
MERSİN-ADANA-GAZİANTEP HIGH STANDARD RAILWAY PROJECT

NOISE AND VIBRATION REPORT

NOVEMBER 2021

ANKARA



MERSİN-ADANA-GAZİANTEP HIGH STANDARD RAILWAY PROJECT

NOISE AND VIBRATION REPORT

version	Revision	Date	Prepared	Proofreading	Quality Management Officer	Controlling	Approving
Draft	A.0	November 2021	Ekim Bakırcı Mechanical Engineer	Gill Cousins Environmental Biological	Esra Okumuşoğlu Geological Engineer	Günel Özenirler Environmental Engineer	D. Emre Kaya Environmental Engineer

REVISION CODES : A: DRAFT, B: FINAL DRAFT, C: FINAL

PROJE NO: 21 / 024

NOVEMBER 2021

CLIENT



REC Uluslararası İnşaat Yatırım Sanayi ve
Ticaret A.Ş.
Portakal Çiçeği Sok. No. 33 Yukarı Ayrancı
ÇANKAYA / ANKARA
☎: +90 (312) 441 31 41
☎: +90 (312) 442 59 48

CONSULTANT:



Tepe Prime İş Ve Yaşam Merkezi
Mustafa Kemal Mahallesi Dumlupınar
Bulvarı No: 266 B Blok Kat: 2 Daire: 38
Çankaya - Ankara / Türkiye
☎: +90 (312) 295 62 48
☎: +90 (312) 295 62 00



MERSIN ADANA GAZIANTEP HIGH STANDART RAILWAY PROJECT

Noise and Vibration Report

Report No : 1250-D-265

Revision No : 00

Publish Date : 03.11.2021



Table Of Contents

Table Of Contents	i
List of Figures	iii
List of Tables	iv
Chapter 1: Introduction	1
1.1 Introduction	1
1.1.1 Definitions	2
1.1.2 Specific Objectives	4
1.1.3 Key Objectives	4
1.2 Area Of Influence	4
1.3 Temporal Scope	6
Chapter 2: Legislative Policy and Guidelines	8
2.1 Applicable Environmental Noise Policies and Guidelines	8
2.2 Applicable Vibration Policies and Guidelines	10
2.3 Applicable Ground Borne Noise Policies and Guidelines	13
Chapter 3: Impact Assessment Methodology	14
3.1 Significance of Impact	14
3.1.1 Responsivity of Receptors	14
3.1.2 Magnitude of Impact	15
3.2 Possible Mitigation Alternatives	18
3.2.1 Construction Mitigation Alternatives	18
3.2.2 Operation Mitigation Alternatives	19
Chapter 4: Background Findings	21
4.1 Baseline Noise Survey	21
4.2 Baseline Vibration Survey	25
4.3 Identified Receivers	26
Chapter 5: Methodology	31
5.1 Noise Modelling	31
5.1.1 Noise Model Verification	33
5.1.2 Construction Noise	34
5.1.3 Operation Noise	38
5.2 Vibration Calculations	39
5.2.1 Construction Vibration	39
5.2.2 Operation Vibrations	42
5.3 Ground Borne Noise	42
5.3.1 TBM Ground Borne Noise	42
5.3.2 Operations Ground Borne Noise	43
Chapter 6: Results & Assessment	44
6.1 Noise	44
6.1.1 Construction Noise	44
6.1.2 Operation Noise	49
6.2 Vibration	54
6.2.1 Construction Vibration	54
6.2.2 Blasting Vibration	58
6.2.3 TBM Vibration	58

6.2.4	Operational Vibration.....	58
6.3	Ground Borne Noise Assessment.....	63
6.3.1	GBN – TBM	63
6.3.2	GBN – Railway operations.....	63
Chapter 7: Mitigation Measures and Residual Impacts.....		66
7.1	Noise Mitigation Measures	66
7.1.1	Construction Noise Mitigation Measures	66
7.1.2	Operation Noise Mitigation Measures	67
7.2	Vibration Mitigation Measures.....	75
7.2.1	Construction Vibration Mitigation Measures.....	75
7.2.2	Operational Vibration Mitigation Measures	75
Chapter 8: Assumptions and Limitations		- 80 -
8.1	Noise Modelling Assumptions and Limitations	- 80 -
8.1.1	Construction.....	- 80 -
8.1.2	Operation.....	- 80 -
8.2	Vibration Calculations Assumptions and Limitations	- 81 -
8.2.1	Construction.....	- 81 -
8.2.2	Operation.....	- 81 -
References		- 82 -
Appendices		- 83 -

List of Figures

Figure 1-1	AOI Determination Model.....	5
Figure 1-2	Project Sections and Construction Activities	6
Figure 4-1	Measurement Locations 1-10.....	22
Figure 4-2	Measurement Locations 10-20.....	23
Figure 4-3	Satellite view of the receivers and project axis	29
Figure 5-1	Terrain Level.....	32
Figure 5-2	Noise Model 3D View	32
Figure 5-3	Model Verification Points	33
Figure 5-4	Transportation Routes.....	37
Figure 5-5	Assessment Points for Blasting	41
Figure 5-6	Assessment Points for TBM Operations	42
Figure 6-1	Construction Noise Map Example	44
Figure 6-2	Operation Noise Map Example.....	49

List of Tables

Table 1-1	Perception of Sound	4
Table 2-1	WBG - IFC Noise Level Guidelines	8
Table 2-2	Environmental Noise Limits for Construction Sites.....	9
Table 2-3	Environmental Noise Limits for Railways.....	9
Table 2-4	Guidance on Effects of Vibration Levels on Humans	10
Table 2-5	Transient Vibration Guide Values for Cosmetic Damage of Buildings	10
Table 2-6	Vibration Dose Values for Buildings	11
Table 2-7	Vibration Limits for Blasting	12
Table 2-8	FTA’s Ground Borne Vibration Limits	12
Table 2-9	Vibration Limits for Blasting (RAMEN)	12
Table 2-10	Vibration Limits for Construction (RAMEN)	12
Table 2-11	Vibration Limits for Railway Operation (RAMEN)	13
Table 2-12	FTA’s Ground Borne Noise Limits	13
Table 3-1	Determination of Impact Significance	14
Table 3-2	Determination of Responsivity of Receptors.....	14
Table 3-3	Designation of Sensitivity of Receptors.....	15
Table 3-4	Determination of Impact Magnitude.....	15
Table 3-5	Categories of Impact Extent.....	16
Table 3-6	Scale of Noise Impact.....	16
Table 3-7	Scale of Construction Vibration Impact	17
Table 3-8	Scale of Blasting Vibration Impact	17
Table 3-9	Scale of Operational Vibration Impact	18
Table 3-10	Scale of Ground Borne Noise Impact	18
Table 4-1	Processed Averaged Noise Measurement Results.....	24
Table 4-2	Baseline Vibration Levels	25
Table 4-3	Selected Receivers for Environmental Noise and Vibration	26
Table 4-4	Selected Receivers for GBN & Vibration from Tunnelling	30
Table 5-1	Model Verification Results	33
Table 5-2	Construction Sound Power Levels – Sections 1-2-3.....	34
Table 5-3	Construction Sound Power Levels – Section 4	35
Table 5-4	Construction Sound Power Levels – Section 5	36
Table 5-5	Train Models and Categories.....	38
Table 5-6	Train Quantities	39
Table 5-7	Reference Vibration Levels for Machine and Equipment.....	40
Table 5-8	Tunnels with Blasting	40

List of Tables

Table 5-9	Tunnel with TBM	41
Table 6-1	Construction Phase Noise Assessment Results.....	45
Table 6-2	Operation Phase Noise Assessment Results, IFC Limits	50
Table 6-3	Construction Vibration Assessment Results	54
Table 6-4	Vibration Assessment for Blasting.....	58
Table 6-5	Vibration Impact Assessment for TBM	58
Table 6-6	Operation Vibration Assessment	59
Table 6-7	GBN for TBM operations	63
Table 6-8	GBN Assessment for Operations	63
Table 7-1	Proposed Noise Barriers.....	68
Table 7-2	Operation Phase Assessment Results After Mitigation, WHO	69
Table 7-3	Buildings with Limit Value Exceedance with and without Mitigation Measures	74
Table 7-4	Proposed Rail Pad Application	75
Table 7-5	Vibration Impact Assessment after Mitigation	76

Chapter 1: Introduction

1.1 Introduction

This report assesses the noise and vibration impacts that would be caused by the *Mersin Adana Gaziantep High Standard Railway Project's* (MAG) construction and operation phases. Noise modelling and vibration studies covering the Project area of influence, were undertaken to analyse the impact of noise and vibration generated by construction and operation.

This report was prepared by Frekans Acoustics & Environmental Laboratory in October 2021. Noise models were prepared and calculated by Mahmut Tuncer Çetin (BSc. EnvE). Field studies, consisting of environmental noise and vibration measurements were undertaken by Ozan Kaya (BSc. EnvE) and Erdem Kesen (BSc. Phys). Field data analysis is implemented by Emre Can Güzel (BSc. ECE). Report production and general supervision were managed by Ekim Bakırcı (MSc. Environmental and Architectural Acoustics, BSc. ME).

This study addresses the noise and vibration impacts for the construction and operation phases of the *Mersin Adana Gaziantep High Standard Railway Project* (MAG). Noise and vibration related definitions, regulations and legal background, the methodology followed, results of noise modelling, potential impacts, and proposed mitigation measures are covered in this document.

The goal of impact assessment is to evaluate the impact magnitude by analysing the ambient conditions and magnitude of potential impacts at receiver locations in order to identify appropriate mitigation measures.

The anticipated activities at each receiver are modelled using the CadnaA acoustic modelling software. The predicted impacts are compared against criteria established for each critical location.

Noise impacts were assessed with the limits outlined in accordance with the recommendations outlined in the IFC Environmental, Health, and Safety (EHS) Guidelines which is based on the Guidelines for Community Noise, World Health Organization (WHO), 1999 and local legal legislation intact in the Republic of Turkey, Regulation on Assessment and Management of Environmental Noise (RAMEN).

Vibration impacts are assessed in compliance with the vibration damage criteria, defined in BS 5228-2:2009 which is an internationally recognised standard.

1.1.1 Definitions

Before explaining the studies that were undertaken, it is helpful to provide definitions of basic acoustic terms and concepts, as given below.

Sound: Sound is vibrational disturbance, exciting hearing mechanisms, transmitted in a predictable manner determined by the medium through which it propagates. To be audible, the disturbance must fall within the frequency range 20 Hz to 20,000 Hz.

Noise: Noise is typically defined as "unwanted sound", sound being the human sensation of pressure fluctuations in the air. Sound levels are expressed in decibels (*dB*) on a logarithmic scale, where 0 *dB* is nominally the "threshold of hearing" and 120 *dB* is nominally the "threshold of pain".

Baseline noise: Prevailing noise in at a particular location measured in the absence of noise generated by the activities being studied.

Decibels (*dB*): The unit describing the amplitude of the sound. The human ear responds to sound logarithmically. The bel is a logarithm of the ratio of the two sound power levels (i.e., instantaneous sound power and reference sound power) and decibel is 1/10 bel.

Frequency: The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or *Hz*.

Sound pressure level (L_p): A logarithmic measure of the effective sound pressure of a sound relative to a reference value. It is measured in decibels (*dB*) above a standard reference level. The commonly used "zero" reference sound pressure in air is 20 $\mu\text{Pa RMS}$ (root mean square), which is usually considered the threshold of human hearing (at 1 *kHz*).

Sound power level (L_w): Ten times the logarithm of the ratio of the sound power under consideration of the standard reference power of 1 *pW* (10^{-12} *W*). The quantity obtained is expressed in decibels.

Equivalent Sound Level (L_{eq}): Quantifies the noise environment as a single value of sound level for any desired duration. L_{eq} correlates well with the effects of noise on people. L_{eq} is also sometimes known as Average Sound Level.

L_{10} : Sound pressure level that is exceeded 10% of the time of measurement.

L_{90} : Sound pressure level that is exceeded 90% of the time of measurement.

A-Weighting: A measure of sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. To describe sound in a manner representative of the human ear's response, it is necessary to reduce the effects of

the low and high frequencies with respect to medium frequencies. The resultant sound level is said to be A-weighted, and the units are in decibels (*dBA*).

Noise Barrier: A physical obstruction that is constructed between the noise source and the noise sensitive receptor(s) that lowers the noise level, examples include standalone noise walls, noise berms (earth or other material), and combination berm/wall systems.

Noise Berms: Noise barriers constructed from natural earthen materials such as soil, stone, rock, rubble, etc. in a natural, unsupported condition are termed, noise berms.

Noise Walls: Noise barrier systems that are manufactured according to a technical design and assembled on-site to obstruct the noise propagating from noise source to receptors.

A – Weighting: Several methods are present to characterize sound. The most common is the A-weighted sound level or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Studies have shown that the A-weighted level is closely correlated with annoyance.

C-Weighting: A measure of sound pressure level designed to reflect the response of the human ear, for higher levels above 100 dB when the human ear's response is flatter.

L_{Aeq} : A weighted equivalent sound pressure level.

L_{Amax} : The maximum A weighted sound pressure level detected in the measurement time domain.

L_{Ceq} : C weighted equivalent sound pressure level.

L_{day} : Equivalent continuous sound pressure level for reference time interval day.

L_{eve} : Equivalent continuous sound pressure level for reference time interval evening.

L_{night} : Equivalent continuous sound pressure level for reference time interval night.

L_{dn} : Day-night-weighted sound pressure level. Day time defined in between 06:00-22:00, and night time defined as 22:00-06:00.

L_{den} : Day, evening- night weighted sound pressure level. Day time defined in between 07:00-19:00, evening time between 19:00-23:00, night time between 23:00-07:00.

Point Source: A source of sound which is concentrated to a point.

Area Source: A source of sound which is distributed over an area.

Line Source: A source of sound emanating from a linear geometry.

The threshold of perception of the human ear is approximately 3 *dB*, and a 5 *dB* change is considered to be clearly noticeable to the ear. This is primarily due to the logarithmic measuring metric typically associated with decibels.

Table 1-1 *Perception of Sound*

Change in sound level	Perceived Change to the Human Ear
± 1 <i>dB</i>	Not perceptible
± 3 <i>dB</i>	Threshold of perception
± 5 <i>dB</i>	Clearly noticeable
± 10 <i>dB</i>	Twice as loud
± 20 <i>dB</i>	Four-fold change

1.1.2 *Specific Objectives*

The specific objectives of the impact assessment are to:

- Determine the existing background noise levels,
- Assess noise impacts on sensitive receptors,
- Identify the vibration impact,
- Suggest mitigation measures and determine the residual impacts.

1.1.3 *Key Objectives*

Potential sources of noise and vibration can be outlined as:

- Noise generated from railway operations,
- Ground borne vibration due to operating trains,
- Noise from construction activities along the railway,
- Noise from trucks passing to and from worksites and project facilities such as quarries and cement batching plants,
- Vibration from construction activities.

1.2 **Area Of Influence**

The project's area of influence (AOI) is defined with respect to the night-time noise limits specified in the IFC EHS (WB/IFC, 2007) as the worst-case scenario. The noise modelling results support determination of the area of impact.

When defining the area of influence from the noise modelling, a basic propagation model was developed to determine the distance by which noise levels drop below 40 *dBA*, 5 *dBA* lower than the IFC night-time limit.

While determining the AOI for operations, maximum speed of 160 km/h for high-speed trains and 120 km/h for freight trains were assumed. In addition, to allow a worst-case scenario to be evaluated, it was assumed that the terrain was flat and that there was no noise attenuation due to topography such as banks. The simple model for operations is presented in Figure 1-1.

The noise map illustrates that the noise levels decrease below 40 dBA within 750 metres of the train track. For that reason, a corridor of 1000 meters either side of the track is considered as the AOI for operations.

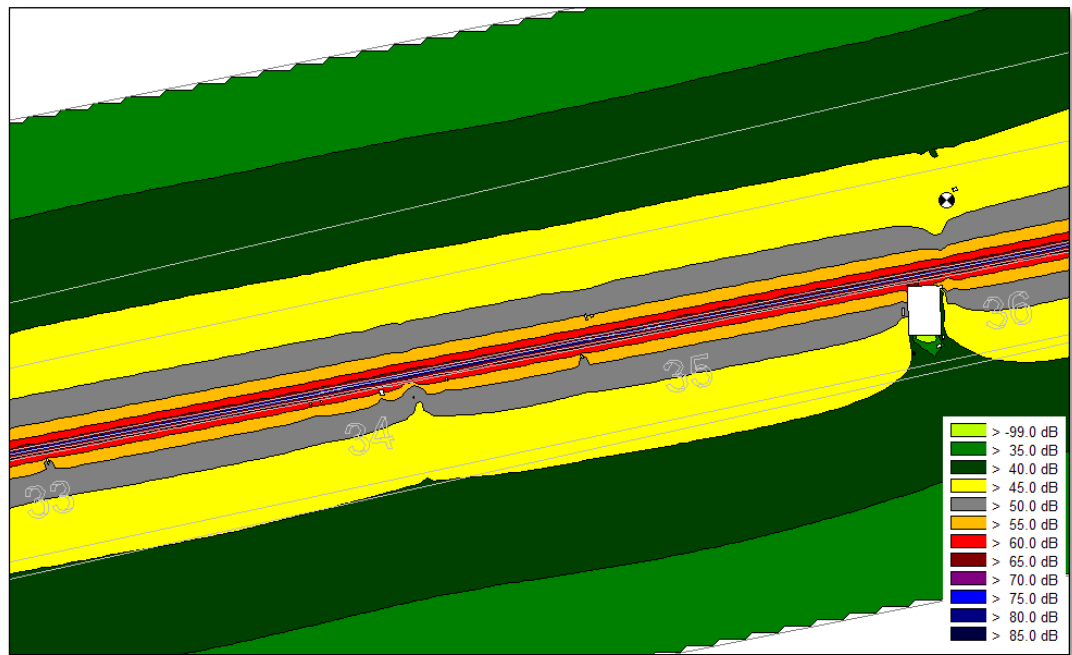


Figure 1-1 AOI Determination Model

For vibration impacts, the distance from the source of vibration to the receptors is defined as the AOI.

The Project area was divided into five sections each with a different traffic load and construction activities. The details of the sections are presented in Figure 1-2 [1].

Section 1: Mersin – Adana: 76 km of operating railway line.

Construction works: Renovation of the two existing lines and construction of two new lines. Electrical, signal, and telecommunications (EST) works on all lines.

Section 2: Adana – Toprakkale: 79 km of operating railway line.

Construction Works: Construction of two 49 km line. EST works along the full 79 km.

Section 3: Toprakkale - Bahçe: 58 km of operating railway line.

Construction Works: Construction and EST works for two lines.

Section 4: Bahçe - Nurdağı: 17 km of operating railway line.

Construction Works: EST works for a single line.

Section 5: Nurdağı - Başıpınar: 56 km operating railway line.

Construction Works: Construction of two 16 km lines. EST works for 56 kms.



Figure 1-2 Project Sections and Construction Activities

A total of 174 representative receiver locations are considered along the line for assessment of the potential impacts of construction and operational activities.

1.3 Temporal Scope

Noise and vibration impacts are assessed for the construction and operation phases. It is assumed that noise and vibration impacts related to construction activities will cease the following commissioning of railway.

In the construction impact assessment, an assumption has been made regarding the number of machines and equipment that would be operating at the same time, at a worksite. This assumption was then extrapolated along the railway line for different sets of construction activities relevant for each section. This analysis made the following assumptions;

- All of the machine and equipment would be operating at the edge of the worksite at the closest points to the determined receiving bodies,

- All of the machine equipment would be working simultaneously at full power.
- In practise neither of these situations would occur but this represents the worst-case scenario.

The operational noise impact of the project will be evaluated in a single scenario considering the design capacity of the railway line.

The operational noise impact of the project will be evaluated according to the daily annual average train traffic load of freight trains and high-speed trains provided for time periods.

Chapter 2: Legislative Policy and Guidelines

In this chapter, national and international legal requirements and applicable standards for the noise and vibration assessment for both construction and operation are described.

2.1 Applicable Environmental Noise Policies and Guidelines

- **International Guidelines**

The international policy in the assessment of noise levels followed in this study is outlined in the World Bank Group's & IFC's Environmental, Health and Safety Guidelines (2007). The guideline refers to the World Health Organizations (WHO), Guidelines for Community Noise (WHO, 1999). The recommended noise levels are presented in

Table 2-1. [2].

The values presented can be applied to both the construction and operation phases of the project. The noise levels should not exceed the levels presented in

Table 2-1 or result in a maximum increase in background levels of 3 *dB* at the nearest receptor location off-site.

Table 2-1 WBG - IFC Noise Level Guidelines

Receptor	Daytime (07:00 - 22:00)	Nighttime (22:00 - 07:00)
Residential areas	55 <i>dBA</i>	45 <i>dBA</i>
Commercial/industrial areas	70 <i>dBA</i>	70 <i>dBA</i>

WHO states cumulative noise level limits which depend on the background noise levels. In the determination of WHO's limits, background noise levels are taken into consideration. In order to evaluate cumulative noise levels, the summation of background noise and project noise exposure is assessed. When the cumulative noise levels are less than the guidance values of $L_{day} = 55 \text{ dBA}$ and $L_{night} = 45 \text{ dBA}$, the limits are set to these values. Alternatively, the cumulative noise levels should not exceed background noise by more than 3 *dBA*, for example in cases where the background noise levels already exceed the standards.

The impact assessment considers the arithmetic difference between the cumulative background and project noise and the guideline values. The impact magnitude considers the increase in noise.

- **National Regulation**

Environmental noise and vibration levels are regulated by the Turkish Regulation on the Assessment and Management of Environmental Noise (RAMEN) (Official Gazette Date/Number: 04.06.2010/27601). RAMEN was prepared in accordance with European Noise Directive (END) and uses the same noise indicators and standard methods.

The single number rating limits for different types of construction activities are defined in Article 23-a and are presented in Table 2.2 [5]. The railway construction limits are evaluated as “Other sources” and the limits for daytime (07:00 -19:00) are specified as $L_{eq}=70$ dBA.

Table 2-2 *Environmental Noise Limits for Construction Sites*

Receptor	Daytime (07:00 - 19:00)
Building	70
Road	75
Other Sources	70

According to RAMEN, construction activities within, or close to, residential areas are not prohibited within evening (19:00 – 23:00) and night-time (23:00 – 07:00) periods unless consent is obtained from the relevant authorities. If consent is gained, maximum evening noise levels should be 65 dBA i.e., 5 dBA lower than the daytime limit and 60 dBA for night-time i.e., 10 dBA lower than the daytime limit (RAMEN – Article 23 - c). In addition, impulse noise levels from construction should not exceed $L_{eqC}= 100$ dBC. (RAMEN – Article 23 - d)

For operations, limit values for noise emissions are defined in “Article 19 – a”, of RAMEN. The maximum allowable environmental equivalent noise levels to be met at the nearest off-site receptor for different periods of the day are presented in Table 2-3.

Table 2-3 *Environmental Noise Limits for Railways*

Day (07:00 - 19:00)	Evening (19:00 - 23:00)	Night (23:00 - 07:00)
65 dBA	60 dBA	55 dBA

- **Standards**

The standard methods recommended in END and RAMEN were selected for noise level analysis are:

- Noise Measurements: ISO 1996-2:2017: Description, measurement, and assessment of environmental noise,

- Railway Noise: The Netherlands national computation method published in ‘Reken- en Meetvoorschrift Railverkeerslawaa’96,
- Industrial Noise: ISO 9613-2: Acoustics – Abatement of sound propagation outdoors, Part 2: General method of calculation,
- Construction Machine/Equipment Sound Power Level Analysis: FHWA Roadway Construction Noise Model.

2.2 Applicable Vibration Policies and Guidelines

- **International Guidelines**

Vibration criteria are defined in “BS 5228-2:2009 - Code of practice for noise and vibration control on construction and open sites” which defines vibration limits for humans and which could result in cosmetic damage to buildings.

Table 2-4 *Guidance on Effects of Vibration Levels on Humans*

Vibration level [<i>mm/s</i>]	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10	Vibration is likely to be intolerable for any more than very brief exposure to this level.
Source: BS 5228-2:2009. Code of practice for noise and vibration control on construction and open sites. Vibration	

Table 2-5 *Transient Vibration Guide Values for Cosmetic Damage of Buildings*

Type of building	Peak component particle velocity in frequency range of predominant pulse, [mm/s]	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures	50	50
Industrial and heavy commercial buildings		
Unreinforced or light framed structures	15-20	20-50
Residential or light commercial buildings		
Note: Values referred to are at the base of the building		
Source: BS 7385-2:1993. Evaluation and measurement for vibration in buildings. Guide to damage levels from ground-borne vibration		

The probability of adverse comments from those experiencing vibration in a building due to ground-borne vibrations are specified in “BS 6472:1 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting”. BS 6472:1 provides vibration dose values (VDVs) based on the likelihood of adverse comments from those experiencing vibration in a building for day and night periods.

Table 2-6 *Vibration Dose Values for Buildings*

Residential Buildings	Low probability of adverse effect (m.s ^{-1.75})	Adverse comment possible (m.s ^{-1.75})	Adverse comment probable (m.s ^{-1.75})
Day (07 – 23)	0.2 - 0.4	0.4 - 0.8	0.8 - 1.6
Night (23 – 07)	0.1 - 0.2	0.2 - 0.4	0.4 - 0.8
For office and workshops multiplying by factors 2 & 4 respectively should be applied for the day.			
Source: BS 6472:1 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting			

The criteria for vibration from blasting are specified in BS 6472:2: Guide to evaluation of human exposure to vibration in buildings Part 2: blast-induced vibration.

The suggested maximum peak particle velocities (*ppv*) for different building uses are presented in The probability of adverse comments from those experiencing vibration in a building due to ground-borne vibrations are specified in “BS 6472:1 Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting”. BS 6472:1 provides vibration dose values (VDVs) based on the likelihood of adverse comments from those experiencing vibration in a building for day and night periods.

Table 2-6. These values represent maximum acceptable magnitudes for vibration with respect to human response for up to three blast vibration events per day.

The United States Federal Transit Administration’s (FTA) Transit Noise and Vibration Impact Assessment Manual is used to evaluate vibration during train operations. The parameters are stated in terms of permissible levels of indoor ground-borne vibration. Ground-borne vibration criteria are represented in terms of root mean square (rms) velocity levels in decibels (*VdB*). A threshold of 75 *VdB* is set for residences and building where people sleep and where the event causing the vibration is occasional defined as a maximum of 70 occurrences of the event per day.

Table 2-7 Vibration Limits for Blasting

Place	Time	Satisfactory magnitude <i>ppv</i> [mm/s]
Residential	Day	6 - 10
	Night	2
	Other Times	4.5
Office	Any time	14
Workshops	Any time	14
<p><i>Note 1. This table recommends magnitudes of vibration below which the probability of adverse comment is low (noise caused by any structural vibration is not considered).</i></p> <p><i>Note2. Doubling the suggested vibration magnitudes could result in adverse comment and this will increase significantly if the magnitudes are quadrupled.</i></p> <p><i>Note 3. For more than three occurrences of vibrations per day see the further multiplication factor in 5.2.</i></p>		

Table 2-8 FTA's Ground Borne Vibration Limits

Land Use Category	Frequent Events (>70 events)	Occasional Events (30 -70 events)	Infrequent Events (<30 events)
Category1: Buildings where vibration interfere with interior operations	65 VdB	65 VdB	65 VdB
Category2: Residences and buildings where people normally sleep	72 VdB	75 VdB	80 VdB
Category3: Institutional land uses with primarily daytime use	75 VdB	78 VdB	83 VdB

- **National Regulation**

The environmental vibration limits are defined in Item 25 of RAMEN. Maximum *ppv* values at receptors due to blasting are presented in Table 2-9.

Table 2-9 Vibration Limits for Blasting (RAMEN)

Frequency (Hz)	Allowable <i>ppv</i> (mm/s)
1	5
4-10	19
30-100	50

The vibration limits for construction activities given in RAMEN are presented in Table 2-10.

Table 2-10 Vibration Limits for Construction (RAMEN)

Location	Allowable <i>ppv</i> (mm/s)	
	Continuous Vibration	Transient Vibration
Residential	5	10
Industrial & Commercial	15	30

Vibration limit values from RAMEN that can be used for railway operations are presented in Table 2-11.

Table 2-11 Vibration Limits for Railway Operation (RAMEN)

Location	Frequency (Hz)	Allowable <i>ppv</i> (mm/s)
Residents	1	1.5
	8-100	0.3
Office	1	3.5
	8-100	0.6

- **Standards**

The applicable standards for construction and operation phases are as follows.

- FTA: Federal Transit Administration, Railway Vibrations
- BS 5228-1:2009: Vibration for blasting and construction vibrations

2.3 Applicable Ground Borne Noise Policies and Guidelines

- **International Guidelines**

FTA defines interior sound pressure levels for the ground-borne noise levels. The levels suggested in FTA are presented in Table 2-12.

Table 2-12 FTA's Ground Borne Noise Limits

Land Use Category	Frequent Events (>70 events)	Occasional Events (30 -70 events)	Infrequent Events (<30 events)
Category1: Buildings where vibration interfere with interior operations	NA	NA	NA
Category2: Residences and buildings where people normally sleep	35 <i>dB</i> A	38 <i>dB</i> A	43 <i>dB</i> A
Category3: Institutional land uses with primarily daytime use	40 <i>dB</i> A	43 <i>dB</i> A	48 <i>dB</i> A

- **National Regulation**

RAMEN appendix VII Table 9 presents indoor equivalent sound levels for different building uses. For the residential buildings and schools, 35 *dB*A sound pressure levels are advised for bedrooms and classrooms respectively under closed window conditions. In addition, for the hospitals, 25 *dB*A were suggested for patient rooms.

- **Standards**

- FTA: Federal Transit Administration, Railway Operations

Chapter 3: Impact Assessment Methodology

To evaluate the significance of impacts from the project, the magnitude of impacts and responsiveness of the receptors are identified throughout the AOI.

The impact magnitude considers the characteristics of the impact of the project. On the other hand, responsiveness takes account of the characteristics of receptors

3.1 Significance of Impact

The category of *significance* is identified based on the combinations of *magnitude* and *responsivity* of receptors in accordance with Table 3-1.

Table 3-1 Determination of Impact Significance

Magnitude of Impact	Responsivity of Receptor		
	Low	Medium	High
No Impact	No Impact		
Negligible	Negligible		Minor
Small	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
Large	Moderate	Major	

3.1.1 Responsivity of Receptors

The second component in the evaluation of impact *significance* is the *responsivity* of a potentially affected receptor.

The term "*responsivity*" refers to a set of characteristics that include:

- Importance of the receptor and
- Sensitivity of the receptor to the impact.

The category of responsiveness is identified based on the combinations of *importance* and *sensitivity* of receptors in accordance with the *responsivity* matrix (Table 3-2).

Table 3-2 Determination of Responsivity of Receptors

Importance	Sensitivity		
	Low	Medium	High
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	

3.1.1.1 Importance of Receptors

In general, evaluation of *importance* of the affected receptors is based on the following considerations:

- Protected status;
- Policy of the regional government.
- Stakeholder opinion.
- Economic value.
- Special features of ecosystems, such as resistance to change, rarity, adaptability, diversity, fragility and the ability to recover.
- Importance of individual components as environmental components.

If one of the above considerations is applicable, importance can be subjectively evaluated as medium or high. Otherwise, the importance is considered as low.

3.1.1.2 Sensitivity of Receptors

Sensitivity of a receptor depends upon the ability to recover for ecological receptors and the type of building use for human receptors (**Error! Not a valid bookmark self-reference.**).

Table 3-3 Designation of Sensitivity of Receptors

Sensitivity	Receptor
Low	High ability to recover the initial properties and functions, minor changes of spatial and dynamic indicators. Office Buildings, farm buildings, industrial or commercial facilities.
Medium	Limited / low ability to recover the initial properties and functions. Measures to minimize disturbance of ecosystems are required. Residential Buildings, hotels.
High	Lack of ability to recover the initial properties and functions. Irreversible disturbances may be caused by minor impacts. Recreational facilities, educational facilities, and health care centers.

3.1.2 Magnitude of Impact

The magnitude of an impacts is determined from a combination of the extent and the scale of impact. (Table 3-4)

Table 3-4 Determination of Impact Magnitude

Extent	Scale				
	No Impact	Small	Medium	Large	Very Large
Single	No impact	Negligible		Small	
Site		Small	Medium		Large
Local		Medium		Large	
Regional		Medium	Large		

3.1.2.1 Extent of Impact

The impact extent characterizes the spatial distribution of the impact. The impact extent categories are detailed in Table 3-5. Impact assessment points are chosen to represent receptors in the area in which they are located. When it comes to broader regions, the influence becomes more extensive.

Table 3-5 Categories of Impact Extent

Noise impact extent category	Criteria
Single	Possible noise and/or vibration impact on a single building.
Site	Possible noise and/or vibration impact on 5 - 10 buildings.
Local	Possible noise and/or vibration impact on 10 - 100 buildings.
Regional	Possible noise and/or vibration impact on 100 - 1000 buildings

3.1.2.2 Scale of Impact

3.1.2.2.1 The Scale of Noise Impact

The scale of a noise impact is the measure of the degree to which noise limit values are exceeded at receptors. Noise impact receptors are residential, office, institutional, educational, health centres, and commercial buildings.

Any levels greater than the WBG - IFC's noise level guidelines or exceedance of baseline noise levels by more than 3 *dB*A will be noted down as exceedance. Criteria to classify the scale of a noise impact during construction and operation are detailed in Table 3-6.

Table 3-6 Scale of Noise Impact

Noise impact scale Category	Exceedance of noise limits WBG - IFC Criteria
No Impact	<1
Small	1-3
Medium	3-5
Large	5-8
Very Large	>8
*Criteria: Day time: 07:00 – 22:00, $L_{day} = 55$ <i>dB</i> A; Night time: 22:00 – 07:00, $L_{night} = 45$ <i>dB</i> A	

3.1.2.2.2 The Scale of Vibration Impact

Vibration impacts need to be evaluated for construction, including blasting, and operation with different limiting values.

Construction Vibration

The construction impact scale is based on vibration levels in *ppv* defined in BS 5228-2:2009. BS 6472:1 Guide to evaluation of human exposure to vibration includes VDV_s considering the likelihood of adverse comments from those experiencing vibration in a building. In order to determine potential negative impacts, the approach uses both day

and night-time values. The VDV_s for night-time are around half of the day-time values. For single occurrences, conversion from VDV to *ppv* yields the same range of maximum values, indicating that the two approaches are consistent. In line with common practice for construction sites, *ppv* values are used. More stringent night-time limits were used in the vibration assessment. For a “very large” scale impact the possible cosmetic damage limit from BS 7385-2:1993 is considered. Vibration assessment criteria are presented in Table 3-7.

Table 3-7 Scale of Construction Vibration Impact

Category of construction vibration impact scale	Day - <i>ppv</i> (mm/s)	Night - <i>ppv</i> (mm/s)
No Impact	<1	<0.5
Small	1 - 5	0.5 - 2.5
Medium	5-10	2.5 -5
Large - National Regulation Limit	10-15	5 - 7.5
Very Large	>15	>7.5

Blasting Vibration

The vibration impact scale for blasting follows criteria in BS 6472:2 Guide to evaluation of human exposure to vibration in buildings, Part 2: Blast-induced vibration method.

Table 3-8 Scale of Blasting Vibration Impact

Category of impact scale	Day - <i>ppv</i> (mm/s)
No Impact /Small	<10
Medium /Large	10 - 15
Very Large	>15

Operational Vibration

Operational vibration impacts are assessed in accordance with the values specified in the FTA Manual. Unless there are extenuating conditions, such as wheel or running-surface problems, the FTA criteria requires that ground-borne vibration should seldom exceed the specified contours by more than 1 or 2 *dB*. However, because actual levels of ground-borne vibration may differ significantly from forecasts in some cases. This situation can be sourced from ground layers and/or trains used. For such cases the FTA guideline suggests a 5 *dB* buffer for the impact assessments. When the calculated ground-borne vibration levels are 0 to 5 *dB* higher than the FTA impact thresholds, there is a strong possibility that ground-borne vibration levels will be lower in practice. When the calculated values are, however, more than 5 *dB* above of the FTA threshold levels, there is a strong likelihood that there would be an impact unless mitigations

measures implemented. Bearing this in mind, the operations vibration scale applied is presented in Table 3-9.

Table 3-9 *Scale of Operational Vibration Impact*

Category of impact scale	VdB
No Impact	<75
Small	75 – 80
Medium	80 – 85
Large / Very Large	>85

Ground Borne Noise

The indoor noise limit of 35 *dba* specified in RAMEN and FTA's ground borne noise limit values are used together to define the impact scale. The limit levels apply to occasional occurrences which is categorised as less than 70 occurrences of the event per day. The mentioned levels are indoor sound pressures resulting from a single event i.e., a train passing by.

Table 3-10 *Scale of Ground Borne Noise Impact*

Category of impact scale	VdB
No Impact	<35
Small	35 - 38
Medium	38 - 43
Large / Very Large	>43

3.2 Possible Mitigation Alternatives

Possible mitigation measures that should be considered for construction and operation are explained in this section.

3.2.1 Construction Mitigation Alternatives

3.2.1.1 Construction Noise Mitigation Alternatives

The following possible mitigation measures may be considered during the construction phase of the project;

- Optimizing working routines and conditions for construction sites
- Implementing periodic maintenance of construction machine/equipment
- Limiting truck routes and speeds at locations where trucks work close to the receptors

3.2.1.2 *Construction Vibration Mitigation Alternatives*

- Routing of heavy vehicles away from residential streets or to areas with the least number of houses,
- Keeping earth-moving equipment as far away from vibration-sensitive areas as feasible on the worksite.
- Spreading of activities which cause vibration over time so that multiple activities that generate vibration do not occur at the same time. When each vibration source acts independently, the total vibration level generated may be significantly lower.
- Avoiding night-time activities.
- Limiting activities that cause vibration to day-time hours in residential areas as sensitivity to vibration increases at the night.[6].

3.2.2 *Operation Mitigation Alternatives*

3.2.2.1 *Operation Noise Mitigation Alternatives*

The following possible mitigation measures may be considered during the operation phase of the project;

- Noise barriers,
- Noise berms,
- Vegetation.

Noise barriers are engineered structures that lower the noise exposure at determined receiver locations. However, it is not feasible to build noise barriers at every receptor where there may be a noise exceedance.

Consideration of the structure of noise barriers is also required. Optimized height of the noise barriers should not exceed ~4 meters to maintain effectiveness of sound reduction and practicality of construction.

Maximizing the effectiveness of noise barriers should take account of the following:

- Distance between receiver locations and barrier structures,
- Terrain levels of the railway axis and receiver locations,
- Relative height of the receiver location and railway axis,
- Social acceptance of barrier structures

In many cases, noise berms are more efficient than noise barriers. Considerations for the use of noise berms include available space (land acquisition), terrain levels and availability of material to form the berm.

Vegetation is an option for social acceptance. Even though vegetation has no proved sufficient effect for noise reduction surely it has affirmative psychological effects on residents.

Vegetation may be less visually intrusive and whilst there is no evidence to support the effectiveness in noise attenuation, receptors often perceive noise reductions in psychological way.

Since this is an impact evaluation, the mitigation measures are evaluated for all feasible places with observation "moderate" and "major" impact.

3.2.2.2 *Operation Vibration Mitigation Alternatives*

The following possible mitigation measures may be considered during operation phase of the project:

- Limiting speed profiles of trains in sections of the railway close to residential areas,
- Employing materials that lower the vibration i.e., ballast mats, high-resilience fasteners, rail pads, floating slab track bed, resilient supported ties (low-vibration track, LVT).

In this work, high resilience fasteners and rail pads are utilized in vibration calculations due to its practicality.

Chapter 4: Background Findings

To evaluate the baseline conditions, noise and vibration level measurements were carried out at selected sensitive locations, in the AOI.

The measurement locations were selected based on the likelihood of a potential railway noise impact and their representativeness of other selected receptors which would be used to conduct the impact assessment. Along the project line, 20 measurement locations were selected. For the noise modelling, 20 locations were deemed insufficient to assess the noise and vibration impacts of the railway line. Thus, 174 assessment points were chosen to examine the impacts in narrow local extent.

4.1 Baseline Noise Survey

Noise level measurements were carried out at 20 points for 48-hours to assess the baseline noise levels around the receiver locations. Location of the noise measurement points were selected so as the measurement results to describe current noise climate at the sensitive locations closest to MAG route.

The environmental noise measurement method ISO 1996-2 was followed. IEC 61672- 1 class 1 sound level meters were used for the measurements. Sound level meters were placed at the monitoring locations. Extraneous noise events were analyzed and extracted from background noise levels. Processed results were used in the impact assessment and development of mitigation measures. Details of the survey are presented in Appendix 1. Monitoring locations and daily average processed results are presented in the Figure 4-1, Figure 4-2 and Table 4-1 respectively.

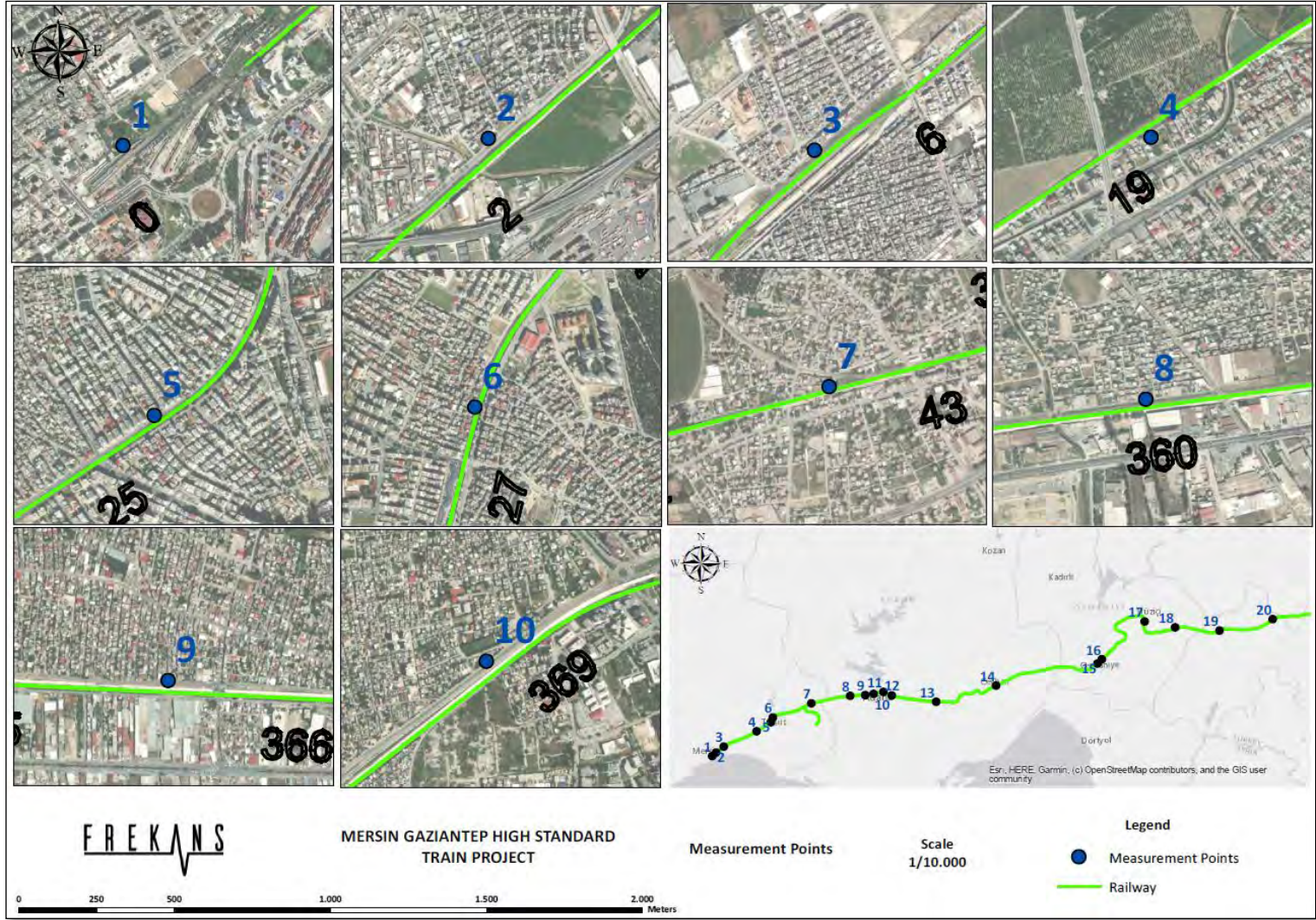


Figure 4-1 Measurement Locations 1-10

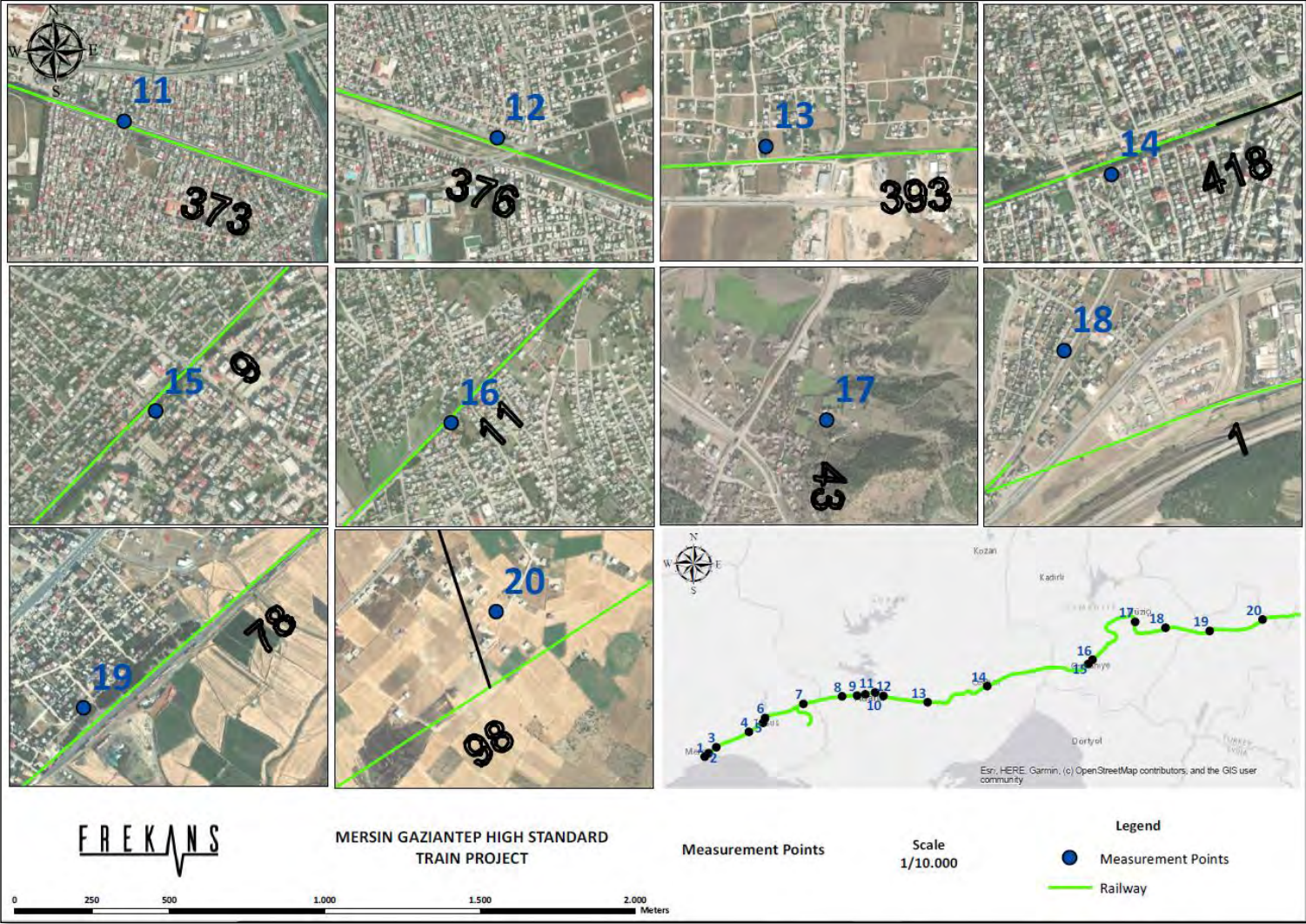


Figure 4-2 Measurement Locations 10-20

Table 4-1 Processed Averaged Noise Measurement Results

Points	Location	Latitude	Longitude	L_{den} (dBA)				L_{dn} (dBA)		
				L_{day} (07:00-19:00)	L_{eve} (19:00-23:00)	L_{night} (23:00-07:00)	L_{den}	L_d (07:00-22:00)	L_n (22:00-07:00)	L_{dn}
Point 1	Akdeniz/Mersin	36.8040300	34.6343160	58,9	53,3	52,2	60,2	58,1	52,0	60,0
Point 2	Akdeniz/Mersin	36.8152210	34.6522000	59,6	56,9	50,9	60,5	59,2	51,7	60,3
Point 3	Akdeniz/Mersin	36.8351380	34.6832970	60,5	58,1	51,7	61,5	60,2	52,3	61,1
Point 4	Akdeniz/Mersin	36.8845960	34.8207010	61,8	61,8	57,2	65,2	62,1	57,0	64,6
Point 5	Tarsus/Mersin	36.9128220	34.8793910	70,0	68,8	63,3	72,1	69,9	63,3	71,5
Point 6	Tarsus/Mersin	36.9288150	34.8882380	66,1	63,8	65,2	71,5	65,8	64,9	71,4
Point 7	Yenice/Mersin	36.9736500	35.0483850	58,8	60,3	53,9	62,5	59,2	55,2	62,5
Point 8	Küçükdikili/Adana	36.9960800	35.2097550	65,6	63,6	61,7	69,0	65,3	61,8	68,9
Point 9	Şakirpaşa/Adana	36.9979310	35.2725410	65,3	61,6	56,5	66,0	64,9	57,3	65,9
Point 10	Döşeme/Adana	37.0009310	35.3071830	71,3	69,7	65,5	73,7	71,1	66,0	73,0
Point 11	Yüreğir/Adana	37.0057850	35.3477840	66,0	65,0	62,8	70,0	66,0	62,5	69,6
Point 12	Yüreğir/Adana	36.9942370	35.3827530	62,6	61,0	59,8	66,8	62,4	59,6	66,6
Point 13	Yüreğir/Adana	36.9693550	35.5659490	59,3	57,9	57,2	64,0	59,2	56,8	63,6
Point 14	Ceyhan/Adana	37.0173750	35.8159600	62,3	57,0	54,2	63,0	62,0	55,3	63,6
Point 15	Merkez/Osmaniye	37.0806090	36.2388590	58,5	56,8	58,0	64,4	58,3	57,8	64,3
Point 16	Merkez/Osmaniye	37.0937980	36.2573360	62,9	63,5	62,9	69,4	63,1	62,9	69,4
Point 17	Düziçi/Osmaniye	37.2153960	36.4390990	52,4	50,3	46,2	54,5	52,1	46,6	54,4
Point 18	Bahçe/Osmaniye	37.1921750	36.5656520	59,3	59,4	58,7	65,2	59,2	58,9	65,3
Point 19	Nurdağı/Gaziantep	37.1753300	36.7481930	51,8	46,1	44,2	52,7	51,1	44,3	52,6
Point 20	Şatırhöyük/Gaziantep	37.2069140	36.9708450	50,6	46,2	41,8	51,1	49,9	42,3	51,0

4.2 Baseline Vibration Survey

To understand the baseline vibration levels and determine the existing train pass-by induced ground borne vibrations, 20 short term vibration level measurements were conducted at the same locations as the noise monitoring points.

Vibration levels were measured with a 3-axis accelerometer and data logger from the exterior façade of buildings following the methodology described in ISO 4866 method. Details of the measurements are presented in Appendix 2. The measured vibration levels were presented in Table 4-2.

Table 4-2 Baseline Vibration Levels

Points	Location	Latitude	Longitude	V_{RMS} (mm/s)	VdB
Point 1	Akdeniz/Mersin	36.8040300	34.6343160	0,085	70,5
Point 2	Akdeniz/Mersin	36.8152210	34.6522000	0,085	70,5
Point 3	Akdeniz/Mersin	36.8351380	34.6832970	0,06	67,5
Point 4	Akdeniz/Mersin	36.8845960	34.8207010	0,045	65,1
Point 5	Tarsus/Mersin	36.9128220	34.8793910	0,06	67,5
Point 6	Tarsus/Mersin	36.9288150	34.8882380	0,088	70,2
Point 7	Yenice/Mersin	36.9736500	35.0483850	0,054	66,6
Point 8	Küçükdikili/Adana	36.9960800	35.2097550	0,037	63,2
Point 9	Şakirpaşa/Adana	36.9979310	35.2725410	0,077	69,7
Point 10	Döşeme/Adana	37.0009310	35.3071830	0,099	71,8
Point 11	Yüreğir/Adana	37.0057850	35.3477840	0,084	70,4
Point 12	Yüreğir/Adana	36.9942370	35.3827530	0,098	71,8
Point 13	Yüreğir/Adana	36.9693550	35.5659490	0,151	74,5
Point 14	Ceyhan/Adana	37.0173750	35.8159600	0,032	62,2
Point 15	Merkez/Osmaniye	37.0806090	36.2388590	0,049	65,8
Point 16	Merkez/Osmaniye	37.0937980	36.2573360	0,04	63,9
Point 17	Düziçi/Osmaniye	37.2153960	36.4390990	0,039	63,9
Point 18	Bahçe/Osmaniye	37.1921750	36.5656520	0,039	63,9
Point 19	Nurdağı/Gaziantep	37.1753300	36.7481930	0,037	63,2
Point 20	Şatırhöyük/Gaziantep	37.2069140	36.9708450	0,045	65,1

4.3 Identified Receivers

To evaluate the impact of the project, additional receptors to those covered by the baseline monitoring were selected. These locations represent a set of receptors which have the same, or similar, background characteristics in terms of environmental noise levels and impact from the project. Moreover, evaluated receptors are representative locations which have the highest chance of being affected by noise & vibration during railway operation. Generally, the assessment locations are situated on the first row to the railway corridor.

The details of selected receivers with the measurement point associated, distance to railway line, the impact source (noise or vibration), the usage of the building was expressed in Table 4-3. In addition, the “extent” which indicates the size of the cluster of receivers represented, sensitivity and importance are also introduced.

For ease of application, the names of the receptors are combined with measurement points. (For R3-5, R3- measurement point identifier, 5- receptor identifier).

Table 4-3 Selected Receivers for Environmental Noise and Vibration

Meas. Points	Receiver	Location	Distance to Source (m)	Noise (N) / Vibration (V)	Comments	Extent	Sensitivity	Importance
R1	1	Mersin	25	N/V	Official	Regional	Low	Low
R1	2	Mersin	24	N/V	Educational	Regional	High	High
R2	1	Mersin	50	N/V	Industrial	Regional	Low	Low
R2	2	Mersin	44	N/V	Educational	Regional	High	High
R2	3	Mersin	13	N/V	Residential	Local	Medium	Medium
R2	4	Mersin	22	N/V	Residential	Local	Medium	Medium
R3	1	Mersin	14	N/V	Residential	Local	Medium	Medium
R3	2	Mersin	22	N/V	Residential	Local	Medium	Medium
R3	3	Mersin	89	N/V	Residential	Local	Medium	Medium
R3	4	Mersin	82	N/V	Residential	Local	Medium	Medium
R3	5	Mersin	32	N/V	Residential	Local	Medium	Medium
R3	6	Mersin	33	N/V	Residential	Local	Medium	Medium
R3	7	Mersin	35	N/V	Residential	Local	Medium	Medium
R3	8	Mersin	23	N/V	Residential	Local	Medium	Medium
R3	9	Mersin	26	N/V	Residential	Site	Medium	Medium
R3	10	Mersin	25	N/V	Residential	Local	Medium	Medium
R3	11	Mersin	27	N/V	Residential	Site	Medium	Medium
R3	12	Mersin	124	N/V	Residential	Site	Medium	Medium
R3	13	Mersin	90	N/V	Educational	Single	High	High
R3	14	Mersin	104	N/V	Residential	Site	Medium	Medium
R3	15	Mersin	17	N/V	Residential	Local	Medium	Medium
R4	1	Adnan Menderes	20	N/V	Residential	Local	Medium	Medium
R4	2	Adnan Menderes	30	N/V	Residential	Local	Medium	Medium
R4	3	Adnan Menderes	21	N/V	Residential	Local	Medium	Medium
R4	4	Adnan Menderes	97	N/V	Residential	Site	Medium	Medium
R5	1	Tarsus	28	N/V	Residential	Regional	Medium	Medium
R5	2	Tarsus	26	N/V	Residential	Regional	Medium	Medium
R5	3	Tarsus	20	N/V	Residential	Regional	Medium	Medium
R5	4	Tarsus	33	N/V	Residential	Regional	Medium	Medium
R5	5	Tarsus	24	N/V	Official	Regional	Low	Low
R5	6	Tarsus	29	N/V	Residential	Regional	Medium	Medium
R5	7	Tarsus	66	N/V	Residential	Regional	Medium	Medium
R5	8	Tarsus	17	N/V	Residential	Regional	Medium	Medium
R6	1	Tarsus	31	N/V	Residential	Regional	Medium	Medium
R6	2	Tarsus	13	N/V	Residential	Regional	Medium	Medium
R6	3	Tarsus	25	N/V	Residential	Regional	Medium	Medium
R6	4	Tarsus	7	N/V	Residential	Site	Medium	Medium
R6	5	Tarsus	11	N/V	Residential	Local	Medium	Medium
R6	6	Tarsus	16	N/V	Residential	Local	Medium	Medium

Meas. Points	Receiver	Location	Distance to Source (m)	Noise (N)/ Vibration (V)	Comments	Extent	Sensitivity	Importance
R6	7	Tarsus	24	N/V	Residential	Local	Medium	Medium
R6	8	Tarsus	253	N/V	Residential	Regional	Medium	Medium
R7	1	Yunusoglu	247	N/V	Residential	Local	Medium	Medium
R7	2	Tekeliören	463	N/V	Residential	Local	Medium	Medium
R7	3	Esenler	524	N/V	Residential	Local	Medium	Medium
R7	4	Kanberlihiyüğü	26	N/V	Residential	Local	Medium	Medium
R7	5	Yenice	23	N/V	Residential	Local	Medium	Medium
R7	6	Yenice	24	N/V	Residential	Local	Medium	Medium
R7	7	Yenice	31	N/V	Residential	Local	Medium	Medium
R7	8	Yenice	24	N/V	Residential	Local	Medium	Medium
R7	9	Yenice	32	N/V	Residential	Local	Medium	Medium
R7	10	Yenice	37	N/V	Residential	Local	Medium	Medium
R7	11	Arıklı	36	N/V	Industrial	Local	Low	Low
R7	12	Zeytinli	34	N/V	Residential	Local	Medium	Medium
R7	13	Zeytinli	368	N/V	Residential	Local	Medium	Medium
R7	14	Kargılı	132	N/V	Residential	Local	Medium	Medium
R8	1	Seyhan	36	N/V	Residential	Local	Medium	Medium
R8	2	Seyhan	31	N/V	Residential	Regional	Medium	Medium
R8	3	Seyhan	28	N/V	Residential	Regional	Medium	Medium
R8	4	Seyhan	116	N/V	Residential	Regional	Medium	Medium
R8	5	Seyhan	34	N/V	Residential	Local	Medium	Medium
R9	1	Adana	31	N/V	Residential	Local	Medium	Medium
R9	2	Adana	45	N/V	Residential	Regional	Medium	Medium
R9	3	Adana	29	N/V	Residential	Regional	Medium	Medium
R9	4	Adana	38	N/V	Residential	Regional	Medium	Medium
R9	5	Adana	29	N/V	Residential	Regional	Medium	Medium
R9	6	Adana	28	N/V	Residential	Regional	Medium	Medium
R9	7	Adana	12	N/V	Residential	Regional	Medium	Medium
R10	1	Adana	10	N/V	Residential	Regional	Medium	Medium
R10	2	Adana	52	N/V	Residential	Regional	Medium	Medium
R10	3	Adana	17	N/V	Residential	Regional	Medium	Medium
R10	4	Adana	51	N/V	Residential	Regional	Medium	Medium
R10	5	Adana	77	N/V	Residential	Regional	Medium	Medium
R11	1	Adana	13	N/V	Residential	Regional	Medium	Medium
R11	2	Adana	14	N/V	Residential	Regional	Medium	Medium
R11	3	Adana	11	N/V	Residential	Regional	Medium	Medium
R11	4	Adana	21	N/V	Residential	Regional	Medium	Medium
R11	5	Adana	12	N/V	Residential	Regional	Medium	Medium
R11	6	Adana	13	N/V	Residential	Regional	Medium	Medium
R11	7	Adana	12	N/V	Residential	Regional	Medium	Medium
R12	1	Adana	12	N/V	Residential	Regional	Medium	Medium
R12	2	Adana	21	N/V	Educational	Regional	High	High
R12	3	Adana	13	N/V	Residential	Regional	Medium	Medium
R12	4	Adana	12	N/V	Residential	Regional	Medium	Medium
R12	5	Adana	9	N/V	Residential	Regional	Medium	Medium
R12	6	Adana	13	N/V	Residential	Regional	Medium	Medium
R12	7	Adana	15	N/V	Residential	Regional	Medium	Medium
R12	8	Adana	26	N/V	Residential	Regional	Medium	Medium
R12	9	Adana	51	N/V	Residential	Regional	Medium	Medium
R12	10	Adana	92	N/V	Residential	Local	Medium	Medium
R12	11	Adana	88	N/V	Residential	Local	Medium	Medium
R12	12	Adana	24	N/V	Residential	Local	Medium	Medium
R12	13	Adana	31	N/V	Residential	Local	Medium	Medium
R12	14	Adana	35	N/V	Residential	Local	Medium	Medium
R12	15	Adana	50	N/V	Residential	Local	Medium	Medium
R13	1	Sarıçam	49	N/V	Residential	Local	Medium	Medium
R13	2	Yakapınar	578	N/V	Residential	Local	Medium	Medium
R13	3	Eski Misis	41	N/V	Residential	Local	Medium	Medium
R13	4	Çakaldere	38	N/V	Residential	Local	Medium	Medium
R13	5	Çokçapınar	292	N/V	Residential	Local	Medium	Medium
R13	6	Sirkeli	10	N/V	Residential	Local	Medium	Medium
R13	7	Toktamış	173	N/V	Residential	Local	Medium	Medium
R13	8	Toktamış	16	N/V	Industrial	Regional	Low	Low
R14	1	Ceyhan	17	N/V	Residential	Regional	Medium	Medium
R14	2	Ceyhan	15	N/V	Residential	Regional	Medium	Medium
R14	3	Ceyhan	40	N/V	Residential	Regional	Medium	Medium
R14	4	Ceyhan	24	N/V	Residential	Regional	Medium	Medium
R14	5	Ceyhan	46	N/V	Residential	Regional	Medium	Medium
R14	6	Ceyhan	11	N/V	Official	Regional	Low	Low
R14	7	Ceyhan	33	N/V	Hospital	Regional	High	High

Meas. Points	Receiver	Location	Distance to Source (m)	Noise (N)/ Vibration (V)	Comments	Extent	Sensitivity	Importance
R14	8	Ceyhan	43	N/V	Educational	Regional	High	High
R14	9	Ceyhan	26	N/V	Residential	Regional	Medium	Medium
R14	10	Kuzucak	282	N/V	Residential	Local	Medium	Medium
R14	11	Mustafabeyli	29	N/V	Residential	Local	Medium	Medium
R15	1	Toprakkale	37	N/V	Residential	Site	Medium	Medium
R15	2	Toprakkale	11	N/V	Residential	Local	Medium	Medium
R15	3	Toprakkale	25	N/V	Residential	Local	Medium	Medium
R15	4	Toprakkale	12	N/V	Official	Regional	Low	Low
R15	5	Toprakkale	20	N/V	Residential	Local	Medium	Medium
R15	6	Toprakkale	61	N/V	Residential	Site	Medium	Medium
R15	7	Toprakkale	59	N/V	Residential	Site	Medium	Medium
R15	8	Toprakkale	302	N/V	Residential	Local	Medium	Medium
R15	9	Toprakkale	288	N/V	Residential	Local	Medium	Medium
R15	10	Toprakkale	21	N/V	Residential	Site	Medium	Medium
R15	11	Akyar	57	N/V	Residential	Site	Medium	Medium
R15	12	Osmaniye	70	N/V	Residential	Local	Medium	Medium
R15	13	Osmaniye	7	N/V	Residential	Local	Medium	Medium
R15	14	Osmaniye	26	N/V	Educational	Regional	High	High
R15	15	Osmaniye	11	N/V	Residential	Regional	Medium	Medium
R15	16	Osmaniye	28	N/V	Residential	Regional	Medium	Medium
R15	17	Osmaniye	33	N/V	Residential	Regional	Medium	Medium
R15	18	Osmaniye	27	N/V	Official	Regional	Low	Low
R15	19	Osmaniye	68	N/V	Residential	Regional	Medium	Medium
R15	20	Osmaniye	12	N/V	Residential	Regional	Medium	Medium
R15	21	Osmaniye	35	N/V	Educational	Regional	High	High
R16	1	Osmaniye	23	N/V	Educational	Regional	High	High
R16	2	Osmaniye	10	N/V	Residential	Regional	Medium	Medium
R16	3	Osmaniye	49	N/V	Residential	Regional	Medium	Medium
R16	4	Osmaniye	16	N/V	Residential	Regional	Medium	Medium
R16	5	Osmaniye	47	N/V	Residential	Regional	Medium	Medium
R16	6	Osmaniye	12	N/V	Residential	Regional	Medium	Medium
R16	7	Osmaniye	23	N/V	Residential	Regional	Medium	Medium
R16	8	Osmaniye	13	N/V	Residential	Regional	Medium	Medium
R16	9	Osmaniye	16	N/V	Residential	Regional	Medium	Medium
R16	10	Osmaniye	40	N/V	Residential	Local	Medium	Medium
R16	11	Osmaniye	15	N/V	Residential	Regional	Medium	Medium
R16	12	Dervişli	324	N/V	Residential	Local	Medium	Medium
R16	13	Dervişli	300	N/V	Residential	Single	Medium	Medium
R16	14	Dervişli	290	N/V	Residential	Site	Medium	Medium
R16	15	Dervişli	491	N/V	Residential	Site	Medium	Medium
R16	16	Tehçi	169	N/V	Residential	Local	Medium	Medium
R16	17	Şekerdere	184	V	Residential	Site	Medium	Medium
R17	1	Yazlamazlı	192	N/V	Residential	Local	Medium	Medium
R17	2	Ellek	270	N/V	Residential	Local	Medium	Medium
R17	3	Bostanlar	98	N/V	Residential	Site	Medium	Medium
R17	4	Düziçi	100	N/V	Residential	Site	Medium	Medium
R17	5	Düziçi	85	N/V	Residential	Regional	Medium	Medium
R17	6	Düziçi	49	N/V	Residential	Regional	Medium	Medium
R17	7	Düziçi	38	N/V	Residential	Local	Medium	Medium
R17	8	Düziçi	35	V	Residential	Local	Medium	Medium
R17	9	Düziçi	38	V	Residential	Local	Medium	Medium
R17	10	Yarbaşı	52	V	Residential	Local	Medium	Medium
R18	1	Bahçe	12	N/V	Residential	Local	Medium	Medium
R18	2	Bahçe	231	N/V	Residential	Local	Medium	Medium
R18	3	Bahçe	33	N/V	Residential	Local	Medium	Medium
R19	1	Nurdağı	73	N/V	Residential	Local	Medium	Medium
R19	2	Nurdağı	436	N/V	Residential	Local	Medium	Medium
R19	3	Nurdağı	20	N/V	Residential	Regional	Medium	Medium
R19	4	Nurdağı	73	N/V	Residential	Regional	Medium	Medium
R20	1	Sakçagözü	60	N/V	Residential	Site	Medium	Medium
R20	2	Sakçagözü	181	N/V	Residential	Local	Medium	Medium
R20	3	Şatırhüyük	71	N/V	Residential	Local	Medium	Medium
R20	4	Eskişarkaya	47	N/V	Residential	Local	Medium	Medium
R20	5	Şehitkamil	226	N/V	Residential	Local	Medium	Medium
R20	6	Kömürler	803	V	Residential	Local	Medium	Medium

Satellite view of the receivers and project axis were presented in Figure 4-3.

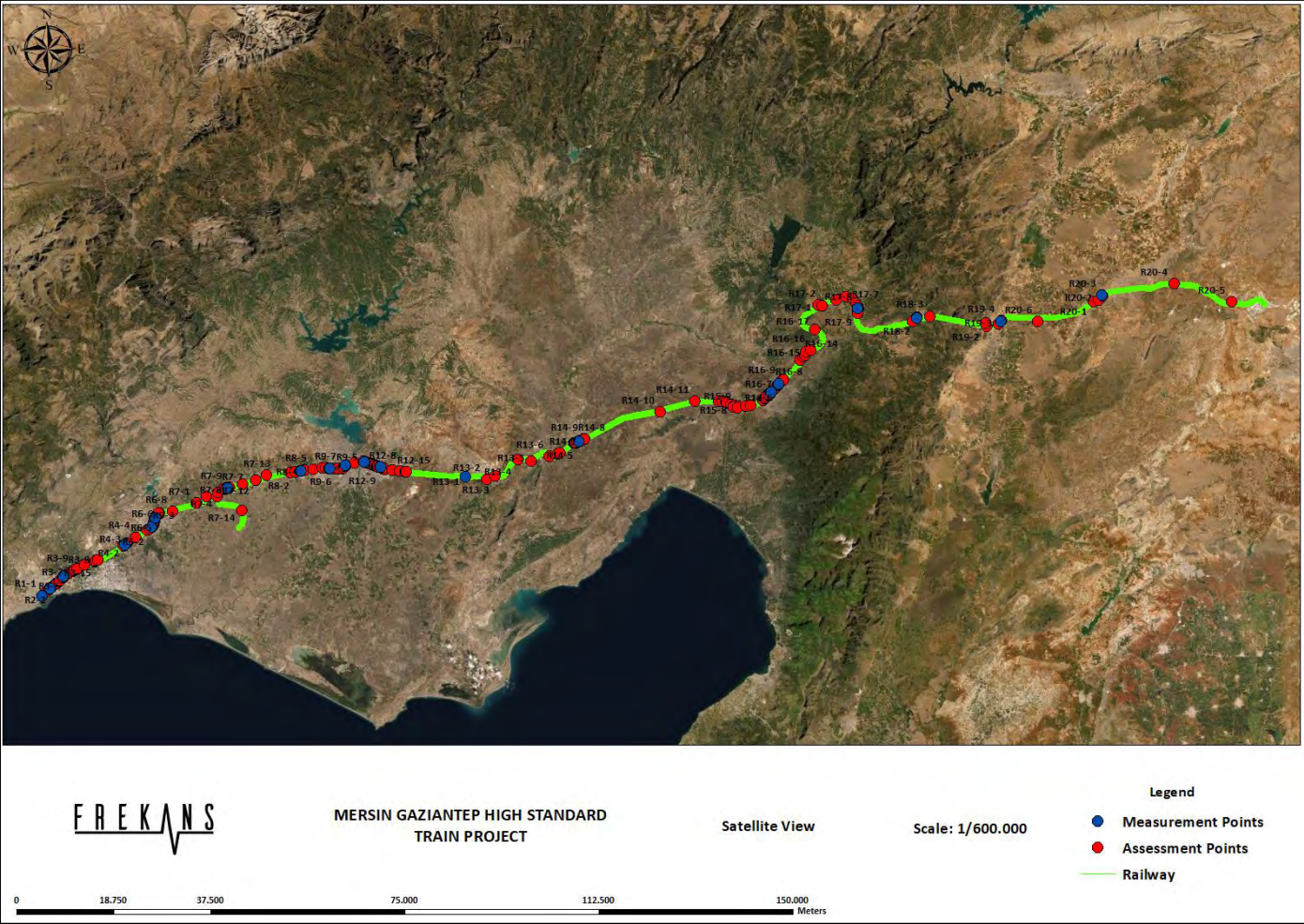


Figure 4-3 *Satellite view of the receivers and project axis*

Additional receivers are presented in Table 4-4 for vibration and ground borne noise assessment due to blasting and TBM operations.

Table 4-4 Selected Receivers for GBN & Vibration from Tunnelling

Receiver	Location	Vertical Distance (m)	Horizontal Distance (m)	KM	Comments	Extent	Sensitivity	Importance
TBM1	Düziçi/Esentepe	3	200	3+400	Residential	Local	Medium	Medium
TBM2	Düziçi/Arıcaklı	126	0	5+000	Residential	Local	Medium	Medium
TBM3	Nurdağı/Y.Kızılac	307	0	7+800	Residential	Local	Medium	Medium
TBM4	Nurdağı/Kaman	323	0	9+000	Residential	Local	Medium	Medium
TBM5	Nurdağı/ Gökçedere	0	118	13+500	Residential	Local	Medium	Medium
TB1	Kalecik	44	1080	48+500	Dam	Single	Low	High
TB2	Kalecik	37	1187	48+700	Residential	Local	Medium	Medium
TB3	Nurdağı	33	1020	79+500	Agriculture	Single	Low	Low
TB4	Nurdağı/Kömürler	69	2300	83+000	Residential	Local	Medium	Medium
TB5	Şatırhöyük	10	250	98+700	Residential	Single	Medium	Medium
TB6	Şatırhöyük	3	150	99+200	Residential	Local	Medium	Medium
TB7	Eskişarkaya	141	0	112+500	Residential	Local	Medium	Medium
TB8	Boyno	66	800	122+700	Residential	Local	Medium	Medium

Chapter 5: Methodology

The methodology used for the noise and vibration calculations is presented in this chapter. For the construction phase, environmental noise and vibration levels were calculated by using appropriate methods taking account of construction equipment and blasting for tunnels. In addition, for train operations, airborne noise and ground-borne vibrations are calculated as well as ground-borne noise for sensitive receptors.

5.1 Noise Modelling

A noise model was developed using commercial noise modeling software CadnaA from Datakustik. The calculation parameters and sound source levels for the modeling and the methods are described in this section.

Since sound propagation is hugely affected by terrain which can act as an obstacle to noise, information on ground topography was considered in the noise model. Ground topography data for a corridor along the railway alignment data was used to develop the model. Other topographical data for the noise propagation pathway was obtained from Digital Elevation Model Dataset from NASA, Reverb Earth Science Discovery Tool.

Ground sound absorption (G) varies between 0 for hard - reflective surfaces and 1 for soft - absorptive surfaces. When calculating noise propagation, G was considered as 0.1 for city zones and 0.9 for rural areas due to the substrate being soil.

Meteorological data (average relative humidity, average temperature, wind frequencies) were included in the noise mapping software to calculate the most suitable sound propagation conditions. Meteorological attenuation parameters – C_{met} - are considered as 1.5, 0.7 and 0 for day, evening and night periods respectively. [7].

Buildings were introduced to prepare 3D noise propagation model where relevant data exists.

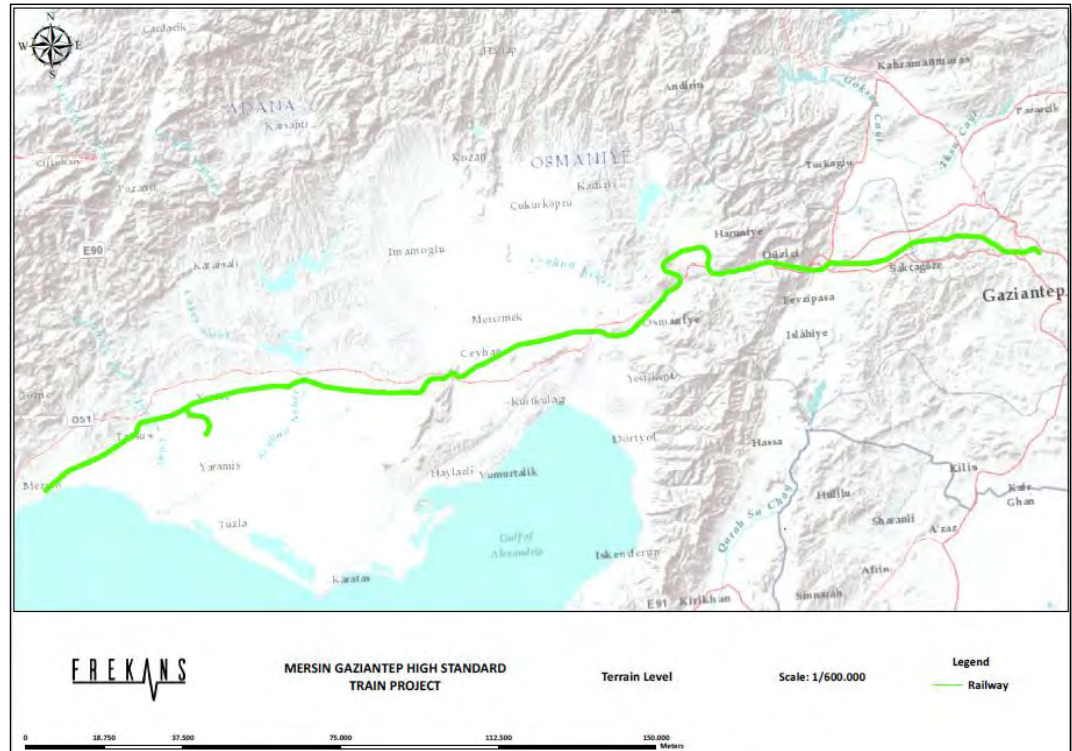


Figure 5-1 Terrain Level

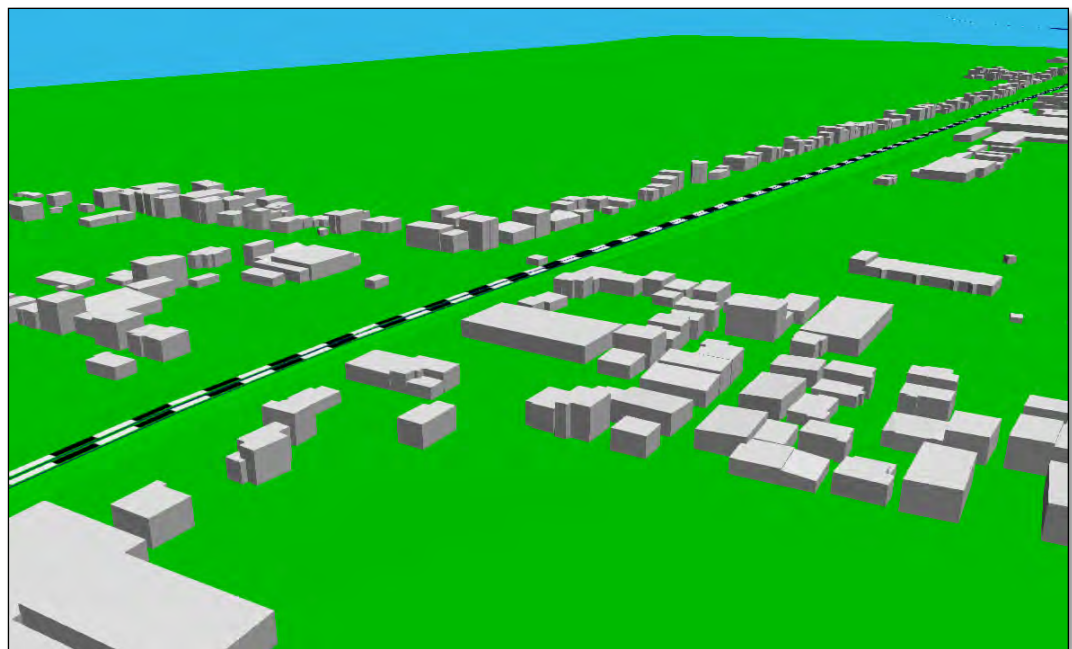


Figure 5-2 Noise Model 3D View

5.1.1 Noise Model Verification

The noise model was verified by using two noise monitoring points along the rail line where trains are running. The train pass-by events by freight and passenger trains detected in the monitoring were incorporated into the model to check the consistency of the railway model with baseline measurements.

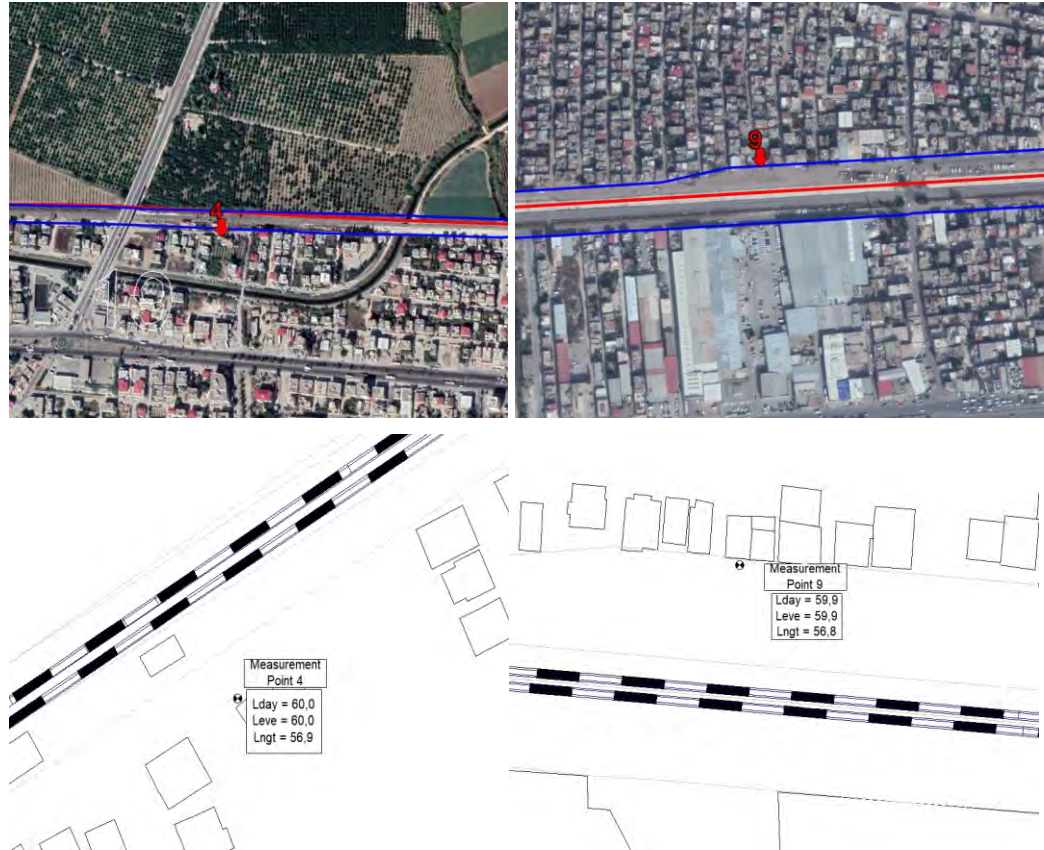


Figure 5-3 Model Verification Points

The comparison of the model and monitoring results are presented in Table 5-1. Except for the day period at monitoring point 9, the variances in day-evening and night-time levels are less than 3 dBA. The explanation for this observation is that the road in front of the monitoring location is the dominant noise source during the day.

Table 5-1 Model Verification Results

P.	Section	KM	Noise Model (dBA)			Measurements (dBA)			Difference (dBA)		
			L_d	L_e	L_n	L_d	L_e	L_n	L_d	L_e	L_n
4	Mersin-Adana, Adnan Menderes	19+100	60.0	60.0	56.9	62.2	61.0	56.1	2.2	1.0	-0.8
9	Mersin-Adana, Adana	365+600	59.9	59.9	56.8	65.2	61.2	56.2	5.3	1.3	-0.6

5.1.2 Construction Noise

The construction period is assumed to be in three main phases which are: (1) infrastructure, (2) superstructure and (3) electrification, signalization, telecommunication (EST) works. The application sites and construction phases are illustrated in Figure 1-2. The construction noise model was developed taking account of the construction phases and locations.

The sound power level (L_w) for the different phases of construction and construction sections are given in It was assumed that all equipment and machinery would be operating at the same time which would not happen in practice and so the model is conservative and presents a worst-case scenario. Different forms of noise sources, such as point, line, and area sources, are utilised in the model. Construction equipment is treated as an area source because it is mobile, and noise can be emitted from a number of points. The workshop at Yenice is considered as a point source. A sound power level of $75 \text{ dBA}/\text{m}^2$ was allocated to the workshop.

Table 5-2, Table 5-3, and Table 5-4. The L_w values for construction machinery and equipment are taken from the Roadway Construction Noise Model User's Guide (RCNM) of the U.S. Federal Highway Administration.

It was assumed that all equipment and machinery would be operating at the same time which would not happen in practice and so the model is conservative and presents a worst-case scenario. Different forms of noise sources, such as point, line, and area sources, are utilised in the model. Construction equipment is treated as an area source because it is mobile, and noise can be emitted from a number of points. The workshop at Yenice is considered as a point source. A sound power level of $75 \text{ dBA}/\text{m}^2$ was allocated to the workshop.

Table 5-2 Construction Sound Power Levels – Sections 1-2-3

Sound Power Level for Each Phase							
MERSIN- ADANA / ADANA - INCIRLIK - TOPRAKKALE / TOPRAKKALE - BAHÇE							
Machine/Equipment	L_w (dBA)	Infrastructure		Superstructure		EST	
		Quant.	Total (dBA)	Quant.	Total (dBA)	Quant.	Total (dBA)
Auger Drill Rig	101.5	1	101.5	-	-	-	-
Backhoe	99.5	3	104.3	2	102.6	1	99.5
Bar Bender	96.5	7	105.0	-	-	-	-
Compactor (ground)	96.5	5	103.5	1	96.5	-	-
Compressor (air)	99.5	3	104.3	1	99.5	1	99.5
Concrete Batch Plant	98.3	2	101.3	2	101.3	2	101.3
Concrete Mixer	104.5	3	109.3	3	109.3	3	109.3
Concrete Pump	98.5	2	101.5	2	101.5	2	101.5
Concrete Saw	106.5	2	109.5	1	106.5	-	-
Crane	100.6	5	107.6	1	100.6	1	100.6
Dozer/Bulldozer/Bobcat	104.5	5	111.5	-	-	-	-
Drill Rig Truck	100.5	1	100.5	-	-	-	-
Dump Truck	103.5	6	111.3	6	111.3	6	111.3
Excavator	104.5	24	118.3	1	104.5	-	-
Front End Loader	99.5	3	104.3	1	99.5	-	-
Generator	102.5	5	109.5	2	105.5	1	102.5

Sound Power Level for Each Phase							
MERSIN- ADANA / ADANA - INCIRLIK - TOPRAKKALE / TOPRAKKALE - BAHÇE							
Machine/Equipment	L_w (dBA)	Infrastructure		Superstructure		EST	
		Quant.	Total (dBA)	Quant.	Total (dBA)	Quant.	Total (dBA)
Grader	104.5	6	112.3	1	104.5	-	-
Hydra Break Ram	103.5	1	103.5	-	-	-	-
Impact Pile Driver	111.5	6	119.3	-	-	-	-
Jackhammer	101.5	2	104.5	-	-	-	-
Man Lift	101.5	-	-	1	101.5	1	101.5
Mounted Impact Hammer (hoe ram)	106.5	2	109.5	-	-	-	-
Pavement Scarifier	101.5	1	101.5	-	-	-	-
Paver	105.5	1	105.5	-	-	-	-
Pickup Truck	74.5	1	74.5	1	74.5	-	-
Pneumatic Tools	105.5	1	105.5	3	110.3	3	110.3
Pumps	97.5	7	106.0	-	-	-	-
Rivit Buster/Chipping Gun	101.5	1	101.5	-	-	-	-
Rock Drill	101.5	4	107.6	-	-	-	-
Roller	101.5	20	114.5	-	-	-	-
Sand Blasting (single nozzle)	101.5	-	-	1	101.5	-	-
Soil Mix Drill Rig	100.5	2	103.5	-	-	-	-
Tractor	103.5	1	103.5	-	-	-	-
Vacuum Excavator (Vac-Truck)	104.5	1	104.5	-	-	-	-
Vibratory Pile Driver	111.5	1	111.5	-	-	-	-
Warning Horn	95.5	2	98.5	1	95.5	1	95.5
Welder/Torch	92.5	2	95.6	1	92.5	-	-
Truck Tamping Machine	101.5	-	-	2	104.5	-	-
Turnout Truck Tamping Machine	101.5	-	-	1	101.5	-	-
Stabilizator	109.5	-	-	1	109.5	-	-
Regulator	114.5	-	-	2	117.6	-	-
Flash Butt Welding Machine (Rail)	94.5	-	-	3	99.3	-	-
Locomotive 1200/2000HP	89.5	-	-	3	94.3	-	-
UNIMOG (with Buffer)	103.5	-	-	2	106.6	-	-
Paver	105.5	-	-	4	111.5	-	-
Wrench Machine (for sleeper screws)	99.5	-	-	6	107.3	-	-
Rail Cutting Machine	101.5	-	-	6	109.3	-	-
Rail Profile Grinding Machine	94.5	-	-	12	105.3	-	-
Catenary Machine with Platform	89.5	-	-	-	-	10	99.5
Catenary Machine with bucket	89.5	-	-	-	-	4	95.6
UNIMOG (with Crane)	103.5	-	-	-	-	2	106.6
Total Sound Power Level (dBA)			125.2			122.2	116.8

Table 5-3 Construction Sound Power Levels – Section 4

Sound Power Level for Each Phase					
BAHÇE - NURDAĞI					
Machine/Equipment	L_w (dBA)	Superstructure		EST	
		Quant.	Total (dBA)	Quant.	Total (dBA)
Backhoe	99.5	-	-	1	99.5
Compressor (air)	99.5	-	-	1	99.5
Crane	100.6	-	-	1	100.6
Generator	102.5	-	-	1	102.5
Man Lift	101.5	-	-	1	101.5
Pneumatic Tools	105.5	-	-	1	105.5
Warning Horn	95.5	-	-	1	95.5
Truck Tamping Machine	101.5	2	104.5	-	-
Turnout Truck Tamping Machine	101.5	1	101.5	-	-
Stabilizator	109.5	1	109.5	-	-
Regulator	114.5	2	117.6	-	-
Flash Butt Welding Machine (Rail)	94.5	3	99.3	-	-
Locomotive 1200/2000HP	89.5	3	94.3	-	-
UNIMOG (with Buffer)	103.5	2	106.6	-	-
Paver	105.5	4	111.5	-	-
Wrench Machine (for sleeper screws)	99.5	6	107.3	-	-
Rail Cutting Machine	101.5	6	109.3	-	-
Rail Profile Grinding Machine	94.5	12	105.3	-	-
Catenary Machine with Platform	89.5	-	-	10	99.5
Catenary Machine with bucket	89.5	-	-	4	95.6
UNIMOG (with Crane)	103.5	-	-	2	106.6
Total Sound Power Level (dBA)			120.3	111.9	

Table 5-4 Construction Sound Power Levels – Section 5

Sound Power Level for Each Phase							
NURDAĞI - BAŞPINAR							
Machine/Equipment	L_w (dBA)	Infrastructure Quantity	Total (dBA)	Superstructure Quantity	Total (dBA)	EST Quantity	Total (dBA)
Backhoe	99.5	1	99.5	1	99.5	1	99.5
Bar Bender	96.5	-	-	-	-	1	96.5
Compressor (air)	99.5	1	99.5	-	-	1	99.5
Concrete Batch Plant	98.3	1	98.3	1	98.3	1	98.3
Concrete Mixer	104.5	3	109.3	3	109.3	3	109.3
Concrete Pump	98.5	1	98.5	1	98.5	1	98.5
Concrete Saw	106.5	1	106.5	1	106.5	1	106.5
Dump Truck	103.5	4	109.6	2	106.6	-	-
Excavator	104.5	1	104.5	-	-	-	-
Front End Loader	99.5	1	99.5	-	-	-	-
Generator	102.5	1	102.5	2	105.5	2	105.5
Grader	104.5	1	104.5	-	-	-	-
Man Lift	101.5	-	-	-	-	1	101.5
Pavement Scarifier	101.5	1	101.5	-	-	-	-
Pickup Truck	74.5	1	74.5	-	-	-	-
Pneumatic Tools	105.5	1	105.5	1	105.5	1	105.5
Pumps	97.5	1	97.5	-	-	-	-
Rivet Buster/Chipping Gun	101.5	1	101.5	-	-	-	-
Sand Blasting (single nozzle)	101.5	-	-	1	101.5	-	-
Warning Horn	95.5	2	98.5	1	95.5	1	95.5
Welder/Torch	92.5	-	-	1	92.5	-	-
Truck Tamping Machine	101.5	-	-	2	104.5	-	-
Turnout Truck Tamping Machine	101.5	-	-	1	101.5	-	-
Stabilizer	109.5	-	-	1	109.5	-	-
Regulator	114.5	-	-	2	117.6	-	-
Flash Butt Welding Machine (Rail)	94.5	-	-	3	99.3	-	-
Locomotive 1200/2000HP	89.5	-	-	3	94.3	-	-
Wrench Machine (for sleeper screws)	99.5	-	-	2	102.6	-	-
Paver	105.5	-	-	4	111.5	-	-
Wrench Machine (for sleeper screws)	99.5	-	-	6	107.3	-	-
Rail Cutting Machine	101.5	-	-	6	109.3	-	-
Rail Profile Grinding Machine	94.5	-	-	12	105.3	-	-
Catenary Machine with Platform	89.5	-	-	-	-	10	99.5
Catenary Machine with bucket	89.5	-	-	-	-	4	95.6
UNIMOG (with Crane)	103.5	-	-	-	-	2	106.6
Total Sound Power Level (dBA)		116.2		121.3		115.0	

A corridor of 2000 m in length x 50 m in wide was considered for construction machineries working simultaneously for the infrastructure and superstructure works. As the phase involving the construction of the infrastructure has the greatest sound power level, an area source sound power level of 75 dBA/m² was applied to infrastructure construction in between Mersin and Bahçe.

The highest construction sound power level calculated for superstructure works for the was 120.3 dBA for the Bahçe – Nurdağı section and 121.3 dBA for the Nurdağı – Başpınar section. Assuming active working corridors of 2000 m x 50 m and 2500 m x 50 m, an area source sound power level of 70 dBA/m² was assumed in the model.

- ***Transportation Routes***

Transportation routes from concrete batch plants and quarries to the construction worksites are considered in the noise model. Since existing plants and quarries are being used by the project, only project-specific access roads running from the main highways to the construction sites were considered. A traffic load of 5 trucks/hour for the concrete batch plants and 10 trucks/hour for quarry routes were used in the model which assumes maximum working capacity of the batch plants and quarry loading.

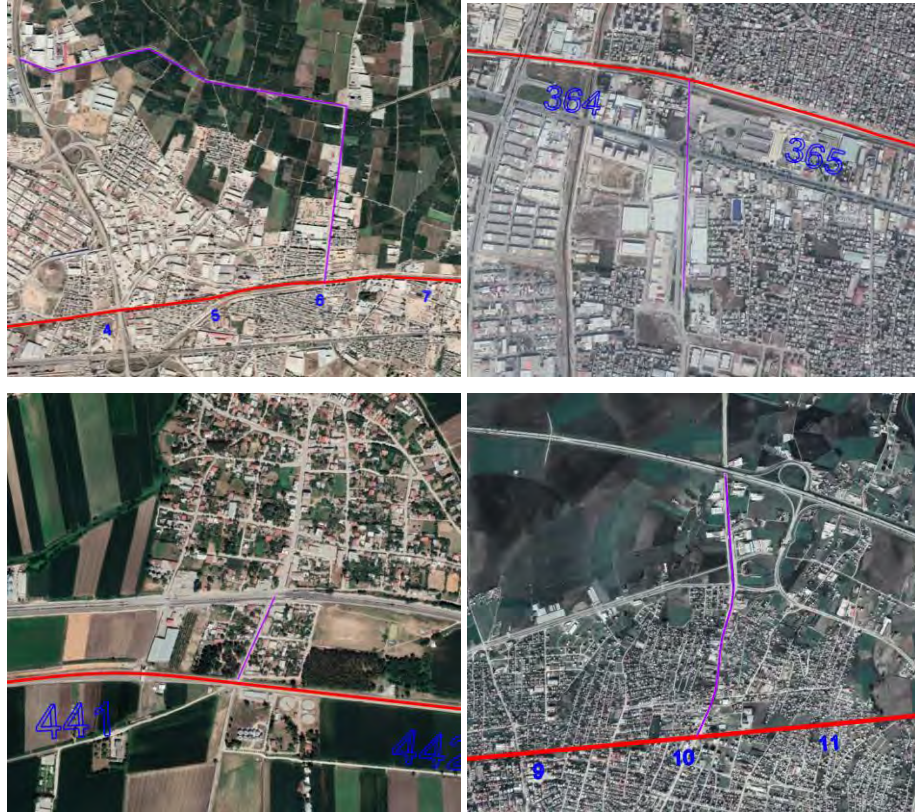


Figure 5-4 Transportation Routes

- ***Quarries and Concrete Batch Plants***

The quarries and batch plants are third-party facilities that will not be used exclusively by the project. These facilities are required to follow RAMEN and other Turkish environmental laws. Thus, their contribution to noise and vibration studies are not considered.

- ***Blasting Air Overpressure***

Air overpressure levels of roughly 120 dBZ can be generated regularly by routine blasting operations of tunnels at neighbouring sites. The propagation velocity of air overpressure is much slower than the propagation velocity of its related ground-borne vibration. As a result, air overpressure usually arrives after the beginning of ground vibration, and by

several seconds if considerable distances are involved. Nonetheless, an observer cannot easily distinguish between these two sources and their respective impacts, thus any air overpressure strongly contributes to the total sensory blast experience.

5.1.3 Operation Noise

The Dutch railway noise calculation method is being used to model planned railway activities (SRM II). Actual train types used by Turkish State Railways (TCDD) are paired with those indicated by the method in terms of number of cars, braking system, and maximum permitted speed.

Detailed data on speed profiles along the railway route were not available yet during the study. Thus, maximum design speeds are defined for the lines except city crossings. In the city crossings half speed are set.

Because the viaducts, other engineering structures and switches are not assured at this stage, they are reserved for the project's detailed design stage. The railway's tunnel sections, on the other hand, are included in the noise model. It should be noted that these critical figures influence wheel-track interactions and may result in greater noise levels than calculations at this point.

For freight trains, regional and main line passenger trains, TCDD operates locomotives such as the DE18000, DE22000, DE24000, DE22000, DE33000, DE36000, E43000, and E68000. In the train annotation, E denotes electric trains, whereas DE symbolizes diesel electric trains. The number codes signify the engine unit's horsepower multiplied by ten. HT65000 and HT80000 train sets are utilized in high-speed railway operations. The high-speed trains are equipped with five couches and one locomotive. Furthermore, freight trains with 20 cars and a diesel locomotive are considered.

Table 5-5 Train Models and Categories

Model	Engine Type	SRM II Category
DE18000, DE22000, DE24000, DE22000, DE33000, DE36000, E43000, E68000	Diesel - Electric	Category 6
Freight Train cars	-	Category 4 (for each 5 units)
HT65000 – HT80000	Electric	Category 9 (for each 4 unit)

Table 5-6 shows the project's planned timetable for each section, during the day, evening, and night periods.

Table 5-6 Train Quantities

Train Quantities							
	Day (07:00-19:00)		Eve (19:00-23:00)		Night (23:00-07:00)		Total
Trains	Freight	HST	Freight	HST	Freight	HST	Total
Mersin - Adana							
Train Quantity	19	12	10	4	19	0	64
Speed (km/h)	120	160	120	160	120	-	
Speed in city crossing (km/h)	60	80	60	80	60	-	
Adana - Toprakkale							
Train Quantity	9	12	3	4	13	0	41
Speed (km/h)	80	160	80	160	80	-	
Speed in city crossing (km/h)	40	80	40	80	40	-	
Toprakkale - Bahçe							
Train Quantity	22	12	5	4	14	0	57
Speed (km/h)	120	160	120	160	120	-	
Speed in city crossing (km/h)	60	80	60	80	60	-	
Bahçe - Nurdağ							
Train Quantity	21	12	10	4	11	0	58
Speed (km/h)	120	160	120	160	120	-	
Speed in city crossing (km/h)	60	80	60	80	60	-	
Nurdağ - Başpınar							
Train Quantity	22	12	12	4	12	0	62
Speed (km/h)	120	160	120	160	120	-	
Speed in city crossing (km/h)	60	80	60	80	60	-	

Along the route, railway tracks with concrete sleepers in ballast bed and jointless rail connections without switches are contemplated. To demonstrate the worst-case scenario, all trains are assumed to be non-braking.

5.2 Vibration Calculations

Vibration calculations are conducted for both construction and operation phases of the project. For the operation stage, train pass-by events are examined, and possible vibration impacts on buildings are calculated.

5.2.1 Construction Vibration

Vibration during the construction stage is mostly caused by three principal contributors. Vibrations caused by machine and equipment activity along the railway corridor, blasting in tunnel sections, and TBM vibrations are examined

5.2.1.1 Machine and Equipment Vibration

Vibrations are more likely to be generated by machines and equipment employed in the Infrastructure and Superstructure phases of construction. Pile drivers may have the most influence in areas where they will be occupied during the infrastructure phase. Second, vibratory rollers with higher vibration velocities must be examined along the line.

The major source of vibration at the superstructure stage is the track stabilizers. At 0.2 m from the source (on sleepers), the highest vibrational velocities referenced under 60 Bar-28 Hz conditions are 255 mm/s ([8], [9]).

Calculations were performed using the information and reference vibration levels obtained from the FTA document. Table 5-7 provides reference vibration values for certain equipment used in "Infrastructure" operations.

Table 5-7 Reference Vibration Levels for Machine and Equipment

Equipment	Reference Vibration (inch/sec) @25 feet
Impact Pile Driver	0.644
Vibratory Roller	0.21
Bulldozer	0.089
Loaded Trucks	0.076
Drilling	0.089

The peak particle velocities at the identified receivers are calculated with reference vibration velocities and distances in between the working area and receiving buildings as shown in the equation.

$$PPV_{receiver} = PPV_{reference} \times \left(\frac{d_{ref}}{d_{rec}}\right)^{1.5}$$

5.2.1.2 Blasting Vibration

Seven of the tunnels are planned to be open with blasting in the project. The tunnels and blasting details are presented in Table 5-8.

Table 5-8 Tunnels with Blasting

Section	Tunnel	Start	End	Holes	Max Explosive in single hole (kg)	Max Explosive in single delay (kg)
Toprakkale-Bahçe	T5	45+900	50+280	58	2	26
Nurdağı-Başpınar	T1	80+376	81+260	90	0.5	6.5
	T2	98+920	101+245	90	2.5	32.5
	T3	101+430	106+565	90	8	104
	T4	108+560	110+460	90	1.5	19.5
	T5	110+525	116+220	90	9	110.5
	T6	120+431	121+712	90	1.5	19.5

The two important parameters affecting vibrational velocities are the distance from blasting operation to the receiver and the maximum explosive charge in unit delay. The scaled distance method is common in calculating *ppv*. The constants of the fitted curve depend on the blasting conditions, meteorological conditions, and soil type of the

environment. The general use constants proposed by Oriard (2005) can be used for vibration levels for blasting.

$$SD = \frac{d(m)}{\sqrt{w(kg/charge)}} \quad PPV = 1730.SD^{-1.6}$$

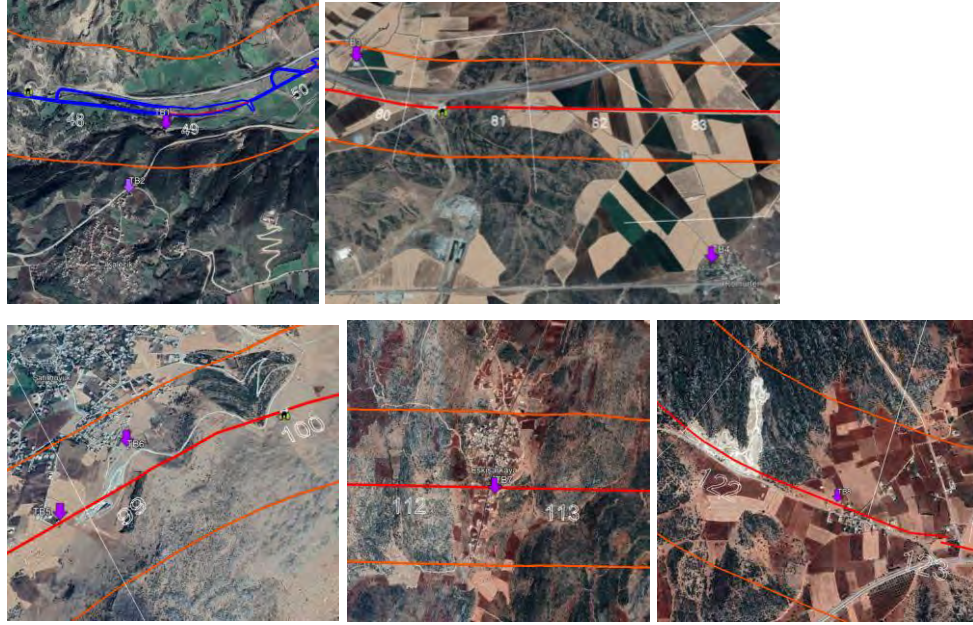


Figure 5-5 Assessment Points for Blasting

5.2.1.3 Tunnel Boring Machine Vibration

One tunnel in Bahçe – Nurdağı section is planned to open by using TBM. The length of the tunnel will be around 10 kms.

Table 5-9 Tunnel with TBM

Section	Tunnel	Start (km)	End (km)
Bahçe-Nurdağı	T1	3+510	13+452

Although the soil & rock type play an important role on vibration propagation, the estimations for the vibrations from TBMs are dependent on the closest distance between source and receivers. There exist other models can be used in prediction of ground vibrations but at this stage the empirical method proposed by Hiller and Crabb used [10]. This method also mentioned in BS 5528-2:2009.

Ground borne Vibration (TBM) $\{v_{res} \leq \frac{180}{x^{1.3}}\}$



Figure 5-6 Assessment Points for TBM Operations

5.2.2 Operation Vibrations

Vibrations caused by railway activities are estimated using FTA guidelines. The distance between the receiver and the source, as well as the speed of the trains, have an influence on railway vibrations.

Vibration is produced by both locomotives and passenger vehicles. The locomotives often produce the highest levels of vibration in commuter trains.

- *Freight Trains* $L_v = 92.28 + 14.81 \cdot \log(d) - 14.17 \cdot \log(d^2) + 1.65 \cdot \log(d^3) + 20 \cdot \log\left(\frac{\text{speed}}{50}\right)$
- *HST* $L_v = 85.88 - 1.06 \cdot \log(d) - 2.32 \cdot \log(d^2) - 0.87 \cdot \log(d^3) + 20 \cdot \log\left(\frac{\text{speed}}{50}\right)$

Distance in ft and speed in miles.

A large percentage of the vibration impact from a new transit facility is often caused by wheel impacts at special trackwork for turnouts and crossovers/switches. In the switch and turn zones a correction of 5 dBs are added to the calculated levels.

No under-balast mat, floating slap, and high-resilience fasteners considered for the track. Track considered as new and corrugations are not taken into account in both wheels and track. Jointless connections are considered in the calculations. For the tunnel portions, a 15 dB correction was made, and coupling to the building foundation was considered for 1-2 storey (-5 dB) and 3-4 storey (-7 dB) structures.

5.3 Ground Borne Noise

5.3.1 TBM Ground Borne Noise

The ground-borne noise from TBM operations was calculated simply relying on the distance to tunnel section. The receiver points for TBM operations used in the GBN evaluation.

$$L_p = 127 - 54 \log r$$

5.3.2 *Operations Ground Borne Noise*

The vibrational velocity levels were used to determine the GBN resulted from train activities. By taking pass by durations into account, correction terms are added to the computed vibration levels and equivalent A-weighted GBN values for day – evening and night-time periods as mentioned in FTA.

$$LeqA = Lv + K_{rad} + K_{a-w} + 10 \cdot \log\left(\frac{T_{totalpassby}}{T_{ref}}\right)$$

Chapter 6: Results & Assessment

This chapter presents the noise modelling findings as well as the computed vibration levels. The procedures described in Chapter 3 are used to obtain the impact scales, magnitudes, and final significances.

6.1 Noise

6.1.1 Construction Noise

The possible noise impact caused by the construction operations is evaluated. A sample construction noise map is presented in Figure 6-1. The noise maps prepared for all project lines are submitted in Appendix 3.

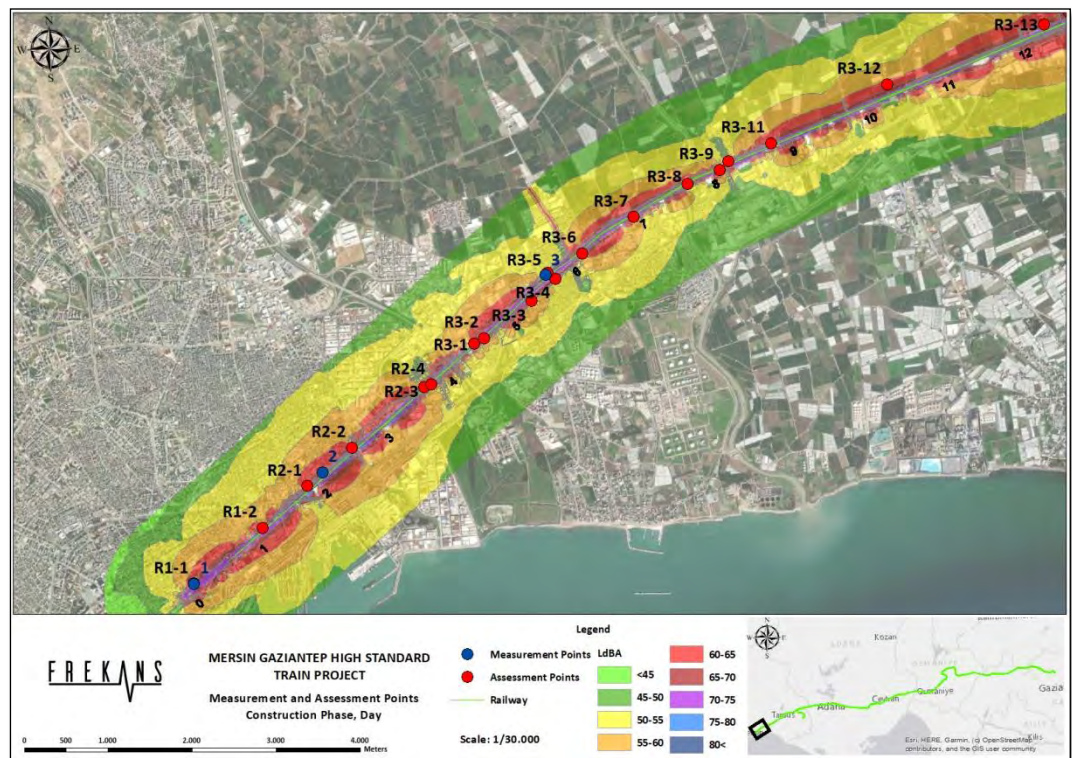


Figure 6-1 Construction Noise Map Example

Noise modelling results at selected receiver points are presented with impact significances in Table 6-1. RAMEN's construction limit values are used in exceedance and impact significance analysis.

