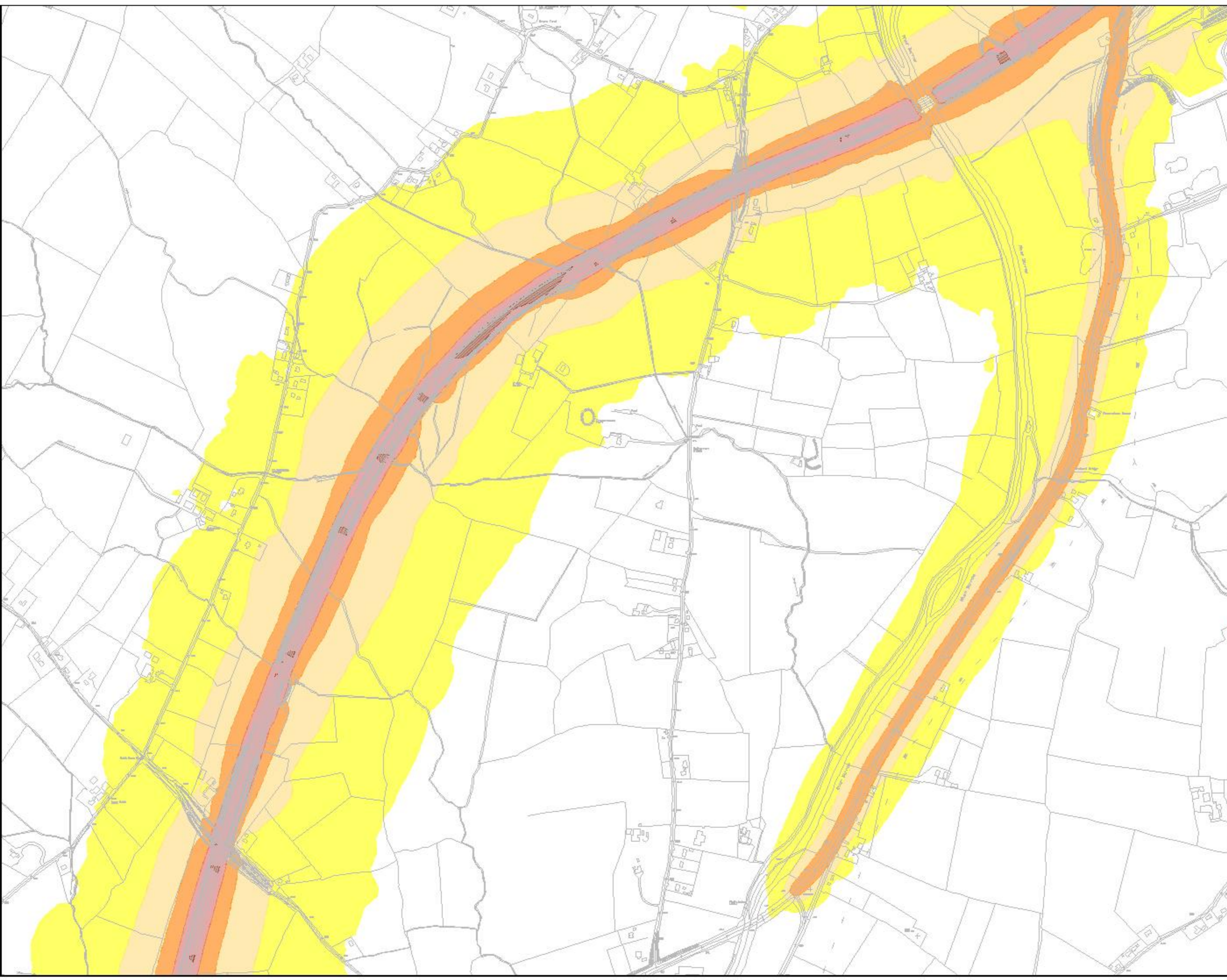
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 Email: roads@carlow.ie

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Project: **NOISE MAPPING**

TW: **L 001**

Drawn by:	RD	Job No:	2018/01
Checked by:	P.F.	Dr. No:	1000000000
Approved by:	D.L.	Doc No:	
Scale:	1:1000	Year:	2018
Date:	2018/01	Project:	2018NAP17



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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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Rev	2018	HTA ISSUE	Dir
File	2018	2018	2018

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Project
 NOISE MAPPING

TW:
 L 1021

Drawn by:	RD	Job File	2018
Checked by:	PJ	Dr-Lin	IFP/CD/ROSE
Approved by:	D.L.	Dir File	2018
Scale:	1:1000	2018NAP18	0
Date:	2018		



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 1"=100m

Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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Rev	2018	HTA 88UE	Dir
File	Date	Approved	Rev

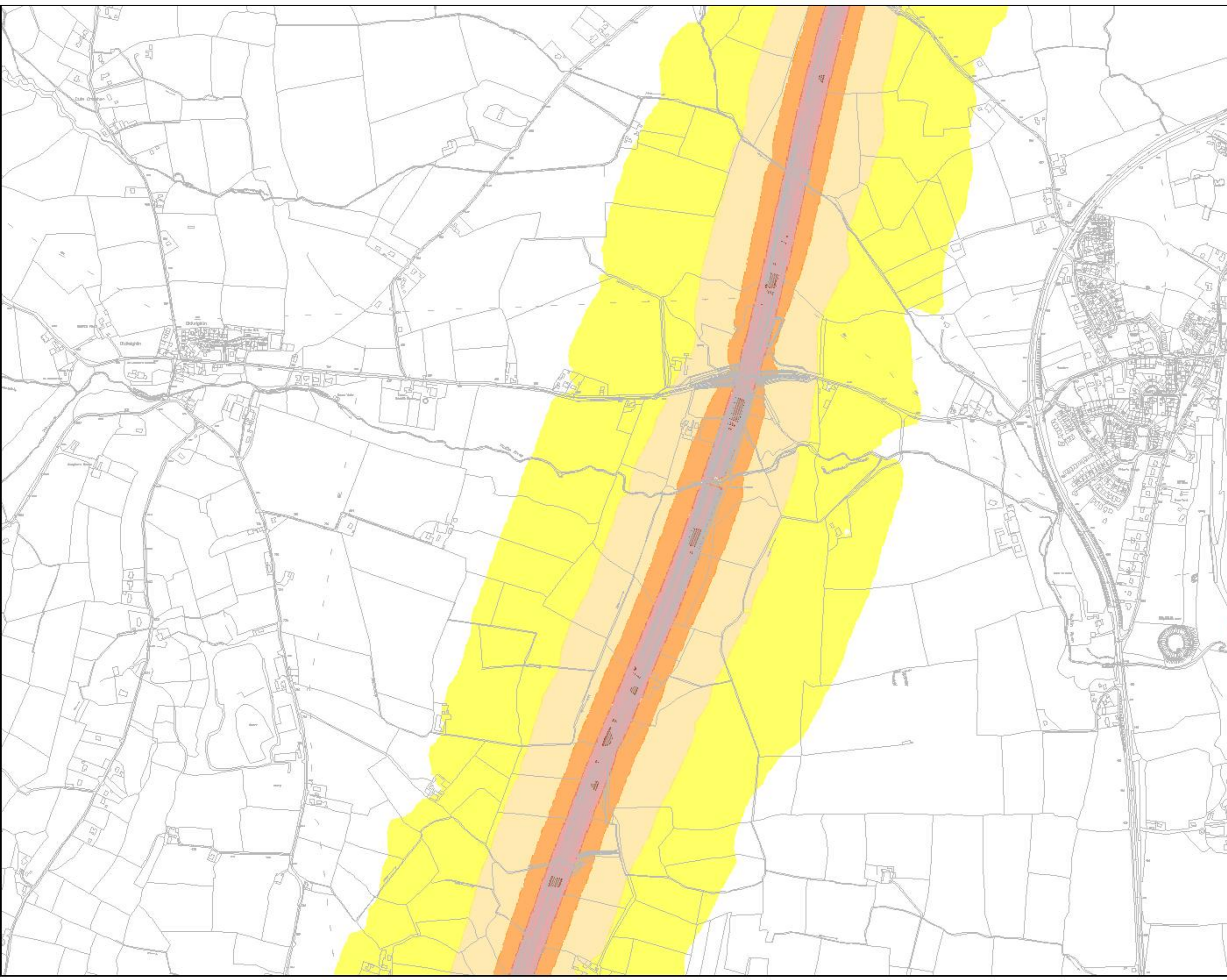
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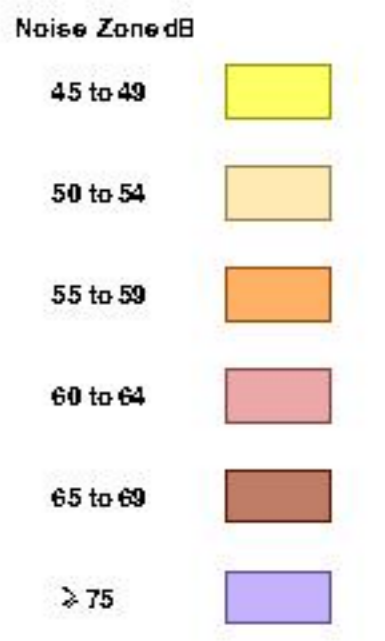
Project: **NOISE MAPPING**

TW: **Lcm**

Drawn by:	RD	Job No:	201819
Checked by:	P.P	Dr-Loc:	IFP/CAD/ROSE
Approved by:	D.L	Doc No:	
Scale:	1:1000	Project No:	2018NAP19
Date:	2018	Page:	0