Table 6-1 Construction Phase Noise Assessment Results

Meas.	Asses. Point	Location	Distance to Source (m)	Model Result L_{eq} (dBA)			Limit Value L_{day} (dBA)	Limit Exceedance (dBA)	Scale of Impact	Impact Magnitude	Impact Significance
				L_{day}	L_{eve}	L_{night}					
R1	R1-1	Mersin	25,0	69,3	69,4	69,5	70,0	0,0	No Impact	No Impact	No Impact
	R1-2	Mersin	24,0	75,6	75,6	75,6	70,0	5,6	Large	Large	Major
R2	R2-1	Mersin	50,0	69,6	69,8	69,9	70,0	0,0	No Impact	No Impact	No Impact
	R2-2	Mersin	44,0	70,8	70,8	70,9	70,0	0,8	No Impact	No Impact	No Impact
	R2-3	Mersin	13,0	77,8	77,8	77,8	70,0	7,8	Large	Large	Major
	R2-4	Mersin	22,0	78,0	78,0	78,0	70,0	8,0	Very Large	Large	Major
	R3-1	Mersin	14,0	78,0	78,0	78,1	70,0	8,0	Very Large	Large	Major
R3	R3-2	Mersin	22,0	78,9	78,9	78,9	70,0	8,9	Very Large	Large	Major
	R3-3	Mersin	89,0	65,8	66,1	66,4	70,0	0,0	No Impact	No Impact	No Impact
	R3-4	Mersin	82,0	66,6	66,9	67,2	70,0	0,0	No Impact	No Impact	No Impact
	R3-5	Mersin	32,0	71,6	71,7	71,8	70,0	1,6	Small	Medium	Moderate
	R3-6	Mersin	33,0	73,3	73,3	73,3	70,0	3,3	Medium	Medium	Moderate
	R3-7	Mersin	35,0	74,0	74,0	74,0	70,0	4,0	Medium	Medium	Moderate
	R3-8	Mersin	23,0	77,5	77,5	77,5	70,0	7,5	Large	Large	Major
	R3-9	Mersin	26,0	77,1	77,1	77,1	70,0	7,1	Large	Medium	Moderate
	R3-10	Mersin	25,0	75,7	75,7	75,8	70,0	5,7	Large	Large	Major
	R3-11	Mersin	27,0	72,9	72,9	73,0	70,0	2,9	Small	Small	Minor
	R3-12	Mersin	124,0	62,3	62,8	63,3	70,0	0,0	No Impact	No Impact	No Impact
	R3-13	Mersin	90,0	67,1	67,4	67,7	70,0	0,0	No Impact	No Impact	No Impact
	R3-14	Mersin	104,0	65,7	66,2	66,6	70,0	0,0	No Impact	No Impact	No Impact
	R3-15	Mersin	17,0	78,8	78,8	78,8	70,0	8,8	Very Large	Large	Major
R4	R4-1	Adnan Menderes	20,0	78,6	78,6	78,6	70,0	8,6	Very Large	Large	Major
	R4-2	Adnan Menderes	30,0	75,5	75,5	75,5	70,0	5,5	Large	Large	Major
	R4-3	Adnan Menderes	21,0	73,1	73,1	73,2	70,0	3,1	Medium	Medium	Moderate
	R4-4	Adnan Menderes	97,0	65,9	66,3	66,7	70,0	0,0	No Impact	No Impact	No Impact
R5	R5-1	Tarsus	28,0	72,9	73,0	73,0	70,0	2,9	Small	Medium	Moderate
	R5-2	Tarsus	26,0	82,1	82,1	82,1	70,0	12,1	Very Large	Large	Major
	R5-3	Tarsus	20,0	77,7	77,7	77,8	70,0	7,7	Large	Large	Major
	R5-4	Tarsus	33,0	74,1	74,2	74,2	70,0	4,1	Medium	Large	Major
	R5-5	Tarsus	24,0	75,8	75,8	75,8	70,0	5,8	Large	Large	Moderate
	R5-6	Tarsus	29,0	75,1	75,1	75,1	70,0	5,1	Large	Large	Major
	R5-7	Tarsus	66,0	67,2	67,4	67,6	70,0	0,0	No Impact	No Impact	No Impact
R6	R5-8	Tarsus	17,0	77,6	77,6	77,6	70,0	7,6	Large	Large	Major
	R6-1	Tarsus	31,0	74,5	74,5	74,5	70,0	4,5	Medium	Large	Major
	R6-2	Tarsus	13,0	77,0	77,0	77,0	70,0	7,0	Large	Large	Major
	R6-3	Tarsus	25,0	73,5	73,6	73,6	70,0	3,5	Medium	Large	Major
	R6-4	Tarsus	7,0	75,2	75,2	75,2	70,0	5,2	Large	Medium	Moderate
	R6-5	Tarsus	11,0	76,7	76,7	76,8	70,0	6,7	Large	Large	Major
	R6-6	Tarsus	16,0	77,8	77,9	77,9	70,0	7,8	Large	Large	Major
	R6-7	Tarsus	24,0	77,2	77,2	77,2	70,0	7,2	Large	Large	Major
R7	R6-8	Tarsus	253,0	58,5	59,2	59,7	70,0	0,0	No Impact	No Impact	No Impact
	R7-1	Yunusoğlu	247,0	59,1	59,7	60,3	70,0	0,0	No Impact	No Impact	No Impact
	R7-2	Tekeliören	463,0	54,6	55,3	55,9	70,0	0,0	No Impact	No Impact	No Impact
	R7-3	Esenler	524,0	57,3	58,0	58,6	70,0	0,0	No Impact	No Impact	No Impact
	R7-4	Kanberlihiyüğü	26,0	76,7	76,7	76,7	70,0	6,7	Large	Large	Major
	R7-5	Yenice	23,0	78,3	78,3	78,3	70,0	8,3	Very Large	Large	Major

Meas.	Asses. Point	Location	Distance to Source (m)	Model Result L_{eq} (dBA)			Limit Value L_{day} (dBA)	Limit Exceedance (dBA)	Scale of Impact	Impact Magnitude	Impact Significance
				L_{day}	L_{eve}	L_{night}					
	R7-6	Yenice	24,0	78,0	78,0	78,0	70,0	8,0	Very Large	Large	Major
	R7-7	Yenice	31,0	72,6	72,6	72,7	70,0	2,6	Small	Medium	Moderate
	R7-8	Yenice	24,0	77,1	77,1	77,1	70,0	7,1	Large	Large	Major
	R7-9	Yenice	32,0	71,4	71,4	71,5	70,0	1,4	Small	Medium	Moderate
	R7-10	Yenice	37,0	72,0	72,0	72,1	70,0	2,0	Small	Medium	Moderate
	R7-11	Ariklı	36,0	72,1	72,2	72,2	70,0	2,1	Small	Medium	Minor
	R7-12	Zeytinli	34,0	68,1	68,2	68,2	70,0	0,0	No Impact	No Impact	No Impact
	R7-13	Zeytinli	368,0	59,3	60,0	60,6	70,0	0,0	No Impact	No Impact	No Impact
R8	R7-14	Kargılı	132,0	62,6	63,1	63,5	70,0	0,0	No Impact	No Impact	No Impact
	R8-1	Seyhan	36,0	73,1	73,2	73,2	70,0	3,1	Medium	Medium	Moderate
	R8-2	Seyhan	31,0	74,2	74,2	74,3	70,0	4,2	Medium	Large	Major
	R8-3	Seyhan	28,0	76,1	76,1	76,2	70,0	6,1	Large	Large	Major
	R8-4	Seyhan	116,0	65,1	65,6	66,0	70,0	0,0	No Impact	No Impact	No Impact
R9	R8-5	Seyhan	34,0	70,4	70,4	70,5	70,0	0,4	No Impact	No Impact	No Impact
	R9-1	Adana	31,0	72,0	72,1	72,2	70,0	2,0	Small	Medium	Moderate
	R9-2	Adana	45,0	70,2	70,4	70,5	70,0	0,2	No Impact	No Impact	No Impact
	R9-3	Adana	29,0	74,4	74,4	74,5	70,0	4,4	Medium	Large	Major
	R9-4	Adana	38,0	71,7	71,8	71,9	70,0	1,7	Small	Medium	Moderate
	R9-5	Adana	29,0	73,4	73,5	73,6	70,0	3,4	Medium	Large	Major
	R9-6	Adana	28,0	73,6	73,7	73,7	70,0	3,6	Medium	Large	Major
R10	R9-7	Adana	12,0	78,0	78,0	78,1	70,0	8,0	Very Large	Large	Major
	R10-1	Adana	10,0	77,9	77,9	77,9	70,0	7,9	Large	Large	Major
	R10-2	Adana	52,0	68,9	69,0	69,2	70,0	0,0	No Impact	No Impact	No Impact
	R10-3	Adana	17,0	78,9	78,9	78,9	70,0	8,9	Very Large	Large	Major
	R10-4	Adana	51,0	68,6	68,7	68,9	70,0	0,0	No Impact	No Impact	No Impact
R11	R10-5	Adana	77,0	67,2	67,4	67,6	70,0	0,0	No Impact	No Impact	No Impact
	R11-1	Adana	13,0	79,8	79,9	79,9	70,0	9,8	Very Large	Large	Major
	R11-2	Adana	14,0	80,1	80,1	80,1	70,0	10,1	Very Large	Large	Major
	R11-3	Adana	11,0	78,3	78,3	78,4	70,0	8,3	Very Large	Large	Major
	R11-4	Adana	21,0	79,2	79,2	79,2	70,0	9,2	Very Large	Large	Major
	R11-5	Adana	12,0	77,2	77,2	77,2	70,0	7,2	Large	Large	Major
	R11-6	Adana	13,0	78,4	78,4	78,4	70,0	8,4	Very Large	Large	Major
R12	R11-7	Adana	12,0	78,9	78,9	78,9	70,0	8,9	Very Large	Large	Major
	R12-1	Adana	12,0	78,3	78,3	78,3	70,0	8,3	Very Large	Large	Major
	R12-2	Adana	21,0	77,9	77,9	78,0	70,0	7,9	Large	Large	Major
	R12-3	Adana	13,0	78,9	78,9	78,9	70,0	8,9	Very Large	Large	Major
	R12-4	Adana	12,0	77,8	77,8	77,8	70,0	7,8	Large	Large	Major
	R12-5	Adana	9,0	77,9	77,9	77,9	70,0	7,9	Large	Large	Major
	R12-6	Adana	13,0	78,6	78,6	78,6	70,0	8,6	Very Large	Large	Major
	R12-7	Adana	15,0	78,4	78,4	78,5	70,0	8,4	Very Large	Large	Major
	R12-8	Adana	26,0	77,2	77,2	77,2	70,0	7,2	Large	Large	Major
	R12-9	Adana	51,0	68,3	68,5	68,6	70,0	0,0	No Impact	No Impact	No Impact
	R12-10	Adana	92,0	65,2	65,5	65,8	70,0	0,0	No Impact	No Impact	No Impact
	R12-11	Adana	88,0	60,4	60,9	61,2	70,0	0,0	No Impact	No Impact	No Impact
	R12-12	Adana	24,0	74,0	74,0	74,0	70,0	4,0	Medium	Medium	Moderate
	R12-13	Adana	31,0	73,3	73,3	73,4	70,0	3,3	Medium	Medium	Moderate
	R12-14	Adana	35,0	72,5	72,6	72,6	70,0	2,5	Small	Medium	Moderate
	R12-15	Adana	50,0	69,4	69,5	69,6	70,0	0,0	No Impact	No Impact	No Impact

Meas.	Asses. Point	Location	Distance to Source (m)	Model Result L_{eq} (dBA)			Limit Value L_{day} (dBA)	Limit Exceedance (dBA)	Scale of Impact	Impact Magnitude	Impact Significance
				L_{day}	L_{eve}	L_{night}					
R13	R13-1	Sarıçam	49,0	74,0	74,1	74,1	70,0	4,0	Medium	Medium	Moderate
	R13-2	Yakapınar	578,0	52,9	53,7	54,3	70,0	0,0	No Impact	No Impact	No Impact
	R13-3	Eski Misis	41,0	66,8	66,9	67,0	70,0	0,0	No Impact	No Impact	No Impact
	R13-4	Çakaldere	38,0	71,7	71,8	71,8	70,0	1,7	Small	Medium	Moderate
	R13-5	Çokçapınar	292,0	56,7	57,4	58,0	70,0	0,0	No Impact	No Impact	No Impact
	R13-6	Sirkeli	10,0	75,3	75,3	75,3	70,0	5,3	Large	Large	Major
	R13-7	Toktamış	173,0	61,2	61,8	62,3	70,0	0,0	No Impact	No Impact	No Impact
	R13-8	Toktamış	16,0	76,8	76,8	76,8	70,0	6,8	Large	Large	Moderate
R14	R14-1	Ceyhan	17,0	77,1	77,1	77,1	70,0	7,1	Large	Large	Major
	R14-2	Ceyhan	15,0	77,4	77,4	77,5	70,0	7,4	Large	Large	Major
	R14-3	Ceyhan	40,0	70,3	70,4	70,4	70,0	0,3	No Impact	No Impact	No Impact
	R14-4	Ceyhan	24,0	79,5	79,5	79,6	70,0	9,5	Very Large	Large	Major
	R14-5	Ceyhan	46,0	71,1	71,2	71,3	70,0	1,1	Small	Medium	Moderate
	R14-6	Ceyhan	11,0	77,8	77,9	77,9	70,0	7,8	Large	Large	Moderate
	R14-7	Ceyhan	33,0	72,0	72,1	72,1	70,0	2,0	Small	Medium	Major
	R14-8	Ceyhan	43,0	66,2	66,4	66,6	70,0	0,0	No Impact	No Impact	No Impact
	R14-9	Ceyhan	26,0	75,3	75,3	75,4	70,0	5,3	Large	Large	Major
	R14-10	Kuzucak	282,0	57,5	58,2	58,7	70,0	0,0	No Impact	No Impact	No Impact
R15	R14-11	Mustafabeyli	29,0	77,2	77,2	77,2	70,0	7,2	Large	Large	Major
	R15-1	Toprakkale	37,0	72,4	72,4	72,5	70,0	2,4	Small	Small	Minor
	R15-2	Toprakkale	11,0	80,0	80,0	80,0	70,0	10,0	Very Large	Large	Major
	R15-3	Toprakkale	25,0	71,7	71,8	71,8	70,0	1,7	Small	Medium	Moderate
	R15-4	Toprakkale	12,0	77,6	77,6	77,6	70,0	7,6	Large	Large	Moderate
	R15-5	Toprakkale	20,0	77,5	77,5	77,5	70,0	7,5	Large	Large	Major
	R15-6	Toprakkale	61,0	67,1	67,3	67,4	70,0	0,0	No Impact	No Impact	No Impact
	R15-7	Toprakkale	59,0	69,1	69,2	69,3	70,0	0,0	No Impact	No Impact	No Impact
	R15-8	Toprakkale	302,0	54,7	55,3	55,9	70,0	0,0	No Impact	No Impact	No Impact
	R15-9	Toprakkale	288,0	58,5	59,1	59,7	70,0	0,0	No Impact	No Impact	No Impact
	R15-10	Toprakkale	21,0	77,6	77,6	77,6	70,0	7,6	Large	Medium	Moderate
	R15-11	Akyar	57,0	68,7	68,8	69,0	70,0	0,0	No Impact	No Impact	No Impact
	R15-12	Osmaniye	70,0	66,2	66,5	66,7	70,0	0,0	No Impact	No Impact	No Impact
	R15-13	Osmaniye	7,0	76,6	76,6	76,7	70,0	6,6	Large	Large	Major
	R15-14	Osmaniye	26,0	76,1	76,1	76,1	70,0	6,1	Large	Large	Major
	R15-15	Osmaniye	11,0	74,5	74,5	74,5	70,0	4,5	Medium	Large	Major
	R15-16	Osmaniye	28,0	61,6	61,8	62,1	70,0	0,0	No Impact	No Impact	No Impact
	R15-17	Osmaniye	33,0	77,5	77,5	77,5	70,0	7,5	Large	Large	Major
	R15-18	Osmaniye	27,0	75,9	75,9	75,9	70,0	5,9	Large	Large	Moderate
	R15-19	Osmaniye	68,0	64,9	65,2	65,4	70,0	0,0	No Impact	No Impact	No Impact
	R15-20	Osmaniye	12,0	76,9	76,9	76,9	70,0	6,9	Large	Large	Major
	R15-21	Osmaniye	35,0	70,8	70,9	70,9	70,0	0,8	No Impact	No Impact	No Impact
R16	R16-1	Osmaniye	23,0	72,3	72,3	72,3	70,0	2,3	Small	Medium	Major
	R16-2	Osmaniye	10,0	79,4	79,4	79,4	70,0	9,4	Very Large	Large	Major
	R16-3	Osmaniye	49,0	69,4	69,6	69,7	70,0	0,0	No Impact	No Impact	No Impact
	R16-4	Osmaniye	16,0	77,7	77,7	77,7	70,0	7,7	Large	Large	Major
	R16-5	Osmaniye	47,0	70,3	70,5	70,6	70,0	0,3	No Impact	No Impact	No Impact
	R16-6	Osmaniye	12,0	77,2	77,3	77,3	70,0	7,2	Large	Large	Major
	R16-7	Osmaniye	23,0	77,4	77,4	77,5	70,0	7,4	Large	Large	Major
	R16-8	Osmaniye	13,0	76,5	76,5	76,5	70,0	6,5	Large	Large	Major

Meas.	Asses. Point	Location	Distance to Source (m)	Model Result L_{eq} (dBA)			Limit Value L_{day} (dBA)	Limit Exceedance (dBA)	Scale of Impact	Impact Magnitude	Impact Significance
				L_{day}	L_{eve}	L_{night}					
	R16-9	Osmaniye	16,0	75,9	76,0	76,0	70,0	5,9	Large	Large	Major
	R16-10	Osmaniye	40,0	73,5	73,6	73,6	70,0	3,5	Medium	Medium	Moderate
	R16-11	Osmaniye	15,0	74,8	74,8	74,8	70,0	4,8	Medium	Large	Major
	R16-12	Dervişli	324,0	60,0	60,7	61,3	70,0	0,0	No Impact	No Impact	No Impact
	R16-13	Dervişli	300,0	68,5	68,6	68,7	70,0	0,0	No Impact	No Impact	No Impact
	R16-14	Dervişli	290,0	72,5	72,5	72,5	70,0	2,5	Small	Small	Minor
	R16-15	Dervişli	491,0	60,8	61,4	61,9	70,0	0,0	No Impact	No Impact	No Impact
	R16-16	Tehçi	169,0	65,3	65,5	65,7	70,0	0,0	No Impact	No Impact	No Impact
R17	R16-17	Şekerdere	184,0	-	-	--	70,0	0,0	No Impact	No Impact	No Impact
	R17-1	Yazlamazlı	192,0	62,7	63,3	63,9	70,0	0,0	No Impact	No Impact	No Impact
	R17-2	Ellek	270,0	61,3	62,0	62,5	70,0	0,0	No Impact	No Impact	No Impact
	R17-3	Bostanlar	98,0	53,0	53,6	54,2	70,0	0,0	No Impact	No Impact	No Impact
	R17-4	Düziçi	100,0	65,9	66,3	66,7	70,0	0,0	No Impact	No Impact	No Impact
	R17-5	Düziçi	85,0	65,2	65,6	65,9	70,0	0,0	No Impact	No Impact	No Impact
	R17-6	Düziçi	49,0	67,0	67,2	67,4	70,0	0,0	No Impact	No Impact	No Impact
	R17-7	Düziçi	38,0	71,1	71,2	71,3	70,0	1,1	Small	Medium	Moderate
	R17-8	Düziçi	35,0	48,2	49,0	49,6	70,0	0,0	No Impact	No Impact	No Impact
	R17-9	Düziçi	38,0	28,7	29,4	30,1	70,0	0,0	No Impact	No Impact	No Impact
R18	R17-10	Yarbaşı	52,0	45,1	45,8	46,5	70,0	0,0	No Impact	No Impact	No Impact
	R18-1	Bahçe	12,0	74,4	74,5	74,5	70,0	4,4	Medium	Medium	Moderate
	R18-2	Bahçe	231,0	50,8	51,5	52,1	70,0	0,0	No Impact	No Impact	No Impact
R19	R18-3	Bahçe	33,0	67,1	67,1	67,2	70,0	0,0	No Impact	No Impact	No Impact
	R19-1	Nurdağı	73,0	64,1	64,4	64,7	70,0	0,0	No Impact	No Impact	No Impact
	R19-2	Nurdağı	436,0	54,7	55,4	56,0	70,0	0,0	No Impact	No Impact	No Impact
	R19-3	Nurdağı	20,0	73,4	73,4	73,4	70,0	3,4	Medium	Large	Major
	R19-4	Nurdağı	73,0	63,9	64,0	64,2	70,0	0,0	No Impact	No Impact	No Impact
R20	R20-1	Sakçağözü	60,0	64,9	65,1	65,3	70,0	0,0	No Impact	No Impact	No Impact
	R20-2	Sakçağözü	181,0	58,5	59,1	59,6	70,0	0,0	No Impact	No Impact	No Impact
	R20-3	Şatırhüyük	71,0	64,4	64,6	64,9	70,0	0,0	No Impact	No Impact	No Impact
	R20-4	Eskişarkaya	47,0	-	-	-	70,0	0,0	No Impact	No Impact	No Impact
	R20-5	Şehitkamil	226,0	57,2	57,8	58,4	70,0	0,0	No Impact	No Impact	No Impact
	R20-6	Kömürler	803,0	50,2	51,0	51,6	70,0	0,0	No Impact	No Impact	No Impact
										No Impact	70
										Negligible	0
										Minor	4
										Moderate	29
										Major	71
										Total	174

6.1.2 Operation Noise

This section contains the findings of the railway noise model and impact analysis. Figure 6-2 depicts a railway noise map as an example. Appendix 4 contains the prepared noise maps along the railway line.

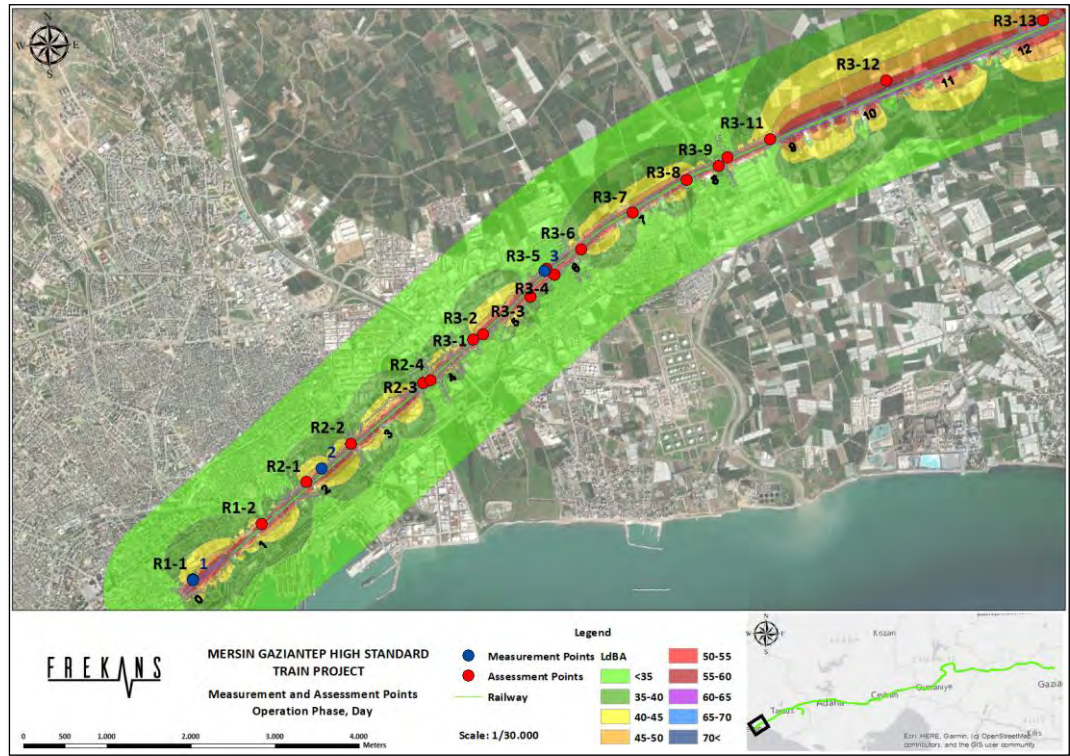


Figure 6-2 Operation Noise Map Example

Noise impact assessments at defined receiver points are presented in Table 6-2. Noise levels emitted by railway operations are evaluated by considering baseline levels and IFC Guideline limit values.

When final impact significances for railway operations are examined, 125 no impact zones are discovered among 174 receivers. Moderate effect was recorded in 24 places, with 18 locations classified as being in a major impacted zone.

Mitigation measures are considered for moderate and major impacted regions in Mitigation Measures and Residual Impacts.

Table 6-2 Operation Phase Noise Assessment Results, IFC Limits

Meas.	Ass. Point	Location	Distance to Source (m)	Model Result L_{eq} (dBA)		Baseline L_{eq} (dBA)		Cumulative (dBA)		Limit Value (dBA)		Limits Exceedance Max	Scale of Impact	Impact Magnitude	Impact Significance
				L_d	L_n	L_d	L_n	L_d	L_n	L_d	L_n				
R1	R1-1	Mersin	25,0	52,8	53,8	58,1	52,0	59,2	56,0	61,1	55,0	1,0	Small	Medium	Minor
	R1-2	Mersin	24,0	55,8	56,7	58,1	52,0	60,1	58,0	61,1	55,0	3,0	Small	Medium	Major
R2	R2-1	Mersin	50,0	52,3	53,2	59,2	51,7	60,0	55,5	62,2	54,7	0,8	No Impact	No Impact	No Impact
	R2-2	Mersin	44,0	52,2	53,1	59,2	51,7	60,0	55,5	62,2	54,7	0,8	No Impact	No Impact	No Impact
	R2-3	Mersin	13,0	58,9	59,8	59,2	51,7	62,1	60,4	62,2	54,7	5,7	Large	Large	Major
	R2-4	Mersin	22,0	56,8	57,8	59,2	51,7	61,2	58,8	62,2	54,7	4,1	Medium	Medium	Moderate
R3	R3-1	Mersin	14,0	59,5	60,4	60,2	52,3	62,9	61,0	63,2	55,3	5,7	Large	Large	Major
	R3-2	Mersin	22,0	56,5	57,5	60,2	52,3	61,7	58,6	63,2	55,3	3,3	Medium	Medium	Moderate
	R3-3	Mersin	89,0	47,8	48,7	60,2	52,3	60,4	53,9	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-4	Mersin	82,0	48,3	49,2	60,2	52,3	60,5	54,0	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-5	Mersin	32,0	54,4	55,4	60,2	52,3	61,2	57,1	63,2	55,3	1,8	Small	Medium	Moderate
	R3-6	Mersin	33,0	54,6	55,6	60,2	52,3	61,3	57,3	63,2	55,3	2,0	Small	Medium	Moderate
	R3-7	Mersin	35,0	54,9	55,8	60,2	52,3	61,3	57,4	63,2	55,3	2,1	Small	Medium	Moderate
	R3-8	Mersin	23,0	57,0	57,9	60,2	52,3	61,9	59,0	63,2	55,3	3,7	Medium	Medium	Moderate
	R3-9	Mersin	26,0	56,2	57,2	60,2	52,3	61,7	58,4	63,2	55,3	3,1	Medium	Medium	Moderate
	R3-10	Mersin	25,0	56,4	57,3	60,2	52,3	61,7	58,5	63,2	55,3	3,2	Medium	Medium	Moderate
	R3-11	Mersin	27,0	55,1	56,0	60,2	52,3	61,4	57,5	63,2	55,3	2,2	Small	Small	Minor
	R3-12	Mersin	124,0	51,7	52,7	60,2	52,3	60,8	55,5	63,2	55,3	0,2	No Impact	No Impact	No Impact
	R3-13	Mersin	90,0	55,2	56,2	60,2	52,3	61,4	57,7	63,2	55,3	2,4	Small	Negligible	Negligible
	R3-14	Mersin	104,0	53,4	54,4	60,2	52,3	61,0	56,5	63,2	55,3	1,2	Small	Small	Minor
	R3-15	Mersin	17,0	64,1	65,1	60,2	52,3	65,6	65,3	63,2	55,3	10,0	Very Large	Large	Major
R4	R4-1	Adnan Menderes	20,0	63,5	64,6	62,1	57,0	65,9	65,3	65,1	60,0	5,3	Large	Large	Major
	R4-2	Adnan Menderes	30,0	60,6	61,6	62,1	57,0	64,4	62,9	65,1	60,0	2,9	Small	Medium	Moderate
	R4-3	Adnan Menderes	21,0	63,8	64,8	62,1	57,0	66,0	65,5	65,1	60,0	5,5	Large	Large	Major
	R4-4	Adnan Menderes	97,0	53,7	54,7	62,1	57,0	62,7	59,0	65,1	60,0	0,0	No Impact	No Impact	No Impact
R5	R5-1	Tarsus	28,0	55,0	55,9	69,9	63,3	70,0	64,0	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-2	Tarsus	26,0	56,0	56,9	69,9	63,3	70,1	64,2	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-3	Tarsus	20,0	57,9	58,8	69,9	63,3	70,2	64,6	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-4	Tarsus	33,0	54,9	55,8	69,9	63,3	70,0	64,0	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-5	Tarsus	24,0	56,6	57,5	69,9	63,3	70,1	64,3	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-6	Tarsus	29,0	55,3	56,3	69,9	63,3	70,0	64,1	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-7	Tarsus	66,0	49,6	50,5	69,9	63,3	69,9	63,5	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-8	Tarsus	17,0	59,5	60,5	69,9	63,3	70,3	65,1	72,9	66,3	0,0	No Impact	No Impact	No Impact
R6	R6-1	Tarsus	31,0	55,3	56,3	65,8	64,9	66,2	65,5	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-2	Tarsus	13,0	58,8	59,7	65,8	64,9	66,6	66,0	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-3	Tarsus	25,0	55,8	56,8	65,8	64,9	66,2	65,5	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-4	Tarsus	7,0	61,0	62,0	65,8	64,9	67,0	66,7	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-5	Tarsus	11,0	59,5	60,5	65,8	64,9	66,7	66,2	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-6	Tarsus	16,0	58,6	59,6	65,8	64,9	66,6	66,0	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-7	Tarsus	24,0	56,8	57,7	65,8	64,9	66,3	65,7	68,8	67,9	0,0	No Impact	No Impact	No Impact
R7	R6-8	Tarsus	253,0	43,9	44,9	65,8	64,9	65,8	64,9	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R7-1	Yunusoglu	247,0	48,7	49,7	59,2	55,2	59,6	56,3	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-2	Tekelioren	463,0	42,0	43,0	59,2	55,2	59,3	55,5	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-3	Esenler	524,0	42,8	43,5	59,2	55,2	59,3	55,5	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-4	Kanberlihyuyüğü	26,0	63,3	64,3	59,2	55,2	64,7	64,8	62,2	58,2	6,6	Large	Large	Major
	R7-5	Yenice	23,0	64,8	65,8	59,2	55,2	65,9	66,2	62,2	58,2	8,0	Large	Large	Major

Meas.	Ass. Point	Location	Distance to Source (m)	Model Result L_{eq} (dBA)		Baseline L_{eq} (dBA)		Cumulative (dBA)		Limit Value (dBA)		Limits Exceedance Max	Scale of Impact	Impact Magnitude	Impact Significance
				L_d	L_n	L_d	L_n	L_d	L_n	L_d	L_n				
	R7-6	Yenice	24,0	63,9	65,0	59,2	55,2	65,2	65,4	62,2	58,2	7,2	Large	Large	Major
	R7-7	Yenice	31,0	62,1	63,1	59,2	55,2	63,9	63,8	62,2	58,2	5,6	Large	Large	Major
	R7-8	Yenice	24,0	63,4	64,4	59,2	55,2	64,8	64,9	62,2	58,2	6,7	Large	Large	Major
	R7-9	Yenice	32,0	61,6	62,6	59,2	55,2	63,6	63,3	62,2	58,2	5,1	Large	Large	Major
	R7-10	Yenice	37,0	61,1	62,1	59,2	55,2	63,3	62,9	62,2	58,2	4,7	Medium	Medium	Moderate
	R7-11	Ankılı	36,0	61,0	62,1	59,2	55,2	63,2	62,9	62,2	58,2	4,7	Medium	Medium	Minor
	R7-12	Zeytinli	34,0	61,1	62,1	59,2	55,2	63,3	62,9	62,2	58,2	4,7	Medium	Medium	Moderate
	R7-13	Zeytinli	368,0	45,6	46,6	59,2	55,2	59,4	55,8	62,2	58,2	0,0	No Impact	No Impact	No Impact
R8	R7-14	Kargılı	132,0	37,3	-	59,2	55,2	59,2	55,2	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R8-1	Seyhan	36,0	61,6	62,7	65,3	61,8	66,8	65,3	68,3	64,8	0,5	No Impact	No Impact	No Impact
	R8-2	Seyhan	31,0	61,8	62,8	65,3	61,8	66,9	65,3	68,3	64,8	0,5	No Impact	No Impact	No Impact
	R8-3	Seyhan	28,0	62,5	63,5	65,3	61,8	67,1	65,7	68,3	64,8	0,9	No Impact	No Impact	No Impact
	R8-4	Seyhan	116,0	52,7	53,7	65,3	61,8	65,5	62,4	68,3	64,8	0,0	No Impact	No Impact	No Impact
R9	R8-5	Seyhan	34,0	54,8	55,8	65,3	61,8	65,7	62,8	68,3	64,8	0,0	No Impact	No Impact	No Impact
	R9-1	Adana	31,0	54,8	55,7	64,9	57,3	65,3	59,6	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-2	Adana	45,0	52,6	53,6	64,9	57,3	65,1	58,8	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-3	Adana	29,0	55,7	56,6	64,9	57,3	65,4	60,0	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-4	Adana	38,0	53,6	54,5	64,9	57,3	65,2	59,1	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-5	Adana	29,0	54,9	55,9	64,9	57,3	65,3	59,7	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-6	Adana	28,0	55,6	56,6	64,9	57,3	65,4	60,0	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-7	Adana	12,0	60,9	61,9	64,9	57,3	66,4	63,2	67,9	60,3	2,9	Small	Medium	Moderate
R10	R10-1	Adana	10,0	60,8	61,7	71,1	66,0	71,5	67,4	74,1	69,0	0,0	No Impact	No Impact	No Impact
	R10-2	Adana	52,0	51,5	52,5	71,1	66,0	71,1	66,2	74,1	69,0	0,0	No Impact	No Impact	No Impact
	R10-3	Adana	17,0	59,0	59,9	71,1	66,0	71,4	67,0	74,1	69,0	0,0	No Impact	No Impact	No Impact
	R10-4	Adana	51,0	52,1	53,0	71,1	66,0	71,2	66,2	74,1	69,0	0,0	No Impact	No Impact	No Impact
	R10-5	Adana	77,0	45,9	46,8	71,1	66,0	71,1	66,1	74,1	69,0	0,0	No Impact	No Impact	No Impact
R11	R11-1	Adana	13,0	54,7	57,2	66,0	62,5	66,3	63,6	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-2	Adana	14,0	53,2	55,6	66,0	62,5	66,2	63,3	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-3	Adana	11,0	55,3	57,8	66,0	62,5	66,4	63,8	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-4	Adana	21,0	53,5	56,0	66,0	62,5	66,2	63,4	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-5	Adana	12,0	54,6	57,1	66,0	62,5	66,3	63,6	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-6	Adana	13,0	54,8	57,2	66,0	62,5	66,3	63,6	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-7	Adana	12,0	54,1	56,6	66,0	62,5	66,3	63,5	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R12-1	Adana	12,0	54,4	56,9	62,4	59,6	63,0	61,5	65,4	62,6	0,0	No Impact	No Impact	No Impact
R12	R12-2	Adana	21,0	50,7	53,1	62,4	59,6	62,7	60,5	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-3	Adana	13,0	53,6	56,1	62,4	59,6	62,9	61,2	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-4	Adana	12,0	54,7	57,1	62,4	59,6	63,1	61,5	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-5	Adana	9,0	56,0	58,5	62,4	59,6	63,3	62,1	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-6	Adana	13,0	53,7	56,2	62,4	59,6	62,9	61,2	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-7	Adana	15,0	52,9	55,4	62,4	59,6	62,9	61,0	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-8	Adana	26,0	50,6	53,0	62,4	59,6	62,7	60,5	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-9	Adana	51,0	44,6	46,9	62,4	59,6	62,5	59,8	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-10	Adana	92,0	41,0	43,2	62,4	59,6	62,4	59,7	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-11	Adana	88,0	31,1	33,4	62,4	59,6	62,4	59,6	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-12	Adana	24,0	55,2	57,7	62,4	59,6	63,2	61,8	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-13	Adana	31,0	54,6	57,1	62,4	59,6	63,1	61,5	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-14	Adana	35,0	53,9	56,4	62,4	59,6	63,0	61,3	65,4	62,6	0,0	No Impact	No Impact	No Impact
R13	R12-15	Adana	50,0	51,7	54,2	62,4	59,6	62,8	60,7	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R13-1	Sarıçam	49,0	53,9	56,4	59,2	56,8	60,3	59,6	62,2	59,8	0,0	No Impact	No Impact	No Impact

Meas.	Ass. Point	Location	Distance to Source (m)	Model Result L_{eq} (dBA)		Baseline L_{eq} (dBA)		Cumulative (dBA)		Limit Value (dBA)		Limits Exceedance Max	Scale of Impact	Impact Magnitude	Impact Significance
				L_d	L_n	L_d	L_n	L_d	L_n	L_d	L_n				
	R13-2	Yakapınar	578,0	33,9	36,4	59,2	56,8	59,2	56,8	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-3	Eski Misis	41,0	48,0	50,2	59,2	56,8	59,5	57,7	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-4	Çakaldere	38,0	52,1	54,4	59,2	56,8	60,0	58,8	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-5	Çokçapınar	292,0	37,4	39,9	59,2	56,8	59,2	56,9	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-6	Sirkeli	10,0	60,9	63,5	59,2	56,8	63,1	64,3	62,2	59,8	4,5	Medium	Medium	Moderate
	R13-7	Toktamuş	173,0	42,8	45,3	59,2	56,8	59,3	57,1	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-8	Toktamuş	16,0	58,4	60,9	59,2	56,8	61,8	62,3	62,2	59,8	2,5	Small	Medium	Minor
	R14-1	Ceyhan	17,0	50,4	52,8	62,0	55,3	62,3	57,2	65,0	58,3	0,0	No Impact	No Impact	No Impact
R14	R14-2	Ceyhan	15,0	53,1	55,6	62,0	55,3	62,5	58,5	65,0	58,3	0,2	No Impact	No Impact	No Impact
	R14-3	Ceyhan	40,0	46,8	49,1	62,0	55,3	62,1	56,2	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-4	Ceyhan	24,0	51,1	53,5	62,0	55,3	62,3	57,5	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-5	Ceyhan	46,0	47,2	49,5	62,0	55,3	62,1	56,3	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-6	Ceyhan	11,0	51,2	53,6	62,0	55,3	62,3	57,5	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-7	Ceyhan	33,0	47,9	50,2	62,0	55,3	62,2	56,5	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-8	Ceyhan	43,0	42,4	44,6	62,0	55,3	62,0	55,7	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-9	Ceyhan	26,0	49,8	52,2	62,0	55,3	62,3	57,0	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-10	Kuzucak	282,0	39,0	41,5	62,0	55,3	62,0	55,5	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-11	Mustafabeyli	29,0	55,8	58,3	62,0	55,3	62,9	60,1	65,0	58,3	1,8	Small	Medium	Moderate
R15	R15-1	Toprakkale	37,0	50,2	52,2	58,3	57,8	58,9	58,9	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-2	Toprakkale	11,0	61,4	63,9	58,3	57,8	63,1	64,9	61,3	60,8	4,1	Medium	Medium	Moderate
	R15-3	Toprakkale	25,0	53,6	56,1	58,3	57,8	59,6	60,0	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-4	Toprakkale	12,0	58,6	61,1	58,3	57,8	61,5	62,8	61,3	60,8	2,0	Small	Medium	Minor
	R15-5	Toprakkale	20,0	62,8	62,8	58,3	57,8	64,1	64,0	61,3	60,8	3,2	Medium	Medium	Moderate
	R15-6	Toprakkale	61,0	58,1	58,0	58,3	57,8	61,2	60,9	61,3	60,8	0,1	No Impact	No Impact	No Impact
	R15-7	Toprakkale	59,0	58,5	58,5	58,3	57,8	61,4	61,2	61,3	60,8	0,4	No Impact	No Impact	No Impact
	R15-8	Toprakkale	302,0	45,9	45,9	58,3	57,8	58,5	58,1	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-9	Toprakkale	288,0	46,8	46,8	58,3	57,8	58,6	58,1	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-10	Toprakkale	21,0	64,1	64,1	58,3	57,8	65,1	65,0	61,3	60,8	4,2	Medium	Medium	Moderate
	R15-11	Akyar	57,0	57,3	57,3	58,3	57,8	60,8	60,6	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-12	Osmaniye	70,0	48,1	48,0	58,3	57,8	58,7	58,2	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-13	Osmaniye	7,0	61,2	61,1	58,3	57,8	63,0	62,8	61,3	60,8	2,0	Small	Medium	Moderate
	R15-14	Osmaniye	26,0	55,9	55,9	58,3	57,8	60,3	60,0	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-15	Osmaniye	11,0	56,8	56,7	58,3	57,8	60,6	60,3	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-16	Osmaniye	28,0	45,2	45,1	58,3	57,8	58,5	58,0	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-17	Osmaniye	33,0	56,4	56,3	58,3	57,8	60,5	60,1	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-18	Osmaniye	27,0	55,9	55,8	58,3	57,8	60,3	59,9	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-19	Osmaniye	68,0	47,4	47,3	58,3	57,8	58,6	58,2	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-20	Osmaniye	12,0	58,4	58,3	58,3	57,8	61,4	61,1	61,3	60,8	0,3	No Impact	No Impact	No Impact
	R15-21	Osmaniye	35,0	53,7	53,7	58,3	57,8	59,6	59,2	61,3	60,8	0,0	No Impact	No Impact	No Impact
R16	R16-1	Osmaniye	23,0	54,1	54,0	63,1	62,9	63,6	63,4	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-2	Osmaniye	10,0	58,5	58,4	63,1	62,9	64,4	64,2	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-3	Osmaniye	49,0	50,7	50,6	63,1	62,9	63,3	63,1	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-4	Osmaniye	16,0	57,2	57,2	63,1	62,9	64,1	63,9	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-5	Osmaniye	47,0	51,5	51,4	63,1	62,9	63,4	63,2	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-6	Osmaniye	12,0	58,7	58,7	63,1	62,9	64,4	64,3	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-7	Osmaniye	23,0	55,6	55,5	63,1	62,9	63,8	63,6	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-8	Osmaniye	13,0	58,8	58,8	63,1	62,9	64,5	64,3	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-9	Osmaniye	16,0	58,1	58,0	63,1	62,9	64,3	64,1	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-10	Osmaniye	40,0	53,6	53,5	63,1	62,9	63,6	63,4	66,1	65,9	0,0	No Impact	No Impact	No Impact

Chapter 6: Results & Assessment

Meas.	Ass. Point	Location	Distance to Source (m)	Model Result L_{eq} (dBA)		Baseline L_{eq} (dBA)		Cumulative (dBA)		Limit Value (dBA)		Limits Exceedance Max	Scale of Impact	Impact Magnitude	Impact Significance
				L_d	L_n	L_d	L_n	L_d	L_n	L_d	L_n				
	R16-11	Osmaniye	15,0	53,9	53,8	63,1	62,9	63,6	63,4	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-12	Dervişli	324,0	46,2	46,2	63,1	62,9	63,2	63,0	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-13	Dervişli	300,0	59,3	59,3	63,1	62,9	64,6	64,5	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-14	Dervişli	290,0	62,1	62,1	63,1	62,9	65,6	65,5	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-15	Dervişli	491,0	49,7	49,8	63,1	62,9	63,3	63,1	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-16	Tehçi	169,0	59,2	59,2	63,1	62,9	64,6	64,4	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-17	Şekerdere	184,0	-	-	63,1	62,9	63,1	62,9	66,1	65,9	0,0	No Impact	No Impact	No Impact
R17	R17-1	Yazlamazlı	192,0	43,5	43,5	52,1	46,6	52,7	48,3	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-2	Ellek	270,0	42,1	42,1	52,1	46,6	52,5	47,9	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-3	Bostanlar	98,0	48,0	47,9	52,1	46,6	53,5	50,3	55,0	49,6	0,7	No Impact	No Impact	No Impact
	R17-4	Düziçi	100,0	47,8	47,7	52,1	46,6	53,5	50,2	55,0	49,6	0,6	No Impact	No Impact	No Impact
	R17-5	Düziçi	85,0	45,6	45,5	52,1	46,6	53,0	49,1	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-6	Düziçi	49,0	48,9	48,8	52,1	46,6	53,8	50,8	55,0	49,6	1,2	Small	Medium	Moderate
	R17-7	Düziçi	38,0	53,2	53,1	52,1	46,6	55,7	54,0	55,0	49,6	4,4	Medium	Medium	Moderate
	R17-8	Düziçi	35,0	20,0	20,0	52,1	46,6	52,1	46,6	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-9	Düziçi	38,0	9,0	9,0	52,1	46,6	52,1	46,6	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-10	Yarbaşı	52,0	14,7	14,7	52,1	46,6	52,1	46,6	55,0	49,6	0,0	No Impact	No Impact	No Impact
R18	R18-1	Bahçe	12,0	61,4	61,4	59,2	58,9	63,4	63,3	62,2	61,9	1,4	Small	Medium	Moderate
	R18-2	Bahçe	231,0	46,3	44,7	59,2	58,9	59,4	59,1	62,2	61,9	0,0	No Impact	No Impact	No Impact
	R18-3	Bahçe	33,0	62,1	60,5	59,2	58,9	63,9	62,8	62,2	61,9	1,7	Small	Medium	Moderate
R19	R19-1	Nurdağı	73,0	56,1	54,4	51,1	44,3	57,3	54,8	55,0	45,0	9,8	Very Large	Large	Major
	R19-2	Nurdağı	436,0	45,2	43,6	51,1	44,3	52,1	47,0	55,0	45,0	2,0	Small	Medium	Moderate
	R19-3	Nurdağı	20,0	58,6	56,9	51,1	44,3	59,3	57,1	55,0	45,0	12,1	Very Large	Large	Major
	R19-4	Nurdağı	73,0	52,3	50,7	51,1	44,3	54,8	51,6	55,0	45,0	6,6	Large	Large	Major
R20	R20-1	Sakçağözü	60,0	56,4	54,7	49,9	42,3	57,3	54,9	55,0	45,0	9,9	Very Large	Large	Major
	R20-2	Sakçağözü	181,0	50,8	49,2	49,9	42,3	53,4	50,0	55,0	45,0	5,0	Large	Large	Major
	R20-3	Şatırhüyük	71,0	53,3	51,7	49,9	42,3	54,9	52,2	55,0	45,0	7,2	Large	Large	Major
	R20-4	Eskişarkaya	47,0	-	-	49,9	42,3	49,9	42,3	55,0	45,0	0,0	No Impact	No Impact	No Impact
	R20-5	Şehitkamil	226,0	50,3	48,7	49,9	42,3	53,1	49,6	55,0	45,0	4,6	Medium	Medium	Moderate
	R20-6	Kömürler	803,0	41,9	40,2	49,9	42,3	50,5	44,4	55,0	45,0	0,0	No Impact	No Impact	No Impact
														No Impact	125
														Negligible	1
														Minor	6
														Moderate	24
														Major	18
														Total	174

6.2 Vibration

6.2.1 Construction Vibration

The vibration evaluations for the infrastructure and superstructure phases of construction are shown in Table 6-3. The temporary use of tracking machine is the reason for one minor and one moderate impacts over the railway line.

Table 6-3 Construction Vibration Assessment Results

Meas. Point	Ass. Point	Distance	Baseline	Construction Vibration Values (mm/s)		Scale of Impact		Impact Magnitude		Impact Significance	
		m	mm/s	Infrastructure	Superstructure	Infrastructure	Superstructure	Infrastructure	Superstructure	Infrastructure	Superstructure
R1	R1-1	25.0	0,085	0.033	0.182	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R1-2	24.0	0,085	0.035	0.194	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R2	R2-1	50.0	0,085	0.012	0.065	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R2-2	44.0	0,085	0.014	0.078	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R2-3	13.0	0,085	0.088	0.487	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R2-4	22.0	0,085	0.040	0.221	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R3	R3-1	14.0	0,06	0.078	0.435	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-2	22.0	0,06	0.040	0.221	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-3	89.0	0,06	0.005	0.027	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-4	82.0	0,06	0.006	0.031	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-5	32.0	0,06	0.023	0.126	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-6	33.0	0,06	0.022	0.120	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-7	35.0	0,06	0.020	0.110	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-8	23.0	0,06	0.037	0.207	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-9	26.0	0,06	0.031	0.172	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-10	25.0	0,06	0.033	0.182	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-11	27.0	0,06	0.029	0.163	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-12	124.0	0,06	0.003	0.017	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-13	90.0	0,06	0.005	0.027	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-14	104.0	0,06	0.004	0.022	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R3-15	17.0	0,06	0.059	0.325	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R4	R4-1	20.0	0,045	0.046	0.255	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R4-2	30.0	0,045	0.025	0.139	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R4-3	21.0	0,045	0.043	0.237	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R4-4	97.0	0,045	0.004	0.024	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R5	R5-1	28.0	0,06	0.028	0.154	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R5-2	26.0	0,06	0.031	0.172	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R5-3	20.0	0,06	0.046	0.255	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R5-4	33.0	0,06	0.022	0.120	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R5-5	24.0	0,06	0.035	0.194	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R5-6	29.0	0,06	0.026	0.146	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R5-7	66.0	0,06	0.008	0.043	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R5-8	17.0	0,06	0.059	0.325	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R6	R6-1	31.0	0,088	0.024	0.132	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

Chapter 6: Results & Assessment

Meas. Point	Ass. Point	Distance	Baseline	Construction Vibration Values (mm/s)		Scale of Impact		Impact Magnitude		Impact Significance	
		m	mm/s	Infrastructure	Superstructure	Infrastructure	Superstructure	Infrastructure	Superstructure	Infrastructure	Superstructure
R6	R6-2	13.0	0,088	0.088	0.487	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R6-3	25.0	0,088	0.033	0.182	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R6-4	7.0	0,088	0.221	1.232	No Impact	Small	No Impact	Small	No Impact	Minor
	R6-5	11.0	0,088	0.112	0.625	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R6-6	16.0	0,088	0.064	0.356	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R6-7	24.0	0,088	0.035	0.194	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R6-8	253.0	0,088	0.001	0.006	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R7	R7-1	247.0	0,054	0.001	0.006	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-2	463.0	0,054	0.000	0.002	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-3	524.0	0,054	0.000	0.002	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-4	26.0	0,054	0.031	0.172	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-5	23.0	0,054	0.037	0.207	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-6	24.0	0,054	0.035	0.194	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-7	31.0	0,054	0.024	0.132	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-8	24.0	0,054	0.035	0.194	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-9	32.0	0,054	0.023	0.126	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-10	37.0	0,054	0.018	0.101	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-11	36.0	0,054	0.019	0.106	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-12	34.0	0,054	0.021	0.115	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-13	368.0	0,054	0.001	0.003	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R7-14	132.0	0,054	0.003	0.015	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R9	R9-1	31.0	0,077	0.024	0.132	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R9-2	45.0	0,077	0.014	0.076	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R9-3	29.0	0,077	0.026	0.146	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R9-4	38.0	0,077	0.018	0.097	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R9-5	29.0	0,077	0.026	0.146	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R9-6	28.0	0,077	0.028	0.154	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R9-7	12.0	0,077	0.099	0.549	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R10	R10-1	10.0	0,099	0.130	0.721	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R10-2	52.0	0,099	0.011	0.061	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R10-3	17.0	0,099	0.059	0.325	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R10-4	51.0	0,099	0.011	0.063	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R10-5	77.0	0,099	0.006	0.034	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R11	R11-1	13.0	0,084	0.088	0.487	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R11-2	14.0	0,084	0.078	0.435	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R11-3	11.0	0,084	0.112	0.625	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R11-4	21.0	0,084	0.043	0.237	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R11-5	12.0	0,084	0.099	0.549	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R11-6	13.0	0,084	0.088	0.487	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R11-7	12.0	0,084	0.099	0.549	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R12	R12-1	12.0	0,098	0.099	0.549	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-2	21.0	0,098	0.043	0.237	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-3	13.0	0,098	0.088	0.487	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-4	12.0	0,098	0.099	0.549	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-5	9.0	0,098	0.152	0.845	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-6	13.0	0,098	0.088	0.487	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-7	15.0	0,098	0.071	0.393	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-8	26.0	0,098	0.031	0.172	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-9	51.0	0,098	0.011	0.063	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-10	92.0	0,098	0.005	0.026	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

Chapter 6: Results & Assessment

Meas. Point	Ass. Point	Distance	Baseline	Construction Vibration Values (mm/s)		Scale of Impact		Impact Magnitude		Impact Significance	
		m	mm/s	Infrastructure	Superstructure	Infrastructure	Superstructure	Infrastructure	Superstructure	Infrastructure	Superstructure
	R12-11	88.0	0,098	0.005	0.028	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-12	24.0	0,098	0.035	0.194	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-13	31.0	0,098	0.024	0.132	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-14	35.0	0,098	0.020	0.110	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R12-15	50.0	0,098	0.012	0.065	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R13	R13-1	49.0	0,151	0.012	0.066	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R13-2	578.0	0,151	0.000	0.002	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R13-3	41.0	0,151	0.016	0.087	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R13-4	38.0	0,151	0.018	0.097	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R13-5	292.0	0,151	0.001	0.005	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R13-6	10.0	0,151	0.130	0.721	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R13-7	173.0	0,151	0.002	0.010	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R14	R13-8	16.0	0,151	0.064	0.356	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-1	17.0	0,032	0.059	0.325	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-2	15.0	0,032	0.071	0.393	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-3	40.0	0,032	0.016	0.090	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-4	24.0	0,032	0.035	0.194	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-5	46.0	0,032	0.013	0.073	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-6	11.0	0,032	0.112	0.625	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-7	33.0	0,032	0.022	0.120	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-8	43.0	0,032	0.015	0.081	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-9	26.0	0,032	0.031	0.172	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R14-10	282.0	0,032	0.001	0.005	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R15	R14-11	29.0	0,032	0.026	0.146	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-1	37.0	0,049	0.018	0.101	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-2	11.0	0,049	0.112	0.625	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-3	25.0	0,049	0.033	0.182	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-4	12.0	0,049	0.099	0.549	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-5	20.0	0,049	0.046	0.255	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-6	61.0	0,049	0.009	0.048	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-7	59.0	0,049	0.009	0.050	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-8	302.0	0,049	0.001	0.004	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-9	288.0	0,049	0.001	0.005	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-10	21.0	0,049	0.043	0.237	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-11	57.0	0,049	0.010	0.053	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-12	70.0	0,049	0.007	0.039	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-13	7.0	0,049	0.221	1.232	No Impact	Small	No Impact	Medium	No Impact	Moderate
	R15-14	26.0	0,049	0.031	0.172	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-15	11.0	0,049	0.112	0.625	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-16	28.0	0,049	0.028	0.154	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-17	33.0	0,049	0.022	0.120	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-18	27.0	0,049	0.029	0.163	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-19	68.0	0,049	0.007	0.041	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-20	12.0	0,049	0.099	0.549	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R15-21	35.0	0,049	0.020	0.110	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R16	R16-1	23.0	0,04	0.037	0.207	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-2	10.0	0,04	0.130	0.721	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-3	49.0	0,04	0.012	0.066	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-4	16.0	0,04	0.064	0.356	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-5	47.0	0,04	0.013	0.071	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact

Chapter 6: Results & Assessment

Meas. Point	Ass. Point	Distance	Baseline	Construction Vibration Values (mm/s)		Scale of Impact		Impact Magnitude		Impact Significance	
		m	mm/s	Infrastructure	Superstructure	Infrastructure	Superstructure	Infrastructure	Superstructure	Infrastructure	Superstructure
	R16-6	12.0	0,04	0.099	0.549	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-7	23.0	0,04	0.037	0.207	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-8	13.0	0,04	0.088	0.487	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-9	16.0	0,04	0.064	0.356	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-10	40.0	0,04	0.016	0.090	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-11	15.0	0,04	0.071	0.393	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-12	324.0	0,04	0.001	0.004	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-13	300.0	0,04	0.001	0.004	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-14	290.0	0,04	0.001	0.005	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-15	491.0	0,04	0.000	0.002	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R17	R16-16	169.0	0,04	0.002	0.010	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R16-17	184.0	0,04	0.002	0.009	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R17-1	192.0	0,039	0.002	0.009	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R17-2	270.0	0,039	0.001	0.005	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R17-3	98.0	0,039	0.004	0.024	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R17-4	100.0	0,039	0.004	0.023	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R17-5	85.0	0,039	0.005	0.029	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R17-6	49.0	0,039	0.012	0.066	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R17-7	38.0	0,039	0.018	0.097	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R17-8	35.0	0,039	0.020	0.110	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R18	R17-9	38.0	0,039	0.018	0.097	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R17-10	52.0	0,039	0.011	0.061	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R18-1	12.0	0,039	0.099	0.549	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R19	R18-2	231.0	0,039	0.001	0.006	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R18-3	33.0	0,039	0.022	0.120	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R19-1	73.0	0,037	0.002	0.037	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R19-2	436.0	0,037	0.000	0.003	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R19-3	20.0	0,037	0.011	0.255	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
R20	R19-4	73.0	0,037	0.002	0.037	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R20-1	60.0	0,037	0.007	0.049	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R20-2	181.0	0,045	0.002	0.009	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R20-3	71.0	0,045	0.000	0.038	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R20-4	47.0	0,045	0.015	0.071	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
	R20-5	226.0	0,045	0.002	0.007	No Impact	No Impact	No Impact	No Impact	No Impact	No Impact
									No Impact	174	172
									Negligible	0	0
									Minor	0	1
									Moderate	0	1
									Major	0	0
									Total	174	174

6.2.2 Blasting Vibration

The vibration impact assessment for the blasting operations in tunnels are presented in Table 6-4. No adverse effects were estimated in vibration calculations for blasting.

Table 6-4 Vibration Assessment for Blasting

Receivers	Tunnel	KM	Vertical Distance (m)	Horizontal Distance (m)	ppv (mm/s)	Impact Significance
TB1	T5	48+500	44	1080	0.2552	No Impact
TB2	T5	48+700	37	1187	0.2195	No Impact
TB3	T1	79+500	33	1020	0.2065	No Impact
TB4	T1	83+000	69	2300	0.056	No Impact
TB5	T2	98+700	10	250	1.958	No Impact
TB6	T2	99+200	3	150	4.4392	No Impact
TB7	T5	112+500	141	0	4.9028	No Impact
TB8	T6	122+700	66	800	0.3033	No Impact

6.2.3 TBM Vibration

The vibration impact assessment for the tunnel boring machine is presented in Table 6-5. No adverse effects were predicted.

Table 6-5 Vibration Impact Assessment for TBM

Receivers	Tunnel	KM	Vertical Distance (m)	Horizontal Distance (m)	ppv (mm/s)	Impact Significance
TBM1	T1	3+400	3	200	0.1836	No Impact
TBM2	T1	5+000	126	0	0.3348	No Impact
TBM3	T1	7+800	307	0	0.1052	No Impact
TBM4	T1	9+000	323	0	0.0985	No Impact
TBM5	T1	13+500	0	118	0.3646	No Impact

6.2.4 Operational Vibration

Vibration impact assessment for railway operations is estimated. Both HST and freight trains were considered. The maximum pass by impact of each class considered. As the ground soil type influence the vibration propagation, these calculations give an estimate for railway operations. Further analysis in design stage strongly recommended especially for the locations where adverse impacts detected.

After calculations by following the FTA guideline, 51 moderate and 6 major impacts were discovered.

Table 6-6 Operation Vibration Assessment

Measurement Point	Assessment Point	Distance to Source (m)	L_v (Adjusted) (VdB)	L_v (Adjusted) (mm/s)	Exceedance Value (VdB)	Scale of Impact	Impact Magnitude	Impact Significance	RAMEN Exceedance
R1	R1-1	25,00	71,83	0,10	-3,17	No Impact	No Impact	No Impact	
	R1-2	24,00	71,98	0,10	-3,02	No Impact	No Impact	No Impact	
R2	R2-1	50,00	72,25	0,10	-2,75	No Impact	No Impact	No Impact	
	R2-2	44,00	72,72	0,11	-2,28	No Impact	No Impact	No Impact	
	R2-3	13,00	77,27	0,19	2,27	Small	Medium	Moderate	
	R2-4	22,00	75,30	0,15	0,30	Small	Medium	Moderate	
R3	R3-1	14,00	76,99	0,18	1,99	Small	Medium	Moderate	
	R3-2	22,00	75,30	0,15	0,30	Small	Medium	Moderate	
	R3-3	89,00	70,10	0,08	-4,90	No Impact	No Impact	No Impact	
	R3-4	82,00	70,40	0,08	-4,60	No Impact	No Impact	No Impact	
	R3-5	32,00	73,91	0,13	-1,09	No Impact	No Impact	No Impact	
	R3-6	33,00	73,79	0,12	-1,21	No Impact	No Impact	No Impact	
	R3-7	35,00	73,57	0,12	-1,43	No Impact	No Impact	No Impact	
	R3-8	23,00	75,14	0,15	0,14	Small	Medium	Moderate	
	R3-9	26,00	74,68	0,14	-0,32	No Impact	No Impact	No Impact	
	R3-10	25,00	74,83	0,14	-0,17	No Impact	No Impact	No Impact	
	R3-11	27,00	74,54	0,14	-0,46	No Impact	No Impact	No Impact	
	R3-12	124,00	68,86	0,07	-6,14	No Impact	No Impact	No Impact	
	R3-13	90,00	70,06	0,08	-4,94	No Impact	No Impact	No Impact	
	R3-14	104,00	69,52	0,08	-5,48	No Impact	No Impact	No Impact	
	R3-15	17,00	76,27	0,17	1,27	Small	Medium	Moderate	
R4	R4-1	20,00	75,66	0,15	0,66	Small	Medium	Moderate	
	R4-2	30,00	74,15	0,13	-0,85	No Impact	No Impact	No Impact	
	R4-3	21,00	75,48	0,15	0,48	Small	Medium	Moderate	
	R4-4	97,00	69,78	0,08	-5,22	No Impact	No Impact	No Impact	
R5	R5-1	28,00	74,41	0,13	-0,59	No Impact	No Impact	No Impact	
	R5-2	26,00	74,68	0,14	-0,32	No Impact	No Impact	No Impact	
	R5-3	20,00	77,66	0,19	2,66	Small	Medium	Moderate	
	R5-4	33,00	75,79	0,16	0,79	Small	Medium	Moderate	
	R5-5	24,00	76,98	0,18	1,98	Small	Medium	Minor	
	R5-6	29,00	79,28	0,23	4,28	Small	Medium	Moderate	
	R5-7	66,00	68,21	0,07	-6,79	No Impact	No Impact	No Impact	
	R5-8	17,00	73,27	0,12	-1,73	No Impact	No Impact	No Impact	
R6	R6-1	31,00	74,03	0,13	-0,97	No Impact	No Impact	No Impact	
	R6-2	13,00	82,27	0,33	7,27	Medium	Large	Major	RAMEN
	R6-3	25,00	76,83	0,18	1,83	Small	Medium	Moderate	
	R6-4	7,00	79,57	0,24	4,57	Small	Small	Minor	
	R6-5	11,00	77,89	0,20	2,89	Small	Medium	Moderate	
	R6-6	16,00	81,49	0,30	6,49	Medium	Medium	Moderate	RAMEN
	R6-7	24,00	79,98	0,25	4,98	Small	Medium	Moderate	
	R6-8	253,00	66,20	0,05	-8,80	No Impact	No Impact	No Impact	
R7	R7-1	247,00	66,29	0,05	-8,71	No Impact	No Impact	No Impact	
	R7-2	463,00	63,95	0,04	-11,05	No Impact	No Impact	No Impact	
	R7-3	524,00	63,49	0,04	-11,51	No Impact	No Impact	No Impact	
	R7-4	26,00	74,68	0,14	-0,32	No Impact	No Impact	No Impact	
	R7-5	23,00	80,14	0,26	5,14	Medium	Medium	Moderate	

Chapter 6: Results & Assessment

Measurement Point	Assessment Point	Distance to Source (m)	L_p (Adjusted) (VdB)	L_p (Adjusted) (mm/s)	Exceedance Value (VdB)	Scale of Impact	Impact Magnitude	Impact Significance	RAMEN Exceedance
	R7-6	24,00	79,98	0,25	4,98	Small	Medium	Moderate	
	R7-7	31,00	74,03	0,13	-0,97	No Impact	No Impact	No Impact	
	R7-8	24,00	74,98	0,14	-0,02	No Impact	No Impact	No Impact	
	R7-9	32,00	73,91	0,13	-1,09	No Impact	No Impact	No Impact	
	R7-10	37,00	78,37	0,21	3,37	Small	Medium	Moderate	
	R7-11	36,00	73,47	0,12	-1,53	No Impact	No Impact	No Impact	
	R7-12	34,00	73,68	0,12	-1,32	No Impact	No Impact	No Impact	
	R7-13	368,00	64,81	0,04	-10,19	No Impact	No Impact	No Impact	
R8	R7-14	132,00	68,63	0,07	-6,37	No Impact	No Impact	No Impact	
	R8-1	36,00	73,47	0,12	-1,53	No Impact	No Impact	No Impact	
	R8-2	31,00	74,03	0,13	-0,97	No Impact	No Impact	No Impact	
	R8-3	28,00	74,41	0,13	-0,59	No Impact	No Impact	No Impact	
	R8-4	116,00	69,11	0,07	-5,89	No Impact	No Impact	No Impact	
R9	R8-5	34,00	73,68	0,12	-1,32	No Impact	No Impact	No Impact	
	R9-1	31,00	74,03	0,13	-0,97	No Impact	No Impact	No Impact	
	R9-2	45,00	72,64	0,11	-2,36	No Impact	No Impact	No Impact	
	R9-3	29,00	74,28	0,13	-0,72	No Impact	No Impact	No Impact	
	R9-4	38,00	73,27	0,12	-1,73	No Impact	No Impact	No Impact	
	R9-5	29,00	74,28	0,13	-0,72	No Impact	No Impact	No Impact	
	R9-6	28,00	74,41	0,13	-0,59	No Impact	No Impact	No Impact	
R10	R9-7	12,00	82,56	0,34	7,56	Medium	Large	Major	RAMEN
	R10-1	10,00	83,24	0,37	8,24	Medium	Large	Major	RAMEN
	R10-2	52,00	72,10	0,10	-2,90	No Impact	No Impact	No Impact	
	R10-3	17,00	76,27	0,17	1,27	Small	Medium	Moderate	
	R10-4	51,00	72,17	0,10	-2,83	No Impact	No Impact	No Impact	
R11	R10-5	77,00	70,64	0,09	-4,36	No Impact	No Impact	No Impact	
	R11-1	13,00	77,27	0,19	2,27	Small	Medium	Moderate	
	R11-2	14,00	76,99	0,18	1,99	Small	Medium	Moderate	
	R11-3	11,00	77,89	0,20	2,89	Small	Medium	Moderate	
	R11-4	21,00	75,48	0,15	0,48	Small	Medium	Moderate	
	R11-5	12,00	77,56	0,19	2,56	Small	Medium	Moderate	
	R11-6	13,00	77,27	0,19	2,27	Small	Medium	Moderate	
R12	R11-7	12,00	77,56	0,19	2,56	Small	Medium	Moderate	
	R12-1	12,00	77,56	0,19	2,56	Small	Medium	Moderate	
	R12-2	21,00	75,48	0,15	0,48	Small	Medium	Major	
	R12-3	13,00	77,27	0,19	2,27	Small	Medium	Moderate	
	R12-4	12,00	77,56	0,19	2,56	Small	Medium	Moderate	
	R12-5	9,00	78,64	0,22	3,64	Small	Medium	Moderate	
	R12-6	13,00	77,27	0,19	2,27	Small	Medium	Moderate	
	R12-7	15,00	76,73	0,17	1,73	Small	Medium	Moderate	
	R12-8	26,00	74,68	0,14	-0,32	No Impact	No Impact	No Impact	
	R12-9	51,00	72,17	0,10	-2,83	No Impact	No Impact	No Impact	
	R12-10	92,00	69,97	0,08	-5,03	No Impact	No Impact	No Impact	
	R12-11	88,00	70,14	0,08	-4,86	No Impact	No Impact	No Impact	
	R12-12	24,00	74,98	0,14	-0,02	No Impact	No Impact	No Impact	
	R12-13	31,00	74,03	0,13	-0,97	No Impact	No Impact	No Impact	
R13	R12-14	35,00	73,57	0,12	-1,43	No Impact	No Impact	No Impact	
	R12-15	50,00	72,25	0,10	-2,75	No Impact	No Impact	No Impact	
R13	R13-1	49,00	72,32	0,10	-2,68	No Impact	No Impact	No Impact	

Measurement Point	Assessment Point	Distance to Source (m)	L_p (Adjusted) (VdB)	L_p (Adjusted) (mm/s)	Exceedance Value (VdB)	Scale of Impact	Impact Magnitude	Impact Significance	RAMEN Exceedance
	R13-2	578,00	63,13	0,04	-11,87	No Impact	No Impact	No Impact	
	R13-3	41,00	72,99	0,11	-2,01	No Impact	No Impact	No Impact	
	R13-4	38,00	78,27	0,21	3,27	Small	Medium	Moderate	
	R13-5	292,00	70,67	0,09	-4,33	No Impact	No Impact	No Impact	
	R13-6	10,00	75,27	0,14	0,27	Small	Medium	Moderate	
	R13-7	173,00	67,62	0,06	-7,38	No Impact	No Impact	No Impact	
	R13-8	16,00	76,49	0,17	1,49	Small	Medium	Minor	
	R14-1	17,00	76,27	0,17	1,27	Small	Medium	Moderate	
R14	R14-2	15,00	76,73	0,17	1,73	Small	Medium	Moderate	
	R14-3	40,00	73,08	0,11	-1,92	No Impact	No Impact	No Impact	
	R14-4	24,00	74,98	0,14	-0,02	No Impact	No Impact	No Impact	
	R14-5	46,00	72,56	0,11	-2,44	No Impact	No Impact	No Impact	
	R14-6	11,00	77,89	0,20	2,89	Small	Medium	Minor	
	R14-7	33,00	75,79	0,16	0,79	Small	Medium	Major	
	R14-8	43,00	72,81	0,11	-2,19	No Impact	No Impact	No Impact	
	R14-9	26,00	74,68	0,14	-0,32	No Impact	No Impact	No Impact	
	R14-10	282,00	65,80	0,05	-9,20	No Impact	No Impact	No Impact	
	R14-11	29,00	74,28	0,13	-0,72	No Impact	No Impact	No Impact	
	R15-1	37,00	73,37	0,12	-1,63	No Impact	No Impact	No Impact	
R15	R15-2	11,00	82,89	0,35	7,89	Medium	Medium	Moderate	RAMEN
	R15-3	25,00	74,83	0,14	-0,17	No Impact	No Impact	No Impact	
	R15-4	12,00	77,56	0,19	2,56	Small	Medium	Minor	
	R15-5	20,00	75,66	0,15	0,66	Small	Medium	Moderate	
	R15-6	61,00	76,50	0,17	1,50	Small	Small	Minor	
	R15-7	59,00	71,63	0,10	-3,37	No Impact	No Impact	No Impact	
	R15-8	302,00	65,54	0,05	-9,46	No Impact	No Impact	No Impact	
	R15-9	288,00	65,72	0,05	-9,28	No Impact	No Impact	No Impact	
	R15-10	21,00	80,48	0,27	5,48	Medium	Medium	Moderate	
	R15-11	57,00	71,76	0,10	-3,24	No Impact	No Impact	No Impact	
	R15-12	70,00	75,99	0,16	0,99	Small	Medium	Moderate	
	R15-13	7,00	79,57	0,24	4,57	Small	Medium	Moderate	
	R15-14	26,00	74,68	0,14	-0,32	No Impact	No Impact	No Impact	
	R15-15	11,00	74,89	0,14	-0,11	No Impact	No Impact	No Impact	
	R15-16	28,00	74,41	0,13	-0,59	No Impact	No Impact	No Impact	
	R15-17	33,00	73,79	0,12	-1,21	No Impact	No Impact	No Impact	
	R15-18	27,00	74,54	0,14	-0,46	No Impact	No Impact	No Impact	
	R15-19	68,00	68,10	0,06	-6,90	No Impact	No Impact	No Impact	
	R15-20	12,00	77,56	0,19	2,56	Small	Medium	Moderate	
	R15-21	35,00	70,57	0,09	-4,43	No Impact	No Impact	No Impact	
R16	R16-1	23,00	72,14	0,10	-2,86	No Impact	No Impact	No Impact	
	R16-2	10,00	78,24	0,21	3,24	Small	Medium	Moderate	
	R16-3	49,00	69,32	0,07	-5,68	No Impact	No Impact	No Impact	
	R16-4	16,00	76,49	0,17	1,49	Small	Medium	Moderate	
	R16-5	47,00	72,48	0,11	-2,52	No Impact	No Impact	No Impact	
	R16-6	12,00	77,56	0,19	2,56	Small	Medium	Moderate	
	R16-7	23,00	75,14	0,15	0,14	Small	Medium	Moderate	
	R16-8	13,00	77,27	0,19	2,27	Small	Medium	Moderate	
	R16-9	16,00	76,49	0,17	1,49	Small	Medium	Moderate	
	R16-10	40,00	73,08	0,11	-1,92	No Impact	No Impact	No Impact	

Chapter 6: Results & Assessment

Measurement Point	Assessment Point	Distance to Source (m)	L_p (Adjusted) (VdB)	L_p (Adjusted) (mm/s)	Exceedance Value (VdB)	Scale of Impact	Impact Magnitude	Impact Significance	RAMEN Exceedance
	R16-11	15,00	76,73	0,17	1,73	Small	Medium	Moderate	
	R16-12	324,00	65,28	0,05	-9,72	No Impact	No Impact	No Impact	
	R16-13	300,00	65,57	0,05	-9,43	No Impact	No Impact	No Impact	
	R16-14	290,00	70,70	0,09	-4,30	No Impact	No Impact	No Impact	
	R16-15	491,00	68,73	0,07	-6,27	No Impact	No Impact	No Impact	
	R16-16	169,00	52,71	0,01	-22,29	No Impact	No Impact	No Impact	
R17	R16-17	184,00	67,39	0,06	-7,61	No Impact	No Impact	No Impact	
	R17-1	192,00	67,23	0,06	-7,77	No Impact	No Impact	No Impact	
	R17-2	270,00	65,96	0,05	-9,04	No Impact	No Impact	No Impact	
	R17-3	98,00	69,74	0,08	-5,26	No Impact	No Impact	No Impact	
	R17-4	100,00	69,66	0,08	-5,34	No Impact	No Impact	No Impact	
	R17-5	85,00	75,27	0,15	0,27	Small	Medium	Moderate	
	R17-6	49,00	72,32	0,10	-2,68	No Impact	No Impact	No Impact	
	R17-7	38,00	73,27	0,12	-1,73	No Impact	No Impact	No Impact	
	R17-8	35,00	58,57	0,02	-16,43	No Impact	No Impact	No Impact	
	R17-9	38,00	58,27	0,02	-16,73	No Impact	No Impact	No Impact	
R18	R17-10	52,00	57,10	0,02	-17,90	No Impact	No Impact	No Impact	
	R18-1	12,00	77,56	0,19	2,56	Small	Medium	Moderate	
	R18-2	231,00	66,54	0,05	-8,46	No Impact	No Impact	No Impact	
R19	R18-3	33,00	73,79	0,12	-1,21	No Impact	No Impact	No Impact	
	R19-1	73,00	70,84	0,09	-4,16	No Impact	No Impact	No Impact	
	R19-2	436,00	64,18	0,04	-10,82	No Impact	No Impact	No Impact	
	R19-3	20,00	80,66	0,27	5,66	Medium	Large	Major	
R20	R19-4	73,00	70,84	0,09	-4,16	No Impact	No Impact	No Impact	
	R20-1	60,00	71,57	0,10	-3,43	No Impact	No Impact	No Impact	
	R20-2	181,00	67,45	0,06	-7,55	No Impact	No Impact	No Impact	
	R20-3	71,00	70,94	0,09	-4,06	No Impact	No Impact	No Impact	
	R20-4	47,00	72,48	0,11	-2,52	No Impact	No Impact	No Impact	
	R20-5	226,00	51,62	0,01	-23,38	No Impact	No Impact	No Impact	
	R20-6	803,00	61,90	0,03	-13,10	No Impact	No Impact	No Impact	
							No Impact	111	
							Negligible	0	
							Minor	6	
							Moderate	51	
							Major	6	
							Total	174	

6.3 Ground Borne Noise Assessment

6.3.1 GBN – TBM

No impact determined for the TBM operations.

Table 6-7 GBN for TBM operations

Receivers	Tunnel	km	Vertical	Horizontal	GBN (dB)	Impact Significance
TBM1	T1	3+400	3	200	2.7	No Impact
TBM2	T1	5+000	126	0	13.6	No Impact
TBM3	T1	7+800	307	0	0	No Impact
TBM4	T1	9+000	323	0	0	No Impact
TBM5	T1	13+500	0	118	15.1	No Impact

6.3.2 GBN – Railway operations

The ground borne noise due to railway operations conducted by considering railway operation vibration levels. Adverse impacts are not detected for the identified receivers along the railway line.

Table 6-8 GBN Assessment for Operations

Assess. Points	Location	Distance to Source (m)	L_{eq} (dBA)	Limit	Scale Of Impact	Impact Significance
R1-1	Mersin	25	24.66	35.00	No Impact	No Impact
R1-2	Mersin	24	24.82	35.00	No Impact	No Impact
R2-1	Mersin	50	25.08	35.00	No Impact	No Impact
R2-2	Mersin	44	25.56	35.00	No Impact	No Impact
R2-3	Mersin	13	30.10	35.00	No Impact	No Impact
R2-4	Mersin	22	28.14	35.00	No Impact	No Impact
R3-1	Mersin	14	29.82	35.00	No Impact	No Impact
R3-2	Mersin	22	28.14	35.00	No Impact	No Impact
R3-3	Mersin	89	22.93	35.00	No Impact	No Impact
R3-4	Mersin	82	23.24	35.00	No Impact	No Impact
R3-5	Mersin	32	26.74	35.00	No Impact	No Impact
R3-6	Mersin	33	26.63	35.00	No Impact	No Impact
R3-7	Mersin	35	26.41	35.00	No Impact	No Impact
R3-8	Mersin	23	27.97	35.00	No Impact	No Impact
R3-9	Mersin	26	27.52	35.00	No Impact	No Impact
R3-10	Mersin	25	27.66	35.00	No Impact	No Impact
R3-11	Mersin	27	27.38	35.00	No Impact	No Impact
R3-12	Mersin	124	21.70	35.00	No Impact	No Impact
R3-13	Mersin	90	22.89	35.00	No Impact	No Impact
R3-14	Mersin	104	22.35	35.00	No Impact	No Impact
R3-15	Mersin	17	29.10	35.00	No Impact	No Impact
R4-1	Adnan Menderes	20	28.50	35.00	No Impact	No Impact
R4-2	Adnan Menderes	30	26.98	35.00	No Impact	No Impact
R4-3	Adnan Menderes	21	28.31	35.00	No Impact	No Impact
R4-4	Adnan Menderes	97	22.61	35.00	No Impact	No Impact
R5-1	Tarsus	28	27.24	35.00	No Impact	No Impact
R5-2	Tarsus	26	27.52	35.00	No Impact	No Impact
R5-3	Tarsus	20	30.50	35.00	No Impact	No Impact
R5-4	Tarsus	33	28.63	35.00	No Impact	No Impact
R5-5	Tarsus	24	29.82	35.00	No Impact	No Impact
R5-6	Tarsus	29	32.11	35.00	No Impact	No Impact
R5-7	Tarsus	66	21.05	35.00	No Impact	No Impact
R5-8	Tarsus	17	26.10	35.00	No Impact	No Impact
R6-1	Tarsus	31	26.86	35.00	No Impact	No Impact
R6-2	Tarsus	13	35.10	35.00	Small	No Impact
R6-3	Tarsus	25	29.66	35.00	No Impact	No Impact
R6-4	Tarsus	7	32.41	35.00	No Impact	No Impact
R6-5	Tarsus	11	30.72	35.00	No Impact	No Impact

Assess. Points	Location	Distance to Source (m)	L_{eq} (dBA)	Limit	Scale Of Impact	Impact Significance
R6-6	Tarsus	16	34.33	35.00	No Impact	No Impact
R6-7	Tarsus	24	32.82	35.00	No Impact	No Impact
R6-8	Tarsus	253	19.04	35.00	No Impact	No Impact
R7-1	Yunusoglu	247	19.13	35.00	No Impact	No Impact
R7-2	Tekelioren	463	16.79	35.00	No Impact	No Impact
R7-3	Esenler	524	16.33	35.00	No Impact	No Impact
R7-4	Kanberlihyuyugu	26	27.52	35.00	No Impact	No Impact
R7-5	Yenice	23	32.97	35.00	No Impact	No Impact
R7-6	Yenice	24	32.82	35.00	No Impact	No Impact
R7-7	Yenice	31	26.86	35.00	No Impact	No Impact
R7-8	Yenice	24	27.82	35.00	No Impact	No Impact
R7-9	Yenice	32	26.74	35.00	No Impact	No Impact
R7-10	Yenice	37	31.20	35.00	No Impact	No Impact
R7-11	Arikli	36	26.30	35.00	No Impact	No Impact
R7-12	Zeytinli	34	26.52	35.00	No Impact	No Impact
R7-13	Zeytinli	368	17.64	35.00	No Impact	No Impact
R7-14	Kargili	132	21.46	35.00	No Impact	No Impact
R8-1	Seyhan	36	26.30	35.00	No Impact	No Impact
R8-2	Seyhan	31	26.86	35.00	No Impact	No Impact
R8-3	Seyhan	28	27.24	35.00	No Impact	No Impact
R8-4	Seyhan	116	21.94	35.00	No Impact	No Impact
R8-5	Seyhan	34	26.52	35.00	No Impact	No Impact
R9-1	Adana	31	26.86	35.00	No Impact	No Impact
R9-2	Adana	45	25.47	35.00	No Impact	No Impact
R9-3	Adana	29	27.11	35.00	No Impact	No Impact
R9-4	Adana	38	26.10	35.00	No Impact	No Impact
R9-5	Adana	29	27.11	35.00	No Impact	No Impact
R9-6	Adana	28	27.24	35.00	No Impact	No Impact
R9-7	Adana	12	35.40	35.00	Small	No Impact
R10-1	Adana	10	36.08	35.00	Small	No Impact
R10-2	Adana	52	24.93	35.00	No Impact	No Impact
R10-3	Adana	17	29.10	35.00	No Impact	No Impact
R10-4	Adana	51	25.01	35.00	No Impact	No Impact
R10-5	Adana	77	23.47	35.00	No Impact	No Impact
R11-1	Adana	13	30.10	35.00	No Impact	No Impact
R11-2	Adana	14	29.82	35.00	No Impact	No Impact
R11-3	Adana	11	30.72	35.00	No Impact	No Impact
R11-4	Adana	21	28.31	35.00	No Impact	No Impact
R11-5	Adana	12	30.40	35.00	No Impact	No Impact
R11-6	Adana	13	30.10	35.00	No Impact	No Impact
R11-7	Adana	12	30.40	35.00	No Impact	No Impact
R12-1	Adana	12	30.40	35.00	No Impact	No Impact
R12-2	Adana	21	28.31	35.00	No Impact	No Impact
R12-3	Adana	13	30.10	35.00	No Impact	No Impact
R12-4	Adana	12	30.40	35.00	No Impact	No Impact
R12-5	Adana	9	31.47	35.00	No Impact	No Impact
R12-6	Adana	13	30.10	35.00	No Impact	No Impact
R12-7	Adana	15	29.57	35.00	No Impact	No Impact
R12-8	Adana	26	27.52	35.00	No Impact	No Impact
R12-9	Adana	51	25.01	35.00	No Impact	No Impact
R12-10	Adana	92	22.81	35.00	No Impact	No Impact
R12-11	Adana	88	22.97	35.00	No Impact	No Impact
R12-12	Adana	24	27.82	35.00	No Impact	No Impact
R12-13	Adana	31	26.86	35.00	No Impact	No Impact
R12-14	Adana	35	26.41	35.00	No Impact	No Impact
R12-15	Adana	50	25.08	35.00	No Impact	No Impact
R13-1	Saricam	49	25.16	35.00	No Impact	No Impact
R13-2	Yakapinar	578	15.96	35.00	No Impact	No Impact
R13-3	Eski Misis	41	25.82	35.00	No Impact	No Impact
R13-4	Çakaldere	38	31.10	35.00	No Impact	No Impact
R13-5	Çokcapinar	292	23.51	35.00	No Impact	No Impact
R13-6	Sirkeli	10	36.08	35.00	Small	No Impact
R13-7	Toktamış	173	20.46	35.00	No Impact	No Impact
R13-8	Toktamış	16	29.33	35.00	No Impact	No Impact
R14-1	Ceyhan	17	29.10	35.00	No Impact	No Impact
R14-2	Ceyhan	15	29.57	35.00	No Impact	No Impact
R14-3	Ceyhan	40	25.91	35.00	No Impact	No Impact
R14-4	Ceyhan	24	27.82	35.00	No Impact	No Impact
R14-5	Ceyhan	46	25.39	35.00	No Impact	No Impact
R14-6	Ceyhan	11	30.72	35.00	No Impact	No Impact
R14-7	Ceyhan	33	28.63	35.00	No Impact	No Impact
R14-8	Ceyhan	43	25.64	35.00	No Impact	No Impact
R14-9	Ceyhan	26	27.52	35.00	No Impact	No Impact
R14-10	Kuzucak	282	18.63	35.00	No Impact	No Impact
R14-11	Mustafabeyli	29	27.11	35.00	No Impact	No Impact
R15-1	Toprakkale	37	26.20	35.00	No Impact	No Impact
R15-2	Toprakkale	11	35.72	35.00	Small	No Impact
R15-3	Toprakkale	25	27.66	35.00	No Impact	No Impact

Assess. Points	Location	Distance to Source (m)	L_{eq} (dBA)	Limit	Scale Of Impact	Impact Significance
R15-4	Toprakkale	12	30.40	35.00	No Impact	No Impact
R15-5	Toprakkale	20	28.50	35.00	No Impact	No Impact
R15-6	Toprakkale	61	29.34	35.00	No Impact	No Impact
R15-7	Toprakkale	59	24.46	35.00	No Impact	No Impact
R15-8	Toprakkale	302	18.38	35.00	No Impact	No Impact
R15-9	Toprakkale	288	18.56	35.00	No Impact	No Impact
R15-10	Toprakkale	21	33.31	35.00	No Impact	No Impact
R15-11	Akyar	57	24.59	35.00	No Impact	No Impact
R15-12	Osmaniye	70	28.83	35.00	No Impact	No Impact
R15-13	Osmaniye	7	32.41	35.00	No Impact	No Impact
R15-14	Osmaniye	26	27.52	35.00	No Impact	No Impact
R15-15	Osmaniye	11	27.72	35.00	No Impact	No Impact
R15-16	Osmaniye	28	27.24	35.00	No Impact	No Impact
R15-17	Osmaniye	33	26.63	35.00	No Impact	No Impact
R15-18	Osmaniye	27	27.38	35.00	No Impact	No Impact
R15-19	Osmaniye	68	20.93	35.00	No Impact	No Impact
R15-20	Osmaniye	12	30.40	35.00	No Impact	No Impact
R15-21	Osmaniye	35	23.41	35.00	No Impact	No Impact
R16-1	Osmaniye	23	24.97	35.00	No Impact	No Impact
R16-2	Osmaniye	10	31.08	35.00	No Impact	No Impact
R16-3	Osmaniye	49	22.16	35.00	No Impact	No Impact
R16-4	Osmaniye	16	29.33	35.00	No Impact	No Impact
R16-5	Osmaniye	47	25.31	35.00	No Impact	No Impact
R16-6	Osmaniye	12	30.40	35.00	No Impact	No Impact
R16-7	Osmaniye	23	27.97	35.00	No Impact	No Impact
R16-8	Osmaniye	13	30.10	35.00	No Impact	No Impact
R16-9	Osmaniye	16	29.33	35.00	No Impact	No Impact
R16-10	Osmaniye	40	25.91	35.00	No Impact	No Impact
R16-11	Osmaniye	15	29.57	35.00	No Impact	No Impact
R16-12	Dervişli	324	18.12	35.00	No Impact	No Impact
R16-13	Dervişli	300	18.40	35.00	No Impact	No Impact
R16-14	Dervişli	290	23.53	35.00	No Impact	No Impact
R16-15	Dervişli	491	21.57	35.00	No Impact	No Impact
R16-16	Tehçi	169	5.53	35.00	No Impact	No Impact
R16-17	Şekerdere	184	20.23	35.00	No Impact	No Impact
R17-1	Yazlamazlı	192	20.07	35.00	No Impact	No Impact
R17-2	Ellek	270	18.80	35.00	No Impact	No Impact
R17-3	Bostanlar	98	22.57	35.00	No Impact	No Impact
R17-4	Düziçi	100	22.50	35.00	No Impact	No Impact
R17-5	Düziçi	85	28.10	35.00	No Impact	No Impact
R17-6	Düziçi	49	25.16	35.00	No Impact	No Impact
R17-7	Düziçi	38	26.10	35.00	No Impact	No Impact
R17-8	Düziçi	35	11.41	35.00	No Impact	No Impact
R17-9	Düziçi	38	11.10	35.00	No Impact	No Impact
R17-10	Yarbaşı	52	9.93	35.00	No Impact	No Impact
R18-1	Bahçe	12	30.40	35.00	No Impact	No Impact
R18-2	Bahçe	231	19.38	35.00	No Impact	No Impact
R18-3	Bahçe	33	26.63	35.00	No Impact	No Impact
R19-1	Nurdağı	73	23.67	35.00	No Impact	No Impact
R19-2	Nurdağı	436	17.01	35.00	No Impact	No Impact
R19-3	Nurdağı	20	33.50	35.00	No Impact	No Impact
R19-4	Nurdağı	73	23.67	35.00	No Impact	No Impact
R20-1	Sakçagözü	60	24.40	35.00	No Impact	No Impact
R20-2	Sakçagözü	181	20.29	35.00	No Impact	No Impact
R20-3	Şatırhüyük	71	23.77	35.00	No Impact	No Impact
R20-4	Eskişarkaya	47	25.31	35.00	No Impact	No Impact
R20-5	Şehitkamil	226	4.45	35.00	No Impact	No Impact
R20-6	Kömürler	803	14.74	35.00	No Impact	No Impact

Chapter 7: Mitigation Measures and Residual Impacts

7.1 Noise Mitigation Measures

7.1.1 Construction Noise Mitigation Measures

According to the defined methodology in this report and modelling efforts conducted, construction phase noise assessment is concluded as; 71 out of 174 assessment points “Major”, 29 out of the 174 assessment points “Moderate” and 4 out of 174 assessment points “Minor” affected from construction noise. 70 out of 174 assessment points found out to be not affected from constructional noise at all.

In order to overcome construction noise related problems possible alternative mitigation should be applied by the contractor which suits best the practical dynamics of the construction activities;

- Speed limit applications should be applied throughout site for the project vehicles that will transport construction materials/equipment.
- Where possible, noise generating activities will be avoided during quiet times of the day.
- Machinery, equipment and vehicles with lower sound power levels and sound reduced models will be preferred.
- Properly refurbished and/or new machinery, equipment and vehicles will be use to the extent possible.
- Maintenance of construction vehicles will be conducted regularly by means of a regular vehicle maintenance and repair program as per the recommendations of the manufacturer.
- Where applicable, silencers will be installed on the exhaust of vehicles.
- Portable barriers and acoustic enclosures will be put around equipment where necessary.
- Natural topography will be used to create a barrier against noise where feasible.
- Construction traffic through the settlements will be avoided, whenever alternative routes and/or service roads are available.

- Idling of construction vehicles will be avoided.
- Noise monitoring will be carried out throughout the active construction sites in order to prevent any kind of public complaint and nuisance.

Since constructional activities has limited time extent along with the completion of the project no residual impact expected at any kind of receiving bodies in terms of noise and vibration.

7.1.2 Operation Noise Mitigation Measures

According to the defined methodology in this report and modelling efforts conducted, operation phase noise assessment is concluded as; 18 out of 174 assessment points “Major”, 24 out of the 174 assessment points “Moderate”, 6 out of 174 assessment points “Minor” and 1 out of 174 assessment points “Negligible” affected from operation noise. 125 out of 174 assessment points found out to be not affected from operational noise at all.

In order to overcome foreseen operational noise problems at receptors which have the final impact significances of “Moderate” and “Major”.

For linear transportation project one of the efficient and widespread mitigation measures is construction of noise barriers. Following Table 7-1 represents noise barrier needs for project to overcome operational noise problems.

Table 7-1 *Proposed Noise Barriers*

Barrier Name	Related Assessment Point	Section	km	Side	Length (m)	Height (m)	Surface Area (m ²)
B1-2	R1-2	Mersin-Adana	1	Left	543	2,5	1357,5
B2-3	R2-3	Mersin-Adana	4	Left	390	2,5	975
B2-4	R2-4	Mersin-Adana	4	Right	453	2,5	1132,5
B3-1	R3-1	Mersin-Adana	5	Left	88	2,5	220
B3-2	R3-2	Mersin-Adana	5	Right	596	2,5	1490
B3-5	R3-5	Mersin-Adana	6	Left	536	2,5	1340
B3-6	R3-6	Mersin-Adana	6	Right	203	2,5	507,5
B3-7	R3-7	Mersin-Adana	7	Right	201	2,5	502,5
B3-8	R3-8	Mersin-Adana	8	Right	294	2,5	735
B3-9	R3-9	Mersin-Adana	8	Right	143	2,5	357,5
B3-10	R3-10/R3-11	Mersin-Adana	8	Left	1163	2,5	2907,5
B3-15	R3-15	Mersin-Adana	13	Left	231	3	693
B4-1	R4-1/R4-2/R4-3	Mersin-Adana	19	Right	1390	3	4170
B7-4	R7-4	Mersin-Adana	41	Left	658	2,5	1645
B7-5	R7-5/R7-7/R7-9/R7-10	Mersin-Adana	42	Left	2010	2,5	5025
B7-6	R7-6/R7-8	Mersin-Adana	42	Right	1102	2,5	2755
B7-12	R7-12	Mersin-Adana	351	Left	603	2,5	1507,5
B9-7	R9-7	Mersin-Adana	368	Right	508	2,5	1270
B13-4	R13-4	Adana-Toprakkale	404	Right	571	2,5	1427,5
B13-6 Part 1	R13-6	Adana-Toprakkale	411	Left	255	2,5	637,5
B13-6 Part 2	R13-6	Adana-Toprakkale	411	Left	328	2,5	820
B14-11	R14-11	Adana-Toprakkale	442	Left	199	2,5	497,5
B15-2	R15-2	Adana-Toprakkale	447	Left	389	2,5	972,5
B15-5	R15-5	Toprakkale-Bahçe	1	Right	451	3,5	1578,5
B15-10	R15-10	Toprakkale-Bahçe	3	Right	385	2,5	962,5
B15-13	R15-13	Toprakkale-Bahçe	7	Left	255	2,5	637,5
B17-6	R17-6/R17-7	Toprakkale-Bahçe	42	Left	929	3	2787
B18-3	R18-3	Bahçe-Nurdağı	3	Left	686	2,5	1715
B19-1	R19-1	Bahçe-Nurdağı	14	Right	1071	3	3213
B19-2	R19-2	Bahçe-Nurdağı	14	Left	1072	2,5	2680
B19-3	R19-3/R19-4	Bahçe-Nurdağı	16	Left	1854	3	5562
B20-1	R20-1	Nurdağı-Başpınar	96	Left	299	3	897
B20-2	R20-2	Nurdağı-Başpınar	97	Right	572	2,5	1430
B20-3	R20-3	Nurdağı-Başpınar	98	Left	1043	2,5	2607,5
B20-5	R20-5	Nurdağı-Başpınar	125	Left	663	2,5	1657,5
Total Length (m)					22134	Total Area (m ²)	58673

After application of the noise barriers noise model has re-run and noise assessment procedures re-applied. Following Table 7-2 shows the result of the operation noise assessment after mitigation measures applied.

Table 7-2 Operation Phase Assessment Results After Mitigation, WHO

Measurement Point	Assessment Point	Distance to Source (m)	Model Result L_{eq} (dBA)		Baseline L_{eq} (dBA)		Cumulative (dBA)		Limit Value (dBA)		Limits Exceedance Max	Scale of Impact	Impact Magnitude	Impact Significance
			L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}				
R1	R1-1	25,0	52,8	53,8	58,1	52,0	59,2	56,0	61,1	55,0	1,0	Small	Medium	Minor
	R1-2	24,0	50,8	51,6	58,1	52,0	58,8	54,8	61,1	55,0	0,0	No Impact	No Impact	No Impact
R2	R2-1	50,0	52,3	53,2	59,2	51,7	60,0	55,5	62,2	54,7	0,8	No Impact	No Impact	No Impact
	R2-2	44,0	52,2	53,1	59,2	51,7	60,0	55,5	62,2	54,7	0,8	No Impact	No Impact	No Impact
	R2-3	13,0	50,5	51,1	59,2	51,7	59,7	54,4	62,2	54,7	0,0	No Impact	No Impact	No Impact
	R2-4	22,0	49,1	49,7	59,2	51,7	59,6	53,8	62,2	54,7	0,0	No Impact	No Impact	No Impact
R3	R3-1	14,0	50,6	51,1	60,2	52,3	60,7	54,8	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-2	22,0	46,4	46,7	60,2	52,3	60,4	53,4	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-3	89,0	47,8	48,7	60,2	52,3	60,4	53,9	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-4	82,0	48,3	49,2	60,2	52,3	60,5	54,0	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-5	32,0	49,9	50,7	60,2	52,3	60,6	54,6	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-6	33,0	44,2	44,5	60,2	52,3	60,3	53,0	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-7	35,0	46,8	47,4	60,2	52,3	60,4	53,5	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-8	23,0	47,7	48,1	60,2	52,3	60,4	53,7	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-9	26,0	45,0	45,1	60,2	52,3	60,3	53,1	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-10	25,0	46,6	47,1	60,2	52,3	60,4	53,4	63,2	55,3	0,0	No Impact	No Impact	No Impact
	R3-11	27,0	52,2	53,0	60,2	52,3	60,8	55,7	63,2	55,3	0,4	No Impact	No Impact	No Impact
	R3-12	124,0	51,7	52,7	60,2	52,3	60,8	55,5	63,2	55,3	0,2	No Impact	No Impact	No Impact
	R3-13	90,0	55,2	56,2	60,2	52,3	61,4	57,7	63,2	55,3	2,4	Small	Negligible	Negligible
	R3-14	104,0	53,4	54,4	60,2	52,3	61,0	56,5	63,2	55,3	1,2	Small	Small	Minor
	R3-15	17,0	49,9	50,4	60,2	52,3	60,6	54,5	63,2	55,3	0,0	No Impact	No Impact	No Impact
R4	R4-1	20,0	53,9	54,5	62,1	57,0	62,7	58,9	65,1	60,0	0,0	No Impact	No Impact	No Impact
	R4-2	30,0	49,3	49,9	62,1	57,0	62,3	57,8	65,1	60,0	0,0	No Impact	No Impact	No Impact
	R4-3	21,0	55,9	56,6	62,1	57,0	63,0	59,8	65,1	60,0	0,0	No Impact	No Impact	No Impact
	R4-4	97,0	53,7	54,7	62,1	57,0	62,7	59,0	65,1	60,0	0,0	No Impact	No Impact	No Impact
R5	R5-1	28,0	55,0	55,9	69,9	63,3	70,0	64,0	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-2	26,0	56,0	56,9	69,9	63,3	70,1	64,2	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-3	20,0	57,9	58,8	69,9	63,3	70,2	64,6	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-4	33,0	54,9	55,8	69,9	63,3	70,0	64,0	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-5	24,0	56,6	57,5	69,9	63,3	70,1	64,3	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-6	29,0	55,3	56,3	69,9	63,3	70,0	64,1	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-7	66,0	49,6	50,5	69,9	63,3	69,9	63,5	72,9	66,3	0,0	No Impact	No Impact	No Impact
	R5-8	17,0	59,5	60,5	69,9	63,3	70,3	65,1	72,9	66,3	0,0	No Impact	No Impact	No Impact
R6	R6-1	31,0	55,3	56,3	65,8	64,9	66,2	65,5	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-2	13,0	58,8	59,7	65,8	64,9	66,6	66,0	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-3	25,0	55,8	56,8	65,8	64,9	66,2	65,5	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-4	7,0	61,0	62,0	65,8	64,9	67,0	66,7	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-5	11,0	59,5	60,5	65,8	64,9	66,7	66,2	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-6	16,0	58,6	59,6	65,8	64,9	66,6	66,0	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-7	24,0	56,8	57,7	65,8	64,9	66,3	65,7	68,8	67,9	0,0	No Impact	No Impact	No Impact
	R6-8	253,0	43,9	44,9	65,8	64,9	65,8	64,9	68,8	67,9	0,0	No Impact	No Impact	No Impact
R7	R7-1	247,0	48,7	49,7	59,2	55,2	59,6	56,3	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-2	463,0	42,0	43,0	59,2	55,2	59,3	55,5	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-3	524,0	42,8	43,5	59,2	55,2	59,3	55,5	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-4	26,0	54,7	55,5	59,2	55,2	60,5	58,4	62,2	58,2	0,2	No Impact	No Impact	No Impact

Chapter 7: Mitigation Measures and Residual Impacts

Measurement Point	Assessment Point	Distance to Source (m)	Model Result L_{eq} (dBA)		Baseline L_{eq} (dBA)		Cumulative (dBA)		Limit Value (dBA)		Limits Exceedance Max	Scale of Impact	Impact Magnitude	Impact Significance
			L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}				
	R7-5	23,0	55,3	55,9	59,2	55,2	60,7	58,6	62,2	58,2	0,4	No Impact	No Impact	No Impact
	R7-6	24,0	52,7	53,2	59,2	55,2	60,1	57,3	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-7	31,0	53,3	54,0	59,2	55,2	60,2	57,7	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-8	24,0	54,4	55,1	59,2	55,2	60,4	58,2	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-9	32,0	51,0	51,5	59,2	55,2	59,8	56,7	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-10	37,0	49,1	49,4	59,2	55,2	59,6	56,2	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-11	36,0	61,0	62,1	59,2	55,2	63,2	62,9	62,2	58,2	4,7	Medium	Medium	Minor
	R7-12	34,0	55,6	56,4	59,2	55,2	60,8	58,9	62,2	58,2	0,7	No Impact	No Impact	No Impact
	R7-13	368,0	45,6	46,6	59,2	55,2	59,4	55,8	62,2	58,2	0,0	No Impact	No Impact	No Impact
	R7-14	132,0	37,3	-	59,2	55,2	59,2	55,2	62,2	58,2	0,0	No Impact	No Impact	No Impact
R8	R8-1	36,0	61,6	62,7	65,3	61,8	66,8	65,3	68,3	64,8	0,5	No Impact	No Impact	No Impact
	R8-2	31,0	61,8	62,8	65,3	61,8	66,9	65,3	68,3	64,8	0,5	No Impact	No Impact	No Impact
	R8-3	28,0	62,5	63,5	65,3	61,8	67,1	65,7	68,3	64,8	0,9	No Impact	No Impact	No Impact
	R8-4	116,0	52,7	53,7	65,3	61,8	65,5	62,4	68,3	64,8	0,0	No Impact	No Impact	No Impact
	R8-5	34,0	54,8	55,8	65,3	61,8	65,7	62,8	68,3	64,8	0,0	No Impact	No Impact	No Impact
R9	R9-1	31,0	54,8	55,7	64,9	57,3	65,3	59,6	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-2	45,0	52,6	53,6	64,9	57,3	65,1	58,8	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-3	29,0	55,7	56,6	64,9	57,3	65,4	60,0	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-4	38,0	53,6	54,5	64,9	57,3	65,2	59,1	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-5	29,0	54,9	55,9	64,9	57,3	65,3	59,7	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-6	28,0	55,6	56,6	64,9	57,3	65,4	60,0	67,9	60,3	0,0	No Impact	No Impact	No Impact
	R9-7	12,0	54,3	55,0	64,9	57,3	65,3	59,3	67,9	60,3	0,0	No Impact	No Impact	No Impact
R10	R10-1	10,0	60,8	61,7	71,1	66,0	71,5	67,4	74,1	69,0	0,0	No Impact	No Impact	No Impact
	R10-2	52,0	51,5	52,5	71,1	66,0	71,1	66,2	74,1	69,0	0,0	No Impact	No Impact	No Impact
	R10-3	17,0	59,0	59,9	71,1	66,0	71,4	67,0	74,1	69,0	0,0	No Impact	No Impact	No Impact
	R10-4	51,0	52,1	53,0	71,1	66,0	71,2	66,2	74,1	69,0	0,0	No Impact	No Impact	No Impact
	R10-5	77,0	45,9	46,8	71,1	66,0	71,1	66,1	74,1	69,0	0,0	No Impact	No Impact	No Impact
R11	R11-1	13,0	54,7	57,2	66,0	62,5	66,3	63,6	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-2	14,0	53,2	55,6	66,0	62,5	66,2	63,3	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-3	11,0	55,3	57,8	66,0	62,5	66,4	63,8	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-4	21,0	53,5	56,0	66,0	62,5	66,2	63,4	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-5	12,0	54,6	57,1	66,0	62,5	66,3	63,6	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-6	13,0	54,8	57,2	66,0	62,5	66,3	63,6	69,0	65,5	0,0	No Impact	No Impact	No Impact
	R11-7	12,0	54,1	56,6	66,0	62,5	66,3	63,5	69,0	65,5	0,0	No Impact	No Impact	No Impact
R12	R12-1	12,0	54,4	56,9	62,4	59,6	63,0	61,5	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-2	21,0	50,7	53,1	62,4	59,6	62,7	60,5	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-3	13,0	53,6	56,1	62,4	59,6	62,9	61,2	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-4	12,0	54,7	57,1	62,4	59,6	63,1	61,5	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-5	9,0	56,0	58,5	62,4	59,6	63,3	62,1	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-6	13,0	53,7	56,2	62,4	59,6	62,9	61,2	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-7	15,0	52,9	55,4	62,4	59,6	62,9	61,0	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-8	26,0	50,6	53,0	62,4	59,6	62,7	60,5	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-9	51,0	44,6	46,9	62,4	59,6	62,5	59,8	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-10	92,0	41,0	43,2	62,4	59,6	62,4	59,7	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-11	88,0	31,1	33,4	62,4	59,6	62,4	59,6	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-12	24,0	55,2	57,7	62,4	59,6	63,2	61,8	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-13	31,0	54,6	57,1	62,4	59,6	63,1	61,5	65,4	62,6	0,0	No Impact	No Impact	No Impact

Chapter 7: Mitigation Measures and Residual Impacts

Measurement Point	Assessment Point	Distance to Source (m)	Model Result L_{eq} (dBA)		Baseline L_{eq} (dBA)		Cumulative (dBA)		Limit Value (dBA)		Limits Exceedance Max	Scale of Impact	Impact Magnitude	Impact Significance
			L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}				
R13	R12-14	35,0	53,9	56,4	62,4	59,6	63,0	61,3	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R12-15	50,0	51,7	54,2	62,4	59,6	62,8	60,7	65,4	62,6	0,0	No Impact	No Impact	No Impact
	R13-1	49,0	53,9	56,4	59,2	56,8	60,3	59,6	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-2	578,0	33,9	36,4	59,2	56,8	59,2	56,8	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-3	41,0	48,0	50,2	59,2	56,8	59,5	57,7	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-4	38,0	44,1	46,3	59,2	56,8	59,3	57,2	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-5	292,0	37,4	39,9	59,2	56,8	59,2	56,9	62,2	59,8	0,0	No Impact	No Impact	No Impact
	R13-6	10,0	55,8	57,6	59,2	56,8	60,8	60,2	62,2	59,8	0,4	No Impact	No Impact	No Impact
	R13-7	173,0	42,8	45,3	59,2	56,8	59,3	57,1	62,2	59,8	0,0	No Impact	No Impact	No Impact
R14	R13-8	16,0	58,4	60,9	59,2	56,8	61,8	62,3	62,2	59,8	2,5	Small	Medium	Minor
	R14-1	17,0	50,4	52,8	62,0	55,3	62,3	57,2	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-2	15,0	53,1	55,6	62,0	55,3	62,5	58,5	65,0	58,3	0,2	No Impact	No Impact	No Impact
	R14-3	40,0	46,8	49,1	62,0	55,3	62,1	56,2	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-4	24,0	51,1	53,5	62,0	55,3	62,3	57,5	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-5	46,0	47,2	49,5	62,0	55,3	62,1	56,3	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-6	11,0	51,2	53,6	62,0	55,3	62,3	57,5	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-7	33,0	47,9	50,2	62,0	55,3	62,2	56,5	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-8	43,0	42,4	44,6	62,0	55,3	62,0	55,7	65,0	58,3	0,0	No Impact	No Impact	No Impact
R15	R14-9	26,0	49,8	52,2	62,0	55,3	62,3	57,0	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-10	282,0	39,0	41,5	62,0	55,3	62,0	55,5	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R14-11	29,0	45,5	45,2	62,0	55,3	62,1	55,7	65,0	58,3	0,0	No Impact	No Impact	No Impact
	R15-1	37,0	50,2	52,2	58,3	57,8	58,9	58,9	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-2	11,0	50,9	50,7	58,3	57,8	59,0	58,6	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-3	25,0	53,6	56,1	58,3	57,8	59,6	60,0	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-4	12,0	58,6	61,1	58,3	57,8	61,5	62,8	61,3	60,8	2,0	Small	Medium	Minor
	R15-5	20,0	57,8	57,7	58,3	57,8	61,1	60,8	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-6	61,0	58,1	58,0	58,3	57,8	61,2	60,9	61,3	60,8	0,1	No Impact	No Impact	No Impact
	R15-7	59,0	58,5	58,5	58,3	57,8	61,4	61,2	61,3	60,8	0,4	No Impact	No Impact	No Impact
	R15-8	302,0	45,9	45,9	58,3	57,8	58,5	58,1	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-9	288,0	46,8	46,8	58,3	57,8	58,6	58,1	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-10	21,0	53,4	52,9	58,3	57,8	59,5	59,0	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-11	57,0	57,3	57,3	58,3	57,8	60,8	60,6	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-12	70,0	48,1	48,0	58,3	57,8	58,7	58,2	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-13	7,0	53,0	52,5	58,3	57,8	59,4	58,9	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-14	26,0	55,9	55,9	58,3	57,8	60,3	60,0	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-15	11,0	56,8	56,7	58,3	57,8	60,6	60,3	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-16	28,0	45,2	45,1	58,3	57,8	58,5	58,0	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-17	33,0	56,4	56,3	58,3	57,8	60,5	60,1	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-18	27,0	55,9	55,8	58,3	57,8	60,3	59,9	61,3	60,8	0,0	No Impact	No Impact	No Impact
R16	R15-19	68,0	47,4	47,3	58,3	57,8	58,6	58,2	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R15-20	12,0	58,4	58,3	58,3	57,8	61,4	61,1	61,3	60,8	0,3	No Impact	No Impact	No Impact
	R15-21	35,0	53,7	53,7	58,3	57,8	59,6	59,2	61,3	60,8	0,0	No Impact	No Impact	No Impact
	R16-1	23,0	54,1	54,0	63,1	62,9	63,6	63,4	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-2	10,0	58,5	58,4	63,1	62,9	64,4	64,2	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-3	49,0	50,7	50,6	63,1	62,9	63,3	63,1	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-4	16,0	57,2	57,2	63,1	62,9	64,1	63,9	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-5	47,0	51,5	51,4	63,1	62,9	63,4	63,2	66,1	65,9	0,0	No Impact	No Impact	No Impact

Chapter 7: Mitigation Measures and Residual Impacts

Measurement Point	Assessment Point	Distance to Source (m)	Model Result L_{eq} (dBA)		Baseline L_{eq} (dBA)		Cumulative (dBA)		Limit Value (dBA)		Limits Exceedance Max	Scale of Impact	Impact Magnitude	Impact Significance
			L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}	L_{day}	L_{night}				
	R16-6	12,0	58,7	58,7	63,1	62,9	64,4	64,3	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-7	23,0	55,6	55,5	63,1	62,9	63,8	63,6	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-8	13,0	58,8	58,8	63,1	62,9	64,5	64,3	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-9	16,0	58,1	58,0	63,1	62,9	64,3	64,1	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-10	40,0	53,6	53,5	63,1	62,9	63,6	63,4	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-11	15,0	53,9	53,8	63,1	62,9	63,6	63,4	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-12	324,0	46,2	46,2	63,1	62,9	63,2	63,0	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-13	300,0	59,3	59,3	63,1	62,9	64,6	64,5	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-14	290,0	62,1	62,1	63,1	62,9	65,6	65,5	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-15	491,0	49,7	49,8	63,1	62,9	63,3	63,1	66,1	65,9	0,0	No Impact	No Impact	No Impact
R17	R16-16	169,0	59,2	59,2	63,1	62,9	64,6	64,4	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R16-17	184,0	-	-	63,1	62,9	63,1	62,9	66,1	65,9	0,0	No Impact	No Impact	No Impact
	R17-1	192,0	43,5	43,5	52,1	46,6	52,7	48,3	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-2	270,0	42,1	42,1	52,1	46,6	52,5	47,9	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-3	98,0	48,0	47,9	52,1	46,6	53,5	50,3	55,0	49,6	0,7	No Impact	No Impact	No Impact
	R17-4	100,0	47,8	47,7	52,1	46,6	53,5	50,2	55,0	49,6	0,6	No Impact	No Impact	No Impact
	R17-5	85,0	45,6	45,5	52,1	46,6	53,0	49,1	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-6	49,0	44,5	44,1	52,1	46,6	52,8	48,5	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-7	38,0	44,4	43,8	52,1	46,6	52,8	48,4	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-8	35,0	19,6	19,6	52,1	46,6	52,1	46,6	55,0	49,6	0,0	No Impact	No Impact	No Impact
R18	R17-9	38,0	9,0	9,0	52,1	46,6	52,1	46,6	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R17-10	52,0	14,7	14,7	52,1	46,6	52,1	46,6	55,0	49,6	0,0	No Impact	No Impact	No Impact
	R18-1	12,0	61,4	61,4	59,2	58,9	63,4	63,3	62,2	61,9	1,4	Small	Medium	Moderate
R19	R18-2	231,0	46,3	44,7	59,2	58,9	59,4	59,1	62,2	61,9	0,0	No Impact	No Impact	No Impact
	R18-3	33,0	53,5	51,6	59,2	58,9	60,2	59,6	62,2	61,9	0,0	No Impact	No Impact	No Impact
	R19-1	73,0	43,6	41,3	51,1	44,3	51,8	46,1	55,0	45,0	1,1	Small	Medium	Moderate
	R19-2	436,0	37,3	35,5	51,1	44,3	51,3	44,8	55,0	45,0	0,0	No Impact	No Impact	No Impact
	R19-3	20,0	47,5	45,3	51,1	44,3	52,7	47,8	55,0	45,0	2,8	Small	Medium	Moderate
R20	R19-4	73,0	40,1	37,7	51,1	44,3	51,4	45,2	55,0	45,0	0,2	No Impact	No Impact	No Impact
	R20-1	60,0	47,5	45,4	49,9	42,3	51,9	47,1	55,0	45,0	2,1	Small	Small	Minor
	R20-2	181,0	43,4	41,6	49,9	42,3	50,8	45,0	55,0	45,0	0,0	No Impact	No Impact	No Impact
	R20-3	71,0	43,5	41,5	49,9	42,3	50,8	44,9	55,0	45,0	0,0	No Impact	No Impact	No Impact
	R20-4	47,0	-	-	49,9	42,3	49,9	42,3	55,0	45,0	0,0	No Impact	No Impact	No Impact
	R20-5	226,0	43,7	41,9	49,9	42,3	50,8	45,1	55,0	45,0	0,1	No Impact	No Impact	No Impact
	R20-6	803,0	41,9	40,2	49,9	42,3	50,5	44,4	55,0	45,0	0,0	No Impact	No Impact	No Impact
	No Impact													164
	Negligible													1
	Minor													6
	Moderate													3
	Major													0
	Total													174

As can be seen from Table 7-2, after application of the proposed mitigation measures operation phase noise assessment is concluded as; 0 out of 174 assessment points “Major”, 3 out of the 174 assessment points “Moderate”, 6 out of 174 assessment points “Minor” and 1 out of 174 assessment points “Negligible” affected from operation noise. 164 out of 174 assessment points found out to be not affected from operational noise at all.

At 3 out of 174 assessment points “Moderate” final impacts significance still persist due to, either inapplicability of the mitigation measures or lack of efficiency of the noise barriers. Following explanation can be found out for these 3 assessment points;

- **R18-1;** for this assessment point noise barriers are inapplicable and/or useless in terms of terrain relationship between railway and receiving bodies.
- **R19-1/R19-3;** even though noise barriers reduced the noise levels at receptors in the scope of practical limits of the noise barriers (around 10-15 *dB*A noise reduction), final impact significances still found out to be “Moderate” for these two assessment points. This situation is because of the relatively low baseline noise levels at the region.

Those 3 assessment points, whose final impact significances found out to be “Moderate” despite mitigation efforts, can be considered as the residual impact due to operational noise for this project.

Apart from pre-determined noise assessment methodology; for the zones which concluded as mitigation needed (barrier zones), a building count survey is conducted. For this project; mitigation requirements are decided according to a defined methodology which is inclusive with numerical environmental noise values and other social and fundamental aspects of the buildings. Limit value (which are determined specific for different representative baseline zones) exceedance values is the numerical portion of the defined noise assessment methodology. Dependent on other fundamental and social aspects of the specific building, operation noise levels exceeding limiting values does not mean “Moderate” or “Major” final impact significances which are considered as mitigation design criteria during project. Mentioned building count survey is conducted with the buildings with limit value exceedances before and after mitigation for every barrier zone.

Following Table 7-3 represents building count survey.

Table 7-3 *Buildings with Limit Value Exceedance with and without Mitigation Measures*

Barrier Name	Related Assessment Point	Number of Building w/ Limit Value Exceedance Before Mitigation	Number of Building w/ Limit Value Exceedance After Mitigation
B1-2	R1-2	10	3
B2-3	R2-3	20	6
B2-4	R2-4	24	2
B3-1	R3-1	5	5
B3-2	R3-2	26	18
B3-5	R3-5	6	0
B3-6	R3-6	8	0
B3-7	R3-7	6	1
B3-8	R3-8	7	3
B3-9	R3-9	2	0
B3-10	R3-10/R3-11	48	18
B3-15	R3-15	14	3
B4-1	R4-1/R4-2/R4-3	34	10
B7-4	R7-4	2	0
B7-5	R7-5/R7-7/R7-9/R7-10	35	3
B7-6	R7-6/R7-8	60	21
B7-12	R7-12	35	10
B9-7	R9-7	36	9
B13-4	R13-4	0	0
B13-6 Part 1	R13-6	5	0
B14-11	R14-11	0	0
B15-2	R15-2	0	0
B15-5	R15-5	10	5
B15-10	R15-10	6	1
B15-3	R15-3	16	0
B17-6	R17-6/R17-7	28	4
B18-3	R18-3	3	0
B19-1	R19-1	80	3
B19-2	R19-2	1	1
B19-3	R19-3/R19-4	93	9
B20-1	R20-1	5	0
B20-2	R20-2	46	1
B20-3	R20-3	9	0
B20-5	R20-5	44	0
Total		724	136

As can be seen from Table 7-3 number of buildings with limit value exceedances which are located in the barrier zones is dropped from 724 to 136. Majority of those 136 buildings has final impact significances of “Minor”, “Negligible” or “No Impact”; only exception for this situation is the buildings located in the perimeter of assessment point which are concluded as the residual impact of the study.

7.2 Vibration Mitigation Measures

7.2.1 Construction Vibration Mitigation Measures

Only one spot was identified as a moderate impact zone during the construction vibration evaluation. Because this structure is so close to the railway line, infrastructure operations such as rail track stabilization have a moderate influence on it. The predicted level, on the other hand, is lower than the national regulatory limitations. As a result, no measures for building vibrations are required. It may be advisable to focus on track stability in this stretch throughout the day.

7.2.2 Operational Vibration Mitigation Measures

Railway operations conducted along the railway and 6 “minor”, 51 “Moderate” and 6 “Major” impacted regions are determined out of 174 assessment points. 5 of the receivers are found to be over RAMEN vibration limits.

To mitigate the estimated railway vibration levels at “Moderate” and “Major” impacted receivers, rail pads and resilient fasteners are recommended at this stage. In detailed railway vibration assessments, weight of the vehicles, propagation conditions of the ground (elastic modulus) need to be known. In detailed design stage it is strongly recommended to conduct vibration assessment especially in city crossings and locations where rails are close to buildings. Different limiting values may be applied for critical buildings which electron microscopes can be in use.

As a mitigation measure using high resilience fasteners along the line is suggested. In addition, rail pad installation recommended at the locations presented in Table 7-4.

Table 7-4 Proposed Rail Pad Application

Related Assessment Point	Section	Km Start	Length (m)
R6-2	Tarsus	27+100	400
R6-6	Tarsus	28+200	300
R7-5	Yenice	41+700	300
R9-7	Adana	367+550	450
R10-1	Adana	368+250	350
R15-2	Toprakkale	447+200	300
R15-10	Toprakkale	2+900	150
R19-3	Nurdağı	16+550	150

Vibration impact assessment after application of proposed mitigation measures is presented in Table 7-5.

Table 7-5 Vibration Impact Assessment after Mitigation

	Assessment Point	Distance to Source (m)	L_v (Adjusted) (VdB)	L_v (Adjusted) (mm/s)	Exceedance Value (VdB)	Scale of Impact	Impact Magnitude	Impact Significance	RAMEN Exceedance
R1	R1-1	25,00	66.83	0.0558	-8.17	No Impact	No Impact	No Impact	-
	R1-2	24,00	66.98	0.0567	-8.02	No Impact	No Impact	No Impact	-
R2	R2-1	50,00	67.25	0.0585	-7.75	No Impact	No Impact	No Impact	-
	R2-2	44,00	67.72	0.0618	-7.28	No Impact	No Impact	No Impact	-
	R2-3	13,00	72.27	0.1043	-2.73	No Impact	No Impact	No Impact	-
	R2-4	22,00	70.30	0.0832	-4.70	No Impact	No Impact	No Impact	-
R3	R3-1	14,00	71.99	0.1010	-3.01	No Impact	No Impact	No Impact	-
	R3-2	22,00	70.30	0.0832	-4.70	No Impact	No Impact	No Impact	-
	R3-3	89,00	65.10	0.0457	-9.90	No Impact	No Impact	No Impact	-
	R3-4	82,00	65.40	0.0473	-9.60	No Impact	No Impact	No Impact	-
	R3-5	32,00	68.91	0.0708	-6.09	No Impact	No Impact	No Impact	-
	R3-6	33,00	68.79	0.0699	-6.21	No Impact	No Impact	No Impact	-
	R3-7	35,00	68.57	0.0682	-6.43	No Impact	No Impact	No Impact	-
	R3-8	23,00	70.14	0.0816	-4.86	No Impact	No Impact	No Impact	-
	R3-9	26,00	69.68	0.0774	-5.32	No Impact	No Impact	No Impact	-
	R3-10	25,00	69.83	0.0788	-5.17	No Impact	No Impact	No Impact	-
	R3-11	27,00	69.54	0.0762	-5.46	No Impact	No Impact	No Impact	-
	R3-12	124,00	63.86	0.0396	-11.14	No Impact	No Impact	No Impact	-
	R3-13	90,00	65.06	0.0455	-9.94	No Impact	No Impact	No Impact	-
	R3-14	104,00	64.52	0.0427	-10.48	No Impact	No Impact	No Impact	-
	R3-15	17,00	71.27	0.0929	-3.73	No Impact	No Impact	No Impact	-
R4	R4-1	20,00	70.66	0.0867	-4.34	No Impact	No Impact	No Impact	-
	R4-2	30,00	69.15	0.0728	-5.85	No Impact	No Impact	No Impact	-
	R4-3	21,00	70.48	0.0849	-4.52	No Impact	No Impact	No Impact	-
	R4-4	97,00	64.78	0.0440	-10.22	No Impact	No Impact	No Impact	-
R5	R5-1	28,00	69.41	0.0750	-5.59	No Impact	No Impact	No Impact	-
	R5-2	26,00	69.68	0.0774	-5.32	No Impact	No Impact	No Impact	-
	R5-3	20,00	72.66	0.1091	-2.34	No Impact	No Impact	No Impact	-
	R5-4	33,00	70.79	0.0880	-4.21	No Impact	No Impact	No Impact	-
	R5-5	24,00	71.98	0.1009	-3.02	No Impact	No Impact	No Impact	-
	R5-6	29,00	74.28	0.1314	-0.72	No Impact	No Impact	No Impact	-
	R5-7	66,00	63.21	0.0368	-11.79	No Impact	No Impact	No Impact	-
	R5-8	17,00	68.27	0.0658	-6.73	No Impact	No Impact	No Impact	-
R6	R6-1	31,00	69.03	0.0718	-5.97	No Impact	No Impact	No Impact	-
	R6-2	13,00	72.27	0.1043	-2.73	No Impact	No Impact	No Impact	-
	R6-3	25,00	71.83	0.0991	-3.17	No Impact	No Impact	No Impact	-
	R6-4	7,00	74.57	0.1360	-0.43	No Impact	No Impact	No Impact	-
	R6-5	11,00	72.89	0.1120	-2.11	No Impact	No Impact	No Impact	-
	R6-6	16,00	71.49	0.0954	-3.51	No Impact	No Impact	No Impact	-
	R6-7	24,00	74.98	0.1425	-0.02	No Impact	No Impact	No Impact	-
R7	R6-8	253,00	61.20	0.0292	-13.80	No Impact	No Impact	No Impact	-
	R7-1	247,00	61.29	0.0295	-13.71	No Impact	No Impact	No Impact	-
	R7-2	463,00	58.95	0.0225	-16.05	No Impact	No Impact	No Impact	-
	R7-3	524,00	58.49	0.0213	-16.51	No Impact	No Impact	No Impact	-
	R7-4	26,00	69.68	0.0774	-5.32	No Impact	No Impact	No Impact	-

Chapter 7: Mitigation Measures and Residual Impacts

	Assessment Point	Distance to Source (m)	L_p (Adjusted) (VdB)	L_p (Adjusted) (mm/s)	Exceedance Value (VdB)	Scale of Impact	Impact Magnitude	Impact Significance	RAMEN Exceedance
	R7-5	23,00	70.14	0.0816	-4.86	No Impact	No Impact	No Impact	-
	R7-6	24,00	74.98	0.1425	-0.02	No Impact	No Impact	No Impact	-
	R7-7	31,00	69.03	0.0718	-5.97	No Impact	No Impact	No Impact	-
	R7-8	24,00	69.98	0.0801	-5.02	No Impact	No Impact	No Impact	-
	R7-9	32,00	68.91	0.0708	-6.09	No Impact	No Impact	No Impact	-
	R7-10	37,00	73.37	0.1184	-1.63	No Impact	No Impact	No Impact	-
	R7-11	36,00	68.47	0.0673	-6.53	No Impact	No Impact	No Impact	-
	R7-12	34,00	68.68	0.0690	-6.32	No Impact	No Impact	No Impact	-
	R7-13	368,00	59.81	0.0248	-15.19	No Impact	No Impact	No Impact	-
	R7-14	132,00	63.63	0.0386	-11.37	No Impact	No Impact	No Impact	-
R8	R8-1	36,00	68.47	0.0673	-6.53	No Impact	No Impact	No Impact	-
	R8-2	31,00	69.03	0.0718	-5.97	No Impact	No Impact	No Impact	-
	R8-3	28,00	69.41	0.0750	-5.59	No Impact	No Impact	No Impact	-
	R8-4	116,00	64.11	0.0408	-10.89	No Impact	No Impact	No Impact	-
	R8-5	34,00	68.68	0.0690	-6.32	No Impact	No Impact	No Impact	-
R9	R9-1	31,00	69.03	0.0718	-5.97	No Impact	No Impact	No Impact	-
	R9-2	45,00	67.64	0.0612	-7.36	No Impact	No Impact	No Impact	-
	R9-3	29,00	69.28	0.0739	-5.72	No Impact	No Impact	No Impact	-
	R9-4	38,00	68.27	0.0658	-6.73	No Impact	No Impact	No Impact	-
	R9-5	29,00	69.28	0.0739	-5.72	No Impact	No Impact	No Impact	-
	R9-6	28,00	69.41	0.0750	-5.59	No Impact	No Impact	No Impact	-
	R9-7	12,00	72.56	0.1079	-2.44	No Impact	No Impact	No Impact	-
R10	R10-1	10,00	73.24	0.1167	-1.76	No Impact	No Impact	No Impact	-
	R10-2	52,00	67.10	0.0575	-7.90	No Impact	No Impact	No Impact	-
	R10-3	17,00	71.27	0.0929	-3.73	No Impact	No Impact	No Impact	-
	R10-4	51,00	67.17	0.0580	-7.83	No Impact	No Impact	No Impact	-
	R10-5	77,00	65.64	0.0486	-9.36	No Impact	No Impact	No Impact	-
R11	R11-1	13,00	72.27	0.1043	-2.73	No Impact	No Impact	No Impact	-
	R11-2	14,00	71.99	0.1010	-3.01	No Impact	No Impact	No Impact	-
	R11-3	11,00	72.89	0.1120	-2.11	No Impact	No Impact	No Impact	-
	R11-4	21,00	70.48	0.0849	-4.52	No Impact	No Impact	No Impact	-
	R11-5	12,00	72.56	0.1079	-2.44	No Impact	No Impact	No Impact	-
	R11-6	13,00	72.27	0.1043	-2.73	No Impact	No Impact	No Impact	-
	R11-7	12,00	72.56	0.1079	-2.44	No Impact	No Impact	No Impact	-
R12	R12-1	12,00	72.56	0.1079	-2.44	No Impact	No Impact	No Impact	-
	R12-2	21,00	70.48	0.0849	-4.52	No Impact	No Impact	No Impact	-
	R12-3	13,00	72.27	0.1043	-2.73	No Impact	No Impact	No Impact	-
	R12-4	12,00	72.56	0.1079	-2.44	No Impact	No Impact	No Impact	-
	R12-5	9,00	73.64	0.1221	-1.36	No Impact	No Impact	No Impact	-
	R12-6	13,00	72.27	0.1043	-2.73	No Impact	No Impact	No Impact	-
	R12-7	15,00	71.73	0.0980	-3.27	No Impact	No Impact	No Impact	-
	R12-8	26,00	69.68	0.0774	-5.32	No Impact	No Impact	No Impact	-
	R12-9	51,00	67.17	0.0580	-7.83	No Impact	No Impact	No Impact	-
	R12-10	92,00	64.97	0.0450	-10.03	No Impact	No Impact	No Impact	-
	R12-11	88,00	65.14	0.0459	-9.86	No Impact	No Impact	No Impact	-
	R12-12	24,00	69.98	0.0801	-5.02	No Impact	No Impact	No Impact	-
	R12-13	31,00	69.03	0.0718	-5.97	No Impact	No Impact	No Impact	-
	R12-14	35,00	68.57	0.0682	-6.43	No Impact	No Impact	No Impact	-
	R12-15	50,00	67.25	0.0585	-7.75	No Impact	No Impact	No Impact	-

Chapter 7: Mitigation Measures and Residual Impacts

	Assessment Point	Distance to Source (m)	L_p (Adjusted) (VdB)	L_p (Adjusted) (mm/s)	Exceedance Value (VdB)	Scale of Impact	Impact Magnitude	Impact Significance	RAMEN Exceedance
R13	R13-1	49,00	67.32	0.0590	-7.68	No Impact	No Impact	No Impact	-
	R13-2	578,00	58.13	0.0205	-16.87	No Impact	No Impact	No Impact	-
	R13-3	41,00	67.99	0.0637	-7.01	No Impact	No Impact	No Impact	-
	R13-4	38,00	73.27	0.1170	-1.73	No Impact	No Impact	No Impact	-
	R13-5	292,00	65.67	0.0488	-9.33	No Impact	No Impact	No Impact	-
	R13-6	10,00	65.27	0.0466	-9.73	No Impact	No Impact	No Impact	-
	R13-7	173,00	62.62	0.0343	-12.38	No Impact	No Impact	No Impact	-
	R13-8	16,00	71.49	0.0954	-3.51	No Impact	No Impact	No Impact	-
R14	R14-1	17,00	71.27	0.0929	-3.73	No Impact	No Impact	No Impact	-
	R14-2	15,00	71.73	0.0980	-3.27	No Impact	No Impact	No Impact	-
	R14-3	40,00	68.08	0.0644	-6.92	No Impact	No Impact	No Impact	-
	R14-4	24,00	69.98	0.0801	-5.02	No Impact	No Impact	No Impact	-
	R14-5	46,00	67.56	0.0606	-7.44	No Impact	No Impact	No Impact	-
	R14-6	11,00	72.89	0.1120	-2.11	No Impact	No Impact	No Impact	-
	R14-7	33,00	70.79	0.0880	-4.21	No Impact	No Impact	No Impact	-
	R14-8	43,00	67.81	0.0624	-7.19	No Impact	No Impact	No Impact	-
	R14-9	26,00	69.68	0.0774	-5.32	No Impact	No Impact	No Impact	-
	R14-10	282,00	60.80	0.0278	-14.20	No Impact	No Impact	No Impact	-
	R14-11	29,00	69.28	0.0739	-5.72	No Impact	No Impact	No Impact	-
R15	R15-1	37,00	68.37	0.0666	-6.63	No Impact	No Impact	No Impact	-
	R15-2	11,00	72.89	0.1120	-2.11	No Impact	No Impact	No Impact	-
	R15-3	25,00	69.83	0.0788	-5.17	No Impact	No Impact	No Impact	-
	R15-4	12,00	72.56	0.1079	-2.44	No Impact	No Impact	No Impact	-
	R15-5	20,00	70.66	0.0867	-4.34	No Impact	No Impact	No Impact	-
	R15-6	61,00	71.50	0.0955	-3.50	No Impact	No Impact	No Impact	-
	R15-7	59,00	66.63	0.0545	-8.37	No Impact	No Impact	No Impact	-
	R15-8	302,00	60.54	0.0270	-14.46	No Impact	No Impact	No Impact	-
	R15-9	288,00	60.72	0.0276	-14.28	No Impact	No Impact	No Impact	-
	R15-10	21,00	70.48	0.0849	-4.52	No Impact	No Impact	No Impact	-
	R15-11	57,00	66.76	0.0553	-8.24	No Impact	No Impact	No Impact	-
	R15-12	70,00	70.99	0.0900	-4.01	No Impact	No Impact	No Impact	-
	R15-13	7,00	74.57	0.1360	-0.43	No Impact	No Impact	No Impact	-
	R15-14	26,00	69.68	0.0774	-5.32	No Impact	No Impact	No Impact	-
	R15-15	11,00	69.89	0.0793	-5.11	No Impact	No Impact	No Impact	-
	R15-16	28,00	69.41	0.0750	-5.59	No Impact	No Impact	No Impact	-
	R15-17	33,00	68.79	0.0699	-6.21	No Impact	No Impact	No Impact	-
	R15-18	27,00	69.54	0.0762	-5.46	No Impact	No Impact	No Impact	-
	R15-19	68,00	63.10	0.0363	-11.90	No Impact	No Impact	No Impact	-
	R15-20	12,00	72.56	0.1079	-2.44	No Impact	No Impact	No Impact	-
	R15-21	35,00	65.57	0.0483	-9.43	No Impact	No Impact	No Impact	-
R16	R16-1	23,00	67.14	0.0578	-7.86	No Impact	No Impact	No Impact	-
	R16-2	10,00	73.24	0.1167	-1.76	No Impact	No Impact	No Impact	-
	R16-3	49,00	64.32	0.0418	-10.68	No Impact	No Impact	No Impact	-
	R16-4	16,00	71.49	0.0954	-3.51	No Impact	No Impact	No Impact	-
	R16-5	47,00	67.48	0.0601	-7.52	No Impact	No Impact	No Impact	-
	R16-6	12,00	72.56	0.1079	-2.44	No Impact	No Impact	No Impact	-
	R16-7	23,00	70.14	0.0816	-4.86	No Impact	No Impact	No Impact	-
	R16-8	13,00	72.27	0.1043	-2.73	No Impact	No Impact	No Impact	-
	R16-9	16,00	71.49	0.0954	-3.51	No Impact	No Impact	No Impact	-

Chapter 7: Mitigation Measures and Residual Impacts

	Assessment Point	Distance to Source (m)	L_p (Adjusted) (VdB)	L_p (Adjusted) (mm/s)	Exceedance Value (VdB)	Scale of Impact	Impact Magnitude	Impact Significance	RAMEN Exceedance
	R16-10	40,00	68.08	0.0644	-6.92	No Impact	No Impact	No Impact	-
	R16-11	15,00	71.73	0.0980	-3.27	No Impact	No Impact	No Impact	-
	R16-12	324,00	60.28	0.0262	-14.72	No Impact	No Impact	No Impact	-
	R16-13	300,00	60.57	0.0271	-14.43	No Impact	No Impact	No Impact	-
	R16-14	290,00	65.70	0.0489	-9.30	No Impact	No Impact	No Impact	-
	R16-15	491,00	63.73	0.0390	-11.27	No Impact	No Impact	No Impact	-
	R16-16	169,00	47.71	0.0062	-27.29	No Impact	No Impact	No Impact	-
	R16-17	184,00	62.39	0.0334	-12.61	No Impact	No Impact	No Impact	-
R17	R17-1	192,00	62.23	0.0328	-12.77	No Impact	No Impact	No Impact	-
	R17-2	270,00	60.96	0.0284	-14.04	No Impact	No Impact	No Impact	-
	R17-3	98,00	64.74	0.0438	-10.26	No Impact	No Impact	No Impact	-
	R17-4	100,00	64.66	0.0434	-10.34	No Impact	No Impact	No Impact	-
	R17-5	85,00	70.27	0.0828	-4.73	No Impact	No Impact	No Impact	-
	R17-6	49,00	67.32	0.0590	-7.68	No Impact	No Impact	No Impact	-
	R17-7	38,00	68.27	0.0658	-6.73	No Impact	No Impact	No Impact	-
	R17-8	35,00	53.57	0.0121	-21.43	No Impact	No Impact	No Impact	-
	R17-9	38,00	53.27	0.0117	-21.73	No Impact	No Impact	No Impact	-
	R17-10	52,00	52.10	0.0102	-22.90	No Impact	No Impact	No Impact	-
R18	R18-1	12,00	72.56	0.1079	-2.44	No Impact	No Impact	No Impact	-
	R18-2	231,00	61.54	0.0303	-13.46	No Impact	No Impact	No Impact	-
	R18-3	33,00	68.79	0.0699	-6.21	No Impact	No Impact	No Impact	-
R19	R19-1	73,00	65.84	0.0497	-9.16	No Impact	No Impact	No Impact	-
	R19-2	436,00	59.18	0.0231	-15.82	No Impact	No Impact	No Impact	-
	R19-3	20,00	70.66	0.0867	-4.34	No Impact	No Impact	No Impact	-
	R19-4	73,00	65.84	0.0497	-9.16	No Impact	No Impact	No Impact	-
R20	R20-1	60,00	66.57	0.0541	-8.43	No Impact	No Impact	No Impact	-
	R20-2	181,00	62.45	0.0337	-12.55	No Impact	No Impact	No Impact	-
	R20-3	71,00	65.94	0.0503	-9.06	No Impact	No Impact	No Impact	-
	R20-4	47,00	67.48	0.0601	-7.52	No Impact	No Impact	No Impact	-
	R20-5	226,00	46.62	0.0054	-28.38	No Impact	No Impact	No Impact	-
	R20-6	803,00	56.90	0.0178	-18.10	No Impact	No Impact	No Impact	-
							No Impact	174	
							Negligible	0	
							Minor	0	
							Moderate	0	
							Major	0	
							Total	174	

Chapter 8: Assumptions and Limitations

8.1 Noise Modelling Assumptions and Limitations

8.1.1 Construction

- For construction noise modelling; given machine equipment assumed to be working on a linear construction site along the railway axis and area noise sources are defined along the railway to be working as consecutive construction sites.
- Calculations and assessment procedures are accurate in line with the accuracy and detail level of the provided information and project documents.
- For assessment points whose finally impact significances concluded as “Moderate” and “Major” long-term noise monitoring studies should be conducted ahead of implementation of the possible mitigation measures.

8.1.2 Operation

- For operation noise modelling; given train quantities and given speed profiles are integrated into the noise model. Train classes and categories are defined along with SRM II railway noise modelling document.
- Since given railway speed profile is not completed yet along city centers velocities are assumed to be halved both for HST's and freight trains.
- In the scope of the project proposed 20 noise measurement stations are inadequate in terms of baseline noise levels representative characteristics. Especially around assessment point 5-1 and 6-4 Tarsus region and 10-1, 10-3, 12-13, 12-14, 12-15 Adana region, more long-term monitoring measurements need to be conducted in order to better understand baseline noise dynamics in these regions before mitigation design is finalized.
- Especially for the barrier regions long-term noise monitoring studies with extended time scope strongly recommended before final operational noise mitigation design.
- Since alignment design is not completed, proposed mitigation measures are decided and pre-designed according to given project drawings. For an application project further measurements and detailed design is strongly recommended.

8.2 Vibration Calculations Assumptions and Limitations

8.2.1 Construction

- For construction vibration calculations; given blasting pattern and reference value for TBM are used.
- Calculations and assessment procedures are accurate in line with the accuracy and detail level of the provided information about TBM dynamics and blasting pattern.
- For vertical distances calculated tunnel slope and absolute height database of Google Earth are used.

8.2.2 Operation

- Operation vibration calculations are conducted with respect to given information and provided documents.
- Precision of the calculations depends on the provided train schedules, speed profiles and unsprung mass. Since detailed speed profile along the railway axis is not complete, maximum train velocities is used for calculations.
- Precision of the calculations depends on the ground survey of the project area. Since there is no reachable ground survey report provided, most favorable vibration propagation conditions assumed in order to be on the safe side via creating a worst-case scenario.
- Prior to finalizing the project, especially in city centers, a detailed vibration assessment survey should be conducted along with the detailed ground survey study, in order to determine soil-based characteristics such as ground elasticity.

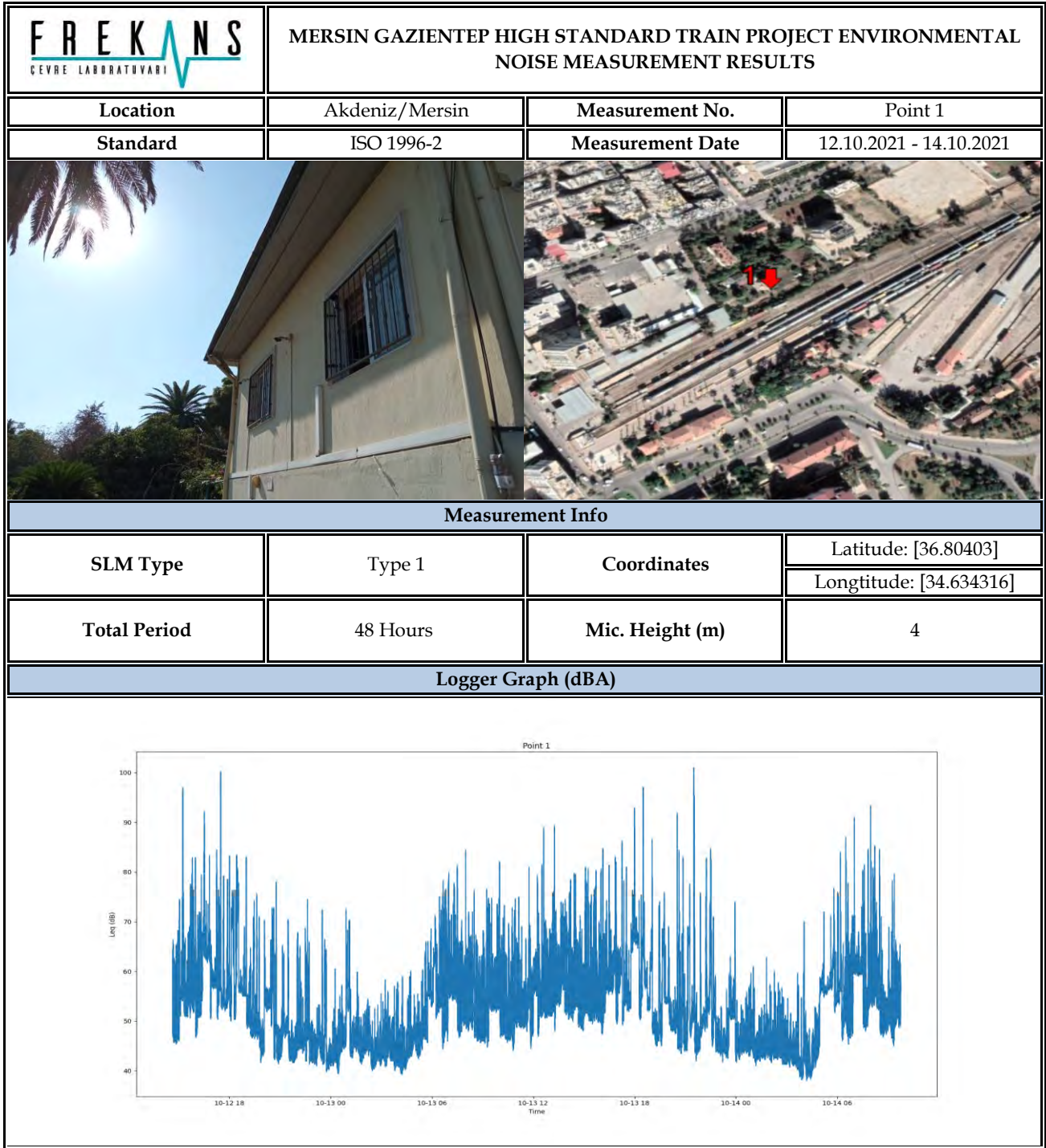
References

- [1] B. Y. H. Y. M. W. I. L. S. C. J. M. Anthony Kubale, “MERSIN-GAZIANTEP HIGH STANDARD RAIL PROJECT GAP ANALYSIS REPORT,” Rambol, London, 2021.
- [2] “World Bank Group Environmental, Health, and Safety Guidelines,” 2007.
- [3] *Environmental Noise Guideline for the European Region*, Copenhagen: World Health Organization, 2018.
- [4] “Environmental Noise Directive,” *DIRECTIVE 2002/49/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL*, 2002.
- [5] “Çevresel Gürültünün Değerlendirilmesi Ve Yönetimi Yönetmeliği,” *Resmi Gazete* 27601, 04 06 2010.
- [6] M. A. E. B. R. M. H. S. Antoinette Quagliata, *Transit Noise and Vibration Impact Assessment Manual*, FTA, 2018.
- [7] Adaptation and revision of the interim noise computation methods for the purpose of strategic noise mapping, EUROPEAN COMMISSION DG Environment, 2003.
- [8] H. H. B. W. X. YAN Bo1, “Mechanical Characteristics Optimization of Ballast Bed Variable on Operating Process for the Dynamic Track Stabilizer,” in *The 9th International Conference on Modelling, Identification and Control*, Kunming, China, 2017.
- [9] B. Y. a. J. Yang, “Modeling and Parameter Optimization of Dynamic Characteristic Variables of Ballast Bed during Operation for Dynamic Track Stabilizer,” *Complexity*, no. vol. 2021, p. 11, 2021.

Appendices

- Appendix 1 Noise Measurement Results*
- Appendix 2 Vibration Measurement Results*
- Appendix 3 Construction Noise Maps*
- Appendix 4 Operation Noise Maps*
- Appendix 5 Operation Noise Maps – After Mitigation*

Appendix 1: Noise Measurement Results



MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

Location	Akdeniz/Mersin	Measurement No.	Point 1		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
12-10-2021 14:00 - 15:00		54,4	58,8	48,7	46,6
12-10-2021 15:00 - 16:00		67,4	65,0	55,4	51,9
12-10-2021 16:00 - 17:00		65,6	66,0	62,7	51,9
12-10-2021 17:00 - 18:00		71,2	62,3	56,0	53,0
12-10-2021 18:00 - 19:00		65,8	71,0	56,9	51,7
12-10-2021 19:00 - 20:00		56,7	60,0	49,0	45,4
12-10-2021 20:00 - 21:00		55,3	57,2	52,8	43,5
12-10-2021 21:00 - 22:00		49,2	50,2	45,6	43,0
12-10-2021 22:00 - 23:00		50,0	49,4	45,4	43,2
12-10-2021 23:00 - 00:00		48,0	48,2	43,8	41,6
13-10-2021 00:00 - 01:00		52,4	48,0	44,3	41,9
13-10-2021 01:00 - 02:00		51,0	53,0	45,4	43,2
13-10-2021 02:00 - 03:00		44,8	47,3	43,7	41,7
13-10-2021 03:00 - 04:00		44,9	46,0	43,7	41,8
13-10-2021 04:00 - 05:00		45,1	47,3	43,6	41,0
13-10-2021 05:00 - 06:00		52,3	55,8	47,8	44,3
13-10-2021 06:00 - 07:00		60,3	62,7	54,4	49,5
13-10-2021 07:00 - 08:00		59,6	61,4	55,9	50,5
13-10-2021 08:00 - 09:00		57,1	59,9	50,7	47,6
13-10-2021 09:00 - 10:00		57,2	58,3	53,6	47,3
13-10-2021 10:00 - 11:00		58,1	60,2	49,2	47,0
13-10-2021 11:00 - 12:00		56,0	58,0	50,7	48,8
13-10-2021 12:00 - 13:00		59,8	60,4	54,4	51,4
13-10-2021 13:00 - 14:00		60,4	60,9	55,9	52,6

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	64,2	58,1
Evening (19:00-23:00)	53,9	53,7
Night (23:00-07:00)	53,3	51,7
LDEN	63,3	59,7

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	63,3	57,6
Night (22:00-07:00)	53,0	51,5
LDN	63,2	59,5

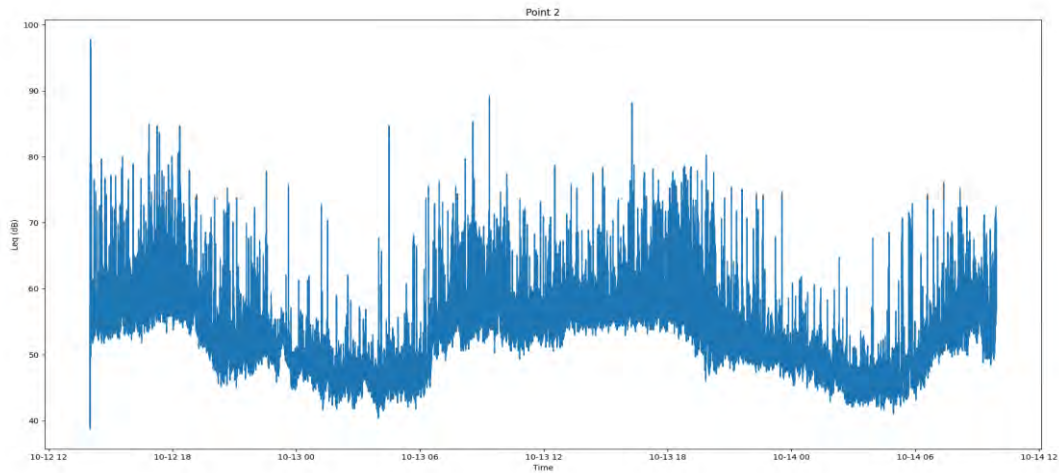
	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS					
Location	Akdeniz/Mersin		Measurement No.	Point 1		
Standard	ISO 1996-2		Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - Second Day						
Date and Time			Leq	L10	L50	L90
13-10-2021 14:00 - 15:00			59,2	62,2	53,6	50,0
13-10-2021 15:00 - 16:00			60,5	58,5	52,6	50,9
13-10-2021 16:00 - 17:00			61,3	62,8	57,2	50,8
13-10-2021 17:00 - 18:00			65,0	66,7	57,3	53,0
13-10-2021 18:00 - 19:00			65,9	67,0	60,7	52,9
13-10-2021 19:00 - 20:00			60,4	63,9	52,0	46,9
13-10-2021 20:00 - 21:00			59,9	56,9	49,3	45,6
13-10-2021 21:00 - 22:00			71,3	65,5	48,0	44,7
13-10-2021 22:00 - 23:00			61,8	64,9	50,8	45,5
13-10-2021 23:00 - 00:00			50,5	52,4	46,0	44,0
14-10-2021 00:00 - 01:00			46,2	47,5	45,3	43,9
14-10-2021 01:00 - 02:00			45,3	46,6	44,4	43,0
14-10-2021 02:00 - 03:00			44,9	46,3	44,0	42,7
14-10-2021 03:00 - 04:00			43,8	44,5	42,4	39,7
14-10-2021 04:00 - 05:00			49,3	49,4	42,9	39,8
14-10-2021 05:00 - 06:00			58,1	61,5	56,7	54,3
14-10-2021 06:00 - 07:00			60,5	62,3	54,4	49,2
14-10-2021 07:00 - 08:00			63,7	61,5	59,8	50,0
14-10-2021 08:00 - 09:00			61,0	62,0	53,7	48,7
14-10-2021 09:00 - 10:00			56,0	59,0	51,5	48,9
14-10-2021 10:00 - 11:00			59,1	59,2	50,2	48,0
14-10-2021 11:00 - 12:00			57,0	59,0	51,7	48,1
14-10-2021 12:00 - 13:00			58,8	59,4	53,4	50,4
14-10-2021 13:00 - 14:00			61,4	61,9	55,2	53,6

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	62,5	59,8
Evening (19:00-23:00)	66,3	53,0
Night (23:00-07:00)	54,2	52,6
LDEN	66,0	60,8

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	64,3	58,8
Night (22:00-07:00)	56,0	52,4
LDN	65,1	60,5

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Akdeniz/Mersin	Measurement No.	Point 1
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	63,6	58,9	
Evening (19:00-23:00)	63,5	53,3	
Night (23:00-07:00)	53,8	52,2	
LDEN	65,0	60,2	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	63,8	58,1	
Night (22:00-07:00)	54,8	52,0	
LDN	64,2	60,0	

<div><div>FREKNS</div><div>ÇEVRE LABORATUVARI</div></div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Akdeniz/Mersin	Measurement No.	Point 2
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [36.815221]
			Longitude: [34.6522]
Total Period	48 Hours	Mic. Height (m)	3
Logger Graph (dBA)			
			

MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

Location	Akdeniz/Mersin	Measurement No.	Point 2		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
12-10-2021 14:00 - 15:00		70,7	60,2	55,4	53,4
12-10-2021 15:00 - 16:00		60,8	61,4	56,8	54,5
12-10-2021 16:00 - 17:00		62,2	63,0	57,4	54,9
12-10-2021 17:00 - 18:00		63,5	65,6	60,3	57,2
12-10-2021 18:00 - 19:00		63,2	64,2	58,4	55,5
12-10-2021 19:00 - 20:00		57,3	59,5	54,6	51,4
12-10-2021 20:00 - 21:00		56,4	55,7	50,9	48,5
12-10-2021 21:00 - 22:00		54,5	53,5	50,7	48,4
12-10-2021 22:00 - 23:00		55,2	54,3	51,4	49,5
12-10-2021 23:00 - 00:00		53,0	53,2	49,8	46,8
13-10-2021 00:00 - 01:00		49,9	51,6	48,9	46,8
13-10-2021 01:00 - 02:00		51,7	50,2	47,0	44,4
13-10-2021 02:00 - 03:00		47,0	48,5	46,1	44,1
13-10-2021 03:00 - 04:00		48,0	49,0	46,2	43,9
13-10-2021 04:00 - 05:00		52,1	48,5	45,9	44,0
13-10-2021 05:00 - 06:00		52,6	52,1	47,0	44,4
13-10-2021 06:00 - 07:00		56,7	58,0	50,6	46,4
13-10-2021 07:00 - 08:00		58,5	60,3	55,5	52,3
13-10-2021 08:00 - 09:00		61,1	61,9	56,3	53,2
13-10-2021 09:00 - 10:00		61,5	61,7	57,2	54,3
13-10-2021 10:00 - 11:00		58,3	59,1	55,0	52,8
13-10-2021 11:00 - 12:00		57,2	57,6	54,6	52,8
13-10-2021 12:00 - 13:00		58,0	58,5	55,0	53,1
13-10-2021 13:00 - 14:00		58,9	59,6	56,7	55,1

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	63,2	59,6
Evening (19:00-23:00)	56,0	55,7
Night (23:00-07:00)	52,3	51,5
LDEN	62,6	60,5

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	62,4	59,0
Night (22:00-07:00)	52,8	52,1
LDN	62,6	60,4

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

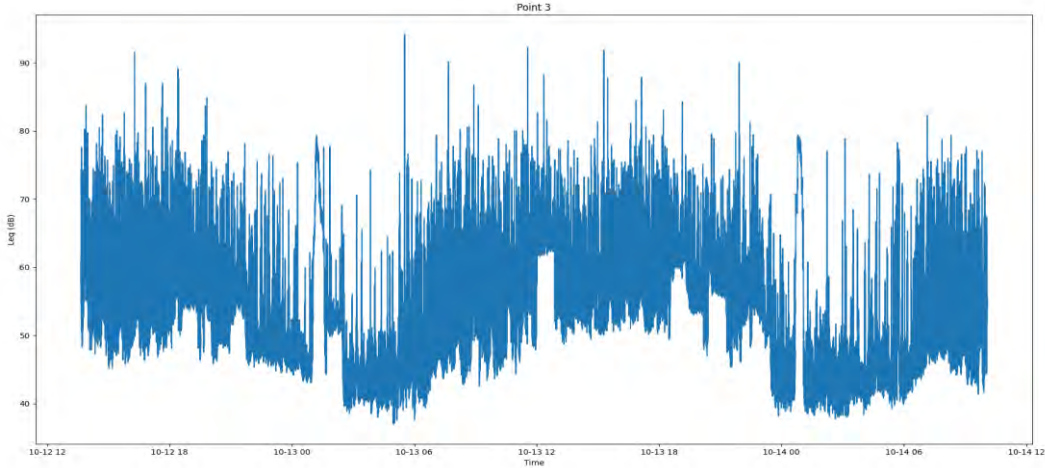
Location	Akdeniz/Mersin	Measurement No.	Point 2		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 14:00 - 15:00		59,0	59,3	56,7	55,2
13-10-2021 15:00 - 16:00		58,4	59,7	56,9	55,4
13-10-2021 16:00 - 17:00		61,4	62,5	57,8	55,8
13-10-2021 17:00 - 18:00		61,1	63,4	57,6	55,4
13-10-2021 18:00 - 19:00		63,5	66,5	59,6	56,2
13-10-2021 19:00 - 20:00		60,0	61,9	55,4	51,9
13-10-2021 20:00 - 21:00		56,7	57,9	52,5	50,0
13-10-2021 21:00 - 22:00		56,0	54,4	51,4	49,7
13-10-2021 22:00 - 23:00		55,1	54,0	50,9	49,3
13-10-2021 23:00 - 00:00		53,2	52,1	50,0	48,4
14-10-2021 00:00 - 01:00		50,5	51,9	49,5	47,6
14-10-2021 01:00 - 02:00		48,4	50,2	47,6	45,7
14-10-2021 02:00 - 03:00		47,3	49,2	46,7	44,4
14-10-2021 03:00 - 04:00		48,0	47,8	45,4	43,8
14-10-2021 04:00 - 05:00		47,4	48,0	45,4	43,6
14-10-2021 05:00 - 06:00		56,5	57,5	46,5	44,3
14-10-2021 06:00 - 07:00		53,3	52,6	49,6	46,5
14-10-2021 07:00 - 08:00		56,4	56,6	53,2	51,4
14-10-2021 08:00 - 09:00		58,1	59,1	55,0	52,3
14-10-2021 09:00 - 10:00		58,5	60,1	55,3	51,6
14-10-2021 10:00 - 11:00		57,3	58,1	54,0	51,8
14-10-2021 11:00 - 12:00		58,2	56,6	55,6	52,2
14-10-2021 12:00 - 13:00		59,0	57,5	54,0	54,1
14-10-2021 13:00 - 14:00		58,2	60,6	57,7	56,1

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	60,1	59,7
Evening (19:00-23:00)	57,4	57,9
Night (23:00-07:00)	51,8	50,3
LDEN	61,2	60,6

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	59,6	59,4
Night (22:00-07:00)	52,3	51,2
LDN	60,8	60,2

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Akdeniz/Mersin	Measurement No.	Point 2
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	62,2	59,6	
Evening (19:00-23:00)	56,8	56,9	
Night (23:00-07:00)	52,1	50,9	
LDEN	62,1	60,5	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	61,5	59,2	
Night (22:00-07:00)	52,6	51,7	
LDN	61,9	60,3	

<div><div>FREKNS</div><div>ÇEVRE LABORATUVARI</div></div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Akdeniz/Mersin	Measurement No.	Point 3
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [36.835138]
			Longitude: [34.683297]
Total Period	48 Hours	Mic. Height (m)	3
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Akdeniz/Mersin	Measurement No.	Point 3		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
12-10-2021 13:00 - 14:00		65,5	68,7	60,3	52,4
12-10-2021 14:00 - 15:00		62,1	64,1	55,2	50,4
12-10-2021 15:00 - 16:00		63,0	64,2	52,8	48,5
12-10-2021 16:00 - 17:00		64,5	64,5	53,9	49,5
12-10-2021 17:00 - 18:00		62,9	64,7	55,8	51,5
12-10-2021 18:00 - 19:00		65,4	66,3	57,1	53,8
12-10-2021 19:00 - 20:00		64,6	66,4	56,3	52,6
12-10-2021 20:00 - 21:00		58,1	60,2	51,8	48,8
12-10-2021 21:00 - 22:00		56,9	57,6	54,2	48,5
12-10-2021 22:00 - 23:00		55,3	55,1	48,8	47,1
12-10-2021 23:00 - 00:00		53,0	51,2	47,5	46,0
13-10-2021 00:00 - 01:00		50,0	48,4	46,0	44,5
13-10-2021 01:00 - 02:00		70,1	76,4	63,4	50,6
13-10-2021 02:00 - 03:00		51,2	53,1	50,5	41,1
13-10-2021 03:00 - 04:00		49,7	46,5	42,7	41,0
13-10-2021 04:00 - 05:00		45,4	46,9	43,3	40,4
13-10-2021 05:00 - 06:00		62,2	54,3	44,3	41,1
13-10-2021 06:00 - 07:00		55,4	57,2	46,2	41,7
13-10-2021 07:00 - 08:00		60,8	61,1	49,5	46,3
13-10-2021 08:00 - 09:00		62,9	63,6	52,1	46,0
13-10-2021 09:00 - 10:00		60,7	61,0	52,6	47,1
13-10-2021 10:00 - 11:00		60,8	61,4	53,5	47,2
13-10-2021 11:00 - 12:00		63,8	64,5	55,5	50,5
13-10-2021 12:00 - 13:00		67,1	69,4	63,8	61,9

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	63,7	60,9
Evening (19:00-23:00)	60,4	56,9
Night (23:00-07:00)	62,1	53,2
LDEN	68,5	61,9

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	63,4	60,4
Night (22:00-07:00)	61,7	53,1
LDN	68,4	61,6

MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

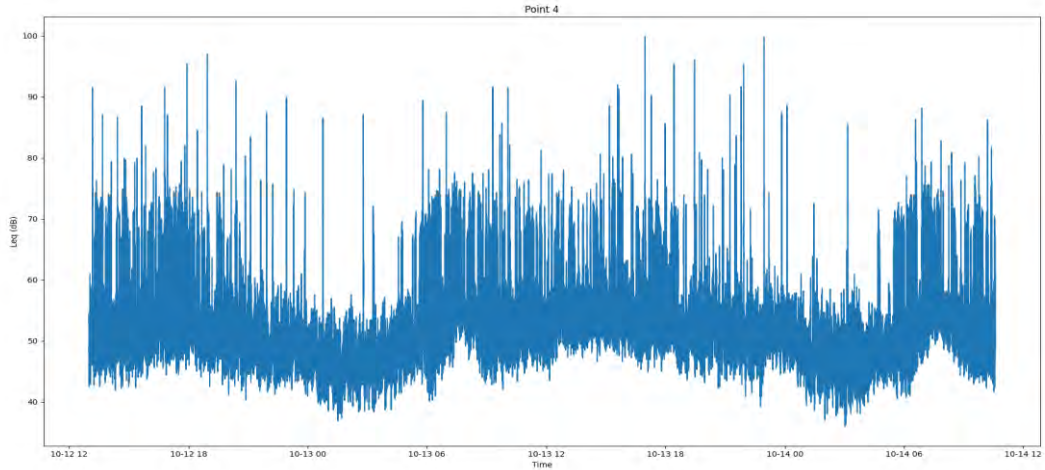
Location	Akdeniz/Mersin	Measurement No.	Point 3		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 13:00 - 14:00		60,9	62,4	55,1	52,0
13-10-2021 14:00 - 15:00		61,4	62,7	55,8	52,6
13-10-2021 15:00 - 16:00		63,4	64,0	55,7	52,4
13-10-2021 16:00 - 17:00		63,2	65,2	57,9	54,1
13-10-2021 17:00 - 18:00		64,5	67,3	58,5	53,6
13-10-2021 18:00 - 19:00		64,5	68,5	61,1	55,4
13-10-2021 19:00 - 20:00		63,0	64,8	57,9	54,2
13-10-2021 20:00 - 21:00		59,9	61,9	57,3	52,1
13-10-2021 21:00 - 22:00		61,0	61,0	55,4	49,3
13-10-2021 22:00 - 23:00		58,9	59,9	55,0	51,8
13-10-2021 23:00 - 00:00		54,4	56,9	49,3	42,0
14-10-2021 00:00 - 01:00		70,7	77,4	46,0	41,3
14-10-2021 01:00 - 02:00		58,5	50,5	43,3	40,4
14-10-2021 02:00 - 03:00		48,1	46,5	42,9	40,0
14-10-2021 03:00 - 04:00		51,0	48,0	43,3	40,3
14-10-2021 04:00 - 05:00		51,0	49,7	44,5	41,8
14-10-2021 05:00 - 06:00		61,9	59,0	44,7	41,9
14-10-2021 06:00 - 07:00		55,4	54,8	46,1	43,3
14-10-2021 07:00 - 08:00		60,4	61,7	50,4	47,7
14-10-2021 08:00 - 09:00		60,2	60,6	49,7	46,2
14-10-2021 09:00 - 10:00		59,2	59,0	48,5	44,6
14-10-2021 10:00 - 11:00		57,3	61,5	52,3	46,7
14-10-2021 11:00 - 12:00		62,6	63,1	56,2	51,2
14-10-2021 12:00 - 13:00		66,1	68,2	61,2	60,2

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	62,1	60,1
Evening (19:00-23:00)	61,0	59,0
Night (23:00-07:00)	62,7	49,6
LDEN	68,8	60,9

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	61,9	59,9
Night (22:00-07:00)	62,4	51,3
LDN	68,7	60,5

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Akdeniz/Mersin	Measurement No.	Point 3
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	63,1	60,5	
Evening (19:00-23:00)	60,7	58,1	
Night (23:00-07:00)	62,4	51,7	
LDEN	68,7	61,5	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	62,8	60,2	
Night (22:00-07:00)	62,0	52,3	
LDN	68,6	61,1	

<div><div>FREKNS</div><div>ÇEVRE LABORATUVARI</div></div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Akdeniz/Mersin	Measurement No.	Point 4
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [36.884596]
			Longitude: [34.820701]
Total Period	48 Hours	Mic. Height (m)	4
Logger Graph (dBA)			
			

MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

Location	Akdeniz/Mersin	Measurement No.	Point 4		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
12-10-2021 13:00 - 14:00		65,8	59,3	50,2	46,5
12-10-2021 14:00 - 15:00		63,9	59,4	50,3	46,8
12-10-2021 15:00 - 16:00		64,0	57,9	50,4	46,8
12-10-2021 16:00 - 17:00		67,6	63,2	52,1	48,5
12-10-2021 17:00 - 18:00		64,8	64,9	52,2	48,8
12-10-2021 18:00 - 19:00		64,5	60,8	51,7	48,1
12-10-2021 19:00 - 20:00		59,5	59,6	51,0	47,3
12-10-2021 20:00 - 21:00		65,2	55,9	50,7	46,5
12-10-2021 21:00 - 22:00		59,6	54,2	49,3	45,9
12-10-2021 22:00 - 23:00		57,5	53,1	48,3	44,8
12-10-2021 23:00 - 00:00		54,7	53,2	48,3	45,2
13-10-2021 00:00 - 01:00		61,3	51,8	46,5	42,0
13-10-2021 01:00 - 02:00		46,6	49,7	45,1	41,0
13-10-2021 02:00 - 03:00		60,3	50,1	45,5	42,0
13-10-2021 03:00 - 04:00		48,8	50,1	45,8	42,2
13-10-2021 04:00 - 05:00		51,1	52,4	48,1	44,4
13-10-2021 05:00 - 06:00		65,1	60,3	49,7	46,5
13-10-2021 06:00 - 07:00		60,7	63,0	49,9	44,8
13-10-2021 07:00 - 08:00		60,5	61,2	53,9	50,2
13-10-2021 08:00 - 09:00		58,9	56,9	52,3	48,0
13-10-2021 09:00 - 10:00		65,8	59,2	50,6	47,1
13-10-2021 10:00 - 11:00		65,8	58,3	51,5	48,0
13-10-2021 11:00 - 12:00		58,3	57,5	52,2	48,4
13-10-2021 12:00 - 13:00		59,9	60,6	53,5	49,1

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	64,2	62,2
Evening (19:00-23:00)	61,5	61,0
Night (23:00-07:00)	59,6	56,1
LDEN	67,1	64,6

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	63,9	62,2
Night (22:00-07:00)	59,4	56,2
LDN	66,8	64,1

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

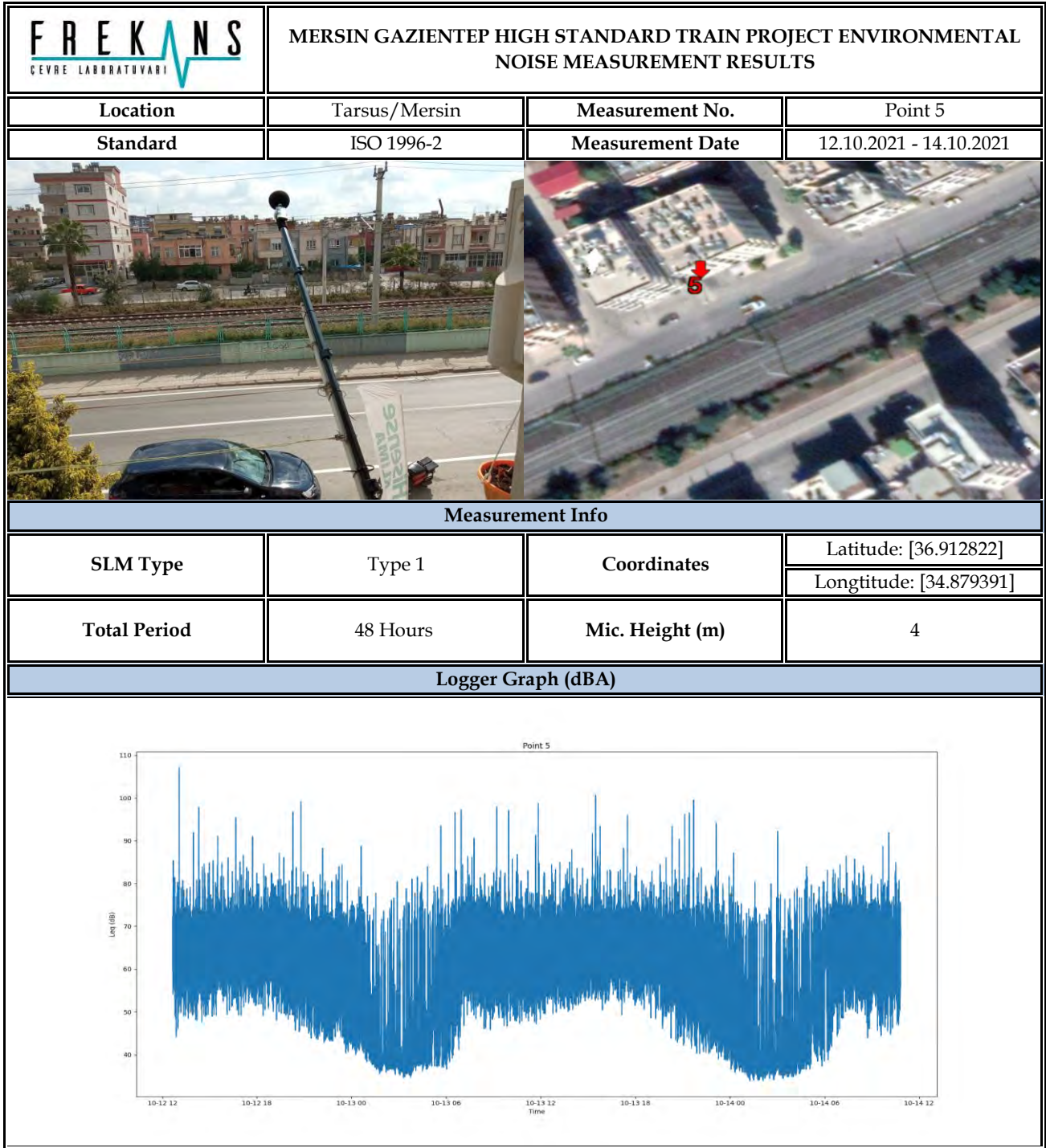
Location	Akdeniz/Mersin	Measurement No.	Point 4		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 13:00 - 14:00		57,8	57,5	53,8	50,8
13-10-2021 14:00 - 15:00		60,0	59,4	54,3	51,3
13-10-2021 15:00 - 16:00		67,9	62,7	54,0	51,2
13-10-2021 16:00 - 17:00		66,2	56,3	52,6	49,4
13-10-2021 17:00 - 18:00		61,5	62,7	52,3	49,3
13-10-2021 18:00 - 19:00		62,9	59,6	52,3	48,4
13-10-2021 19:00 - 20:00		63,5	57,3	51,4	47,7
13-10-2021 20:00 - 21:00		57,4	55,5	51,6	47,7
13-10-2021 21:00 - 22:00		67,8	57,2	51,7	47,5
13-10-2021 22:00 - 23:00		64,9	54,1	50,1	46,2
13-10-2021 23:00 - 00:00		60,6	55,3	51,5	48,4
14-10-2021 00:00 - 01:00		61,0	54,3	50,0	46,6
14-10-2021 01:00 - 02:00		50,3	52,1	46,7	42,9
14-10-2021 02:00 - 03:00		48,2	51,2	46,7	42,5
14-10-2021 03:00 - 04:00		60,7	51,5	45,6	41,2
14-10-2021 04:00 - 05:00		51,1	51,0	47,0	43,8
14-10-2021 05:00 - 06:00		57,3	61,0	47,9	44,5
14-10-2021 06:00 - 07:00		61,8	62,9	50,4	45,3
14-10-2021 07:00 - 08:00		61,6	62,9	54,4	51,3
14-10-2021 08:00 - 09:00		58,5	56,1	52,7	49,1
14-10-2021 09:00 - 10:00		58,5	55,9	49,5	46,1
14-10-2021 10:00 - 11:00		64,3	59,5	49,4	46,0
14-10-2021 11:00 - 12:00		59,8	56,2	51,2	47,6
14-10-2021 12:00 - 13:00		58,9	59,2	52,6	48,7

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	63,2	60,7
Evening (19:00-23:00)	64,8	62,5
Night (23:00-07:00)	58,7	58,1
LDEN	67,1	65,6

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	63,6	61,9
Night (22:00-07:00)	60,0	57,7
LDN	67,2	65,0

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Akdeniz/Mersin	Measurement No.	Point 4
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	63,8	61,8	
Evening (19:00-23:00)	63,4	61,8	
Night (23:00-07:00)	59,2	57,2	
LDEN	67,1	65,2	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	63,7	62,1	
Night (22:00-07:00)	59,7	57,0	
LDN	67,0	64,6	



MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

Location	Tarsus/Mersin	Measurement No.	Point 5		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
12-10-2021 12:00 - 13:00		68,2	70,7	62,5	55,3
12-10-2021 13:00 - 14:00		78,0	70,1	61,7	54,9
12-10-2021 14:00 - 15:00		71,5	71,0	62,0	54,8
12-10-2021 15:00 - 16:00		69,4	71,5	63,8	57,4
12-10-2021 16:00 - 17:00		71,1	71,2	64,4	57,2
12-10-2021 17:00 - 18:00		68,6	71,4	64,5	57,2
12-10-2021 18:00 - 19:00		68,2	71,2	64,9	58,0
12-10-2021 19:00 - 20:00		67,6	70,6	62,9	55,1
12-10-2021 20:00 - 21:00		70,2	69,8	60,0	52,1
12-10-2021 21:00 - 22:00		64,2	67,5	57,6	48,1
12-10-2021 22:00 - 23:00		64,3	67,2	55,6	47,1
12-10-2021 23:00 - 00:00		64,5	66,2	53,9	45,0
13-10-2021 00:00 - 01:00		64,9	63,2	47,6	41,6
13-10-2021 01:00 - 02:00		54,6	54,5	39,6	37,3
13-10-2021 02:00 - 03:00		61,1	51,2	38,5	37,0
13-10-2021 03:00 - 04:00		55,9	48,4	37,5	35,8
13-10-2021 04:00 - 05:00		60,5	59,7	41,1	37,8
13-10-2021 05:00 - 06:00		69,0	64,3	46,0	38,7
13-10-2021 06:00 - 07:00		67,9	68,2	55,7	42,1
13-10-2021 07:00 - 08:00		68,8	71,7	63,8	56,5
13-10-2021 08:00 - 09:00		66,8	70,5	61,9	54,4
13-10-2021 09:00 - 10:00		73,2	70,9	61,8	53,9
13-10-2021 10:00 - 11:00		66,4	69,4	61,1	53,7
13-10-2021 11:00 - 12:00		69,4	69,9	60,9	53,6

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	71,4	71,1
Evening (19:00-23:00)	67,3	66,3
Night (23:00-07:00)	64,6	63,7
LDEN	72,9	72,2

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	70,9	70,5
Night (22:00-07:00)	64,6	63,6
LDN	72,7	72,0

**MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

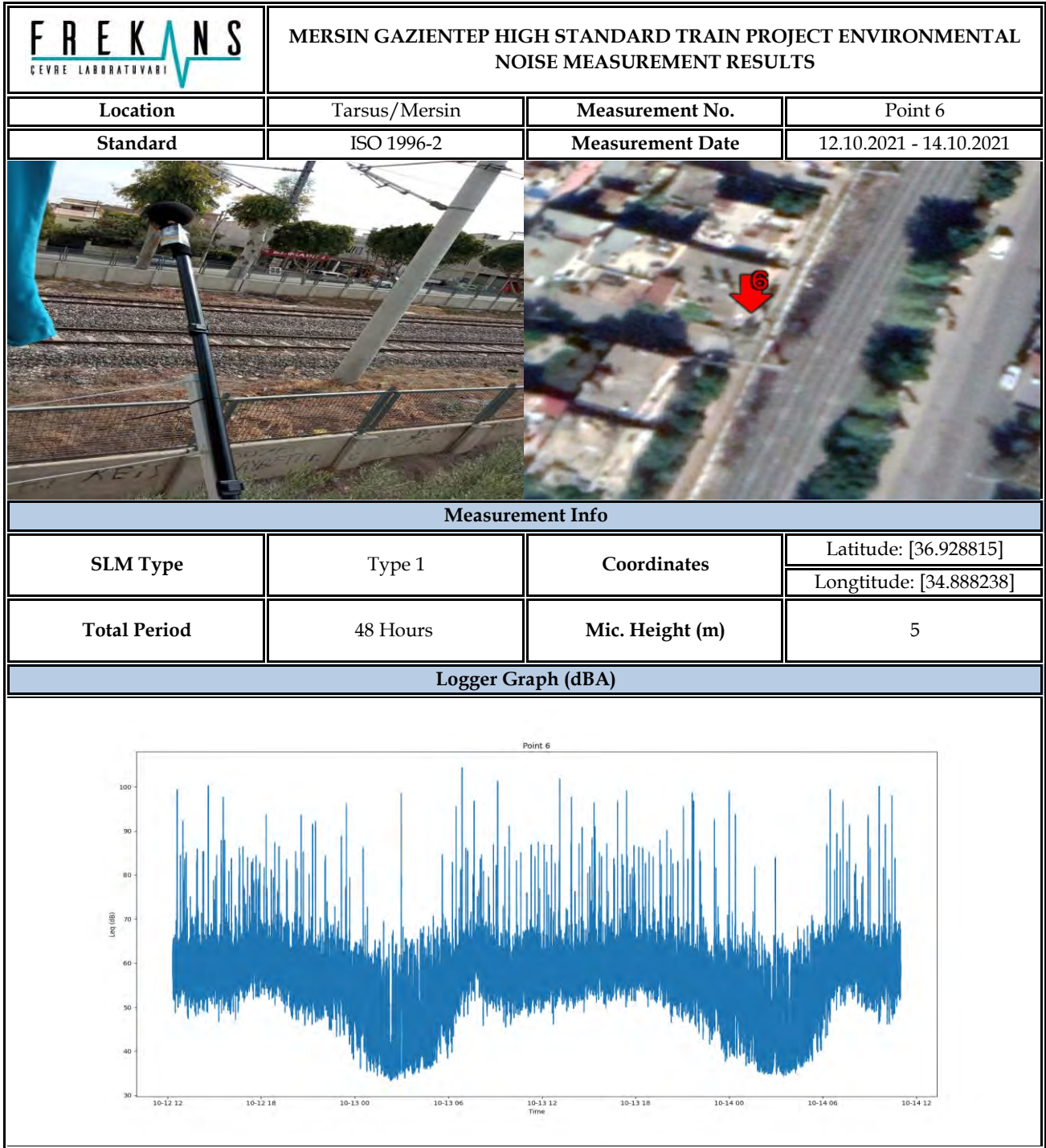
Location	Tarsus/Mersin	Measurement No.	Point 5		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 12:00 - 13:00		67,8	70,6	62,7	55,5
13-10-2021 13:00 - 14:00		67,4	70,1	61,9	55,4
13-10-2021 14:00 - 15:00		66,6	69,8	61,5	55,7
13-10-2021 15:00 - 16:00		73,3	71,5	63,7	57,1
13-10-2021 16:00 - 17:00		67,4	70,7	63,9	57,9
13-10-2021 17:00 - 18:00		68,8	70,5	64,2	57,7
13-10-2021 18:00 - 19:00		67,7	70,9	64,3	57,4
13-10-2021 19:00 - 20:00		67,2	69,6	62,4	54,3
13-10-2021 20:00 - 21:00		66,9	69,0	59,9	51,0
13-10-2021 21:00 - 22:00		75,3	69,7	58,0	47,9
13-10-2021 22:00 - 23:00		64,0	67,1	55,7	45,9
13-10-2021 23:00 - 00:00		66,0	66,0	52,2	42,7
14-10-2021 00:00 - 01:00		63,2	62,8	45,4	37,7
14-10-2021 01:00 - 02:00		57,0	54,6	38,2	35,4
14-10-2021 02:00 - 03:00		53,8	49,8	37,1	35,3
14-10-2021 03:00 - 04:00		66,6	55,6	38,3	35,6
14-10-2021 04:00 - 05:00		59,7	59,9	40,2	36,5
14-10-2021 05:00 - 06:00		61,3	64,2	48,0	39,4
14-10-2021 06:00 - 07:00		67,0	70,5	59,8	46,4
14-10-2021 07:00 - 08:00		68,2	71,7	63,6	55,8
14-10-2021 08:00 - 09:00		67,5	71,1	62,3	54,6
14-10-2021 09:00 - 10:00		66,4	69,9	61,3	53,7
14-10-2021 10:00 - 11:00		69,2	70,5	60,9	53,4
14-10-2021 11:00 - 12:00		68,9	70,2	60,2	52,6

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	68,7	68,3
Evening (19:00-23:00)	70,7	70,4
Night (23:00-07:00)	63,7	62,9
LDEN	72,5	71,9

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	69,5	69,1
Night (22:00-07:00)	63,7	63,0
LDN	71,6	71,0

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Tarsus/Mersin	Measurement No.	Point 5
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	70,3	70,0	
Evening (19:00-23:00)	69,3	68,8	
Night (23:00-07:00)	64,2	63,3	
LDEN	72,7	72,1	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	70,3	69,9	
Night (22:00-07:00)	64,2	63,3	
LDN	72,2	71,5	



MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

Location	Tarsus/Mersin	Measurement No.	Point 6		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
12-10-2021 12:00 - 13:00		69,2	64,2	58,9	54,7
12-10-2021 13:00 - 14:00		64,2	63,4	58,5	53,2
12-10-2021 14:00 - 15:00		73,8	63,0	58,8	54,4
12-10-2021 15:00 - 16:00		71,3	64,5	59,1	54,2
12-10-2021 16:00 - 17:00		65,5	63,4	59,2	54,7
12-10-2021 17:00 - 18:00		64,9	63,7	60,2	56,8
12-10-2021 18:00 - 19:00		66,3	63,8	59,8	56,4
12-10-2021 19:00 - 20:00		63,2	63,6	58,8	54,4
12-10-2021 20:00 - 21:00		67,3	62,5	57,1	51,8
12-10-2021 21:00 - 22:00		66,6	61,7	56,4	50,8
12-10-2021 22:00 - 23:00		61,2	61,2	55,8	50,9
12-10-2021 23:00 - 00:00		67,9	60,9	54,3	46,0
13-10-2021 00:00 - 01:00		61,7	58,8	50,2	42,2
13-10-2021 01:00 - 02:00		51,6	55,7	44,8	37,3
13-10-2021 02:00 - 03:00		72,2	53,7	39,0	34,6
13-10-2021 03:00 - 04:00		51,3	55,4	41,1	35,9
13-10-2021 04:00 - 05:00		53,9	58,1	44,8	37,5
13-10-2021 05:00 - 06:00		64,0	62,2	52,0	43,0
13-10-2021 06:00 - 07:00		71,4	62,2	56,6	48,5
13-10-2021 07:00 - 08:00		66,7	64,4	60,5	56,2
13-10-2021 08:00 - 09:00		64,3	63,3	59,3	54,5
13-10-2021 09:00 - 10:00		69,2	62,6	57,7	52,8
13-10-2021 10:00 - 11:00		61,4	60,9	56,9	52,3
13-10-2021 11:00 - 12:00		63,3	61,4	57,1	52,6

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	68,1	65,7
Evening (19:00-23:00)	65,3	63,3
Night (23:00-07:00)	67,1	65,2
LDEN	73,5	71,5

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	67,8	65,4
Night (22:00-07:00)	66,7	64,9
LDN	73,3	71,4

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

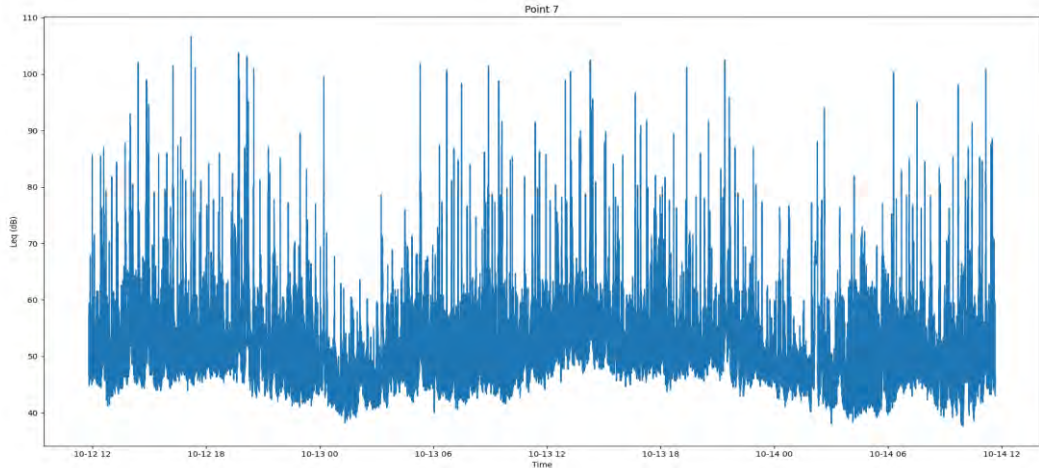
Location	Tarsus/Mersin	Measurement No.	Point 6		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 12:00 - 13:00		64,6	62,3	57,6	53,5
13-10-2021 13:00 - 14:00		69,5	62,2	58,0	54,2
13-10-2021 14:00 - 15:00		63,5	61,8	58,2	54,5
13-10-2021 15:00 - 16:00		71,8	65,2	59,5	55,8
13-10-2021 16:00 - 17:00		67,3	62,4	59,0	55,1
13-10-2021 17:00 - 18:00		68,5	64,9	59,7	55,7
13-10-2021 18:00 - 19:00		63,8	62,9	59,4	56,0
13-10-2021 19:00 - 20:00		63,3	63,4	59,0	54,7
13-10-2021 20:00 - 21:00		65,9	63,1	57,7	52,4
13-10-2021 21:00 - 22:00		71,4	62,2	56,5	51,5
13-10-2021 22:00 - 23:00		60,7	60,6	55,1	48,3
13-10-2021 23:00 - 00:00		61,8	60,3	53,3	45,7
14-10-2021 00:00 - 01:00		72,4	60,3	51,7	42,7
14-10-2021 01:00 - 02:00		56,4	58,2	47,3	38,5
14-10-2021 02:00 - 03:00		60,6	56,3	43,8	36,2
14-10-2021 03:00 - 04:00		51,7	55,5	41,2	35,9
14-10-2021 04:00 - 05:00		52,6	56,9	44,0	37,4
14-10-2021 05:00 - 06:00		57,7	63,0	50,9	42,7
14-10-2021 06:00 - 07:00		67,4	63,5	58,3	51,1
14-10-2021 07:00 - 08:00		67,0	64,7	61,0	56,6
14-10-2021 08:00 - 09:00		64,7	64,1	59,4	54,9
14-10-2021 09:00 - 10:00		68,7	62,9	58,1	53,0
14-10-2021 10:00 - 11:00		67,0	63,4	58,3	53,7
14-10-2021 11:00 - 12:00		65,2	62,5	57,6	51,2

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	67,7	66,4
Evening (19:00-23:00)	67,2	64,3
Night (23:00-07:00)	65,3	65,1
LDEN	72,3	71,6

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	67,8	66,2
Night (22:00-07:00)	65,0	64,8
LDN	71,9	71,4

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Tarsus/Mersin	Measurement No.	Point 6
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	67,9	66,1	
Evening (19:00-23:00)	66,3	63,8	
Night (23:00-07:00)	66,3	65,2	
LDEN	72,9	71,5	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	67,8	65,8	
Night (22:00-07:00)	65,9	64,9	
LDN	72,7	71,4	

<div>FREKNS</div> <div>ÇEVRE LABORATUVARI</div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Yenice/Mersin	Measurement No.	Point 7
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [36.97365]
			Longitude: [35.048385]
Total Period	48 Hours	Mic. Height (m)	3
Logger Graph (dBA)			
			

MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

Location	Yenice/Mersin	Measurement No.	Point 7		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
12-10-2021 11:00 - 12:00		53,0	56,0	51,0	47,6
12-10-2021 12:00 - 13:00		65,2	61,1	49,1	45,6
12-10-2021 13:00 - 14:00		66,9	57,6	49,0	46,0
12-10-2021 14:00 - 15:00		78,9	74,1	51,7	47,3
12-10-2021 15:00 - 16:00		62,3	60,8	50,2	46,6
12-10-2021 16:00 - 17:00		74,2	56,9	49,8	47,3
12-10-2021 17:00 - 18:00		74,3	55,2	49,7	47,2
12-10-2021 18:00 - 19:00		61,7	56,9	50,9	48,2
12-10-2021 19:00 - 20:00		80,1	65,7	50,9	48,3
12-10-2021 20:00 - 21:00		81,6	69,0	51,2	46,4
12-10-2021 21:00 - 22:00		61,9	56,6	49,0	45,7
12-10-2021 22:00 - 23:00		60,9	56,4	49,9	45,5
12-10-2021 23:00 - 00:00		57,8	56,7	46,7	43,7
13-10-2021 00:00 - 01:00		73,0	53,3	45,5	42,2
13-10-2021 01:00 - 02:00		47,3	49,1	43,2	40,6
13-10-2021 02:00 - 03:00		47,2	49,6	44,8	42,1
13-10-2021 03:00 - 04:00		56,5	58,4	46,9	42,8
13-10-2021 04:00 - 05:00		52,9	55,6	47,3	44,8
13-10-2021 05:00 - 06:00		74,6	61,2	48,9	45,6
13-10-2021 06:00 - 07:00		66,6	55,6	47,2	44,2
13-10-2021 07:00 - 08:00		65,9	55,7	47,0	43,8
13-10-2021 08:00 - 09:00		74,5	59,0	50,2	45,5
13-10-2021 09:00 - 10:00		68,5	58,6	48,4	44,5
13-10-2021 10:00 - 11:00		60,2	54,2	48,7	45,8

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	71,8	58,9
Evening (19:00-23:00)	77,9	59,8
Night (23:00-07:00)	68,4	53,1
LDEN	78,0	62,0

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	74,6	59,0
Night (22:00-07:00)	68,0	55,0
LDN	76,2	62,3

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

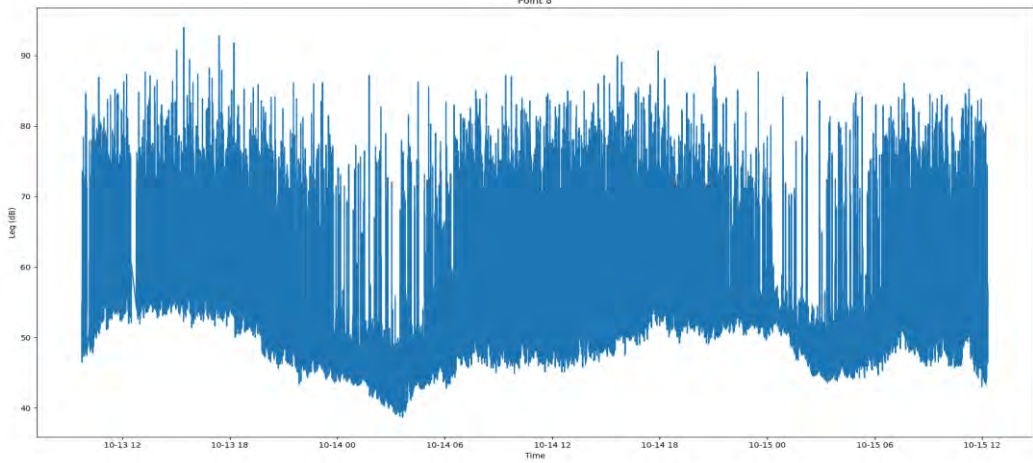
Location	Yenice/Mersin	Measurement No.	Point 7		
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 11:00 - 12:00		63,6	55,6	50,2	47,4
13-10-2021 12:00 - 13:00		66,6	59,1	52,3	49,1
13-10-2021 13:00 - 14:00		72,2	62,4	53,4	50,4
13-10-2021 14:00 - 15:00		77,5	60,9	52,8	49,9
13-10-2021 15:00 - 16:00		65,8	63,1	51,9	48,7
13-10-2021 16:00 - 17:00		66,4	55,9	50,6	47,9
13-10-2021 17:00 - 18:00		62,7	57,9	51,3	48,3
13-10-2021 18:00 - 19:00		61,7	58,0	50,5	47,2
13-10-2021 19:00 - 20:00		69,3	57,1	50,1	47,9
13-10-2021 20:00 - 21:00		62,9	55,8	50,8	47,8
13-10-2021 21:00 - 22:00		76,0	61,2	51,3	47,8
13-10-2021 22:00 - 23:00		60,8	57,2	49,9	46,7
13-10-2021 23:00 - 00:00		54,1	51,9	48,4	46,4
14-10-2021 00:00 - 01:00		57,6	57,2	46,8	44,0
14-10-2021 01:00 - 02:00		50,9	49,5	46,3	43,8
14-10-2021 02:00 - 03:00		69,9	67,4	47,4	42,5
14-10-2021 03:00 - 04:00		55,3	55,0	44,7	41,4
14-10-2021 04:00 - 05:00		53,2	55,7	43,4	41,0
14-10-2021 05:00 - 06:00		55,7	60,5	45,5	41,9
14-10-2021 06:00 - 07:00		66,0	54,9	47,0	43,8
14-10-2021 07:00 - 08:00		64,3	54,8	48,8	46,5
14-10-2021 08:00 - 09:00		59,0	53,6	46,7	43,1
14-10-2021 09:00 - 10:00		71,4	55,3	46,4	42,2
14-10-2021 10:00 - 11:00		64,1	58,0	49,1	43,8

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	69,7	58,7
Evening (19:00-23:00)	71,1	60,8
Night (23:00-07:00)	62,9	54,6
LDEN	72,5	62,9

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	70,3	59,4
Night (22:00-07:00)	62,7	55,4
LDN	71,4	62,7

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Yenice/Mersin	Measurement No.	Point 7
Standard	ISO 1996-2	Measurement Date	12.10.2021 - 14.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	70,9	58,8	
Evening (19:00-23:00)	75,7	60,3	
Night (23:00-07:00)	66,5	53,9	
LDEN	76,1	62,5	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	72,9	59,2	
Night (22:00-07:00)	66,1	55,2	
LDN	74,4	62,5	

FREKANS <small>ÇEVRE LABORATUVARI</small>		MERSİN GAZİANTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Küçükdikili/Adana	Measurement No.	Point 8
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [36.99608]
			Longitude: [35.209755]
Total Period	48 Hours	Mic. Height (m)	3
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Küçükdikili/ Adana	Measurement No.	Point 8		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 09:00 - 10:00		64,5	63,3	52,3	48,7
13-10-2021 10:00 - 11:00		65,3	67,5	55,0	50,5
13-10-2021 11:00 - 12:00		69,3	68,5	56,9	54,1
13-10-2021 12:00 - 13:00		67,8	67,2	56,8	54,0
13-10-2021 13:00 - 14:00		66,1	67,9	57,9	55,1
13-10-2021 14:00 - 15:00		66,0	67,7	57,7	55,1
13-10-2021 15:00 - 16:00		68,5	70,2	58,6	55,0
13-10-2021 16:00 - 17:00		66,7	68,4	58,2	54,8
13-10-2021 17:00 - 18:00		67,2	68,9	57,9	54,3
13-10-2021 18:00 - 19:00		68,9	69,4	57,1	52,7
13-10-2021 19:00 - 20:00		68,3	67,1	55,4	51,2
13-10-2021 20:00 - 21:00		63,3	64,4	51,5	48,1
13-10-2021 21:00 - 22:00		61,9	61,6	50,8	47,3
13-10-2021 22:00 - 23:00		61,3	58,0	49,1	46,2
13-10-2021 23:00 - 00:00		60,2	55,1	47,7	45,4
14-10-2021 00:00 - 01:00		57,3	51,0	46,3	44,6
14-10-2021 01:00 - 02:00		61,1	48,5	44,9	43,6
14-10-2021 02:00 - 03:00		59,7	49,1	43,4	41,4
14-10-2021 03:00 - 04:00		59,9	49,3	42,5	40,2
14-10-2021 04:00 - 05:00		63,5	50,1	44,7	43,2
14-10-2021 05:00 - 06:00		59,2	56,6	47,8	45,2
14-10-2021 06:00 - 07:00		63,5	61,9	49,7	45,5
14-10-2021 07:00 - 08:00		66,1	69,4	54,9	48,9
14-10-2021 08:00 - 09:00		65,3	67,0	52,9	48,3

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	67,1	66,1
Evening (19:00-23:00)	64,7	63,2
Night (23:00-07:00)	61,0	60,6
LDEN	69,2	68,4

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	66,8	65,7
Night (22:00-07:00)	61,0	60,7
LDN	68,9	68,3

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

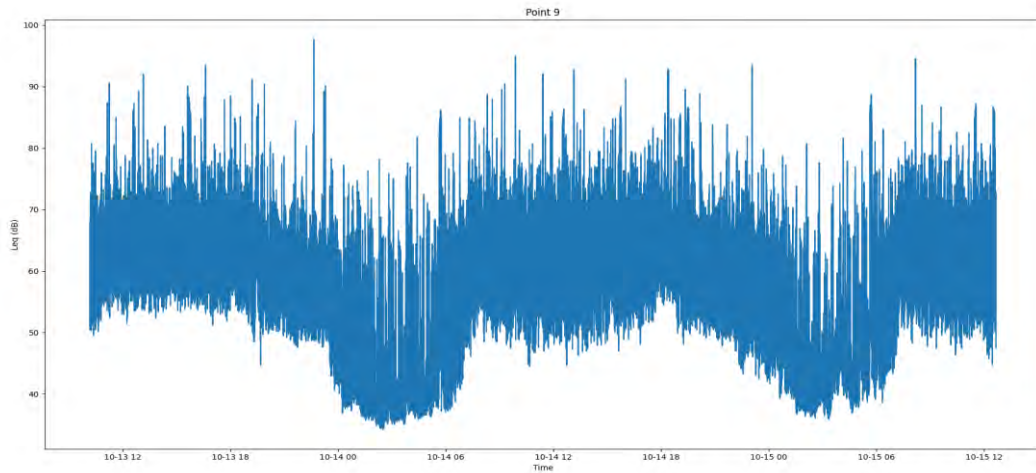
Location	Küçükdikili/ Adana	Measurement No.	Point 8		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 09:00 - 10:00		64,8	66,5	52,3	47,9
14-10-2021 10:00 - 11:00		64,9	67,6	53,2	48,4
14-10-2021 11:00 - 12:00		66,1	67,4	52,4	47,9
14-10-2021 12:00 - 13:00		64,7	66,5	52,0	47,9
14-10-2021 13:00 - 14:00		71,2	68,0	54,6	49,0
14-10-2021 14:00 - 15:00		65,1	67,2	54,1	49,8
14-10-2021 15:00 - 16:00		67,5	69,3	55,3	50,3
14-10-2021 16:00 - 17:00		65,3	66,8	54,4	51,2
14-10-2021 17:00 - 18:00		66,6	68,0	56,3	52,7
14-10-2021 18:00 - 19:00		64,6	67,8	56,0	52,7
14-10-2021 19:00 - 20:00		64,5	66,0	54,8	52,1
14-10-2021 20:00 - 21:00		63,2	64,3	53,9	51,6
14-10-2021 21:00 - 22:00		64,4	63,9	53,9	51,8
14-10-2021 22:00 - 23:00		64,0	59,4	53,4	51,8
14-10-2021 23:00 - 00:00		60,0	56,7	53,0	51,7
15-10-2021 00:00 - 01:00		62,9	56,1	52,9	51,6
15-10-2021 01:00 - 02:00		57,8	53,2	50,7	48,5
15-10-2021 02:00 - 03:00		66,1	51,0	47,5	45,5
15-10-2021 03:00 - 04:00		58,2	50,2	46,1	44,7
15-10-2021 04:00 - 05:00		66,9	56,4	47,7	45,3
15-10-2021 05:00 - 06:00		64,5	62,0	49,8	46,8
15-10-2021 06:00 - 07:00		62,6	60,4	51,9	48,2
15-10-2021 07:00 - 08:00		65,9	68,3	55,2	50,7
15-10-2021 08:00 - 09:00		66,0	67,4	52,8	48,5

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	66,5	65,4
Evening (19:00-23:00)	64,1	63,9
Night (23:00-07:00)	63,5	62,6
LDEN	70,4	69,6

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	66,1	65,1
Night (22:00-07:00)	63,5	62,7
LDN	70,4	69,5

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Küçükdikili/ Adana	Measurement No.	Point 8
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	66,8	65,6	
Evening (19:00-23:00)	64,4	63,6	
Night (23:00-07:00)	62,4	61,7	
LDEN	69,9	69,0	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	66,5	65,3	
Night (22:00-07:00)	62,5	61,8	
LDN	69,7	68,9	

<div><div>FREKANS</div><div>ÇEVRE LABORATUVARI</div></div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Şakirpaşa/Adana	Measurement No.	Point 9
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [36.997931] Longitude: [35.272541]
Total Period	48 Hours	Mic. Height (m)	3
Logger Graph (dBA)			
			

MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS

Location	Şakirpaşa/Adana	Measurement No.	Point 9		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 10:00 - 11:00		63,7	66,8	60,7	54,5
13-10-2021 11:00 - 12:00		66,7	68,6	62,8	57,3
13-10-2021 12:00 - 13:00		71,0	70,8	63,4	57,7
13-10-2021 13:00 - 14:00		67,2	68,9	63,7	58,2
13-10-2021 14:00 - 15:00		65,7	68,7	63,5	58,3
13-10-2021 15:00 - 16:00		70,9	71,0	63,4	57,9
13-10-2021 16:00 - 17:00		66,6	68,4	62,3	57,0
13-10-2021 17:00 - 18:00		66,6	69,3	63,3	56,7
13-10-2021 18:00 - 19:00		68,7	69,6	63,4	57,3
13-10-2021 19:00 - 20:00		71,9	70,6	60,8	54,0
13-10-2021 20:00 - 21:00		61,8	64,1	56,5	52,3
13-10-2021 21:00 - 22:00		60,8	63,2	55,2	51,0
13-10-2021 22:00 - 23:00		66,3	62,0	54,7	50,7
13-10-2021 23:00 - 00:00		61,3	61,1	53,0	44,8
14-10-2021 00:00 - 01:00		56,5	55,9	45,2	39,9
14-10-2021 01:00 - 02:00		55,5	54,0	40,1	36,7
14-10-2021 02:00 - 03:00		57,1	50,9	37,8	35,6
14-10-2021 03:00 - 04:00		57,8	50,6	38,3	36,3
14-10-2021 04:00 - 05:00		59,6	53,2	39,5	37,2
14-10-2021 05:00 - 06:00		70,1	60,2	45,1	38,8
14-10-2021 06:00 - 07:00		60,9	63,4	49,8	40,4
14-10-2021 07:00 - 08:00		65,3	68,6	61,2	53,7
14-10-2021 08:00 - 09:00		66,1	68,6	62,3	54,7
14-10-2021 09:00 - 10:00		67,4	68,7	61,6	54,4

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	67,7	65,2
Evening (19:00-23:00)	67,5	61,2
Night (23:00-07:00)	62,9	56,2
LDEN	71,0	65,7

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	67,7	64,7
Night (22:00-07:00)	63,5	56,8
LDN	70,8	65,6

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

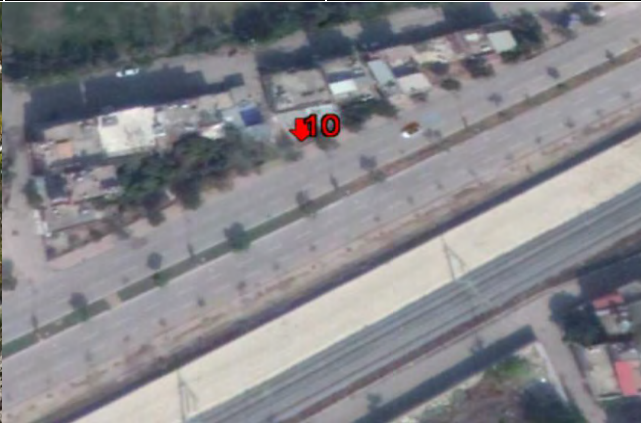
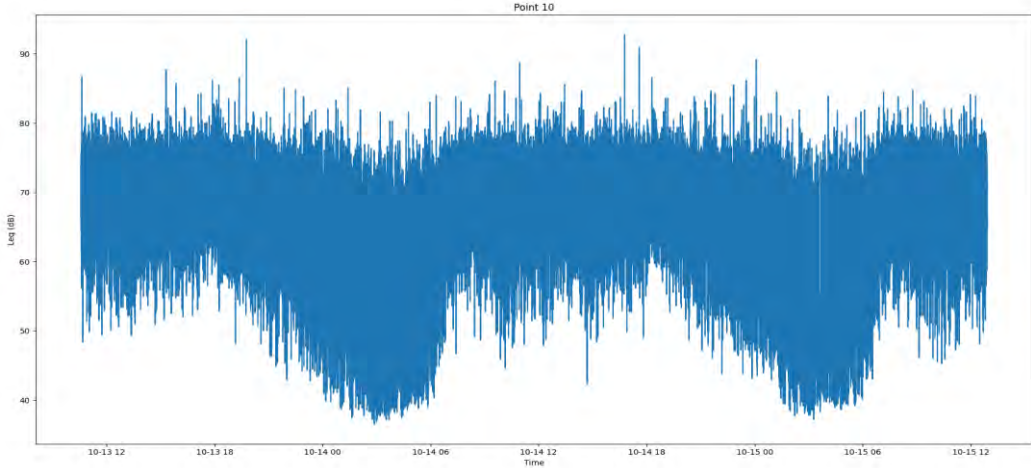
Location	Şakirpaşa/Adana	Measurement No.	Point 9		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 10:00 - 11:00		64,4	67,8	60,2	51,7
14-10-2021 11:00 - 12:00		67,7	69,7	61,4	53,2
14-10-2021 12:00 - 13:00		70,2	70,4	61,6	52,9
14-10-2021 13:00 - 14:00		65,9	68,0	60,7	53,0
14-10-2021 14:00 - 15:00		65,6	69,0	62,0	54,1
14-10-2021 15:00 - 16:00		70,1	70,4	62,3	54,8
14-10-2021 16:00 - 17:00		66,8	68,8	62,2	55,1
14-10-2021 17:00 - 18:00		66,5	69,3	63,5	57,0
14-10-2021 18:00 - 19:00		69,0	69,3	63,7	58,1
14-10-2021 19:00 - 20:00		72,3	73,0	61,2	54,1
14-10-2021 20:00 - 21:00		62,9	64,3	56,7	52,6
14-10-2021 21:00 - 22:00		61,0	63,7	55,0	51,0
14-10-2021 22:00 - 23:00		61,9	63,8	54,3	48,0
14-10-2021 23:00 - 00:00		62,3	62,3	52,7	46,6
15-10-2021 00:00 - 01:00		60,4	61,3	49,4	43,5
15-10-2021 01:00 - 02:00		52,9	55,1	44,3	39,0
15-10-2021 02:00 - 03:00		61,4	53,8	40,3	37,7
15-10-2021 03:00 - 04:00		53,6	51,2	42,2	37,8
15-10-2021 04:00 - 05:00		61,3	57,9	45,0	39,3
15-10-2021 05:00 - 06:00		71,8	64,3	46,9	41,0
15-10-2021 06:00 - 07:00		59,9	62,0	49,9	43,5
15-10-2021 07:00 - 08:00		65,3	68,7	61,5	54,2
15-10-2021 08:00 - 09:00		67,2	69,6	62,9	55,1
15-10-2021 09:00 - 10:00		65,8	68,6	61,2	53,7

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	67,4	65,5
Evening (19:00-23:00)	67,4	62,0
Night (23:00-07:00)	64,4	56,7
LDEN	71,7	66,2

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	67,6	65,0
Night (22:00-07:00)	64,2	57,7
LDN	71,3	66,2

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Şakirpaşa/Adana	Measurement No.	Point 9
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	68,0	65,3	
Evening (19:00-23:00)	67,4	61,6	
Night (23:00-07:00)	63,7	56,5	
LDEN	71,4	66,0	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	68,0	64,9	
Night (22:00-07:00)	63,8	57,3	
LDN	71,1	65,9	

<div><div>FREKNS</div><div>ÇEVRE LABORATUVARI</div></div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Döşeme/ Adana	Measurement No.	Point 10
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [37.000931]
			Longitude: [35.307183]
Total Period	48 Hours	Mic. Height (m)	3
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Döşeme/ Adana	Measurement No.	Point 10		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 10:00 - 11:00		72,1	75,0	69,4	61,4
13-10-2021 11:00 - 12:00		71,1	74,7	69,4	61,2
13-10-2021 12:00 - 13:00		71,2	74,6	69,4	61,4
13-10-2021 13:00 - 14:00		70,7	74,2	68,9	60,0
13-10-2021 14:00 - 15:00		71,1	74,7	69,5	61,7
13-10-2021 15:00 - 16:00		71,6	74,9	69,9	62,4
13-10-2021 16:00 - 17:00		71,4	74,8	69,7	62,2
13-10-2021 17:00 - 18:00		72,9	75,6	70,7	64,4
13-10-2021 18:00 - 19:00		73,2	75,9	70,5	63,4
13-10-2021 19:00 - 20:00		71,2	74,0	68,9	61,6
13-10-2021 20:00 - 21:00		69,9	73,5	67,0	57,9
13-10-2021 21:00 - 22:00		69,1	72,8	65,8	55,3
13-10-2021 22:00 - 23:00		68,5	72,3	64,9	53,3
13-10-2021 23:00 - 00:00		67,8	72,1	63,3	50,1
14-10-2021 00:00 - 01:00		66,0	70,3	59,6	46,2
14-10-2021 01:00 - 02:00		64,8	69,4	55,9	43,1
14-10-2021 02:00 - 03:00		63,0	66,7	49,8	39,6
14-10-2021 03:00 - 04:00		61,7	65,6	46,1	39,2
14-10-2021 04:00 - 05:00		62,1	66,1	50,4	40,1
14-10-2021 05:00 - 06:00		63,7	67,4	52,7	41,6
14-10-2021 06:00 - 07:00		67,4	71,6	62,7	50,4
14-10-2021 07:00 - 08:00		71,5	74,9	69,7	61,3
14-10-2021 08:00 - 09:00		71,7	75,2	70,3	62,6
14-10-2021 09:00 - 10:00		72,1	75,2	69,6	60,2

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	71,8	71,4
Evening (19:00-23:00)	69,8	69,4
Night (23:00-07:00)	65,1	65,1
LDEN	73,7	73,5

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	71,5	71,1
Night (22:00-07:00)	65,6	65,6
LDN	73,5	73,4

MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

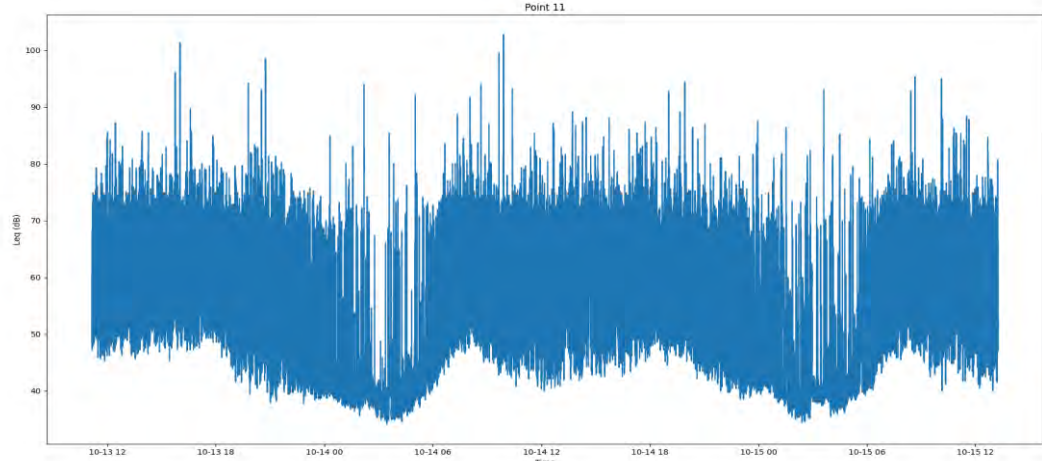
Location	Döşeme/ Adana	Measurement No.	Point 10		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 10:00 - 11:00		71,9	74,4	68,6	58,7
14-10-2021 11:00 - 12:00		70,8	74,3	68,9	60,7
14-10-2021 12:00 - 13:00		71,2	74,6	69,4	60,9
14-10-2021 13:00 - 14:00		71,4	74,8	69,3	62,2
14-10-2021 14:00 - 15:00		71,1	74,5	69,3	60,9
14-10-2021 15:00 - 16:00		71,3	74,9	69,5	61,0
14-10-2021 16:00 - 17:00		71,9	74,9	70,3	62,3
14-10-2021 17:00 - 18:00		71,8	74,9	70,3	63,3
14-10-2021 18:00 - 19:00		72,1	75,3	70,9	64,6
14-10-2021 19:00 - 20:00		70,8	74,3	69,2	62,2
14-10-2021 20:00 - 21:00		70,1	73,8	67,8	58,8
14-10-2021 21:00 - 22:00		70,0	73,5	66,7	56,8
14-10-2021 22:00 - 23:00		70,4	73,0	65,6	55,0
14-10-2021 23:00 - 00:00		68,5	72,3	63,3	51,7
15-10-2021 00:00 - 01:00		67,8	72,0	62,0	49,4
15-10-2021 01:00 - 02:00		65,9	70,1	57,1	43,9
15-10-2021 02:00 - 03:00		63,4	67,9	52,4	40,8
15-10-2021 03:00 - 04:00		61,9	65,2	48,7	40,3
15-10-2021 04:00 - 05:00		64,2	67,4	50,2	40,8
15-10-2021 05:00 - 06:00		64,5	68,6	54,0	42,3
15-10-2021 06:00 - 07:00		67,2	71,7	62,3	49,5
15-10-2021 07:00 - 08:00		71,4	75,0	69,7	61,5
15-10-2021 08:00 - 09:00		72,5	75,6	70,5	62,9
15-10-2021 09:00 - 10:00		71,2	74,8	69,3	59,6

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	71,6	71,4
Evening (19:00-23:00)	70,4	70,0
Night (23:00-07:00)	65,9	65,9
LDEN	74,1	74,0

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	71,3	71,2
Night (22:00-07:00)	66,7	66,4
LDN	74,2	73,9

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Döşeme/ Adana	Measurement No.	Point 10
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	71,6	71,3	
Evening (19:00-23:00)	70,1	69,7	
Night (23:00-07:00)	65,5	65,5	
LDEN	73,9	73,7	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	71,4	71,1	
Night (22:00-07:00)	66,2	66,0	
LDN	73,9	73,6	

<div><div>FREKANS</div><div>ÇEVRE LABORATUVARI</div></div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Yüreğir/Adana	Measurement No.	Point 11
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [37.005785]
			Longitude: [35.347784]
Total Period	48 Hours	Mic. Height (m)	3
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Yüreğir/Adana	Measurement No.	Point 11		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 11:00 - 12:00		63,4	67,3	56,6	49,3
13-10-2021 12:00 - 13:00		66,4	68,2	58,1	50,5
13-10-2021 13:00 - 14:00		64,1	67,5	57,2	50,1
13-10-2021 14:00 - 15:00		65,0	68,4	58,5	51,7
13-10-2021 15:00 - 16:00		67,1	68,4	58,6	51,8
13-10-2021 16:00 - 17:00		69,6	68,5	59,5	52,4
13-10-2021 17:00 - 18:00		65,0	68,4	60,0	53,3
13-10-2021 18:00 - 19:00		63,4	66,9	58,3	51,3
13-10-2021 19:00 - 20:00		66,8	67,1	55,7	47,0
13-10-2021 20:00 - 21:00		68,5	66,4	53,4	45,3
13-10-2021 21:00 - 22:00		61,6	64,3	51,2	42,8
13-10-2021 22:00 - 23:00		59,1	62,3	48,8	41,0
13-10-2021 23:00 - 00:00		56,8	58,4	44,1	40,3
14-10-2021 00:00 - 01:00		55,8	53,6	41,2	39,4
14-10-2021 01:00 - 02:00		60,4	52,4	39,9	38,0
14-10-2021 02:00 - 03:00		66,4	46,5	39,5	37,4
14-10-2021 03:00 - 04:00		63,1	44,0	37,7	36,0
14-10-2021 04:00 - 05:00		49,0	42,8	38,6	36,6
14-10-2021 05:00 - 06:00		66,1	58,1	41,9	39,8
14-10-2021 06:00 - 07:00		62,0	64,5	49,8	43,4
14-10-2021 07:00 - 08:00		65,6	68,5	55,8	48,5
14-10-2021 08:00 - 09:00		68,4	69,4	58,2	50,3
14-10-2021 09:00 - 10:00		72,0	68,1	55,6	47,7
14-10-2021 10:00 - 11:00		64,3	67,0	55,2	47,3

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	67,1	67,1
Evening (19:00-23:00)	65,4	65,4
Night (23:00-07:00)	62,4	62,4
LDEN	70,1	70,1

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	66,9	66,9
Night (22:00-07:00)	62,2	62,2
LDN	69,7	69,7

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

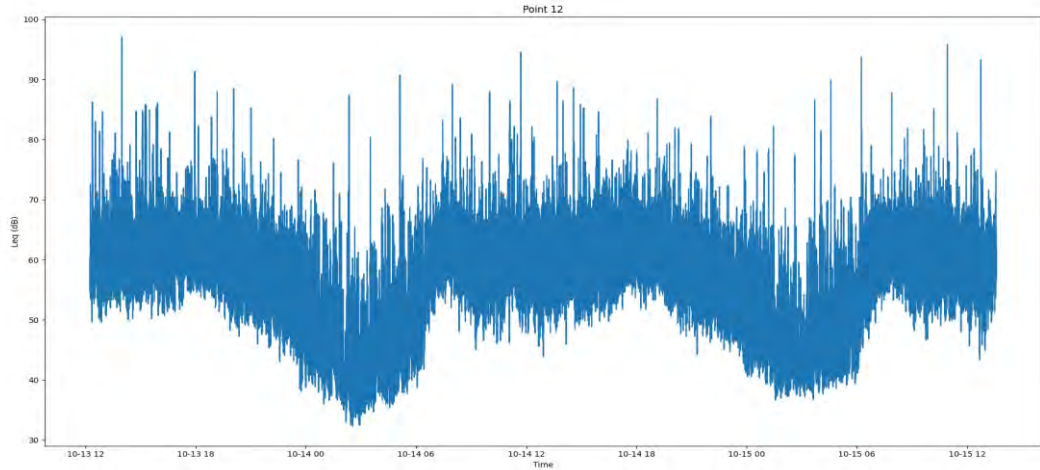
Location	Yüreğir/Adana	Measurement No.	Point 11		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 11:00 - 12:00		65,5	67,6	57,7	48,6
14-10-2021 12:00 - 13:00		63,0	66,0	55,3	45,3
14-10-2021 13:00 - 14:00		65,2	67,6	56,8	48,6
14-10-2021 14:00 - 15:00		65,6	67,6	57,6	48,7
14-10-2021 15:00 - 16:00		64,1	67,5	56,9	48,6
14-10-2021 16:00 - 17:00		64,6	68,1	58,0	49,5
14-10-2021 17:00 - 18:00		65,4	67,9	58,6	50,9
14-10-2021 18:00 - 19:00		64,0	67,0	58,0	50,8
14-10-2021 19:00 - 20:00		67,2	66,9	57,1	49,5
14-10-2021 20:00 - 21:00		64,9	65,7	53,9	46,7
14-10-2021 21:00 - 22:00		63,2	64,3	49,9	44,1
14-10-2021 22:00 - 23:00		59,9	62,6	49,2	42,4
14-10-2021 23:00 - 00:00		62,7	58,7	44,3	41,0
15-10-2021 00:00 - 01:00		58,8	55,8	42,6	40,3
15-10-2021 01:00 - 02:00		65,9	55,1	40,0	37,5
15-10-2021 02:00 - 03:00		59,7	53,0	38,7	36,1
15-10-2021 03:00 - 04:00		64,4	47,7	39,6	38,3
15-10-2021 04:00 - 05:00		65,0	46,9	39,6	37,5
15-10-2021 05:00 - 06:00		58,6	58,7	41,9	39,9
15-10-2021 06:00 - 07:00		63,4	62,9	50,2	42,5
15-10-2021 07:00 - 08:00		64,6	68,2	56,4	48,7
15-10-2021 08:00 - 09:00		66,6	68,8	58,2	50,9
15-10-2021 09:00 - 10:00		63,2	67,5	56,1	48,8
15-10-2021 10:00 - 11:00		67,9	68,6	57,4	49,3

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	65,2	65,2
Evening (19:00-23:00)	64,5	64,5
Night (23:00-07:00)	63,1	63,1
LDEN	70,0	70,0

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	65,2	65,2
Night (22:00-07:00)	62,8	62,8
LDN	69,7	69,7