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0	2015	HTA 88UE	Dtr
File	Date	Amendment	Rev

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Project: **NOISE MAPPING**






TR: **L 1020**

Drawn by:	RD	Jah/Fh	20/08/15
Checked by:	P.F	Dr-Liv	15/09/2015
Approved by:	Dtr	Dir/Fh	
Scale:	1:1000	2018NAP20	0
Date:	20/08/15		




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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	


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0 200m R.T.A. ISSUE Dtr

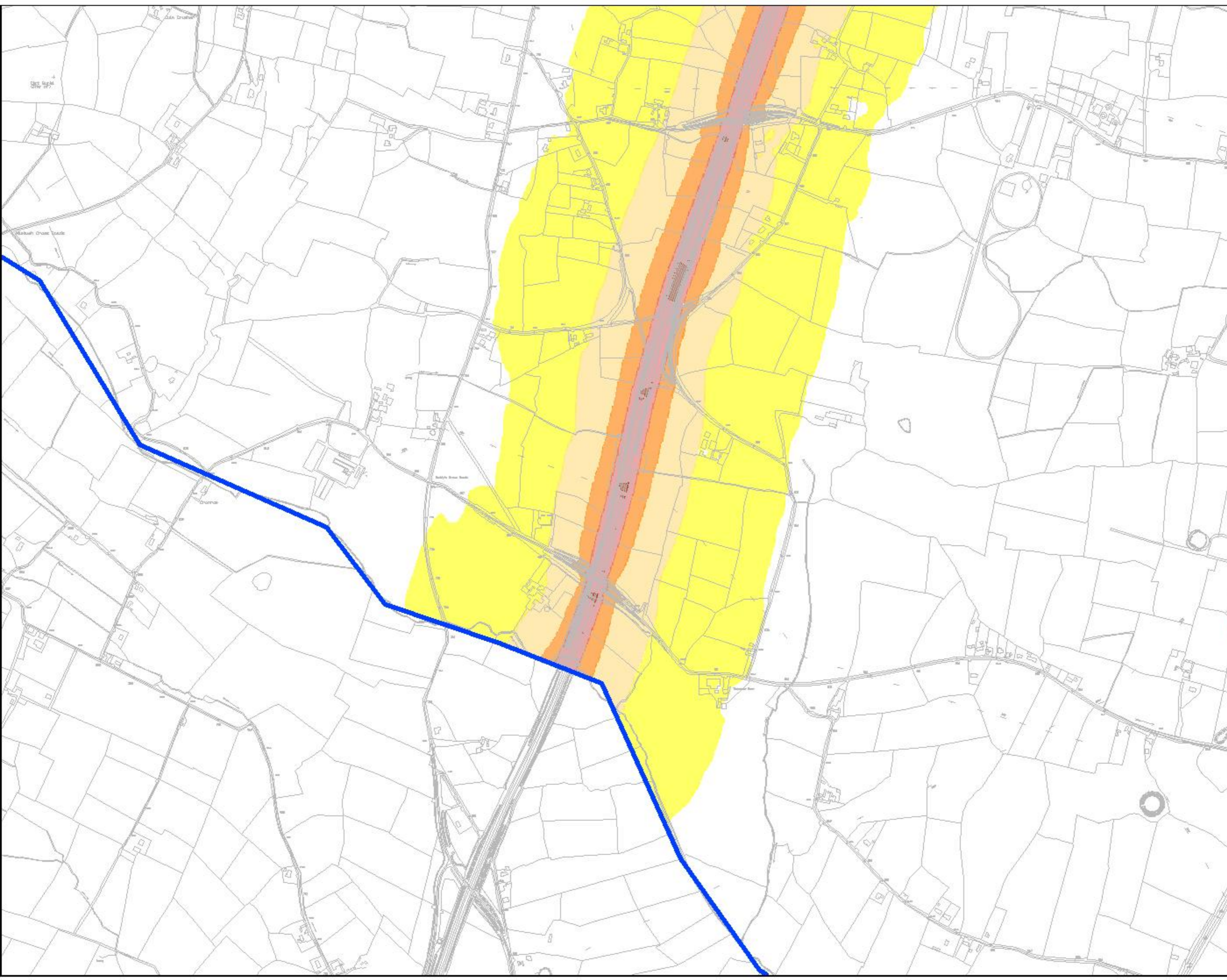

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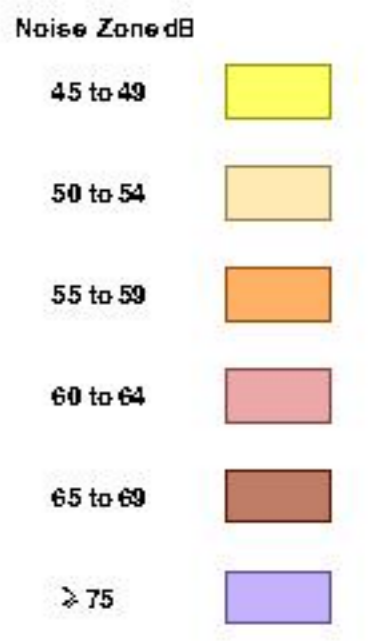
Project: **NOISE MAPPING**

TW: **L cm**

Drawn by:	RD	J.M.P.	2018
Checked by:	P.P.	Dr. L.V.	15/06/2018
Approved by:	D.T.	D.G.P.	
Scale:	1:1000	2018NAP21	0
Date:	2018		



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0 200m
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 Date: 2018/05/22

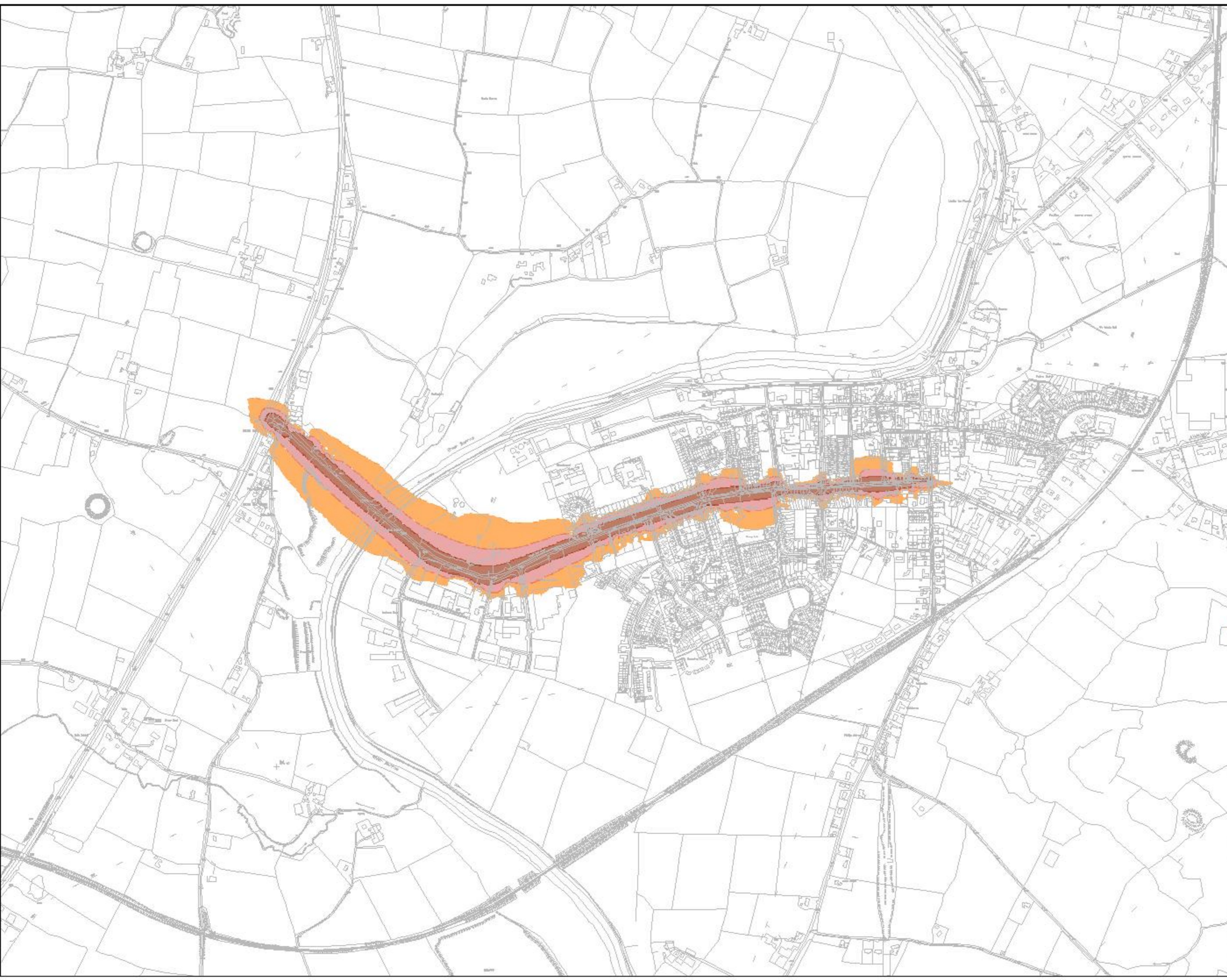
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Project: **NOISE MAPPING**



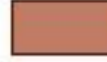


TR: **L 1022**

Drawn by:	RD	Jah.Fh	2018/05/22
Checked by:	P.F.	Dr-Liv	15/05/2018
Approved by:	D.L.	Dag.Fh	
Scale:	1:1000	2018NAP22	0
Date:	2018/05/22		