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Yüreğir/Adana	Measurement No.	Point 11
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	66,0	66,0	
Evening (19:00-23:00)	65,0	65,0	
Night (23:00-07:00)	62,8	62,8	
LDEN	70,0	70,0	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	66,0	66,0	
Night (22:00-07:00)	62,5	62,5	
LDN	69,6	69,6	

<div><div>FREKANS</div><div>ÇEVRE LABORATUVARI</div></div>		MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Yüreğir/Adana	Measurement No.	Point 12
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [36.994237]
			Longitude: [35.382753]
Total Period	48 Hours	Mic. Height (m)	4
Logger Graph (dBA)			
			

MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS

Location	Yüreğir/Adana	Measurement No.	Point 12		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 12:00 - 13:00		65,5	65,5	59,4	55,0
13-10-2021 13:00 - 14:00		65,1	64,8	59,0	55,1
13-10-2021 14:00 - 15:00		61,9	64,3	58,4	54,9
13-10-2021 15:00 - 16:00		68,0	68,1	60,0	55,8
13-10-2021 16:00 - 17:00		63,8	65,9	59,6	55,4
13-10-2021 17:00 - 18:00		64,4	65,2	60,0	56,6
13-10-2021 18:00 - 19:00		62,7	65,0	60,0	56,8
13-10-2021 19:00 - 20:00		63,5	65,0	59,0	54,7
13-10-2021 20:00 - 21:00		62,0	63,6	56,5	52,5
13-10-2021 21:00 - 22:00		60,5	62,7	55,6	51,1
13-10-2021 22:00 - 23:00		56,9	59,5	53,7	48,8
13-10-2021 23:00 - 00:00		55,7	58,5	52,0	46,2
14-10-2021 00:00 - 01:00		53,2	55,9	48,1	41,5
14-10-2021 01:00 - 02:00		56,1	55,8	44,9	38,5
14-10-2021 02:00 - 03:00		62,8	53,3	39,1	34,9
14-10-2021 03:00 - 04:00		58,6	51,8	40,9	36,5
14-10-2021 04:00 - 05:00		51,9	54,0	43,5	38,1
14-10-2021 05:00 - 06:00		65,5	60,0	48,6	41,2
14-10-2021 06:00 - 07:00		59,3	61,7	55,8	47,7
14-10-2021 07:00 - 08:00		63,2	64,5	59,4	56,5
14-10-2021 08:00 - 09:00		64,5	64,3	58,6	54,8
14-10-2021 09:00 - 10:00		61,4	62,7	56,5	52,7
14-10-2021 10:00 - 11:00		61,8	62,9	57,1	53,0
14-10-2021 11:00 - 12:00		69,6	66,5	58,4	53,7

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	65,1	63,3
Evening (19:00-23:00)	61,3	59,6
Night (23:00-07:00)	60,1	58,7
LDEN	67,6	66,1

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	64,6	62,8
Night (22:00-07:00)	59,9	58,5
LDN	67,3	65,9

MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

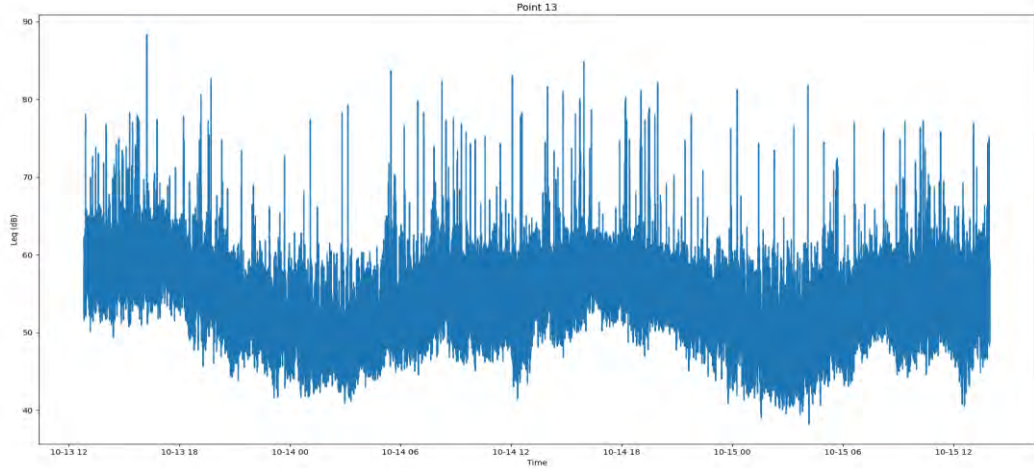
Location	Yüreğir/Adana	Measurement No.	Point 12		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 12:00 - 13:00		60,7	63,3	57,1	52,4
14-10-2021 13:00 - 14:00		62,6	64,0	57,5	53,1
14-10-2021 14:00 - 15:00		63,4	64,4	58,1	53,8
14-10-2021 15:00 - 16:00		65,0	65,8	58,6	54,3
14-10-2021 16:00 - 17:00		61,5	64,5	58,4	54,8
14-10-2021 17:00 - 18:00		63,4	66,0	60,1	56,8
14-10-2021 18:00 - 19:00		62,7	65,4	60,4	56,9
14-10-2021 19:00 - 20:00		63,5	66,0	59,7	55,3
14-10-2021 20:00 - 21:00		63,7	63,8	57,5	53,2
14-10-2021 21:00 - 22:00		60,4	62,5	55,3	51,2
14-10-2021 22:00 - 23:00		59,2	60,7	54,1	49,6
14-10-2021 23:00 - 00:00		58,2	59,0	52,4	47,8
15-10-2021 00:00 - 01:00		56,7	57,8	50,0	43,7
15-10-2021 01:00 - 02:00		62,6	56,4	44,7	39,3
15-10-2021 02:00 - 03:00		56,7	53,0	42,6	39,2
15-10-2021 03:00 - 04:00		60,0	53,7	43,0	39,2
15-10-2021 04:00 - 05:00		62,8	57,8	45,4	40,4
15-10-2021 05:00 - 06:00		55,4	58,7	47,7	42,3
15-10-2021 06:00 - 07:00		65,1	62,5	56,0	49,3
15-10-2021 07:00 - 08:00		62,1	64,6	59,4	56,0
15-10-2021 08:00 - 09:00		61,7	64,2	58,9	55,7
15-10-2021 09:00 - 10:00		61,4	63,8	57,4	53,5
15-10-2021 10:00 - 11:00		65,6	64,8	58,2	53,9
15-10-2021 11:00 - 12:00		61,3	63,9	57,7	53,7

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	62,9	62,1
Evening (19:00-23:00)	62,1	62,1
Night (23:00-07:00)	60,9	60,7
LDEN	67,8	67,5

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	62,9	62,2
Night (22:00-07:00)	60,8	60,5
LDN	67,5	67,2

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Yüreğir/Adana	Measurement No.	Point 12
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	64,0	62,6	
Evening (19:00-23:00)	61,7	61,0	
Night (23:00-07:00)	60,5	59,8	
LDEN	67,6	66,8	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	63,7	62,4	
Night (22:00-07:00)	60,3	59,6	
LDN	67,4	66,6	

<div><div>FREKANS</div><div>ÇEVRE LABORATUVARI</div></div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Yüreğir/Adana	Measurement No.	Point 13
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [36.969355]
			Longitude: [35.565949]
Total Period	48 Hours	Mic. Height (m)	4,5
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Yüreğir/Adana	Measurement No.	Point 13		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
13-10-2021 12:00 - 13:00		64,7	63,1	57,8	54,9
13-10-2021 13:00 - 14:00		59,8	62,3	58,3	54,6
13-10-2021 14:00 - 15:00		61,2	63,5	58,5	54,6
13-10-2021 15:00 - 16:00		62,1	64,0	58,8	55,1
13-10-2021 16:00 - 17:00		64,8	63,7	59,9	55,9
13-10-2021 17:00 - 18:00		60,8	63,6	60,0	56,0
13-10-2021 18:00 - 19:00		59,7	61,3	57,4	52,9
13-10-2021 19:00 - 20:00		61,9	62,3	56,4	51,0
13-10-2021 20:00 - 21:00		56,9	59,7	53,7	48,6
13-10-2021 21:00 - 22:00		55,2	57,0	51,8	48,4
13-10-2021 22:00 - 23:00		53,4	56,8	50,9	47,6
13-10-2021 23:00 - 00:00		53,0	55,5	50,6	46,5
14-10-2021 00:00 - 01:00		52,2	55,7	50,0	45,0
14-10-2021 01:00 - 02:00		55,6	53,7	46,5	44,2
14-10-2021 02:00 - 03:00		56,0	52,9	46,6	44,6
14-10-2021 03:00 - 04:00		57,2	52,0	46,3	44,0
14-10-2021 04:00 - 05:00		49,9	53,1	47,6	45,7
14-10-2021 05:00 - 06:00		61,7	59,6	51,6	47,8
14-10-2021 06:00 - 07:00		58,3	57,2	52,2	48,0
14-10-2021 07:00 - 08:00		58,6	58,5	52,7	49,2
14-10-2021 08:00 - 09:00		59,9	59,8	54,8	50,7
14-10-2021 09:00 - 10:00		57,3	58,3	53,1	49,0
14-10-2021 10:00 - 11:00		57,0	58,4	52,6	48,9
14-10-2021 11:00 - 12:00		55,6	58,8	53,6	49,6

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	61,0	59,9
Evening (19:00-23:00)	58,1	57,4
Night (23:00-07:00)	56,9	56,8
LDEN	64,1	63,8

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	60,7	59,6
Night (22:00-07:00)	56,6	56,5
LDN	63,9	63,5

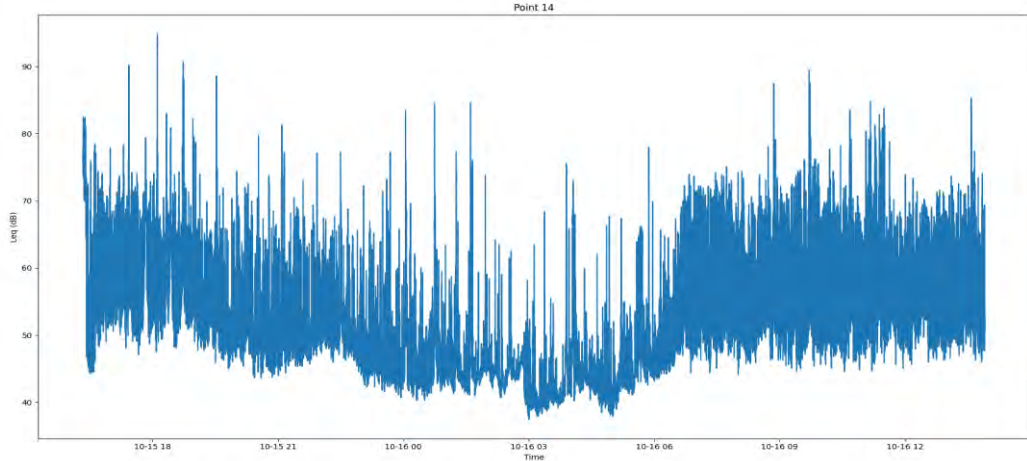
	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS				
Location	Yüreğir/Adana	Measurement No.	Point 13		
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 12:00 - 13:00		61,7	59,7	53,2	47,8
14-10-2021 13:00 - 14:00		58,1	60,5	55,5	51,2
14-10-2021 14:00 - 15:00		58,7	60,4	55,2	51,1
14-10-2021 15:00 - 16:00		60,9	61,4	56,2	52,2
14-10-2021 16:00 - 17:00		58,8	61,2	57,9	54,4
14-10-2021 17:00 - 18:00		59,0	60,6	57,5	53,9
14-10-2021 18:00 - 19:00		61,0	61,0	57,4	53,2
14-10-2021 19:00 - 20:00		64,3	64,3	55,6	51,8
14-10-2021 20:00 - 21:00		56,1	58,6	54,4	51,6
14-10-2021 21:00 - 22:00		58,5	58,4	53,4	49,5
14-10-2021 22:00 - 23:00		54,3	57,0	52,4	48,4
14-10-2021 23:00 - 00:00		57,7	57,6	52,8	47,6
15-10-2021 00:00 - 01:00		60,0	57,0	51,6	45,2
15-10-2021 01:00 - 02:00		54,4	55,8	48,4	43,6
15-10-2021 02:00 - 03:00		54,8	54,3	46,3	42,1
15-10-2021 03:00 - 04:00		57,2	55,8	47,2	42,3
15-10-2021 04:00 - 05:00		59,0	55,9	48,3	43,9
15-10-2021 05:00 - 06:00		56,8	59,2	51,3	47,1
15-10-2021 06:00 - 07:00		56,6	56,4	51,4	46,8
15-10-2021 07:00 - 08:00		54,8	58,2	53,0	49,8
15-10-2021 08:00 - 09:00		56,0	58,6	53,4	49,7
15-10-2021 09:00 - 10:00		57,0	58,4	52,1	48,1
15-10-2021 10:00 - 11:00		57,2	59,7	53,9	49,5
15-10-2021 11:00 - 12:00		58,4	60,7	54,1	50,1

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	58,9	58,5
Evening (19:00-23:00)	60,1	58,3
Night (23:00-07:00)	57,4	58,0
LDEN	64,4	64,5

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	59,4	58,7
Night (22:00-07:00)	57,2	57,4
LDN	64,0	64,0

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Yüreğir/Adana	Measurement No.	Point 13
Standard	ISO 1996-2	Measurement Date	13.10.2021 - 15.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	59,9	59,3	
Evening (19:00-23:00)	59,2	57,9	
Night (23:00-07:00)	57,2	57,2	
LDEN	64,2	64,0	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	60,0	59,2	
Night (22:00-07:00)	56,9	56,8	
LDN	63,9	63,6	

<div>FREKNS</div> <div>ÇEVRE LABORATUVARI</div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Ceyhan/Adana	Measurement No.	Point 14
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [37.017375]
			Longitude: [35.81596]
Total Period	48 Hours	Mic. Height (m)	4,5
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Ceyhan/Adana	Measurement No.	Point 14		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 16:00 - 17:00		67,0	72,2	56,3	47,1
14-10-2021 17:00 - 18:00		63,7	66,5	57,8	51,2
14-10-2021 18:00 - 19:00		66,7	65,6	55,9	50,5
14-10-2021 19:00 - 20:00		58,5	60,4	50,8	46,8
14-10-2021 20:00 - 21:00		55,0	57,8	48,8	45,1
14-10-2021 21:00 - 22:00		56,6	57,5	48,5	45,5
14-10-2021 22:00 - 23:00		55,4	55,8	48,4	45,7
14-10-2021 23:00 - 00:00		51,7	52,0	44,7	41,8
15-10-2021 00:00 - 01:00		58,2	54,8	45,7	43,0
15-10-2021 01:00 - 02:00		59,2	52,6	45,3	43,2
15-10-2021 02:00 - 03:00		46,9	47,6	45,1	42,6
15-10-2021 03:00 - 04:00		47,2	46,2	41,4	40,0
15-10-2021 04:00 - 05:00		48,2	49,9	43,7	41,0
15-10-2021 05:00 - 06:00		55,2	57,9	45,1	41,8
15-10-2021 06:00 - 07:00		54,2	63,8	51,8	46,1
15-10-2021 07:00 - 08:00		61,6	66,3	57,3	48,3
15-10-2021 08:00 - 09:00		60,7	63,4	52,3	47,4
15-10-2021 09:00 - 10:00		62,4	64,9	54,2	48,0
15-10-2021 10:00 - 11:00		59,1	62,5	52,6	47,3
15-10-2021 11:00 - 12:00		62,5	62,8	54,6	48,6
15-10-2021 12:00 - 13:00		59,1	63,5	54,7	48,6
15-10-2021 13:00 - 14:00		59,9	63,0	54,6	48,6
15-10-2021 14:00 - 15:00		58,5	61,5	55,5	47,5
15-10-2021 15:00 - 16:00		58,9	62,4	56,4	48,5

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	62,7	62,4
Evening (19:00-23:00)	56,6	56,5
Night (23:00-07:00)	54,8	53,2
LDEN	63,4	62,6

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	62,0	61,8
Night (22:00-07:00)	56,0	55,4
LDN	63,3	62,4

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Ceyhan/Adana	Measurement No.	Point 14		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
15-10-2021 16:00 - 17:00		68,5	73,7	57,8	48,6
15-10-2021 17:00 - 18:00		65,2	68,0	59,3	52,7
15-10-2021 18:00 - 19:00		68,2	67,1	57,4	52,0
15-10-2021 19:00 - 20:00		60,0	61,9	52,3	48,3
15-10-2021 20:00 - 21:00		56,5	59,3	50,3	46,6
15-10-2021 21:00 - 22:00		58,1	59,0	50,0	47,0
15-10-2021 22:00 - 23:00		56,9	57,3	49,9	47,2
15-10-2021 23:00 - 00:00		53,2	53,5	46,2	43,3
16-10-2021 00:00 - 01:00		57,5	54,1	45,0	42,3
16-10-2021 01:00 - 02:00		58,5	51,9	44,6	42,5
16-10-2021 02:00 - 03:00		46,2	46,9	44,4	41,9
16-10-2021 03:00 - 04:00		55,3	45,5	40,7	39,3
16-10-2021 04:00 - 05:00		51,3	49,2	43,0	40,3
16-10-2021 05:00 - 06:00		56,2	57,2	44,4	41,1
16-10-2021 06:00 - 07:00		59,0	63,1	51,1	45,4
16-10-2021 07:00 - 08:00		63,3	68,0	59,0	50,0
16-10-2021 08:00 - 09:00		62,4	65,1	54,0	49,1
16-10-2021 09:00 - 10:00		64,1	66,6	55,9	49,7
16-10-2021 10:00 - 11:00		60,8	64,2	54,3	49,0
16-10-2021 11:00 - 12:00		64,2	64,5	56,3	50,3
16-10-2021 12:00 - 13:00		60,8	65,2	56,4	50,3
16-10-2021 13:00 - 14:00		61,6	64,7	56,3	50,3
16-10-2021 14:00 - 15:00		60,2	63,2	57,2	49,2
16-10-2021 15:00 - 16:00		60,6	64,1	58,1	50,2

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	64,8	62,2
Evening (19:00-23:00)	58,1	57,5
Night (23:00-07:00)	56,0	54,9
LDEN	65,0	63,4

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	64,8	62,2
Night (22:00-07:00)	56,1	55,2
LDN	65,3	63,6

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Ceyhan/Adana	Measurement No.	Point 14
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	63,9	62,3	
Evening (19:00-23:00)	57,4	57,0	
Night (23:00-07:00)	55,5	54,2	
LDEN	64,3	63,0	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	63,6	62,0	
Night (22:00-07:00)	56,1	55,3	
LDN	64,7	63,6	



MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

Location	Merkez/Osmaniye	Measurement No.	Point 15		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 13:00 - 14:00		66,6	65,2	50,9	45,5
14-10-2021 14:00 - 15:00		52,9	53,3	50,4	47,9
14-10-2021 15:00 - 16:00		61,1	59,9	50,4	46,5
14-10-2021 16:00 - 17:00		57,1	51,8	48,0	45,4
14-10-2021 17:00 - 18:00		65,1	62,4	49,7	47,2
14-10-2021 18:00 - 19:00		59,4	54,7	48,4	45,5
14-10-2021 19:00 - 20:00		53,3	54,9	49,4	47,0
14-10-2021 20:00 - 21:00		60,3	56,3	53,1	49,8
14-10-2021 21:00 - 22:00		59,0	54,1	48,5	47,3
14-10-2021 22:00 - 23:00		57,4	49,3	47,9	46,9
14-10-2021 23:00 - 00:00		59,0	49,7	48,1	45,9
15-10-2021 00:00 - 01:00		56,6	47,2	45,4	43,5
15-10-2021 01:00 - 02:00		63,3	47,0	45,1	42,7
15-10-2021 02:00 - 03:00		46,2	46,8	46,0	45,3
15-10-2021 03:00 - 04:00		52,3	46,8	45,8	44,9
15-10-2021 04:00 - 05:00		65,8	68,8	45,3	43,5
15-10-2021 05:00 - 06:00		57,6	51,9	45,8	44,3
15-10-2021 06:00 - 07:00		59,6	50,0	46,2	43,5
15-10-2021 07:00 - 08:00		49,7	51,6	48,8	46,1
15-10-2021 08:00 - 09:00		58,4	54,5	50,1	47,3
15-10-2021 09:00 - 10:00		62,6	53,4	48,4	45,3
15-10-2021 10:00 - 11:00		65,5	54,9	49,5	46,4
15-10-2021 11:00 - 12:00		62,9	54,7	49,7	47,2
15-10-2021 12:00 - 13:00		57,0	57,7	48,2	45,3

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	62,1	57,1
Evening (19:00-23:00)	58,2	56,3
Night (23:00-07:00)	60,4	57,8
LDEN	66,9	64,0

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	61,6	56,9
Night (22:00-07:00)	60,2	57,8
LDN	66,8	64,1

MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

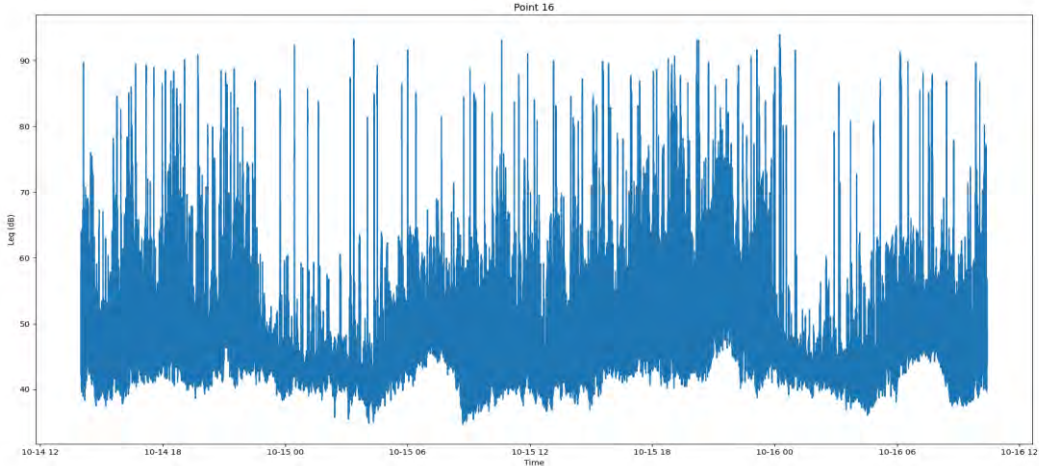
Location	Merkez/Osmaniye	Measurement No.	Point 15		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
15-10-2021 13:00 - 14:00		61,2	51,8	48,1	45,7
15-10-2021 14:00 - 15:00		58,6	56,2	49,7	46,8
15-10-2021 15:00 - 16:00		61,4	59,3	48,8	46,7
15-10-2021 16:00 - 17:00		63,9	63,8	52,6	47,5
15-10-2021 17:00 - 18:00		61,6	54,9	49,5	47,4
15-10-2021 18:00 - 19:00		64,5	53,2	49,6	47,7
15-10-2021 19:00 - 20:00		58,6	60,0	49,8	48,1
15-10-2021 20:00 - 21:00		61,5	51,2	48,9	47,7
15-10-2021 21:00 - 22:00		54,0	49,4	47,7	46,8
15-10-2021 22:00 - 23:00		63,1	59,8	49,6	47,2
15-10-2021 23:00 - 00:00		59,1	59,9	50,8	49,4
16-10-2021 00:00 - 01:00		67,0	67,8	58,7	43,3
16-10-2021 01:00 - 02:00		46,2	47,3	45,9	44,9
16-10-2021 02:00 - 03:00		50,7	48,3	47,4	46,7
16-10-2021 03:00 - 04:00		57,4	46,1	44,8	43,4
16-10-2021 04:00 - 05:00		56,6	47,1	46,4	45,6
16-10-2021 05:00 - 06:00		60,2	49,2	45,7	44,4
16-10-2021 06:00 - 07:00		63,8	49,8	45,1	43,0
16-10-2021 07:00 - 08:00		62,0	65,0	47,5	43,8
16-10-2021 08:00 - 09:00		65,7	50,3	46,7	43,3
16-10-2021 09:00 - 10:00		49,4	51,6	46,3	42,6
16-10-2021 10:00 - 11:00		46,5	48,7	45,6	42,8
16-10-2021 11:00 - 12:00		59,7	51,5	46,5	44,0
16-10-2021 12:00 - 13:00		53,8	54,5	45,0	42,1

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	61,9	59,8
Evening (19:00-23:00)	60,4	57,3
Night (23:00-07:00)	61,1	58,2
LDEN	67,6	64,7

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	61,4	59,5
Night (22:00-07:00)	61,4	57,8
LDN	67,8	64,5

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Merkez/Osmaniye	Measurement No.	Point 15
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	62,0	58,5	
Evening (19:00-23:00)	59,5	56,8	
Night (23:00-07:00)	60,8	58,0	
LDEN	67,2	64,4	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	61,5	58,3	
Night (22:00-07:00)	60,8	57,8	
LDN	67,3	64,3	

<div>FREKNS</div> <div>ÇEVRE LABORATUVARI</div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Merkez/Osmaniye	Measurement No.	Point 16
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [37.093798]
			Longitude: [36.257336]
Total Period	48 Hours	Mic. Height (m)	5
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Merkez/Osmaniye	Measurement No.	Point 16		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 14:00 - 15:00		60,5	56,5	46,3	40,9
14-10-2021 15:00 - 16:00		61,7	54,4	43,1	40,5
14-10-2021 16:00 - 17:00		65,3	58,4	46,6	41,5
14-10-2021 17:00 - 18:00		68,3	54,2	45,7	42,9
14-10-2021 18:00 - 19:00		66,2	62,8	50,4	44,4
14-10-2021 19:00 - 20:00		66,4	56,8	45,2	41,7
14-10-2021 20:00 - 21:00		62,5	55,5	44,5	41,7
14-10-2021 21:00 - 22:00		66,5	60,4	48,6	43,1
14-10-2021 22:00 - 23:00		63,7	52,0	45,5	43,5
14-10-2021 23:00 - 00:00		62,6	46,0	43,4	40,7
15-10-2021 00:00 - 01:00		62,1	45,3	42,9	41,0
15-10-2021 01:00 - 02:00		65,1	45,5	42,4	40,7
15-10-2021 02:00 - 03:00		43,8	44,8	42,6	40,7
15-10-2021 03:00 - 04:00		67,6	43,7	41,2	39,4
15-10-2021 04:00 - 05:00		66,5	47,6	41,3	38,3
15-10-2021 05:00 - 06:00		59,5	52,2	43,9	41,5
15-10-2021 06:00 - 07:00		65,0	55,2	46,7	44,0
15-10-2021 07:00 - 08:00		54,2	52,0	47,8	45,8
15-10-2021 08:00 - 09:00		57,2	49,7	44,4	38,1
15-10-2021 09:00 - 10:00		64,3	51,3	42,9	38,7
15-10-2021 10:00 - 11:00		65,6	56,4	45,5	41,0
15-10-2021 11:00 - 12:00		64,8	54,5	45,0	41,5
15-10-2021 12:00 - 13:00		58,3	55,5	43,3	39,3
15-10-2021 13:00 - 14:00		61,5	52,6	44,3	40,5

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	63,9	62,6
Evening (19:00-23:00)	65,1	61,7
Night (23:00-07:00)	64,2	63,0
LDEN	70,7	69,2

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	64,2	62,7
Night (22:00-07:00)	64,1	62,5
LDN	70,6	68,9

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

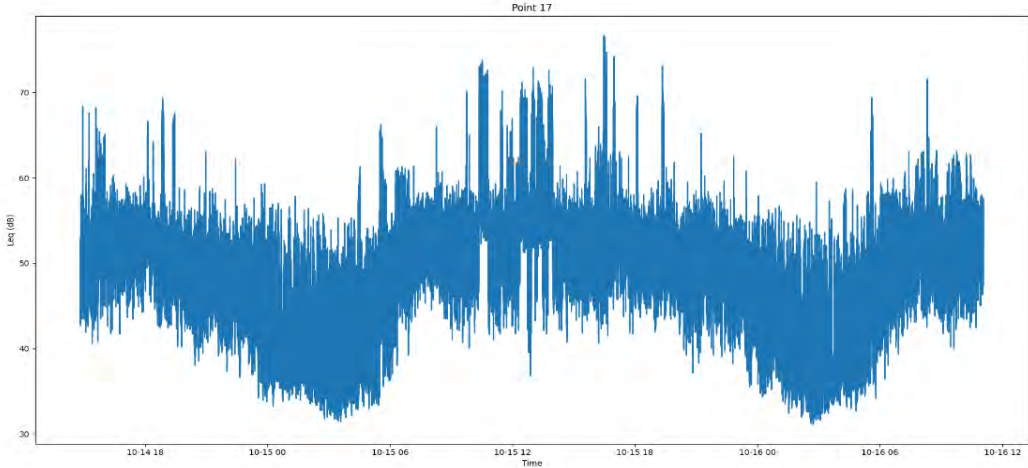
Location	Merkez/Osmaniye	Measurement No.	Point 16		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
15-10-2021 14:00 - 15:00		64,2	55,5	45,0	41,0
15-10-2021 15:00 - 16:00		69,4	63,5	47,2	42,2
15-10-2021 16:00 - 17:00		65,3	55,4	47,3	44,0
15-10-2021 17:00 - 18:00		65,0	62,6	50,6	44,7
15-10-2021 18:00 - 19:00		69,0	62,7	50,2	43,3
15-10-2021 19:00 - 20:00		67,2	63,9	47,5	43,0
15-10-2021 20:00 - 21:00		69,3	61,6	48,9	44,5
15-10-2021 21:00 - 22:00		65,5	67,2	58,7	51,5
15-10-2021 22:00 - 23:00		66,7	60,4	52,7	45,6
15-10-2021 23:00 - 00:00		67,6	59,5	45,9	42,4
16-10-2021 00:00 - 01:00		73,4	53,5	43,7	41,6
16-10-2021 01:00 - 02:00		66,3	45,2	42,9	41,2
16-10-2021 02:00 - 03:00		55,7	45,0	42,7	41,1
16-10-2021 03:00 - 04:00		64,2	44,8	41,9	39,5
16-10-2021 04:00 - 05:00		58,7	45,1	41,2	38,8
16-10-2021 05:00 - 06:00		62,6	57,2	43,8	41,2
16-10-2021 06:00 - 07:00		70,1	55,4	46,9	44,2
16-10-2021 07:00 - 08:00		66,2	53,4	48,0	46,0
16-10-2021 08:00 - 09:00		63,2	51,5	44,8	40,3
16-10-2021 09:00 - 10:00		59,8	51,7	43,5	39,8
16-10-2021 10:00 - 11:00		61,9	58,1	47,3	42,9
16-10-2021 11:00 - 12:00		63,6	53,3	43,8	40,3
16-10-2021 12:00 - 13:00		59,8	57,0	44,8	40,8
16-10-2021 13:00 - 14:00		60,7	51,8	43,5	39,7

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	65,8	63,3
Evening (19:00-23:00)	67,4	64,7
Night (23:00-07:00)	67,7	62,9
LDEN	73,9	69,6

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	66,4	63,6
Night (22:00-07:00)	67,6	63,3
LDN	73,9	69,8

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Merkez/Osmaniye	Measurement No.	Point 16
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	64,8	62,9	
Evening (19:00-23:00)	66,4	63,5	
Night (23:00-07:00)	66,3	62,9	
LDEN	72,6	69,4	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	65,3	63,1	
Night (22:00-07:00)	66,2	62,9	
LDN	72,5	69,4	

<div>FREKANS</div> <div>ÇEVRE LABORATUVARI</div>		MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Düziçi/Osmaniye	Measurement No.	Point 17
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [37.215396]
			Longitude: [36.439099]
Total Period	48 Hours	Mic. Height (m)	3,5
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Düziçi/Osmaniye	Measurement No.	Point 17		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 14:00 - 15:00		54,1	56,4	52,3	47,1
14-10-2021 15:00 - 16:00		54,2	57,2	51,6	46,1
14-10-2021 16:00 - 17:00		52,9	55,2	52,4	48,6
14-10-2021 17:00 - 18:00		53,2	55,3	52,9	49,3
14-10-2021 18:00 - 19:00		55,0	56,5	52,3	47,5
14-10-2021 19:00 - 20:00		52,7	54,4	50,2	45,5
14-10-2021 20:00 - 21:00		49,3	52,4	47,9	43,6
14-10-2021 21:00 - 22:00		49,8	52,7	48,6	43,8
14-10-2021 22:00 - 23:00		48,5	51,5	47,4	42,4
14-10-2021 23:00 - 00:00		47,7	51,2	45,9	37,9
15-10-2021 00:00 - 01:00		45,7	49,9	41,4	36,2
15-10-2021 01:00 - 02:00		44,2	48,0	39,9	35,9
15-10-2021 02:00 - 03:00		43,8	48,3	38,2	34,3
15-10-2021 03:00 - 04:00		42,7	47,2	37,9	33,3
15-10-2021 04:00 - 05:00		45,4	48,8	39,7	35,0
15-10-2021 05:00 - 06:00		52,2	57,4	44,9	37,4
15-10-2021 06:00 - 07:00		51,3	54,3	49,9	43,9
15-10-2021 07:00 - 08:00		53,0	55,3	52,5	48,9
15-10-2021 08:00 - 09:00		52,9	55,3	52,3	48,7
15-10-2021 09:00 - 10:00		52,6	54,9	51,5	46,8
15-10-2021 10:00 - 11:00		60,9	66,4	54,0	48,7
15-10-2021 11:00 - 12:00		54,8	57,5	52,3	47,6
15-10-2021 12:00 - 13:00		59,4	64,8	53,9	47,4
15-10-2021 13:00 - 14:00		60,2	65,4	54,8	49,1

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	56,4	52,4
Evening (19:00-23:00)	50,4	49,6
Night (23:00-07:00)	48,0	45,9
LDEN	56,9	54,2

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	55,8	52,0
Night (22:00-07:00)	48,0	46,3
LDN	56,8	54,1

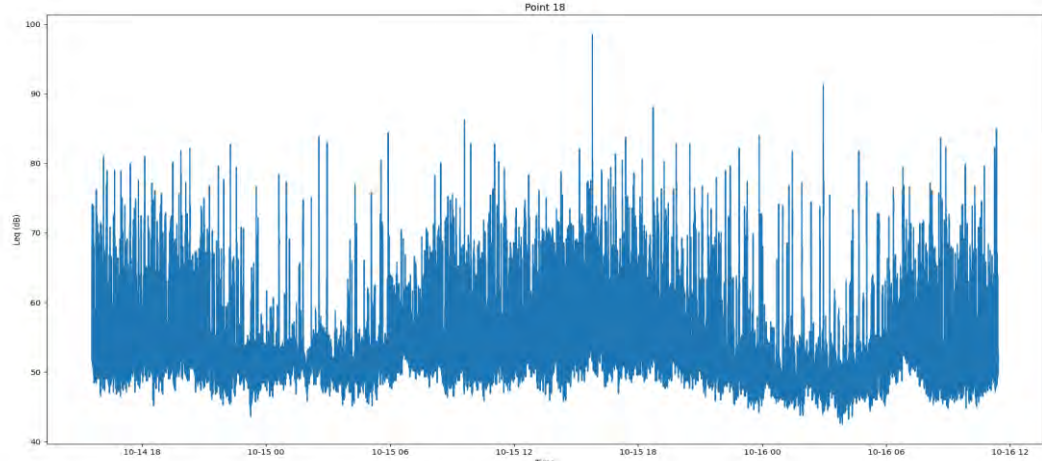
	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS				
Location	Düziçi/Osmaniye	Measurement No.	Point 17		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
15-10-2021 14:00 - 15:00		52,3	54,9	51,7	47,2
15-10-2021 15:00 - 16:00		54,6	55,6	52,0	47,8
15-10-2021 16:00 - 17:00		57,2	56,6	52,1	48,1
15-10-2021 17:00 - 18:00		53,0	54,9	52,5	48,9
15-10-2021 18:00 - 19:00		53,1	54,6	51,2	47,1
15-10-2021 19:00 - 20:00		55,7	55,6	51,1	46,8
15-10-2021 20:00 - 21:00		50,5	53,3	49,6	45,1
15-10-2021 21:00 - 22:00		51,5	54,2	50,8	45,6
15-10-2021 22:00 - 23:00		49,9	52,9	48,8	44,0
15-10-2021 23:00 - 00:00		48,3	51,4	47,1	41,6
16-10-2021 00:00 - 01:00		45,9	49,6	43,2	37,5
16-10-2021 01:00 - 02:00		44,3	48,5	39,7	34,7
16-10-2021 02:00 - 03:00		43,2	47,3	37,4	32,6
16-10-2021 03:00 - 04:00		43,3	47,7	38,2	34,1
16-10-2021 04:00 - 05:00		44,5	48,3	40,0	35,4
16-10-2021 05:00 - 06:00		51,4	53,2	44,9	38,6
16-10-2021 06:00 - 07:00		50,7	53,9	49,0	43,6
16-10-2021 07:00 - 08:00		52,3	55,0	51,5	46,9
16-10-2021 08:00 - 09:00		53,0	54,7	51,6	47,3
16-10-2021 09:00 - 10:00		52,2	54,9	51,0	46,6
16-10-2021 10:00 - 11:00		52,3	54,9	51,5	47,5
16-10-2021 11:00 - 12:00		53,2	55,7	52,9	49,2
16-10-2021 12:00 - 13:00		55,2	56,2	52,8	48,2
16-10-2021 13:00 - 14:00		54,6	56,8	54,1	48,9

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	53,6	52,4
Evening (19:00-23:00)	52,6	50,9
Night (23:00-07:00)	47,6	46,5
LDEN	56,0	54,8

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	53,5	52,1
Night (22:00-07:00)	47,9	47,0
LDN	55,7	54,6

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Düziçi/Osmaniye	Measurement No.	Point 17
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	55,4	52,4	
Evening (19:00-23:00)	51,6	50,3	
Night (23:00-07:00)	47,8	46,2	
LDEN	56,5	54,5	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	54,9	52,1	
Night (22:00-07:00)	48,0	46,6	
LDN	56,3	54,4	

<div><div>FREKANS</div><div>ÇEVRE LABORATUVARI</div></div>		MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Bahçe/Osmaniye	Measurement No.	Point 18
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [37.192175]
			Longitude: [36.565652]
Total Period	48 Hours	Mic. Height (m)	4
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Bahçe/Osmaniye	Measurement No.	Point 18		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 15:00 - 16:00		62,3	67,5	54,5	50,5
14-10-2021 16:00 - 17:00		60,2	61,0	52,7	49,8
14-10-2021 17:00 - 18:00		59,6	60,9	52,6	49,8
14-10-2021 18:00 - 19:00		60,3	61,8	52,8	49,9
14-10-2021 19:00 - 20:00		62,9	67,1	52,9	50,2
14-10-2021 20:00 - 21:00		59,9	60,4	53,4	50,2
14-10-2021 21:00 - 22:00		59,1	59,2	50,7	48,0
14-10-2021 22:00 - 23:00		59,3	54,8	50,7	48,1
14-10-2021 23:00 - 00:00		55,0	52,6	49,8	47,4
15-10-2021 00:00 - 01:00		58,6	53,1	50,6	48,8
15-10-2021 01:00 - 02:00		55,6	53,6	51,3	49,3
15-10-2021 02:00 - 03:00		60,1	53,9	51,1	49,1
15-10-2021 03:00 - 04:00		50,8	52,5	50,0	48,1
15-10-2021 04:00 - 05:00		54,9	52,9	49,8	47,7
15-10-2021 05:00 - 06:00		62,9	65,5	51,3	48,7
15-10-2021 06:00 - 07:00		54,7	56,6	53,0	50,7
15-10-2021 07:00 - 08:00		55,5	56,7	52,4	50,7
15-10-2021 08:00 - 09:00		60,1	61,4	53,0	49,8
15-10-2021 09:00 - 10:00		60,1	62,1	53,1	49,7
15-10-2021 10:00 - 11:00		57,1	59,6	52,1	49,3
15-10-2021 11:00 - 12:00		63,0	65,4	53,1	50,0
15-10-2021 12:00 - 13:00		60,3	63,7	53,5	51,0
15-10-2021 13:00 - 14:00		58,8	60,9	52,7	49,8
15-10-2021 14:00 - 15:00		59,2	62,9	53,1	49,3

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	60,1	59,1
Evening (19:00-23:00)	60,6	59,9
Night (23:00-07:00)	58,1	57,2
LDEN	65,1	64,3

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	60,3	59,2
Night (22:00-07:00)	58,2	57,6
LDN	65,0	64,3

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

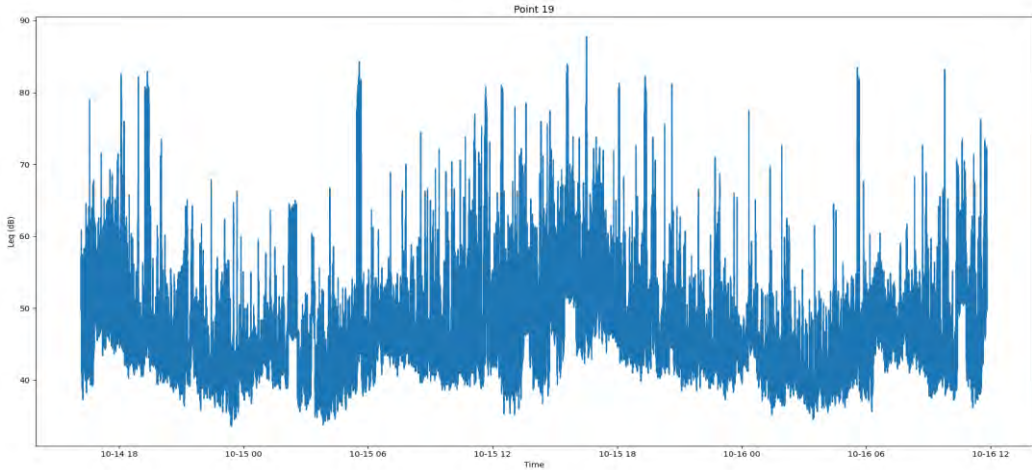
Location	Bahçe/Osmaniye	Measurement No.	Point 18		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
15-10-2021 15:00 - 16:00		66,4	66,1	56,2	51,6
15-10-2021 16:00 - 17:00		62,5	62,6	54,8	50,9
15-10-2021 17:00 - 18:00		62,0	61,5	53,7	51,0
15-10-2021 18:00 - 19:00		61,8	63,2	53,6	51,3
15-10-2021 19:00 - 20:00		62,3	64,5	52,5	50,2
15-10-2021 20:00 - 21:00		59,3	56,0	51,7	49,7
15-10-2021 21:00 - 22:00		57,9	57,3	50,9	48,7
15-10-2021 22:00 - 23:00		60,2	58,1	50,2	48,1
15-10-2021 23:00 - 00:00		59,7	54,7	49,4	46,9
16-10-2021 00:00 - 01:00		54,1	51,6	49,2	47,2
16-10-2021 01:00 - 02:00		57,5	51,3	47,8	45,9
16-10-2021 02:00 - 03:00		65,4	53,3	49,0	46,9
16-10-2021 03:00 - 04:00		50,2	50,8	47,6	45,1
16-10-2021 04:00 - 05:00		59,5	52,7	48,6	46,3
16-10-2021 05:00 - 06:00		58,9	56,3	49,6	47,4
16-10-2021 06:00 - 07:00		60,3	58,7	53,1	49,9
16-10-2021 07:00 - 08:00		56,9	59,2	52,7	49,9
16-10-2021 08:00 - 09:00		62,1	62,9	50,3	47,5
16-10-2021 09:00 - 10:00		59,7	56,9	50,2	47,8
16-10-2021 10:00 - 11:00		58,2	58,3	50,9	48,1
16-10-2021 11:00 - 12:00		63,7	61,7	52,2	49,4
16-10-2021 12:00 - 13:00		61,2	64,2	54,6	52,1
16-10-2021 13:00 - 14:00		57,6	59,5	51,6	48,9
16-10-2021 14:00 - 15:00		59,1	63,6	52,4	48,6

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	62,3	59,6
Evening (19:00-23:00)	60,2	58,9
Night (23:00-07:00)	60,0	59,8
LDEN	66,8	66,1

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	61,9	59,3
Night (22:00-07:00)	60,1	59,8
LDN	66,8	66,2

	MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Bahçe/Osmaniye	Measurement No.	Point 18
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	61,2	59,3	
Evening (19:00-23:00)	60,4	59,4	
Night (23:00-07:00)	59,2	58,7	
LDEN	66,0	65,2	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	61,1	59,2	
Night (22:00-07:00)	59,2	58,9	
LDN	66,0	65,3	

<div>FREKNS</div> <div>ÇEVRE LABORATUVARI</div>		MERSIN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS	
Location	Nurdağı/Gaziantep	Measurement No.	Point 19
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
			
Measurement Info			
SLM Type	Type 1	Coordinates	Latitude: [37.17533]
			Longitude: [36.748193]
Total Period	48 Hours	Mic. Height (m)	2,5
Logger Graph (dBA)			
			

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Nurdağı/Gaziantep	Measurement No.	Point 19		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 16:00 - 17:00		52,3	55,4	47,5	42,2
14-10-2021 17:00 - 18:00		54,5	57,7	51,4	47,3
14-10-2021 18:00 - 19:00		61,5	53,1	45,7	43,0
14-10-2021 19:00 - 20:00		67,7	73,9	45,4	42,8
14-10-2021 20:00 - 21:00		48,2	47,2	42,8	40,6
14-10-2021 21:00 - 22:00		49,4	51,8	43,3	39,8
14-10-2021 22:00 - 23:00		48,1	47,8	41,6	38,9
14-10-2021 23:00 - 00:00		49,0	50,4	41,8	36,8
15-10-2021 00:00 - 01:00		43,4	45,6	42,7	40,1
15-10-2021 01:00 - 02:00		46,8	47,9	43,1	40,6
15-10-2021 02:00 - 03:00		47,6	49,5	43,2	38,6
15-10-2021 03:00 - 04:00		45,6	49,7	40,3	37,2
15-10-2021 04:00 - 05:00		48,0	45,9	41,1	37,5
15-10-2021 05:00 - 06:00		67,7	73,9	43,0	40,0
15-10-2021 06:00 - 07:00		48,1	49,8	45,9	41,9
15-10-2021 07:00 - 08:00		51,6	49,5	45,5	43,5
15-10-2021 08:00 - 09:00		47,4	47,7	43,9	42,0
15-10-2021 09:00 - 10:00		49,9	51,9	42,9	40,6
15-10-2021 10:00 - 11:00		52,3	54,4	45,2	41,5
15-10-2021 11:00 - 12:00		64,7	65,4	46,6	41,7
15-10-2021 12:00 - 13:00		64,3	56,9	45,4	40,7
15-10-2021 13:00 - 14:00		53,9	54,3	47,8	41,4
15-10-2021 14:00 - 15:00		56,8	60,6	49,2	42,3
15-10-2021 15:00 - 16:00		65,8	59,8	52,8	46,6

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	60,2	52,4
Evening (19:00-23:00)	61,8	46,0
Night (23:00-07:00)	58,9	43,9
LDEN	65,9	52,7

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	60,9	51,7
Night (22:00-07:00)	58,5	43,9
LDN	65,3	52,6

MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS

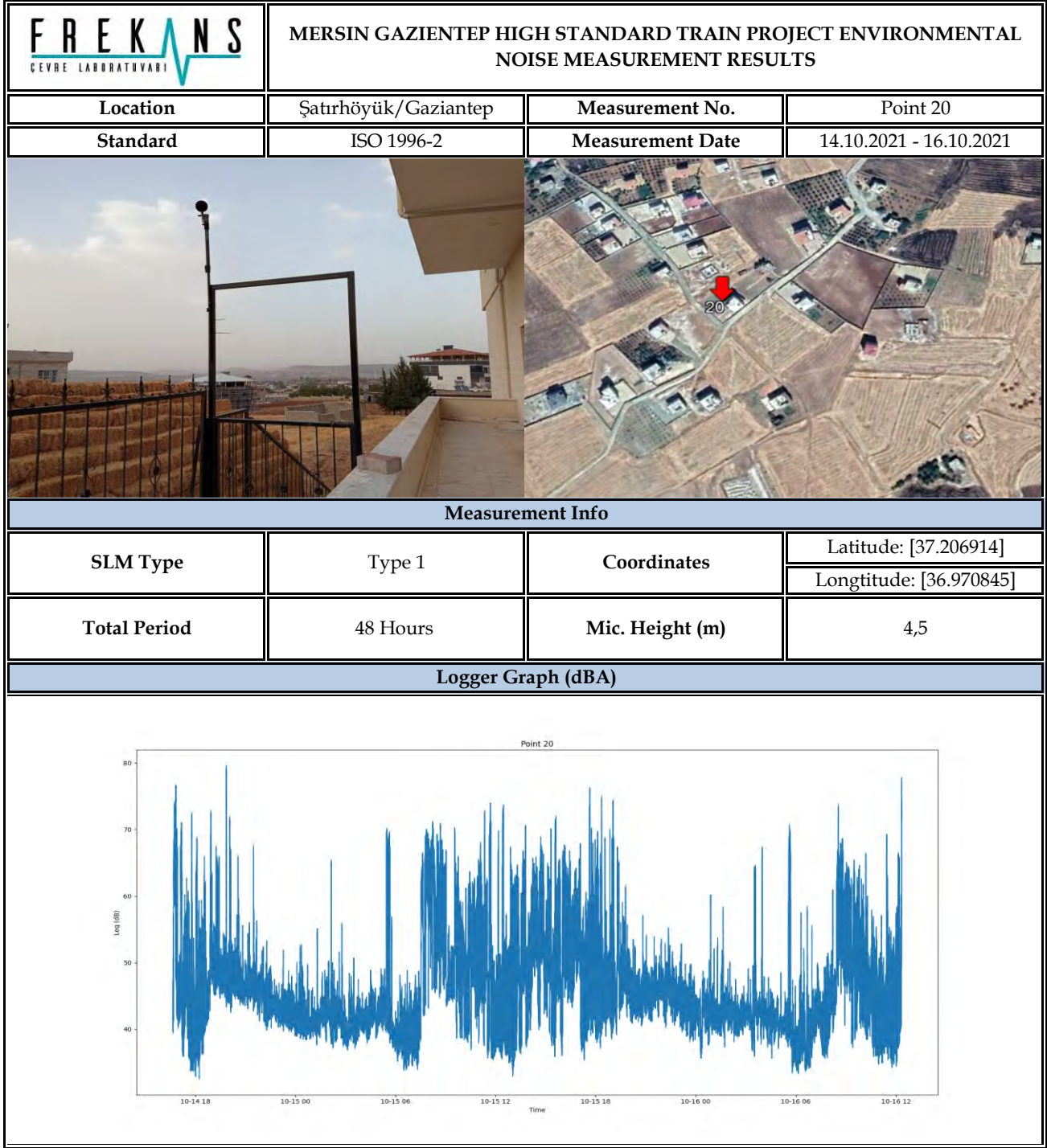
Location	Nurdağı/Gaziantep	Measurement No.	Point 19		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
15-10-2021 16:00 - 17:00		58,0	58,3	51,1	46,9
15-10-2021 17:00 - 18:00		55,5	58,8	51,3	47,6
15-10-2021 18:00 - 19:00		62,4	53,9	46,1	43,7
15-10-2021 19:00 - 20:00		65,5	57,7	45,9	42,9
15-10-2021 20:00 - 21:00		53,0	53,3	45,4	42,5
15-10-2021 21:00 - 22:00		48,6	49,8	43,8	41,3
15-10-2021 22:00 - 23:00		50,4	50,7	43,6	41,1
15-10-2021 23:00 - 00:00		48,3	48,4	43,5	40,6
16-10-2021 00:00 - 01:00		49,5	49,3	44,5	41,2
16-10-2021 01:00 - 02:00		48,1	43,9	39,9	38,0
16-10-2021 02:00 - 03:00		47,3	47,6	41,0	38,6
16-10-2021 03:00 - 04:00		43,7	42,8	38,9	36,9
16-10-2021 04:00 - 05:00		48,4	45,8	40,5	37,9
16-10-2021 05:00 - 06:00		68,2	56,2	42,9	39,5
16-10-2021 06:00 - 07:00		47,5	50,4	46,4	40,7
16-10-2021 07:00 - 08:00		48,6	50,3	46,6	44,0
16-10-2021 08:00 - 09:00		50,6	50,2	44,9	42,7
16-10-2021 09:00 - 10:00		56,6	51,9	42,2	39,7
16-10-2021 10:00 - 11:00		53,7	57,0	47,7	40,4
16-10-2021 11:00 - 12:00		51,9	53,6	46,1	40,1
16-10-2021 12:00 - 13:00		54,6	55,2	46,2	40,8
16-10-2021 13:00 - 14:00		52,6	53,6	46,9	40,2
16-10-2021 14:00 - 15:00		53,0	55,2	48,2	41,6
16-10-2021 15:00 - 16:00		60,0	61,2	55,6	42,8

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	56,7	49,9
Evening (19:00-23:00)	59,9	46,4
Night (23:00-07:00)	59,4	44,5
LDEN	65,6	52,2

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	58,4	49,5
Night (22:00-07:00)	59,0	44,7
LDN	65,3	52,2

	MERSİN GAZİANTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Nurdağı/Gaziantep	Measurement No.	Point 19
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	59,1	51,8	
Evening (19:00-23:00)	61,0	46,1	
Night (23:00-07:00)	59,2	44,2	
LDEN	65,8	52,7	

dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	60,0	51,1	
Night (22:00-07:00)	58,7	44,3	
LDN	65,3	52,6	



**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Şatırhöyük/Gaziantep	Measurement No.	Point 20		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - First Day					
Date and Time		Leq	L10	L50	L90
14-10-2021 16:00 - 17:00		62,3	66,1	60,4	42,7
14-10-2021 17:00 - 18:00		53,0	53,9	43,3	37,1
14-10-2021 18:00 - 19:00		51,6	52,1	43,7	38,8
14-10-2021 19:00 - 20:00		53,8	58,6	47,9	46,2
14-10-2021 20:00 - 21:00		48,2	48,6	46,5	45,0
14-10-2021 21:00 - 22:00		46,8	47,8	46,3	44,7
14-10-2021 22:00 - 23:00		43,9	45,9	43,3	42,0
14-10-2021 23:00 - 00:00		42,4	43,9	42,0	40,9
15-10-2021 00:00 - 01:00		41,5	43,0	40,8	39,6
15-10-2021 01:00 - 02:00		42,1	43,5	41,6	39,9
15-10-2021 02:00 - 03:00		42,1	43,5	41,3	38,8
15-10-2021 03:00 - 04:00		40,7	42,2	40,4	38,2
15-10-2021 04:00 - 05:00		41,8	43,4	41,4	39,7
15-10-2021 05:00 - 06:00		56,5	62,9	42,1	38,6
15-10-2021 06:00 - 07:00		38,6	40,3	37,9	35,8
15-10-2021 07:00 - 08:00		59,3	64,9	42,9	36,4
15-10-2021 08:00 - 09:00		61,4	65,3	59,2	48,6
15-10-2021 09:00 - 10:00		53,4	55,6	47,4	44,7
15-10-2021 10:00 - 11:00		52,5	56,5	49,9	41,4
15-10-2021 11:00 - 12:00		57,5	61,8	47,6	37,7
15-10-2021 12:00 - 13:00		54,9	54,2	42,1	37,7
15-10-2021 13:00 - 14:00		54,0	58,1	48,5	38,4
15-10-2021 14:00 - 15:00		56,6	60,6	54,0	44,0
15-10-2021 15:00 - 16:00		56,0	58,8	49,3	40,0

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	57,4	51,7
Evening (19:00-23:00)	49,7	46,7
Night (23:00-07:00)	48,3	41,3
LDEN	57,4	51,6

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	56,7	51,1
Night (22:00-07:00)	48,0	41,7
LDN	57,2	51,4

**MERSİN GAZİENTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL
NOISE MEASUREMENT RESULTS**

Location	Şatırhöyük/Gaziantep	Measurement No.	Point 20		
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021		
Hourly Measurement Results (dBA) - Second Day					
Date and Time		Leq	L10	L50	L90
15-10-2021 16:00 - 17:00		56,0	59,8	53,5	47,4
15-10-2021 17:00 - 18:00		52,9	56,1	46,2	40,1
15-10-2021 18:00 - 19:00		51,2	50,9	44,4	40,9
15-10-2021 19:00 - 20:00		52,4	54,8	46,1	43,2
15-10-2021 20:00 - 21:00		45,1	46,8	44,7	42,6
15-10-2021 21:00 - 22:00		45,7	47,2	45,3	43,6
15-10-2021 22:00 - 23:00		46,0	47,7	45,6	43,5
15-10-2021 23:00 - 00:00		44,0	45,7	43,6	41,3
16-10-2021 00:00 - 01:00		43,0	44,5	43,1	38,9
16-10-2021 01:00 - 02:00		43,5	44,7	42,7	41,2
16-10-2021 02:00 - 03:00		42,3	43,8	42,1	40,1
16-10-2021 03:00 - 04:00		47,6	45,0	42,8	39,9
16-10-2021 04:00 - 05:00		42,0	43,6	42,0	39,2
16-10-2021 05:00 - 06:00		55,2	44,3	40,5	36,4
16-10-2021 06:00 - 07:00		39,8	40,1	37,0	34,9
16-10-2021 07:00 - 08:00		41,9	44,1	40,8	37,9
16-10-2021 08:00 - 09:00		57,7	62,6	50,6	42,5
16-10-2021 09:00 - 10:00		55,3	60,4	50,0	41,6
16-10-2021 10:00 - 11:00		45,6	48,0	42,8	38,9
16-10-2021 11:00 - 12:00		46,4	47,8	41,1	37,6
16-10-2021 12:00 - 13:00		53,8	49,1	42,9	39,4
16-10-2021 13:00 - 14:00		52,2	56,3	46,7	36,6
16-10-2021 14:00 - 15:00		57,4	61,4	54,8	44,8
16-10-2021 15:00 - 16:00		57,0	59,8	50,3	41,0

dBA	Raw Leq	Processed Leq
Day (07:00-19:00)	53,5	44,6
Evening (19:00-23:00)	48,5	45,6
Night (23:00-07:00)	47,9	42,2
LDEN	55,5	49,5

dBA	Raw Leq	Processed Leq
Day (07:00-22:00)	52,7	44,8
Night (22:00-07:00)	47,8	42,9
LDN	55,3	49,6

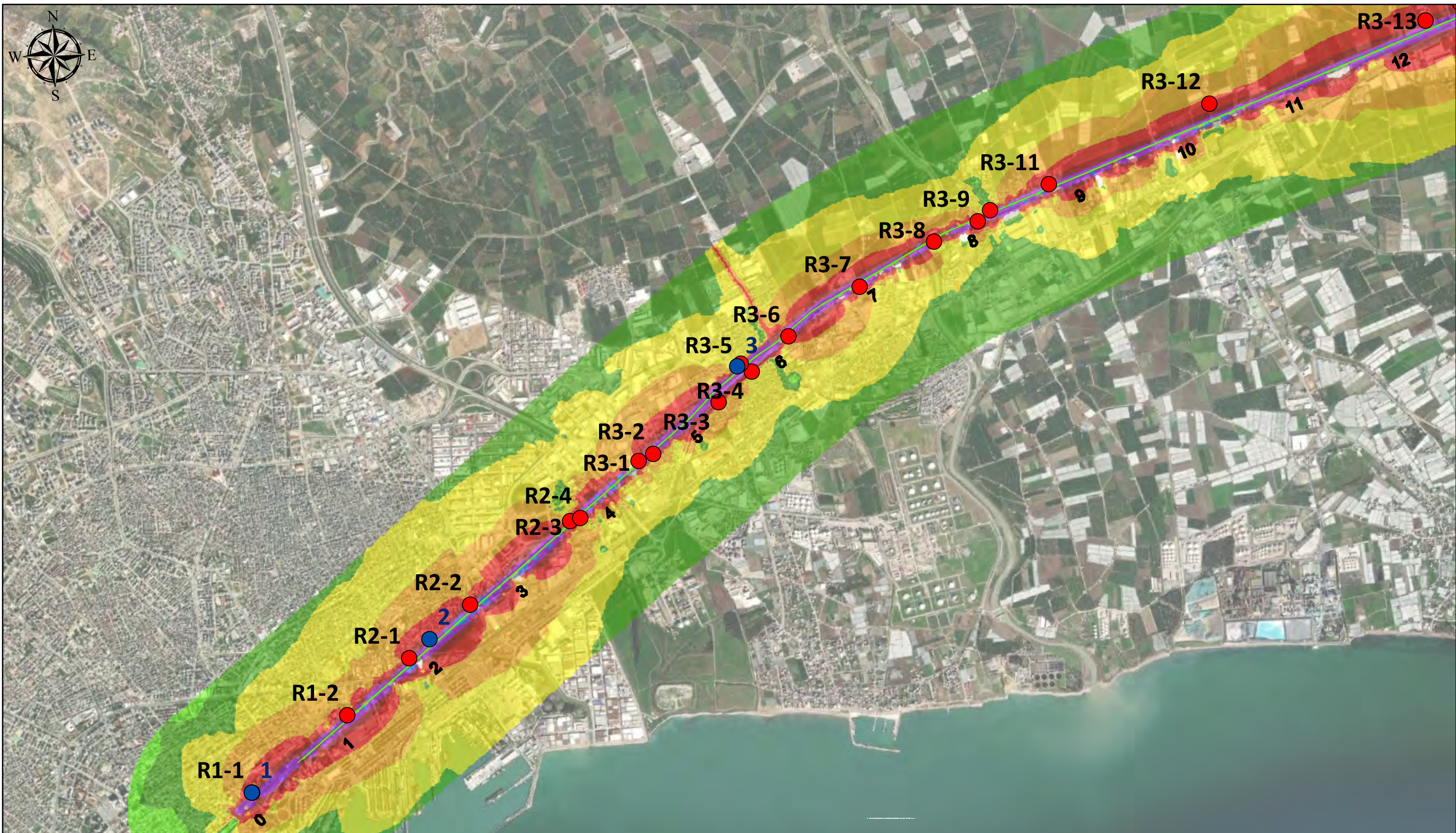
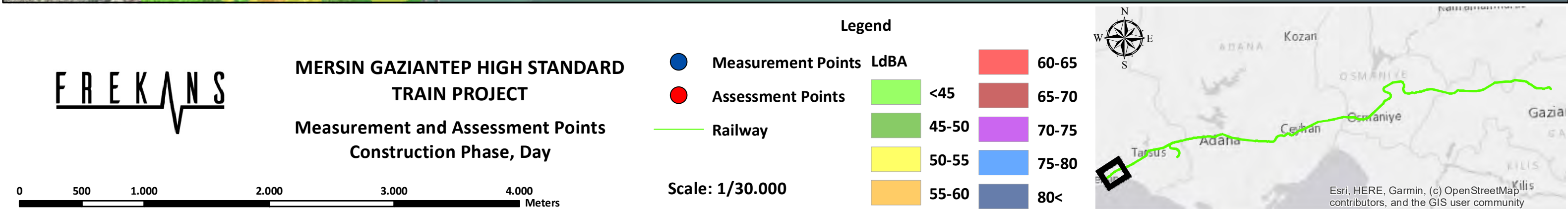
	MERSİN GAZİANTEP HIGH STANDARD TRAIN PROJECT ENVIRONMENTAL NOISE MEASUREMENT RESULTS		
Location	Şatırhöyük/Gaziantep	Measurement No.	Point 20
Standard	ISO 1996-2	Measurement Date	14.10.2021 - 16.10.2021
Measurement Results - Total			
dBA	Raw Leq	Processed Leq	
Day (07:00-19:00)	56,1		50,6
Evening (19:00-23:00)	49,2		46,2
Night (23:00-07:00)	48,1		41,8
LDEN	56,7		51,1

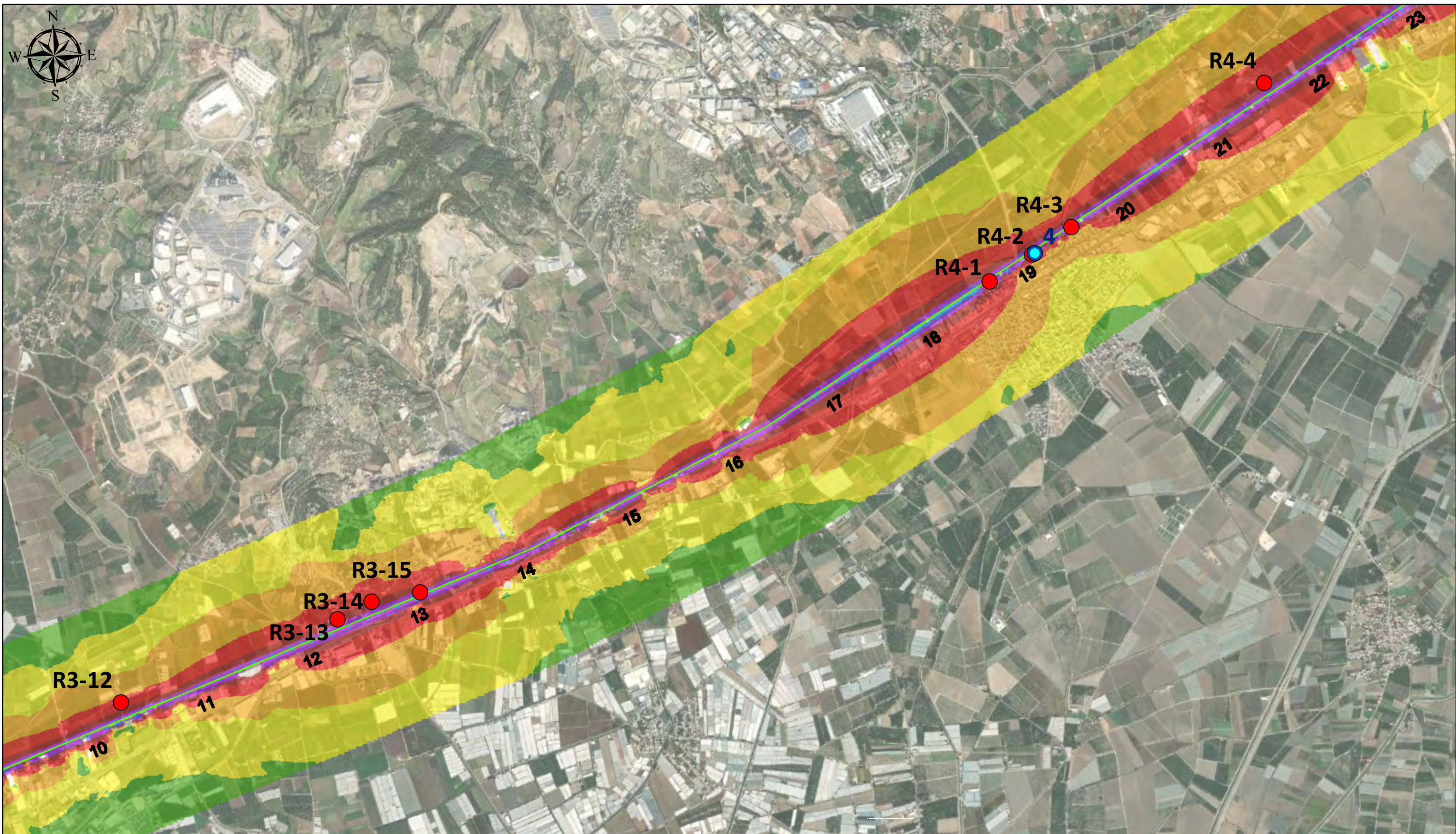
dBA	Raw Leq	Processed Leq	
Day (07:00-22:00)	55,3		49,9
Night (22:00-07:00)	47,9		42,3
LDN	56,5		51,0

Appendix 2: Vibration Measurement Results

Groundborn Vibration Measurement Results				
Measurement Ponit	Baseline Vibration Values		Category 2 Limit Value (VdB)	Assesment Value
	RMS (mm/s)	VdB (μinch/s)		
1	0,085	70,500	75,000	Compatible
2	0,085	70,500		Compatible
3	0,060	67,500		Compatible
4	0,045	65,100		Compatible
5	0,060	67,500		Compatible
6	0,088	70,200		Compatible
7	0,054	66,600		Compatible
8	0,037	63,200		Compatible
9	0,077	69,700		Compatible
10	0,099	71,800		Compatible
11	0,084	70,400		Compatible
12	0,098	71,800		Compatible
13	0,151	74,500		Compatible
14	0,032	62,200		Compatible
15	0,049	65,800		Compatible
16	0,040	63,900		Compatible
17	0,039	63,900		Compatible
18	0,039	63,900		Compatible
19	0,037	63,200		Compatible
20	0,045	65,100		Compatible

Appendix 3: Construction Noise Maps





FREKANS

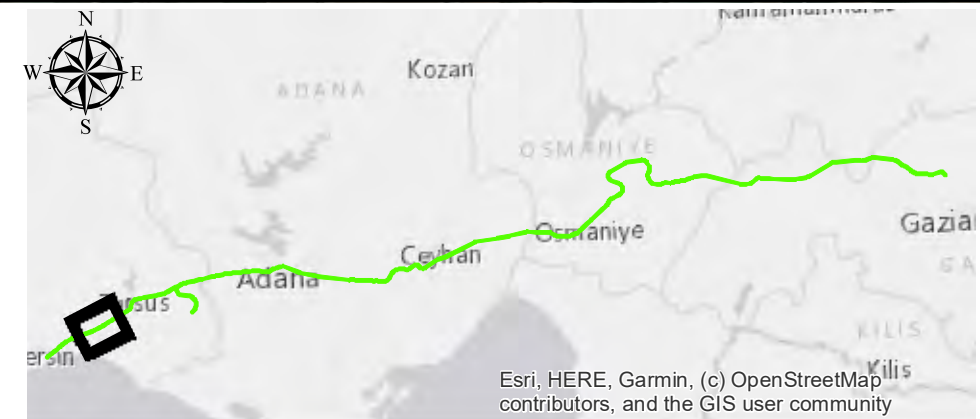
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

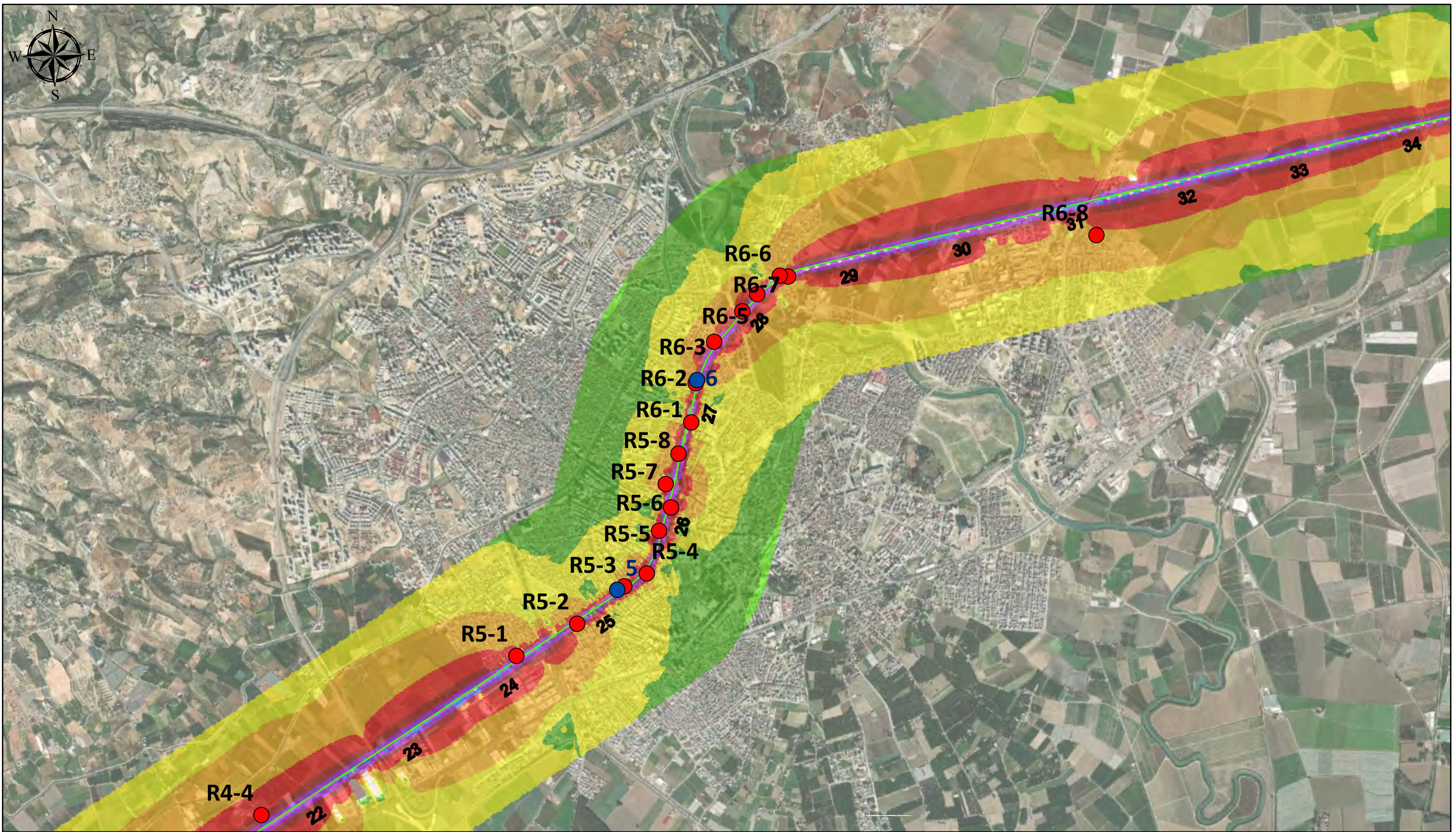
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

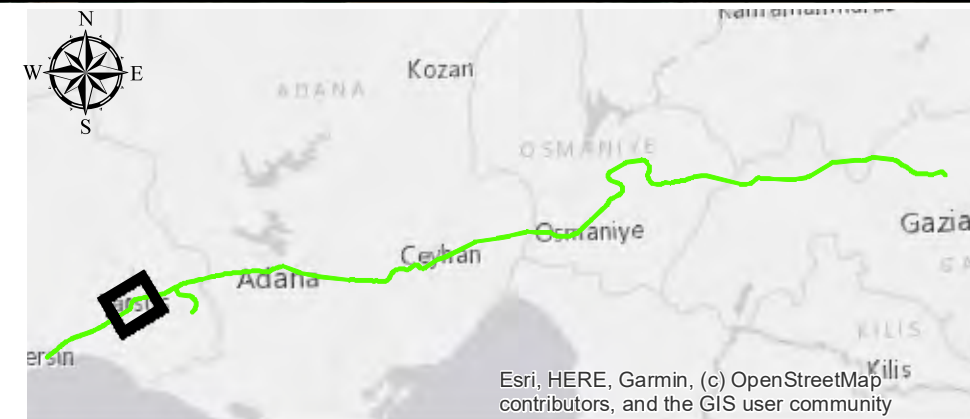
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

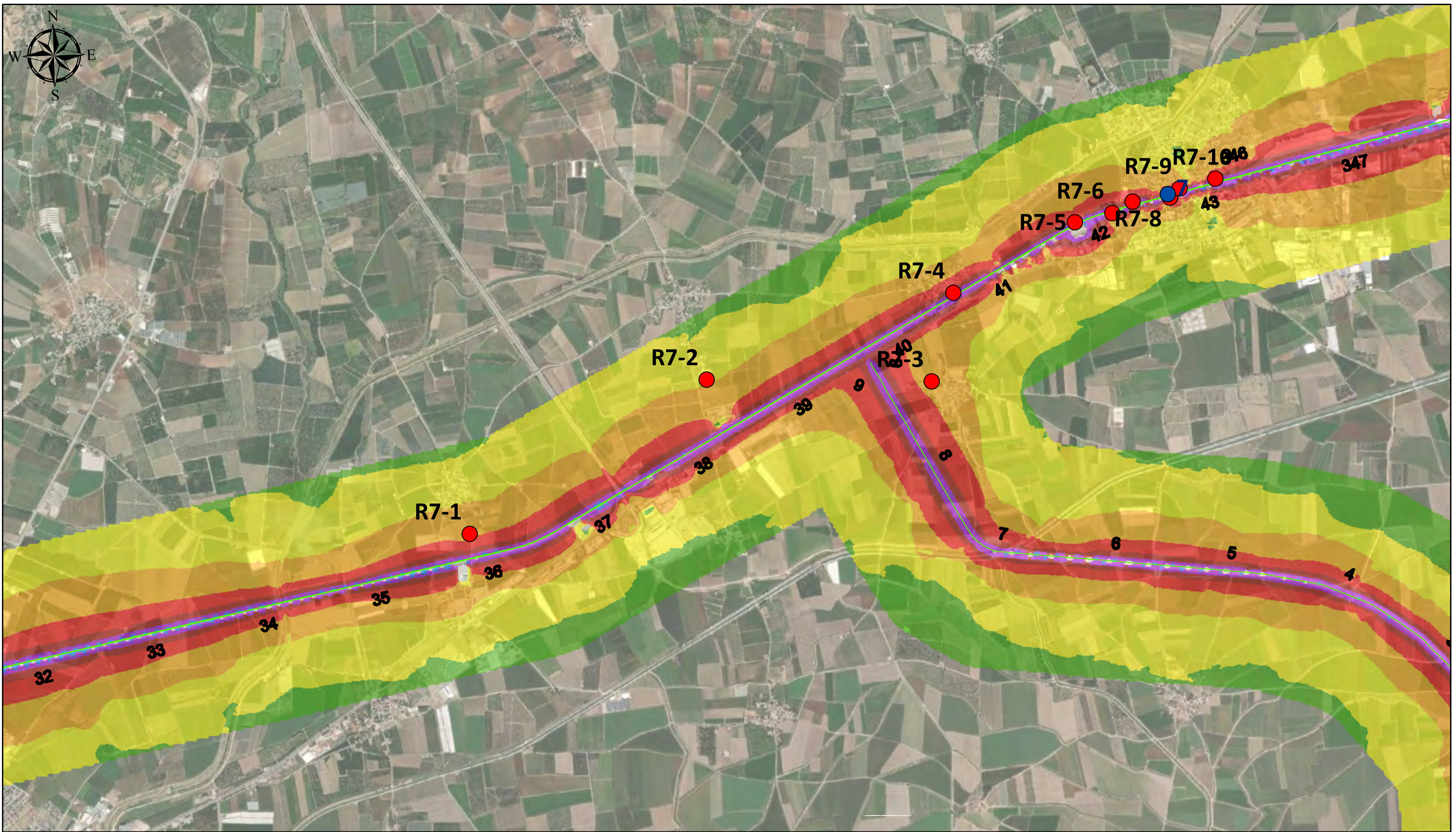
Scale: 1/30.000

Legend

LdBA	
■	<45
■	45-50
■	50-55
■	55-60
■	60-65
■	65-70
■	70-75
■	75-80
■	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

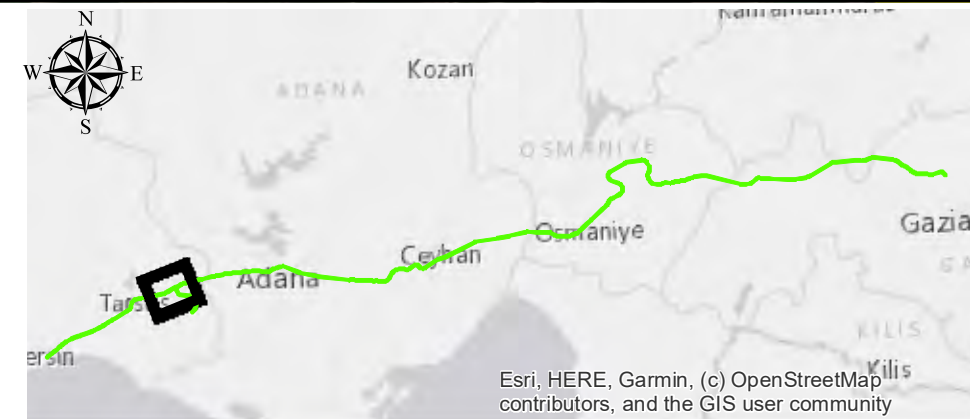
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

Scale: 1/30.000

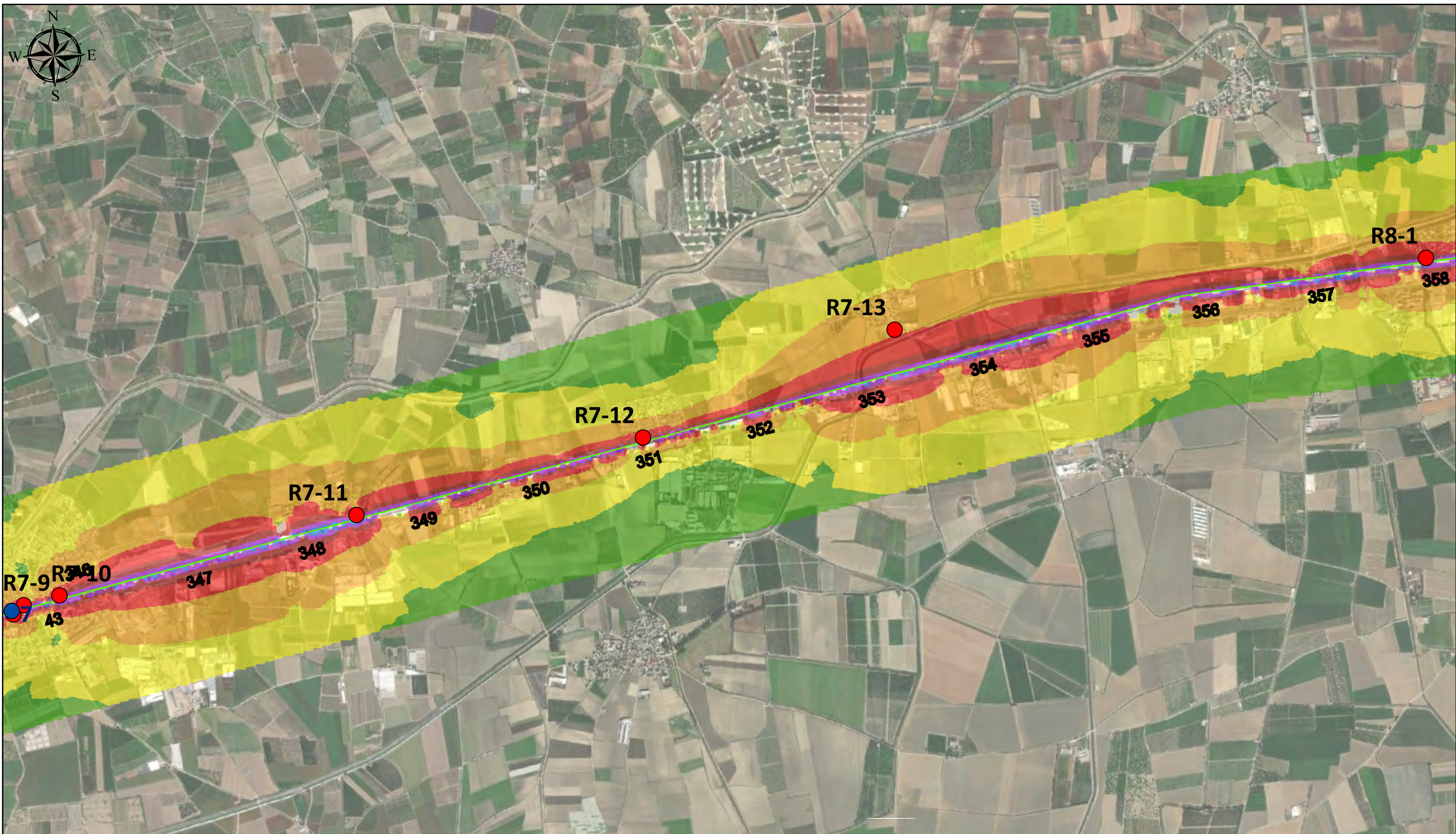
Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

0 500 1.000 2.000 3.000 4.000 Meters



FREKANS

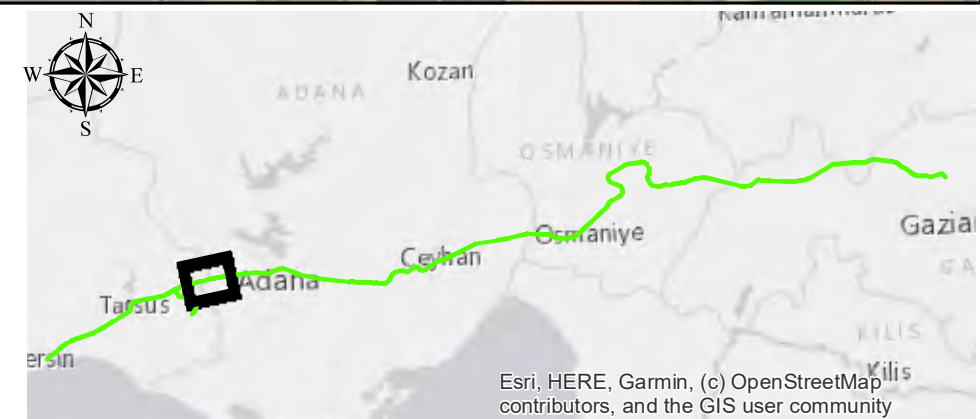
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

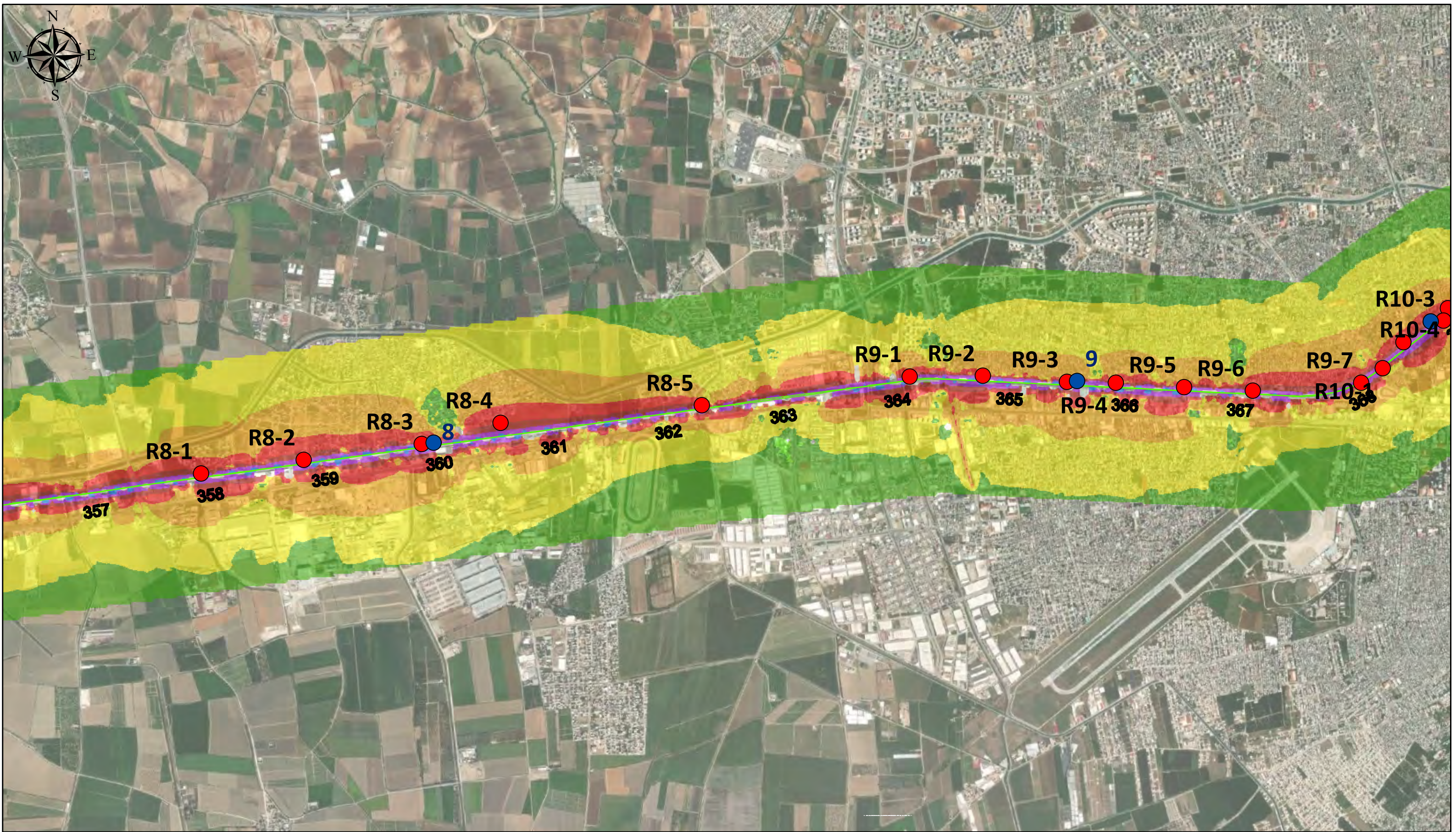
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

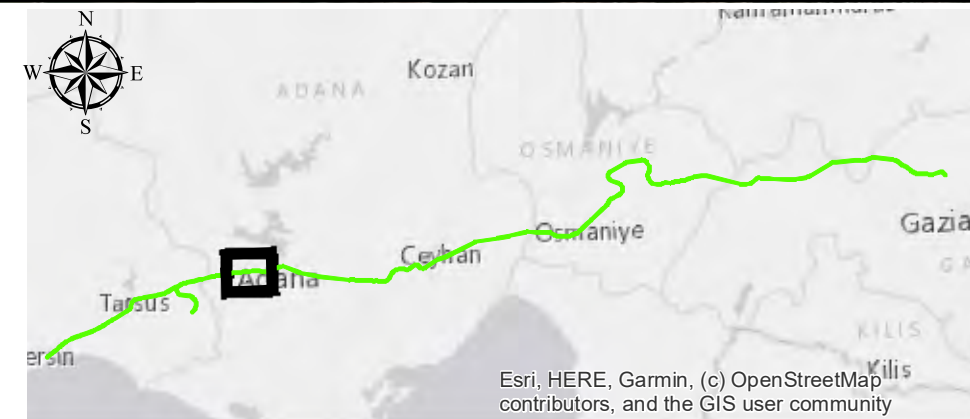
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

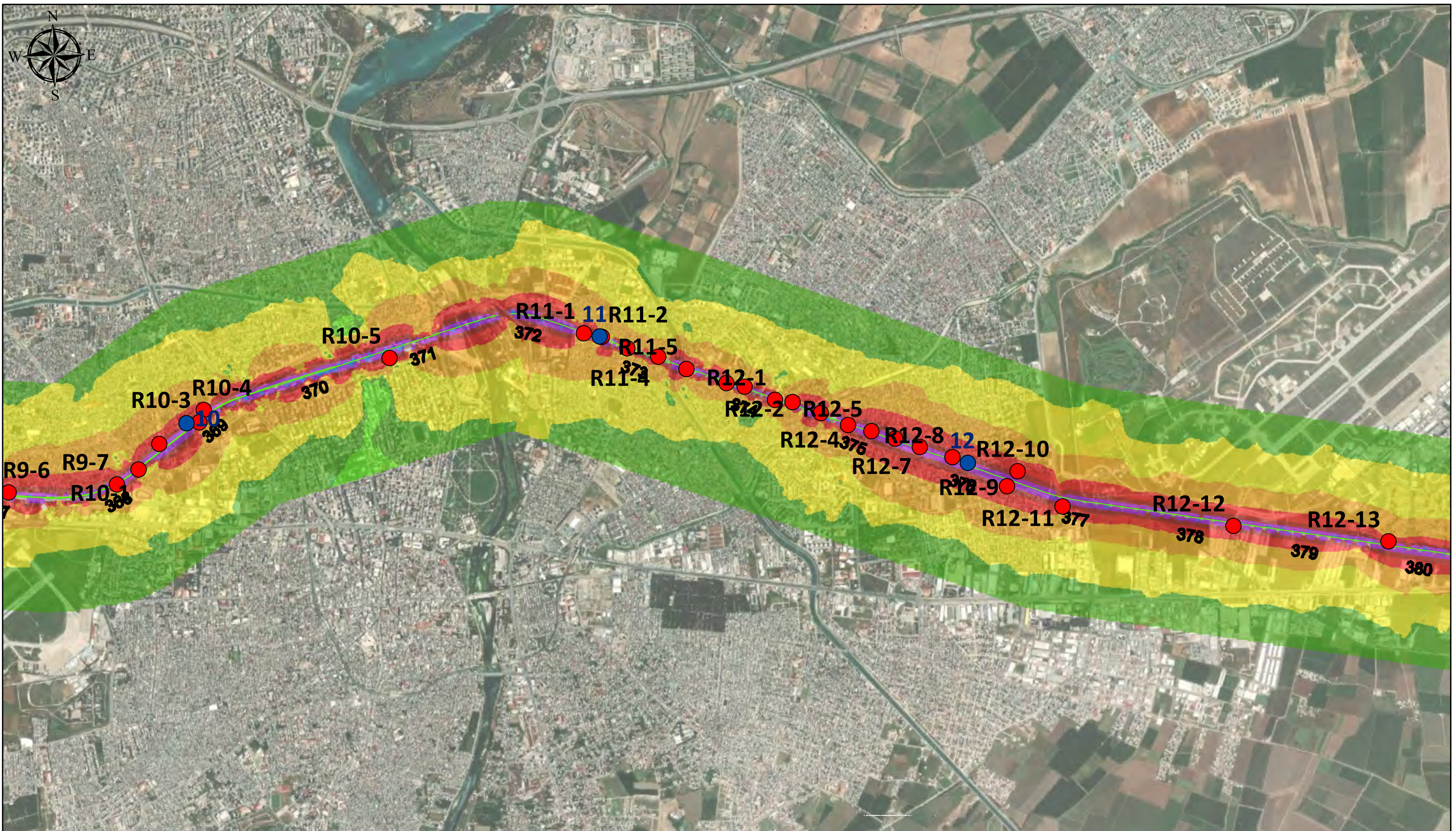
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
60-65	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



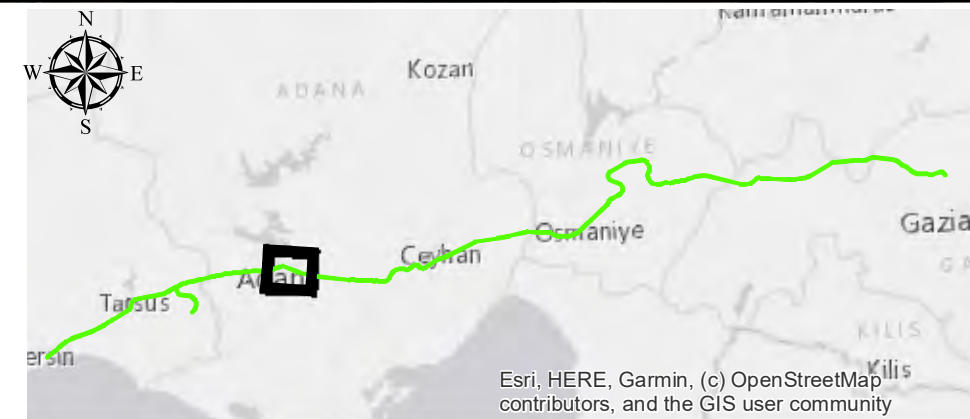
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

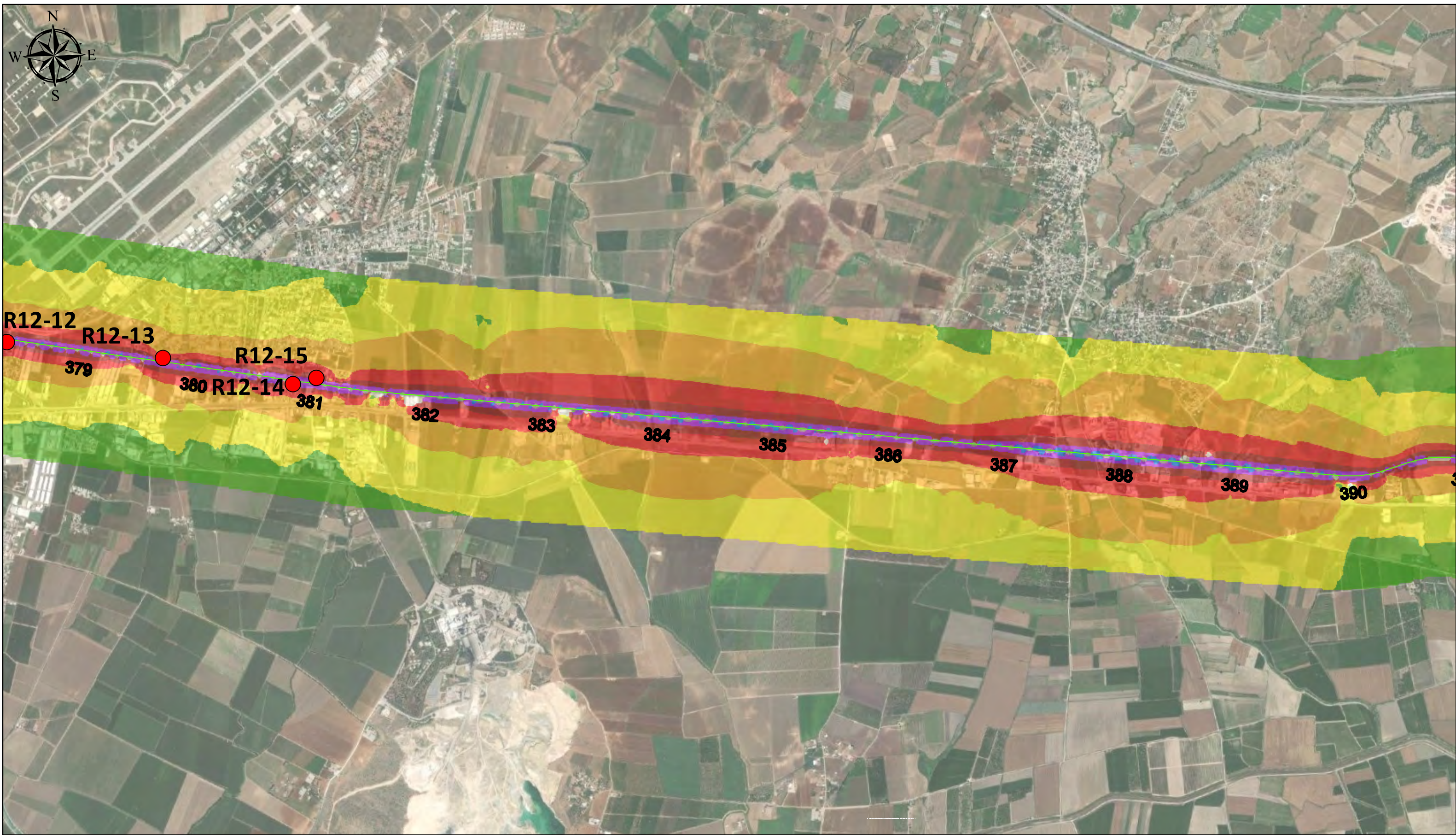
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**

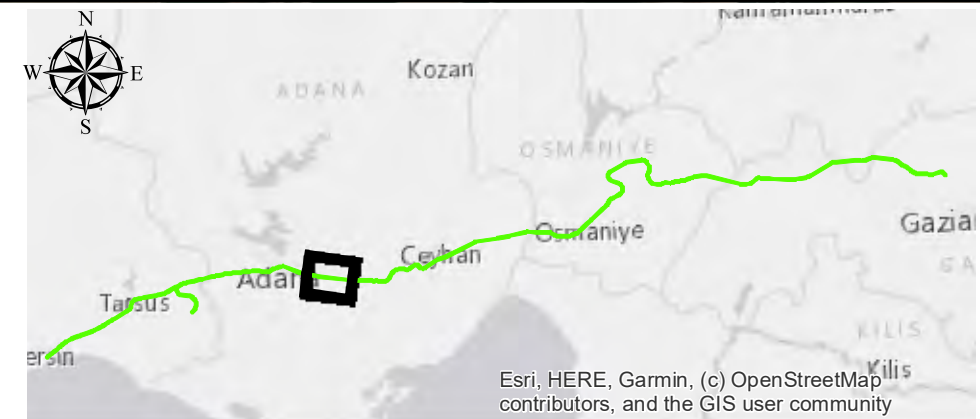
**Measurement and Assessment Points
Construction Phase, Day**

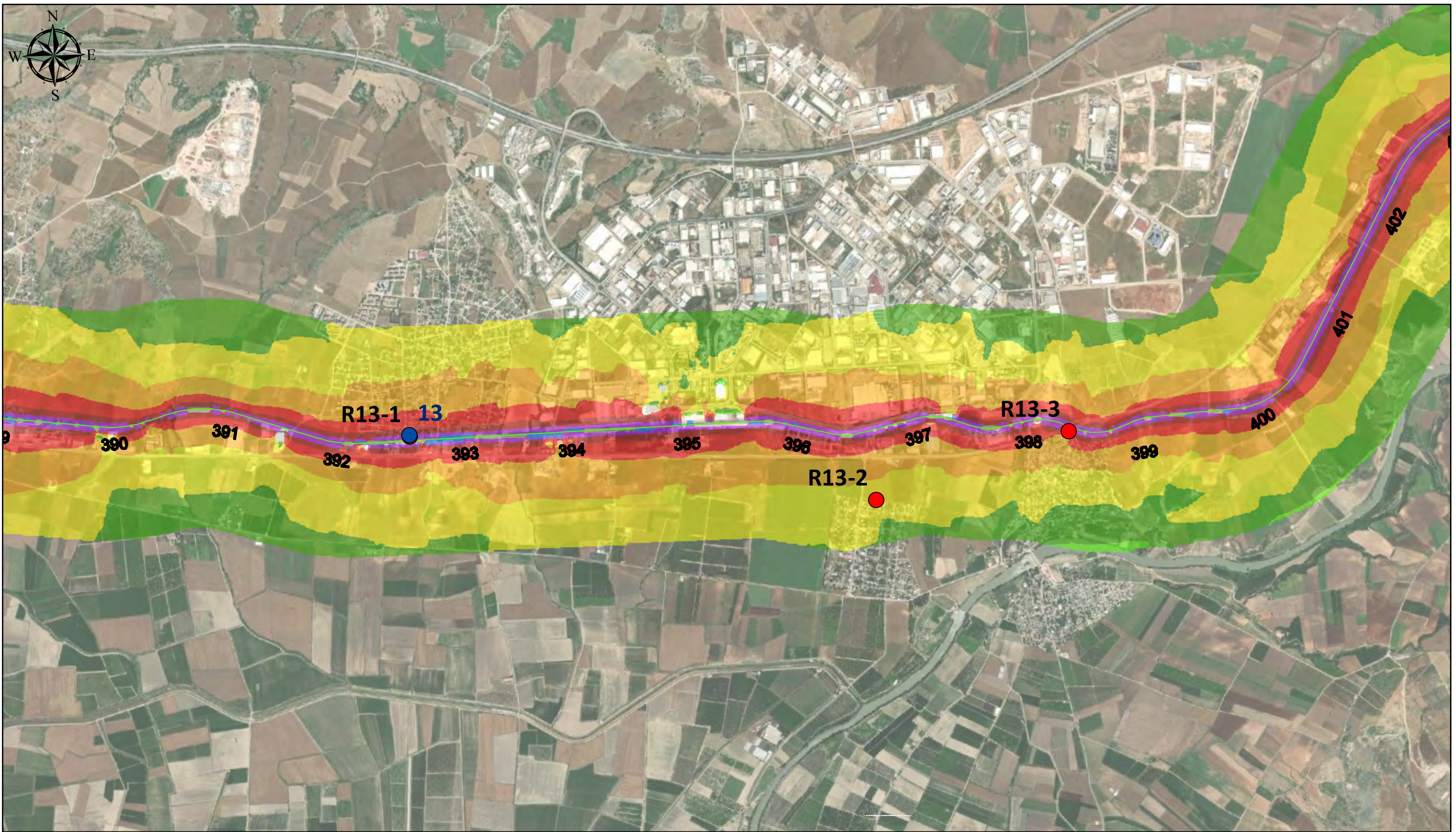
- Measurement Points
- Assessment Points
- Railway

Scale: 1/30.000

Legend

LdBA	
 	<45
 	45-50
 	50-55
 	55-60
 	60-65
 	65-70
 	70-75
 	75-80
 	80<





FREKANS

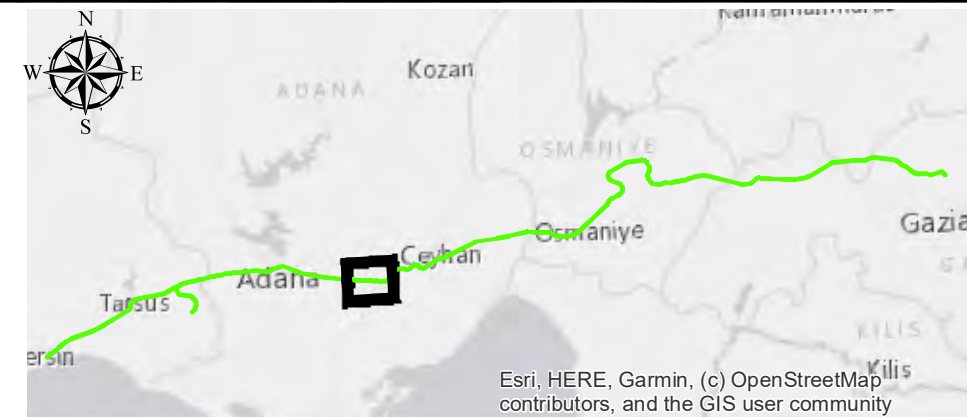
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

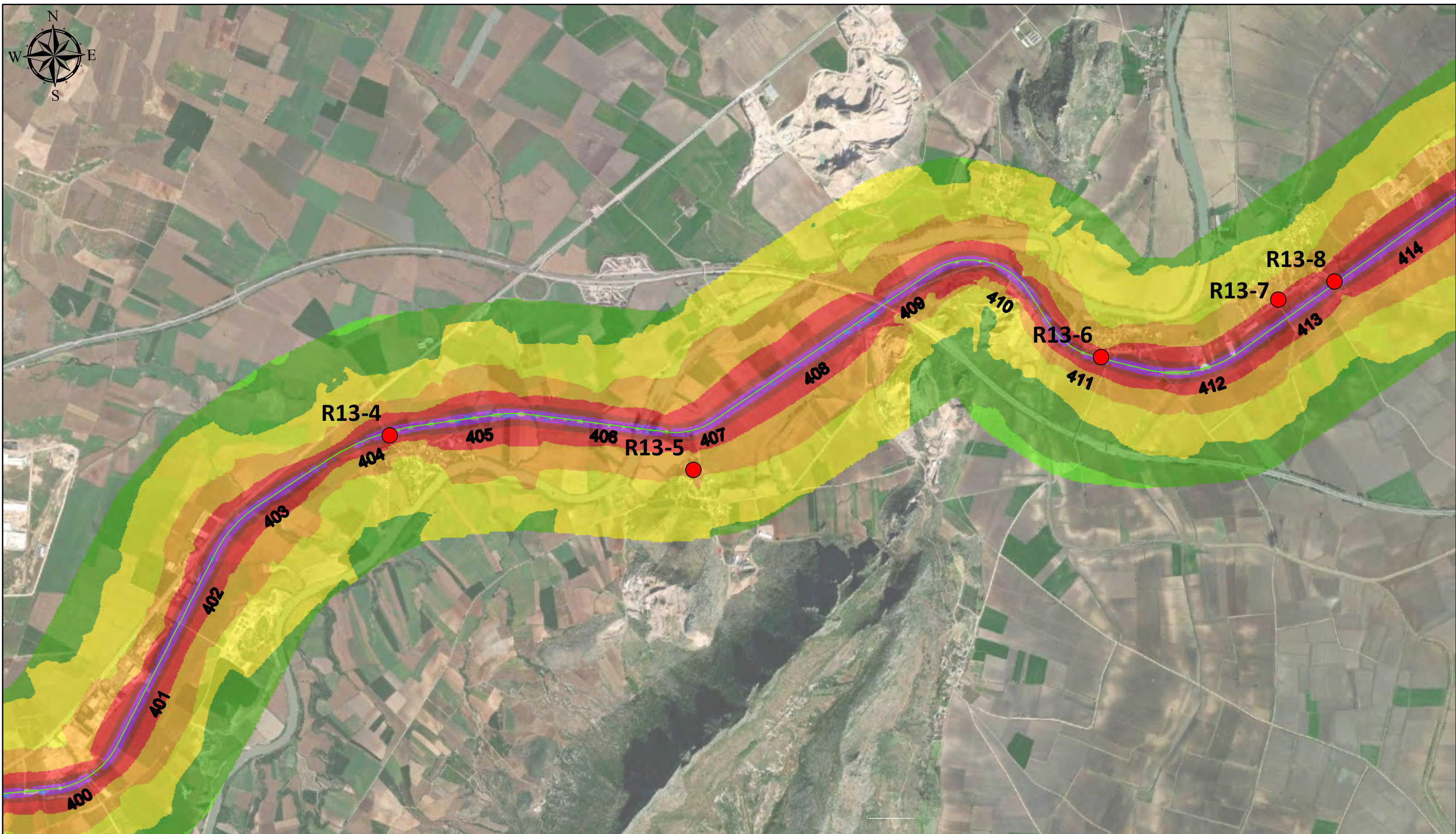
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

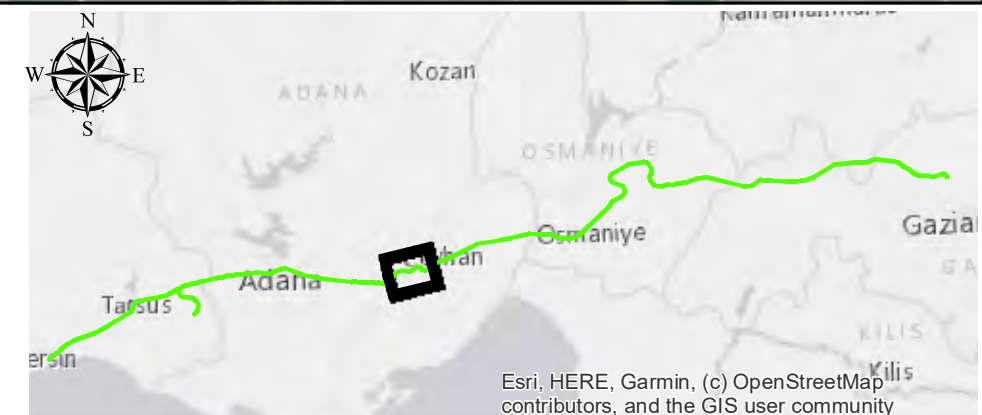
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