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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	


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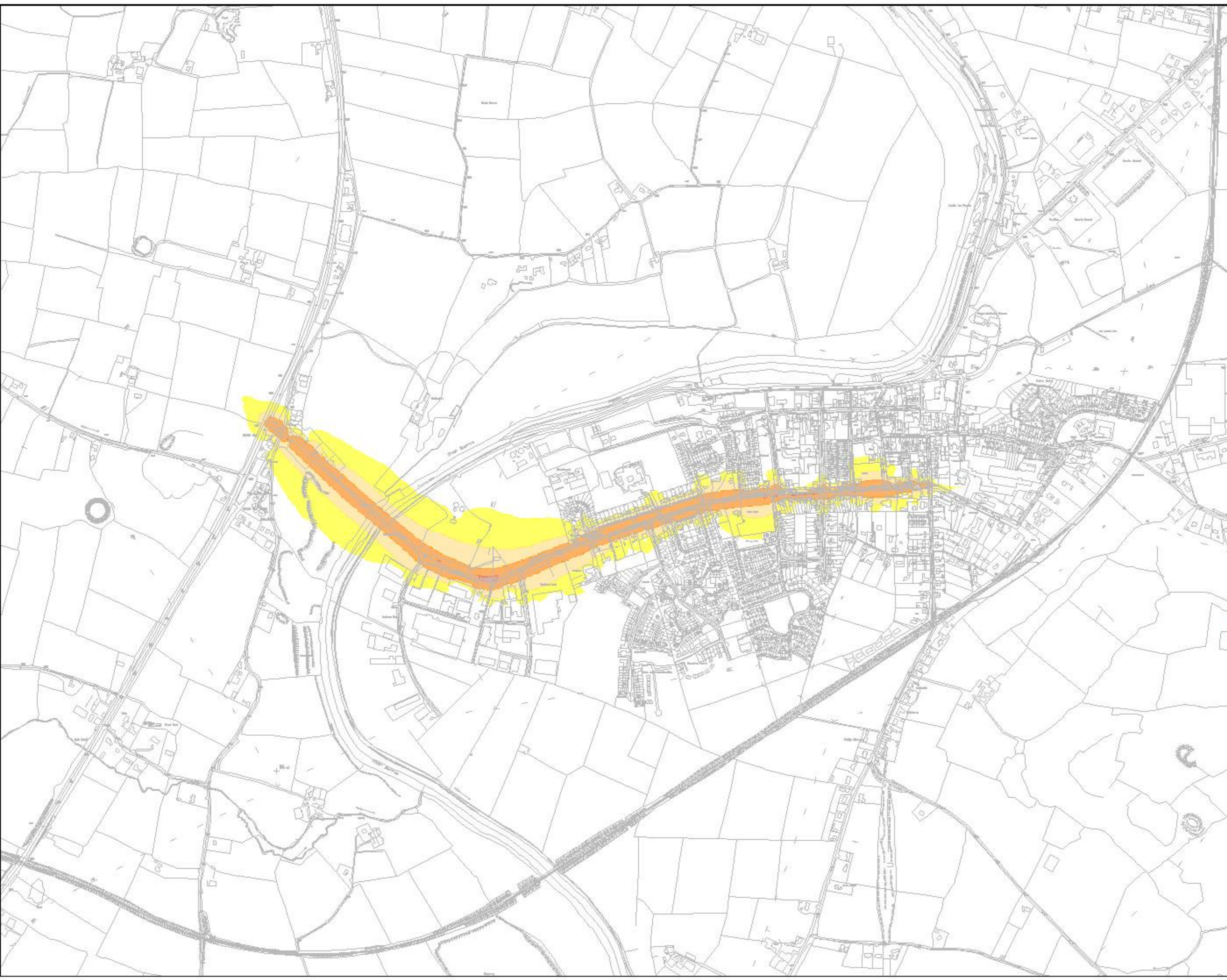

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Project: **NOISE MAPPING**

TR: **Lcm**

Drawn by:	RD	Job File:	2018NAP
Checked by:	P.P.	Drawn by:	IFP/CD/ROSE
Approved by:	D.L.	Drawn by:	
Scale:	1:1000	Project:	2018NAP23
Date:	20/01/2018	Page:	0



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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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TW:
 L 1021

Drawn by:	RD	Jh Ph	20 0818
Checked by:	P.P	Dr-Liv	15/06/2018
Approved by:	D.Lv	Dig Ph	Per:
Scale:	1:1000	2018NAP24	0
Date:	2018/05/24		



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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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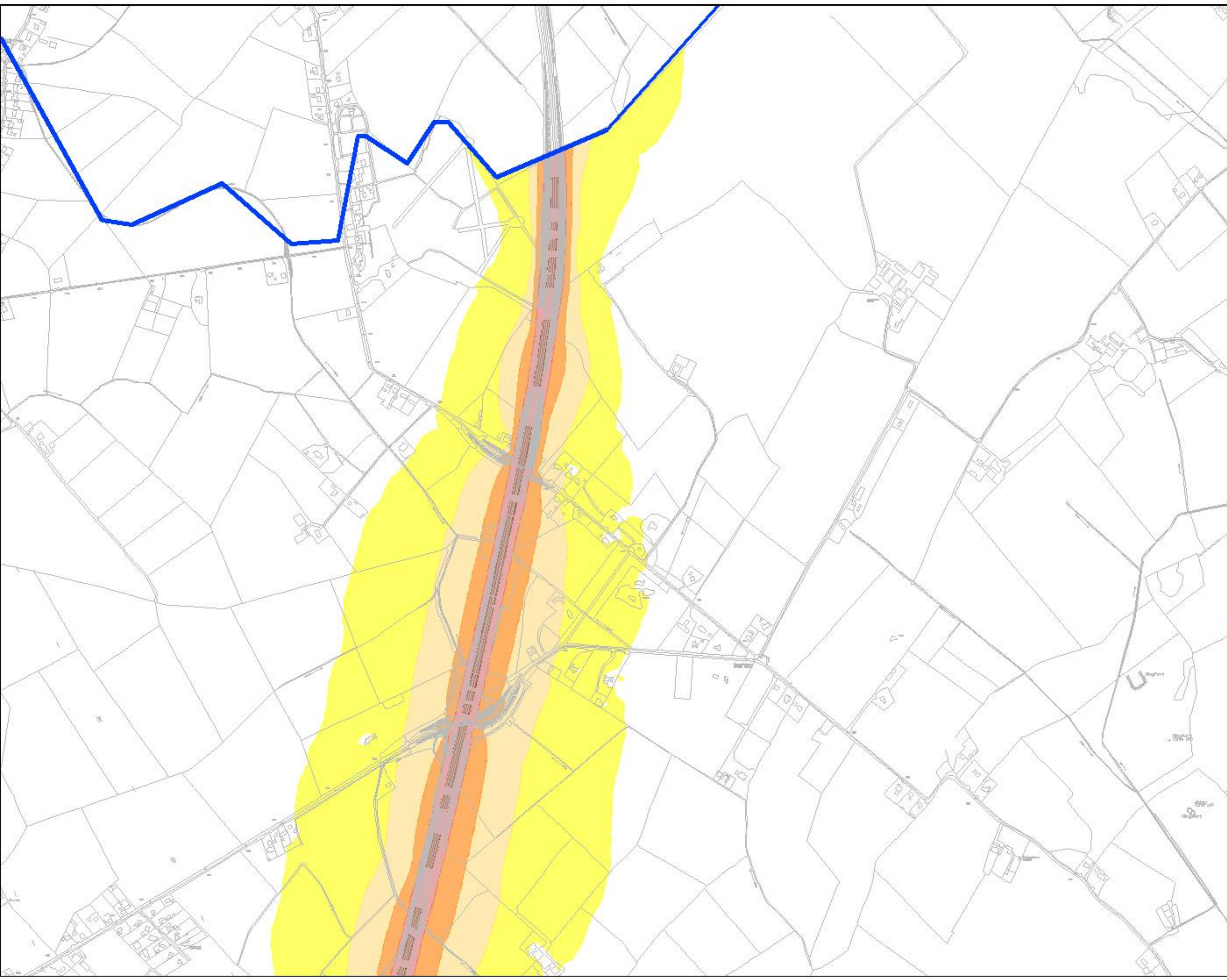
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TW:
 L cm

Drawn by:	RD	Job File:	2018NAP
Checked by:	P.P.	Drawn by:	IFP/CAD/ROSE
Approved by:	D.L.	Drawn by:	
Scale:	1:1000	Project:	2018NAP25
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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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Project: NOISE MAPPING

TU: L 1021

Drawn by:	RD	Job No:	2018NAP
Checked by:	P.P.	Drawn by:	IFP/CODE/ROSE
Approved by:	D.L.	Drawn by:	
Scale:	1:1000	Project No:	2018NAP26
Date:	20/01/2018	Page:	0



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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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 Date: 2018/05/27
 Drawing: 2018NAP27

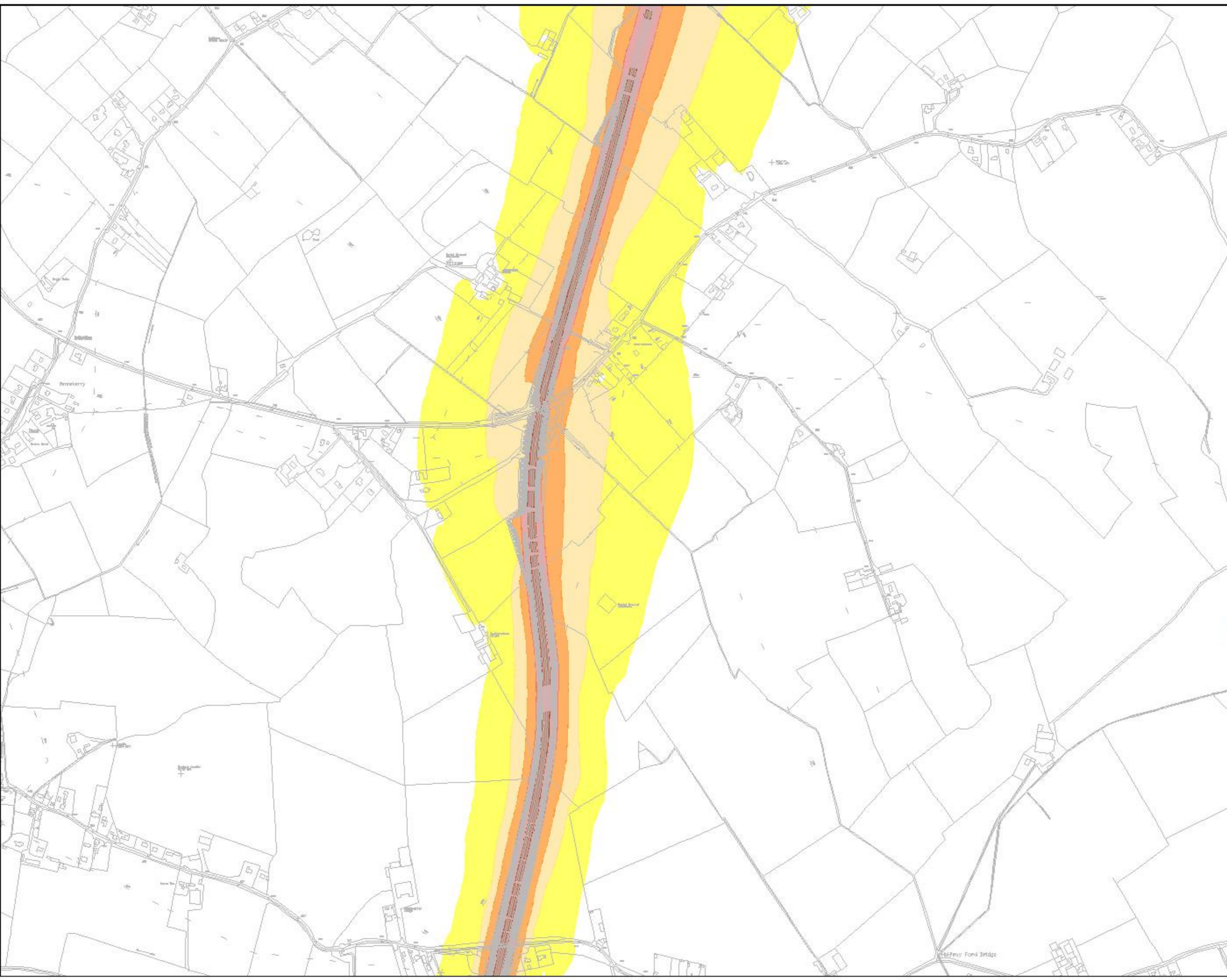
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TM:
 L cm

Drawn by:	RD	Job No:	2018NAP27
Checked by:	P.P.	Dr. No:	IFP/CD/ERICE
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Scale:	1:1000	Year:	2018
Date:	2018/05/27	Project:	2018NAP27



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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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File	Date	Amendment	Rev

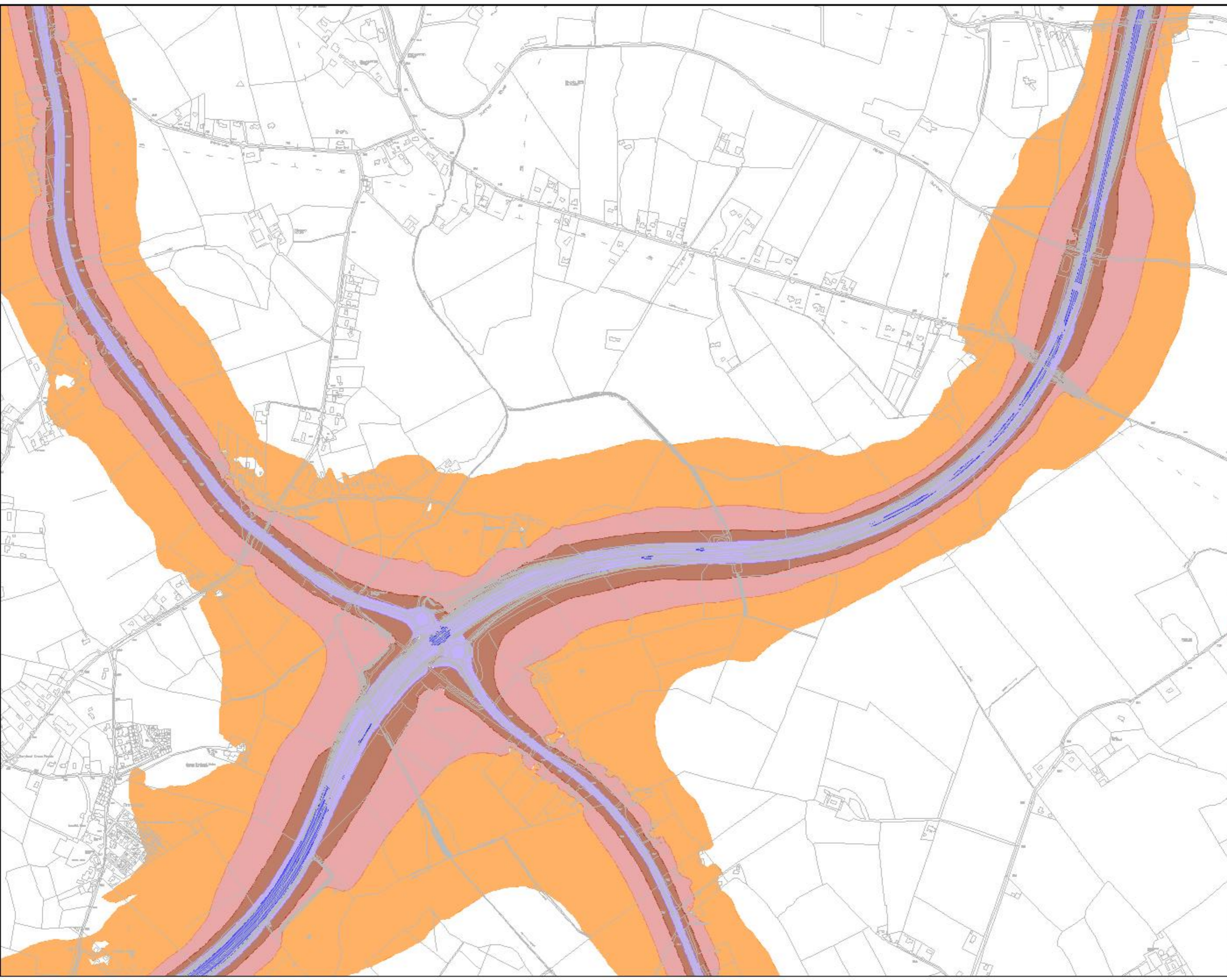
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Project: **NOISE MAPPING**

TW: **L 1021**

Drawn by:	RD	Job No:	201811
Checked by:	P.P	Dr. No:	11/10/2018
Approved by:	D.L	Obj No:	
Scale:	1:1	Project:	2018NAP28
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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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 Date: 20/01/2018
 Drawing: 2018NAP29