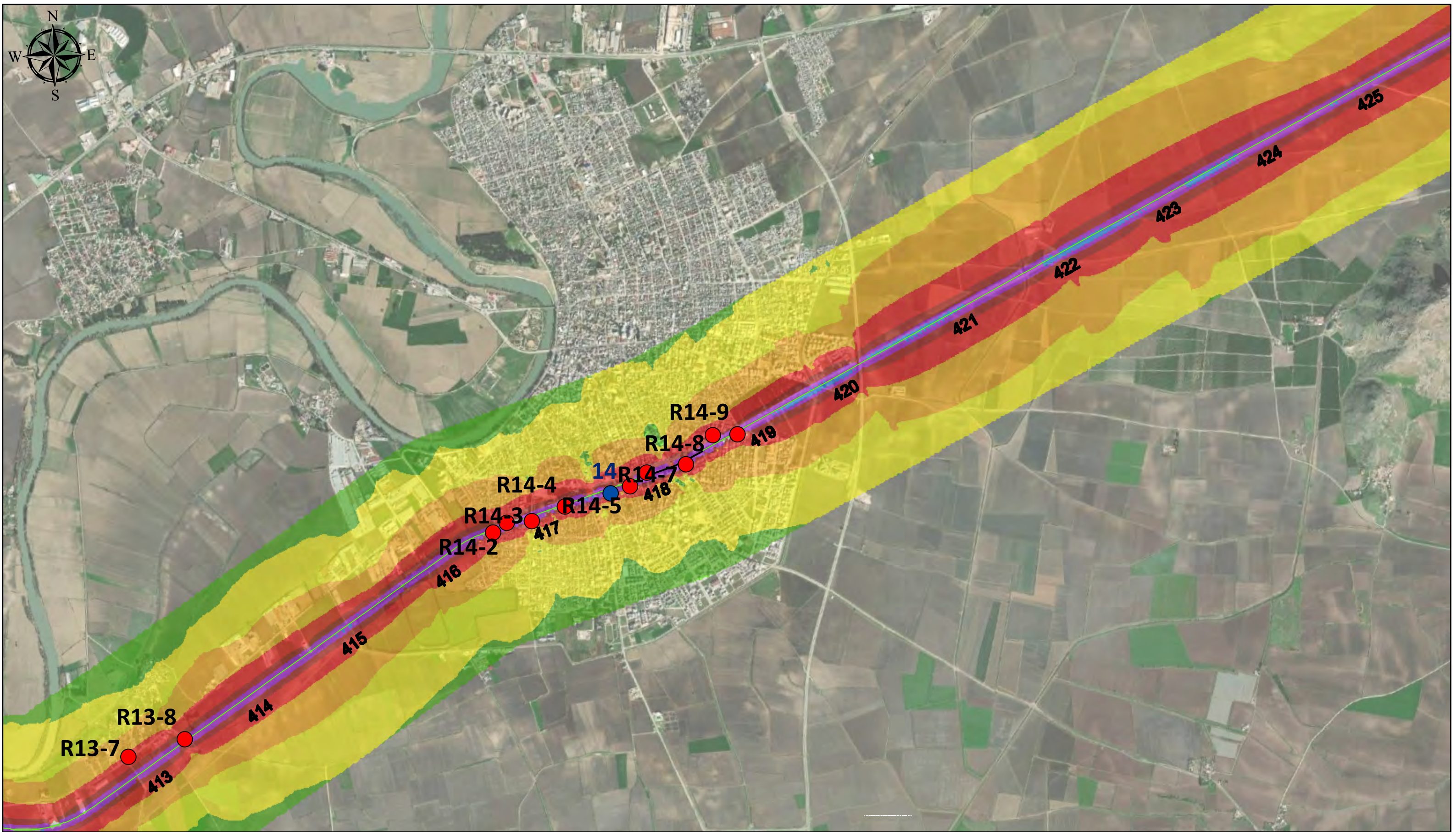
Scale: 1/30.000

Legend

LdBA	
■	60-65
■	65-70
■	70-75
■	75-80
■	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

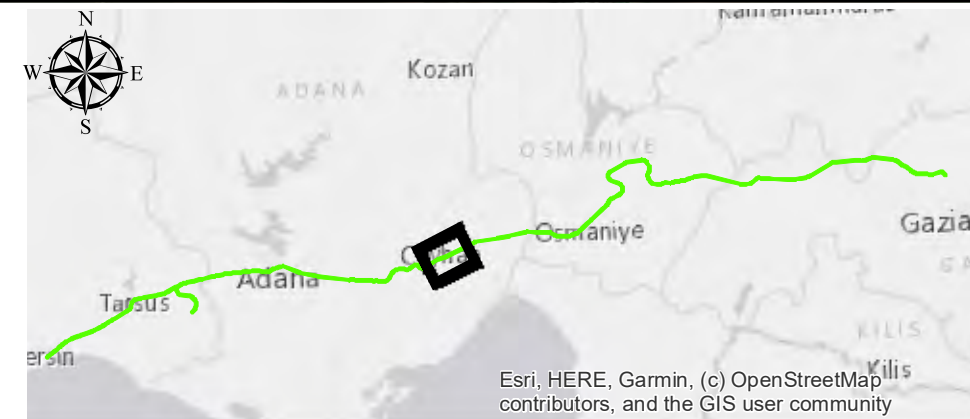
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

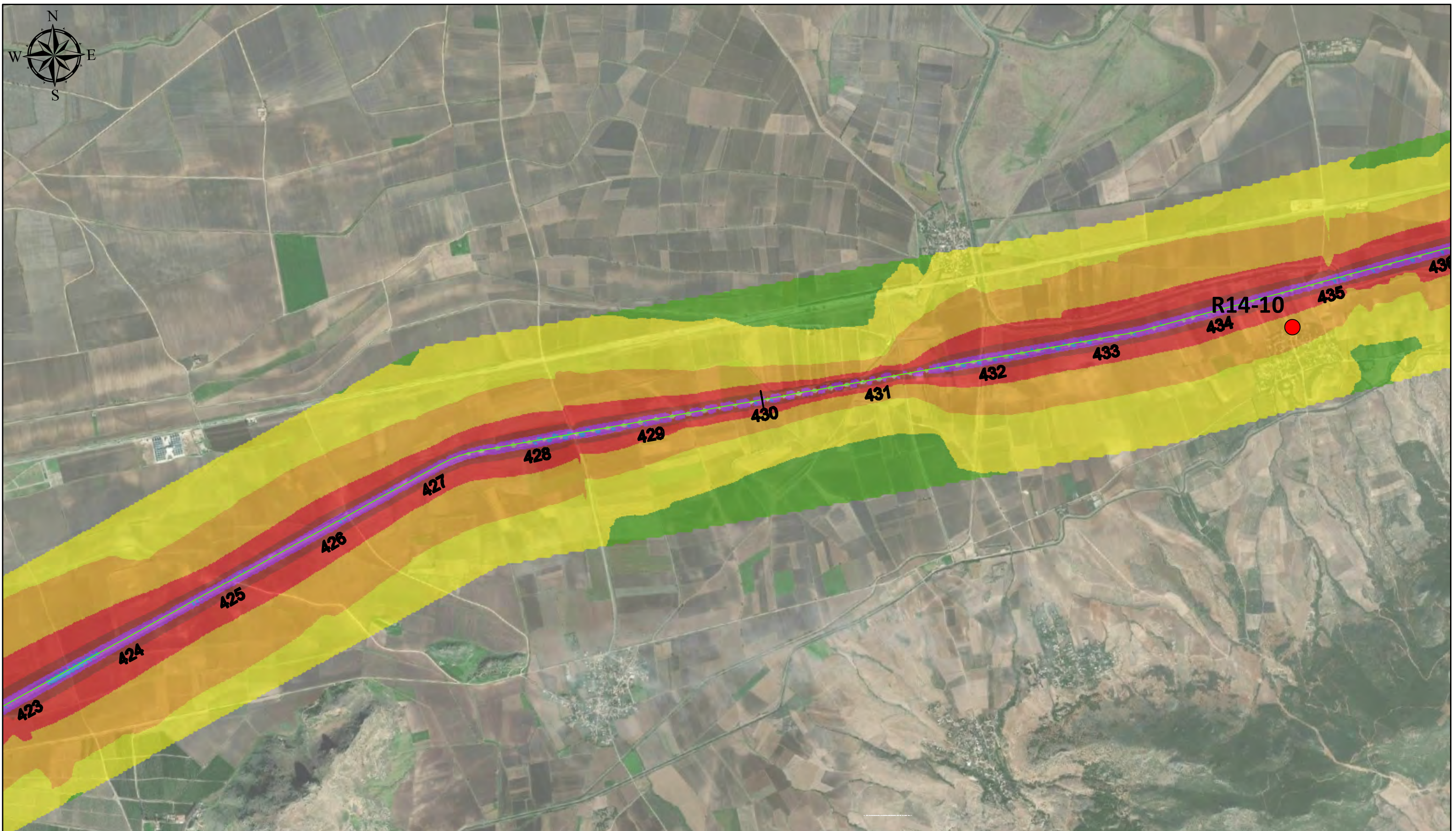
- Measurement Points
- Assessment Points
- Railway

Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<





FREKANS

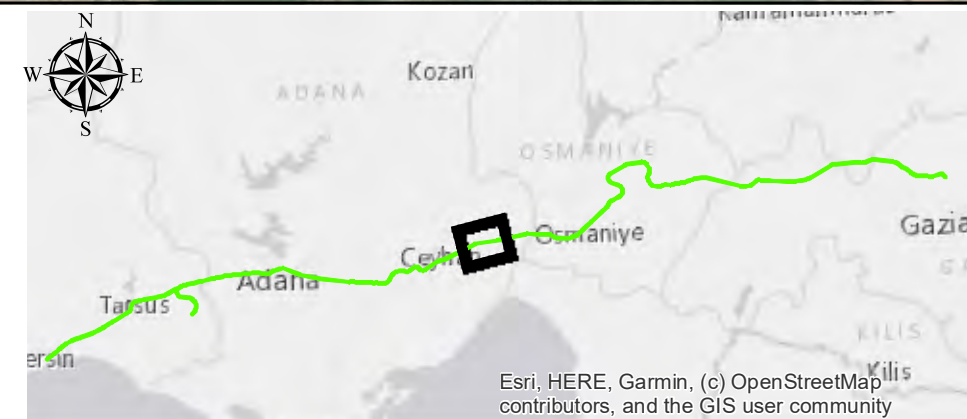
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

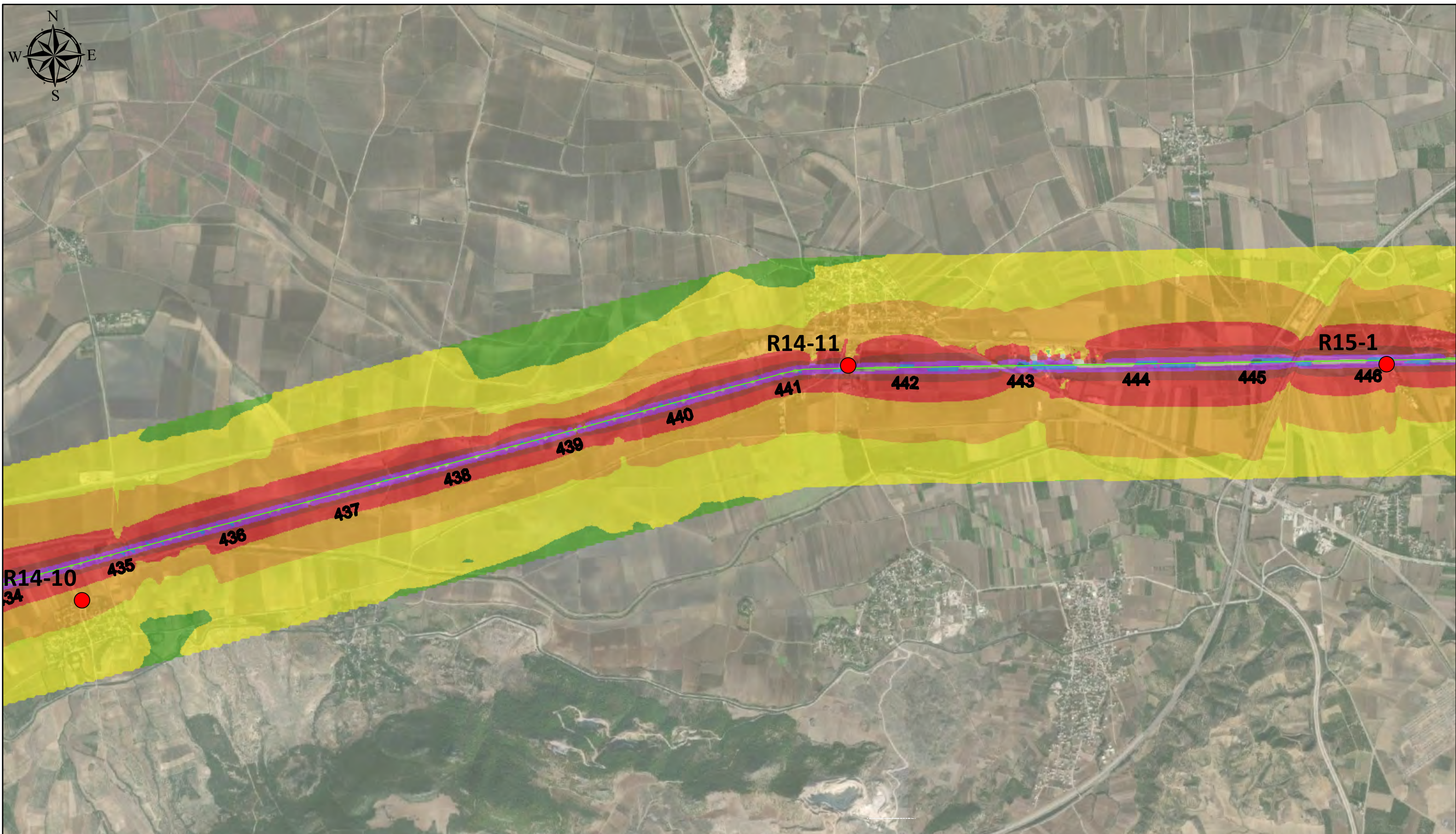
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

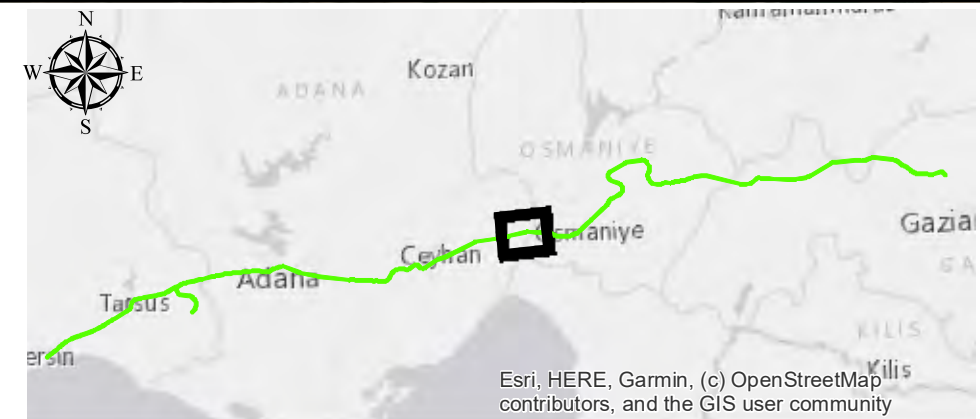
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

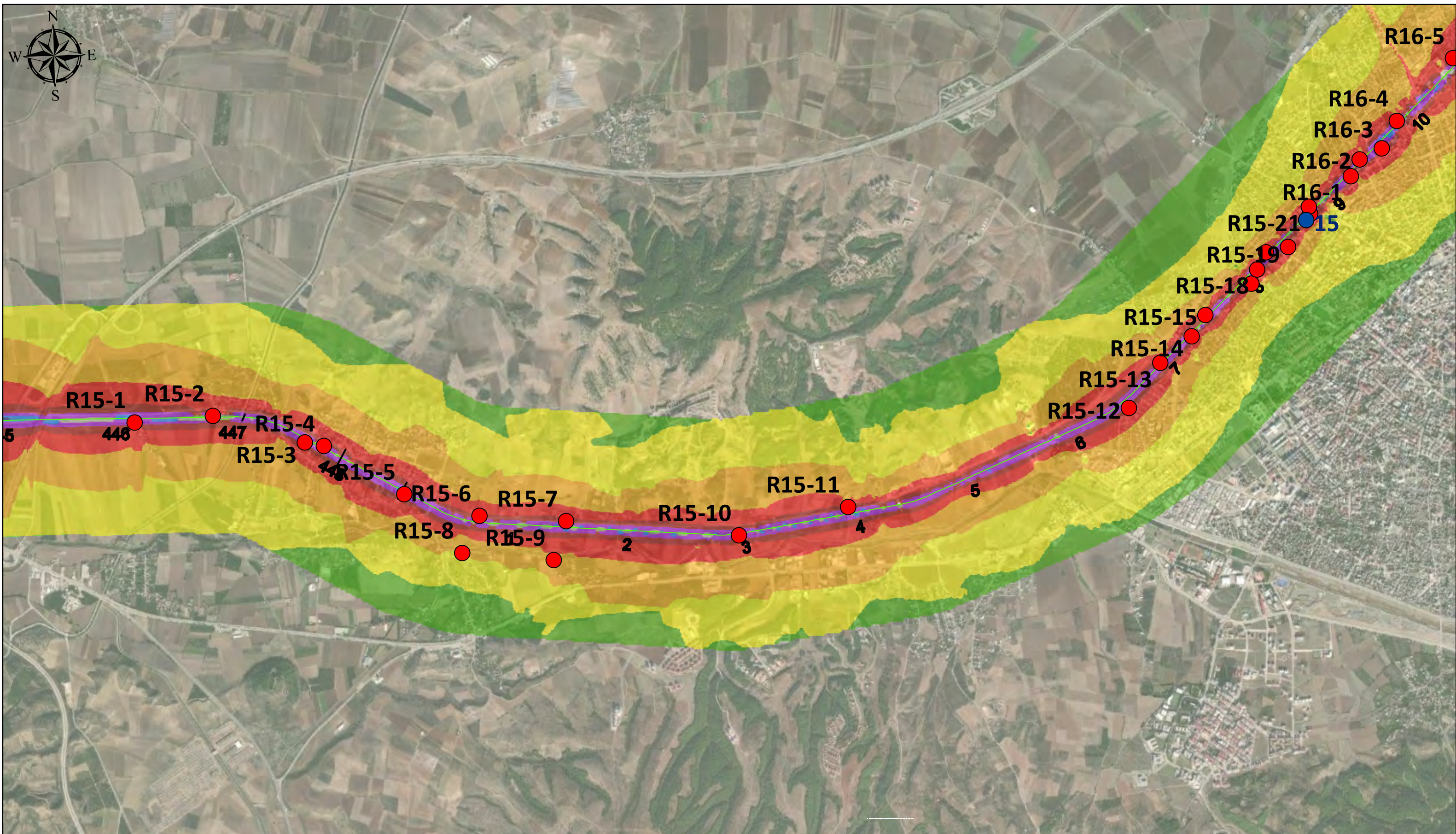
Scale: 1/30.000

Legend

LdBA	
■	60-65
■	65-70
■	70-75
■	75-80
■	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

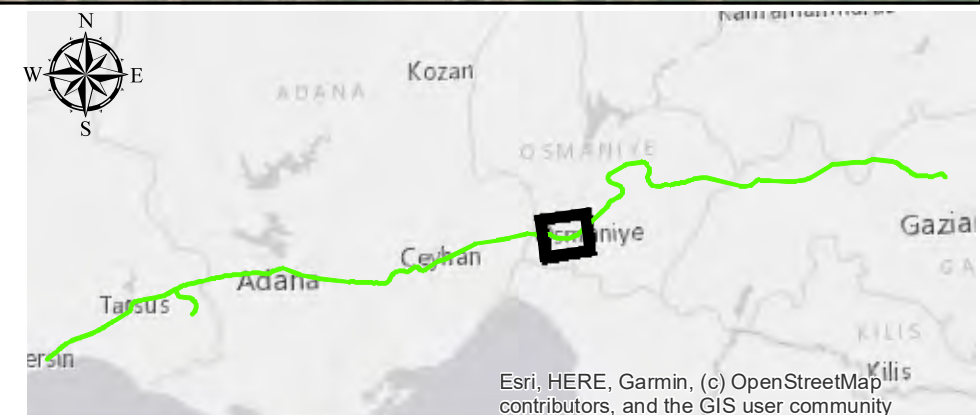
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

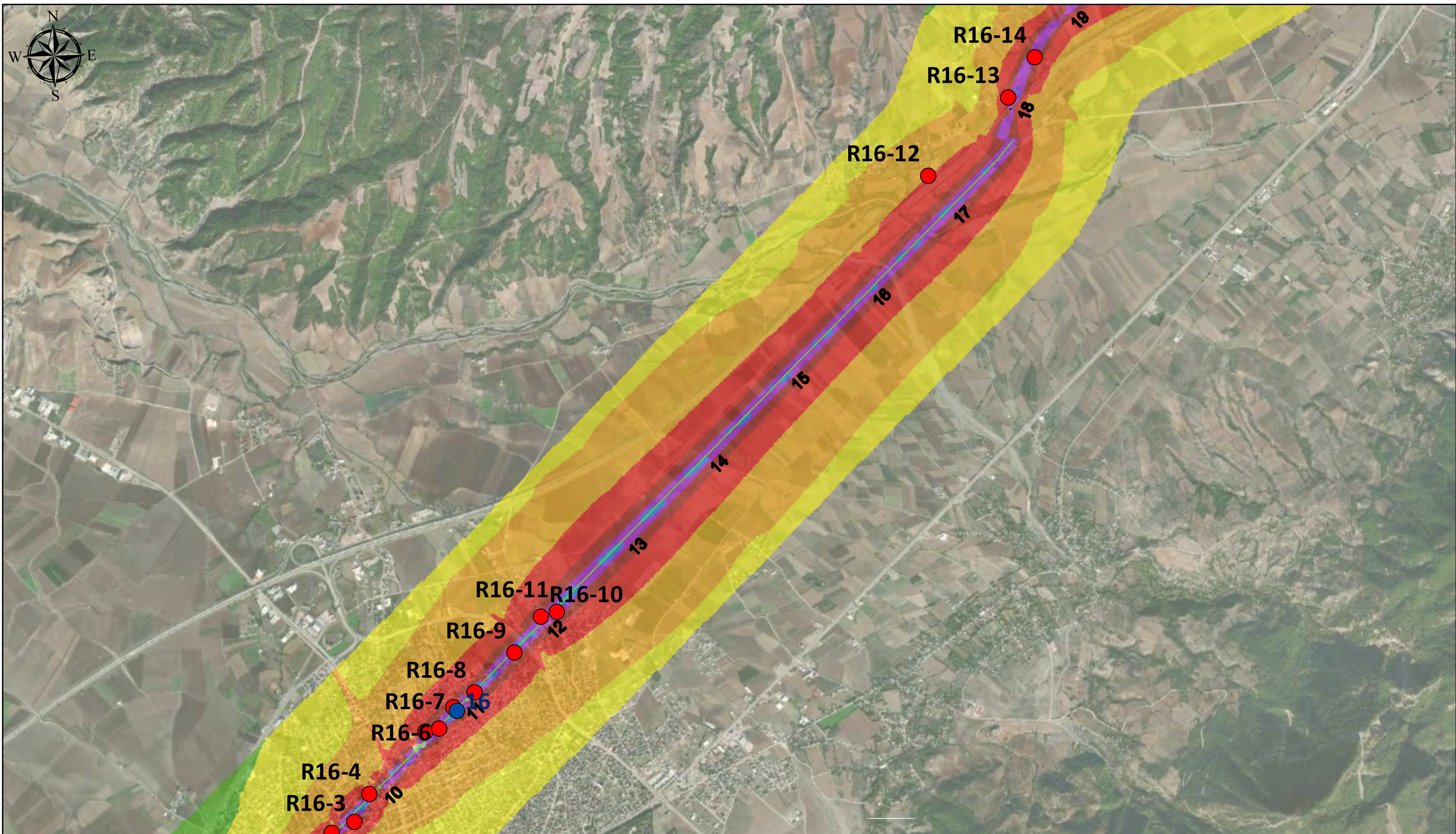
Scale: 1/30.000

Legend

LdBA	
	<45
	45-50
	50-55
	55-60
	60-65
	65-70
	70-75
	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

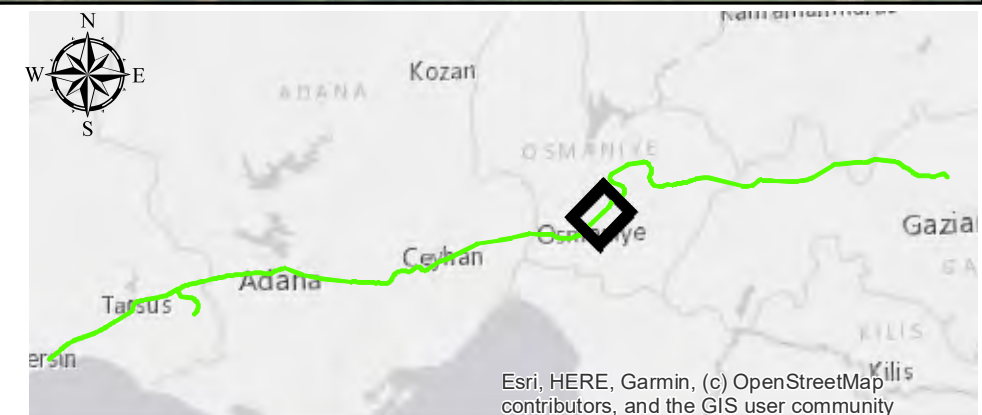
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

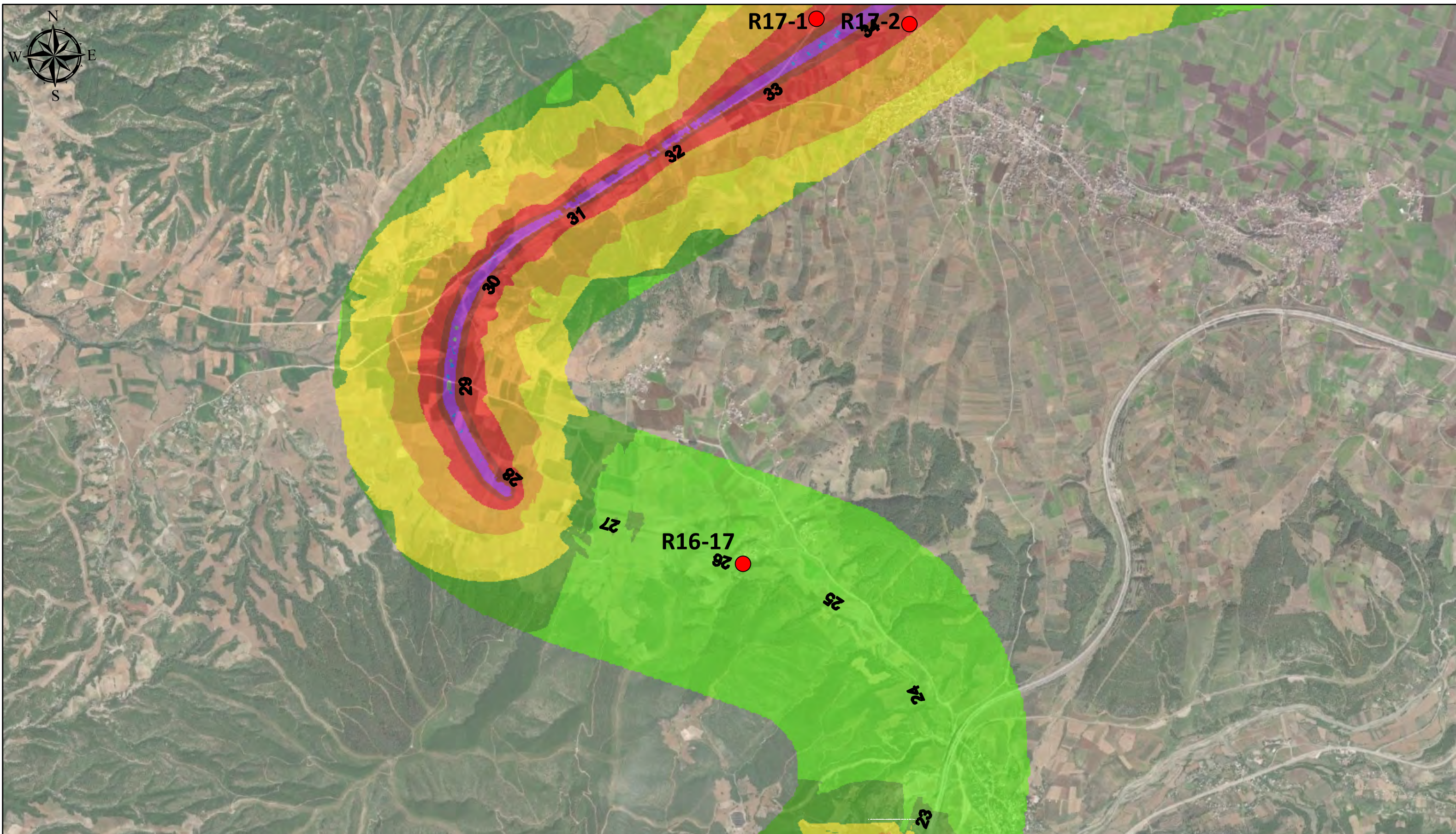
- Measurement Points
- Assessment Points
- Railway

Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<





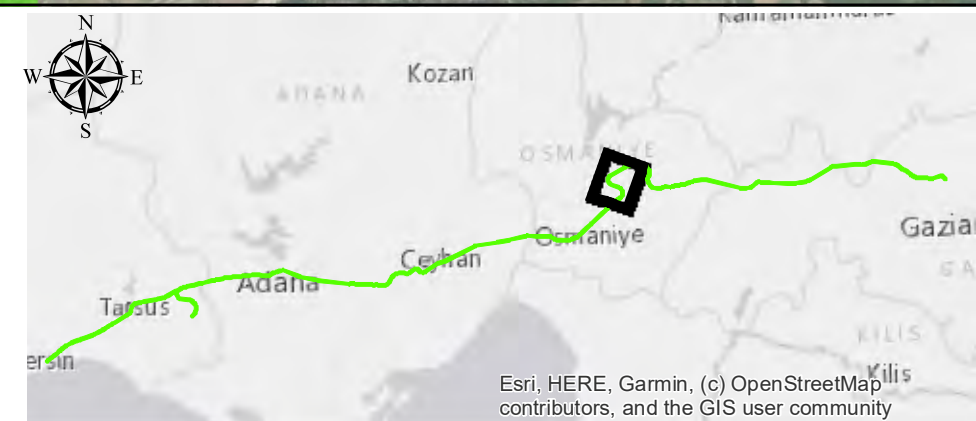
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

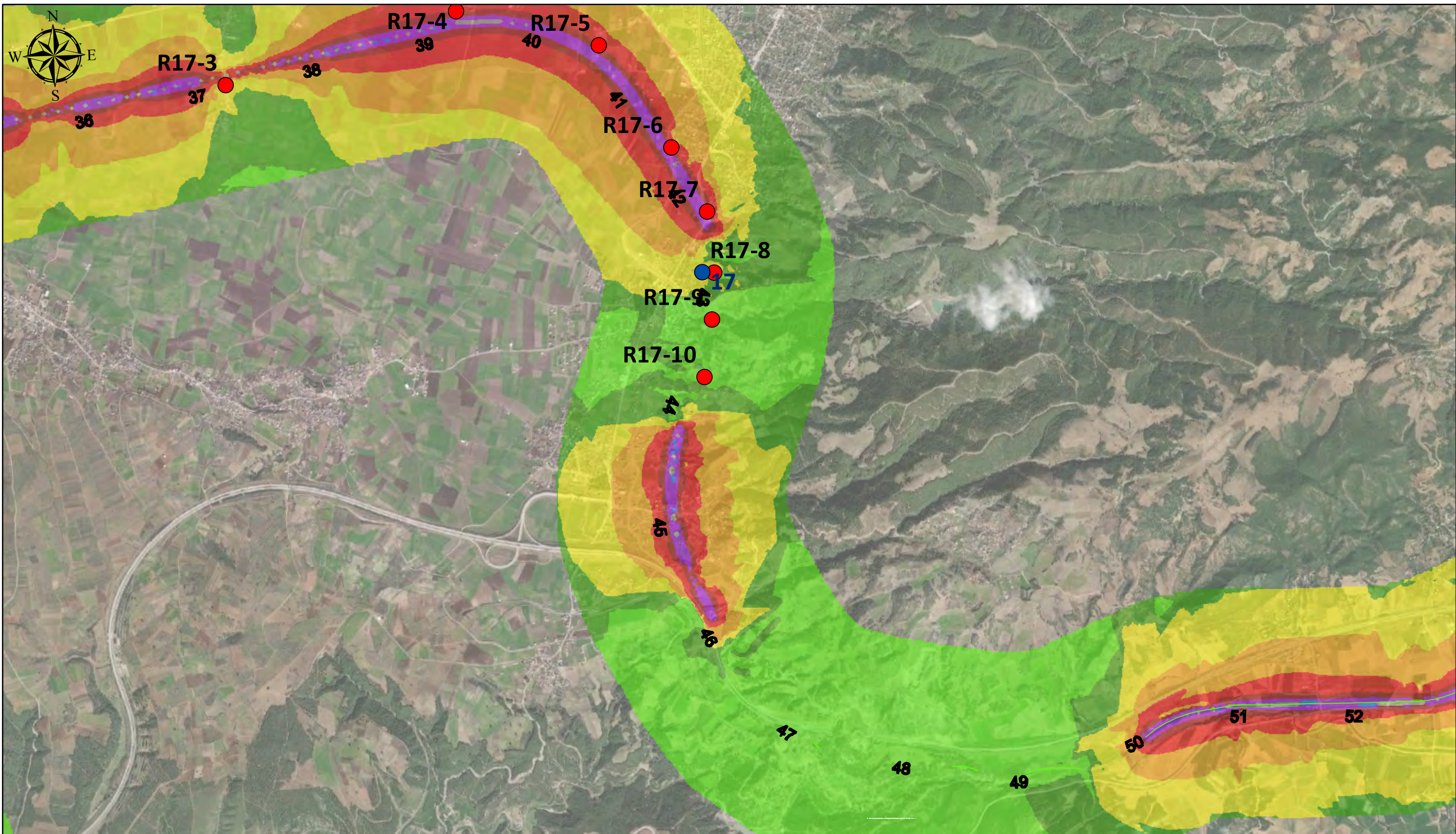
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

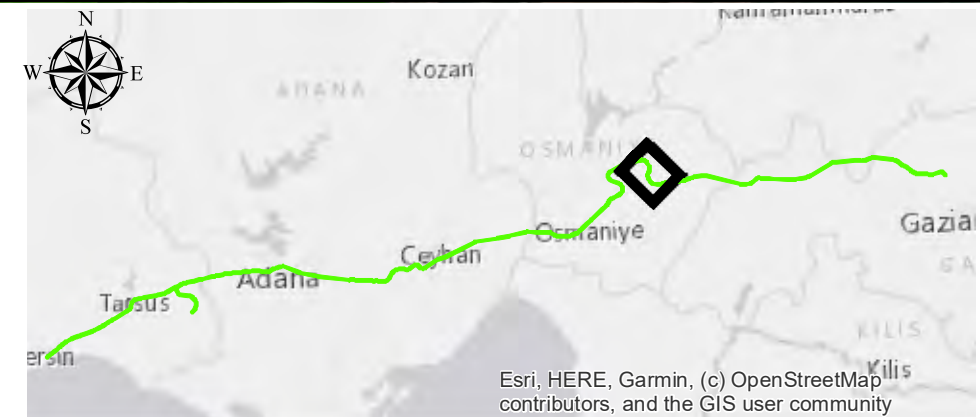
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

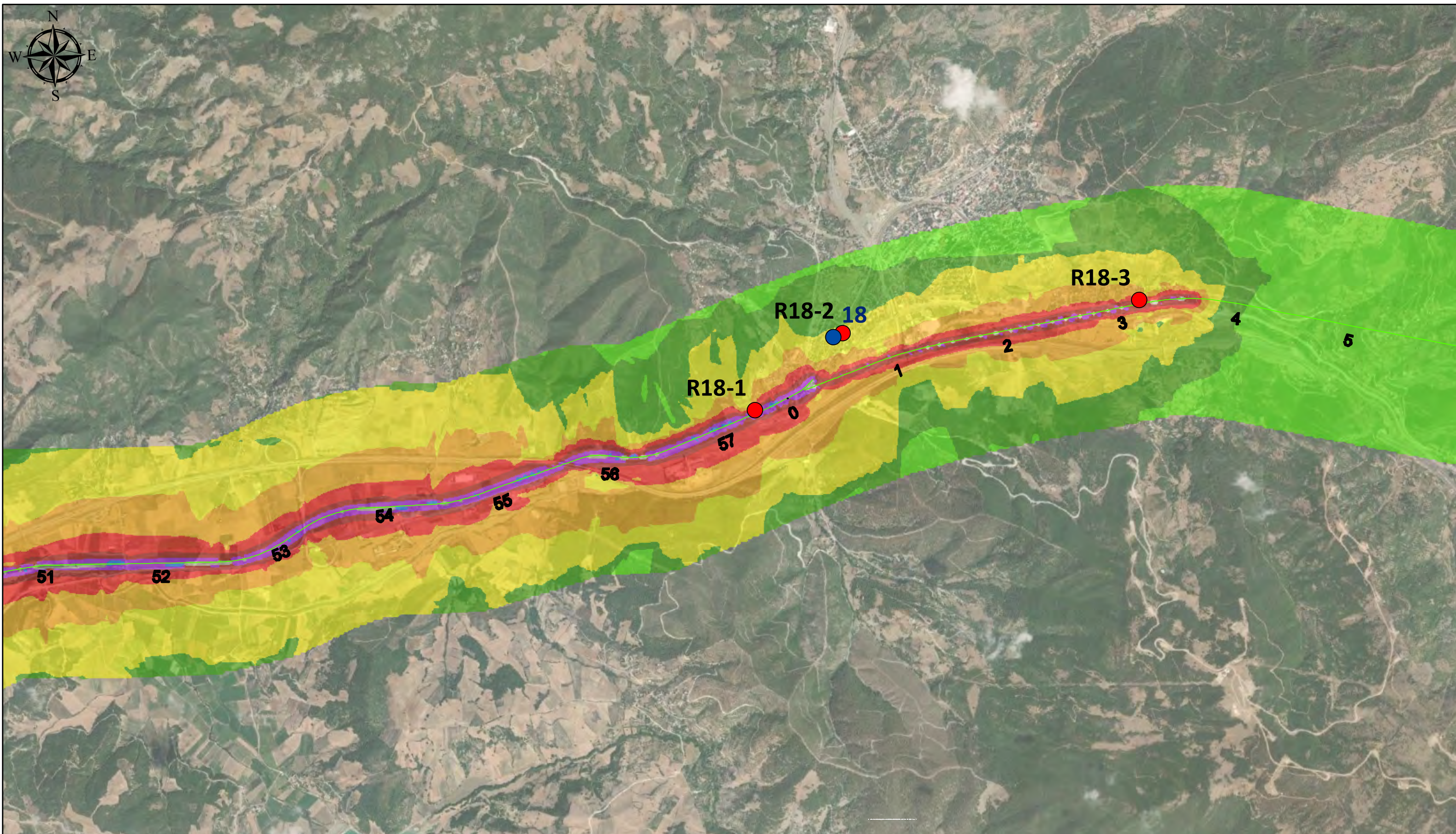
Scale: 1/30.000

Legend

LdBA	
■ 60-65	■ 60-65
■ 65-70	■ 65-70
■ 70-75	■ 70-75
■ 75-80	■ 75-80
■ 80<	■ 80<
■ 55-60	
■ 50-55	
■ 45-50	
■ <45	



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



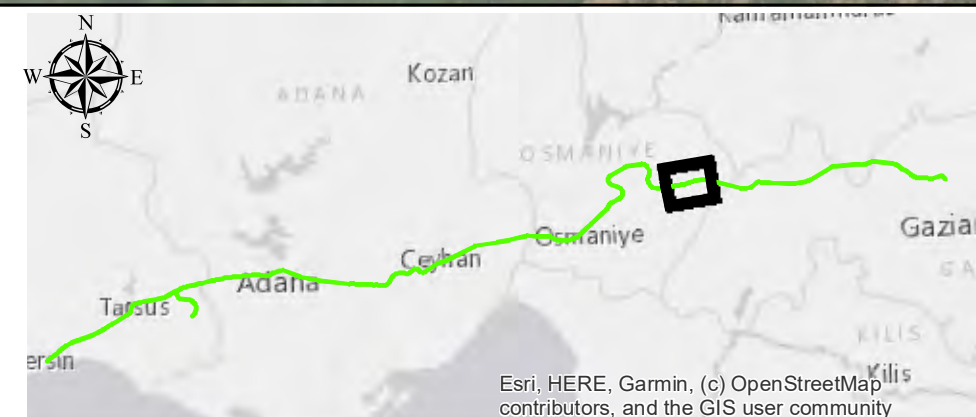
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

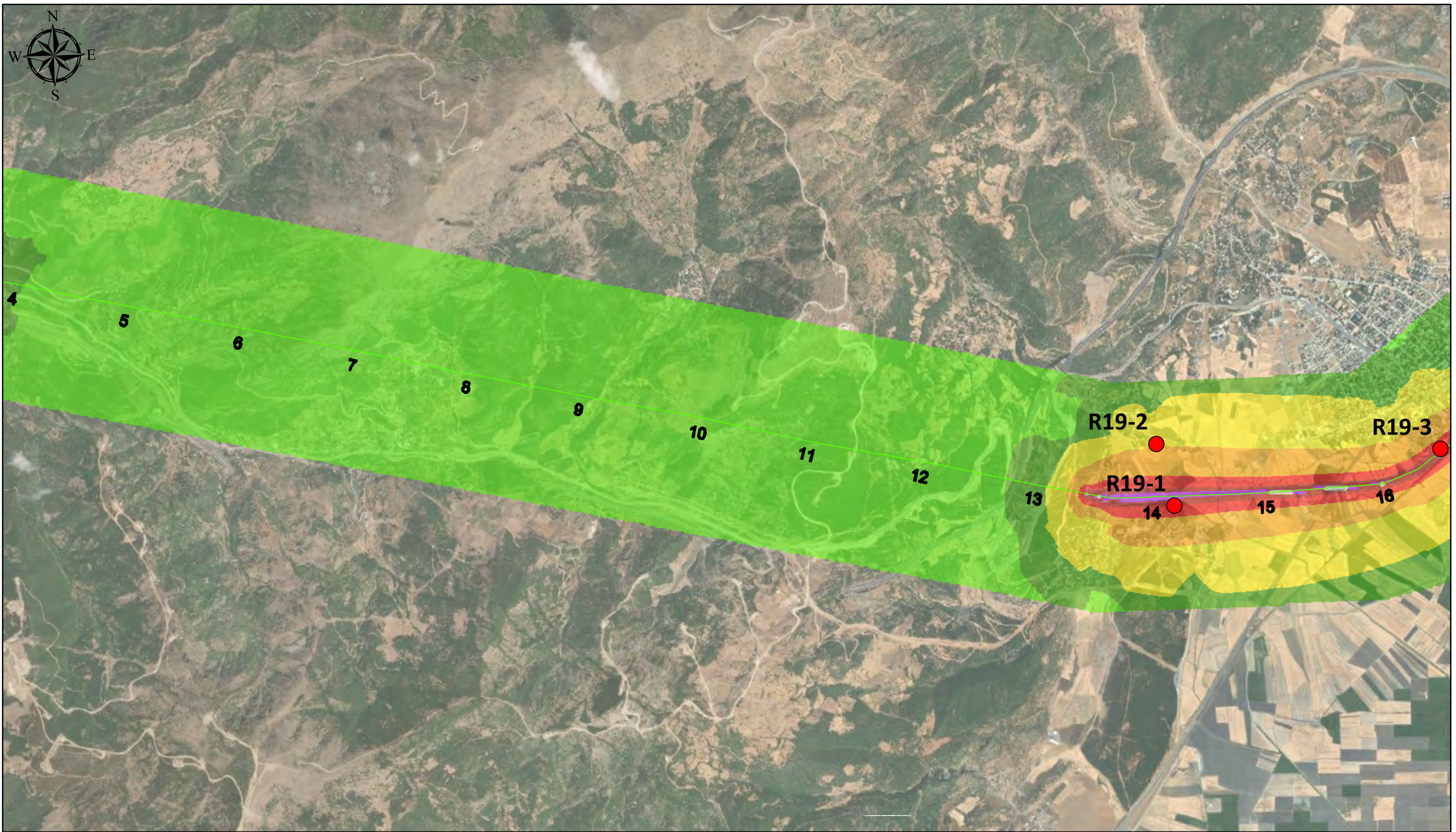
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

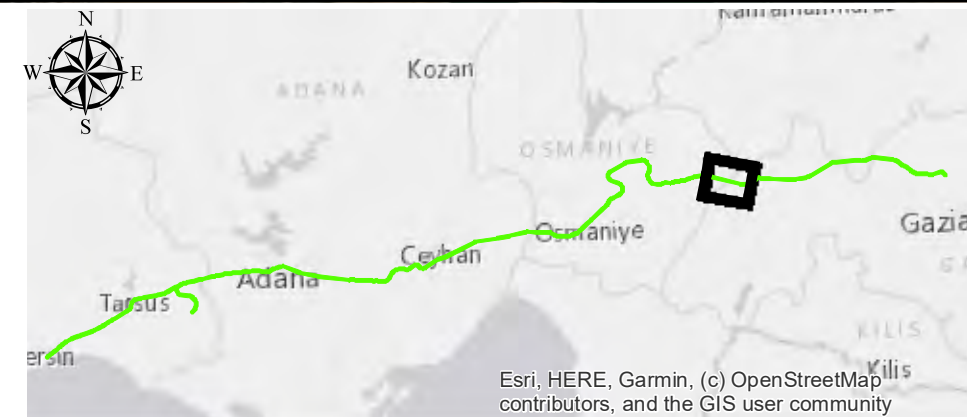
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

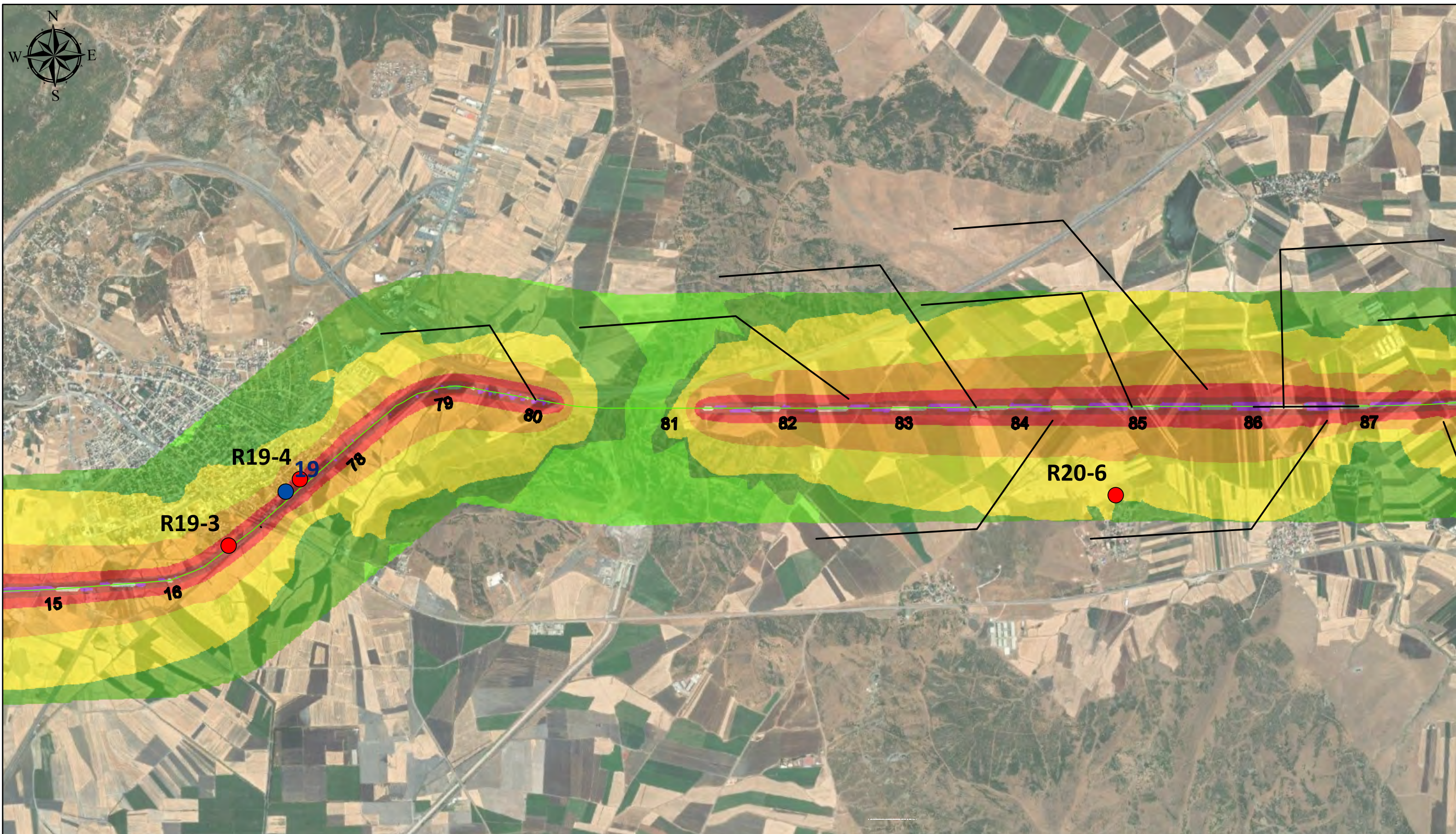
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



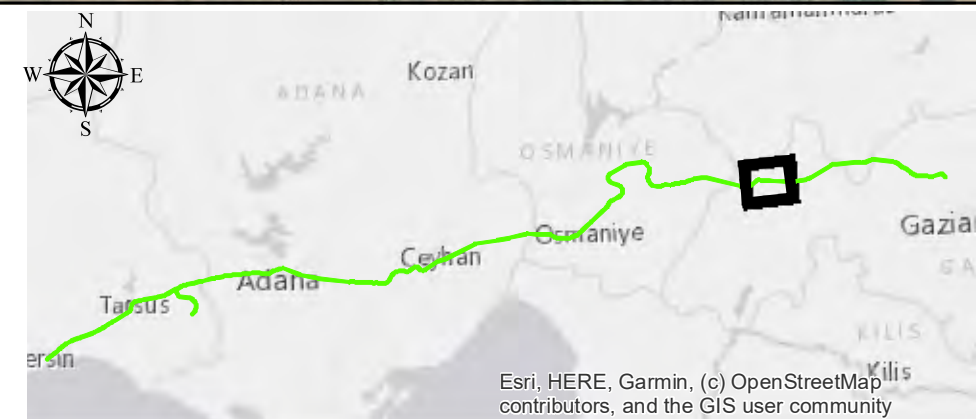
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

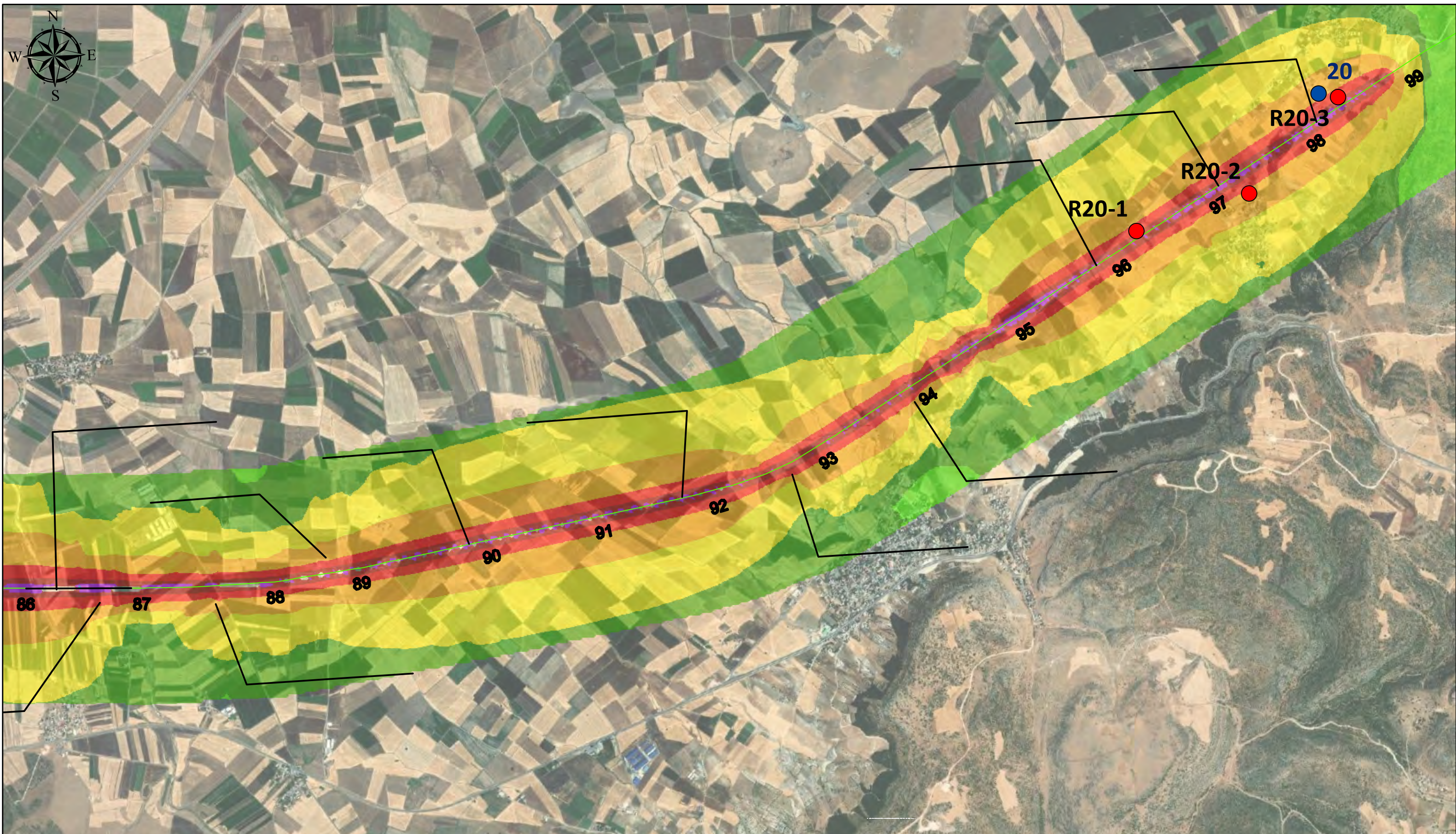
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

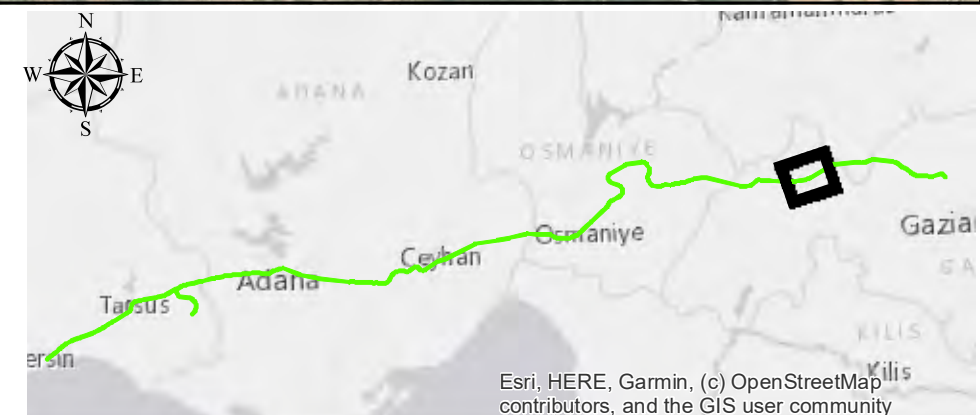
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**

**Measurement and Assessment Points
Construction Phase, Day**

- Measurement Points (Blue dot)
- Assessment Points (Red dot)
- Railway (Green line)

Legend

- LdBA
- <45 (Green)
 - 45-50 (Light Green)
 - 50-55 (Yellow)
 - 55-60 (Orange)
 - 60-65 (Red)
 - 65-70 (Dark Red)
 - 70-75 (Purple)
 - 75-80 (Blue)
 - 80< (Dark Blue)



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

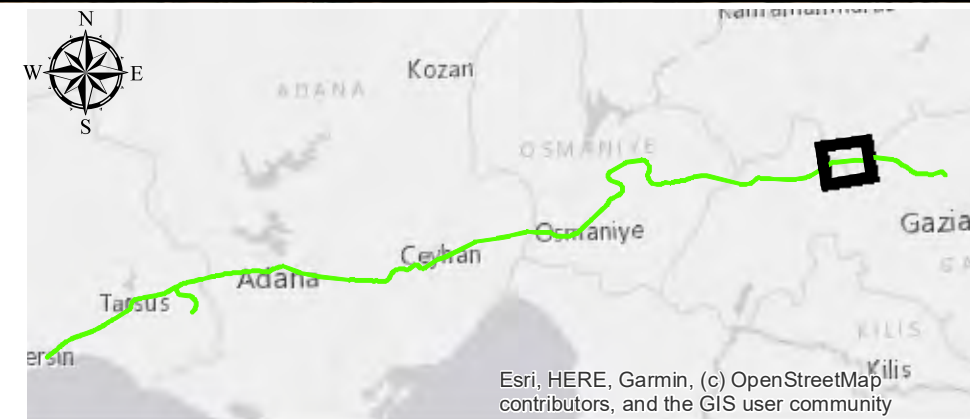
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

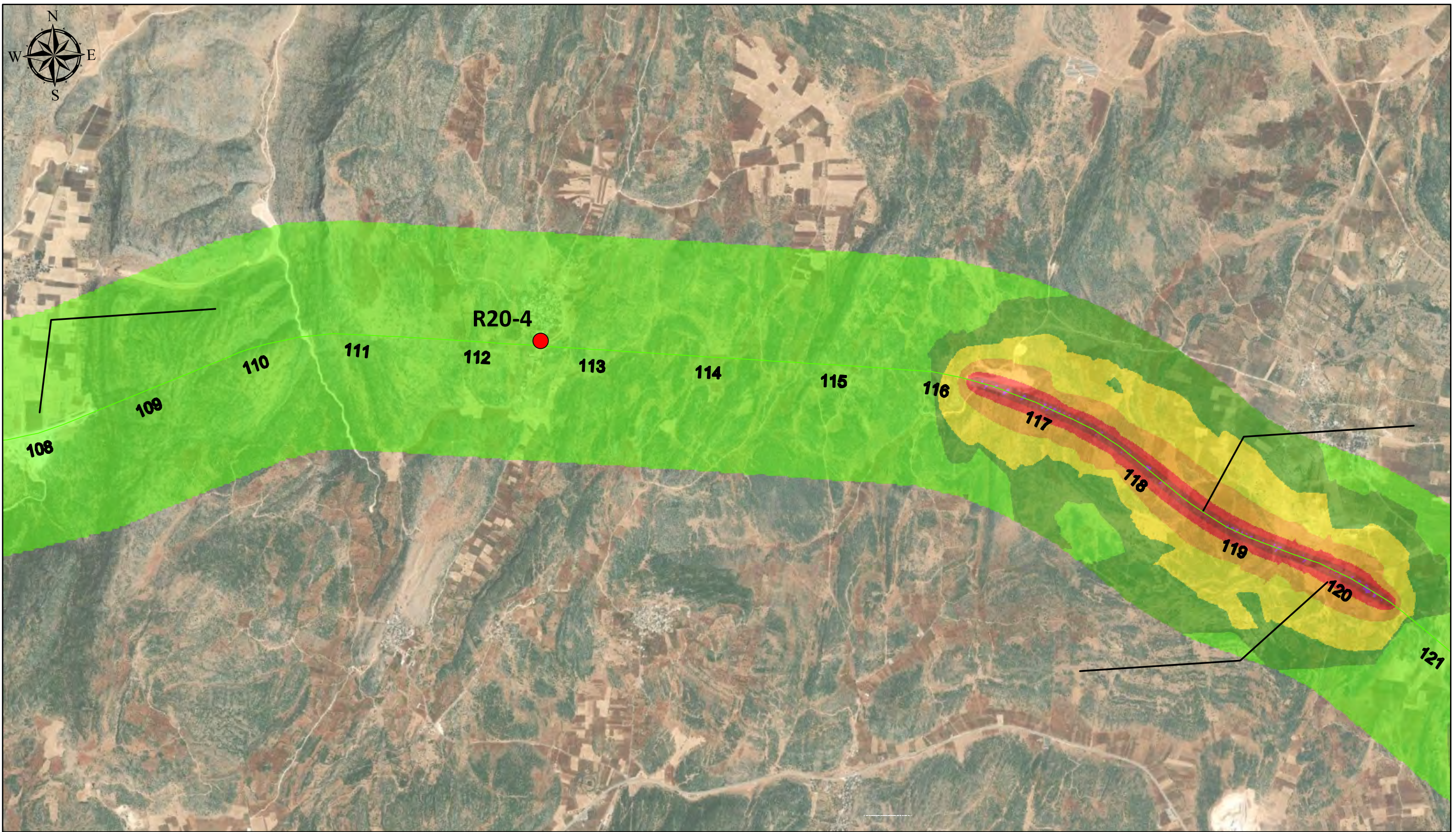
Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

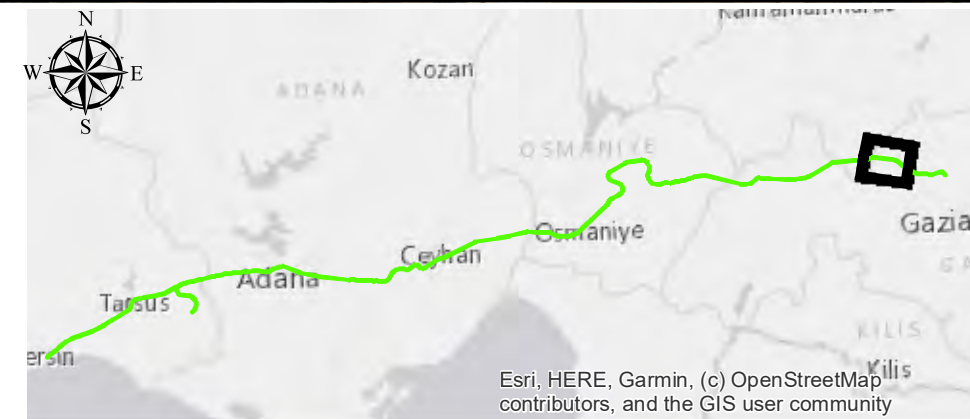
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Construction Phase, Day**

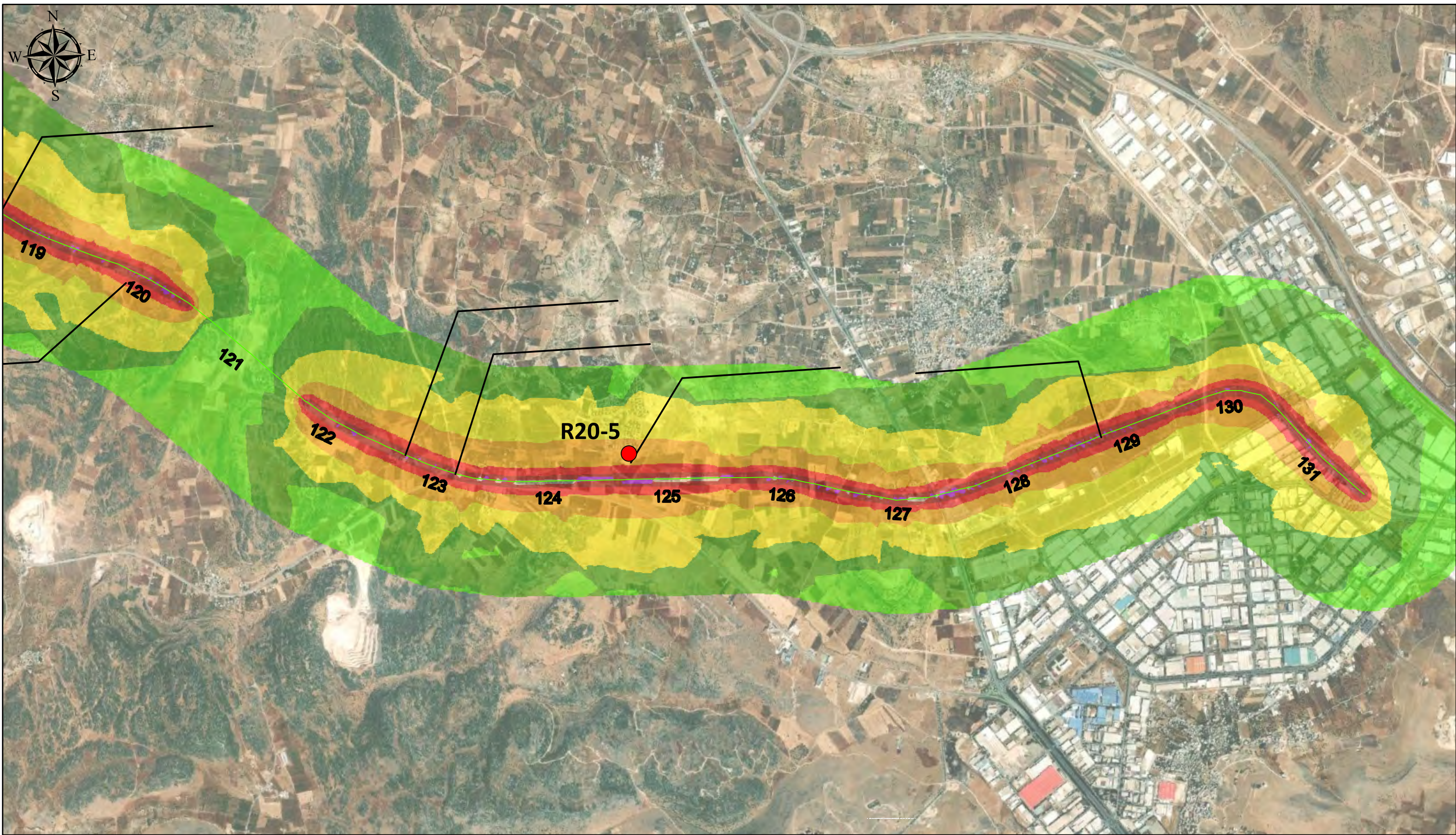
- Measurement Points
- Assessment Points
- Railway

Scale: 1/30.000

Legend

LdBA	
<45	60-65
45-50	65-70
50-55	70-75
55-60	75-80
	80<





FREKANS

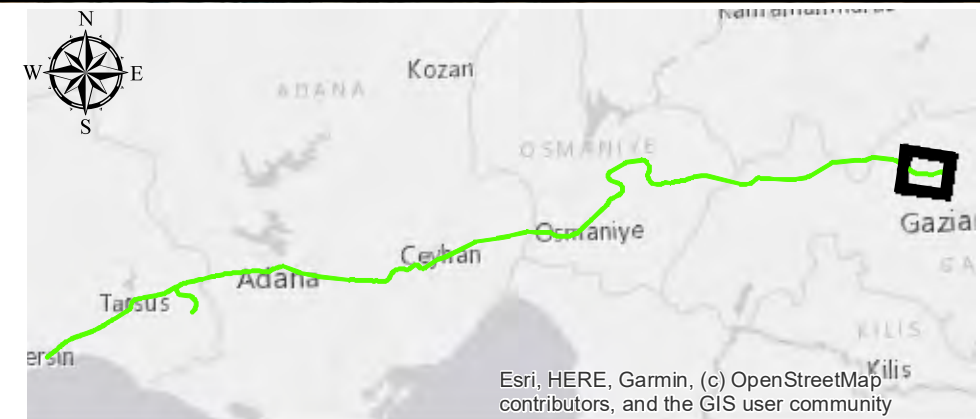
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Construction Phase, Day

- Measurement Points
- Assessment Points
- Railway

Scale: 1/30.000

Legend

LdBA	
■	<45
■	45-50
■	50-55
■	55-60
■	60-65
■	65-70
■	70-75
■	75-80
■	80<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Appendix 4: Operation Noise Maps, Day-Evening-Night (DEN) Rating



FREKANS

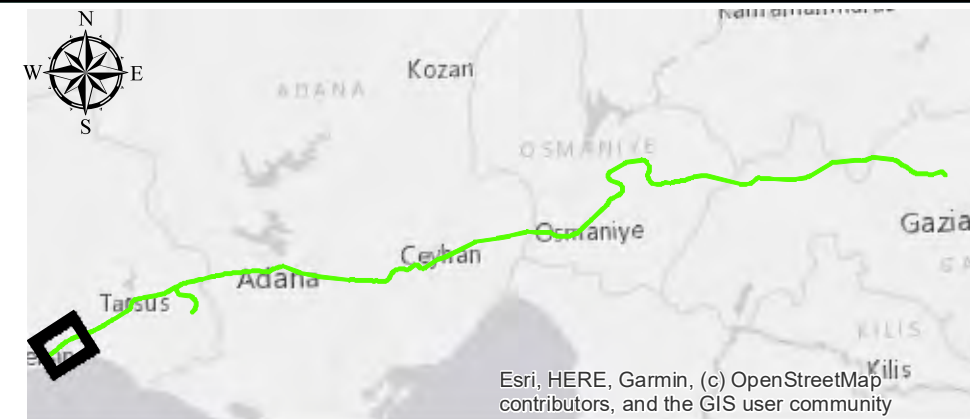
MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT
Measurement and Assessment Points
Operation Phase, Day

- Measurement Points
- Assessment Points
- Railway

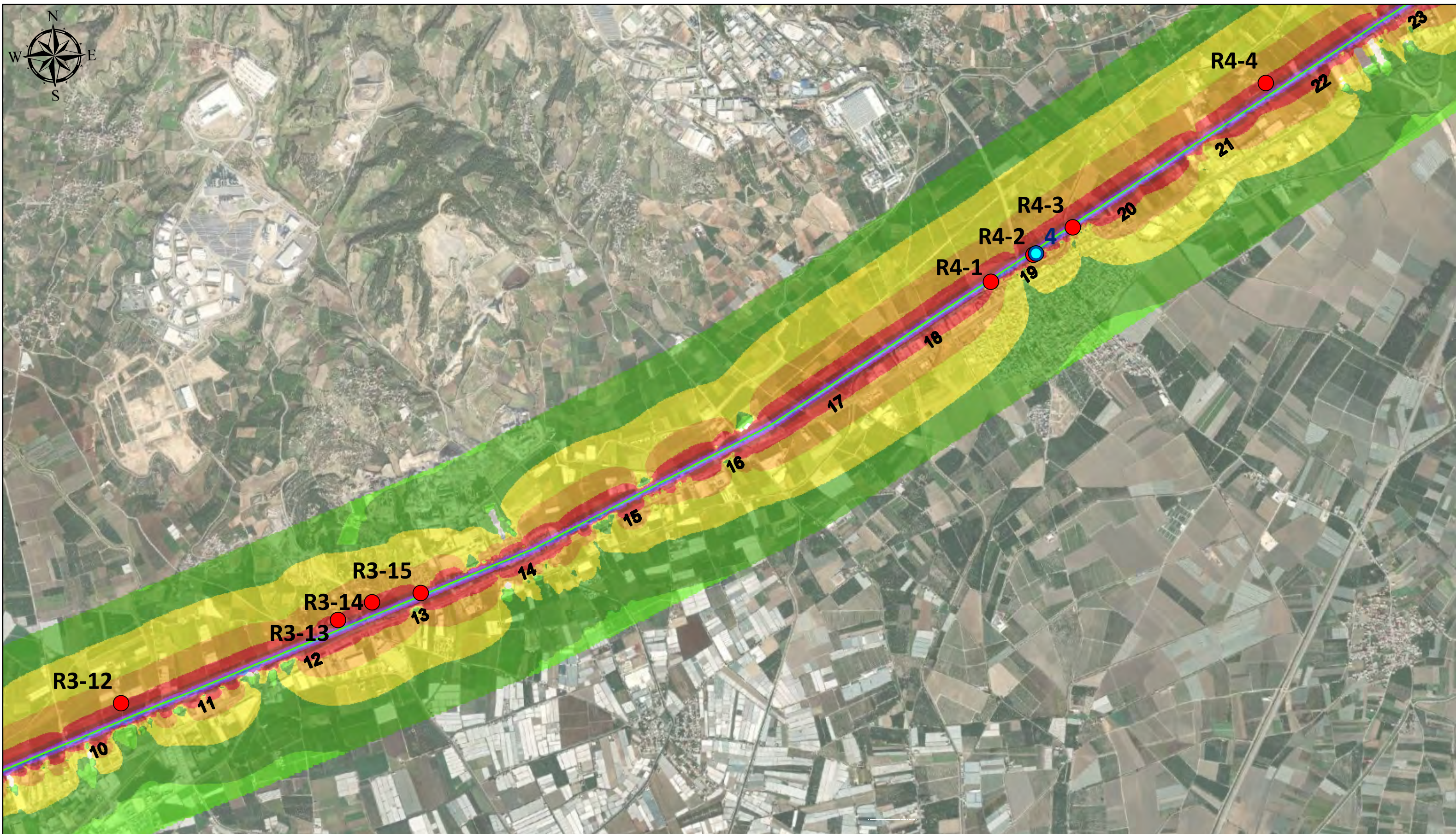
Scale: 1/30.000

Legend

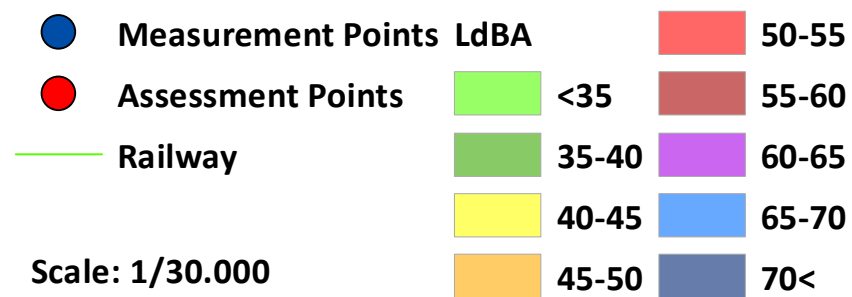
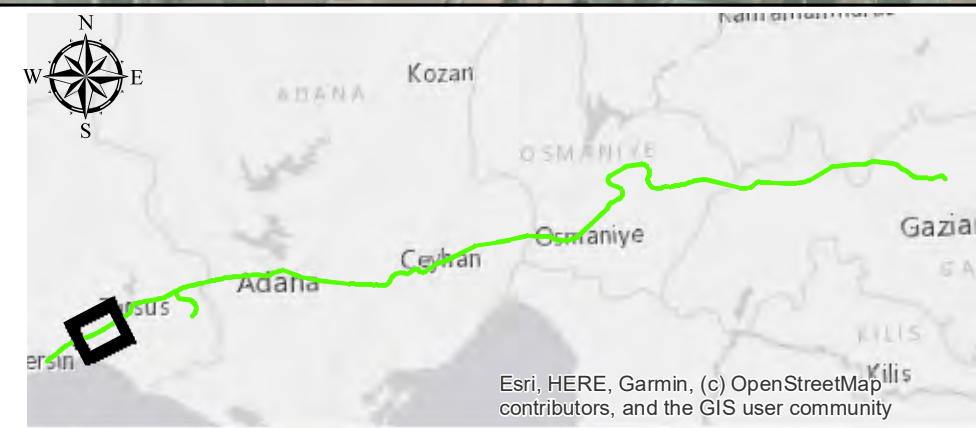
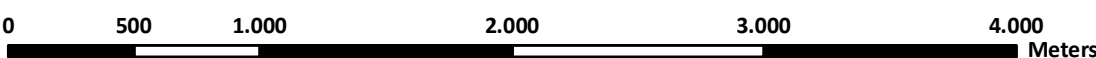
LdBA	50-55
<35	55-60
35-40	60-65
40-45	65-70
45-50	70<

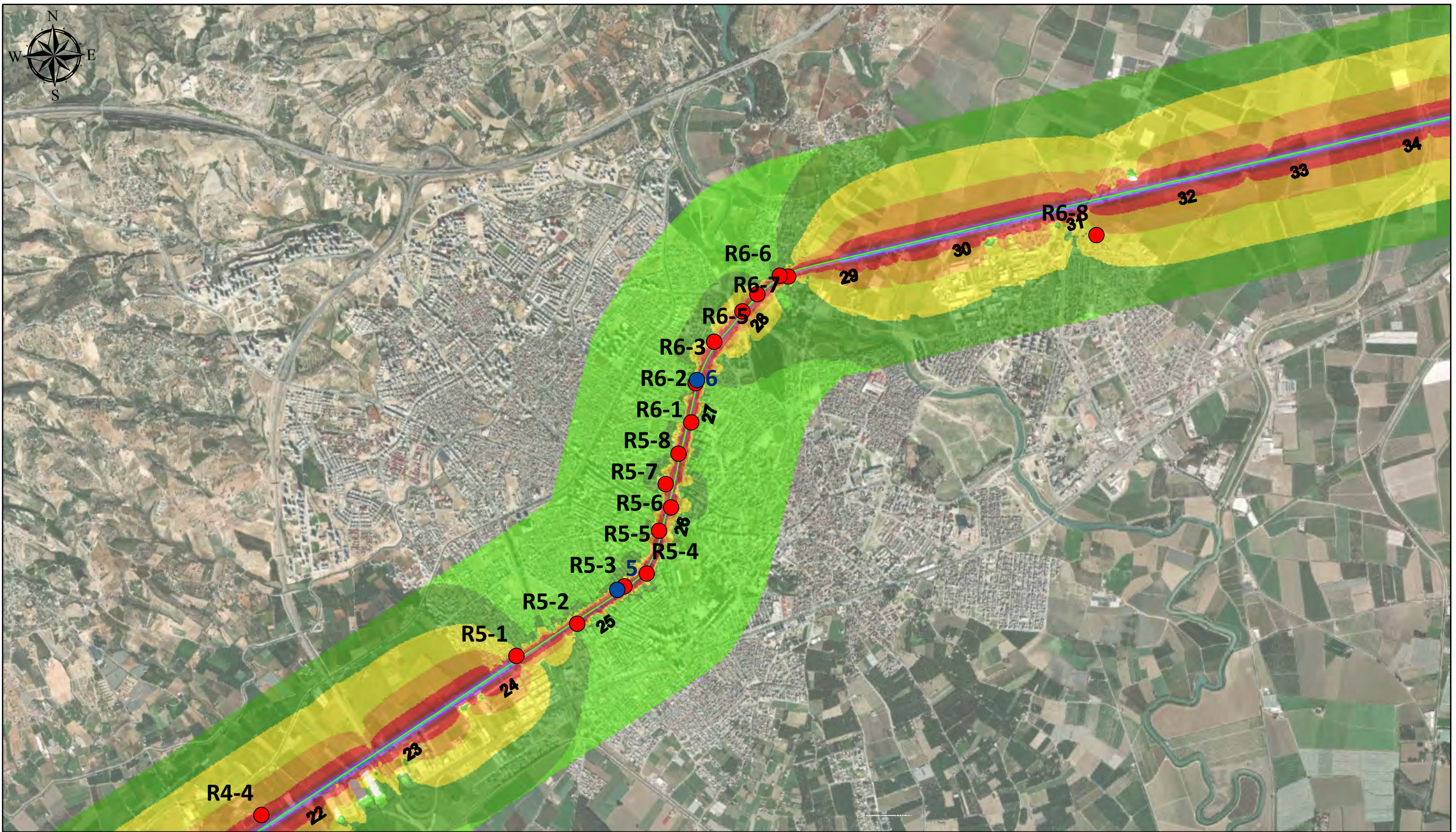


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



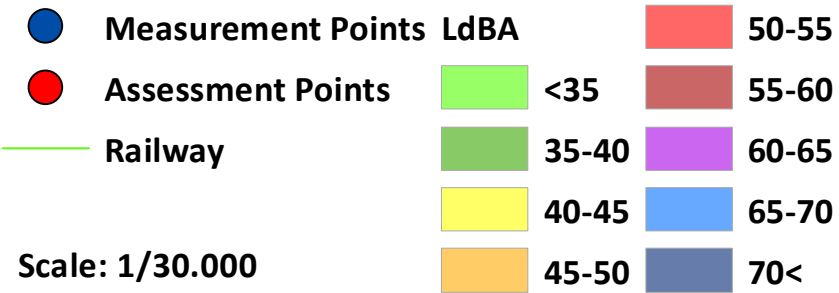
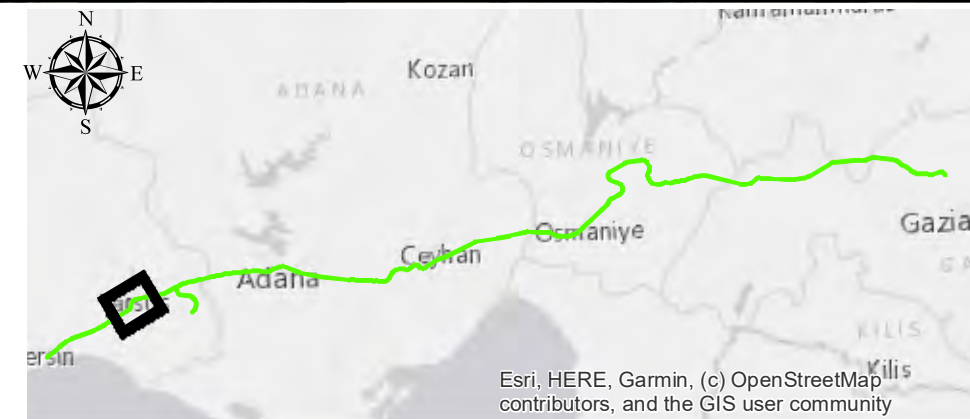
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Day**



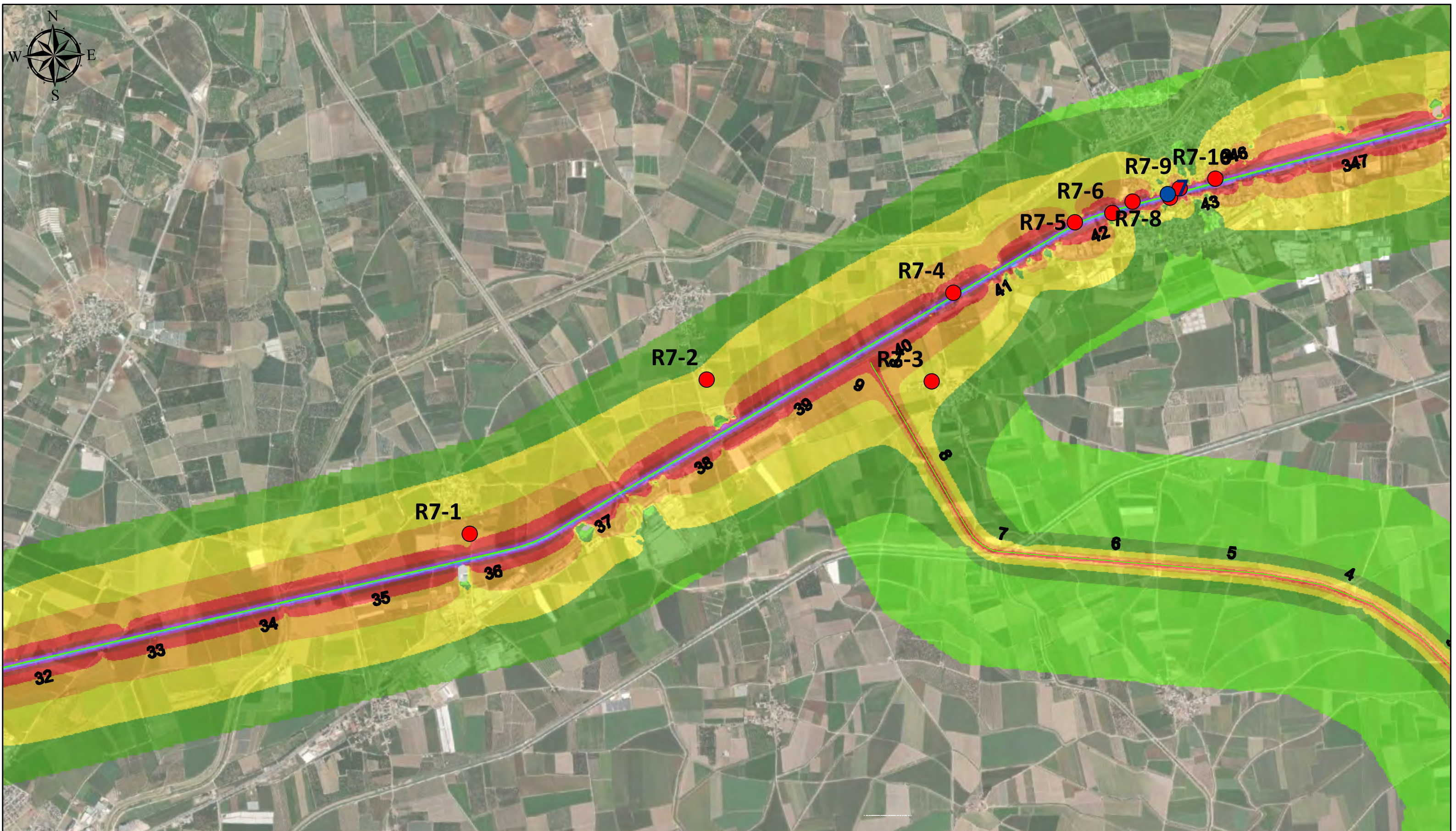


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

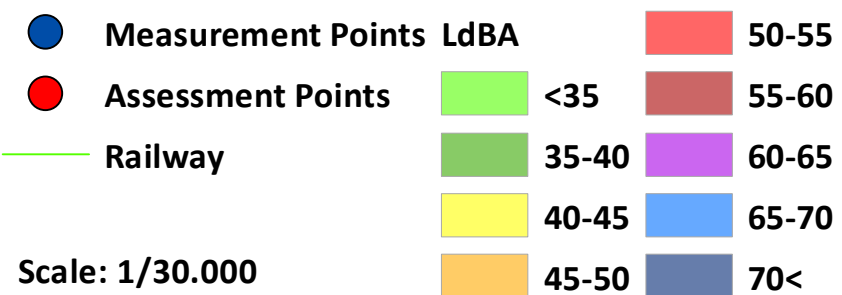
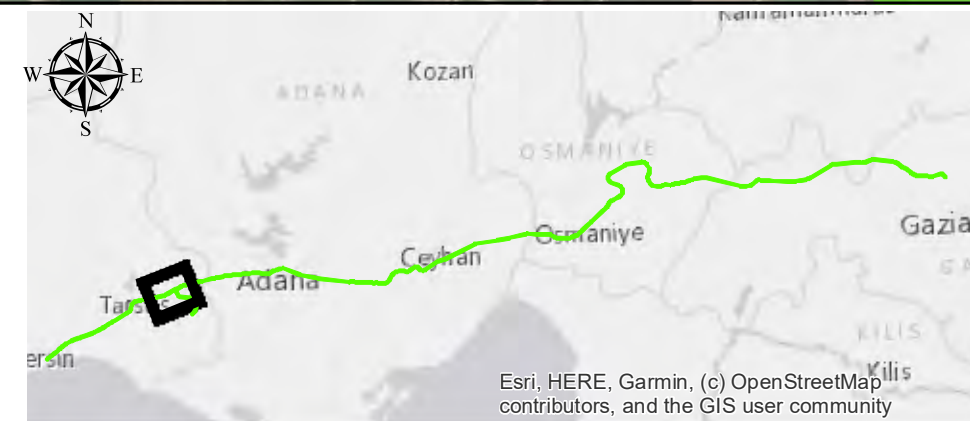


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

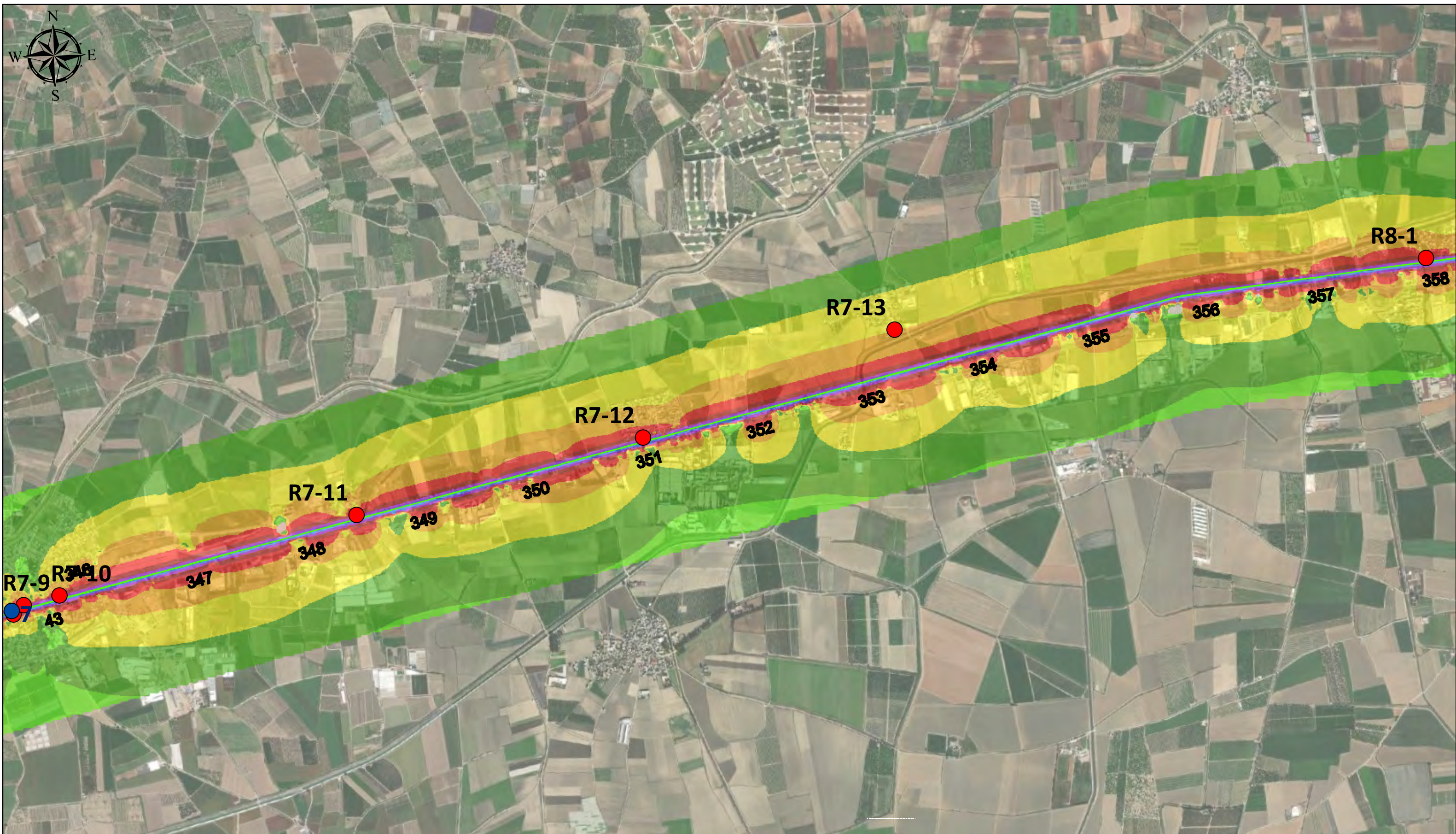


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



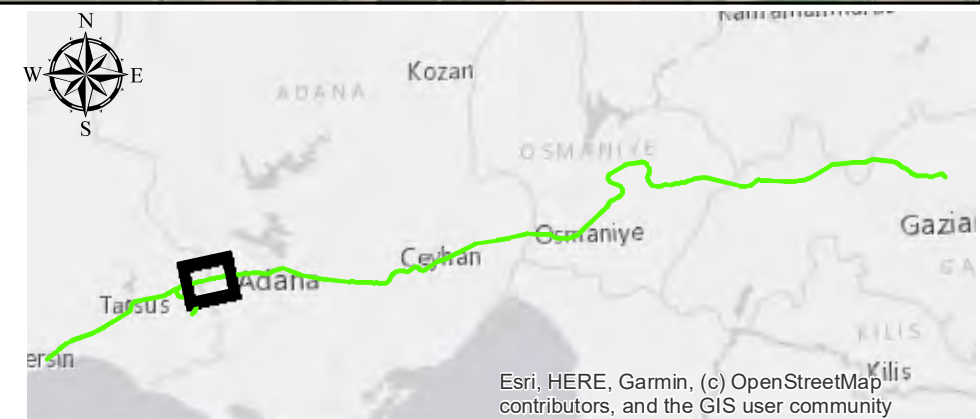
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

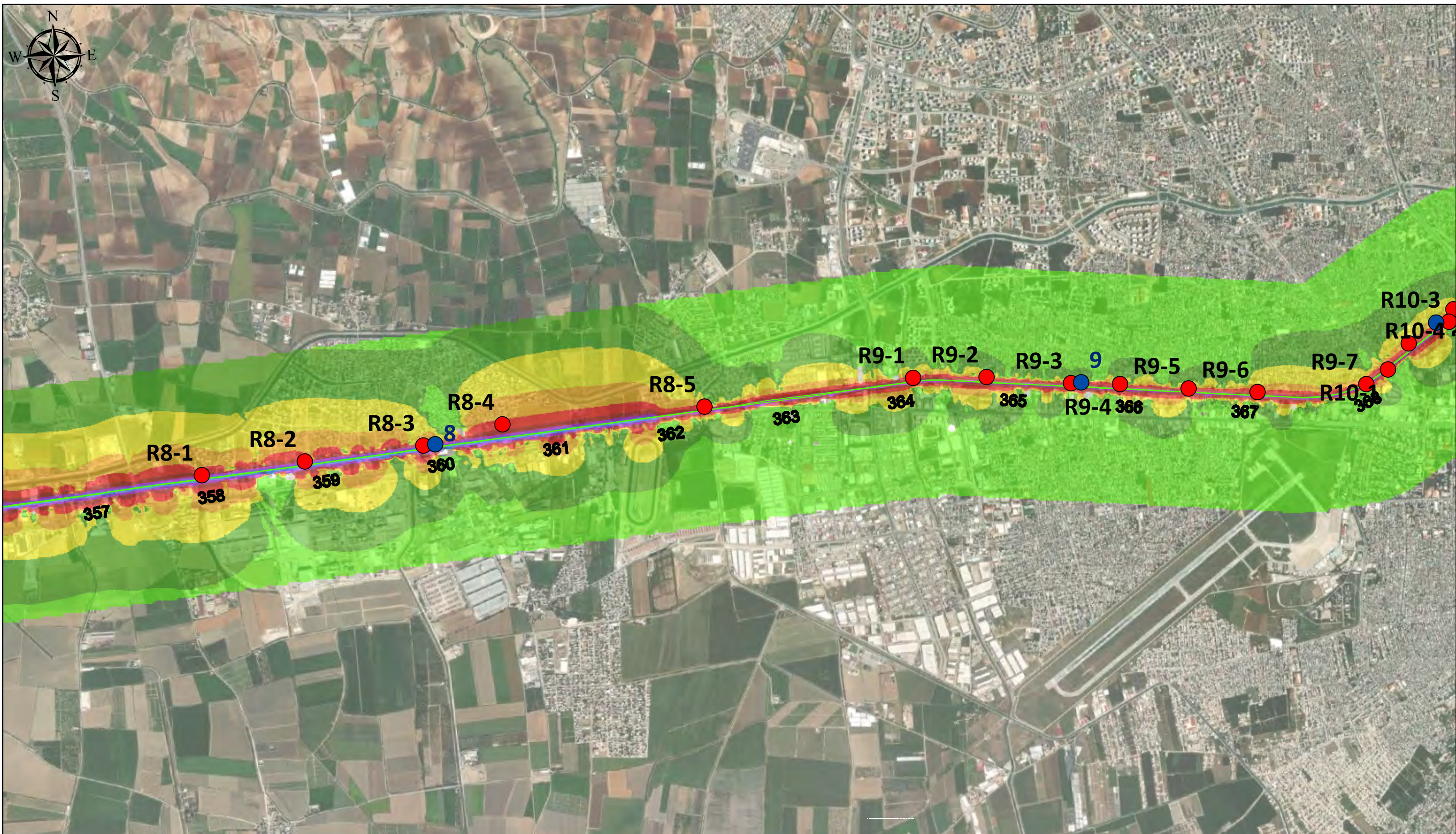
- Measurement Points LdBA
- Assessment Points
- Railway

Scale: 1/30.000

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<

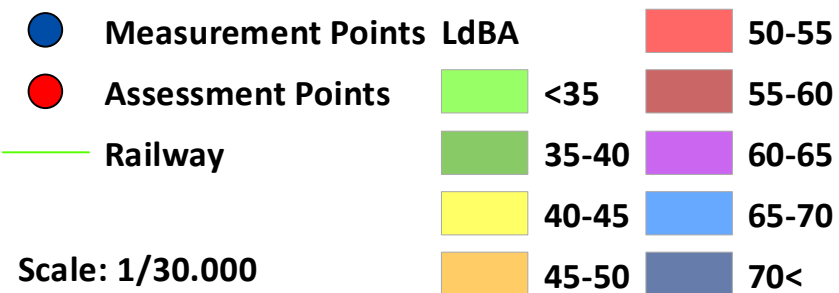
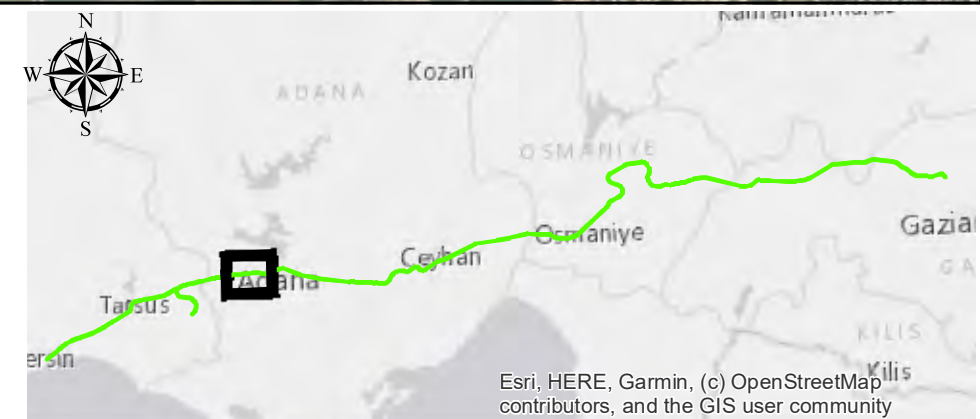


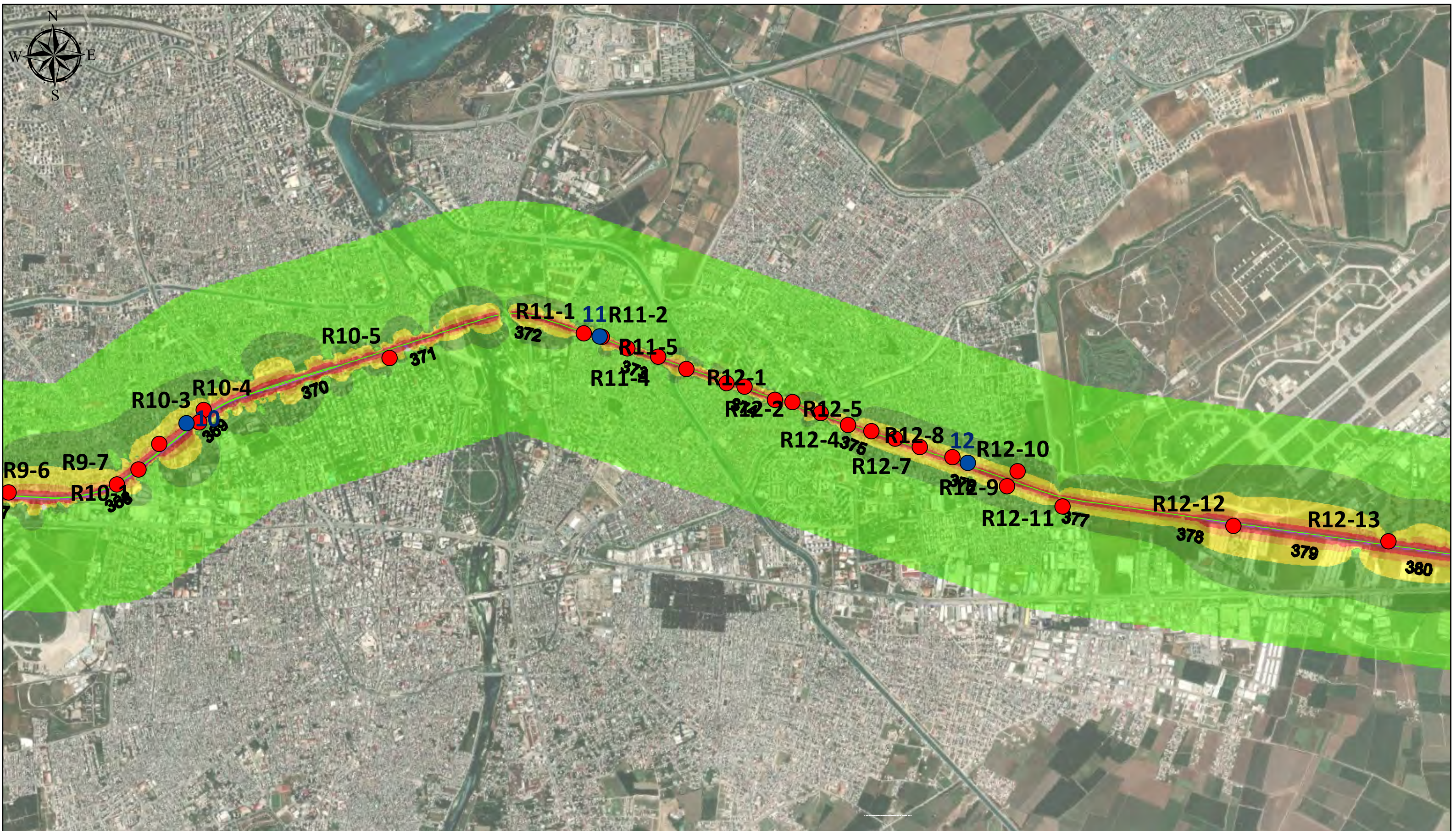
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

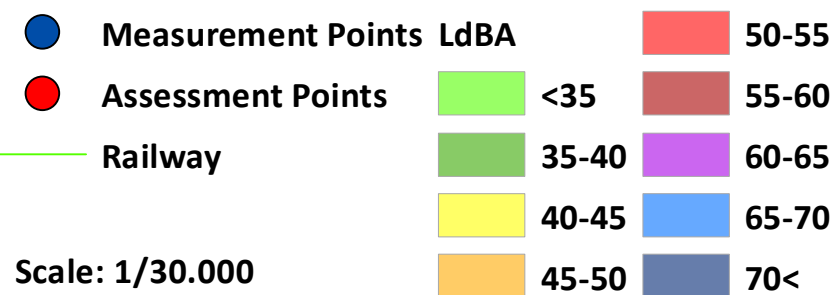
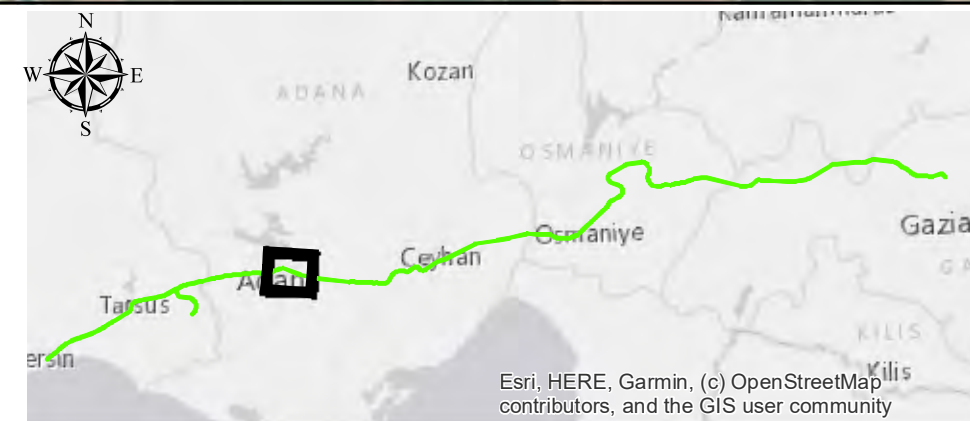
MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT
Measurement and Assessment Points
Operation Phase, Day





FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT **Measurement and Assessment Points** **Operation Phase, Day**



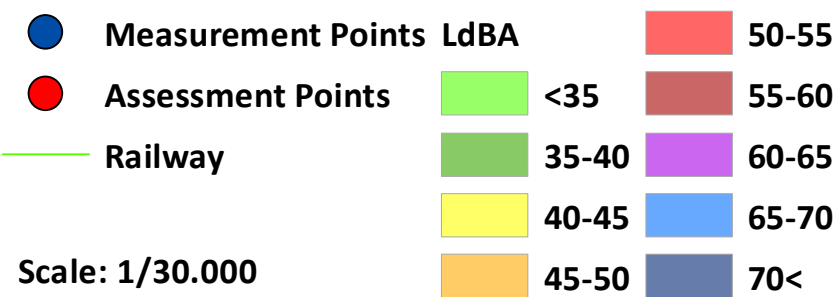
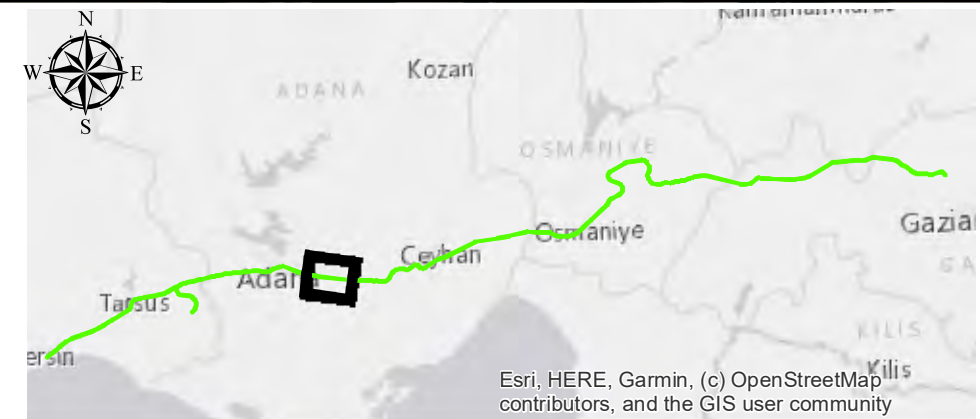
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**

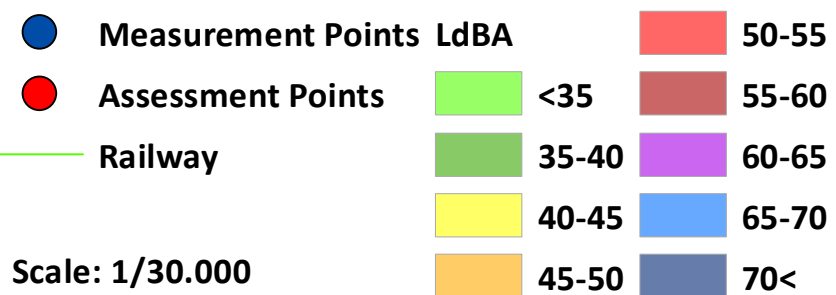
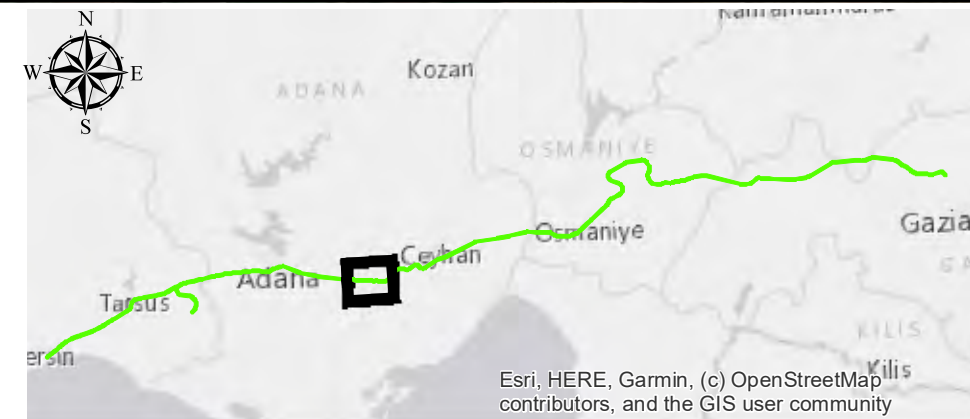
**Measurement and Assessment Points
Operation Phase, Day**



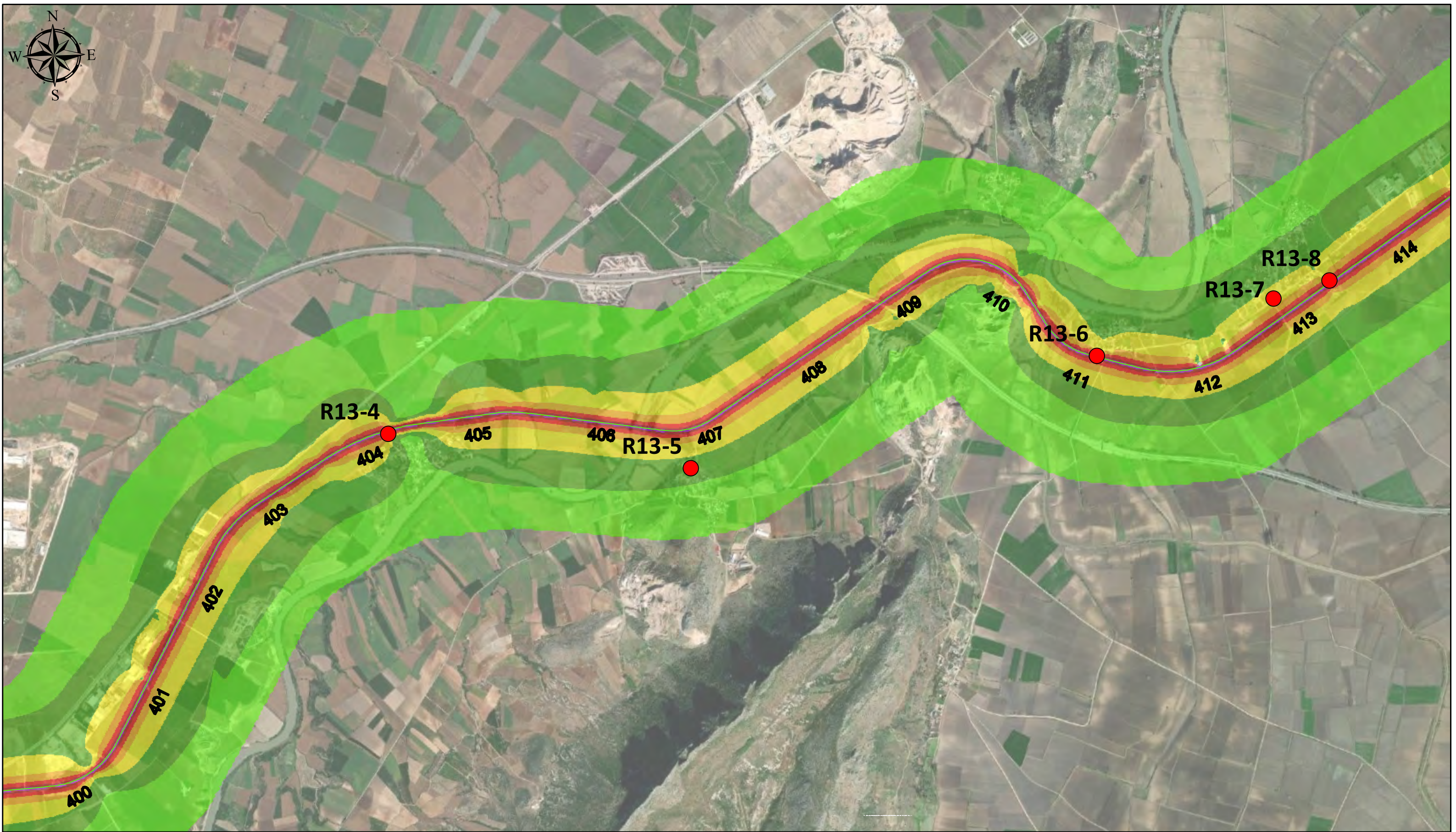


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

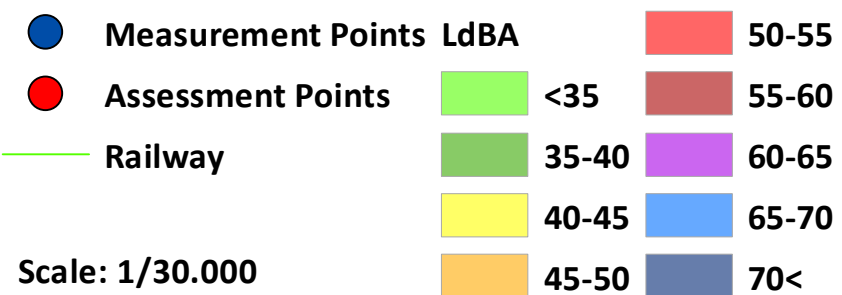
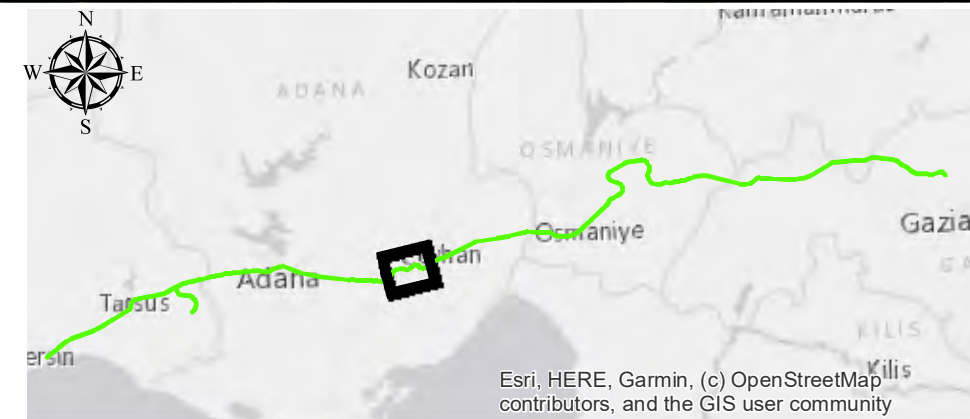