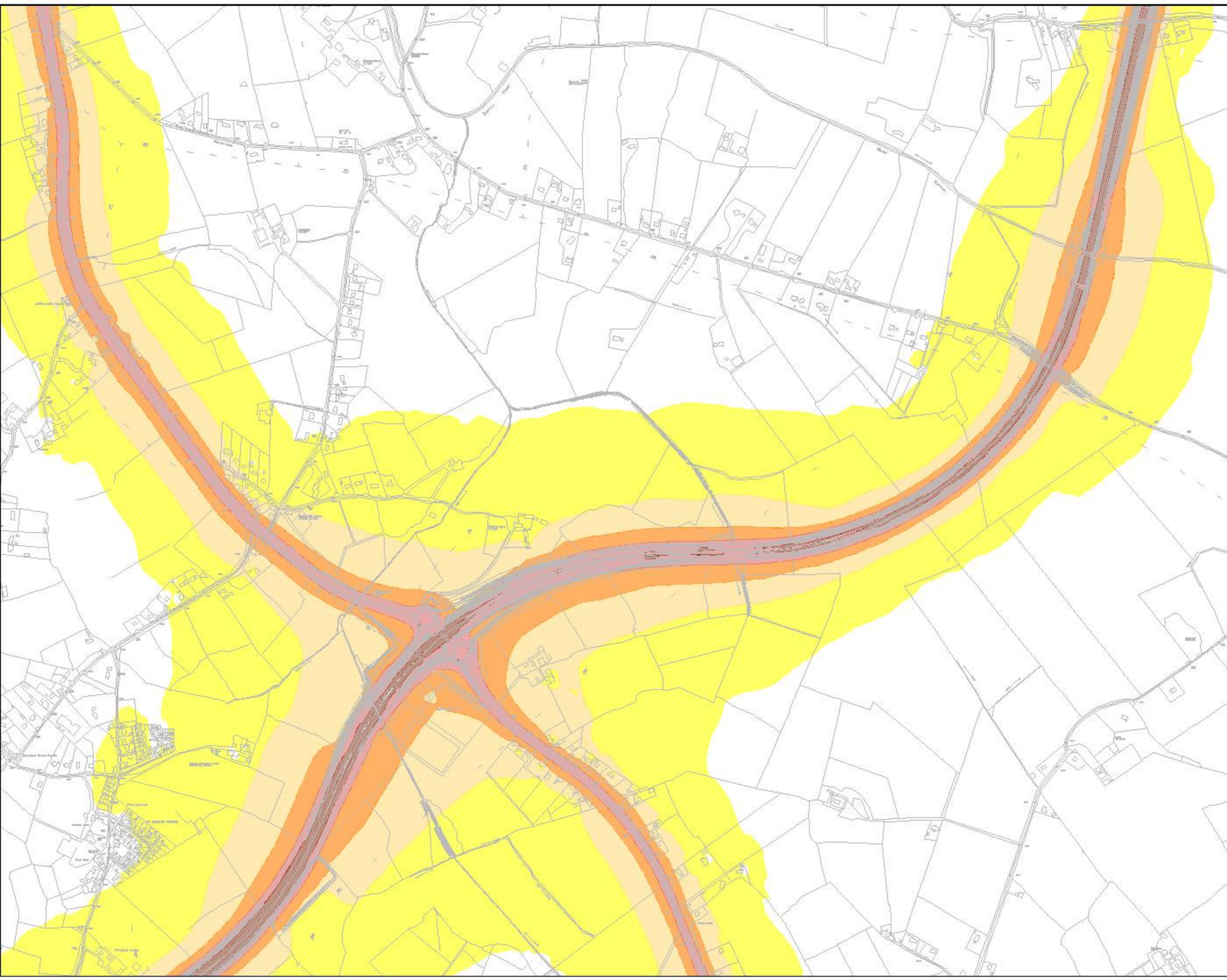
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Project: **NOISE MAPPING**

TM: **Lcm**

Drawn by:	RD	Job No:	2018NAP29
Checked by:	P.P.	Dr-Loc:	IFP/CAD/ROSE
Approved by:	D.L.	Org No:	
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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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TW:
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Drawn by:	RD	Job No:	2018AP30
Checked by:	P.F.	Dr. No:	11/10/2018
Approved by:	D.L.	Obj No:	
Scale:	1:1000	2018AP30	0
Date:	20/01/2018		




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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	


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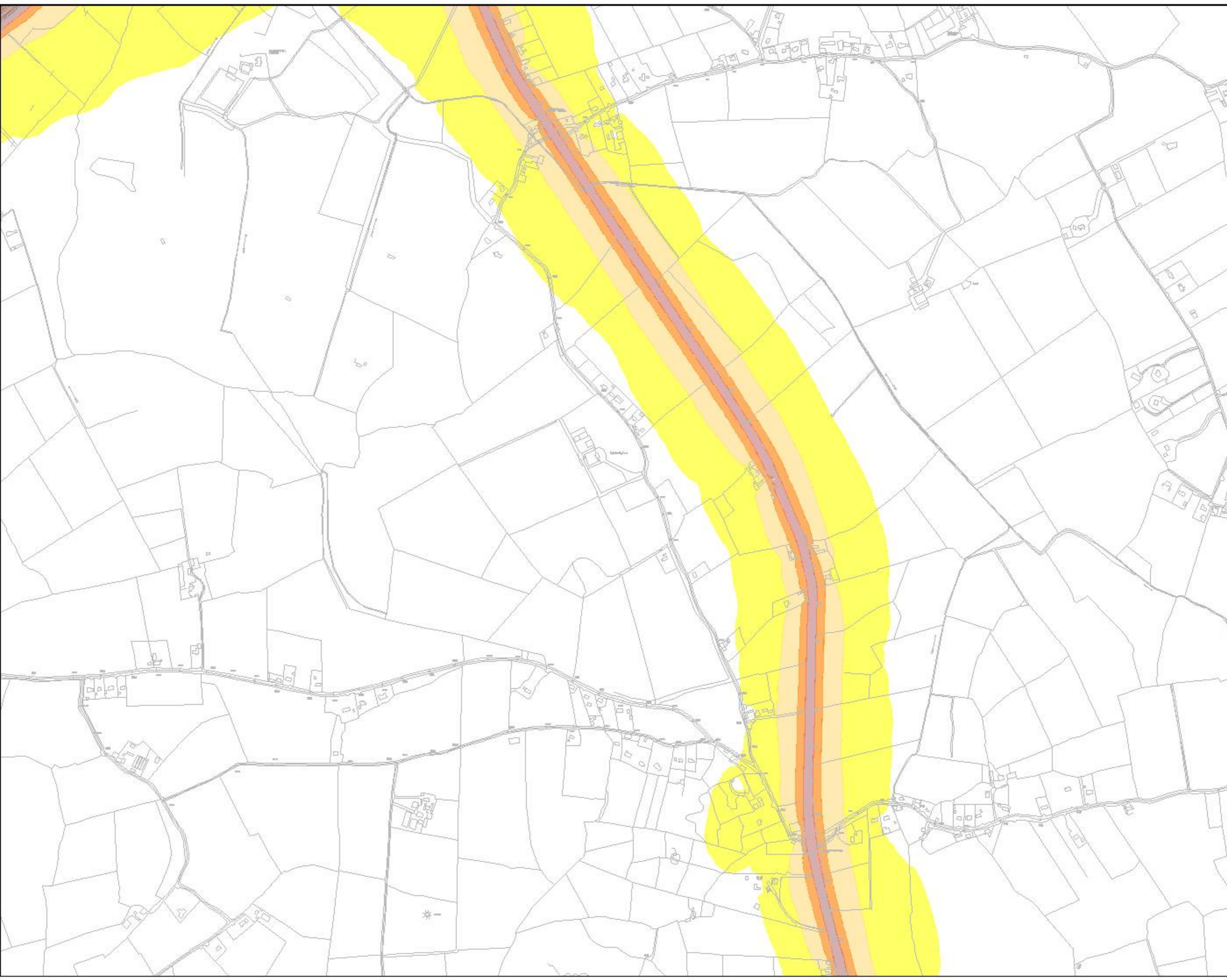

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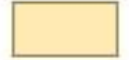



TR:
 Lcm

Drawn by:	RD	Job No:	2018NAP
Checked by:	P.P.	Drawn by:	IFF/C/DE/ROE
Approved by:	D.L.	Drawn by:	IFF/C/DE/ROE
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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	


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NOISE MAPPING

TR: L 1021

Drawn by:	RD	Jah.Fin	26/03/18
Checked by:	P.P.	Dr-Liv	16/04/2018
Approved by:	D.L.	Dig.Fin	
Scale:	1:1000	2018NAP32	0
Date:	2018/03/26		



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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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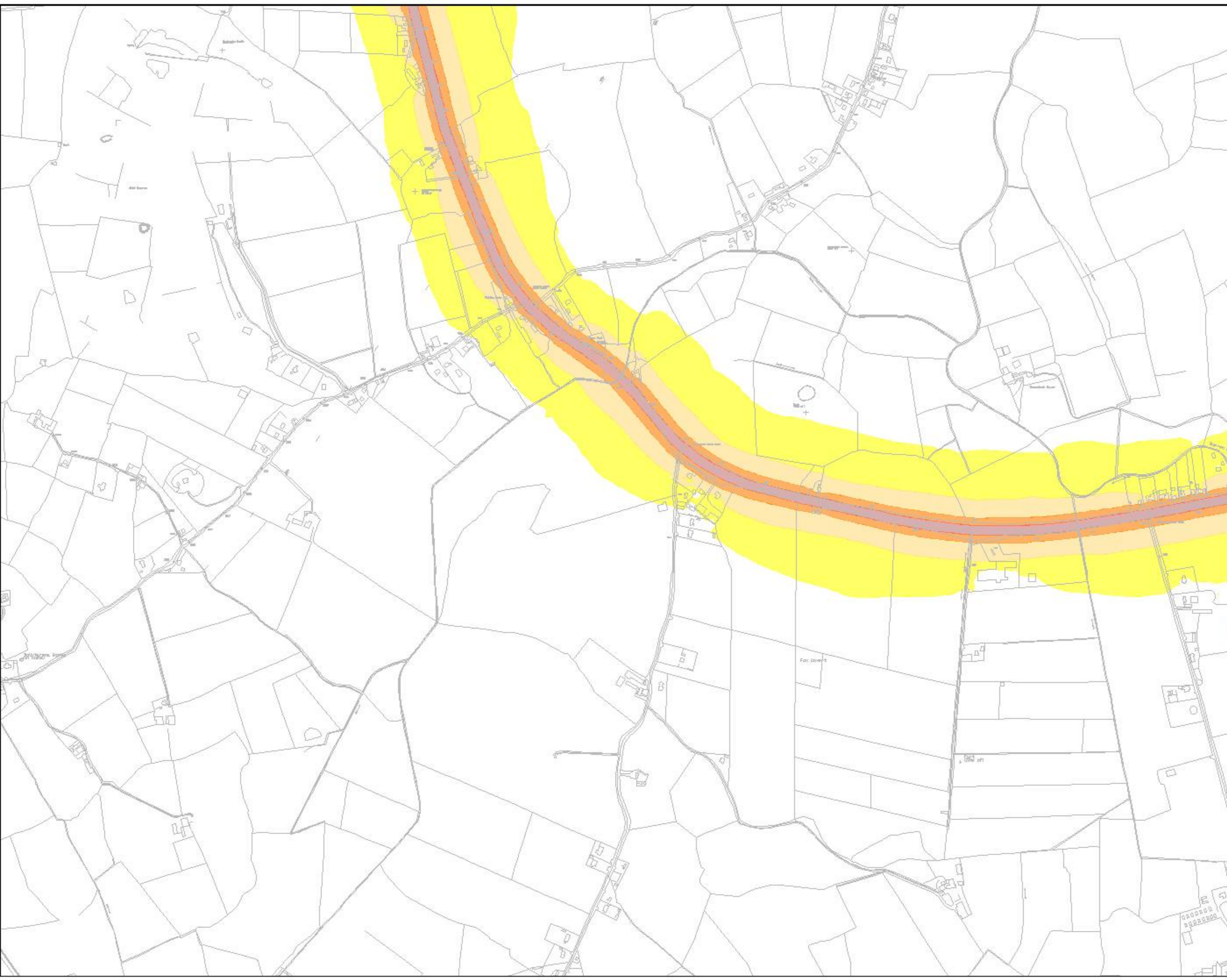
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Project
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TW:
 L cm