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

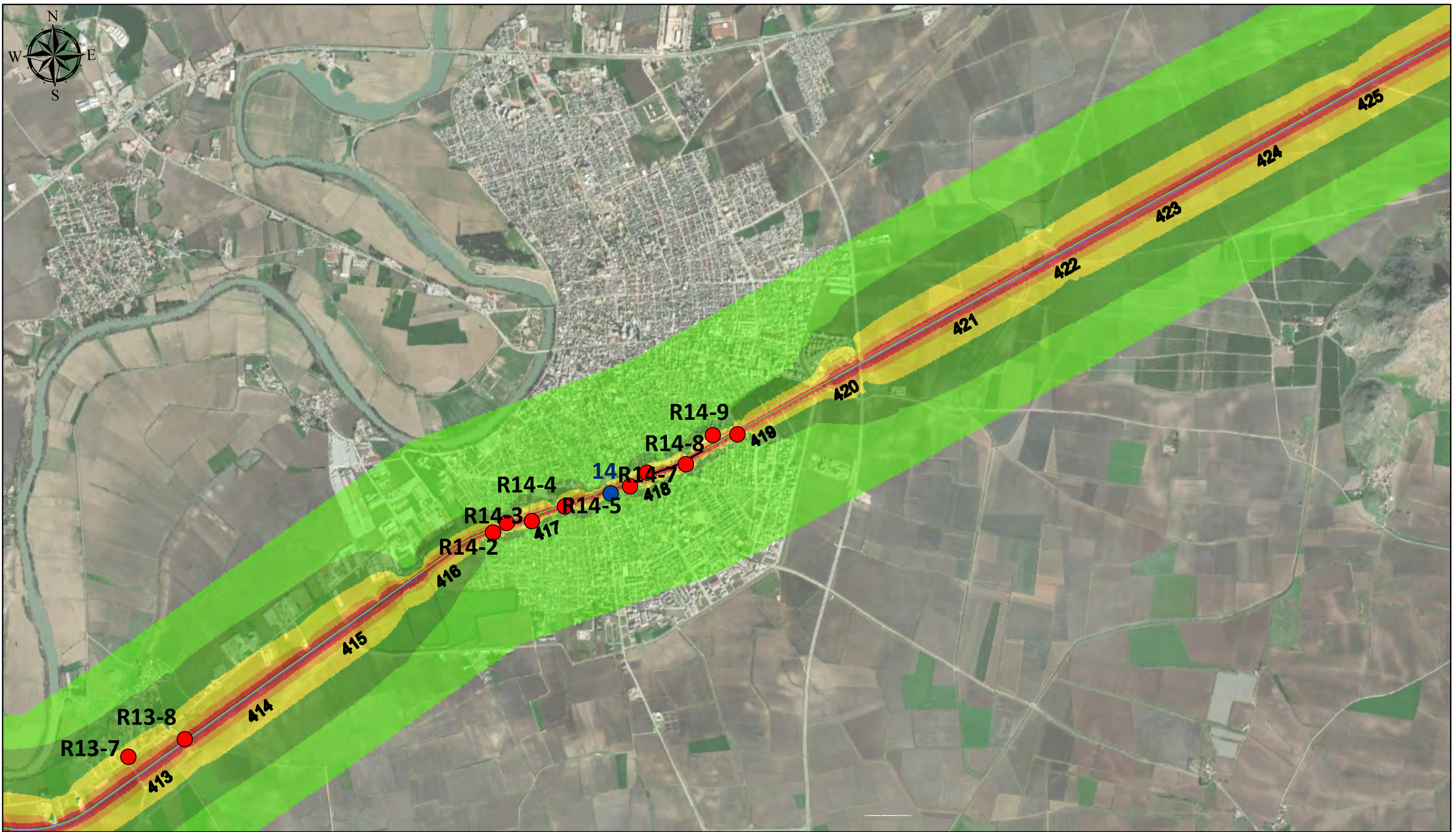


FREKANS

MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT
Measurement and Assessment Points
Operation Phase, Day

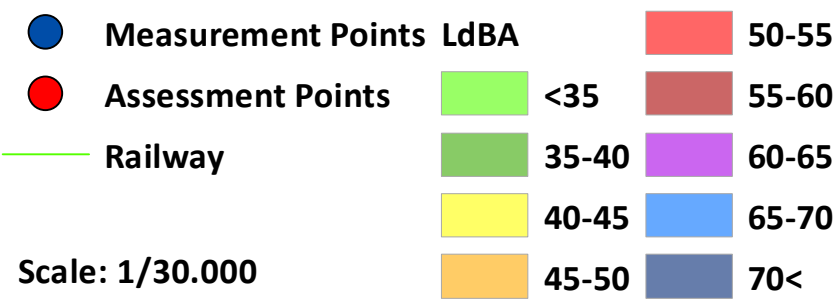
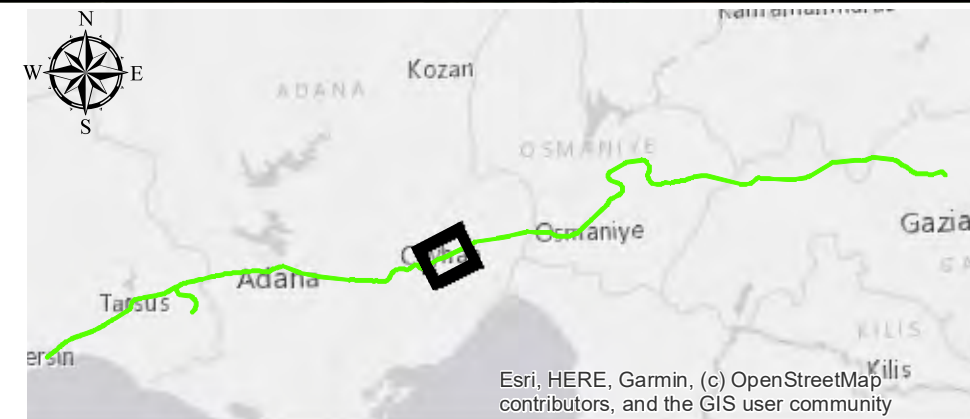


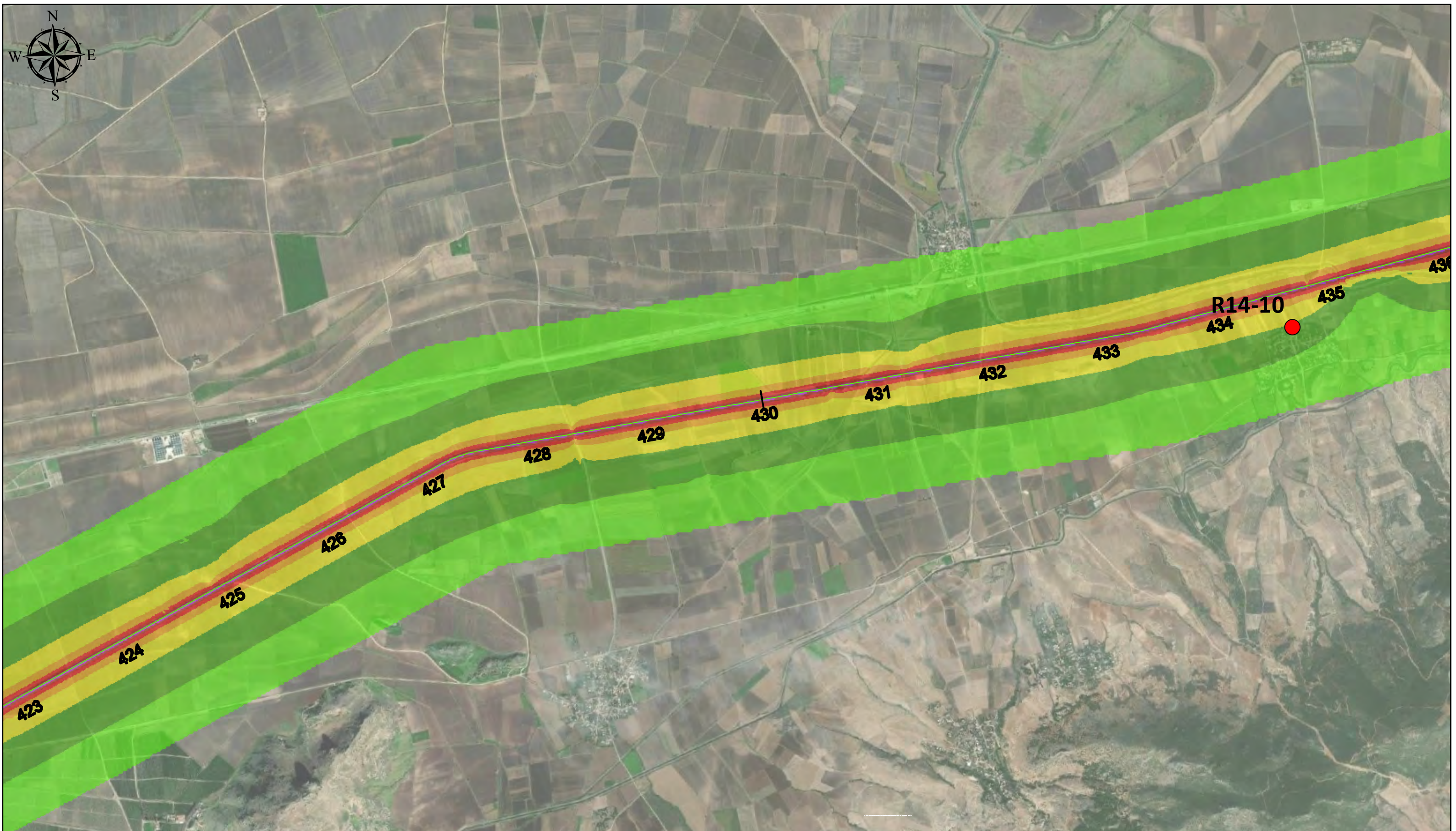
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day





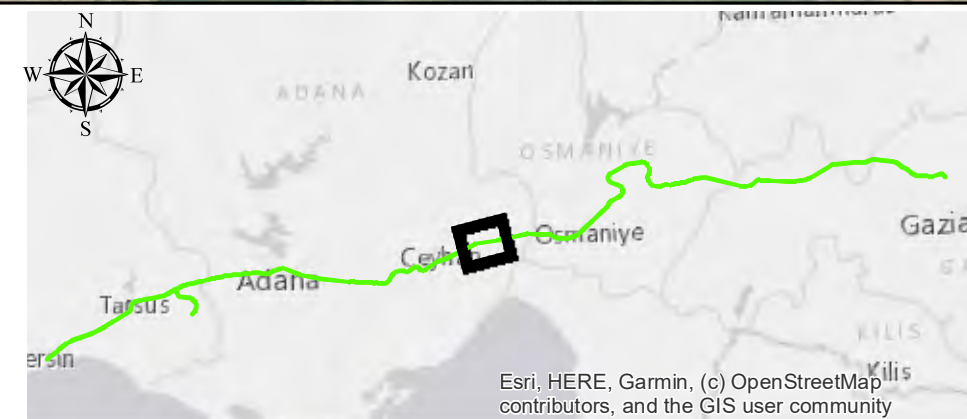
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

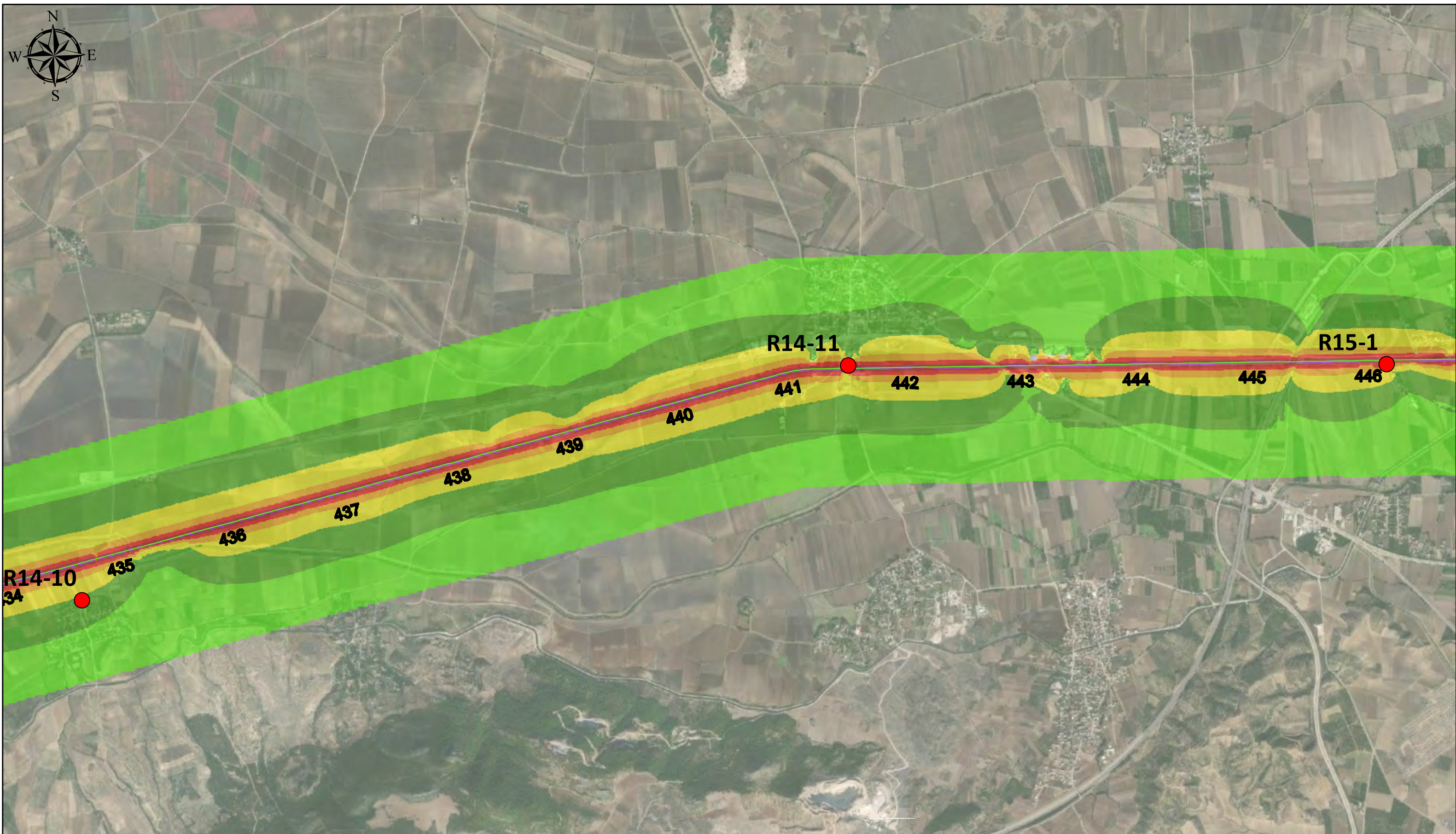
- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway

Scale: 1/30.000

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<

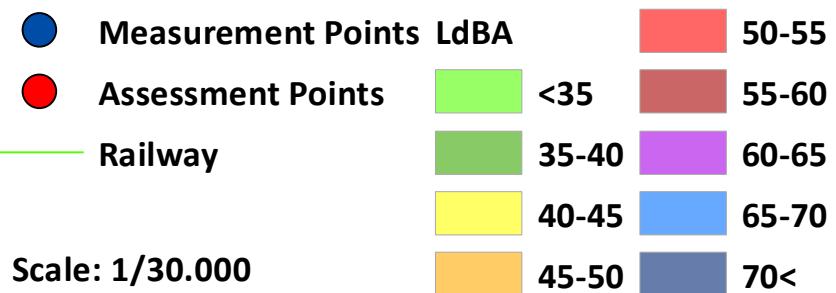
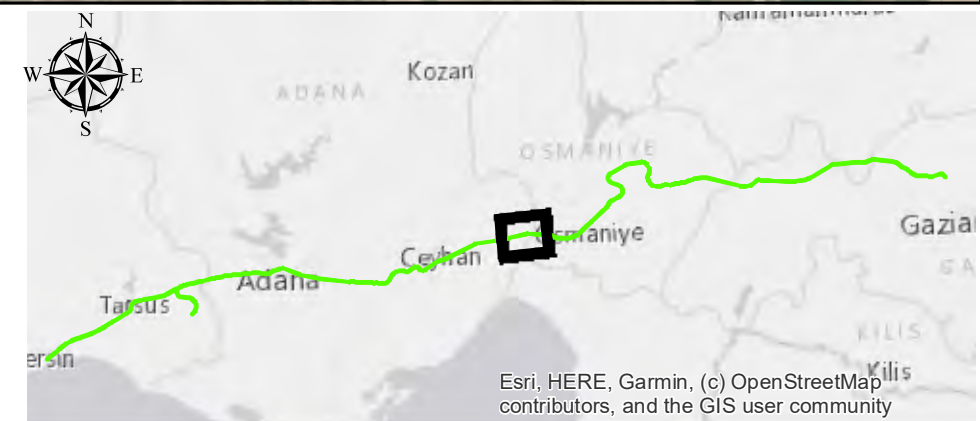


0 500 1.000 2.000 3.000 4.000 Meters

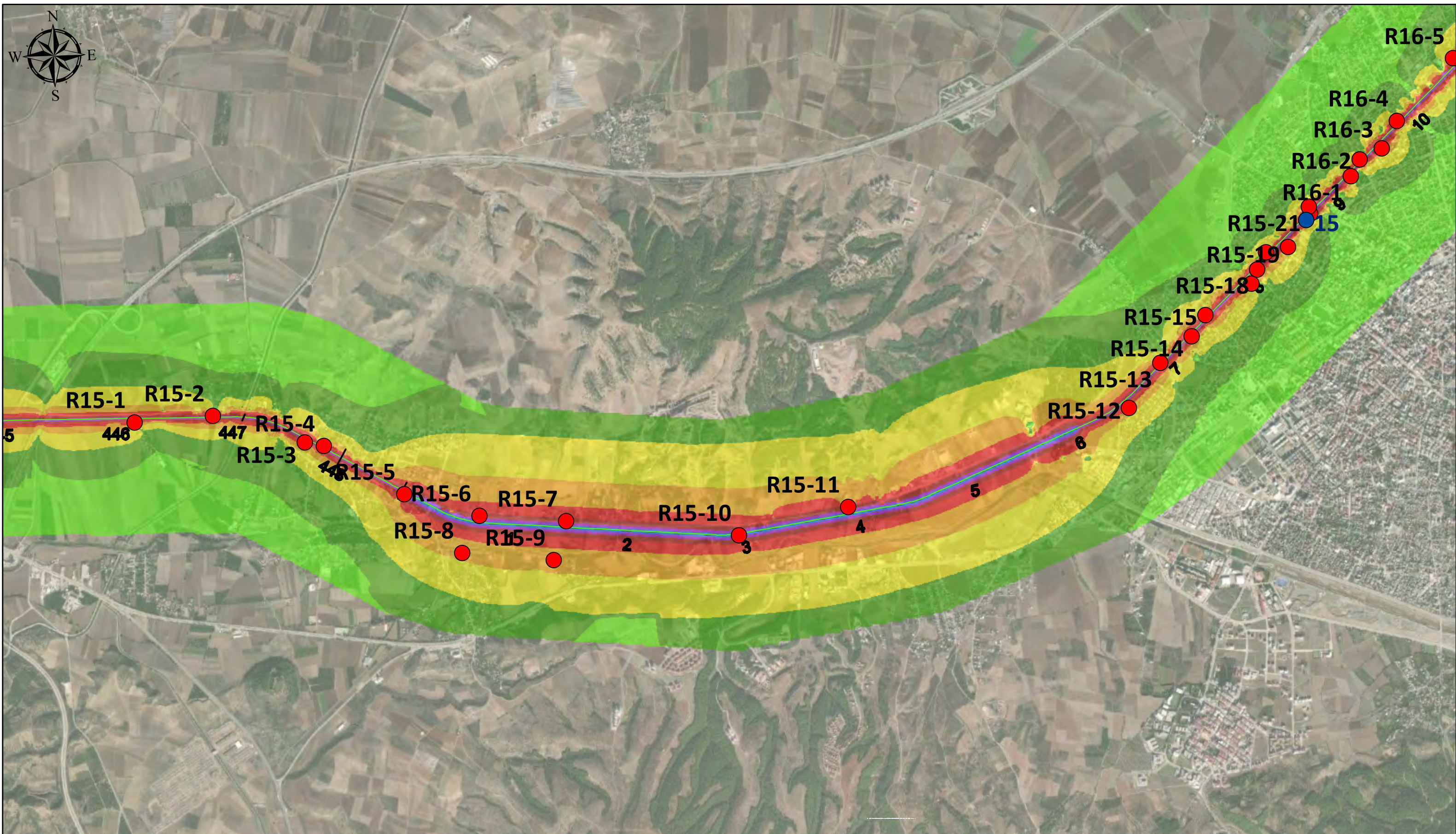


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

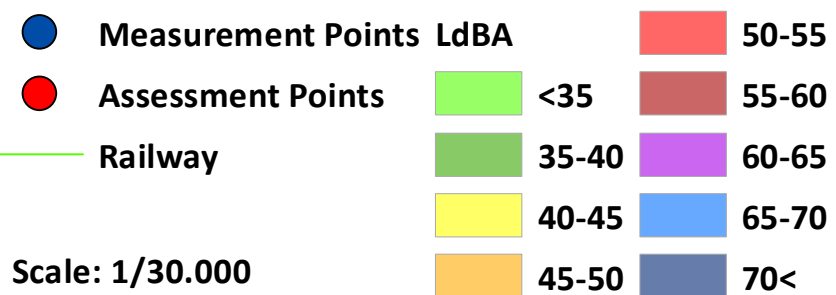
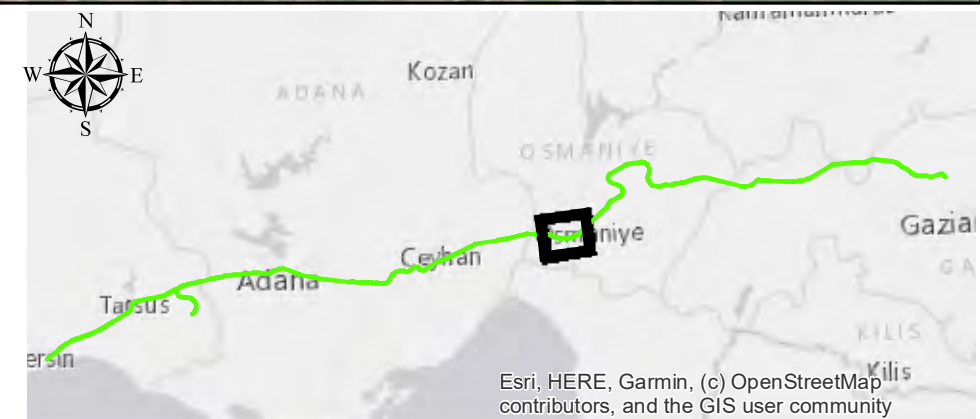


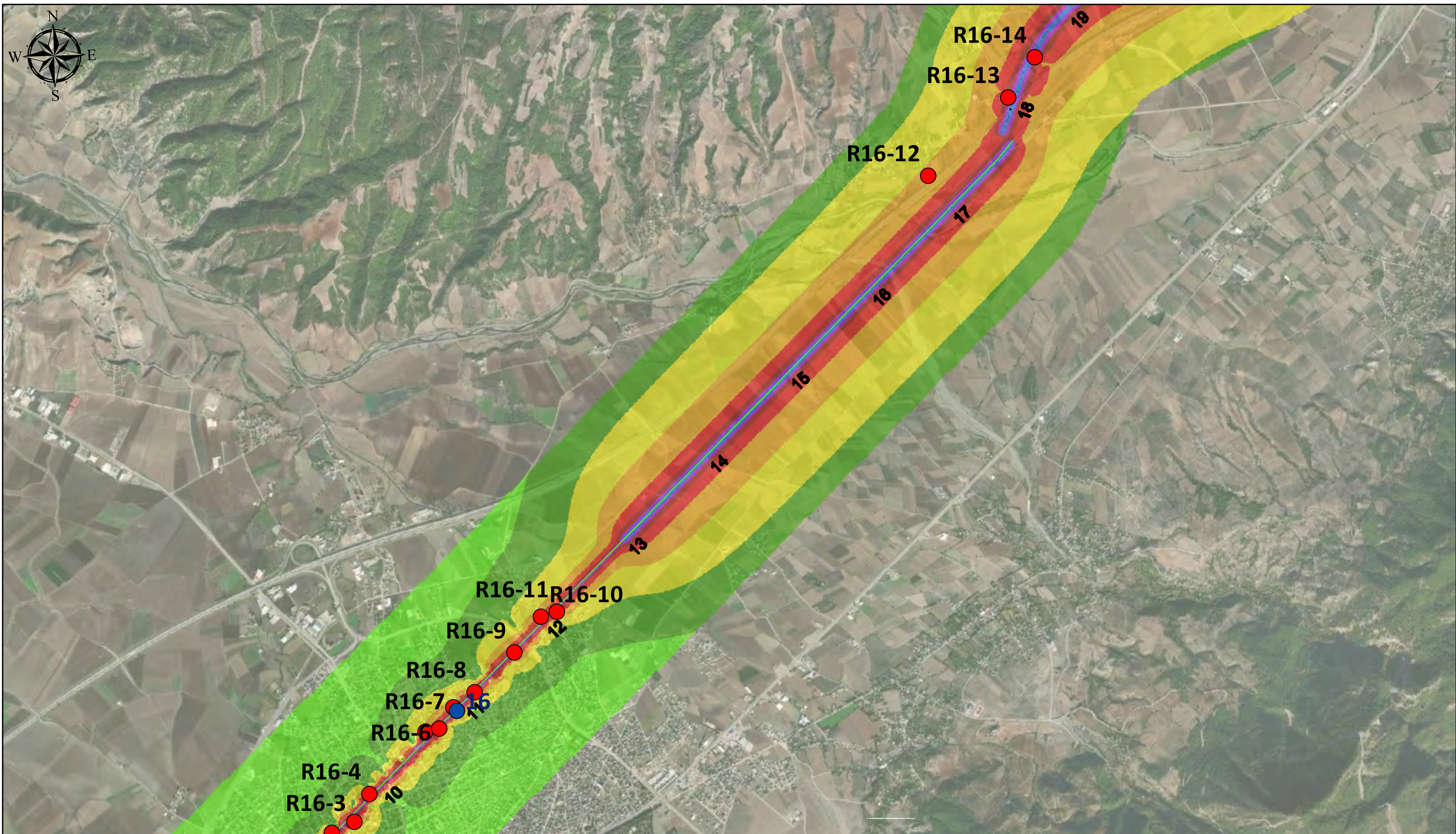
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT
Measurement and Assessment Points
Operation Phase, Day





FREKANS

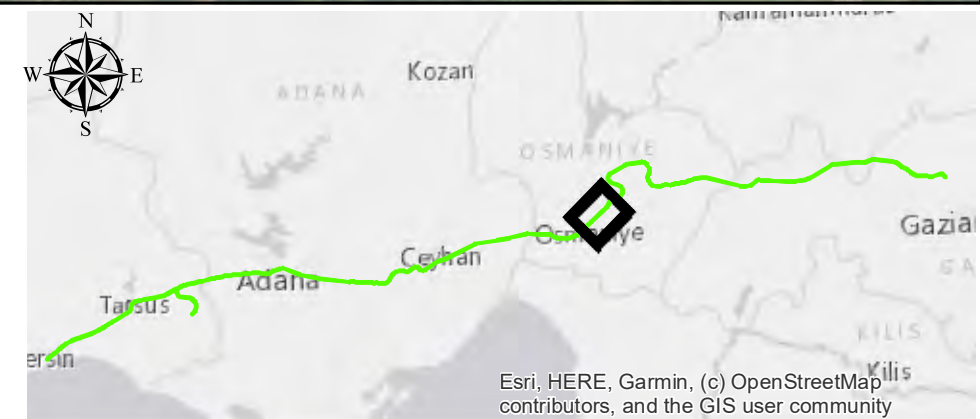
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

- Measurement Points LdBA
- Assessment Points
- Railway

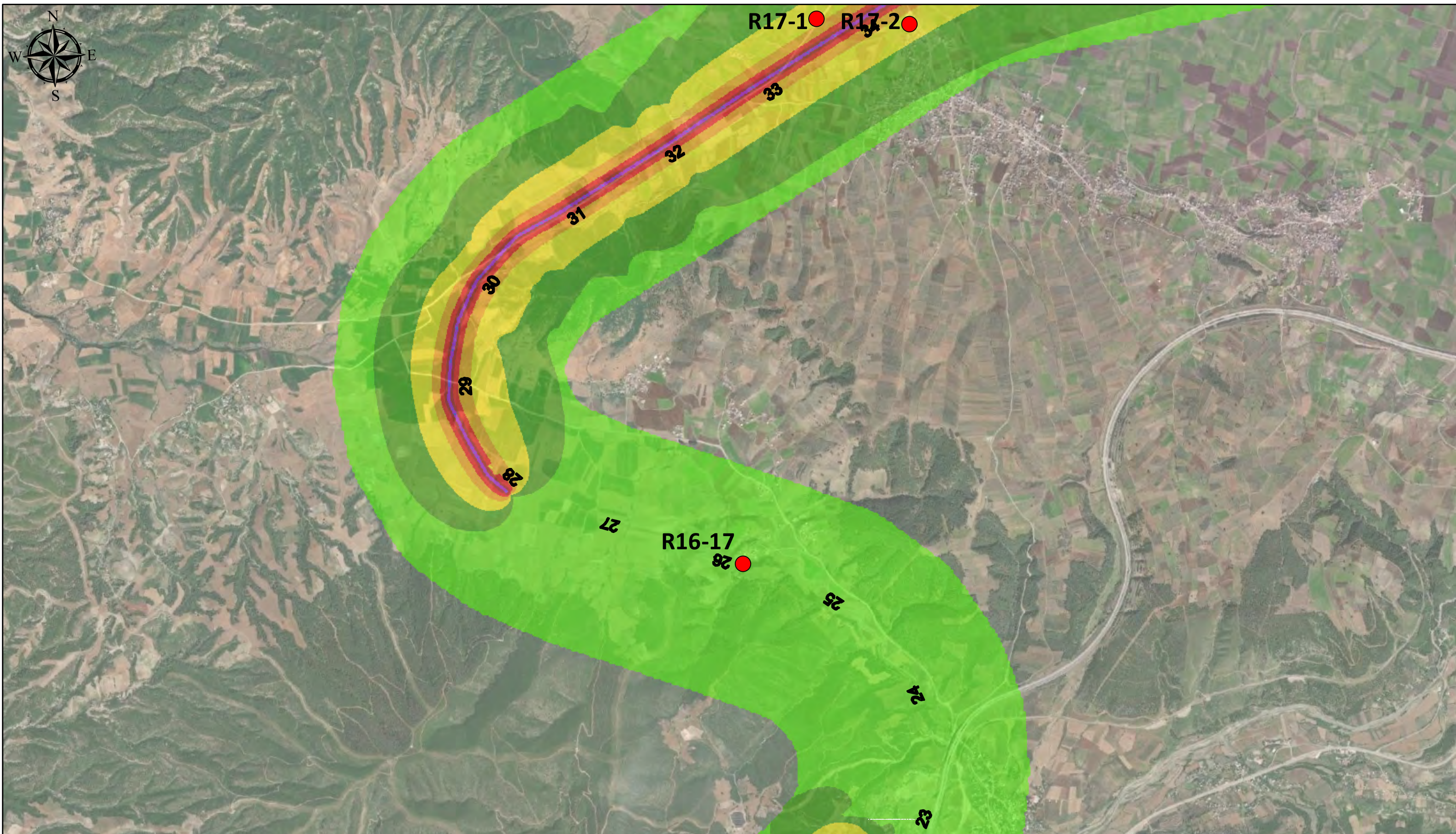
Scale: 1/30.000

Legend

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



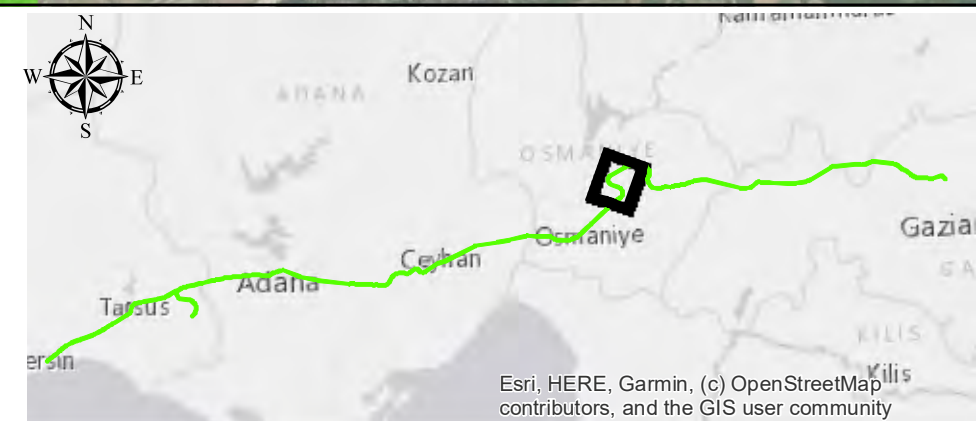
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

- Measurement Points LdBA
- Assessment Points
- Railway

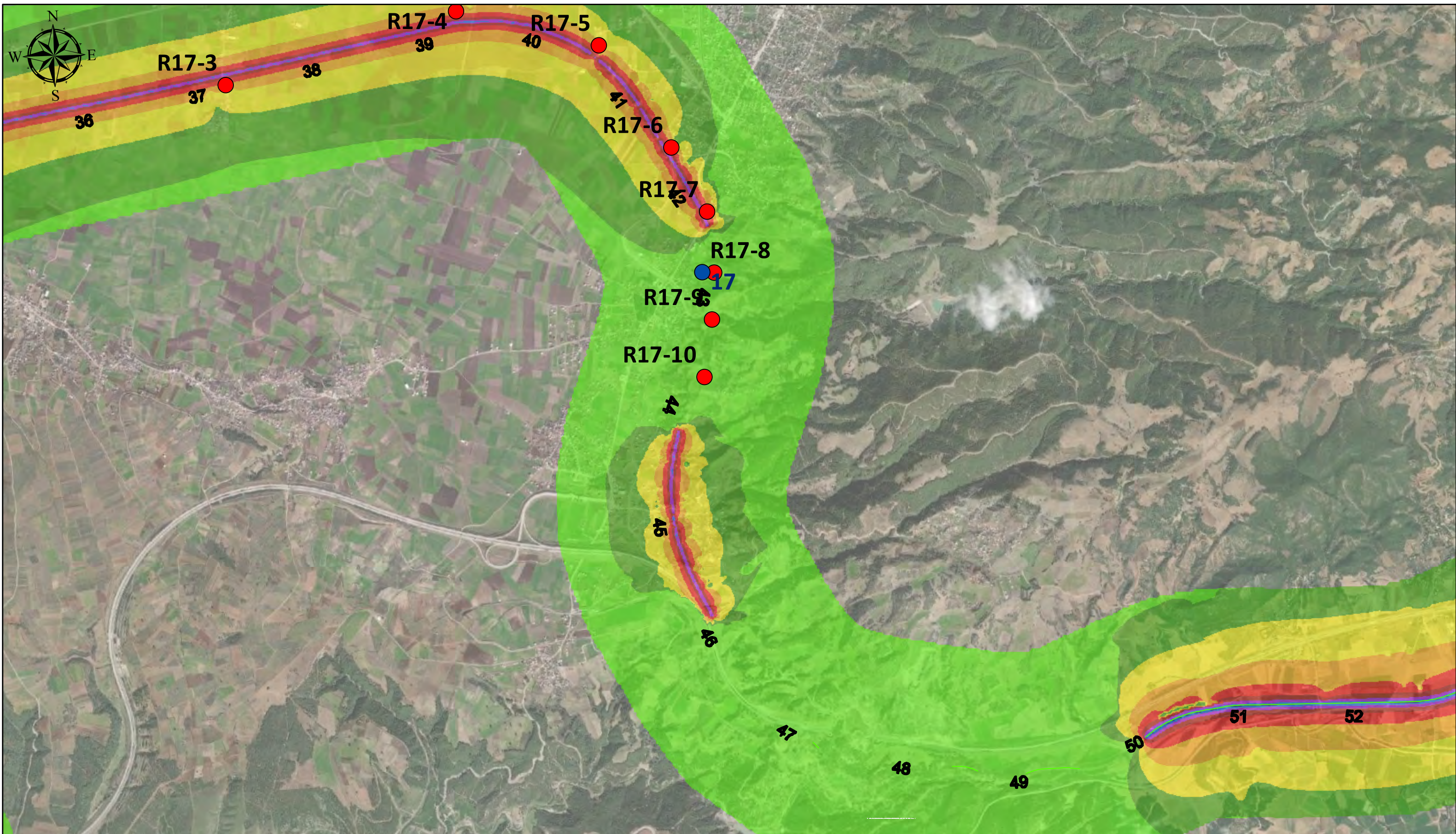
Scale: 1/30.000

Legend

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

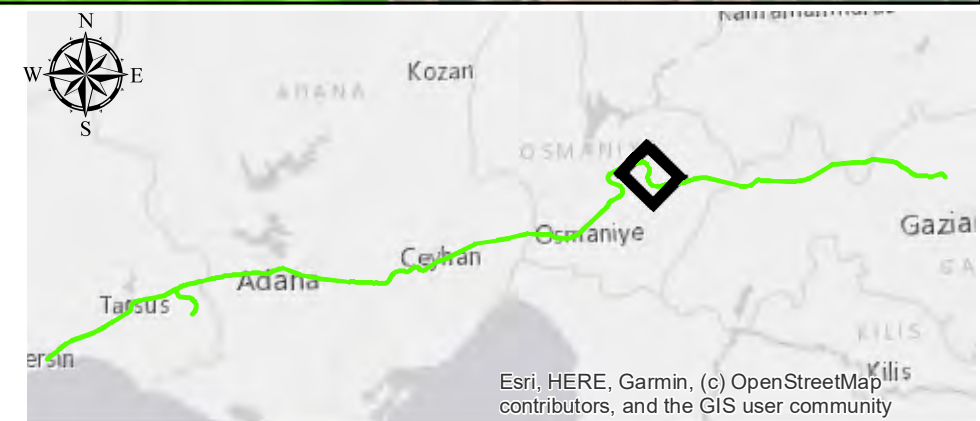
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

- Measurement Points LdBA
- Assessment Points
- Railway

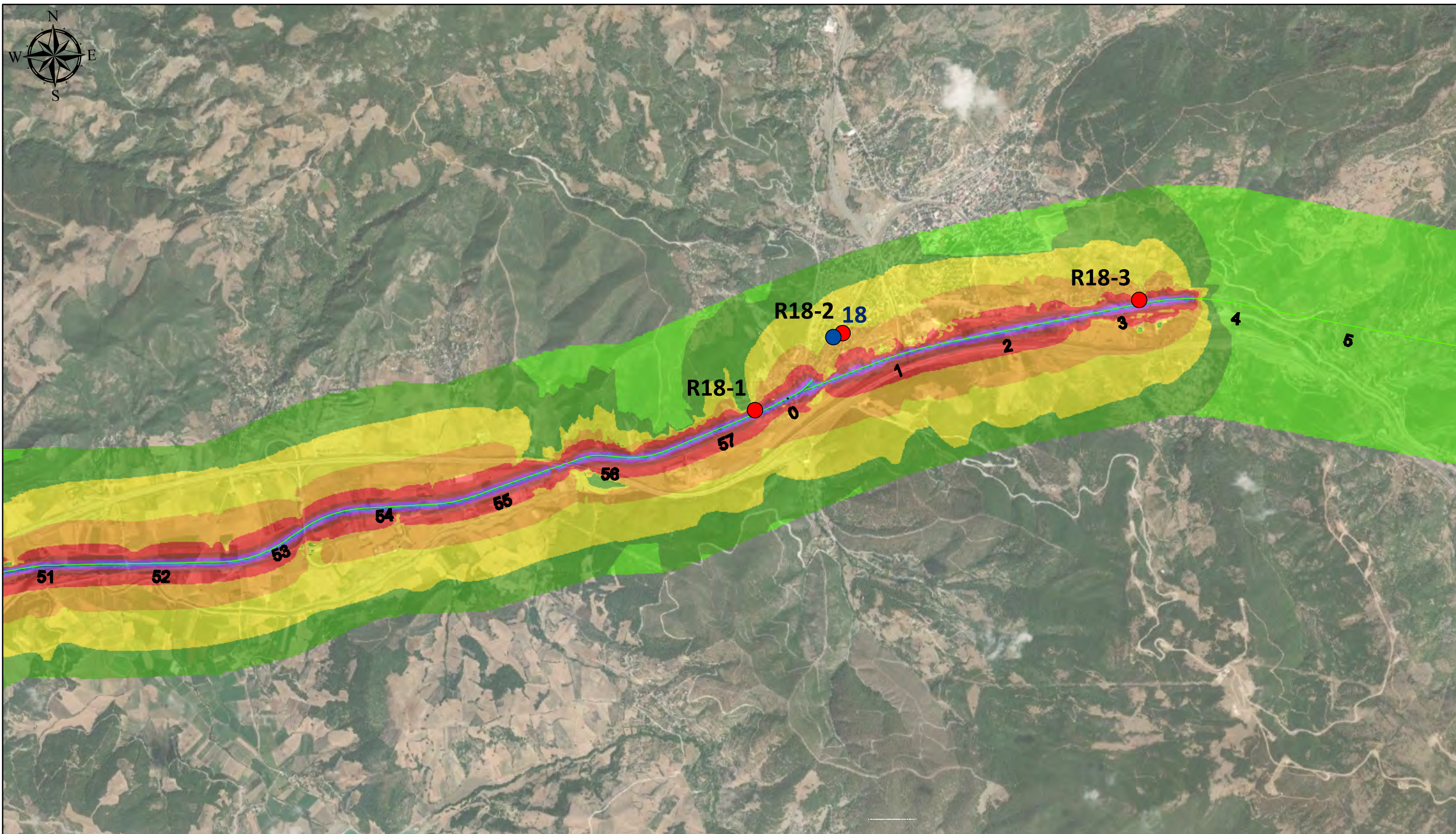
Scale: 1/30.000

Legend

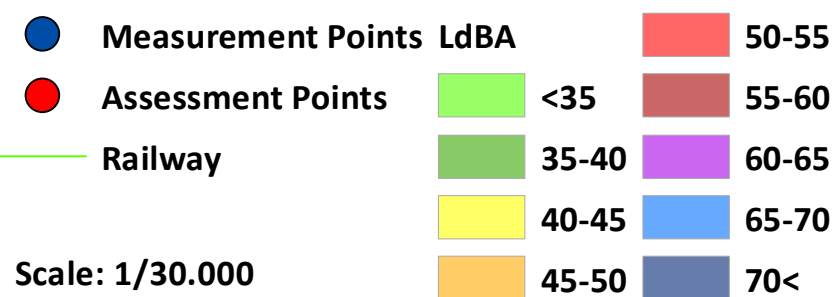
	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<



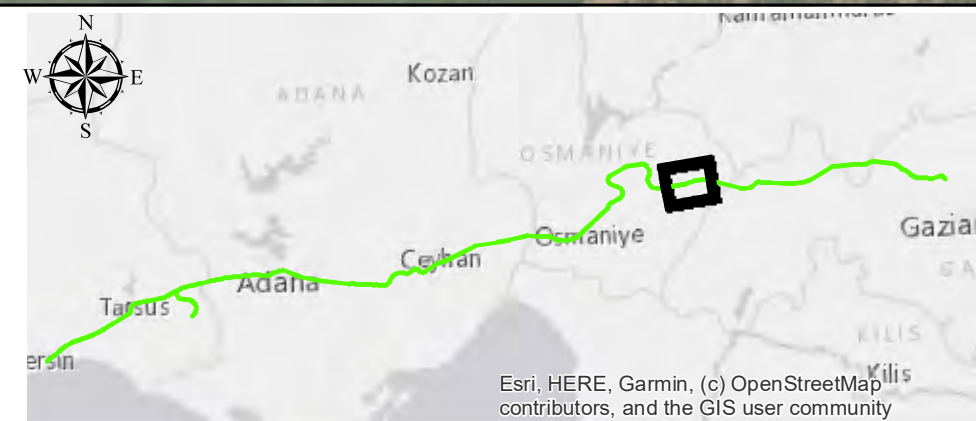
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



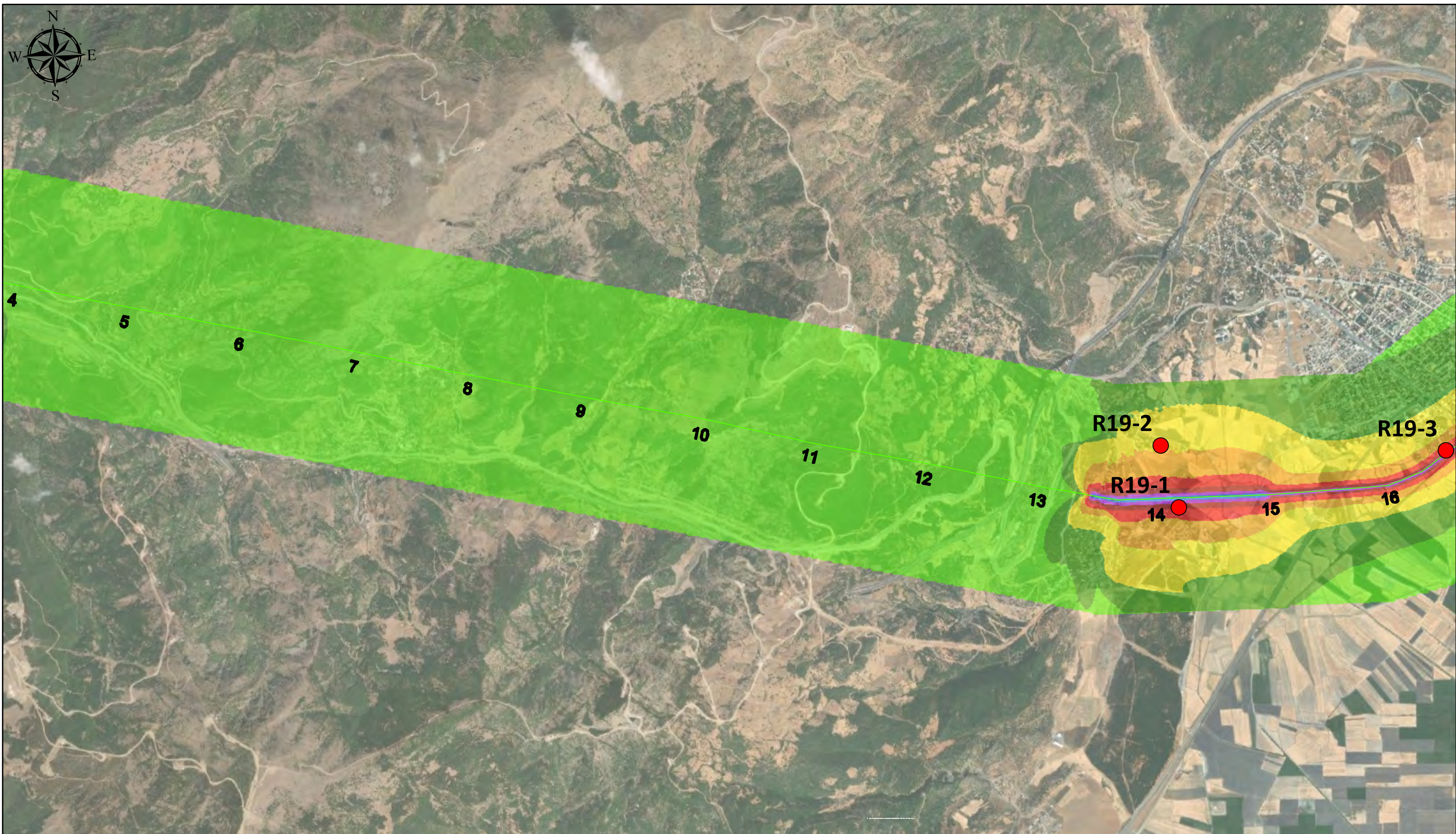
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Day**



Scale: 1/30.000

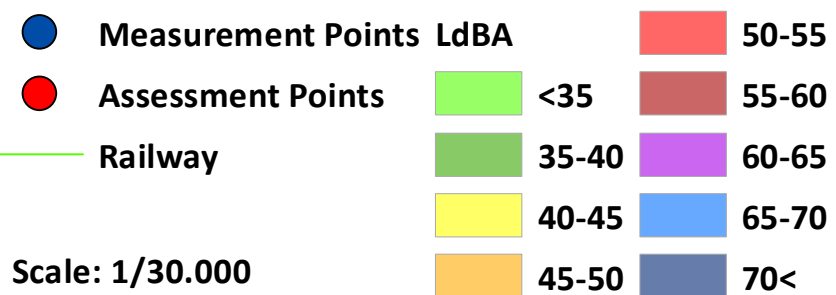


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

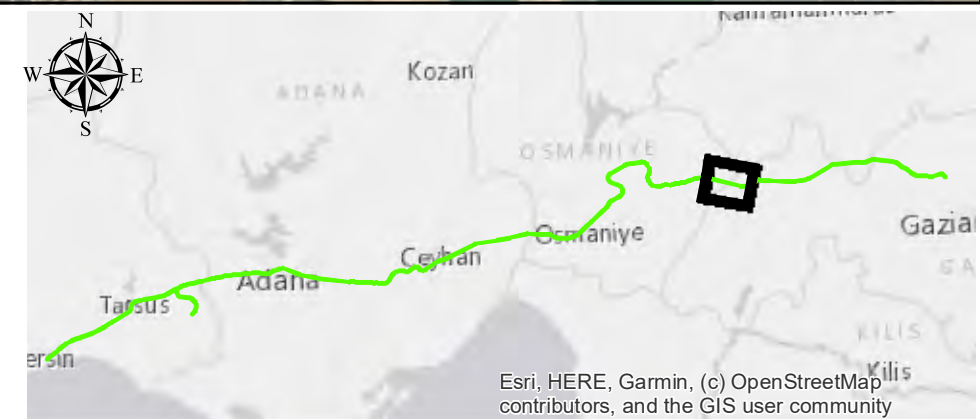


FREKANS

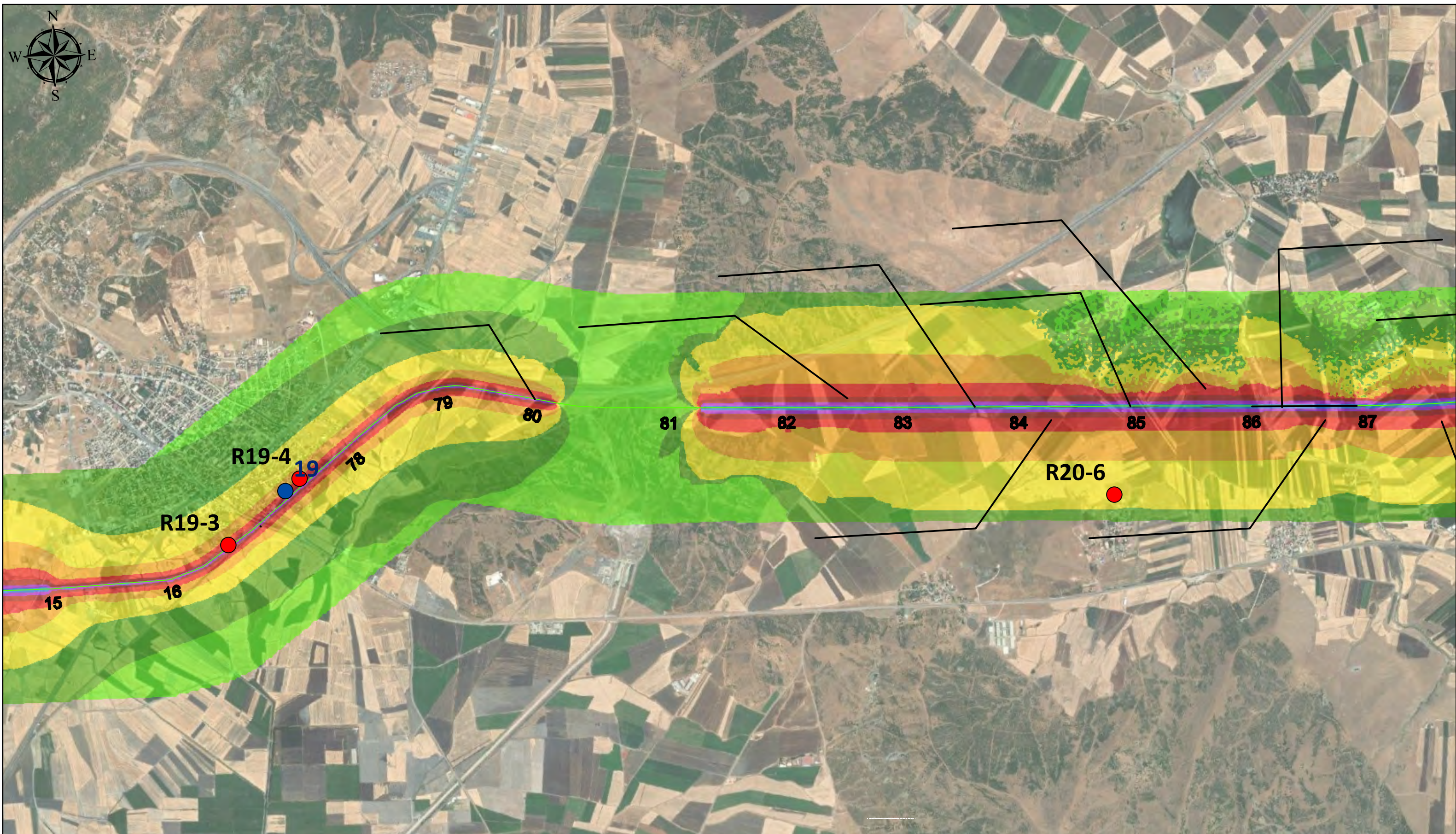
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



Scale: 1/30.000

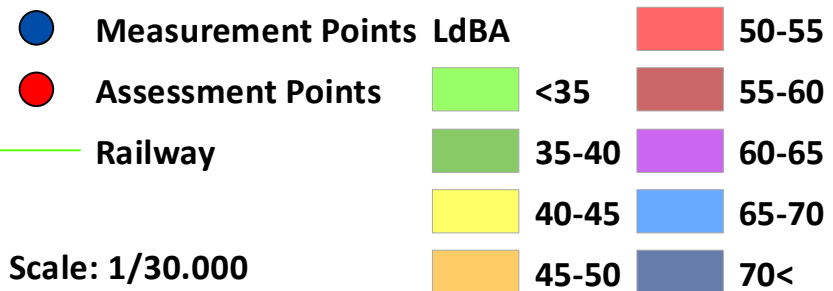
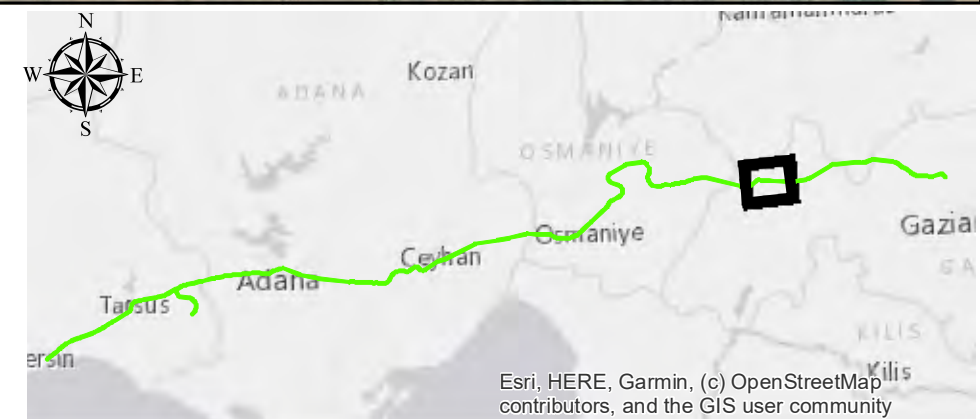


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

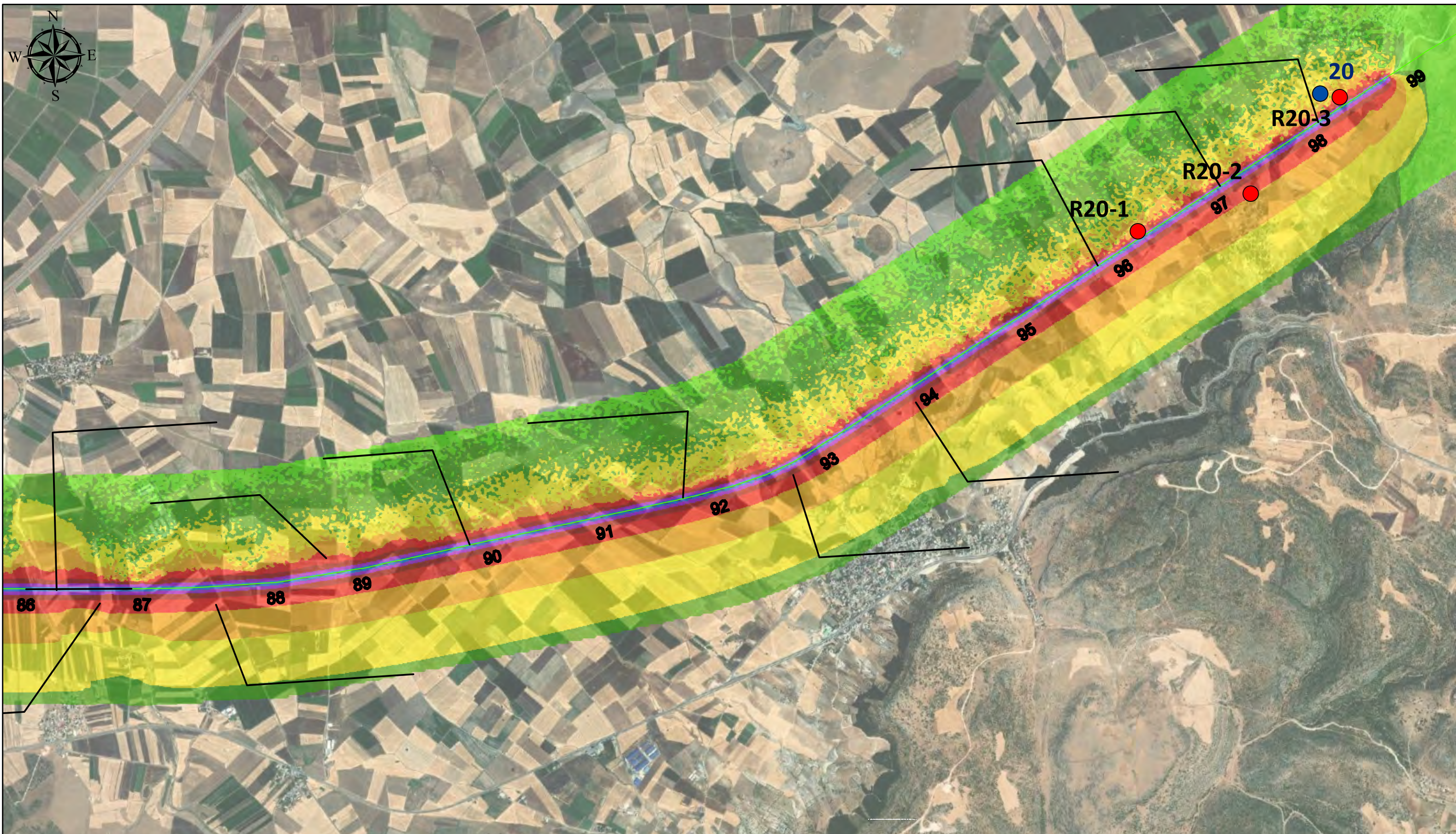


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



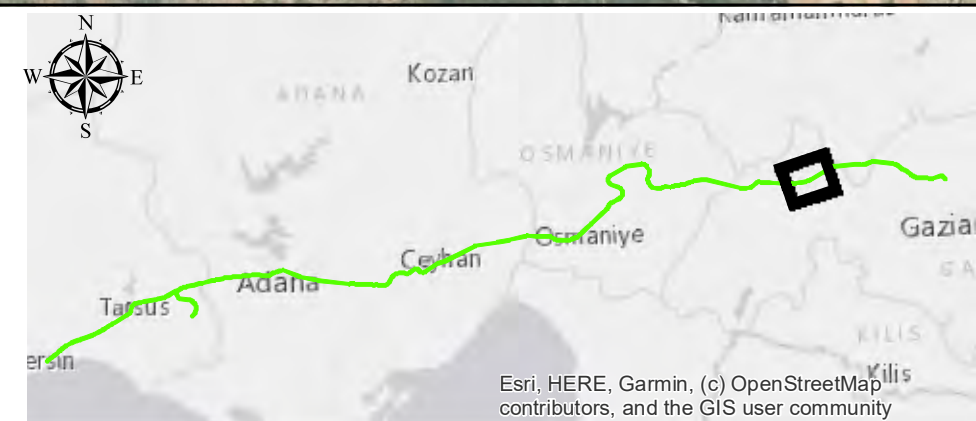
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway
- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70< |

Scale: 1/30.000



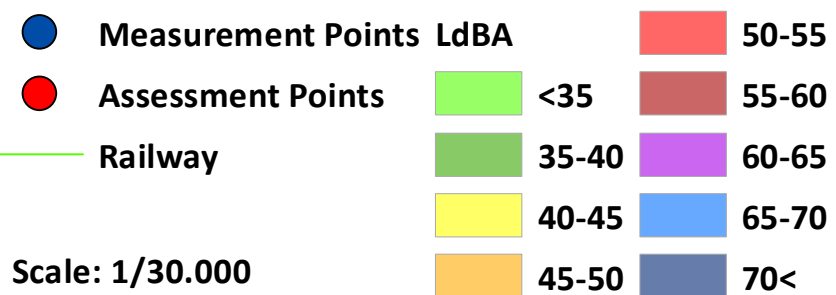
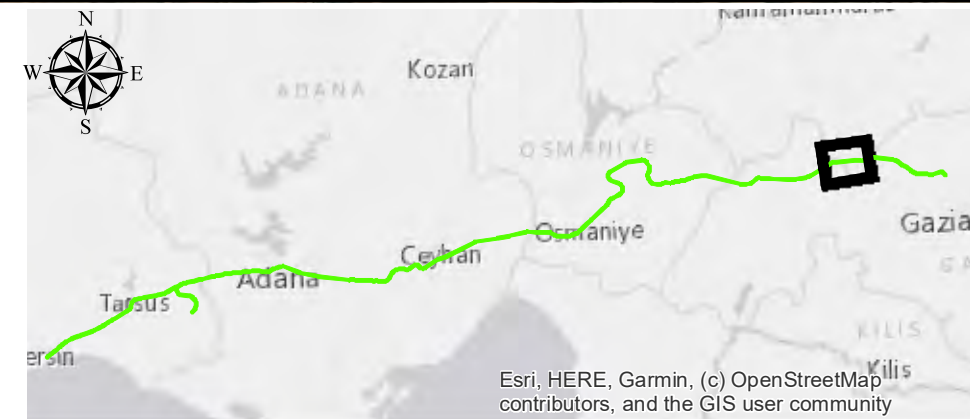
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

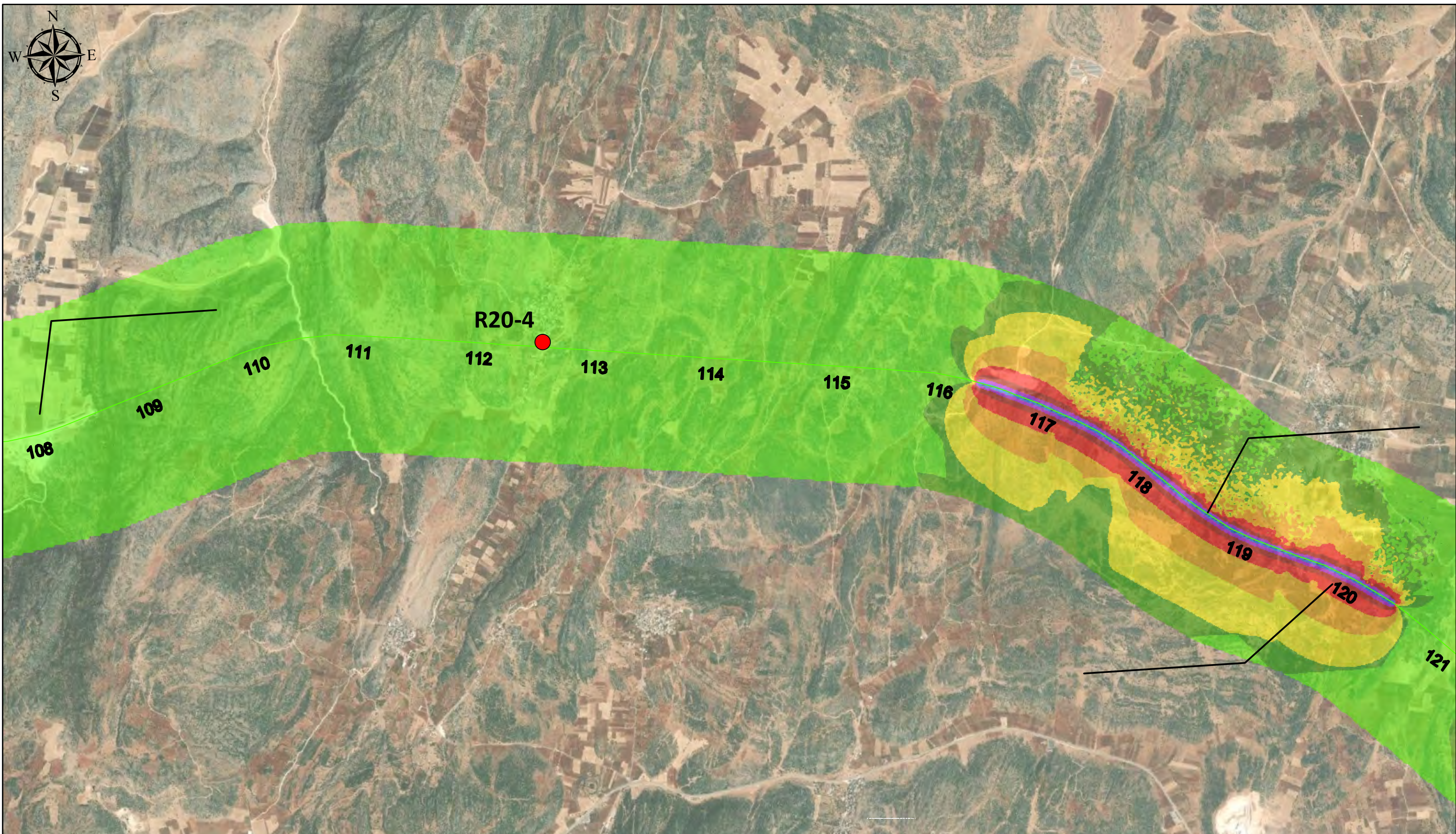
0 500 1.000 2.000 3.000 4.000 Meters



FREKANS

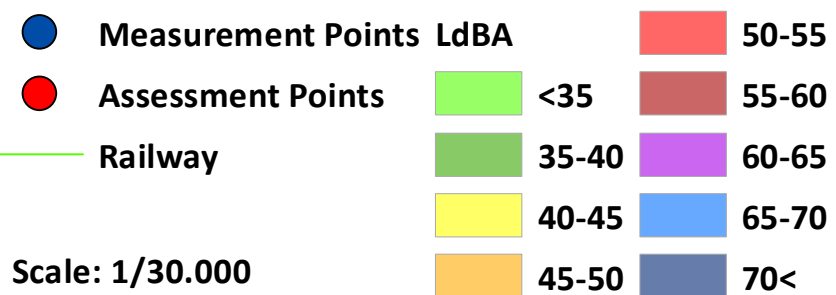
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



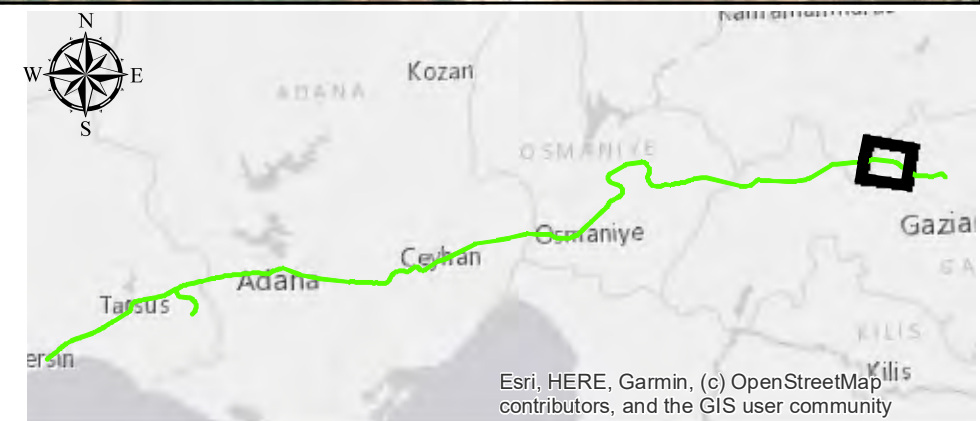


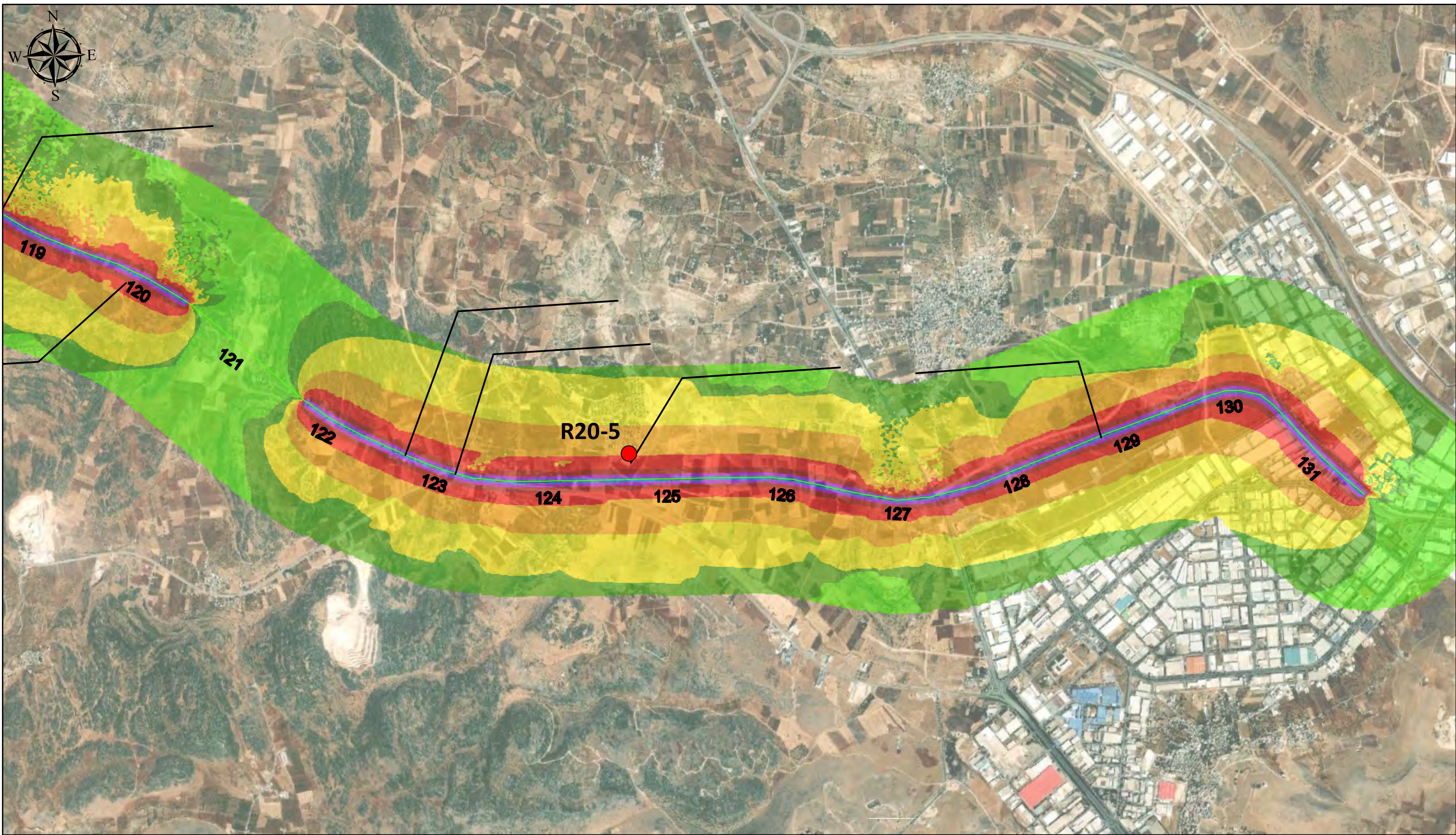
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



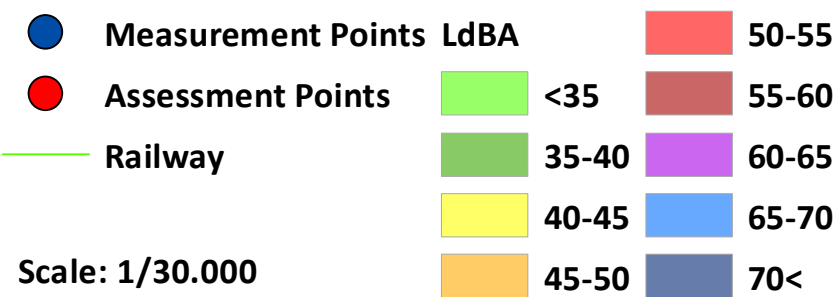
Scale: 1/30.000



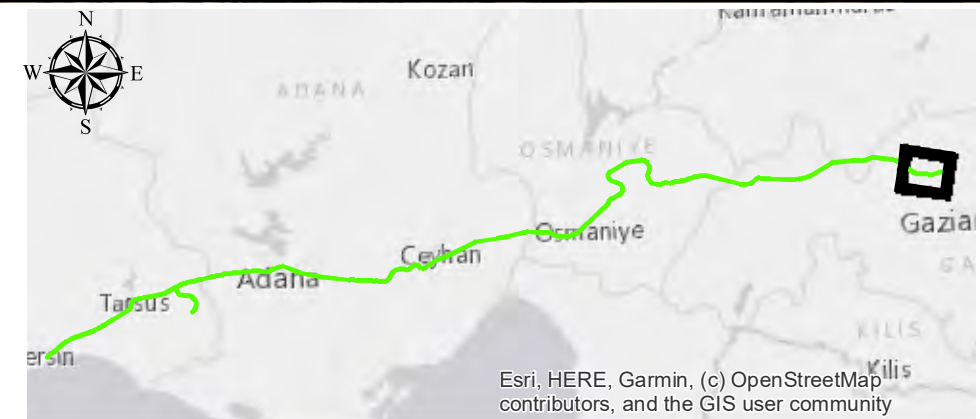


FREKANS

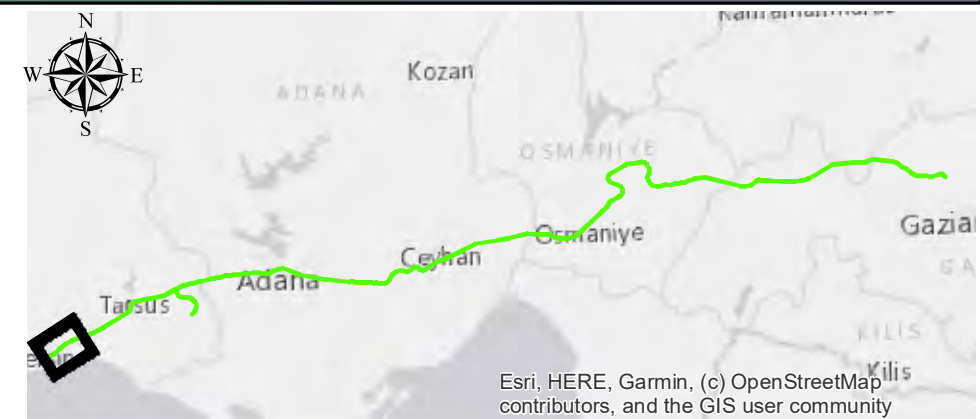
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

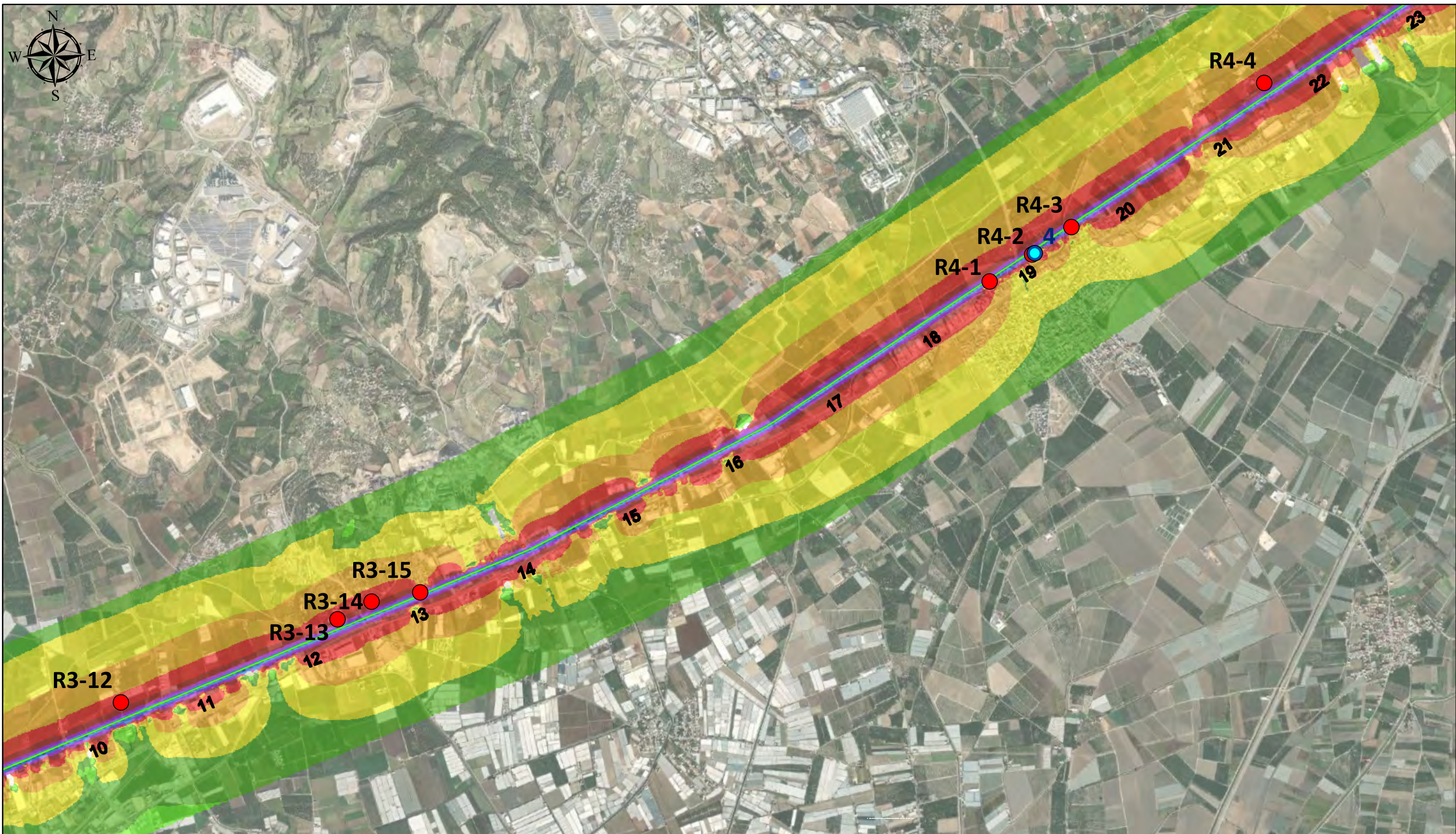


Scale: 1/30.000



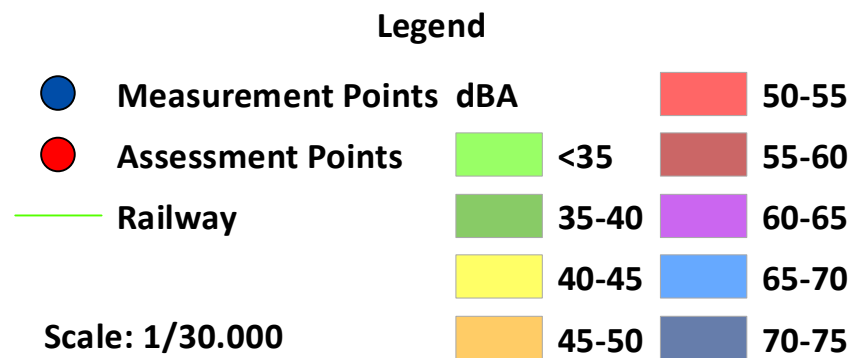
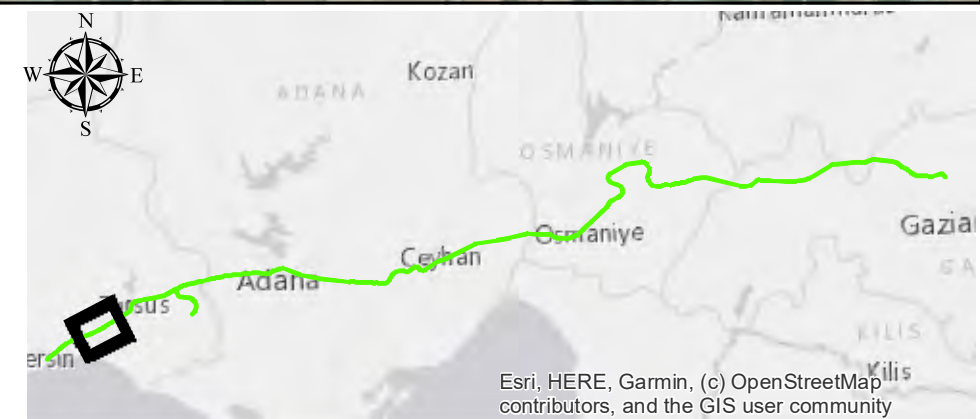
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



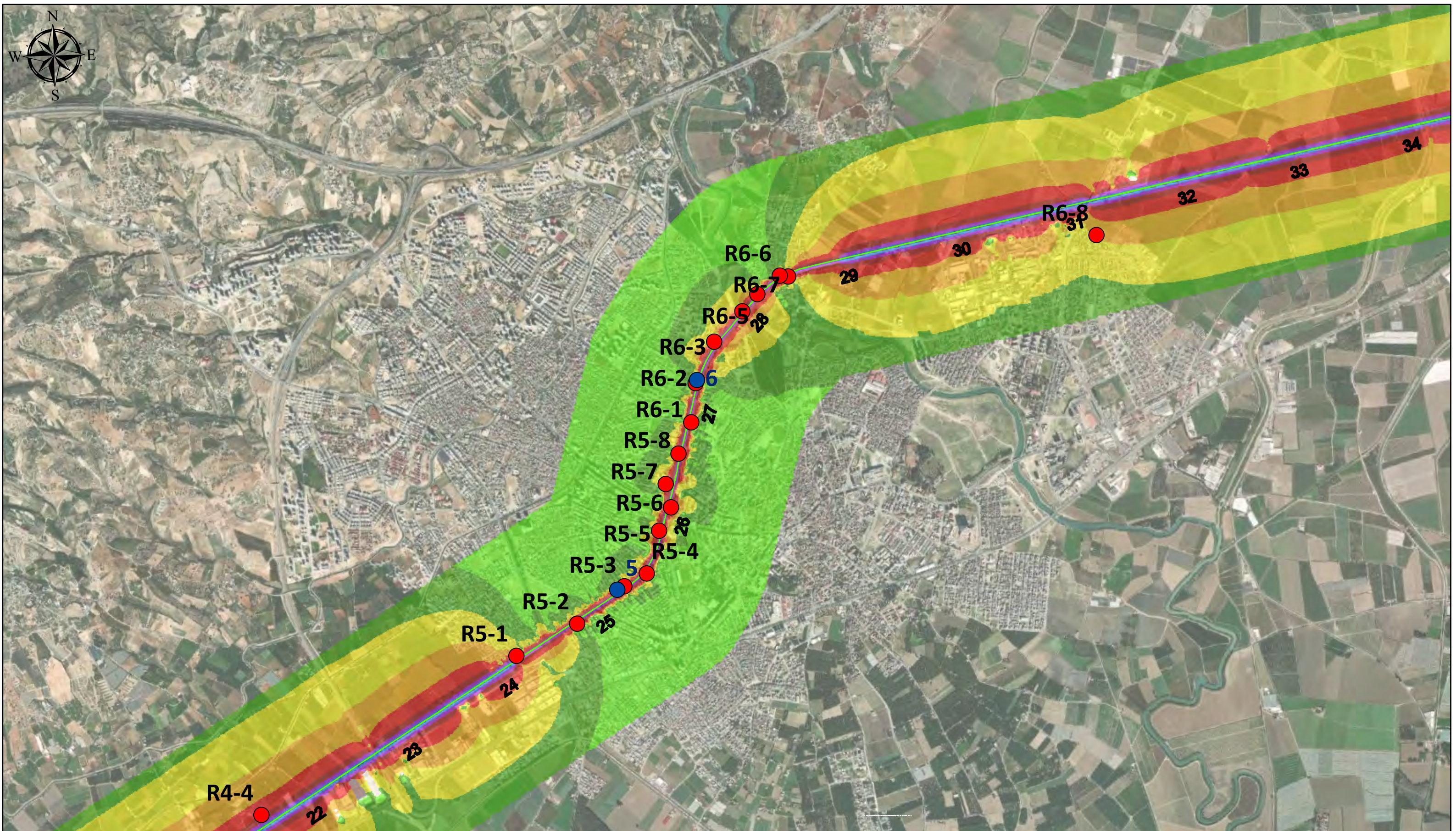


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

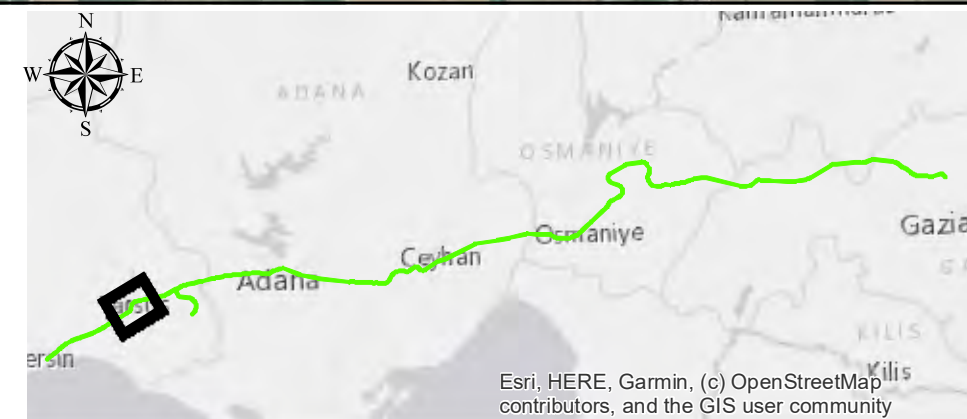
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

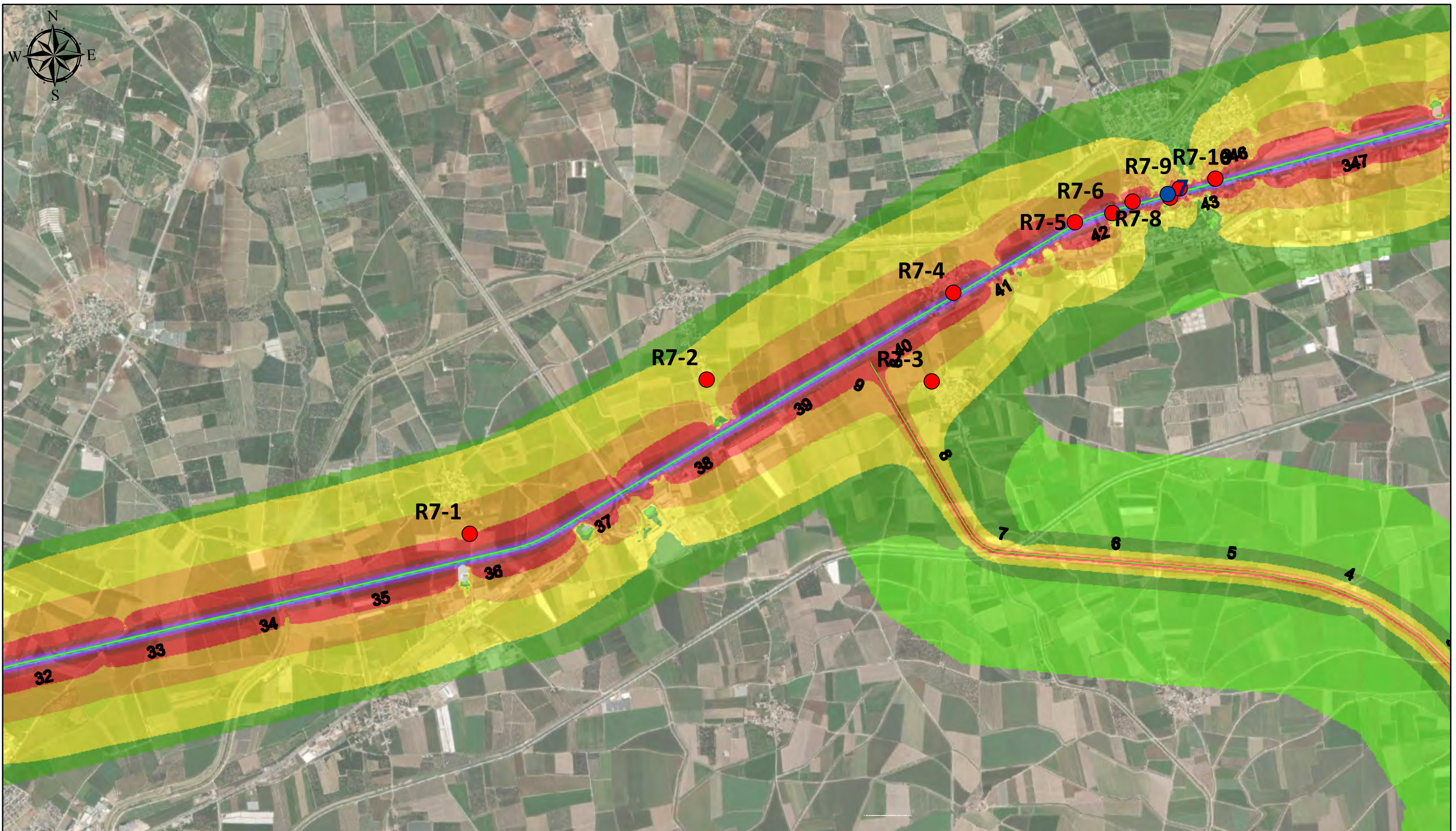
Scale: 1/30.000

Legend

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70-75



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

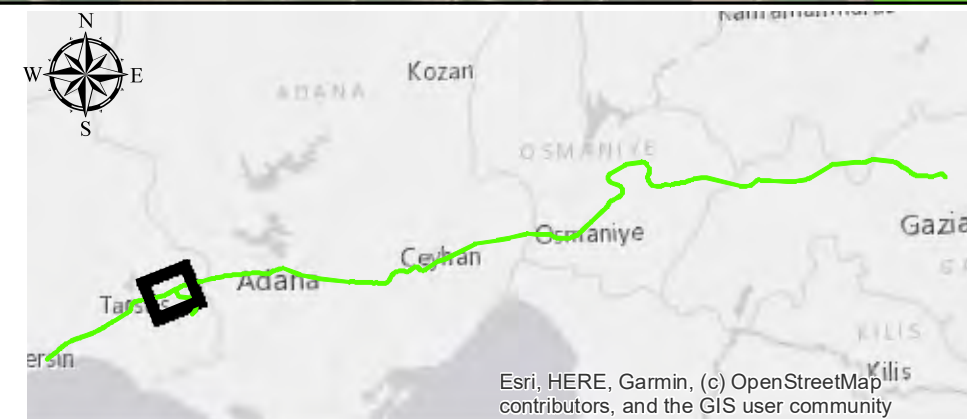
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

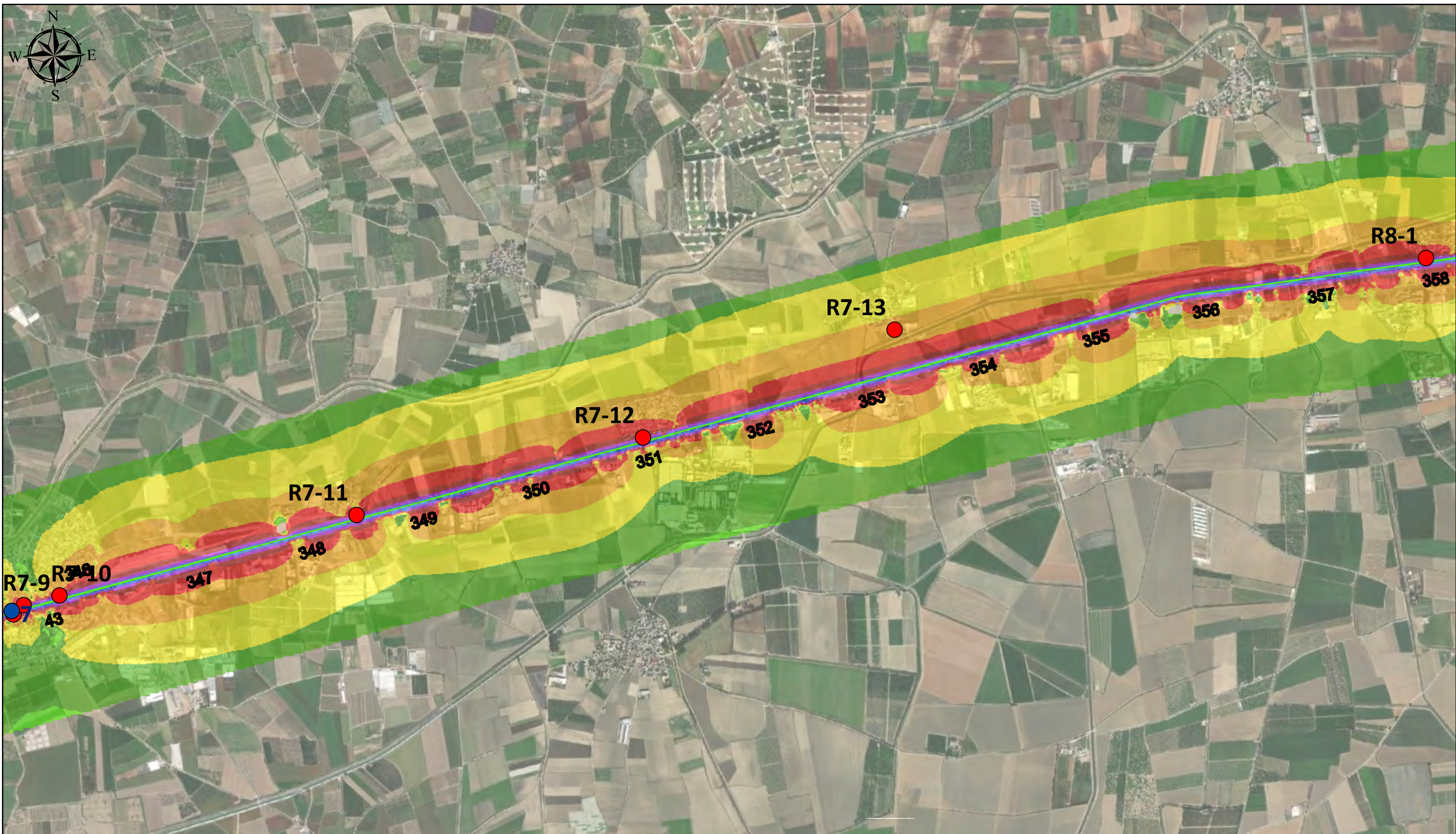
Scale: 1/30.000

Legend

- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70-75 |



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

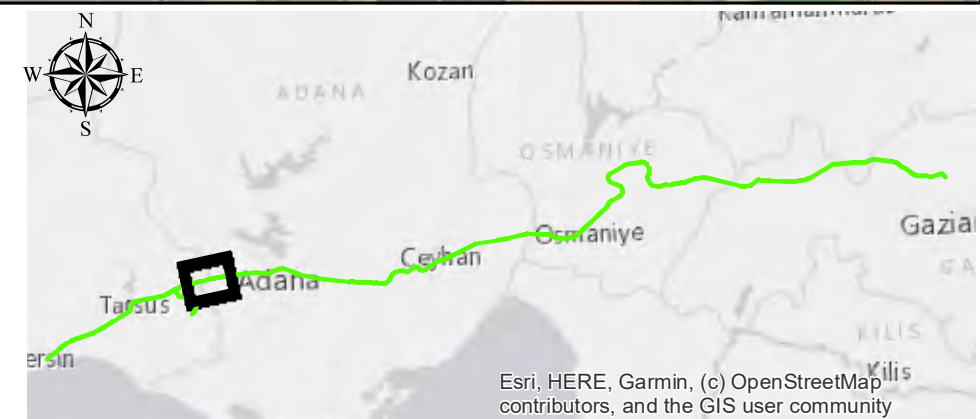
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

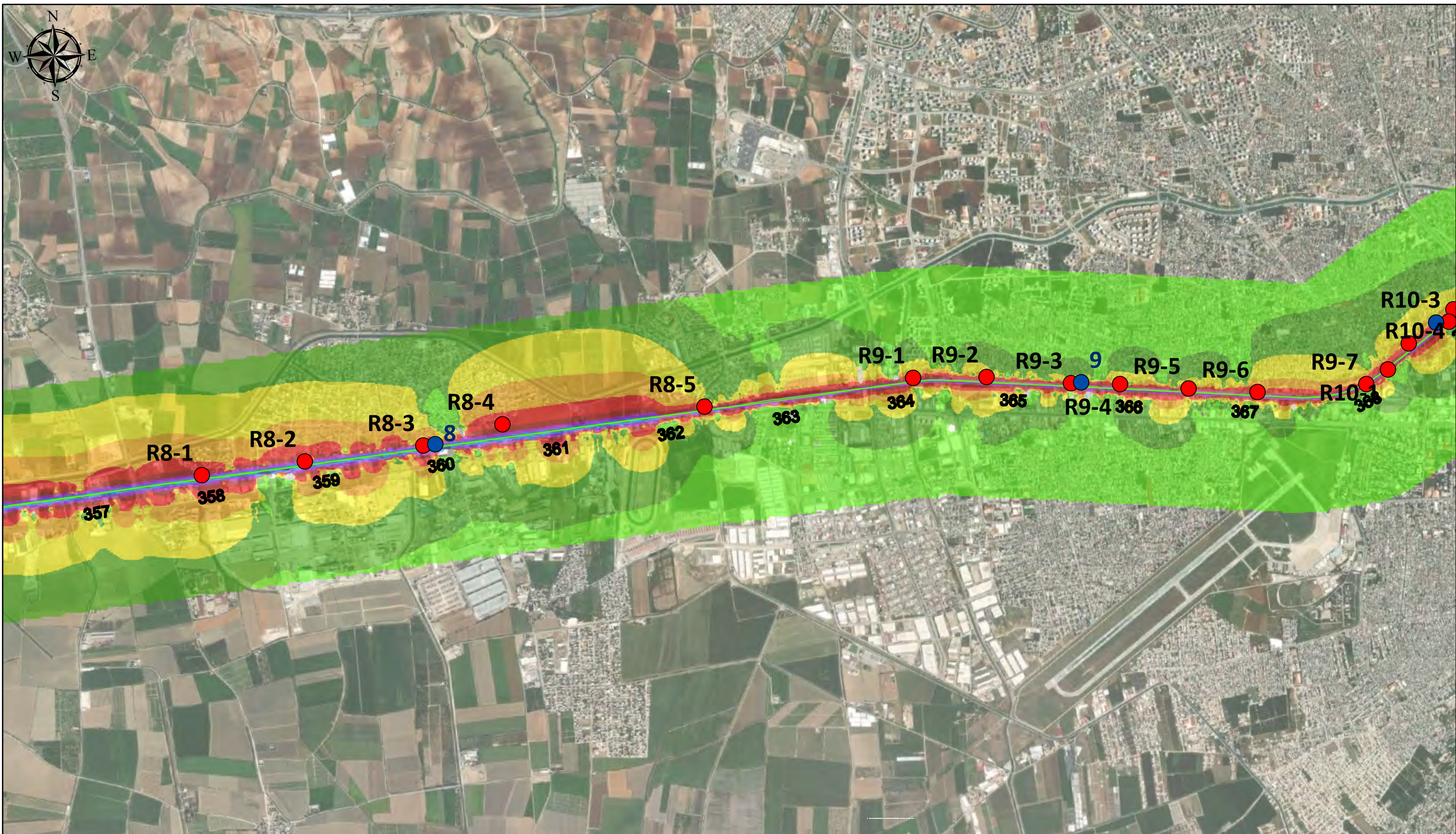
Scale: 1/30.000

Legend

- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70-75 |



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



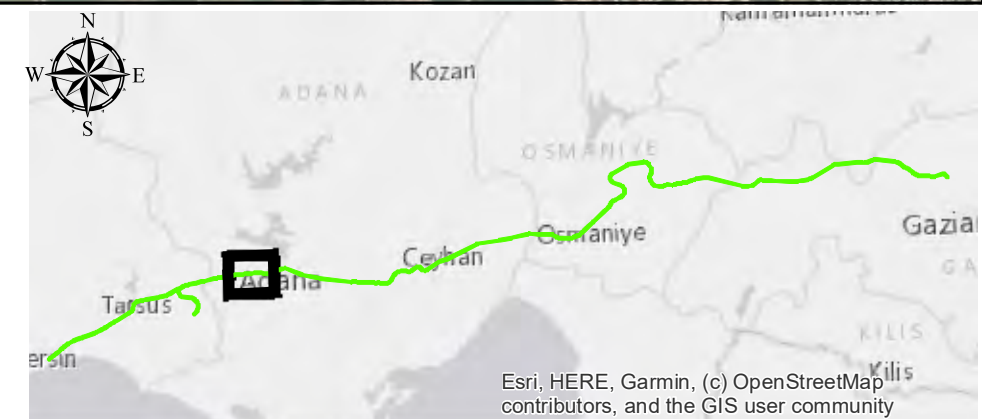
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

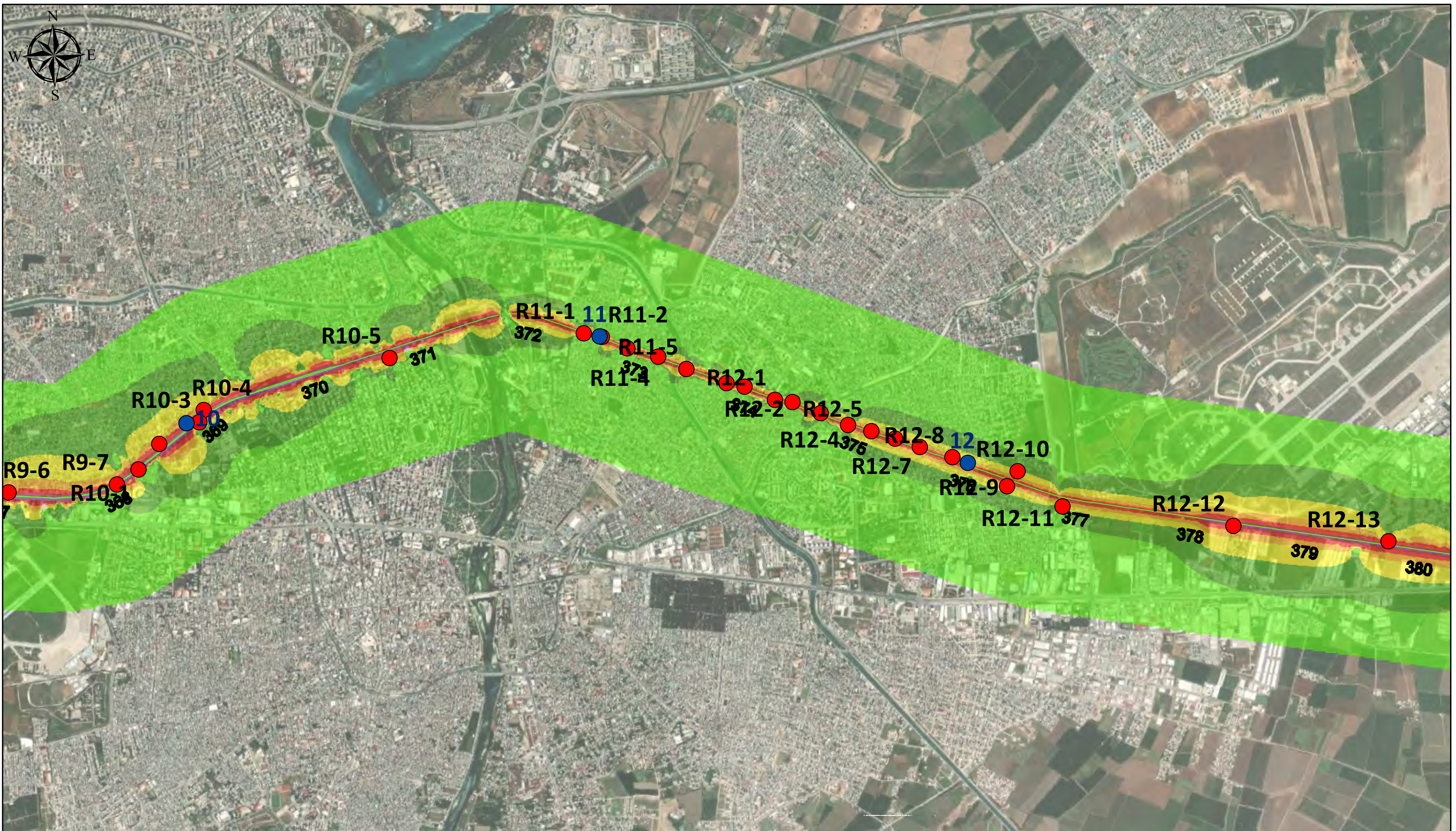
- Legend**
- Measurement Points dBA
 - Assessment Points
 - Railway

Scale: 1/30.000

<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70-75



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

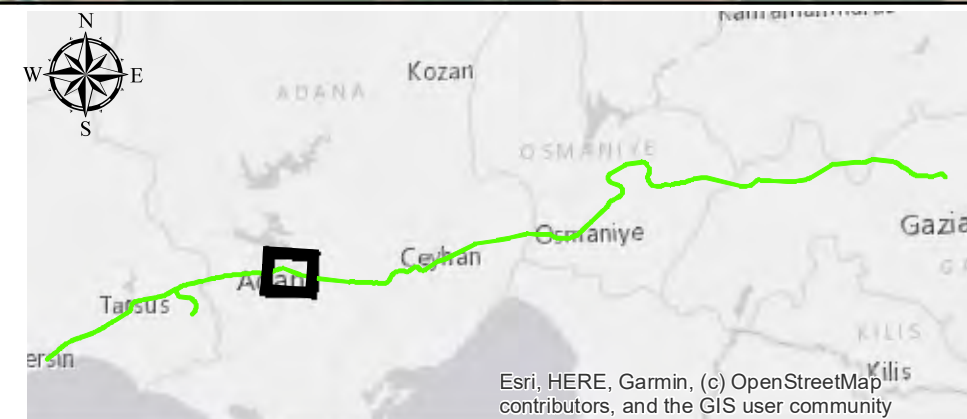
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

Scale: 1/30.000

Legend

<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70-75



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

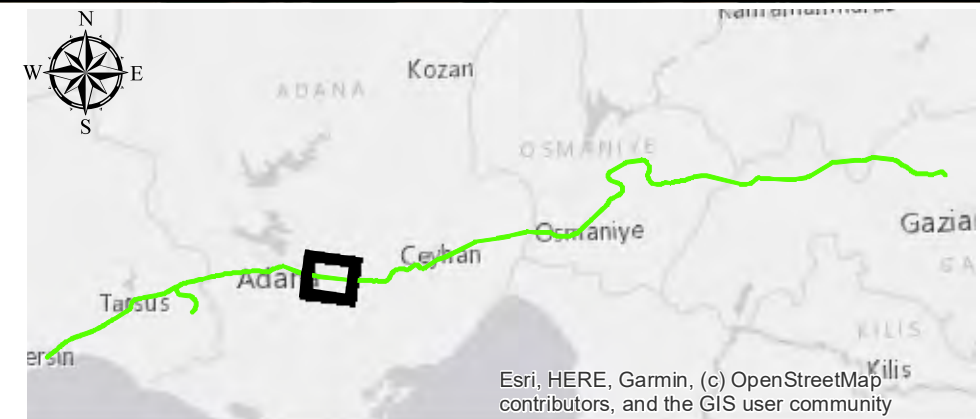
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