Drawn by:	RD	Jh Ph	20 8/16
Checked by:	P.P	D-Lv	15/10/2016
Approved by:	D-Lv	Dg Ph	P.P
Scale:	1:1000	2018NAP33 0	
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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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Project
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TW:
 L 10111

Drawn by:	RD	Jah Ph	20/01/18
Checked by:	P.P	Dr-Liv	18/01/2018
Approved by:	D.L	Dag Ph	
Scale:	1:1000	2018NAP34	0
Date:	20/01/18		



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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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 Date: 2018/03/28
 Scale: 1:1000

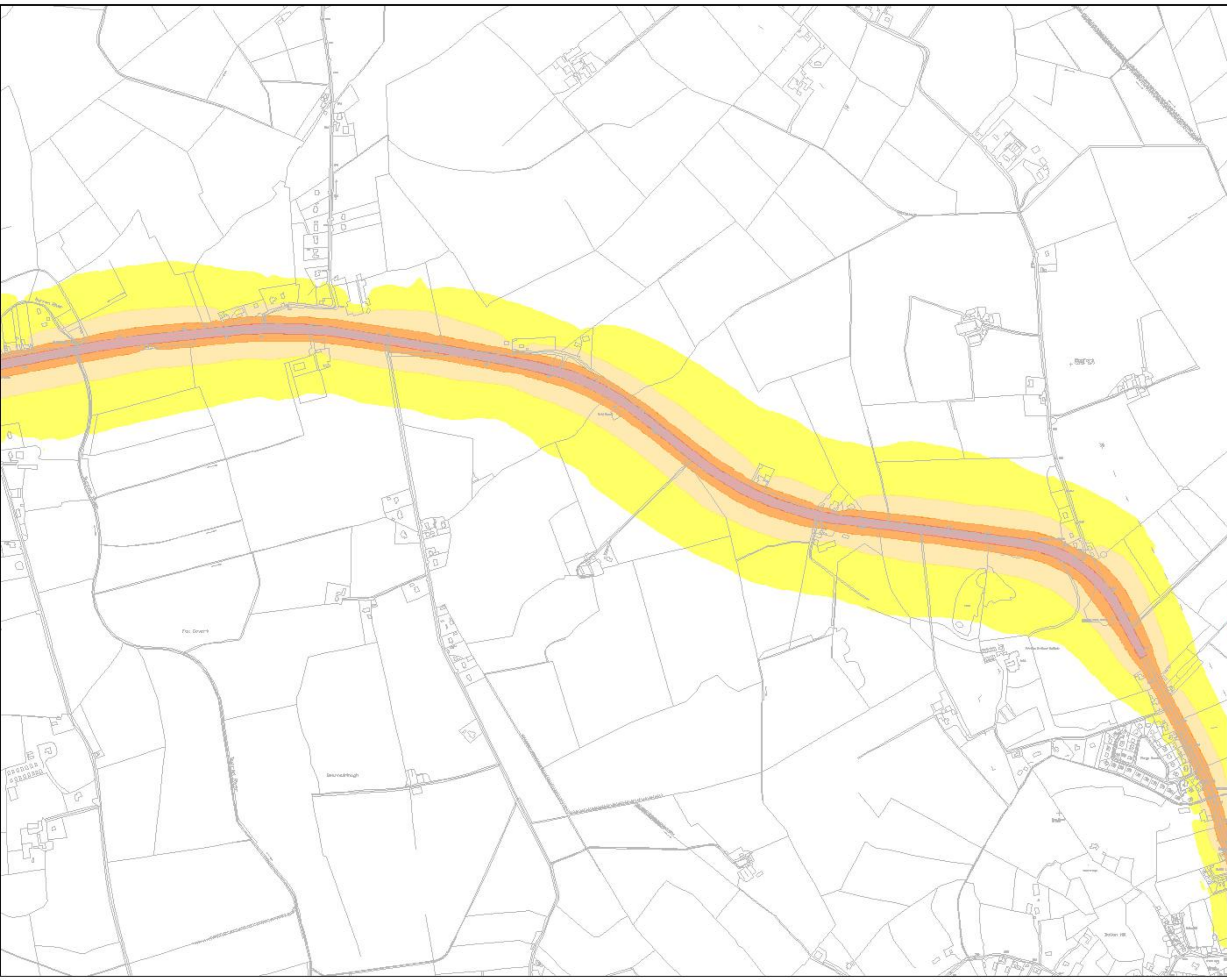
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TR:
 L cm

Drawn by:	RD	Job No:	2018NAP35
Checked by:	P.F.	Dr. No:	IFP/CD/ERICE
Approved by:	D.L.	Org No:	
Scale:	1:1000	Project:	2018NAP35
Date:	2018/03/28	Page:	0



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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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HTA 88UE
 Date: 2018/03/28
 Scale: 1:1000

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 Email: roads@carlow.ie

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Project
 NOISE MAPPING

TN:
 L 1021

Drawn by:	RD	Job No:	2018/03/28
Checked by:	P.F.	Drawn by:	IFF/C/DE/ROE
Approved by:	D.L.	Drawn by:	
Scale:	1:1000	Project No:	2018NAP36
Date:	2018/03/28	Page:	0



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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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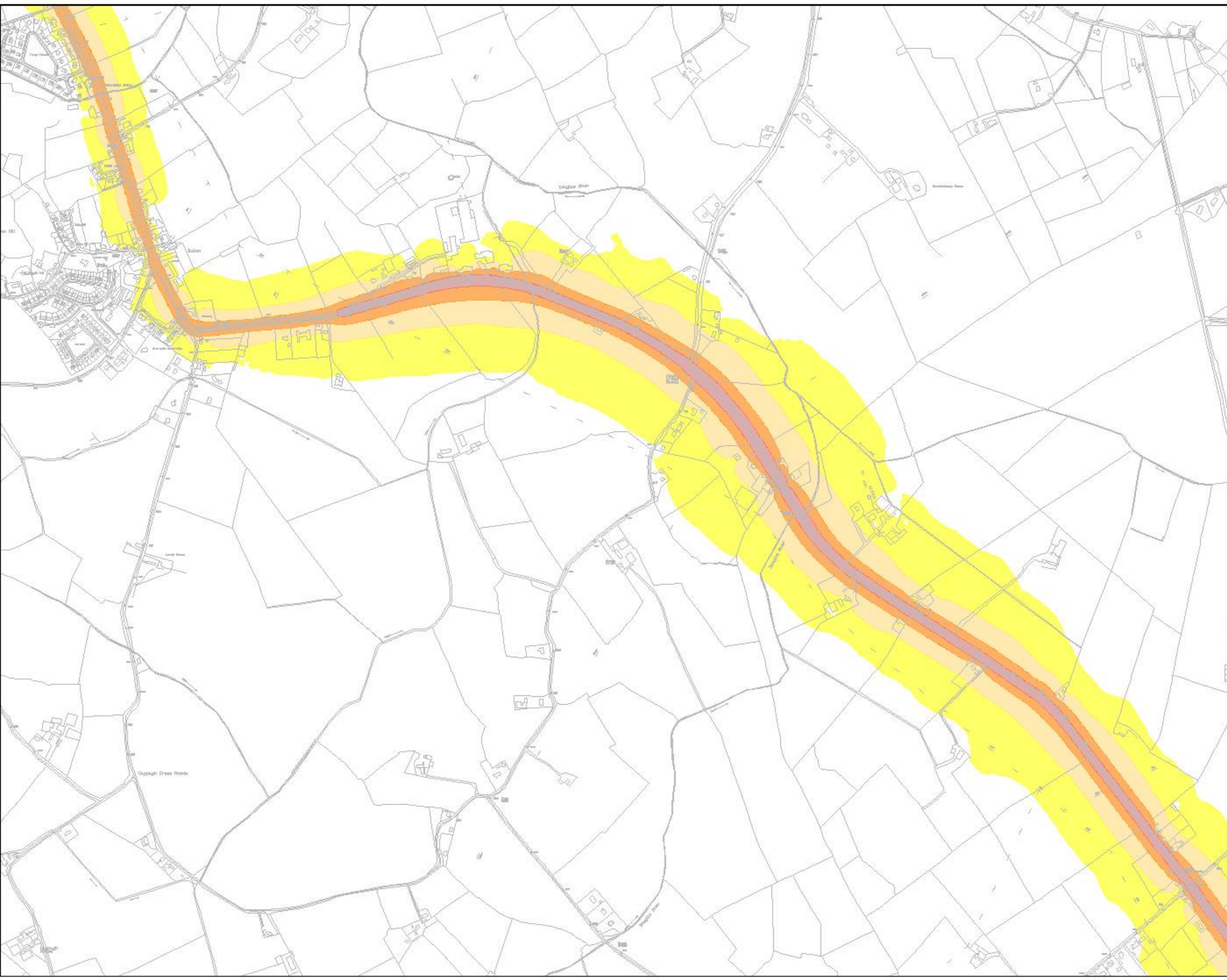
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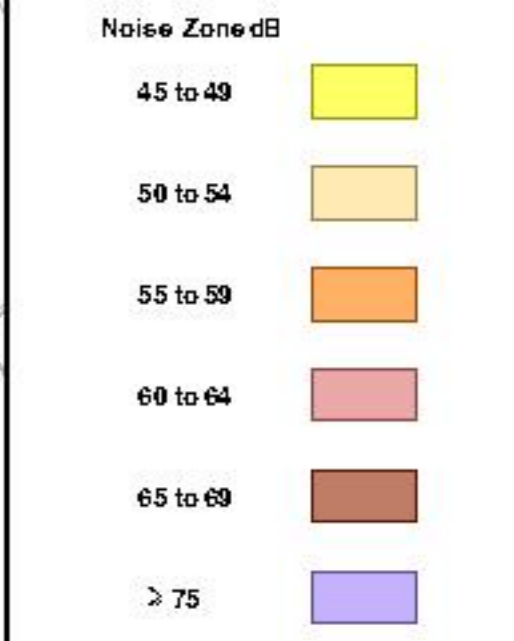
Project: **NOISE MAPPING**

TR: **L 001**

Drawn by:	RD	Job File:	2018NAP37
Checked by:	P.P	Drawn by:	IFP/CD/ERICE
Approved by:	D.L.R	Drawn by:	
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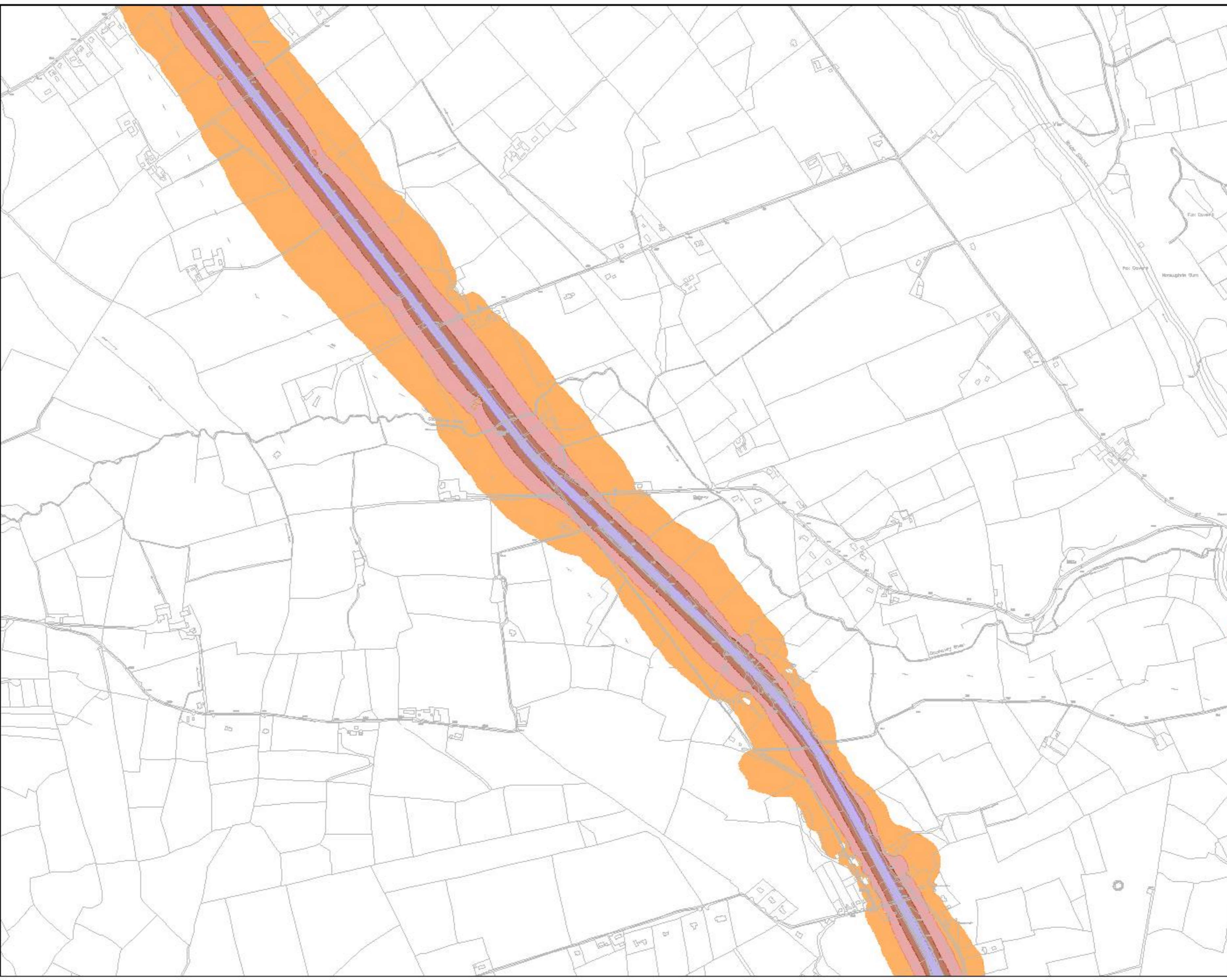
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 ROADS DEPARTMENT
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NOISE MAPPING



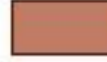


TR: L 1021

Drawn by:	RD	Jah.Fin	20.08.18
Checked by:	P.P	Dr-Liv	15.08.2018
Approved by:	D.Liv	Dr.Liv	
Scale:	1:1000	2018NAP38	0
Date:	2018/06/28		




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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	


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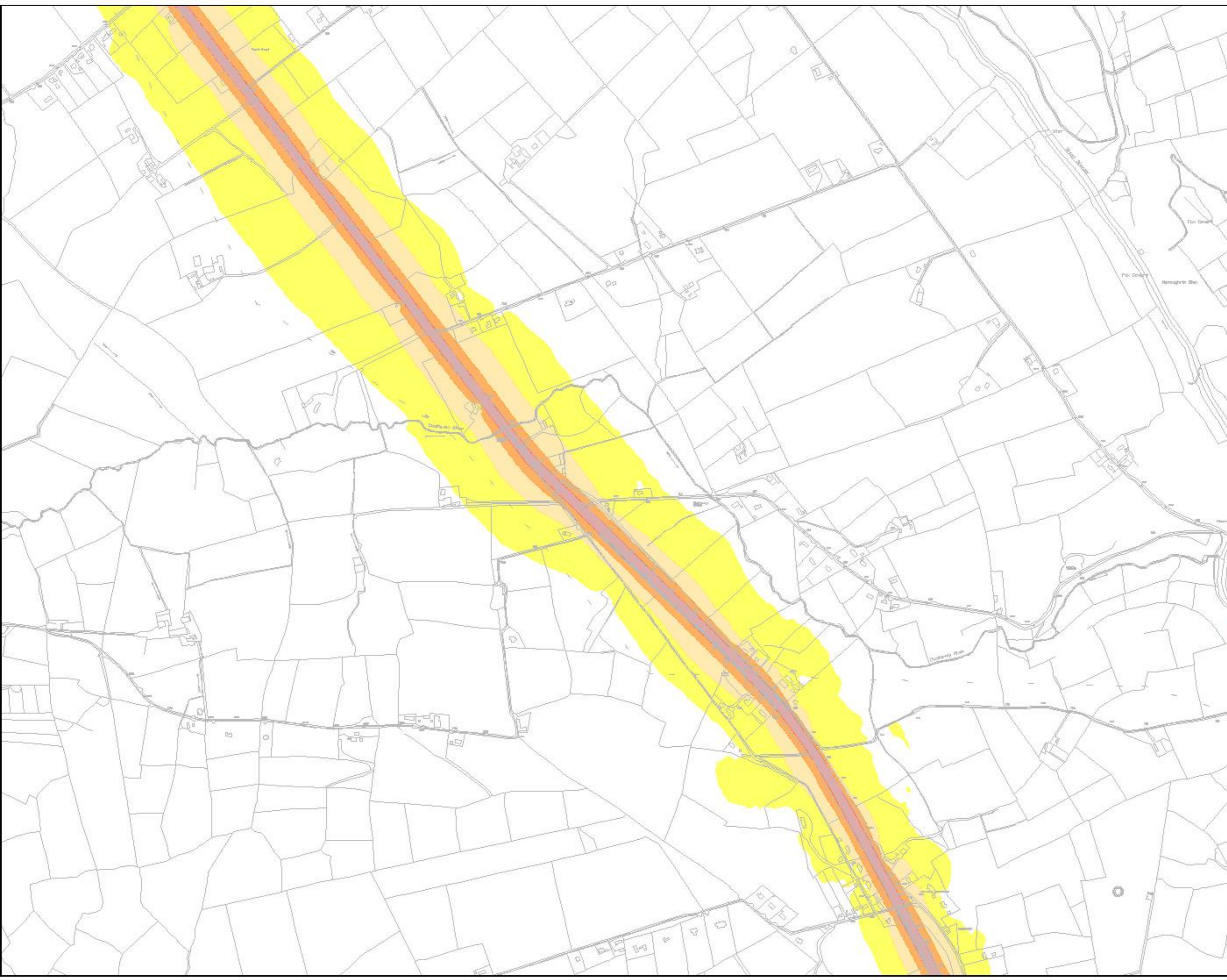