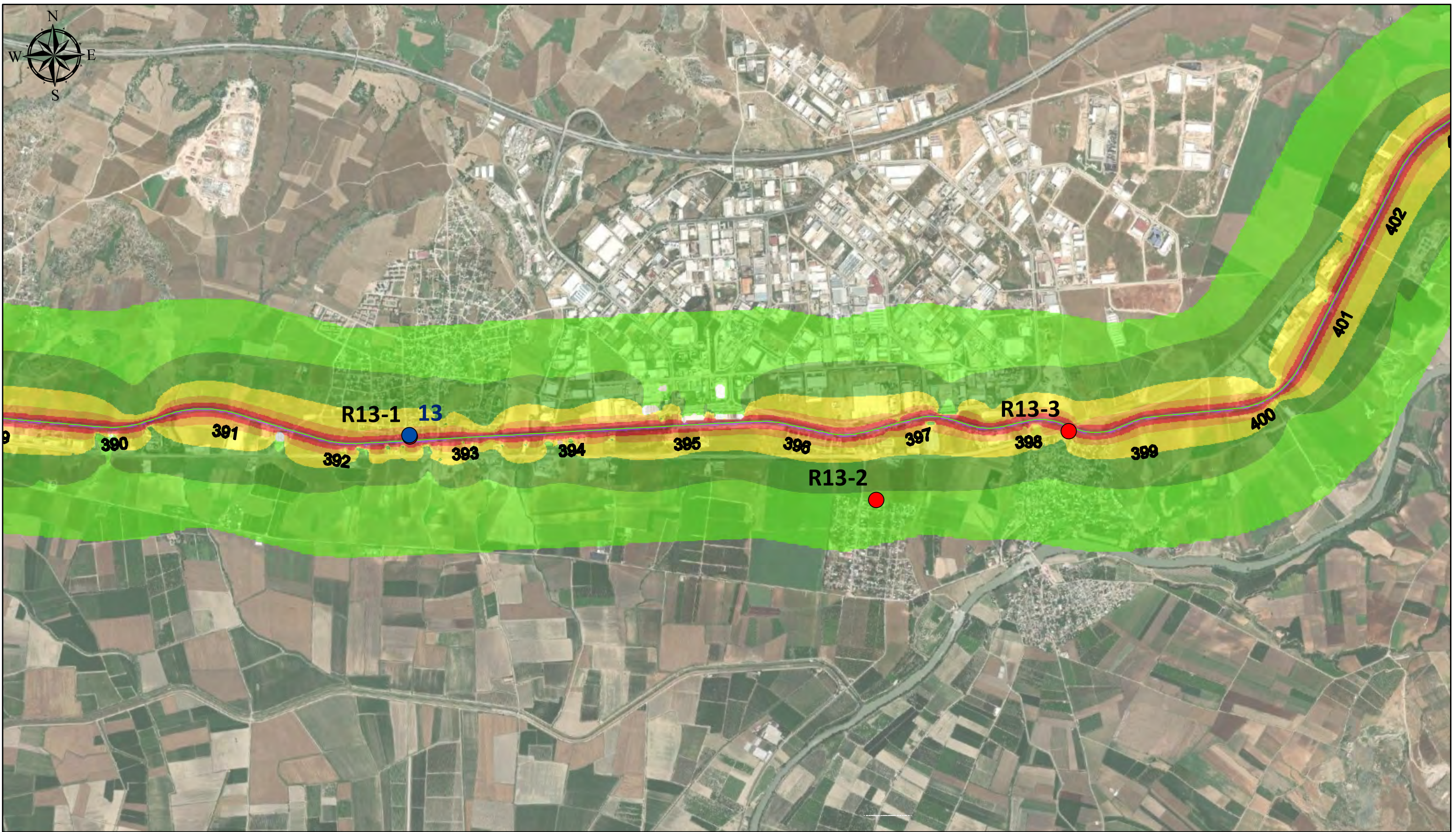
Scale: 1/30.000

Legend

<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70-75



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



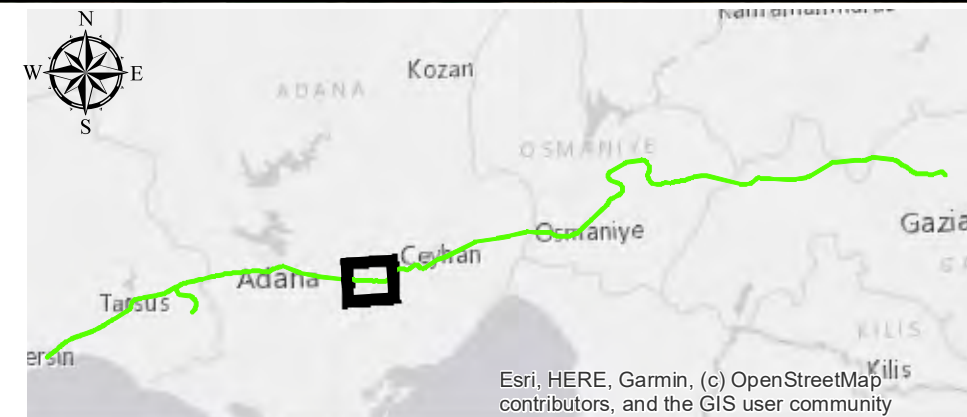
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

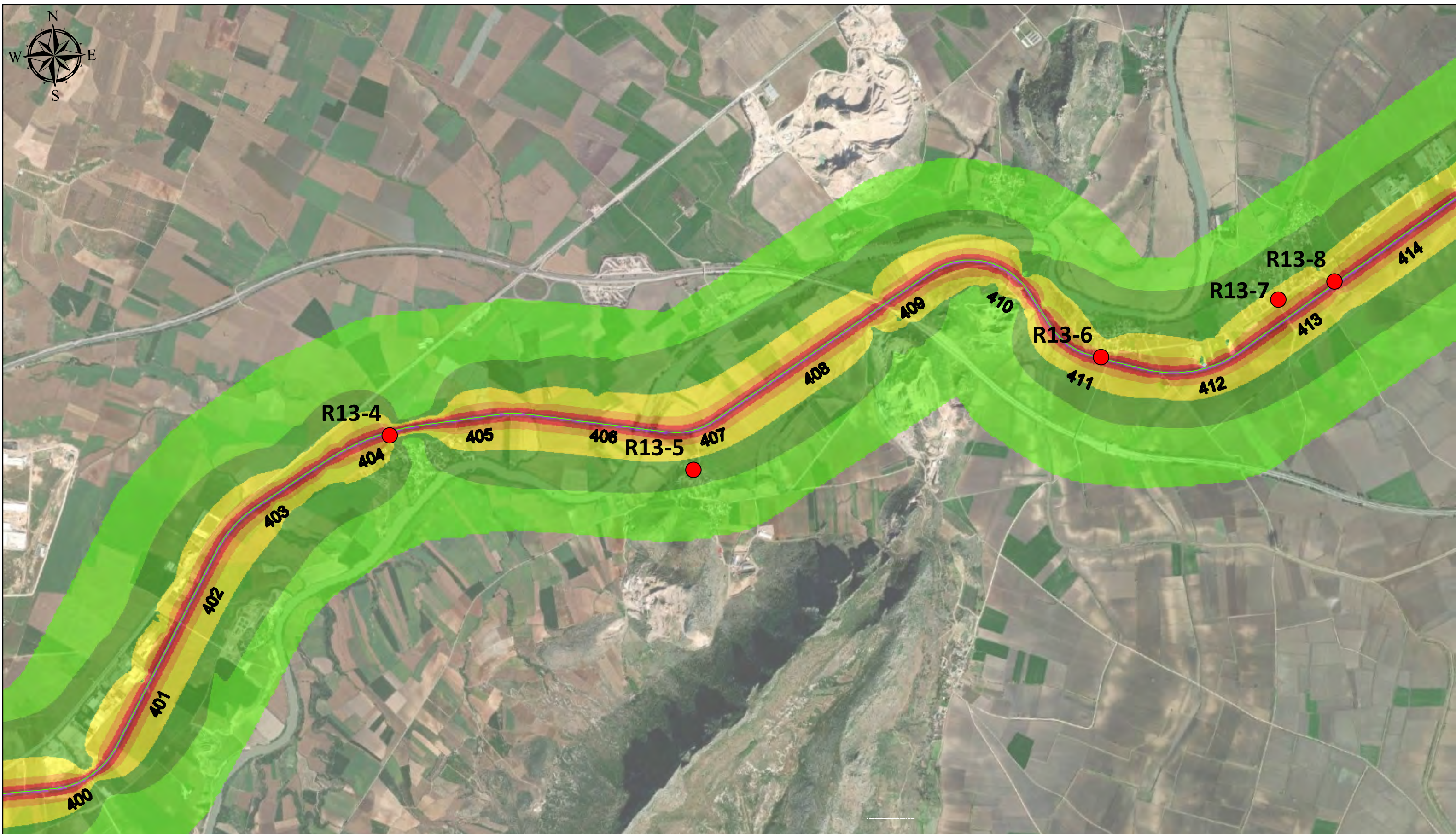
- Legend**
- Measurement Points dBA
 - Assessment Points
 - Railway

Scale: 1/30.000

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70-75



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

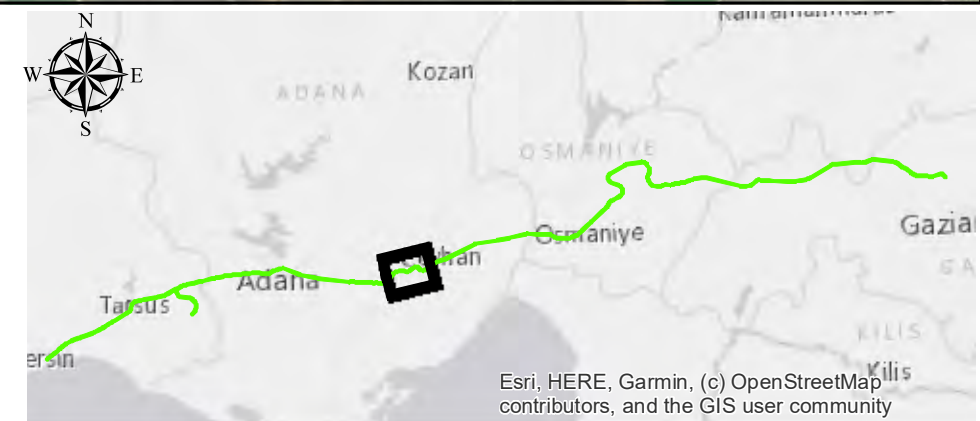
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

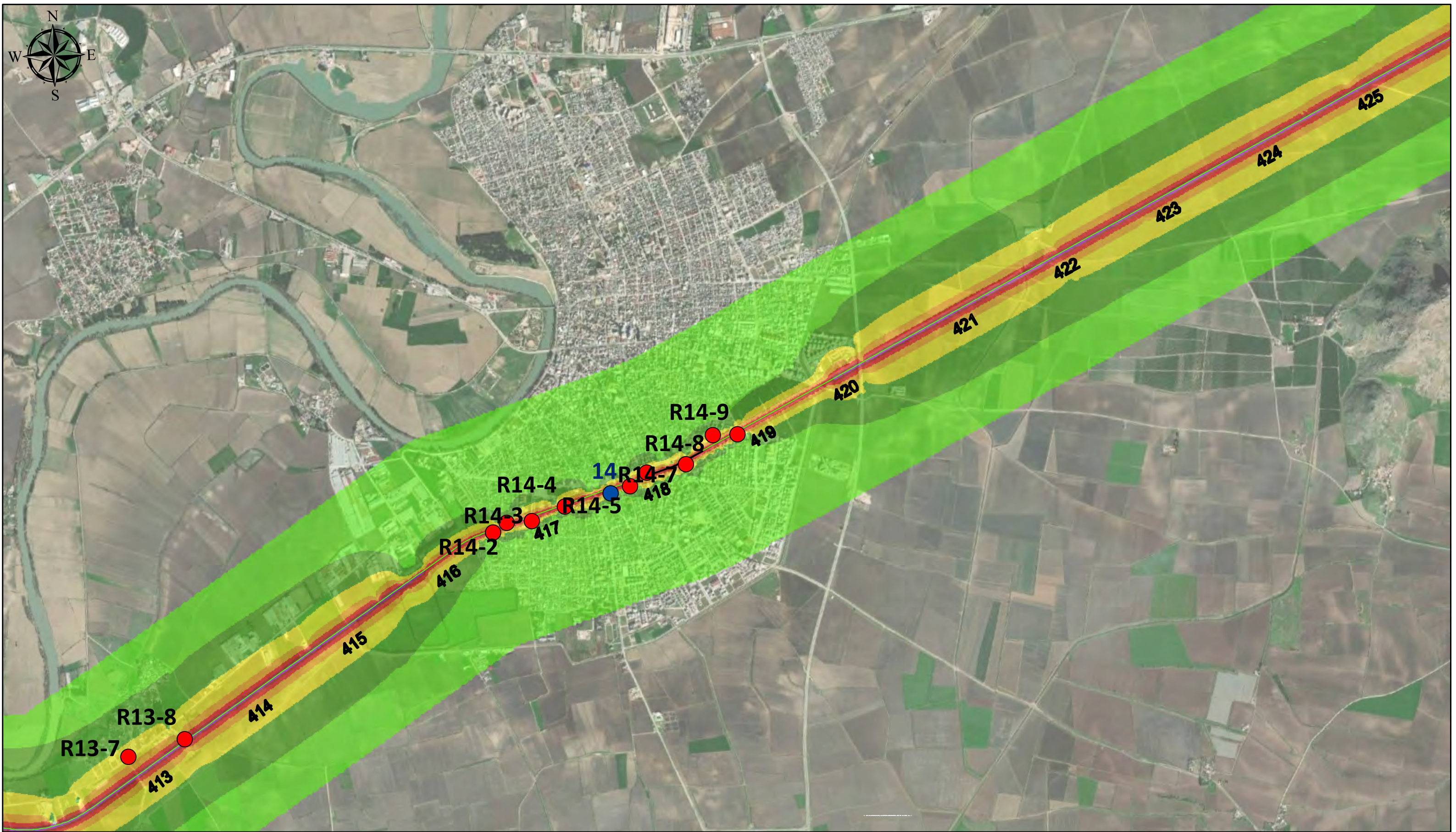
Scale: 1/30.000

Legend

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70-75



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



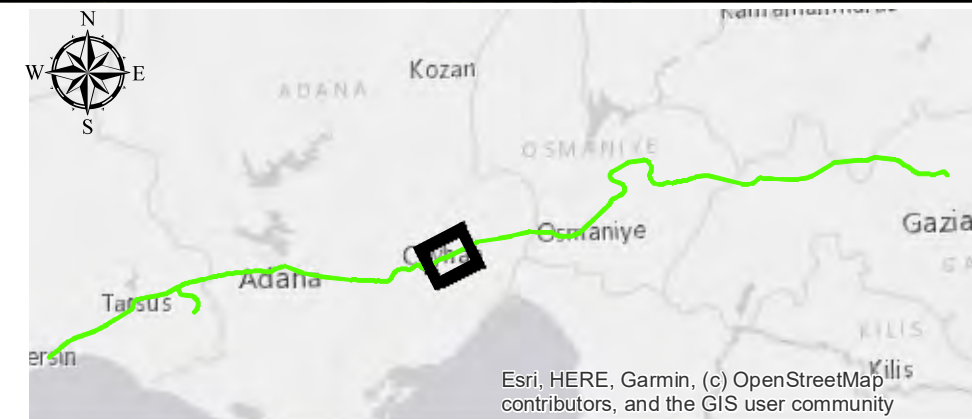
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

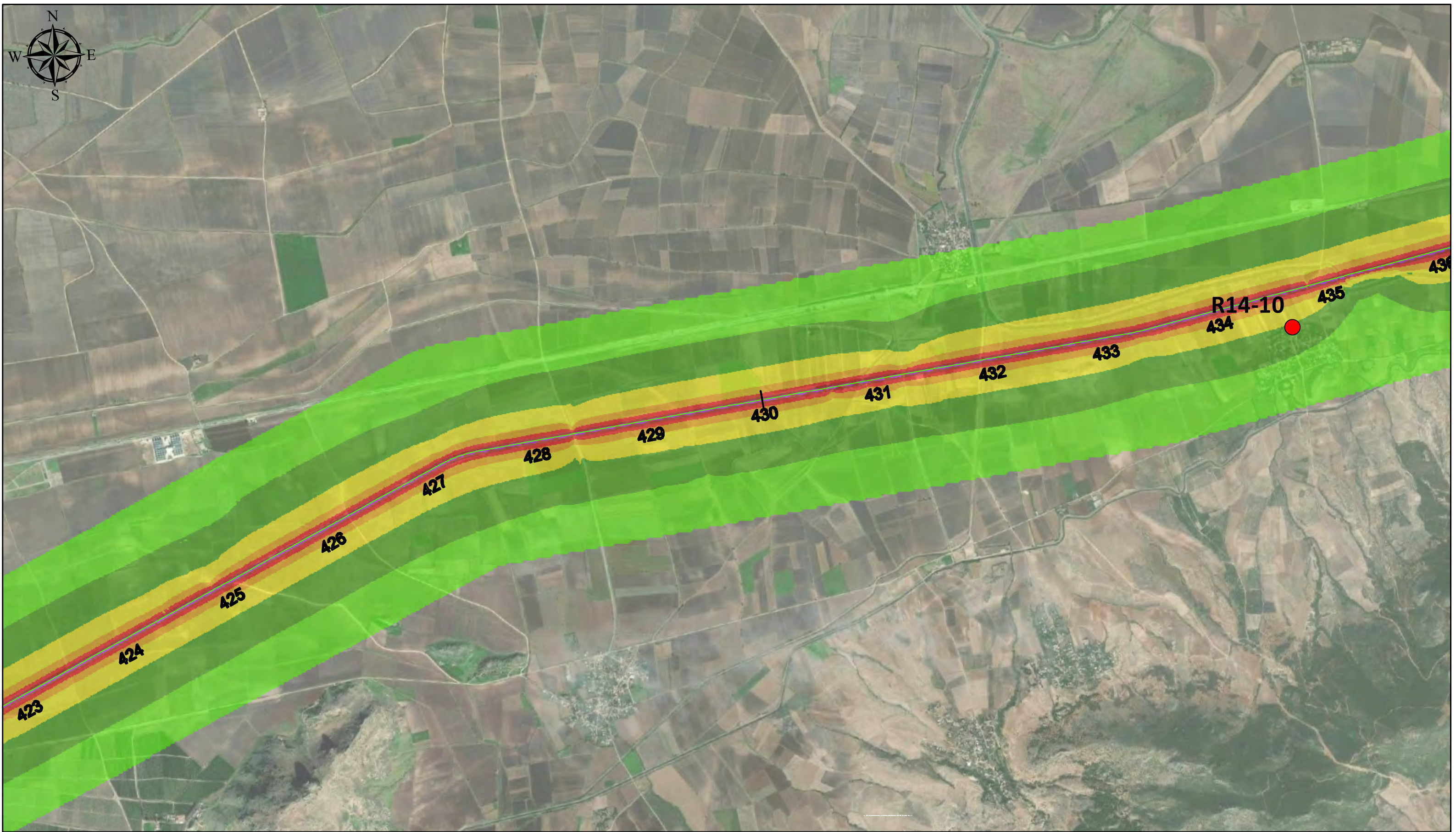
- Legend**
- Measurement Points dBA
 - Assessment Points
 - Railway

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70-75

Scale: 1/30.000



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



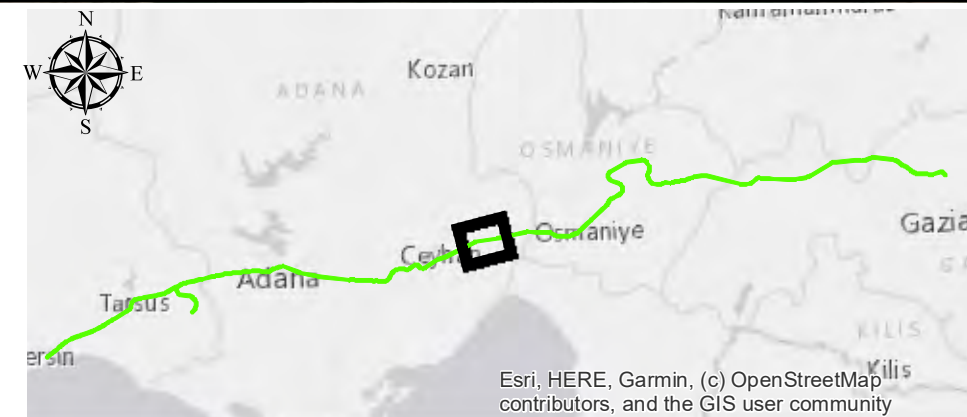
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

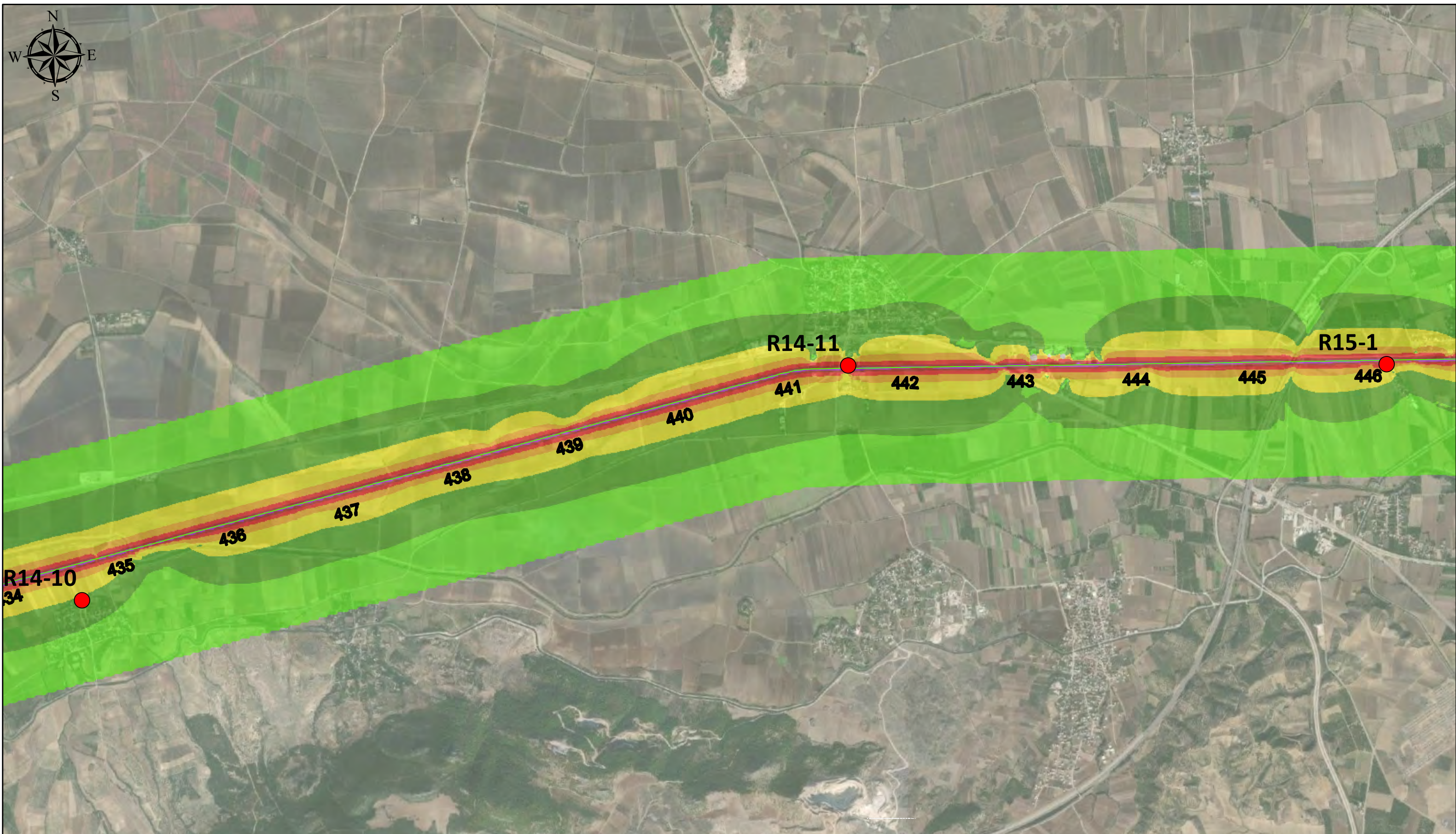
- Legend**
- Measurement Points dBA
 - Assessment Points
 - Railway

Scale: 1/30.000

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70-75



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

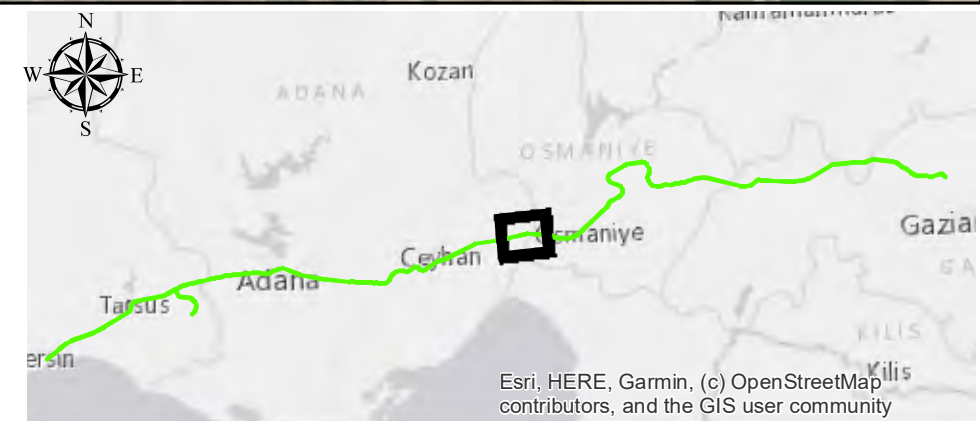
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

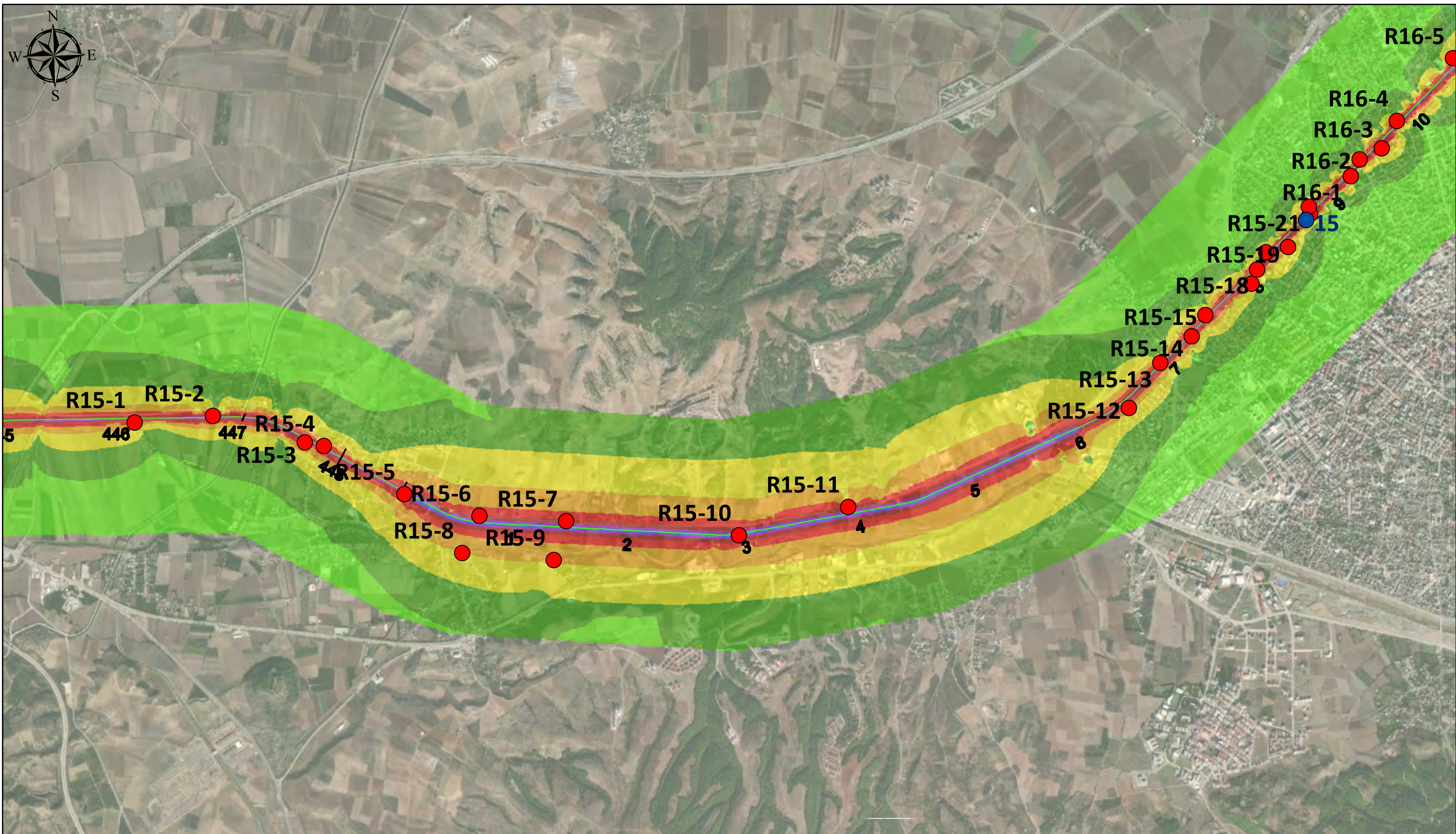
Scale: 1/30.000

Legend

<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70-75



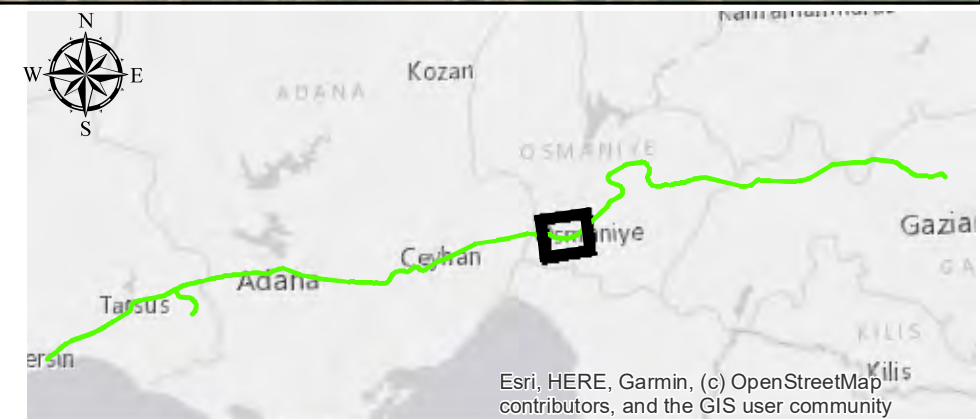
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

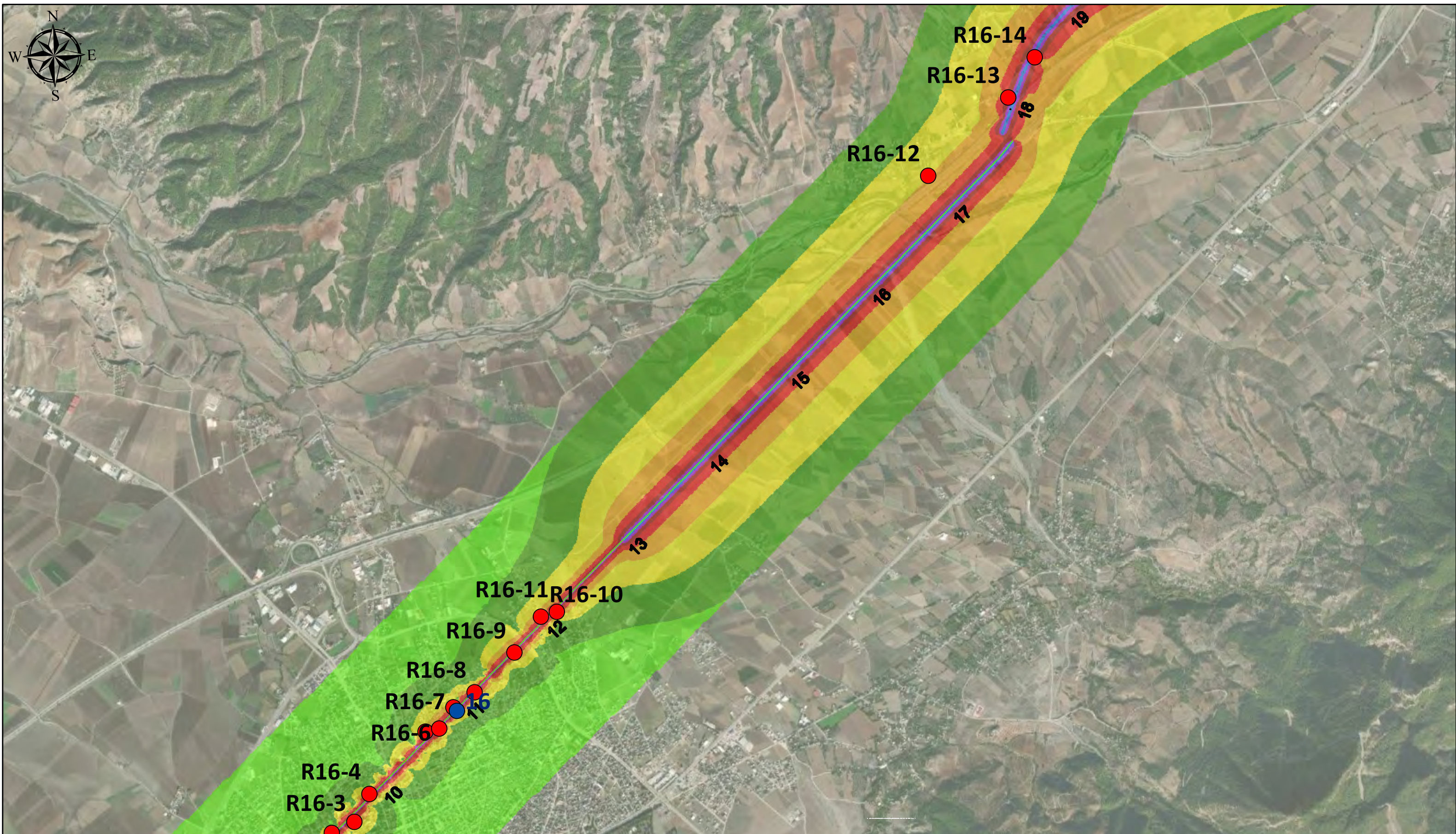


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

Scale: 1/30.000





FREKANS

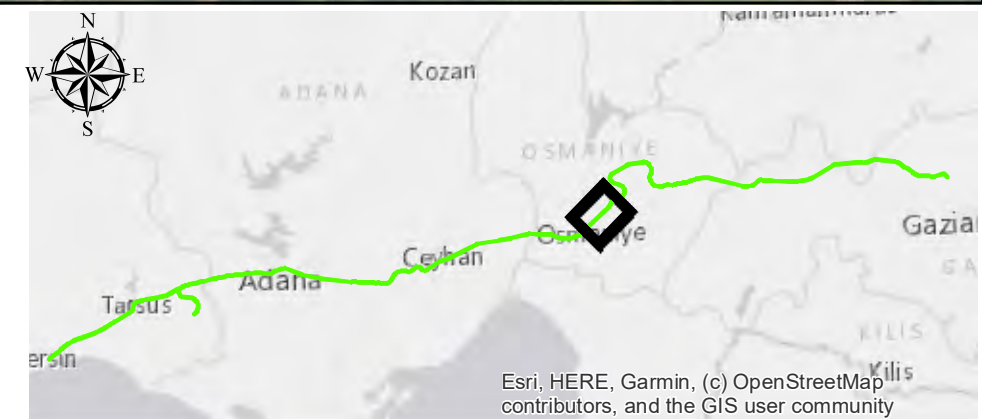
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

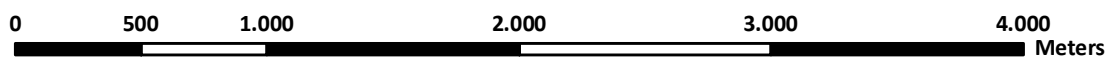
Scale: 1/30.000

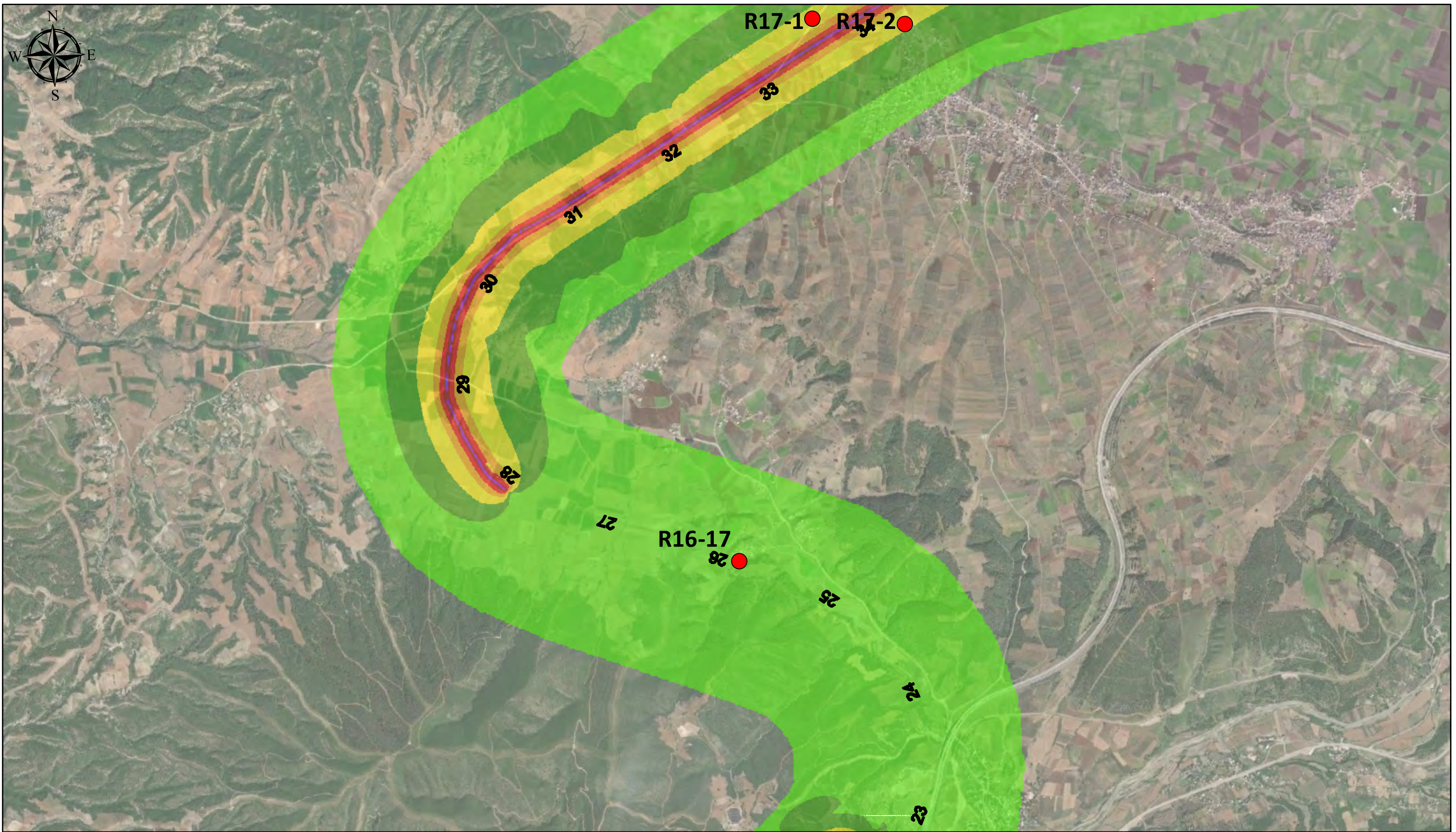
Legend

 <35	 50-55
 35-40	 55-60
 40-45	 60-65
 45-50	 65-70
	 70-75



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community





FREKANS

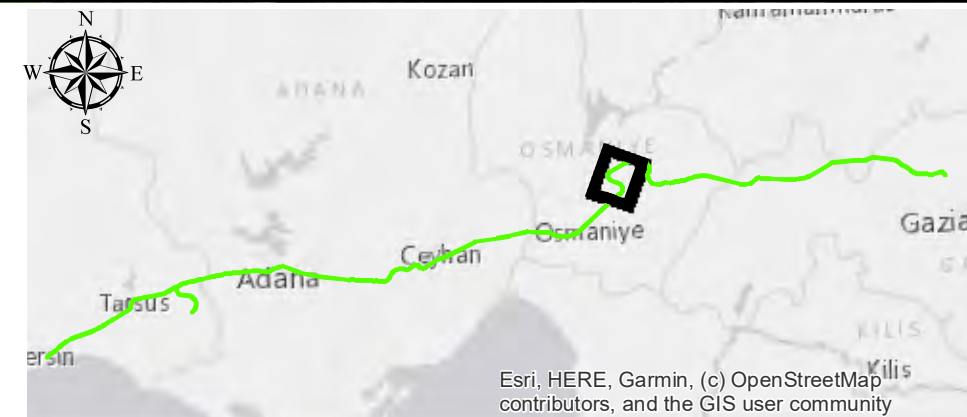
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

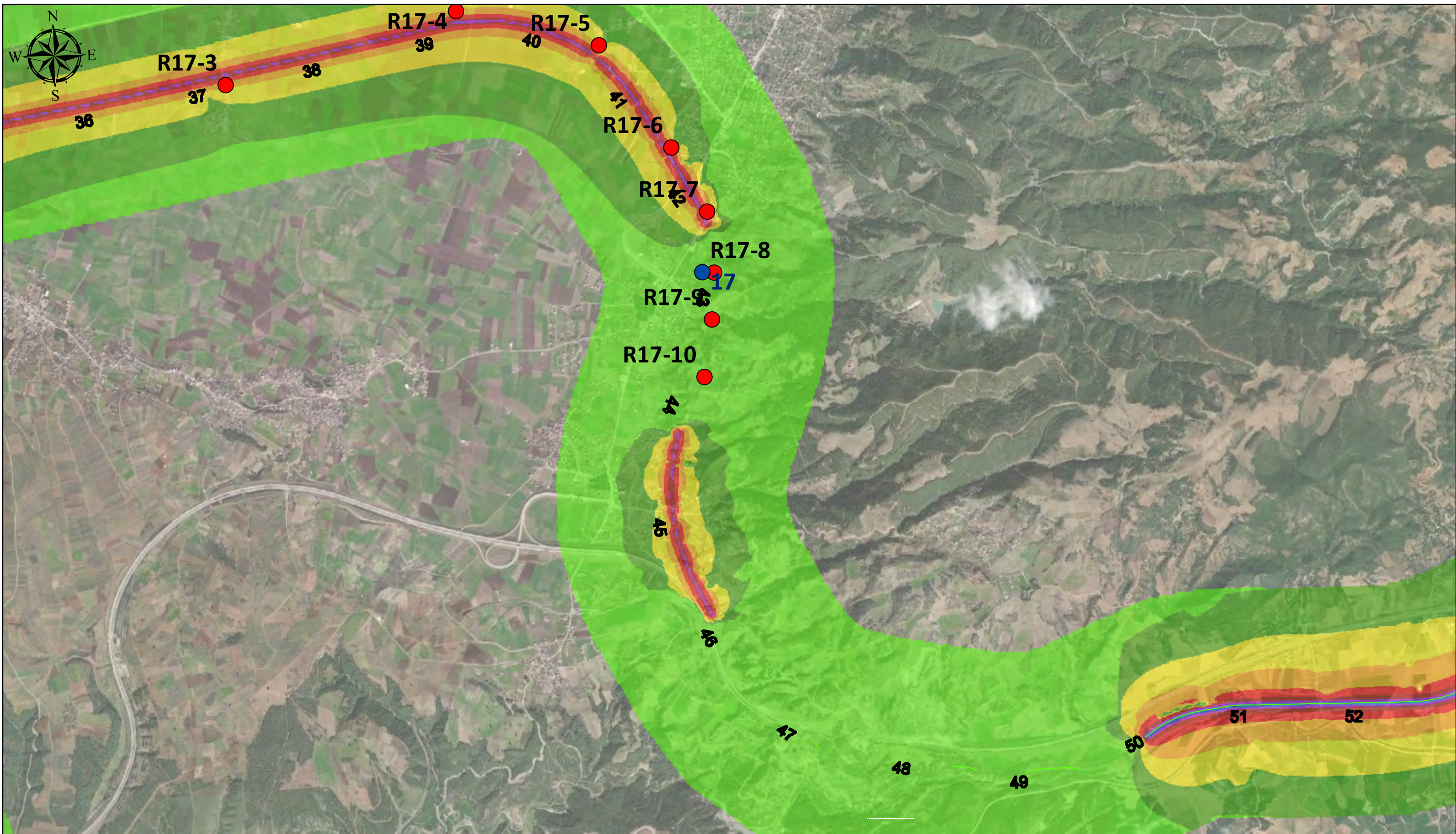
Scale: 1/30.000

Legend

- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70-75 |

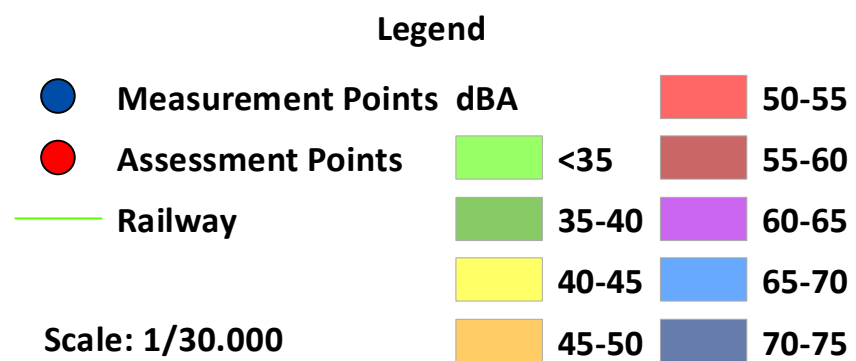
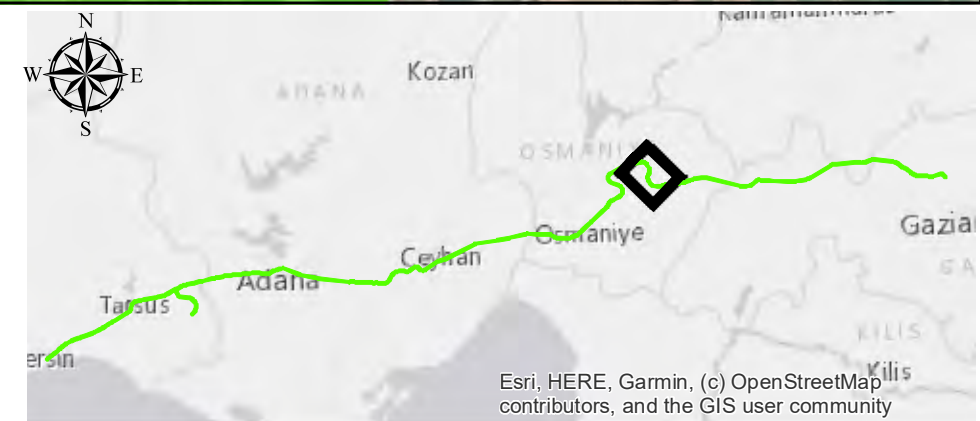


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

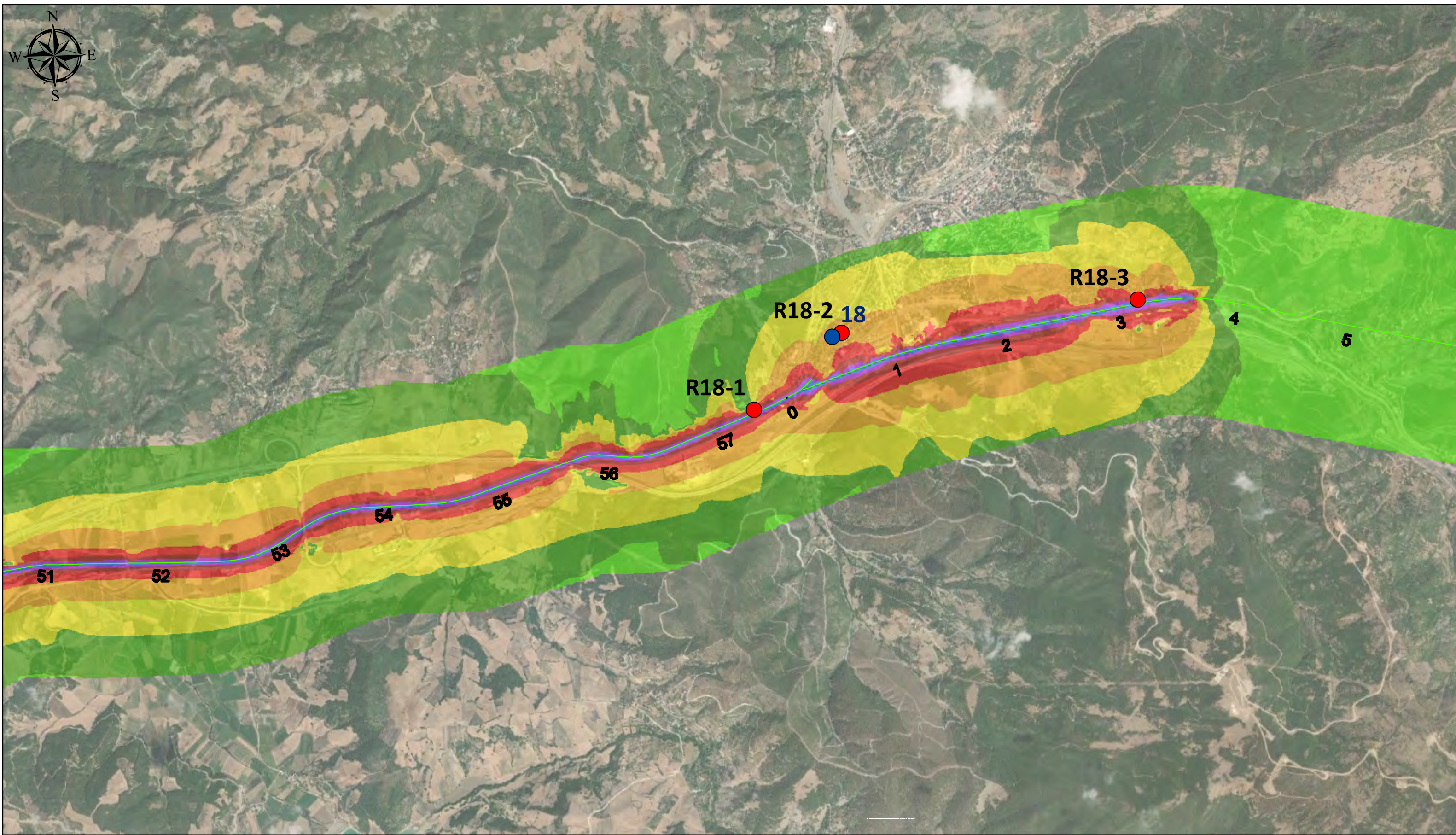


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

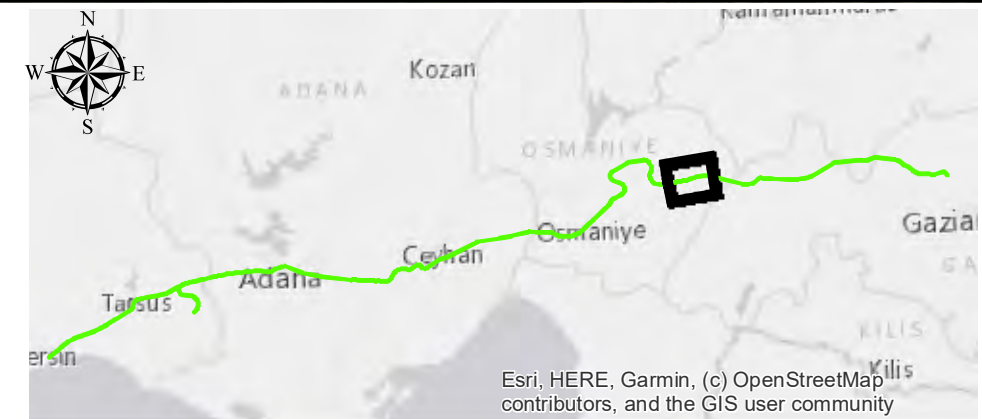
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Legend**
- Measurement Points dBA
 - Assessment Points
 - Railway

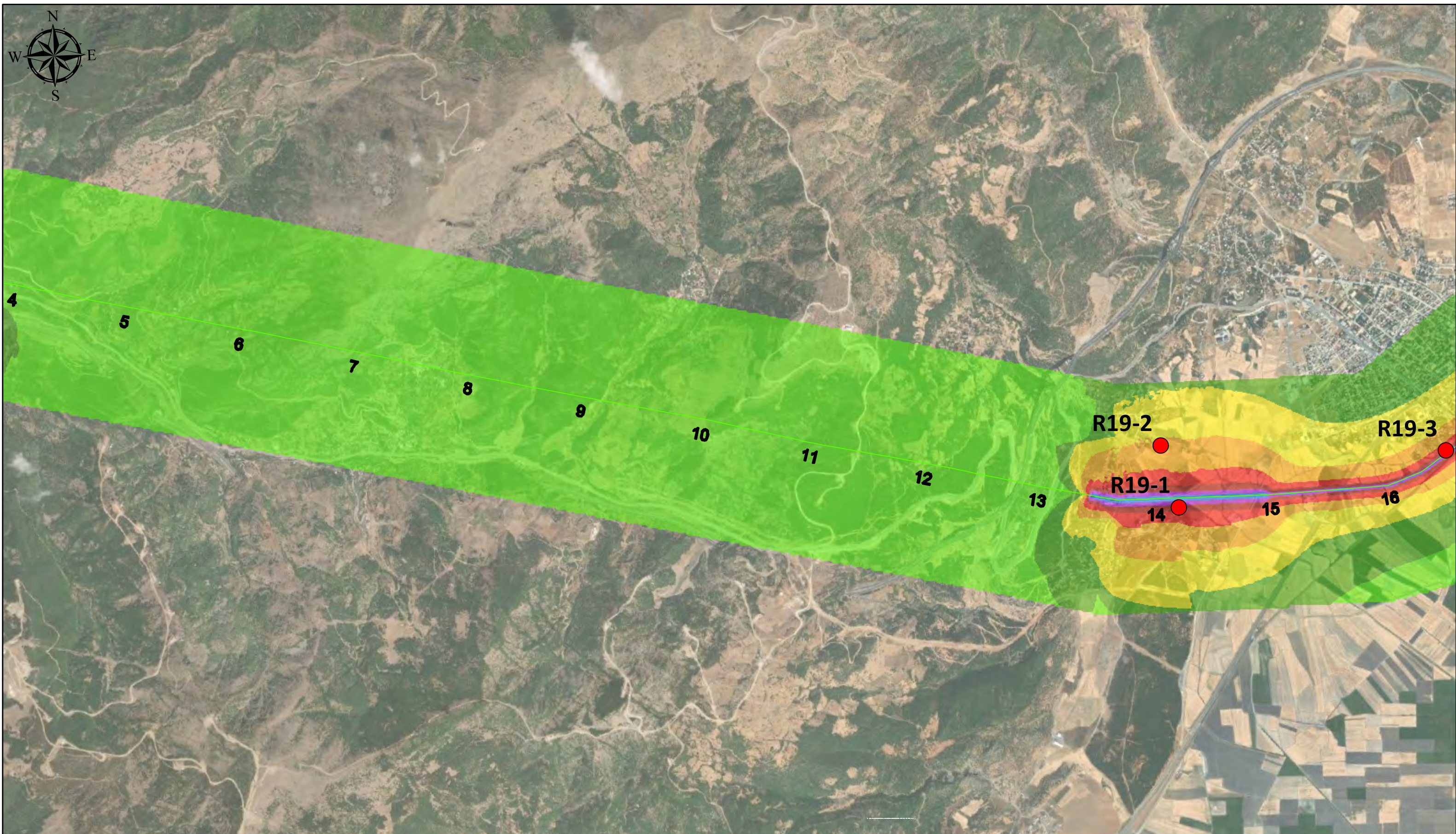
Scale: 1/30.000

50-55
55-60
60-65
65-70
70-75

<35
35-40
40-45
45-50



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



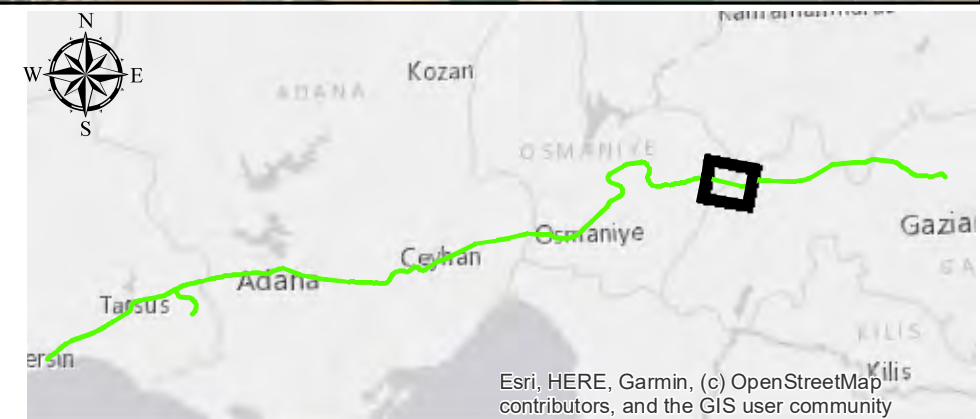
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

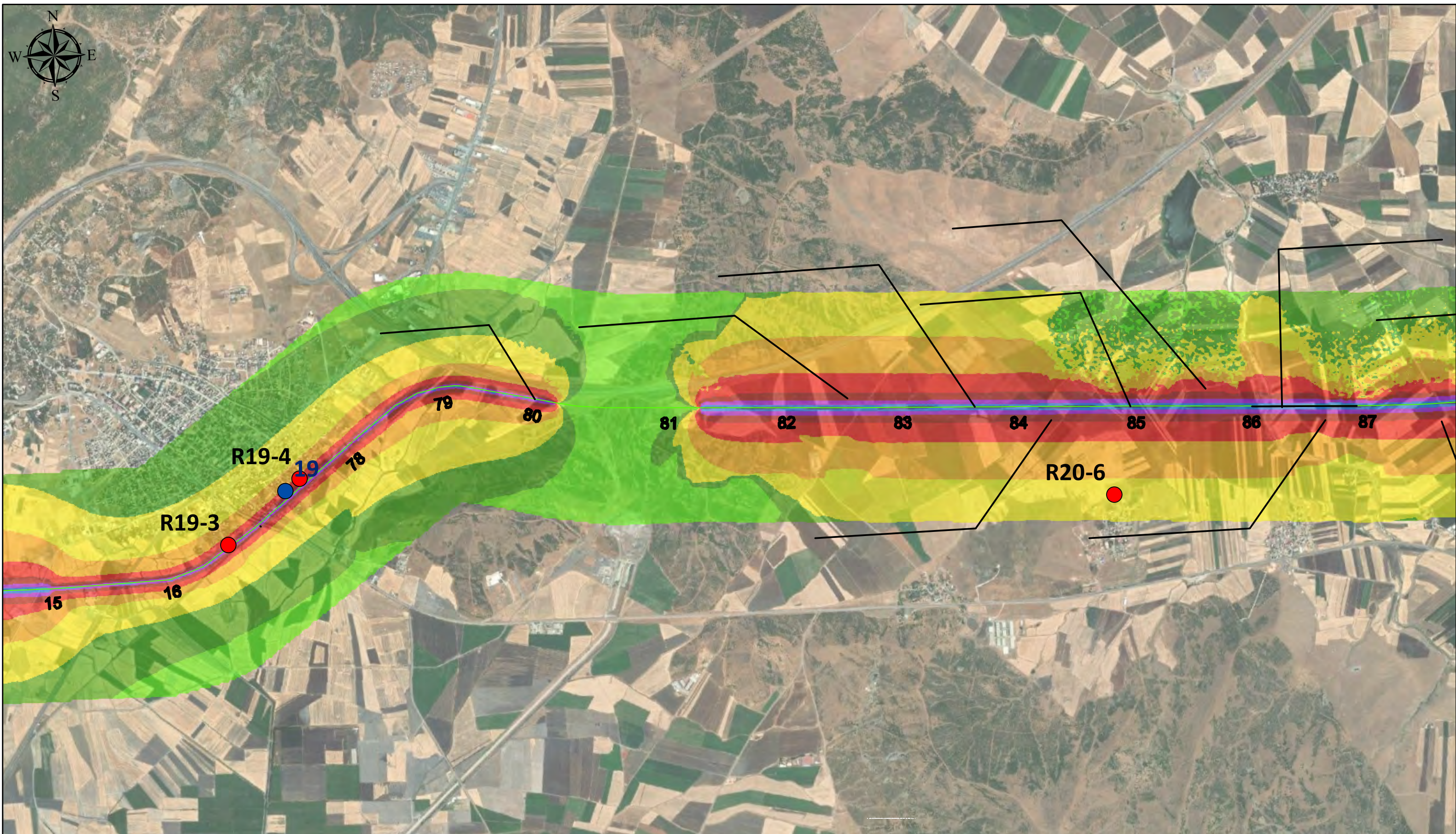
- Measurement Points dBA
- Assessment Points
- Railway

Scale: 1/30.000

<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70-75



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

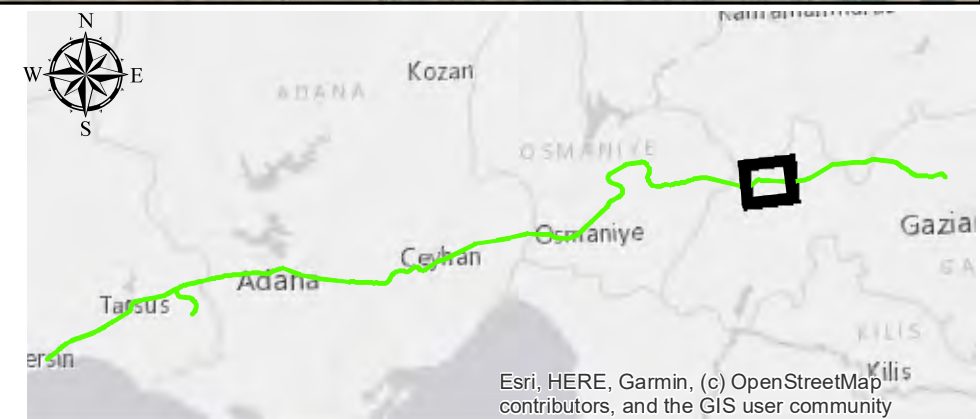
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

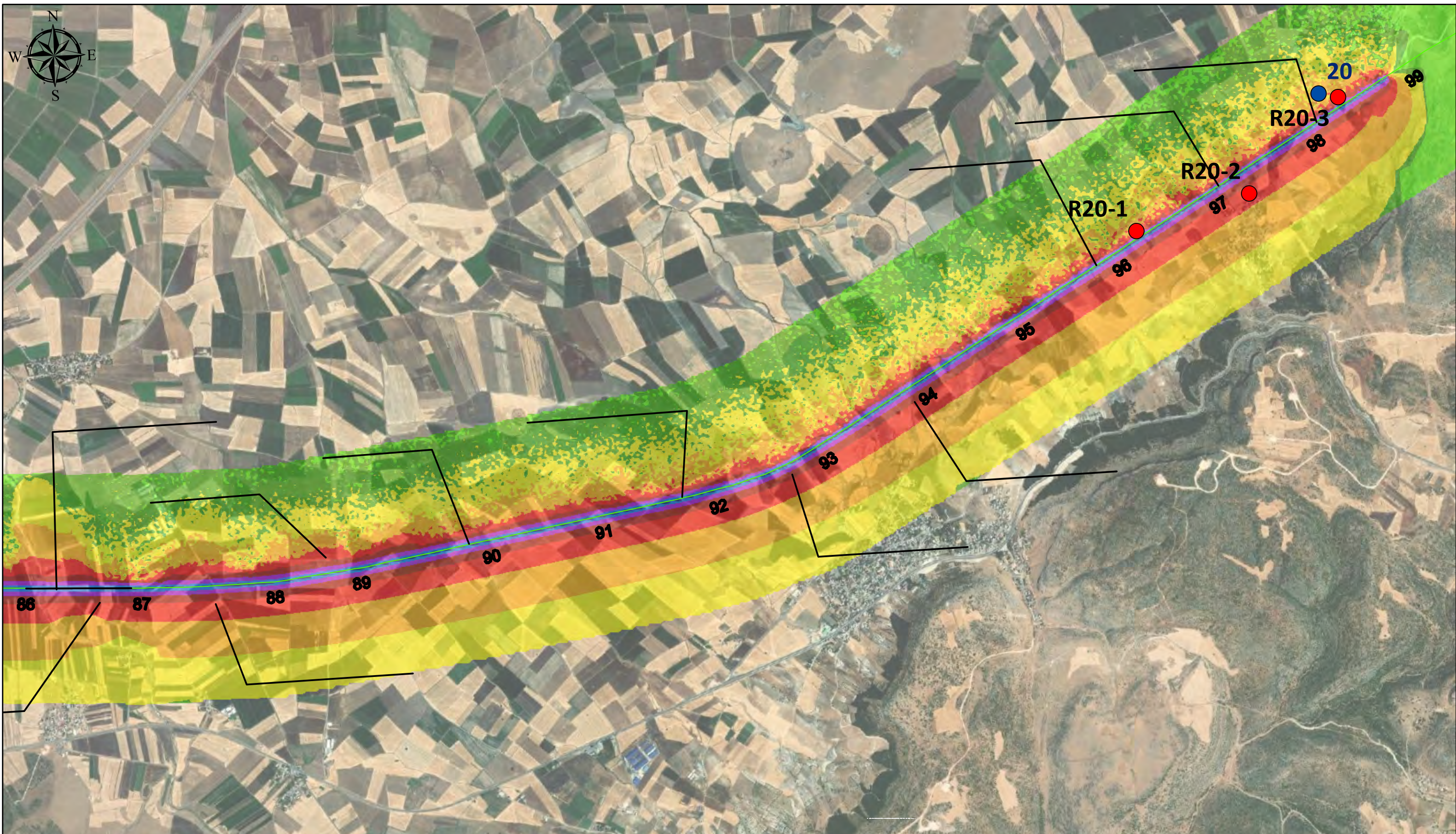
Scale: 1/30.000

Legend

- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70-75 |

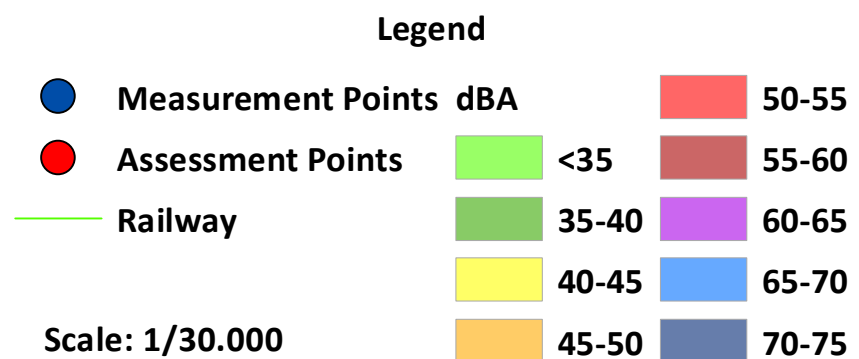
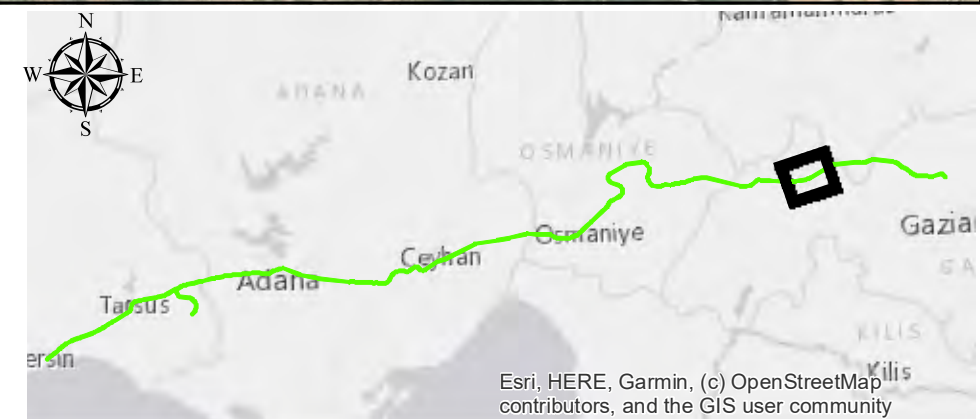
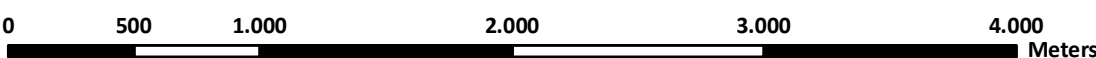


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening





FREKANS

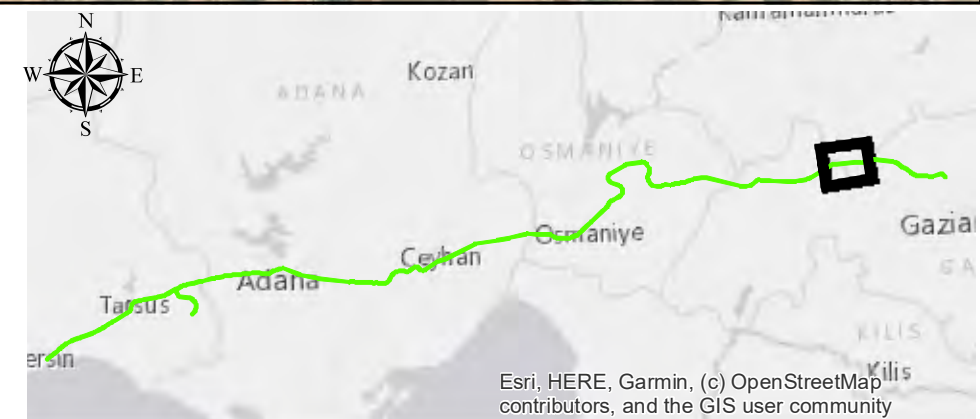
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

- Measurement Points dBA
- Assessment Points
- Railway

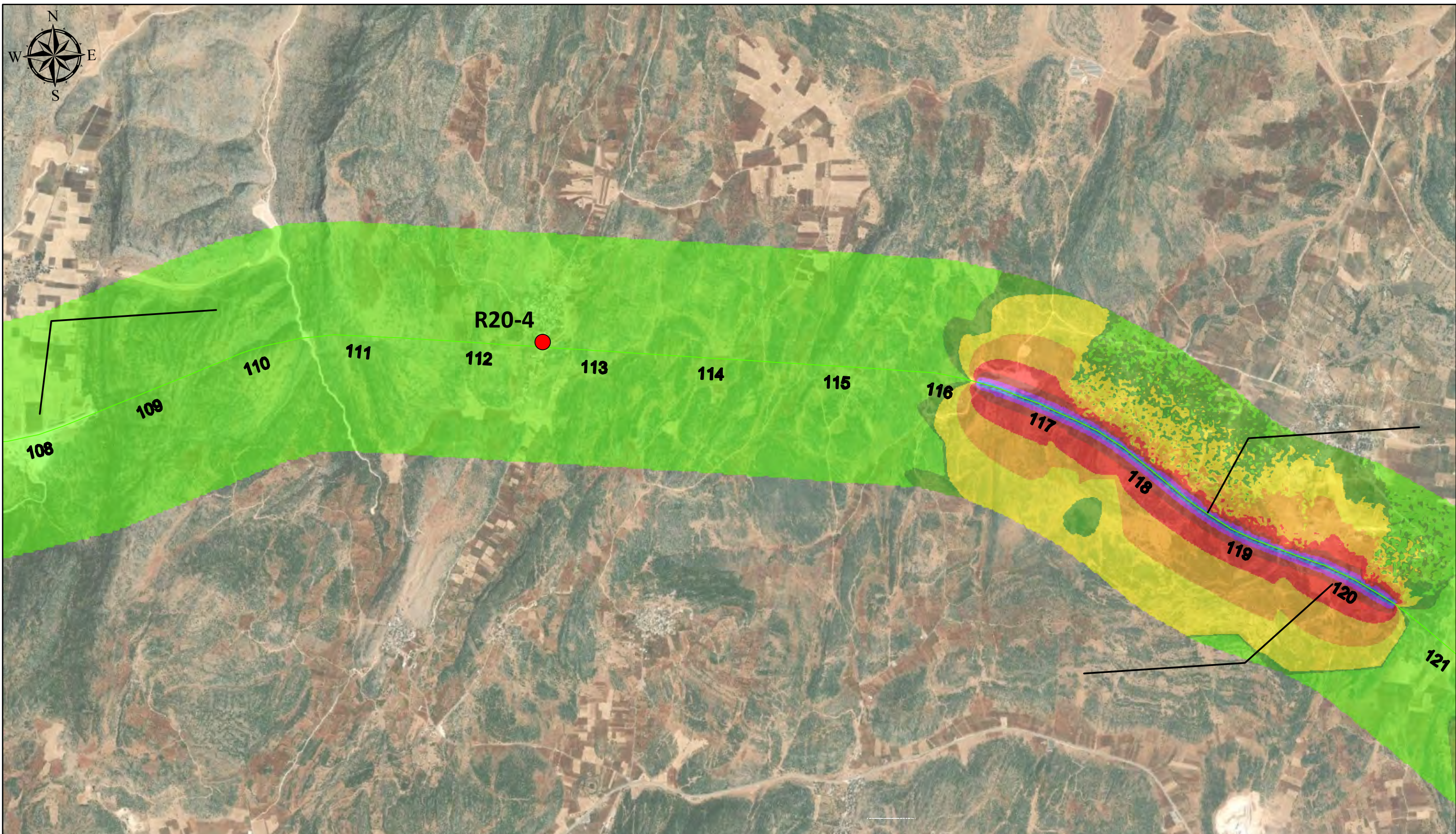
Scale: 1/30.000

Legend

- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70-75 |

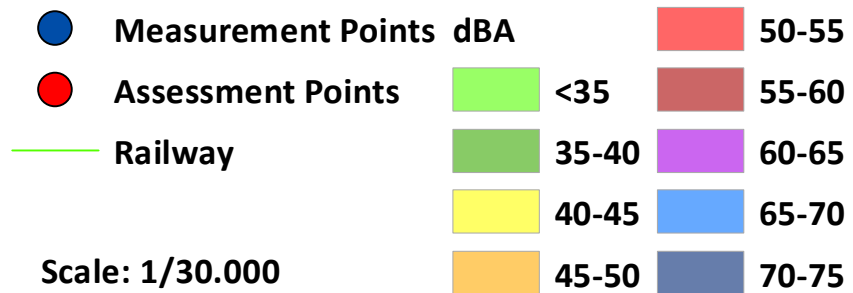
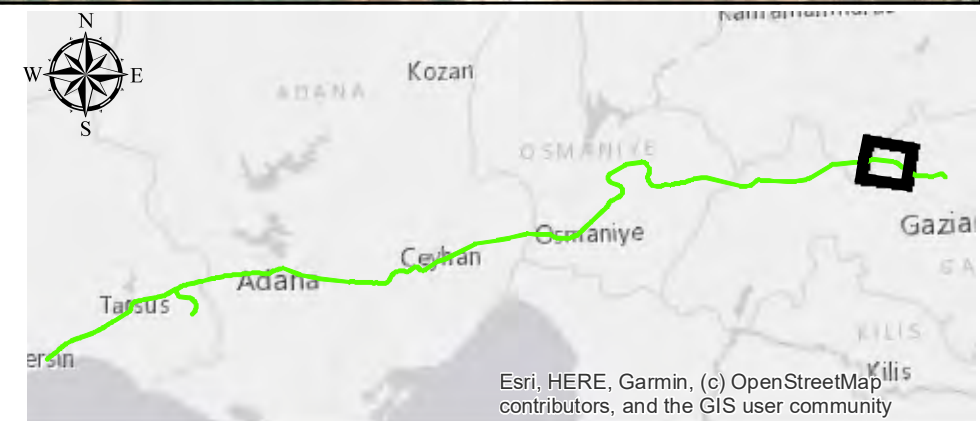


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

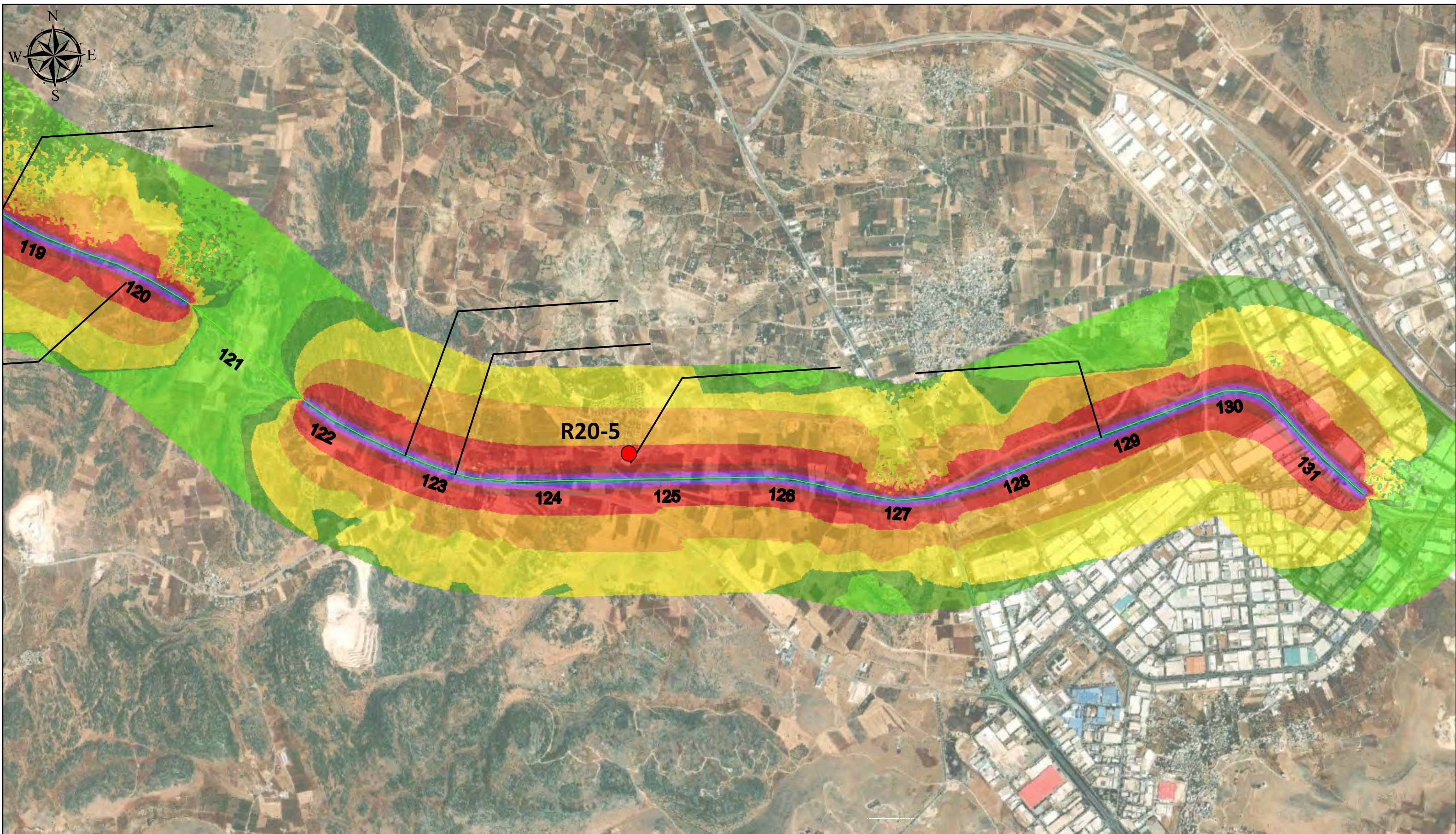


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

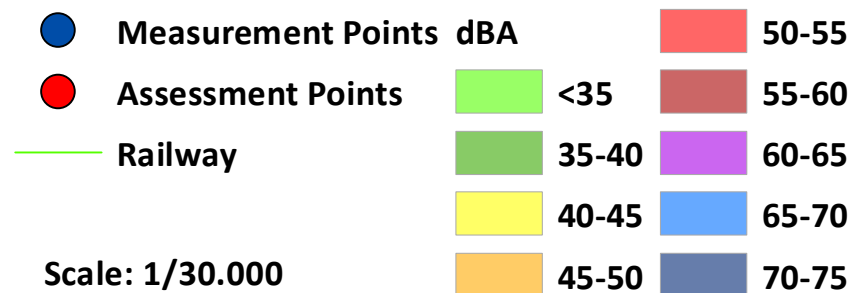
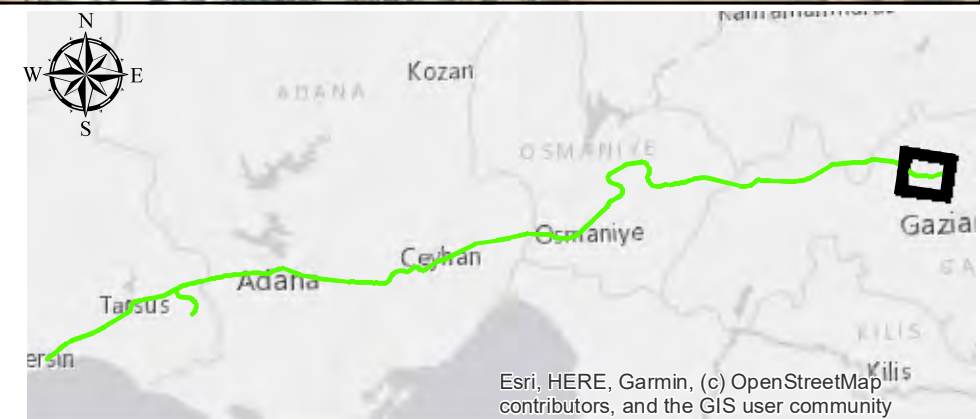


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

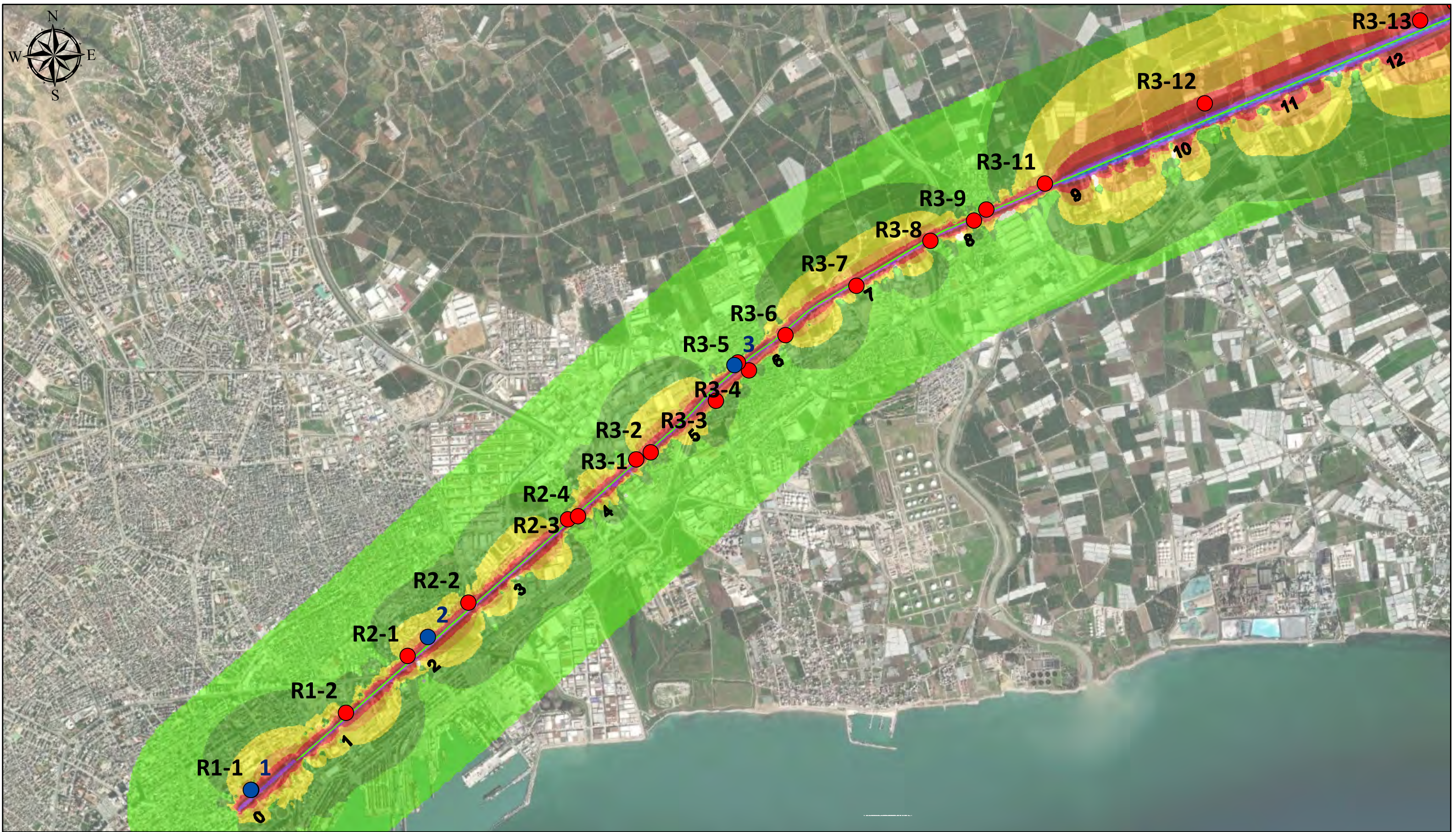


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Evening

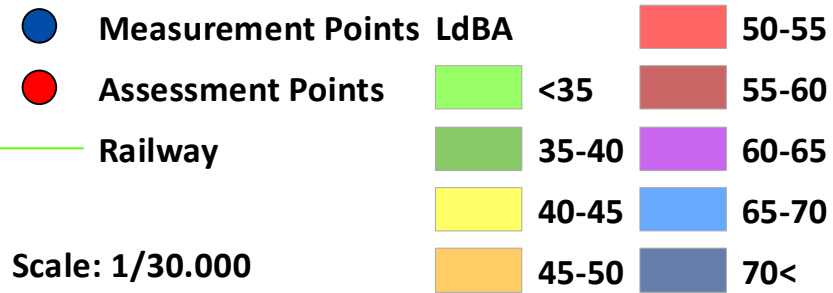
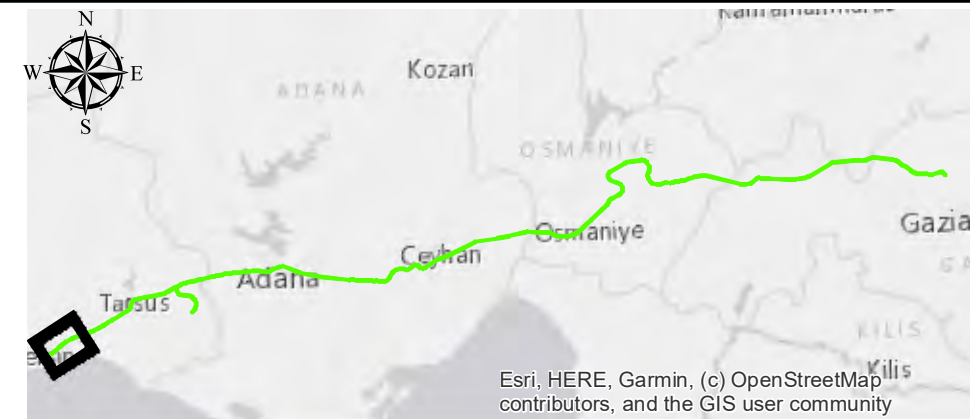


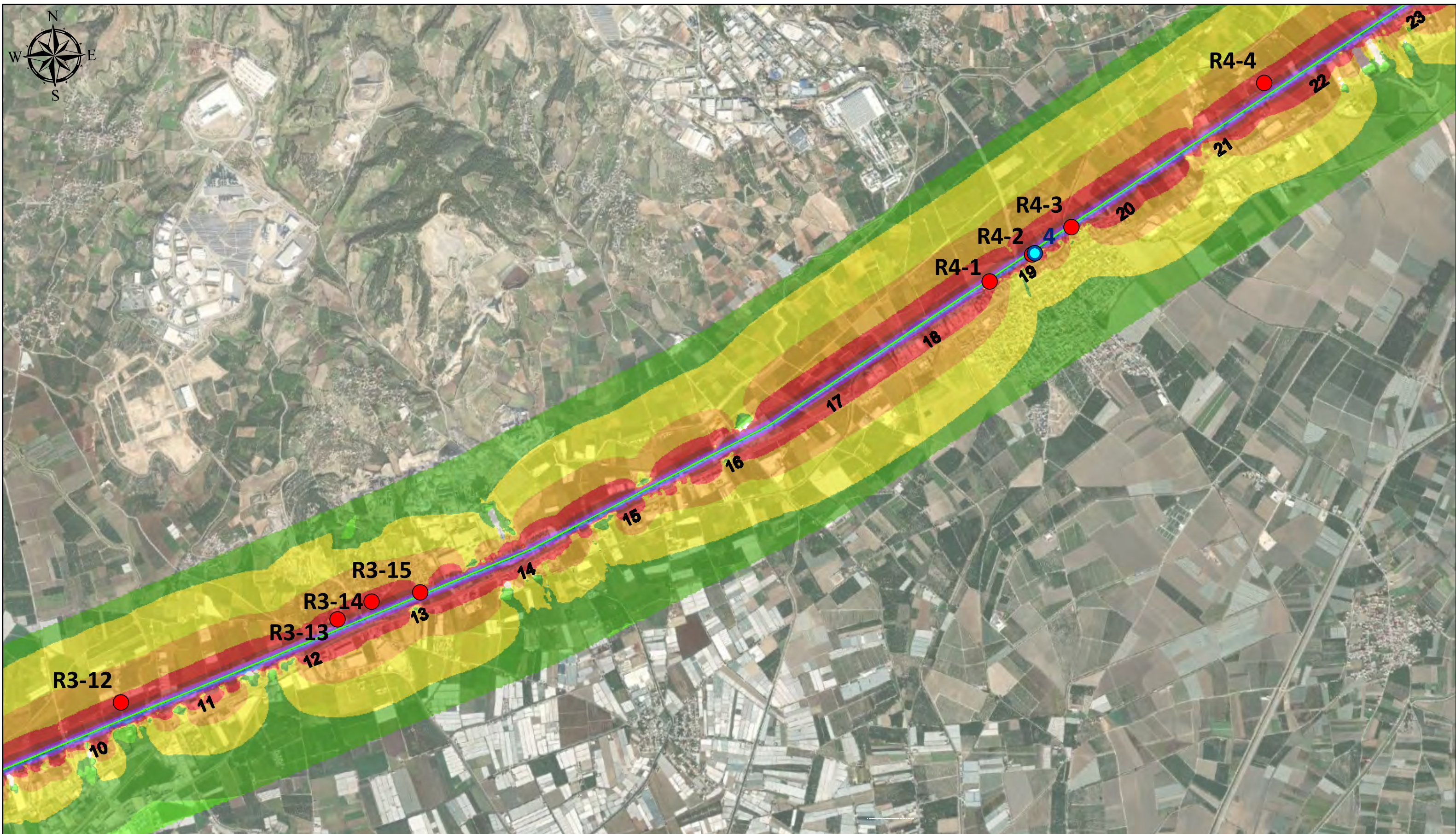
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

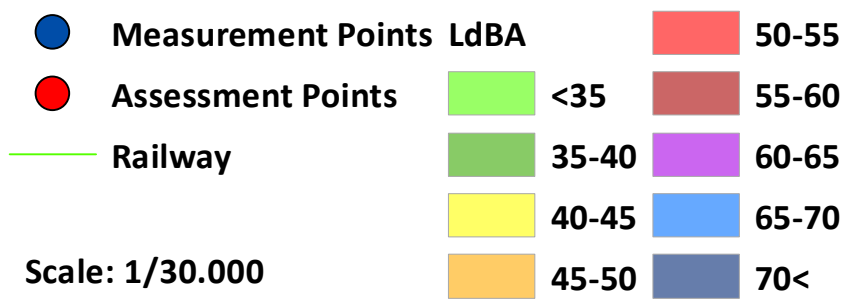
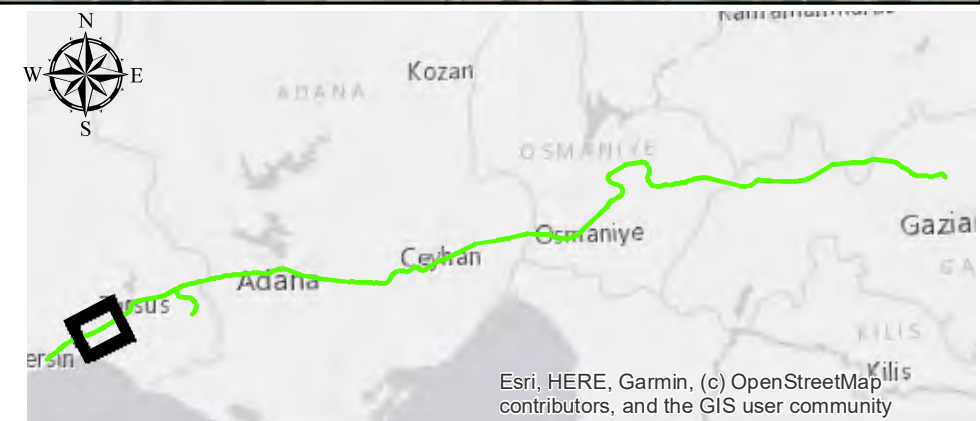
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

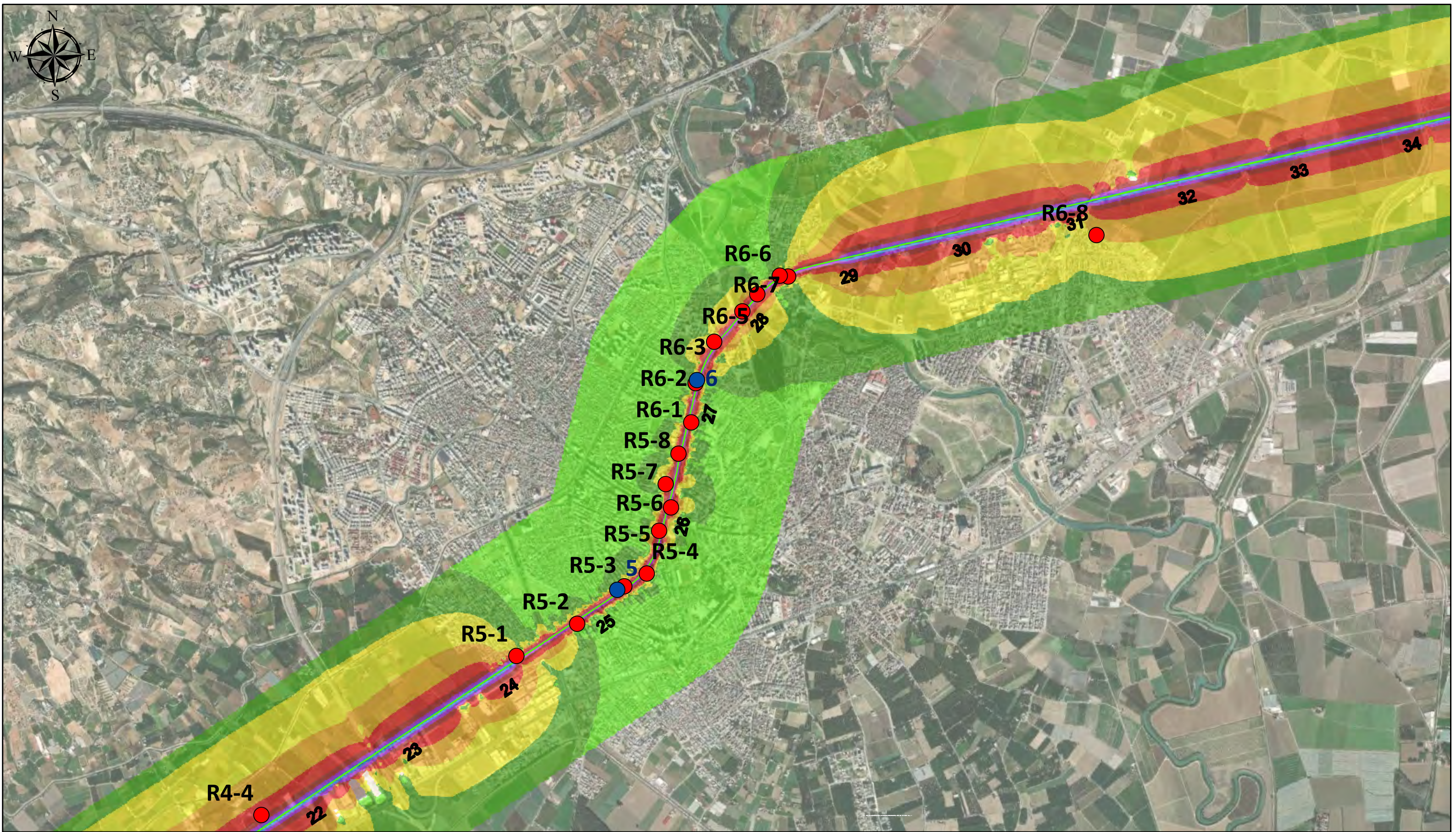




FREKANS

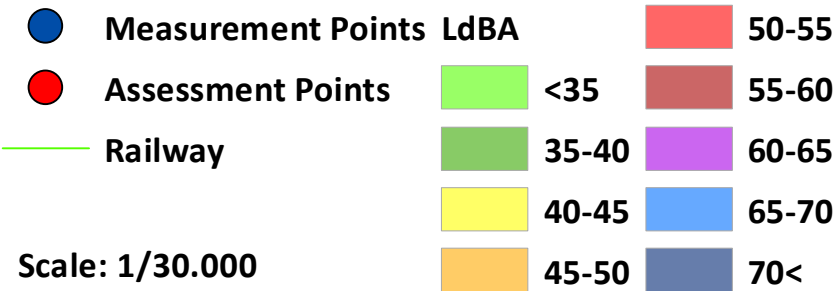
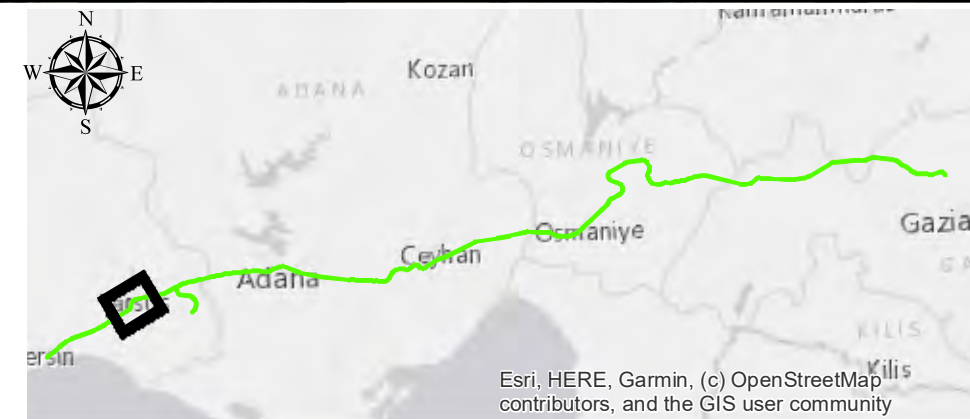
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**



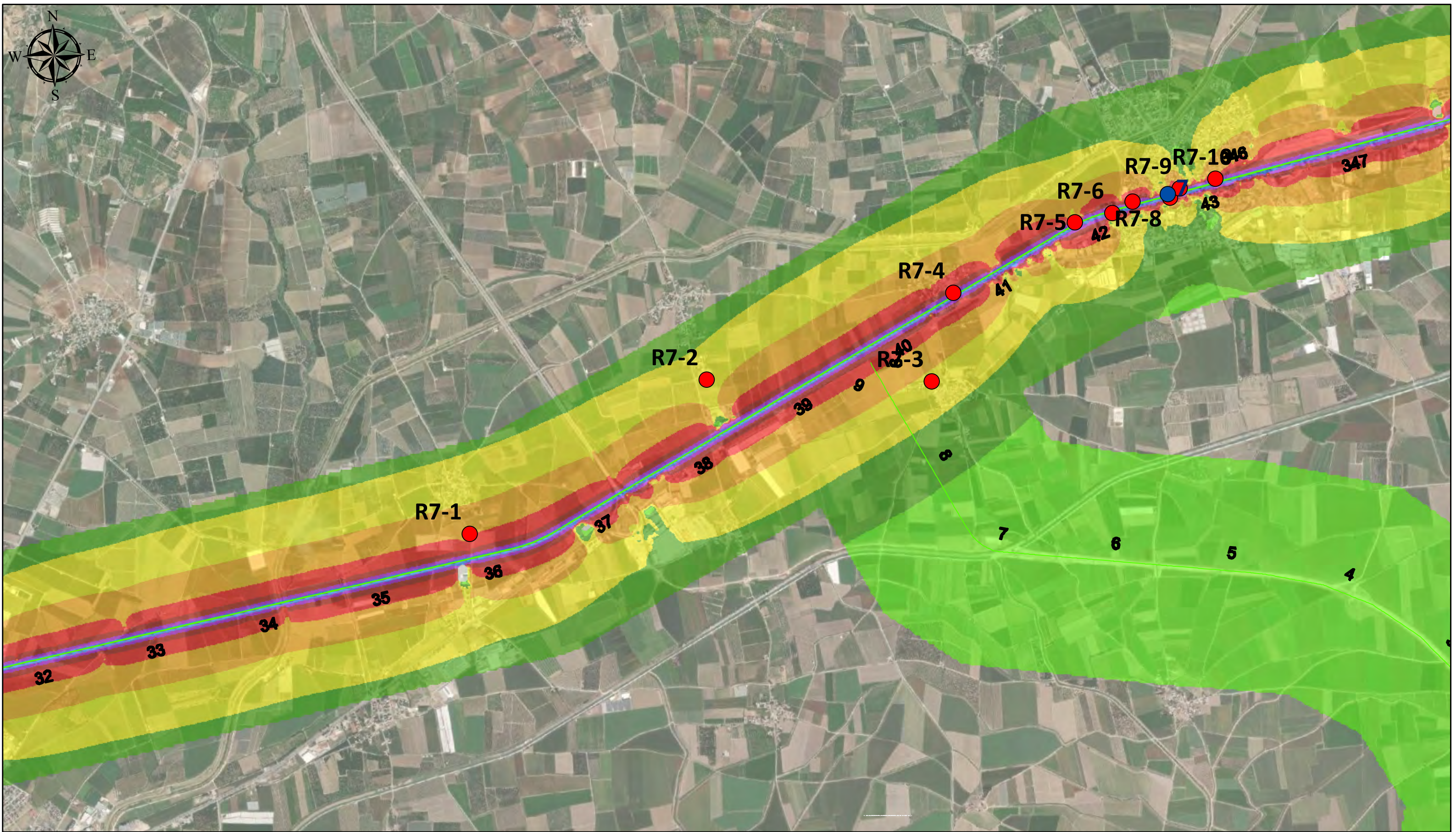


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

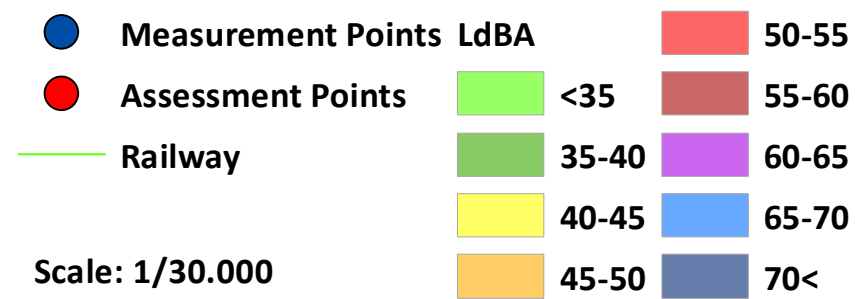
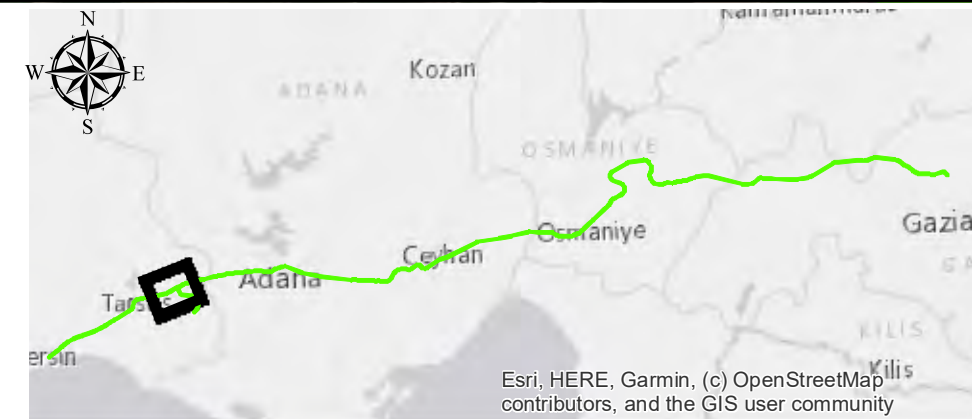
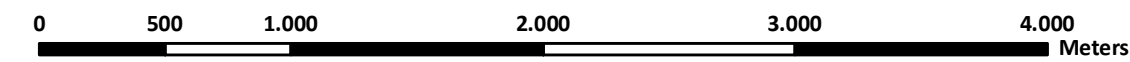


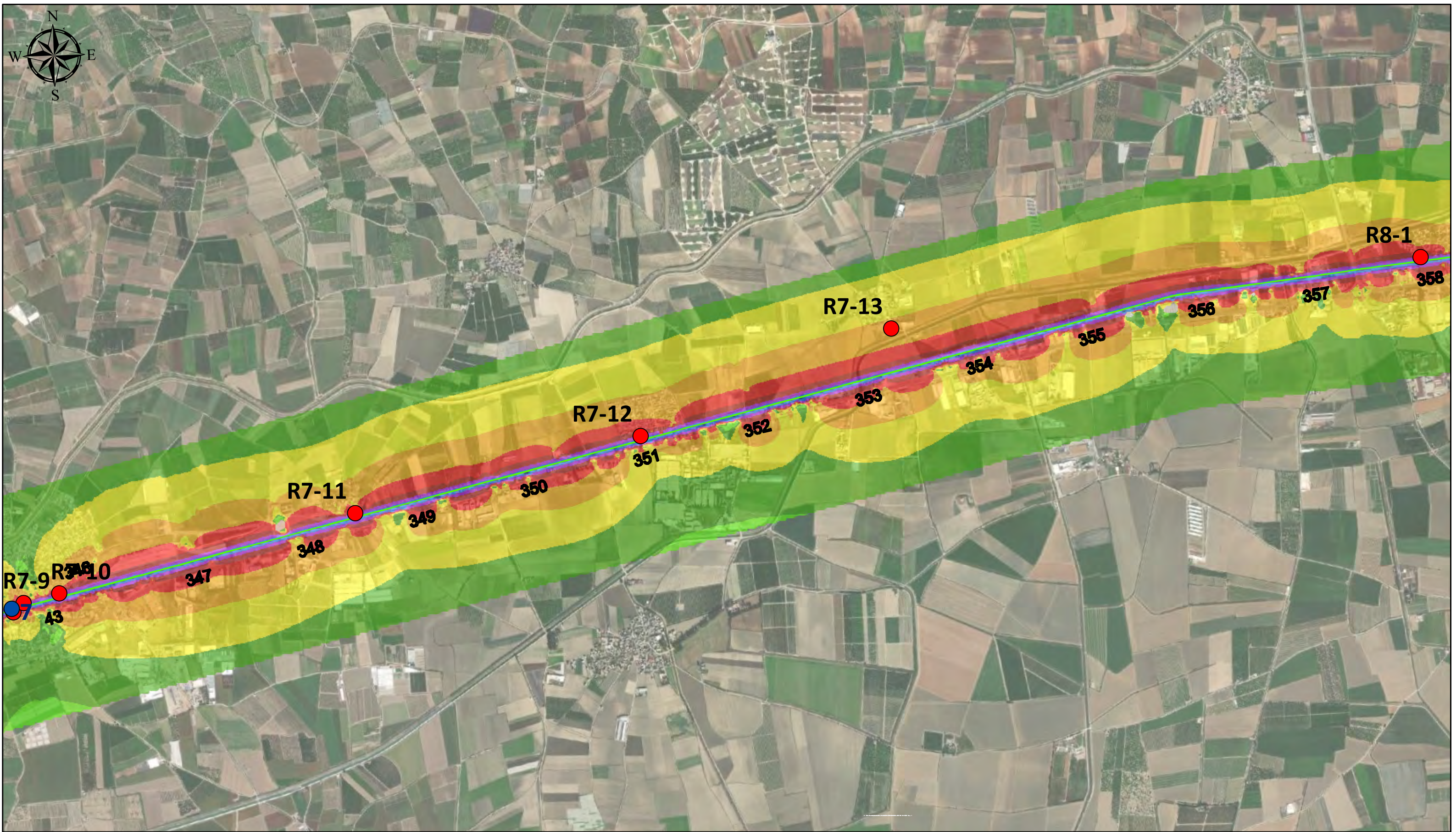
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**





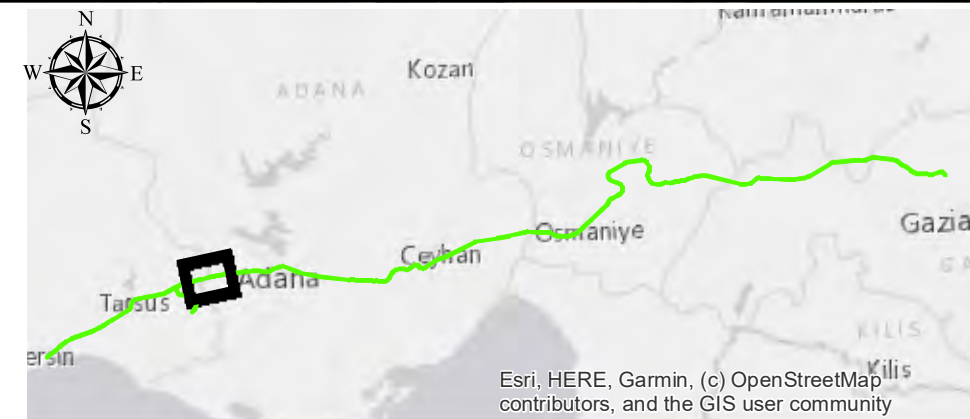
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

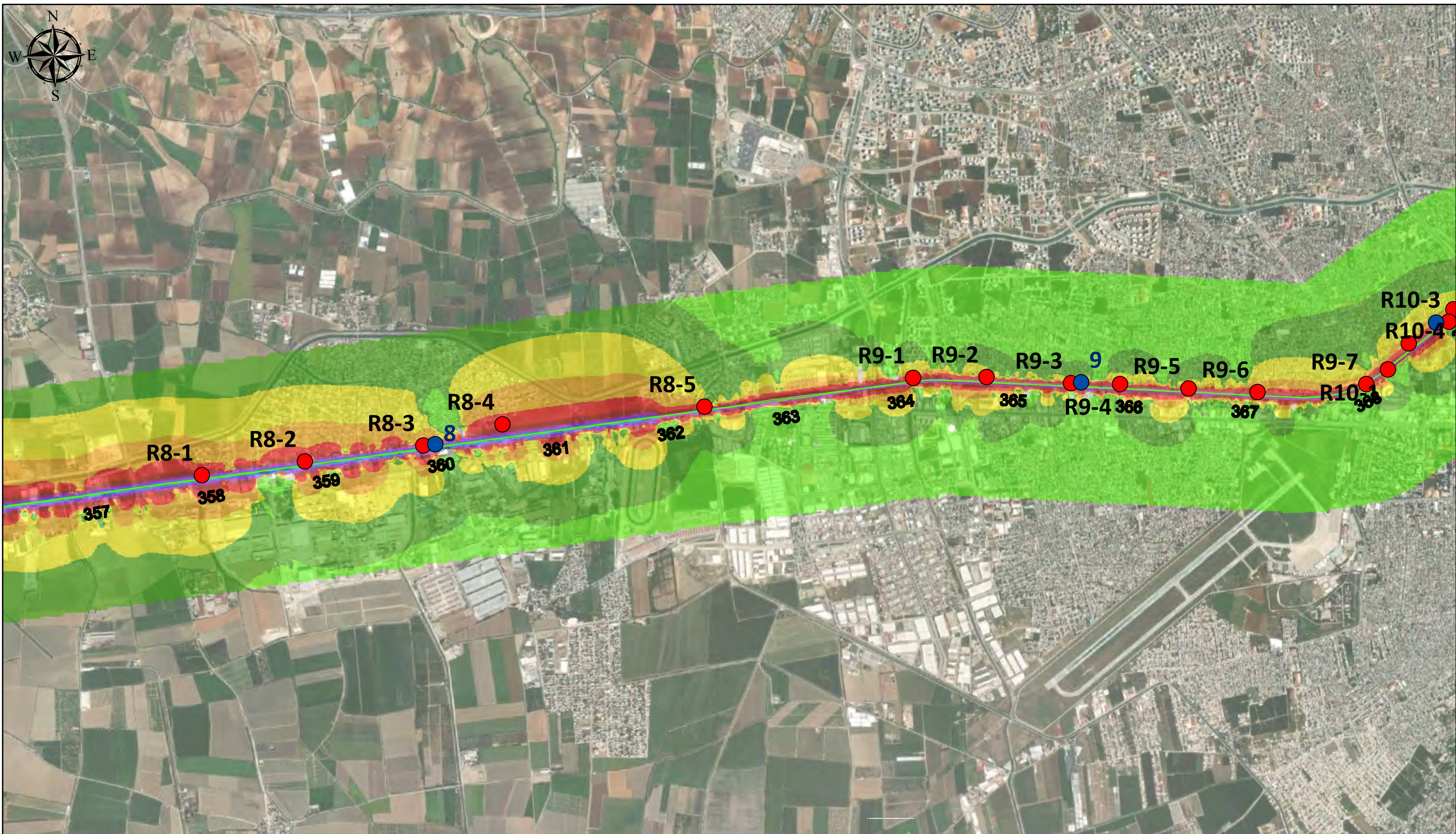
- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway