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Project
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TW:
 Lcm

Drawn by:	RD	Job No:	2018NAP39
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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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Project: **NOISE MAPPING**



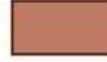


TW: **L 1021**

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Checked by:	P.P.	Drawn by:	IFF/C/DE/ICE
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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	


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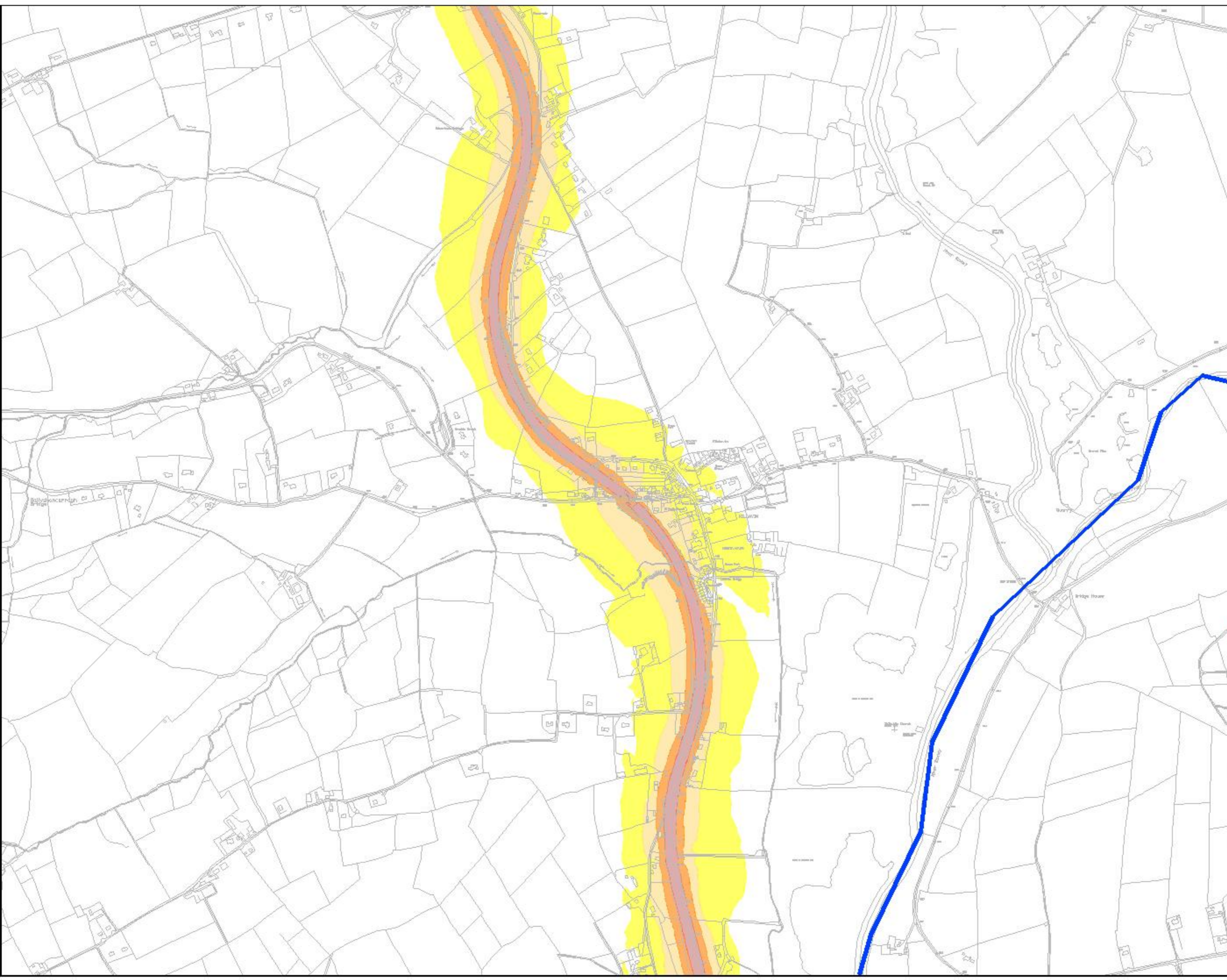

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TR: **Lcm**

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Noise Zone dB

45 to 49	
50 to 54	
55 to 59	
60 to 64	
65 to 69	
> 75	

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TN: **L 1021**

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Noise Zone dB

55 to 59	
60 to 64	
65 to 69	
70 to 74	
> 75	

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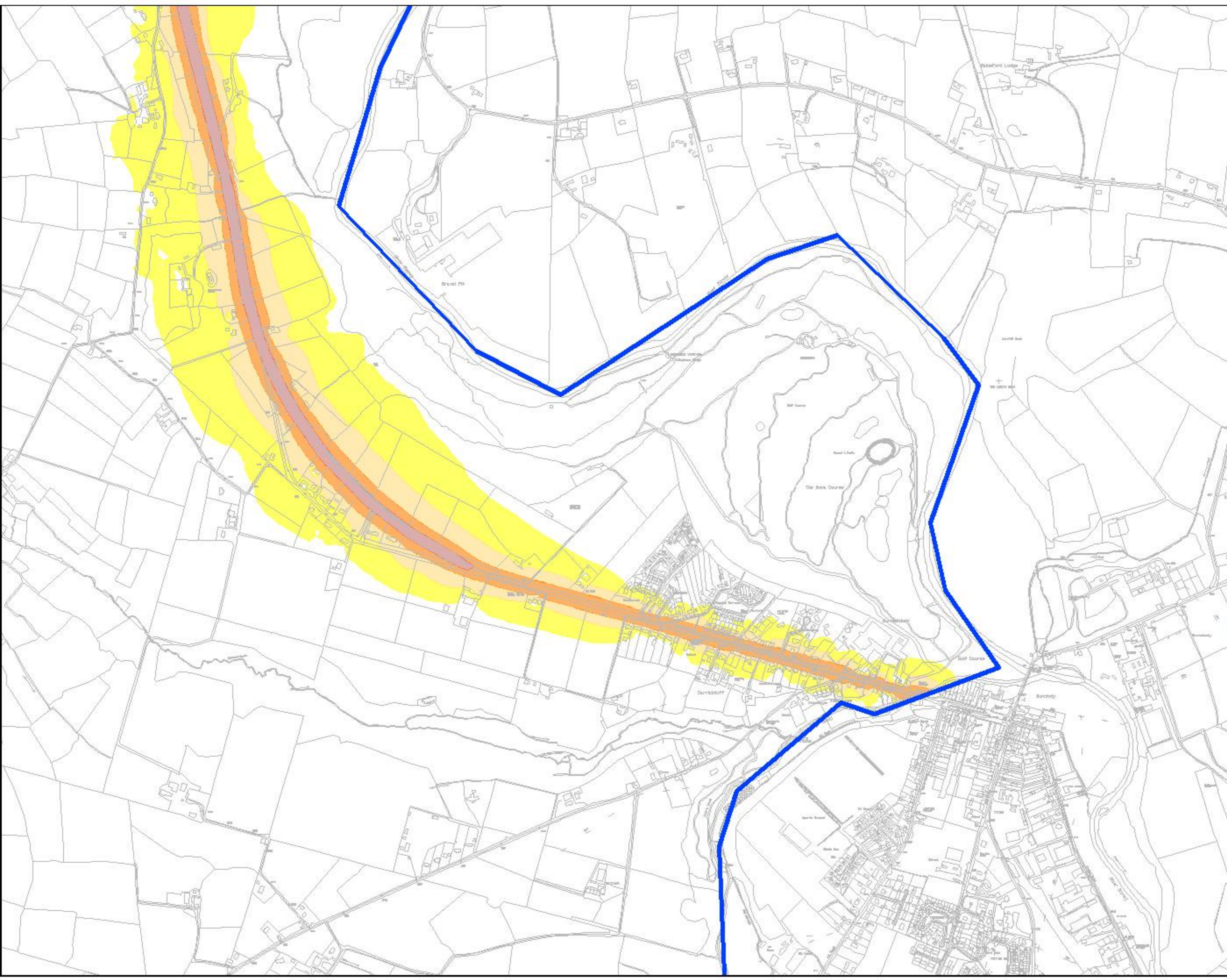
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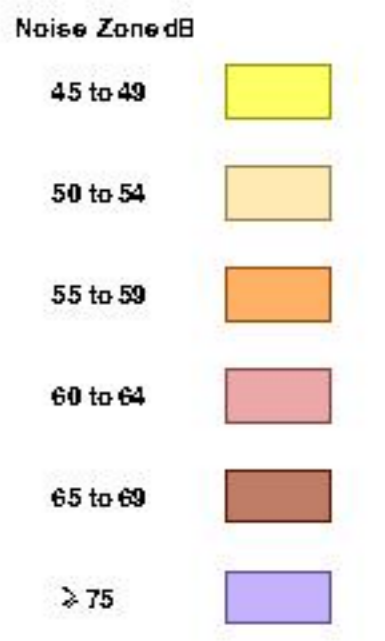
Project: **NOISE MAPPING**

TW: **L 001**

Drawn by:	RD	Jh.Fh	20/08/18
Checked by:	P.P	Dr-Liv	18/08/2018
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TN: **L 1031**

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