Scale: 1/30.000

- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70< |

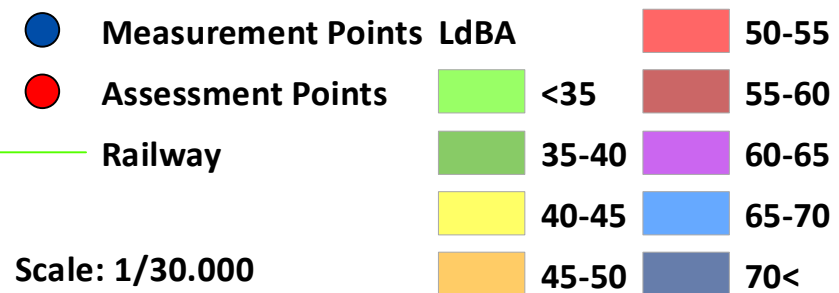
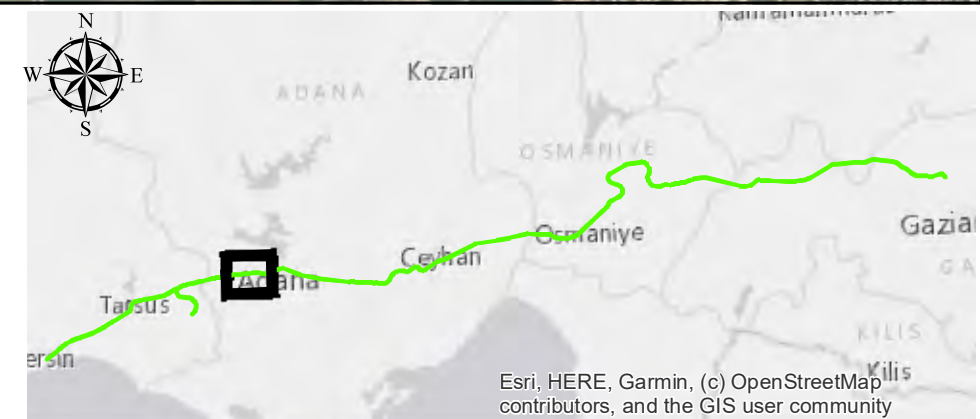


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

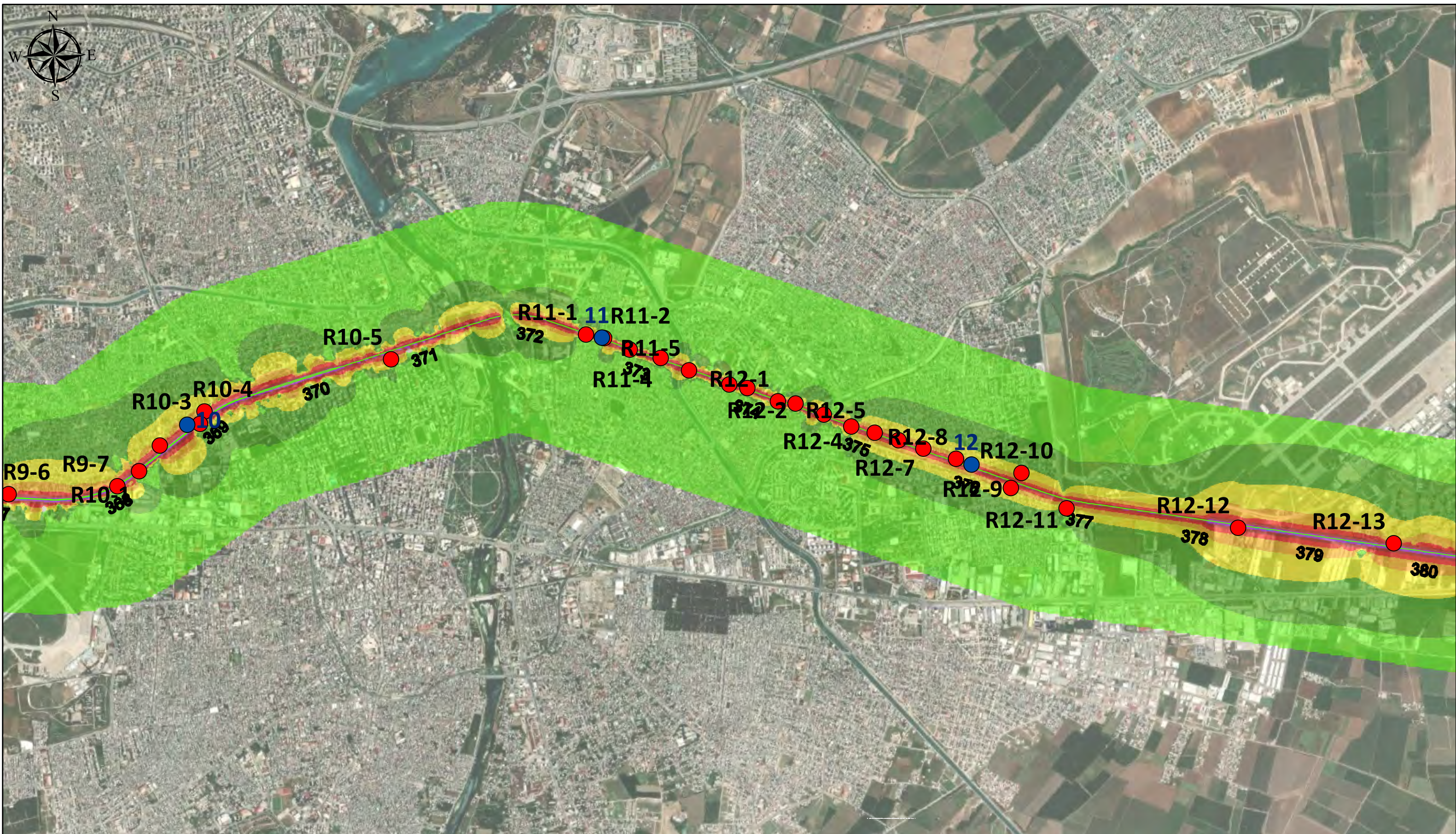


FREKANS

MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT
Measurement and Assessment Points
Operation Phase, Night

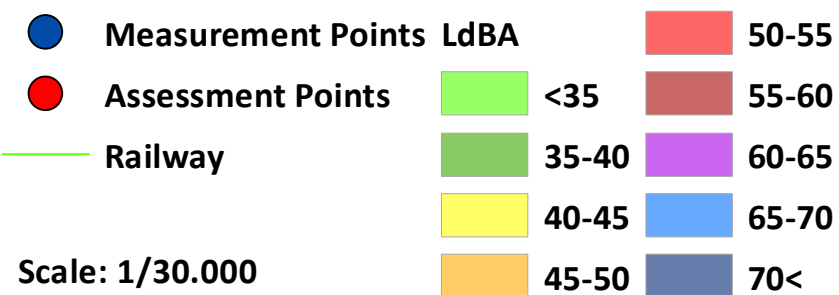
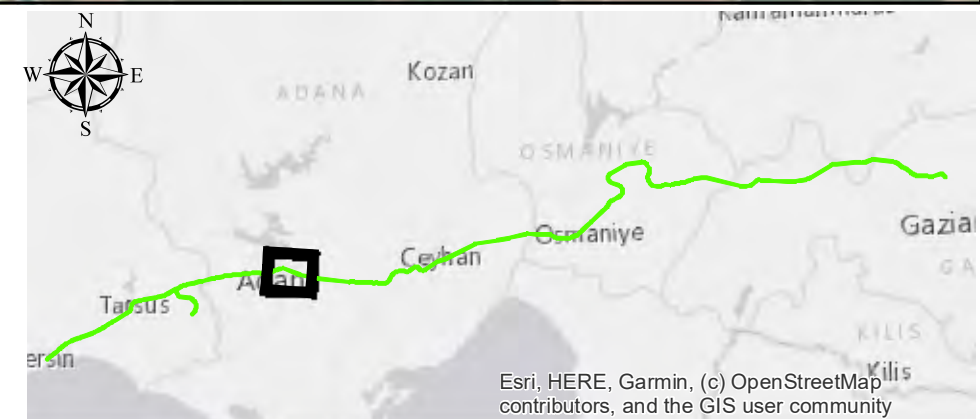


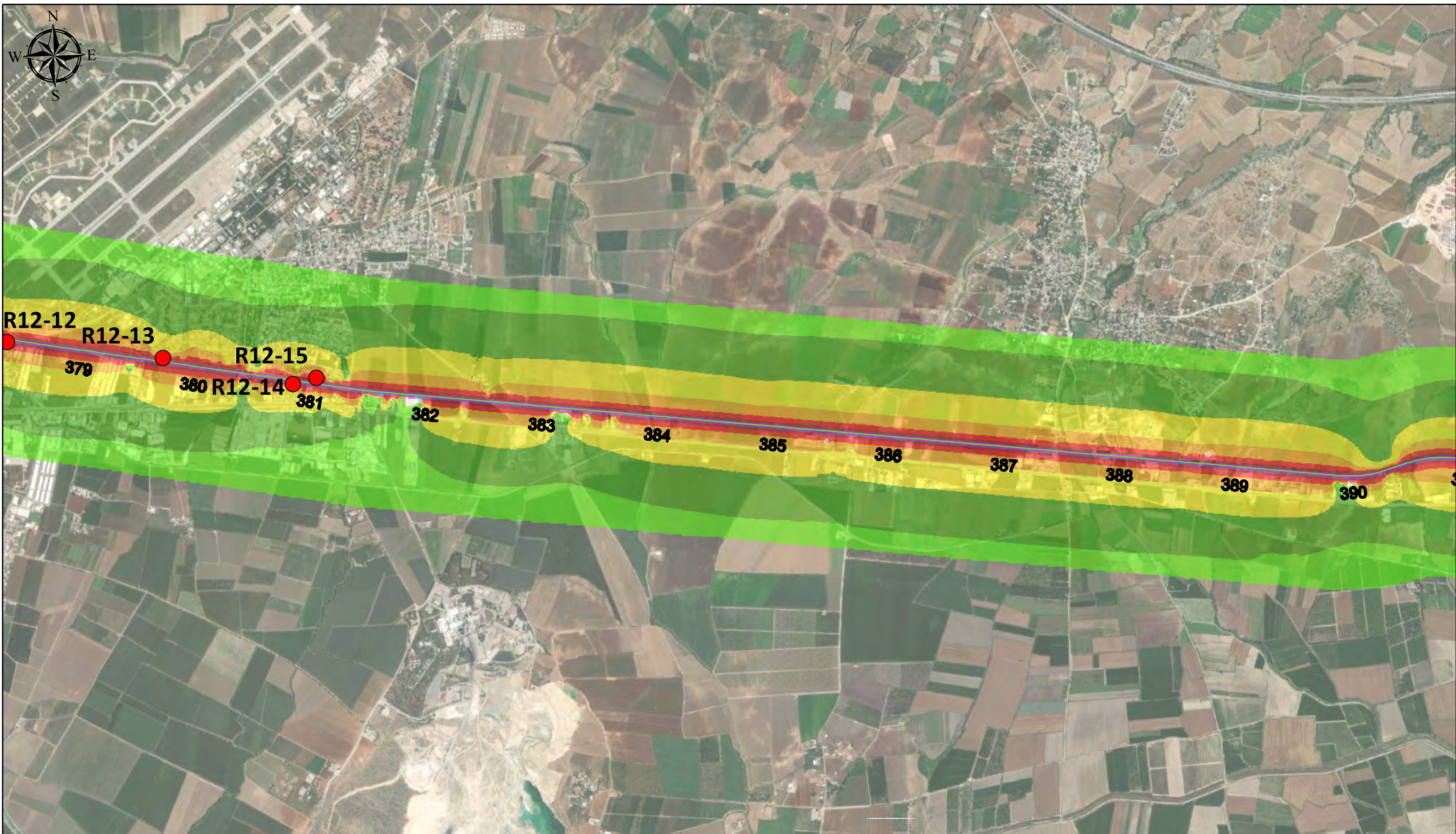
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

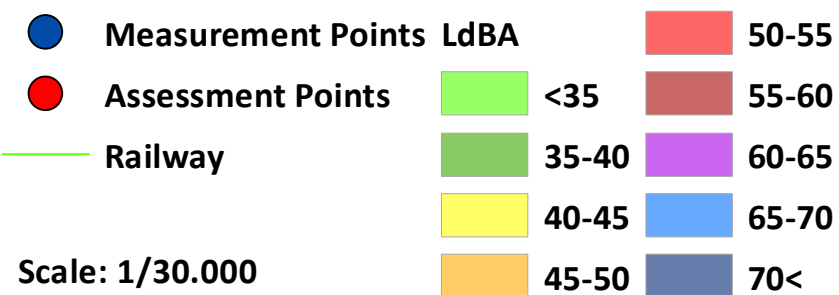
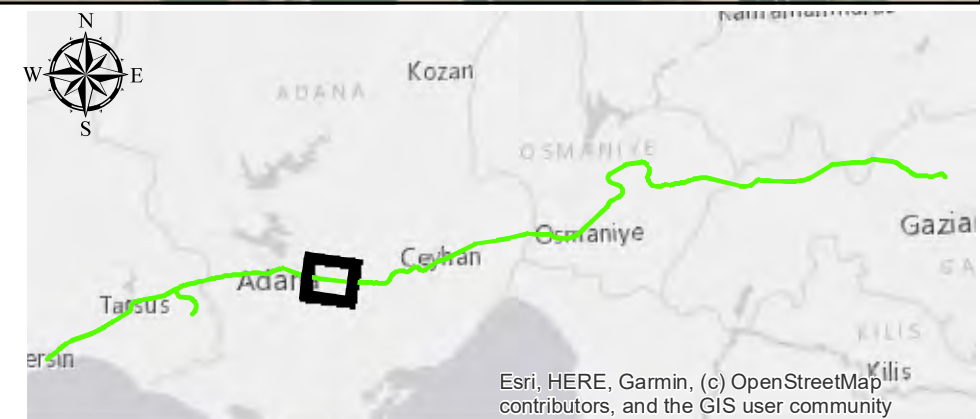
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night



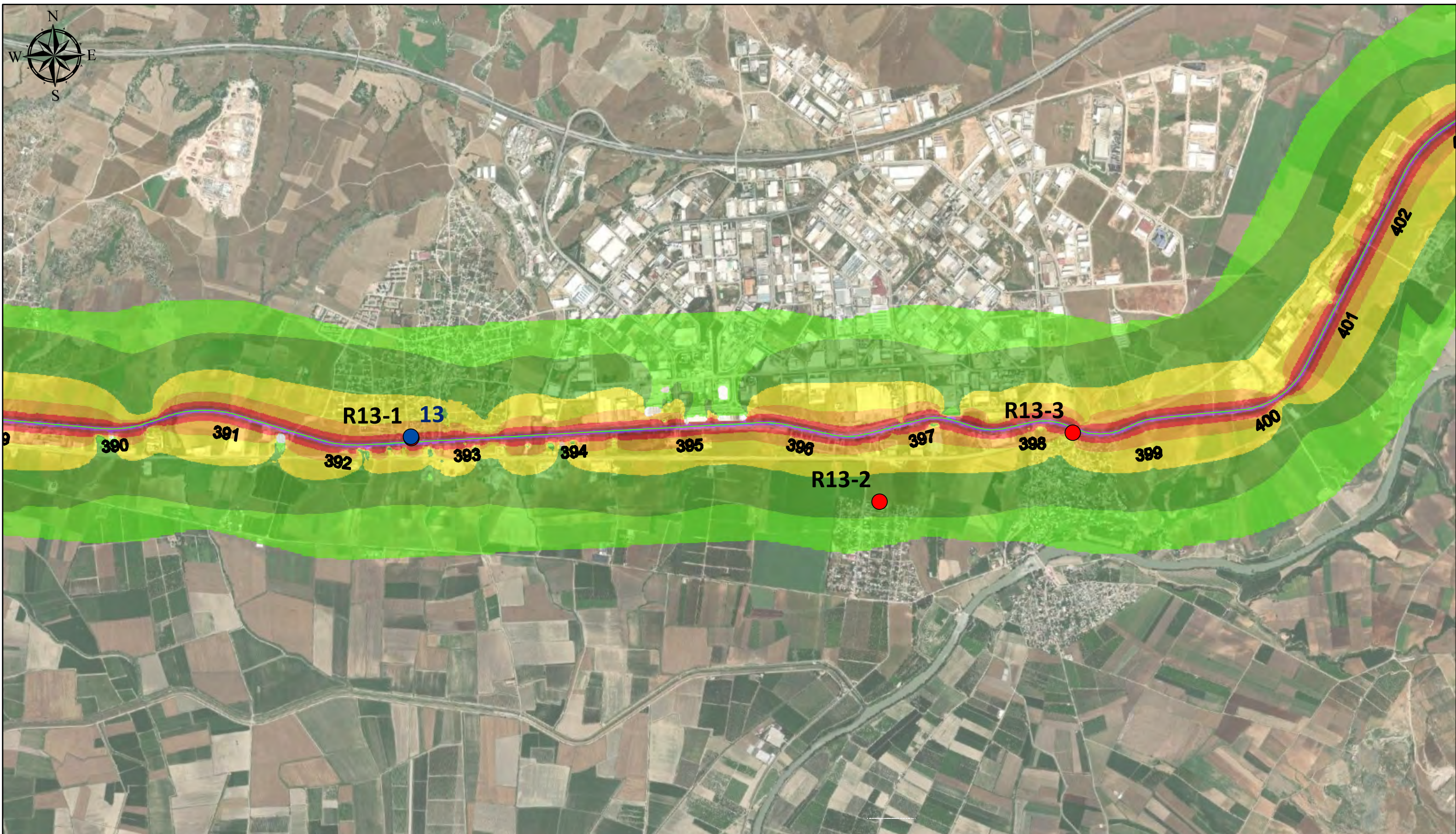


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**

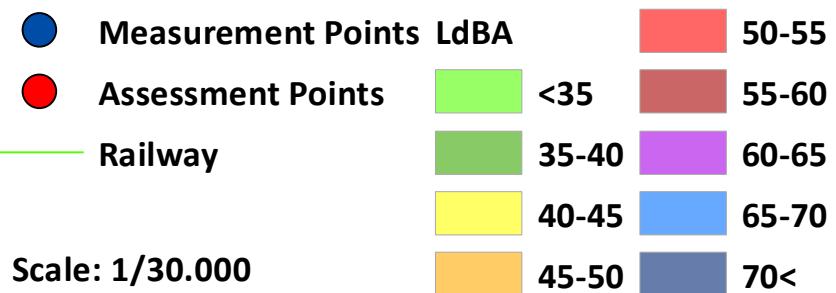


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

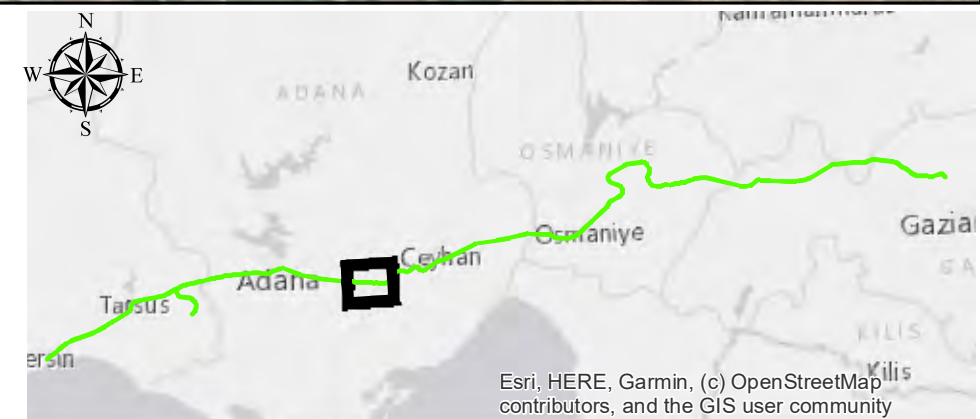


FREKANS

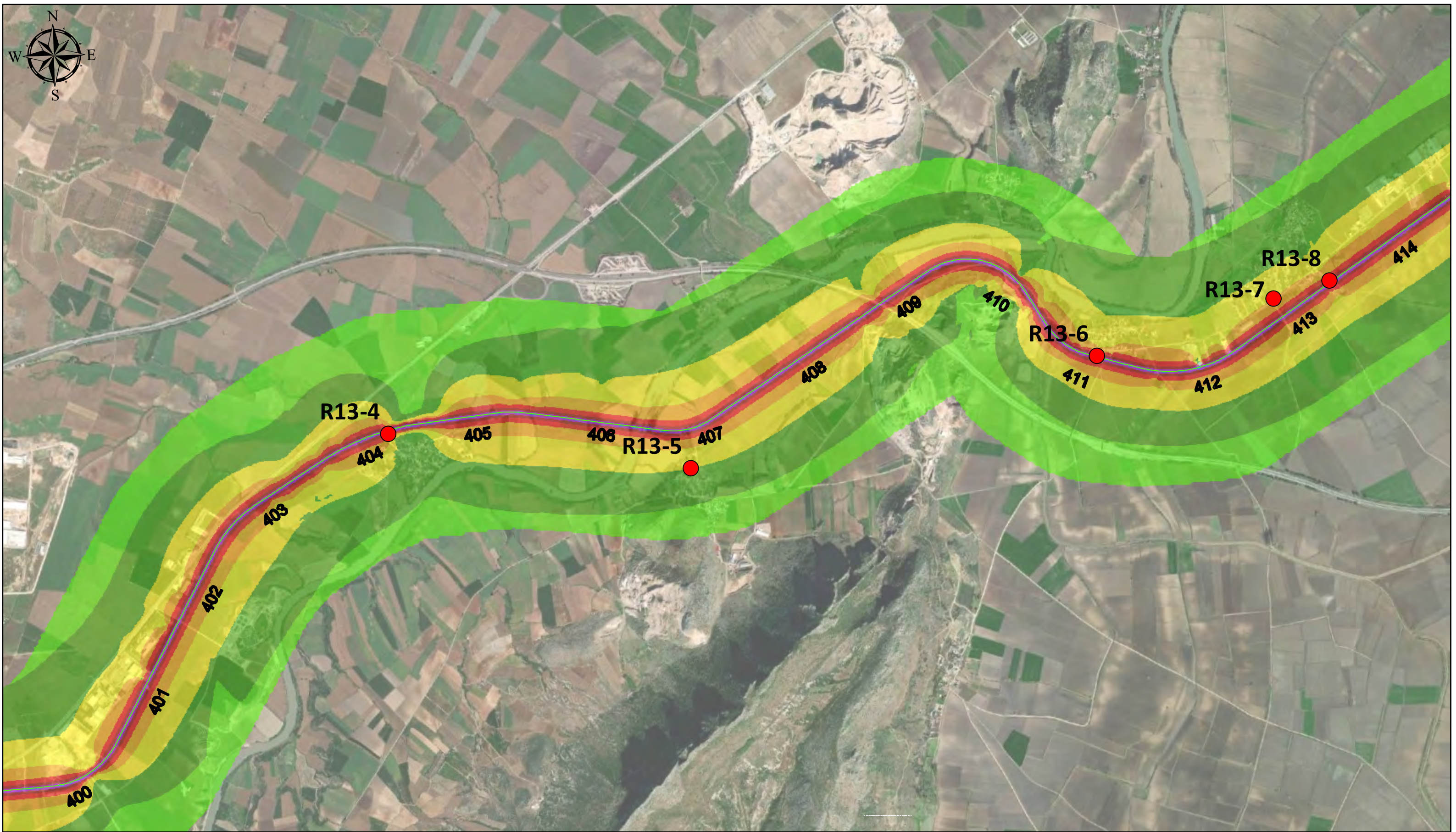
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**



Scale: 1/30.000



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

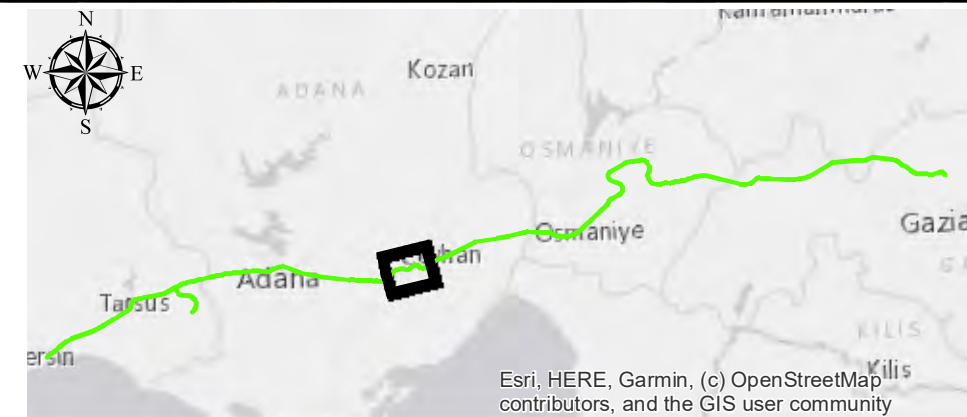
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**

- Measurement Points LdBA
- Assessment Points
- Railway

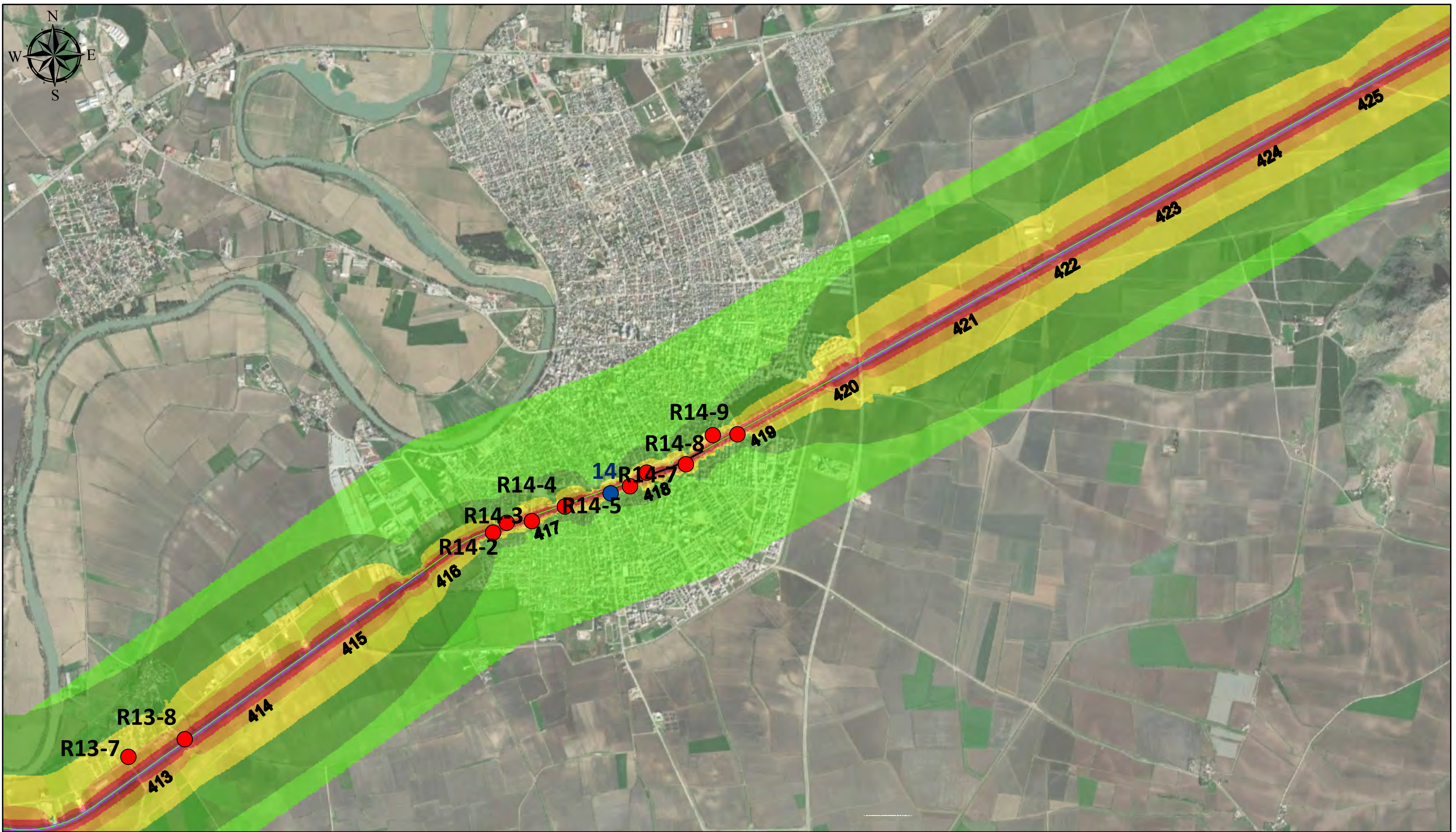
Scale: 1/30.000

Legend

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



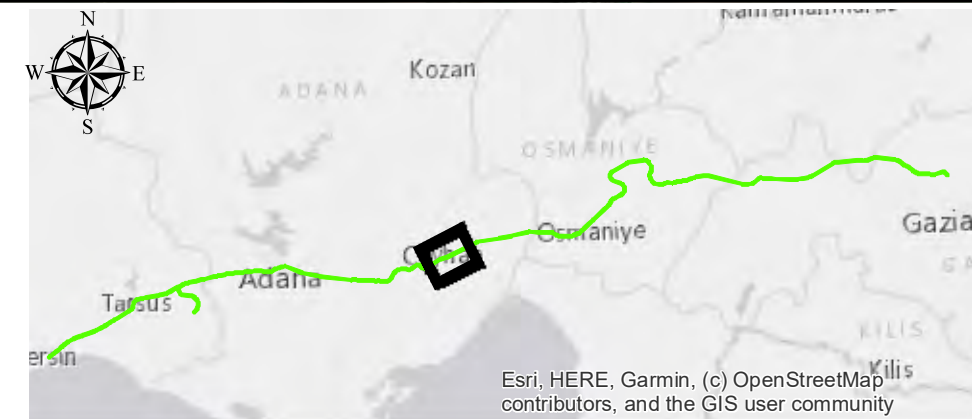
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

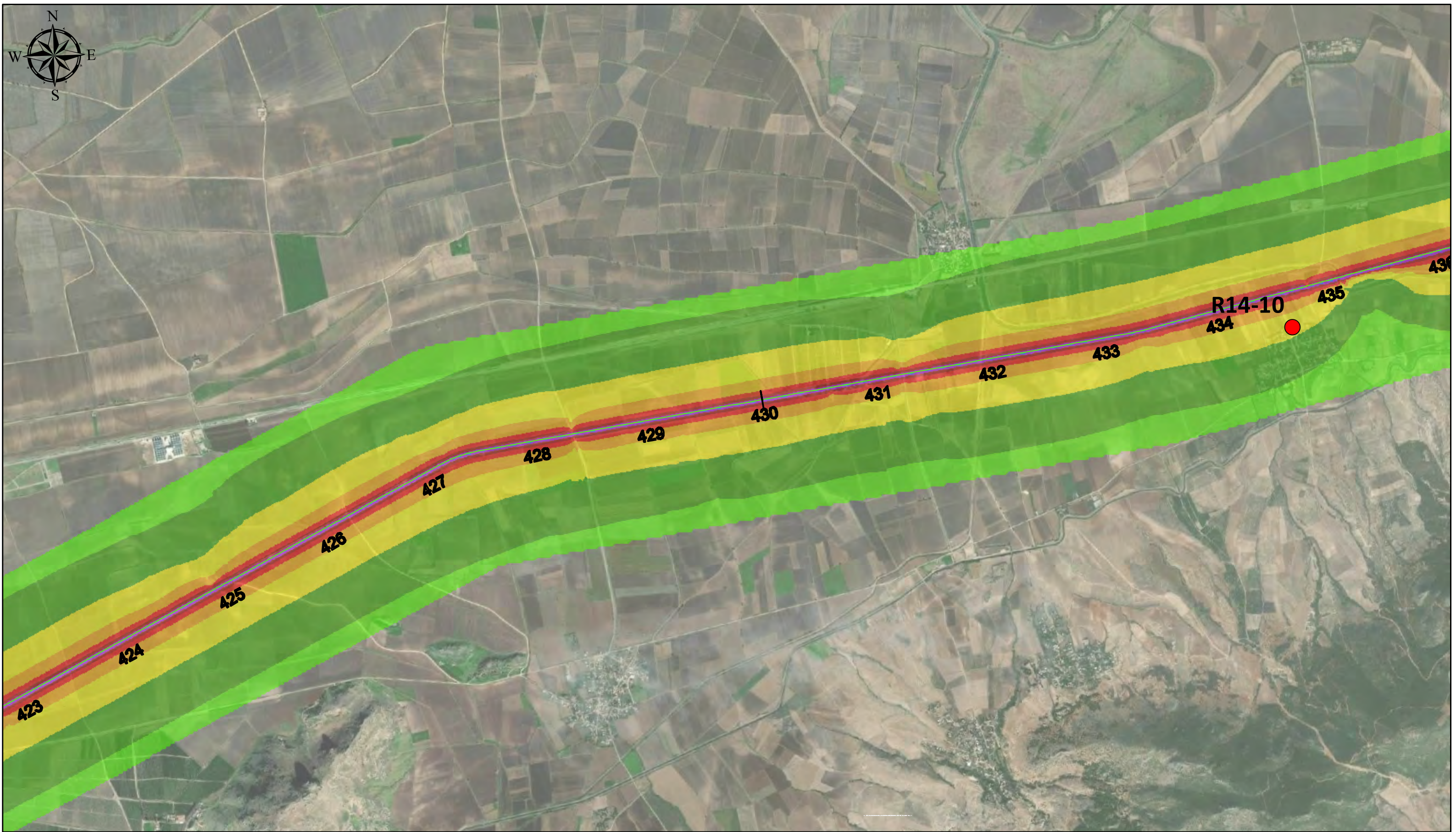
- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway

Scale: 1/30.000

	50-55
	55-60
	60-65
	65-70
	70<

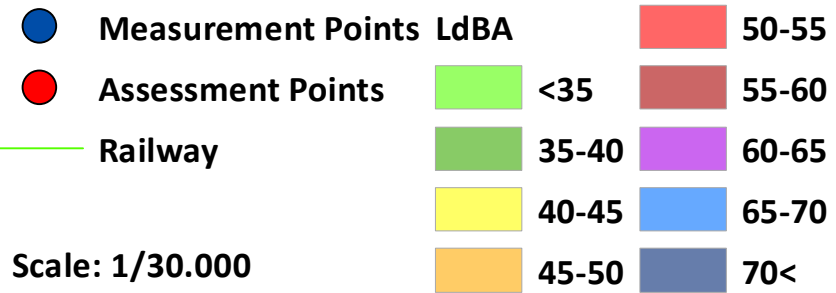
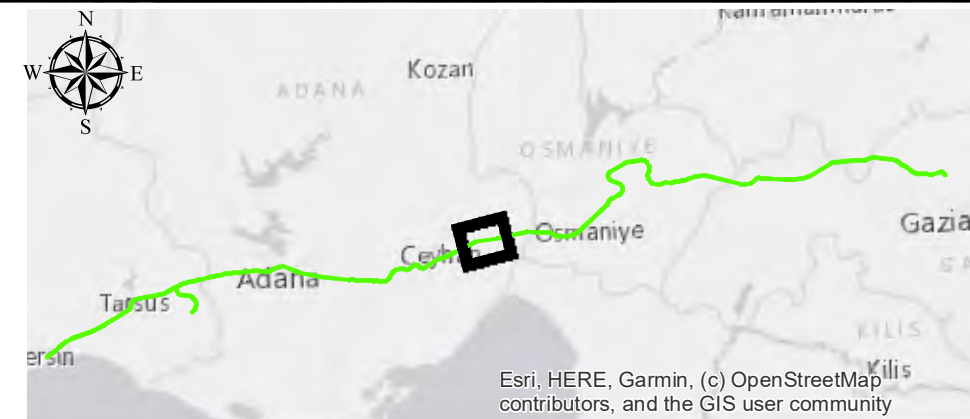


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

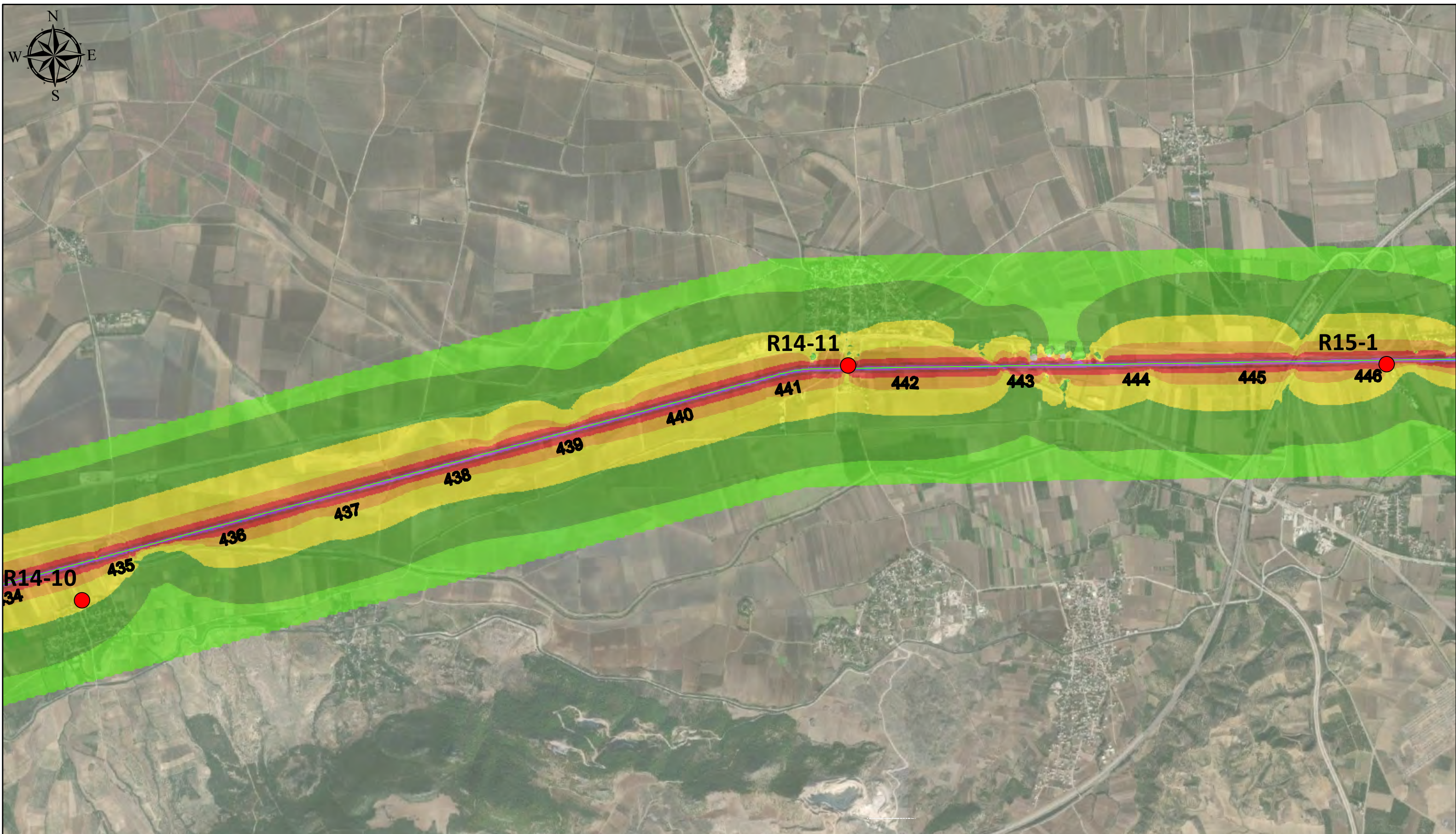


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

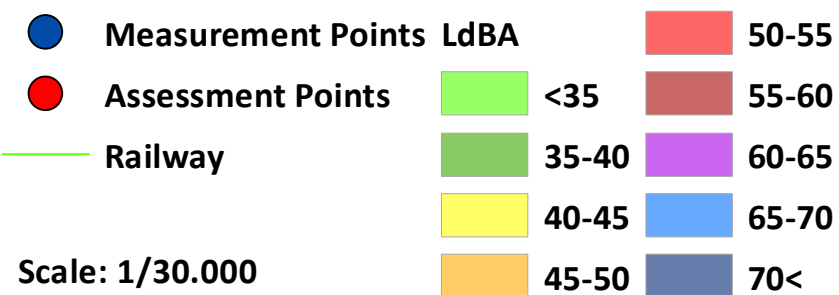
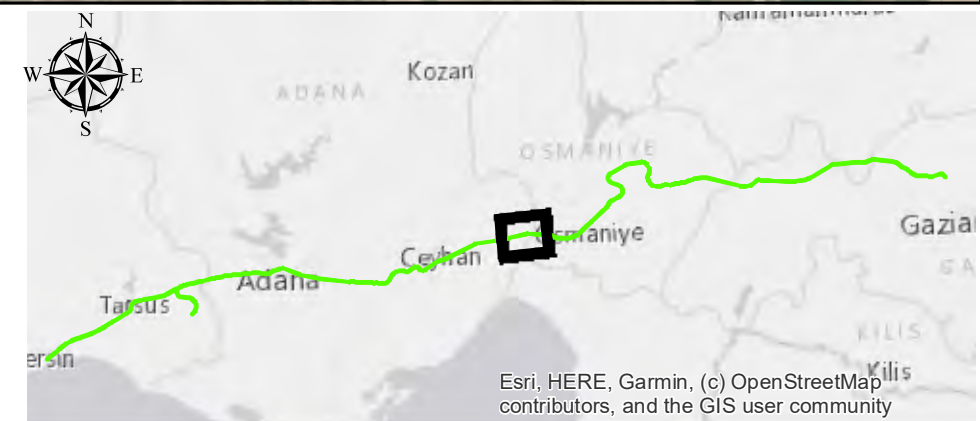


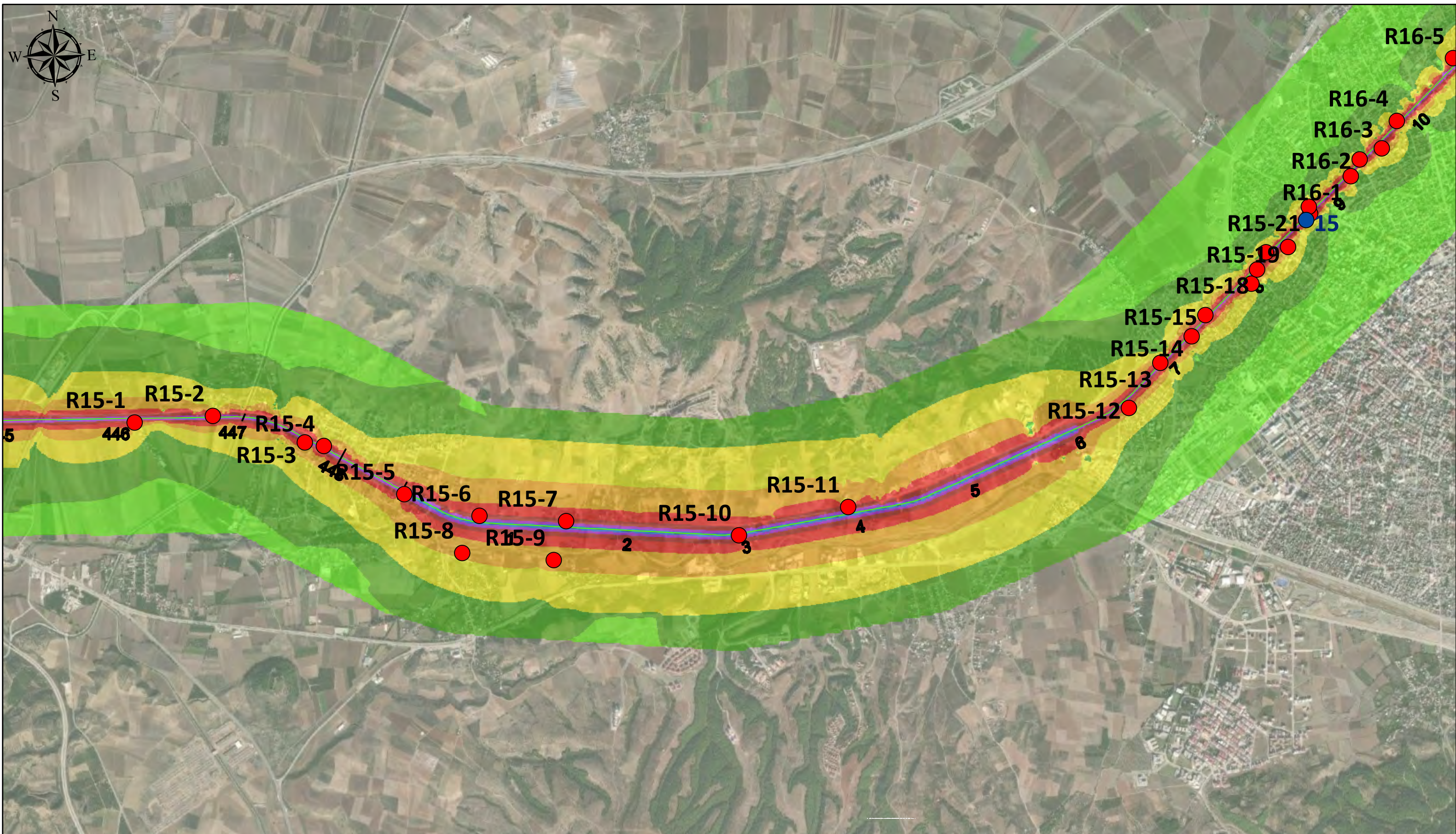
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

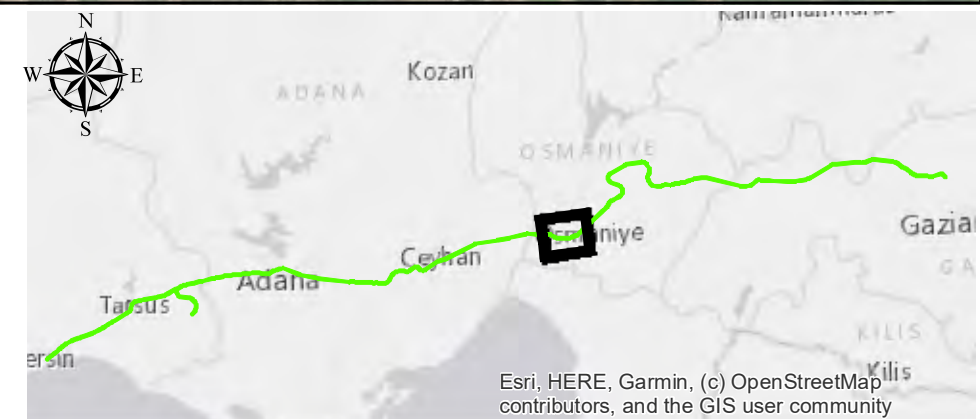


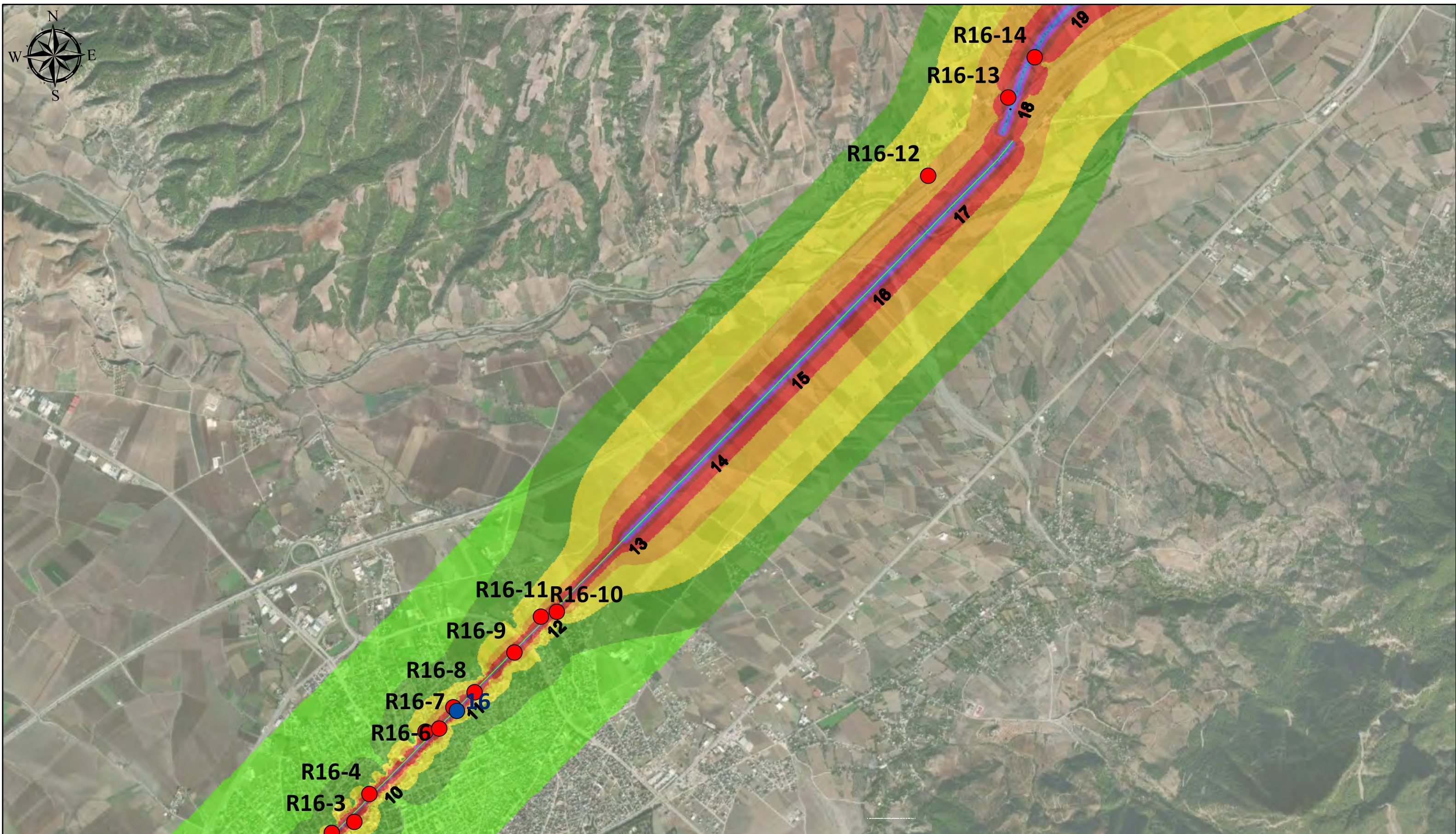


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**

**Measurement and Assessment Points
Operation Phase, Night**





FREKANS

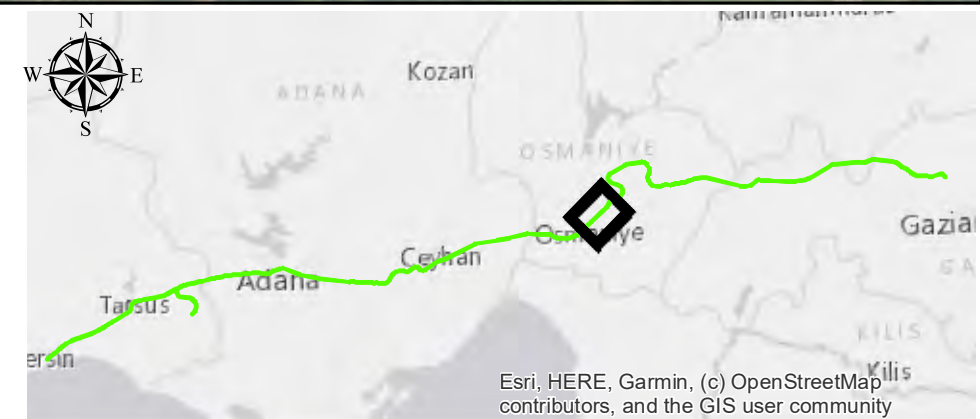
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**

- Measurement Points LdBA
- Assessment Points
- Railway

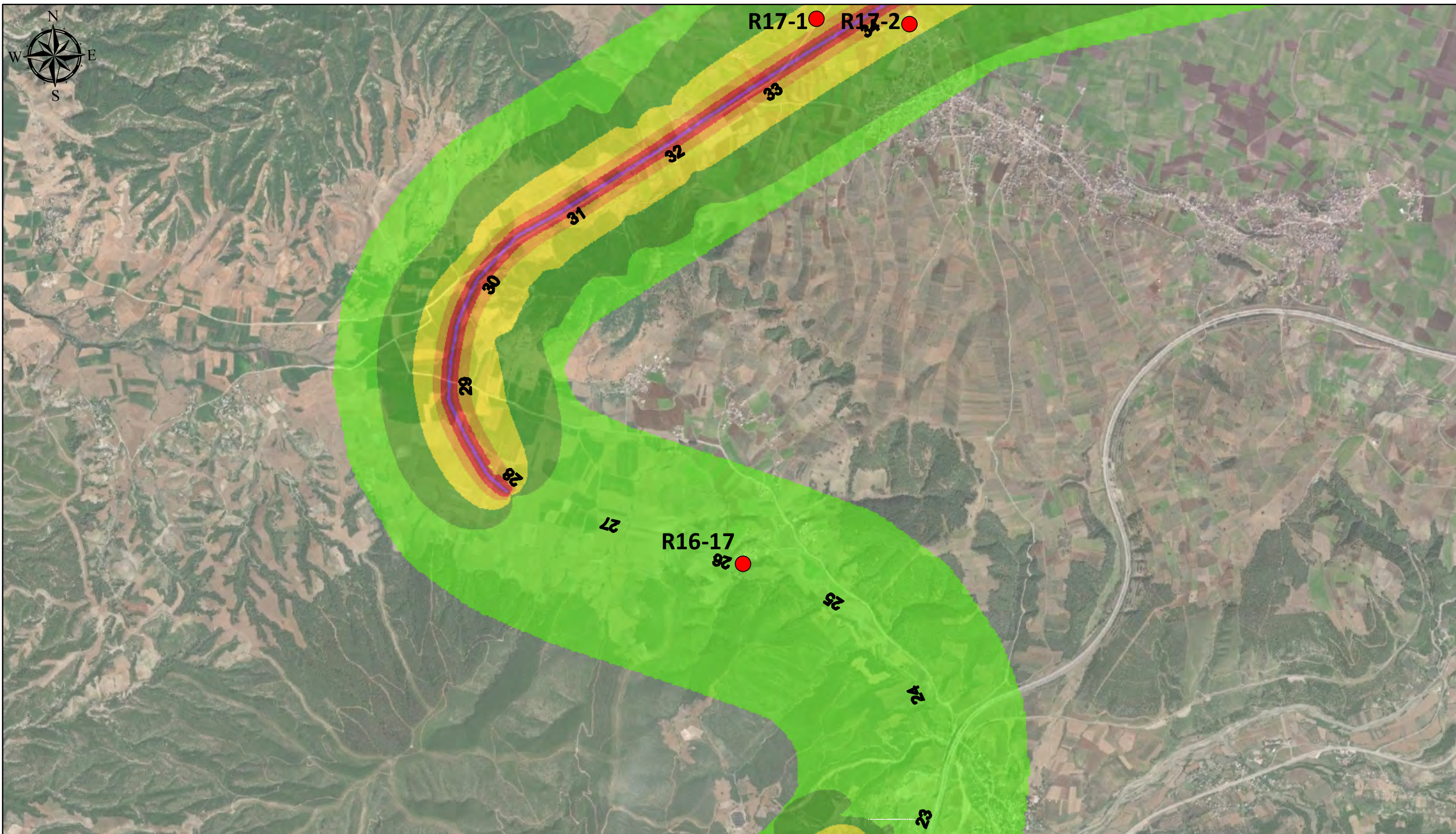
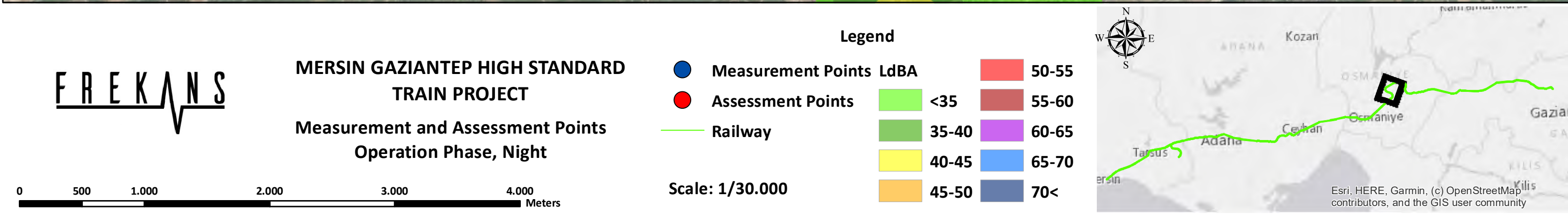
Scale: 1/30.000

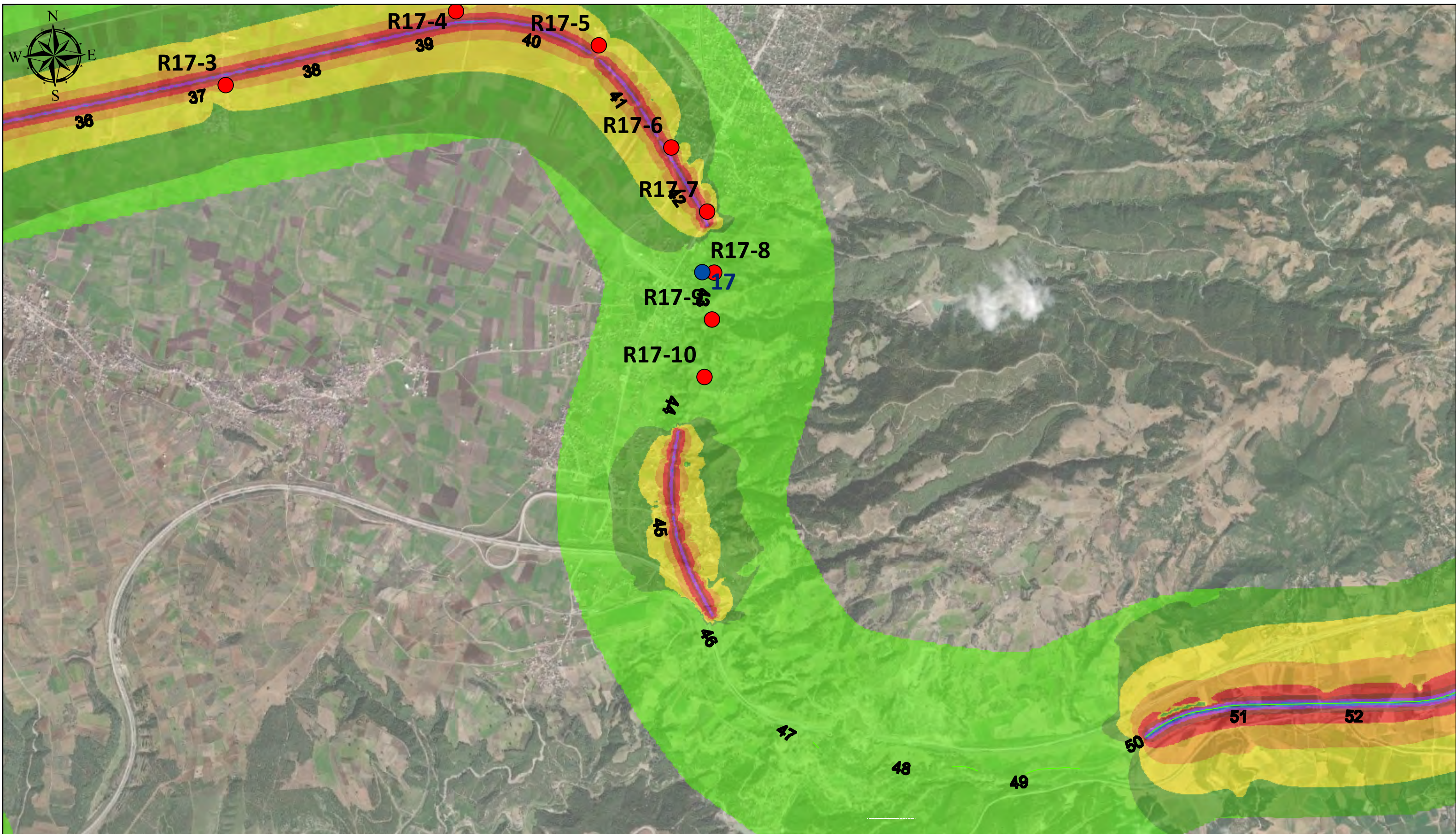
Legend

■	50-55
■	55-60
■	60-65
■	65-70
■	70<
■	<35
■	35-40
■	40-45
■	45-50



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community





FREKANS

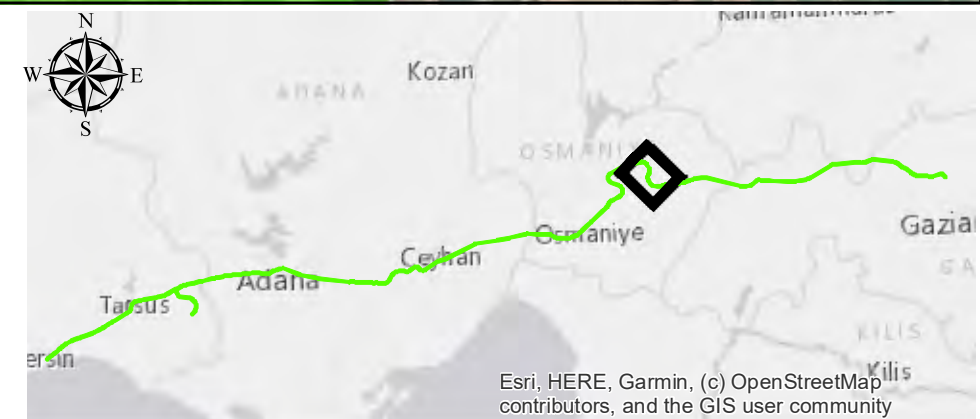
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

- Measurement Points LdBA
- Assessment Points
- Railway

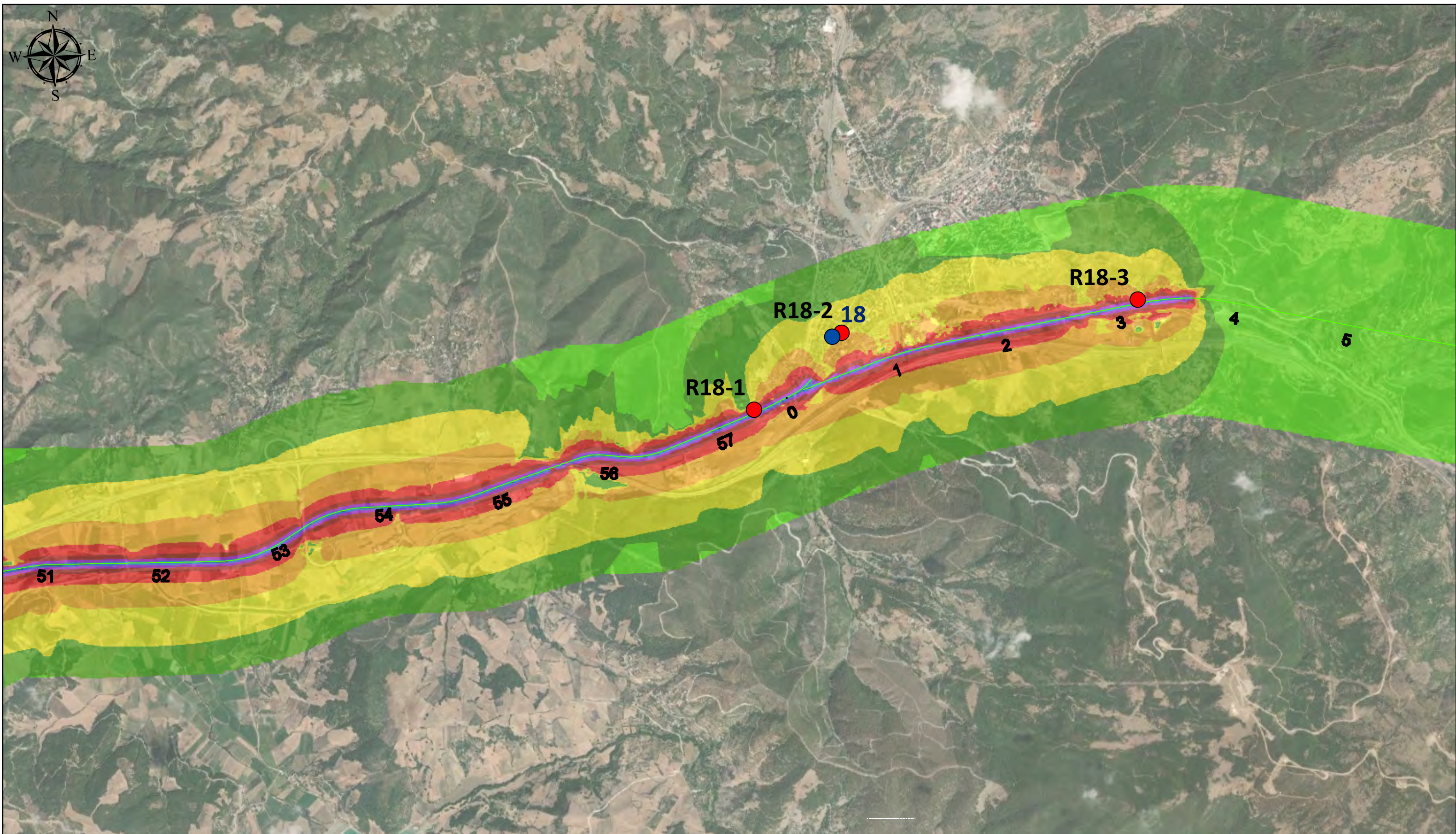
Scale: 1/30.000

Legend

<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70<

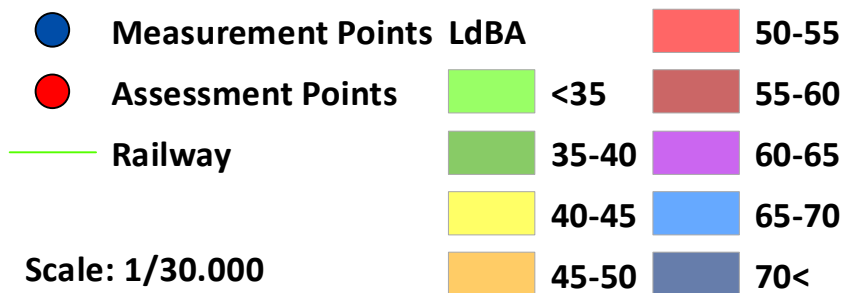


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

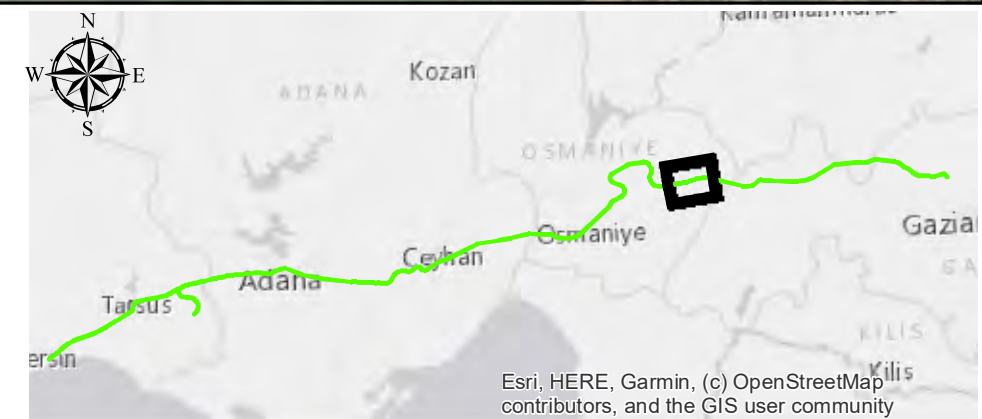


FREKANS

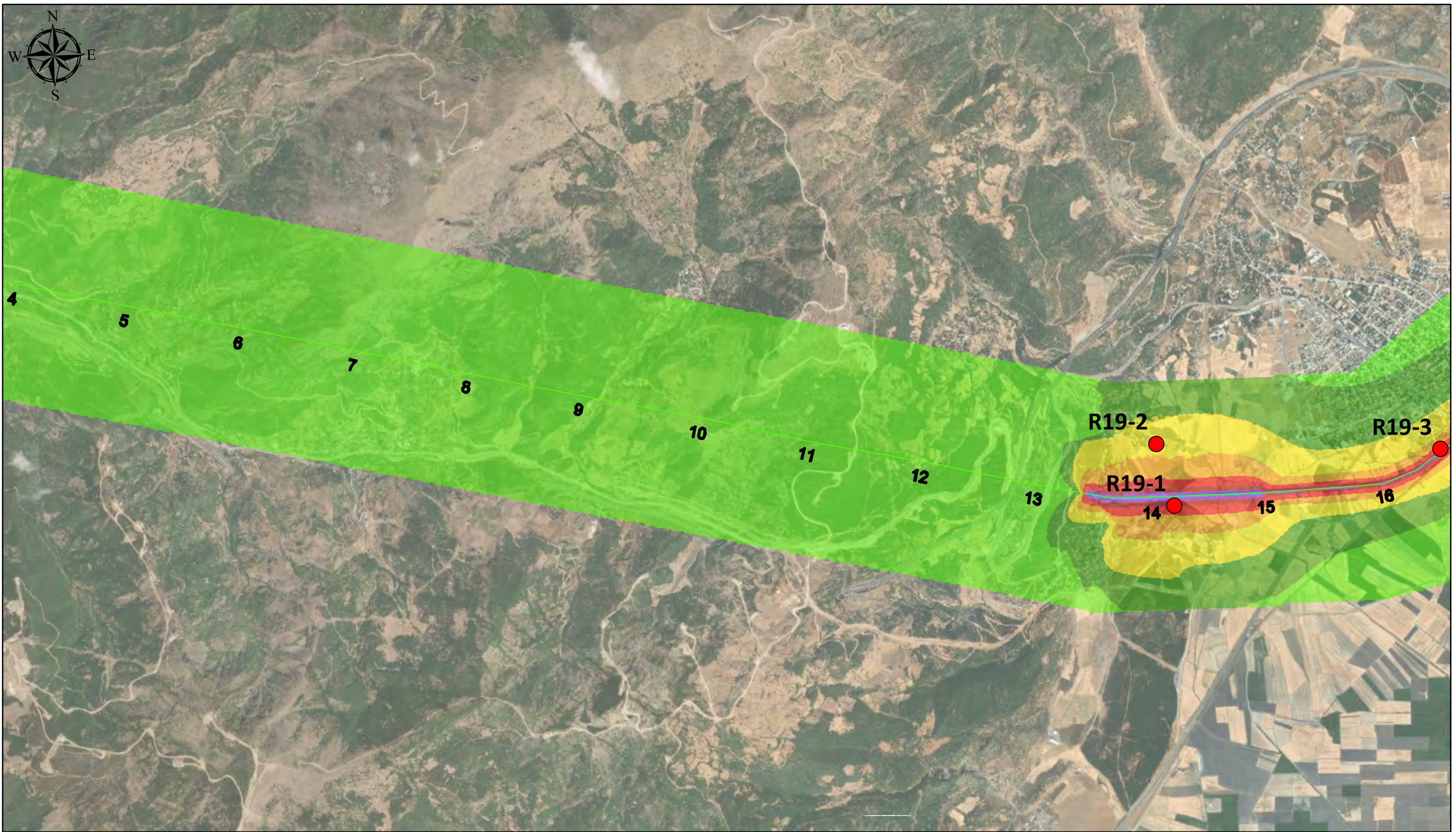
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night



Scale: 1/30.000

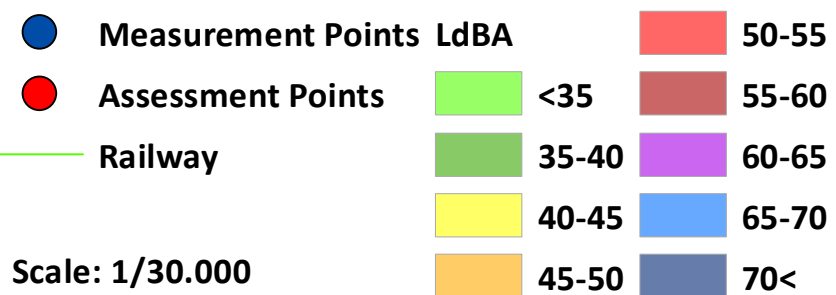
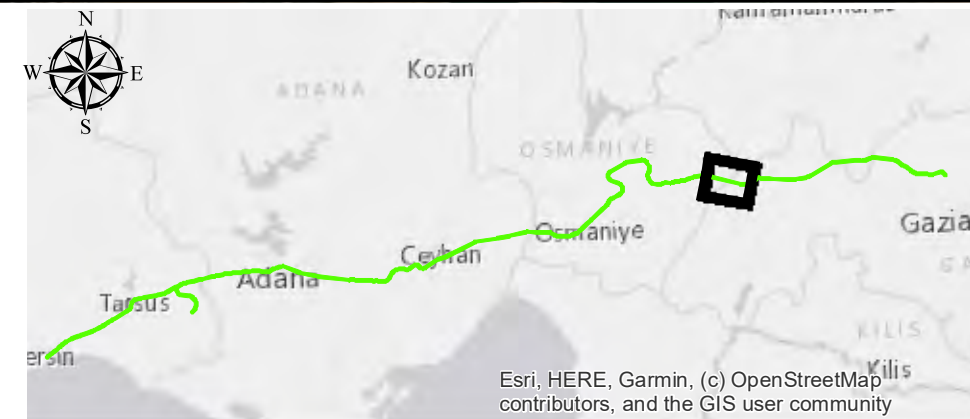


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

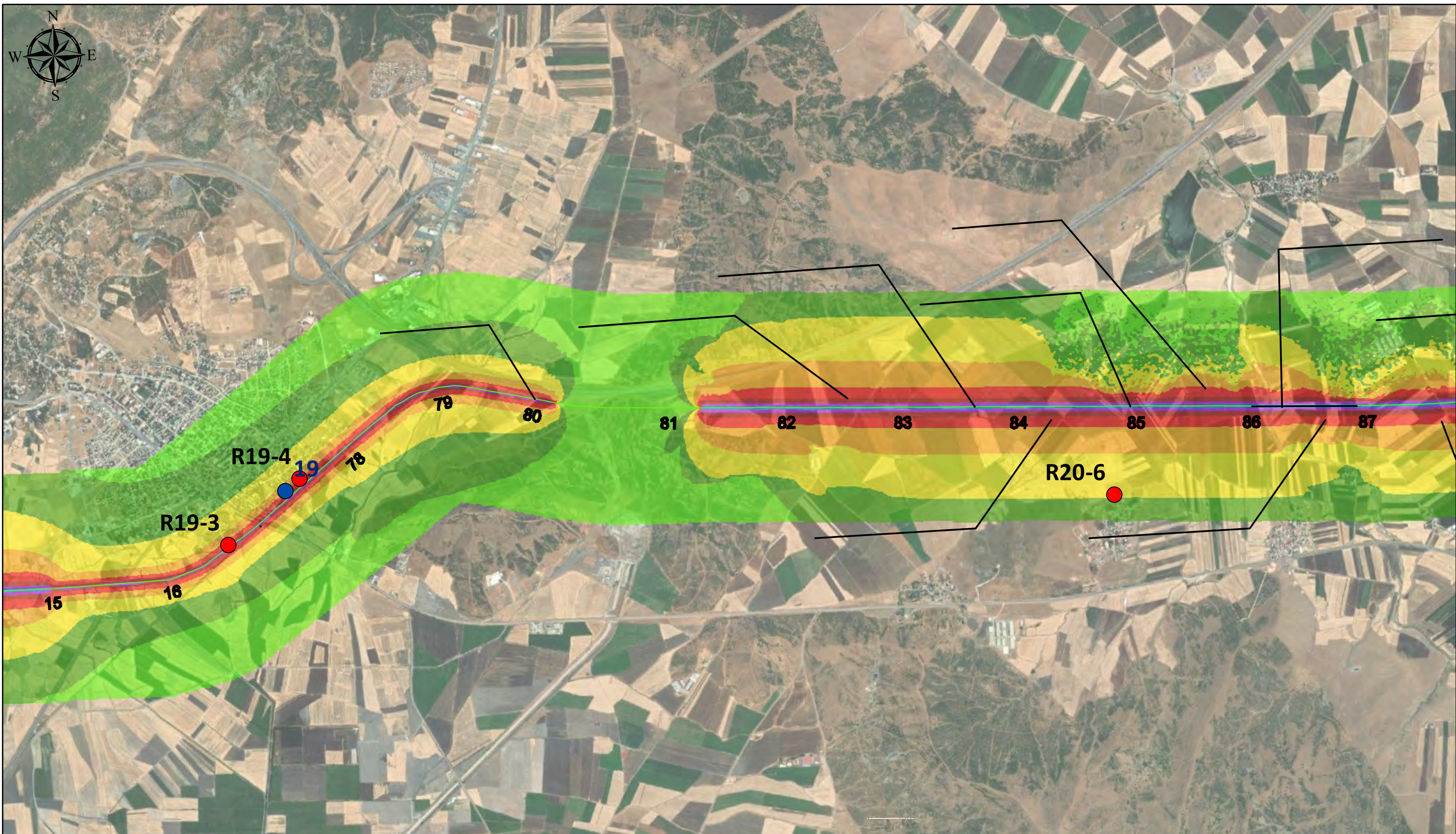


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**

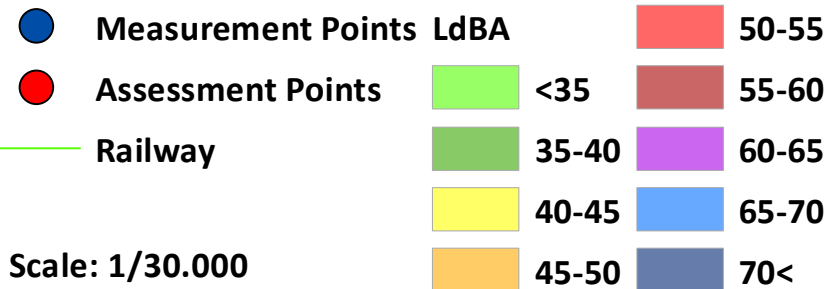


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

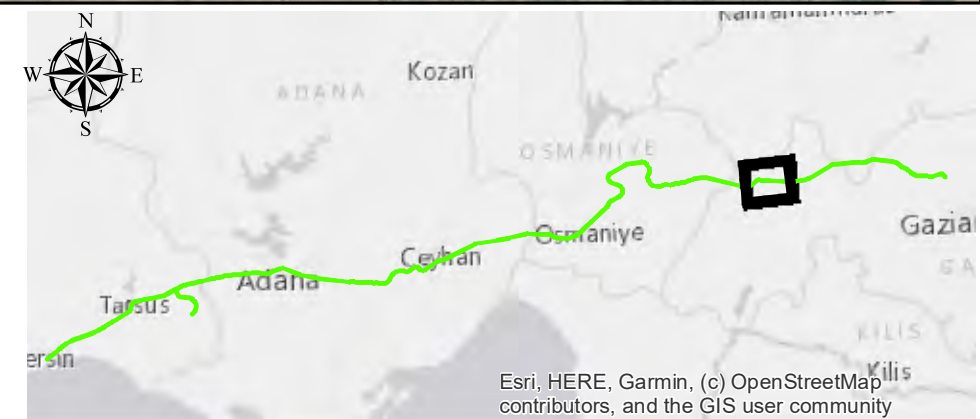


FREKANS

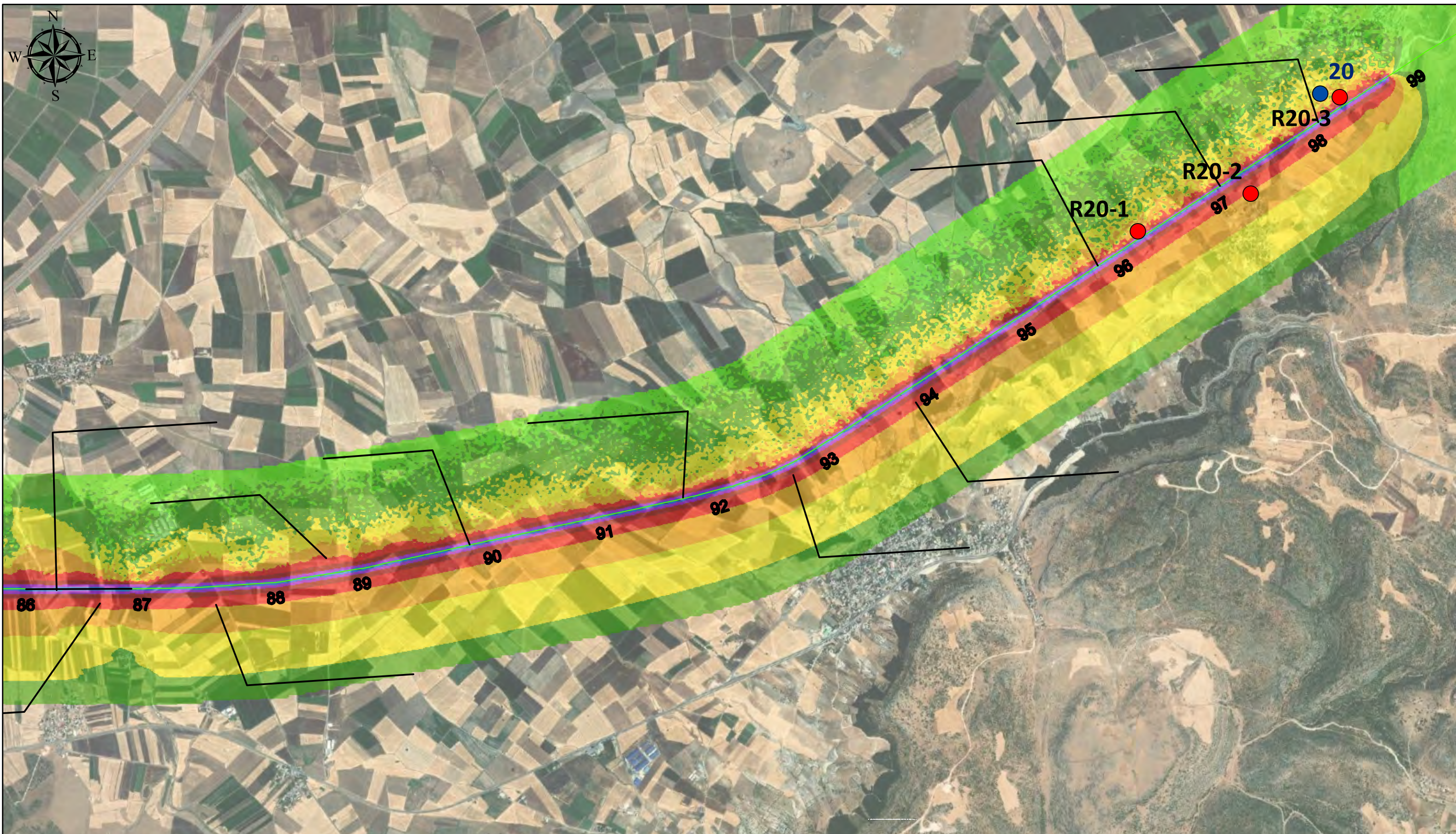
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**



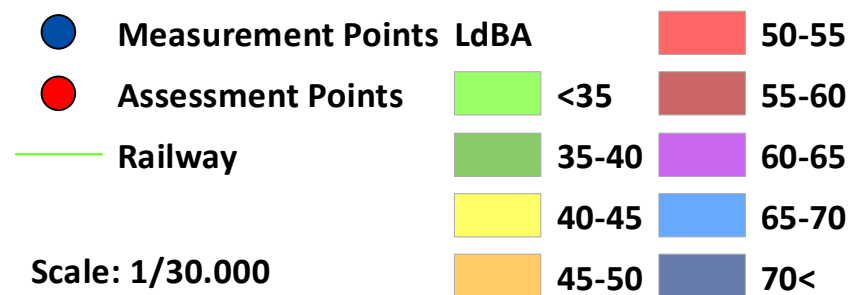
Scale: 1/30.000



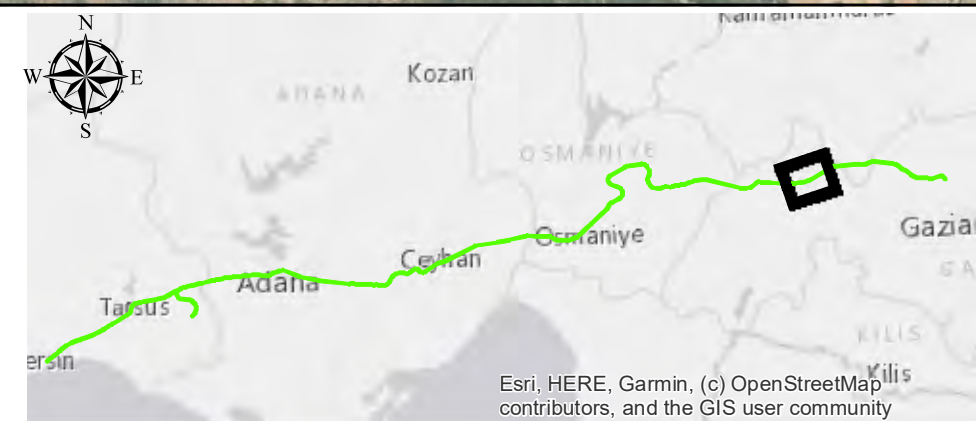
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



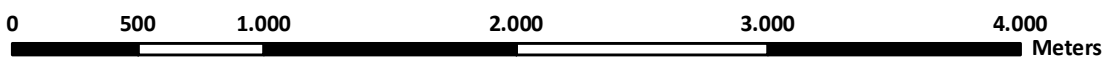
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night



Scale: 1/30.000



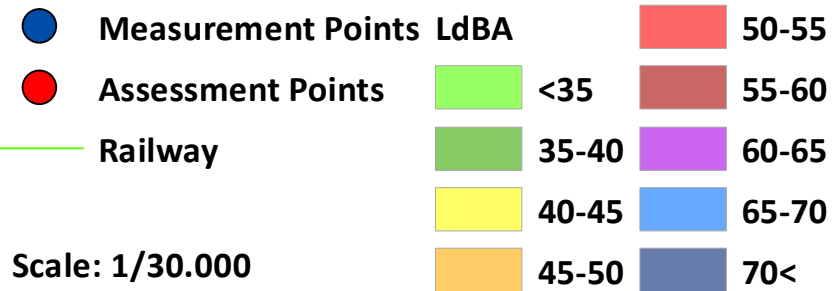
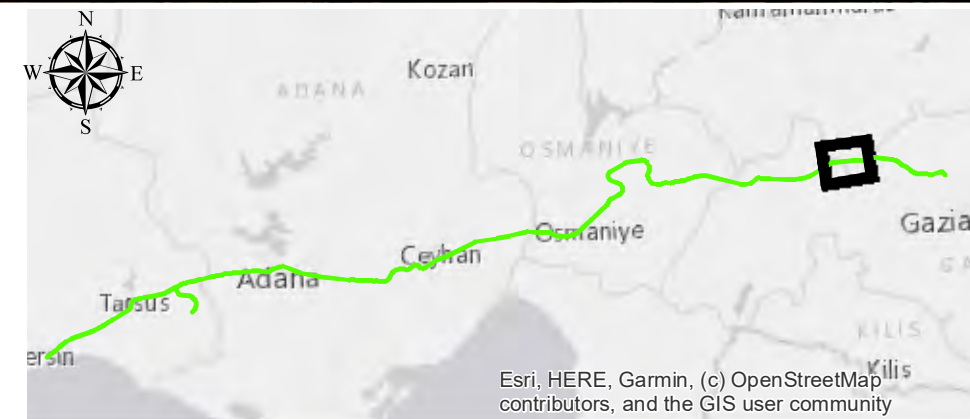
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



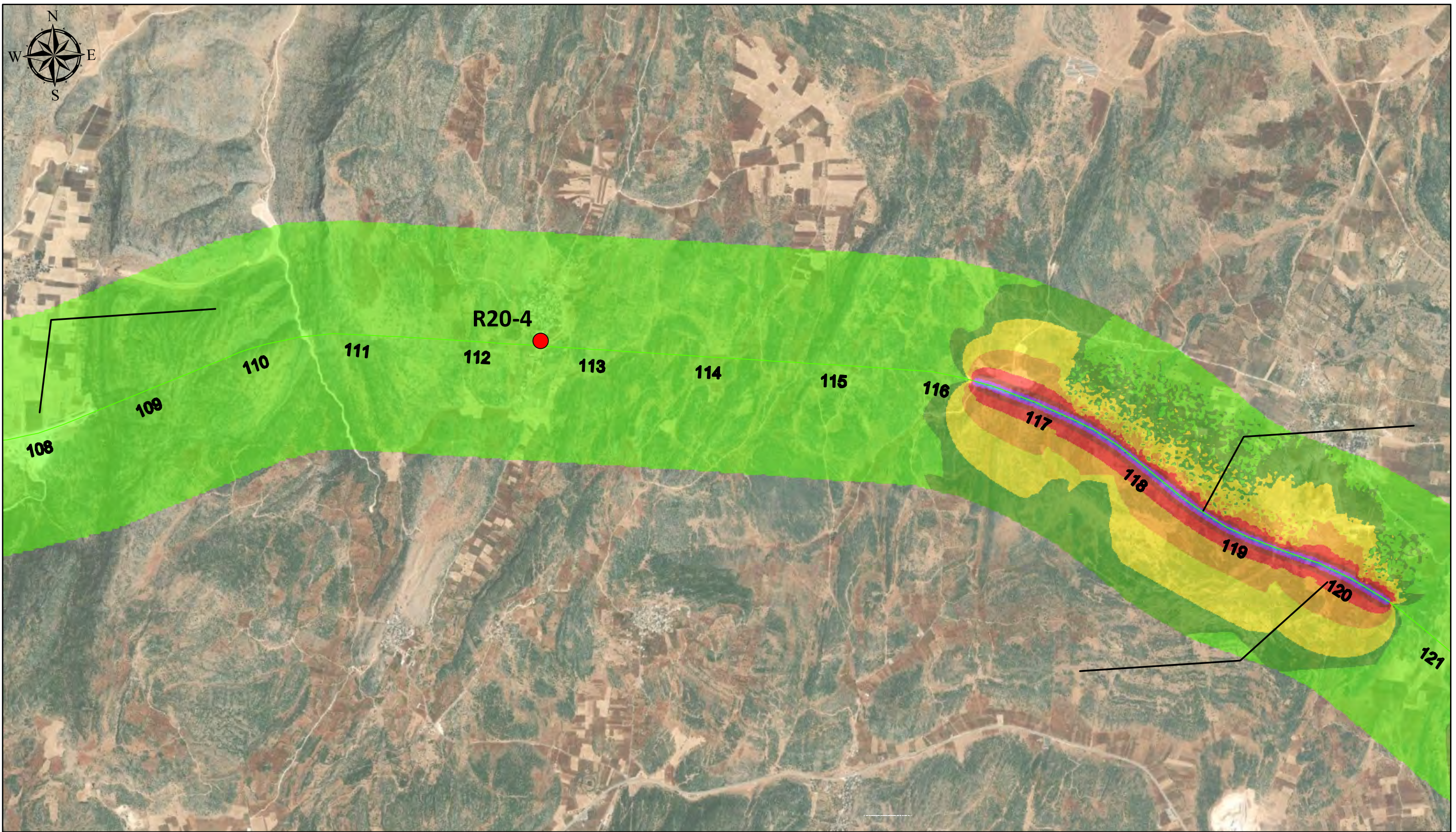


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

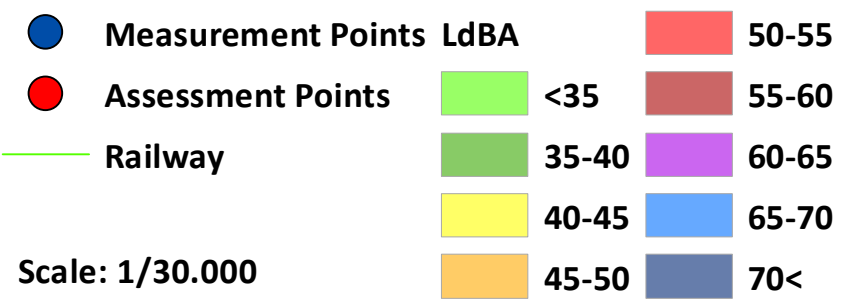
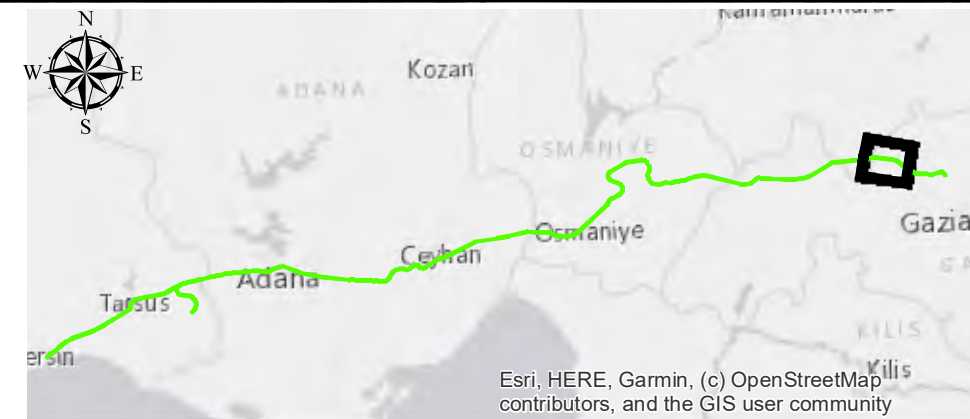


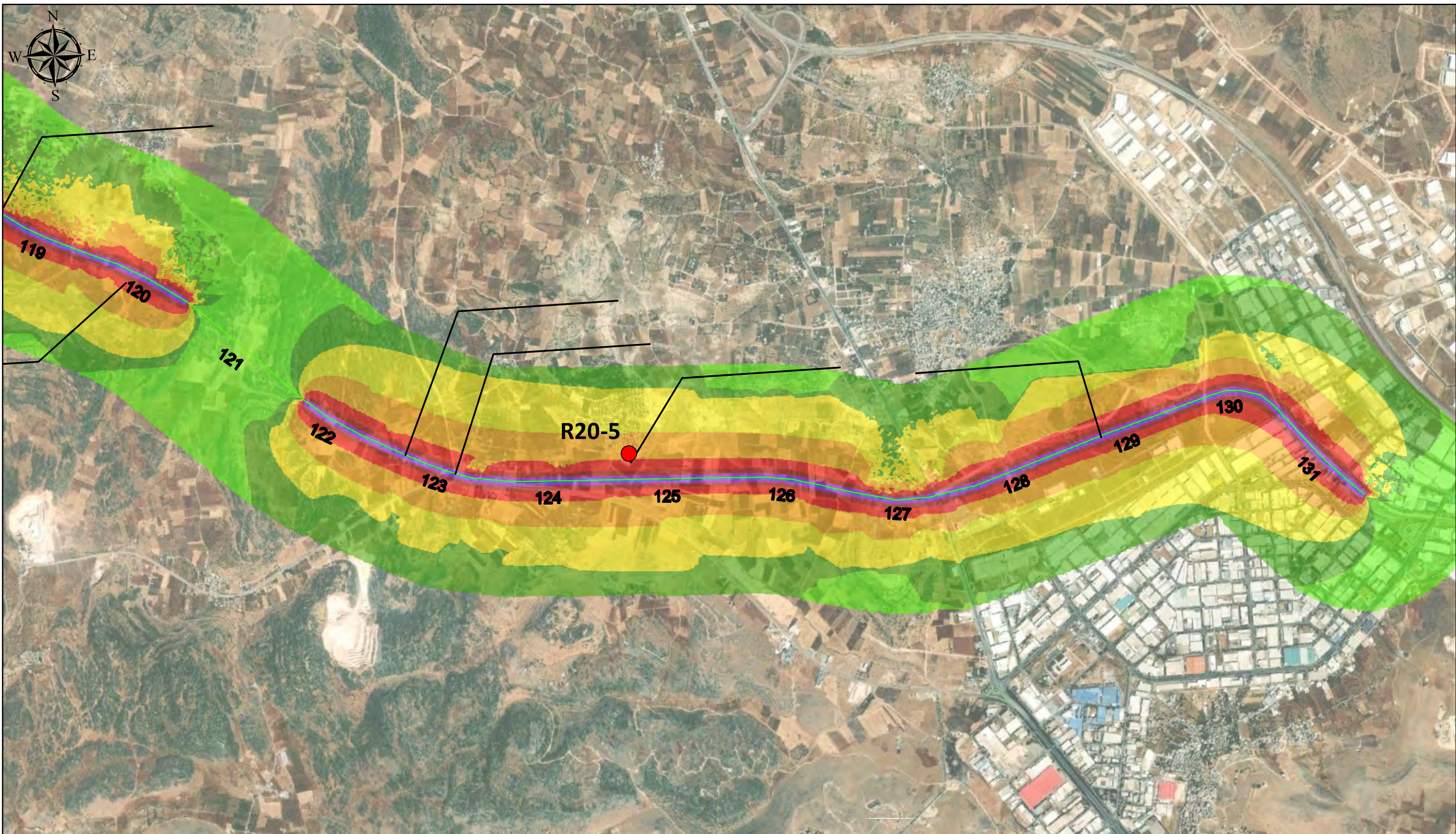
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

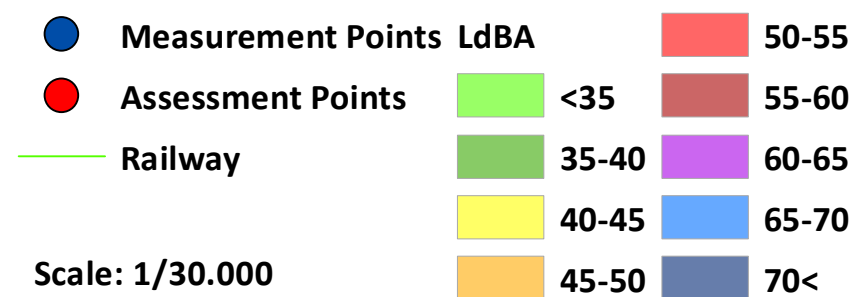
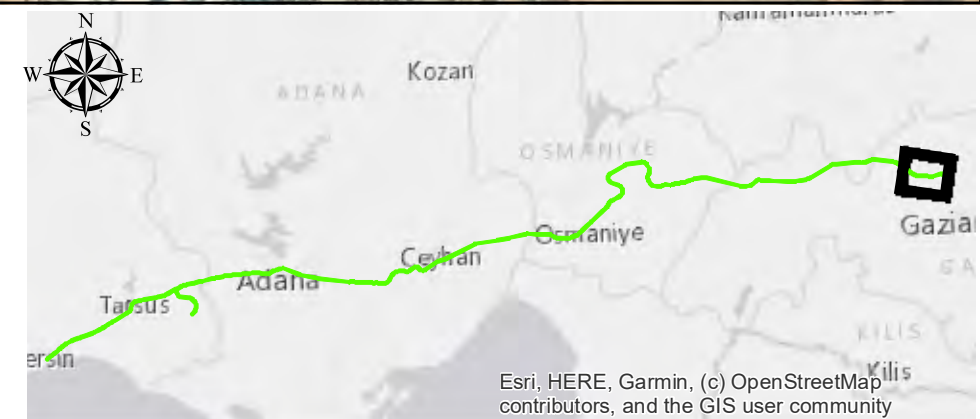
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**





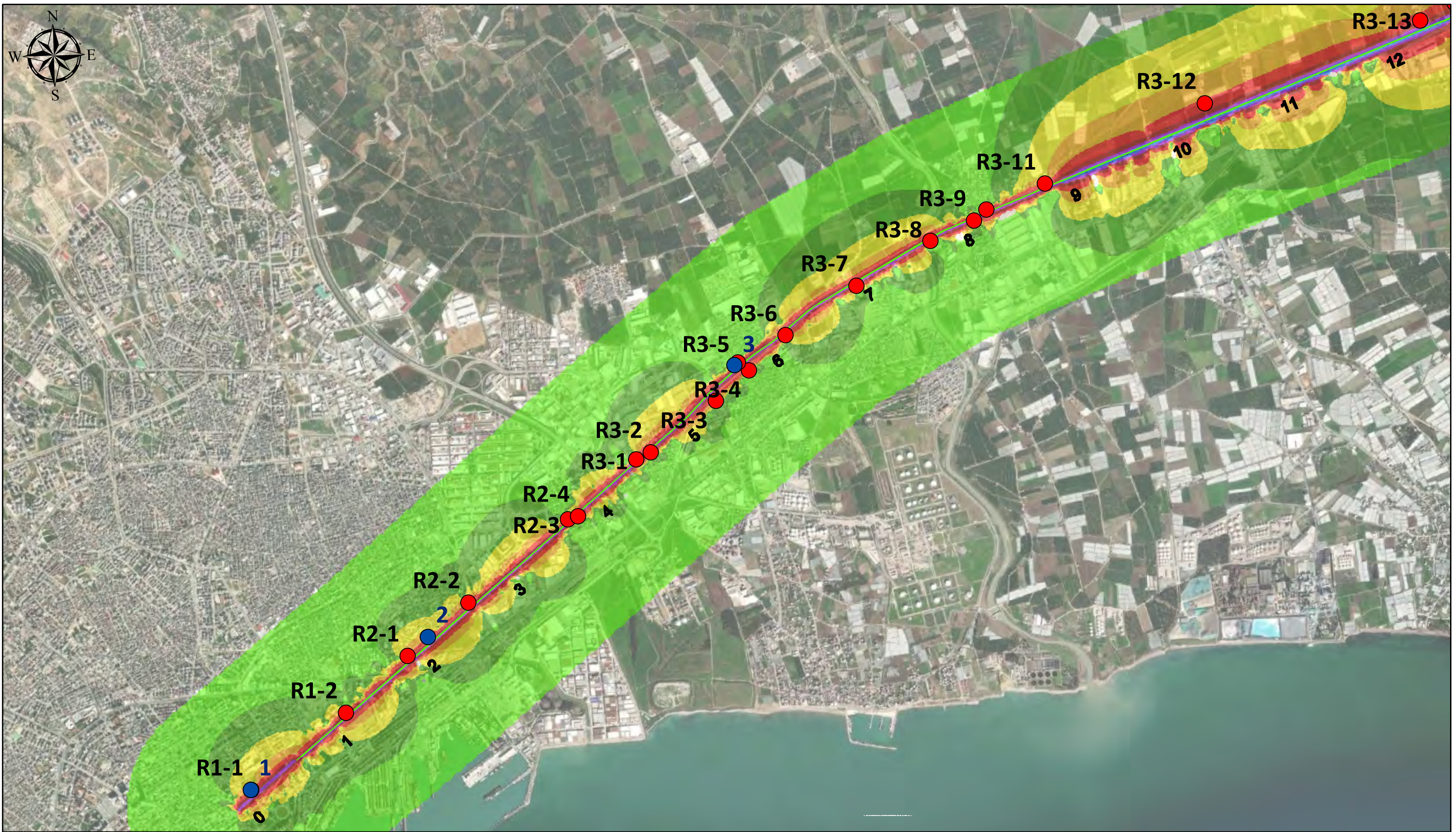
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**



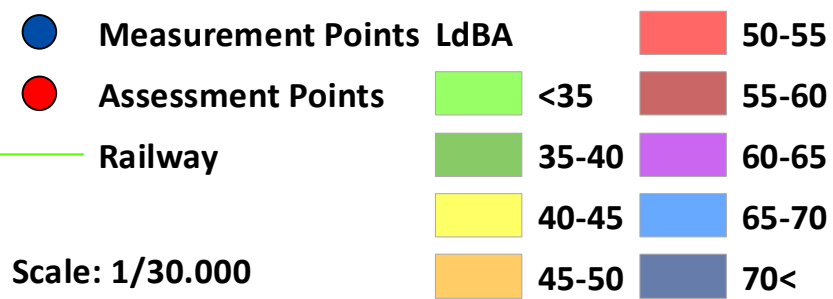
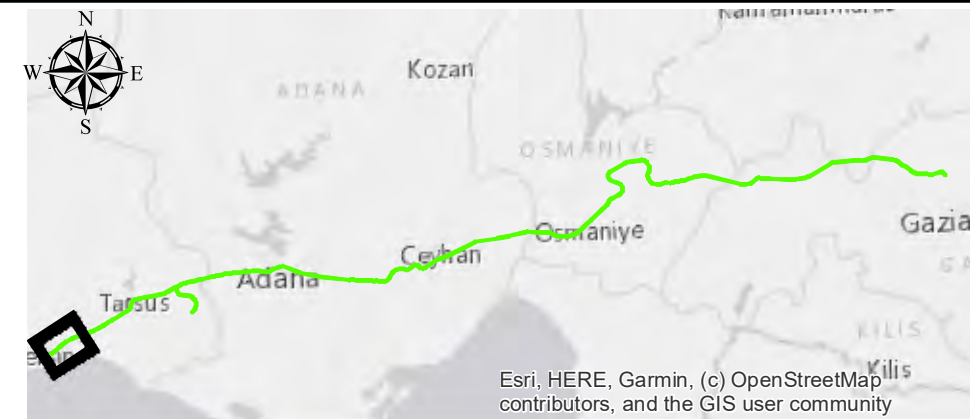
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

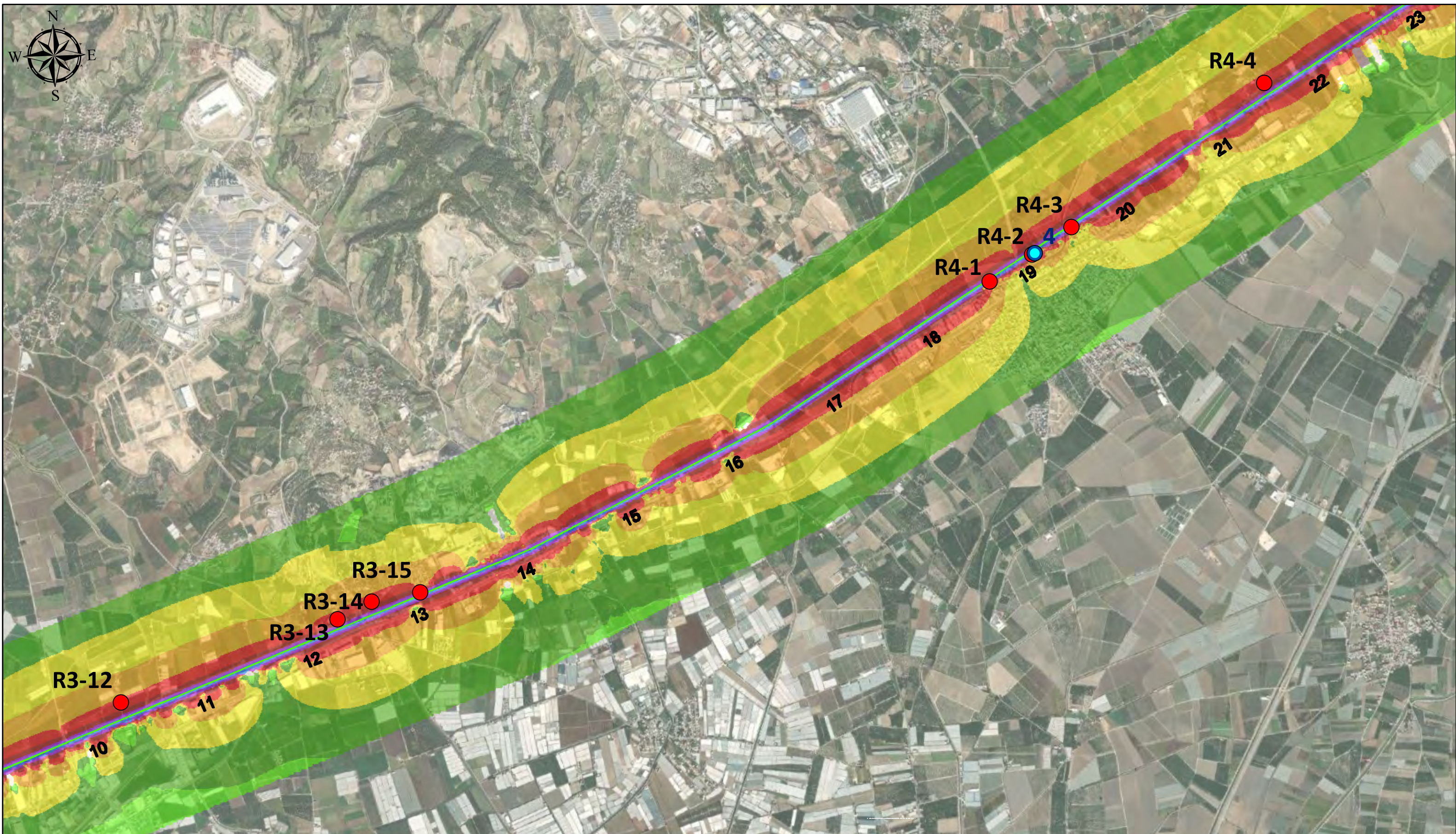
Appendix 4: Operation Noise Maps, Day-Night (DN) Rating



FREKANS

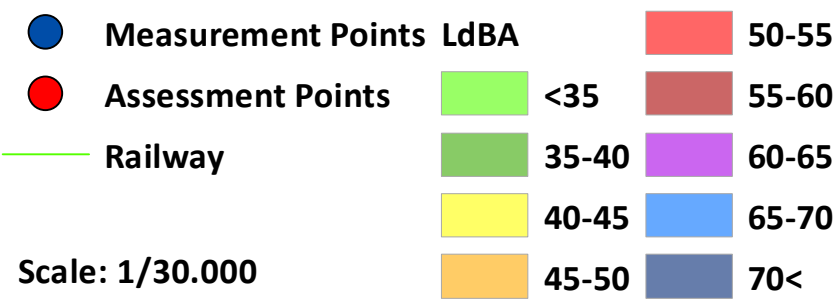
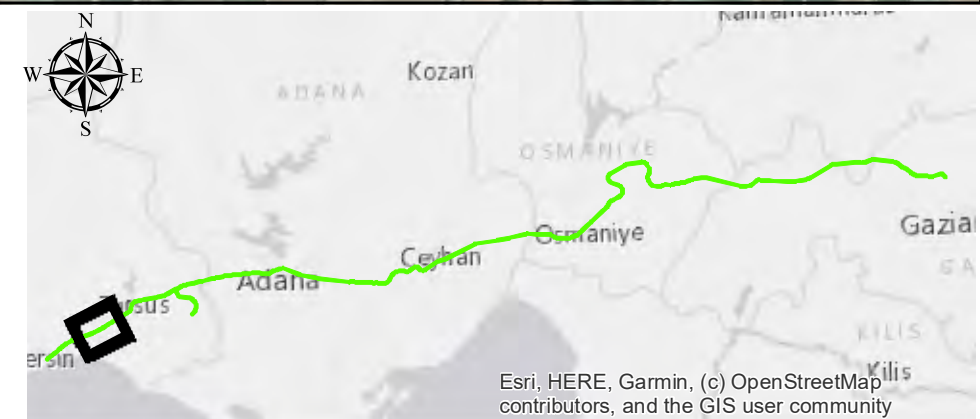
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

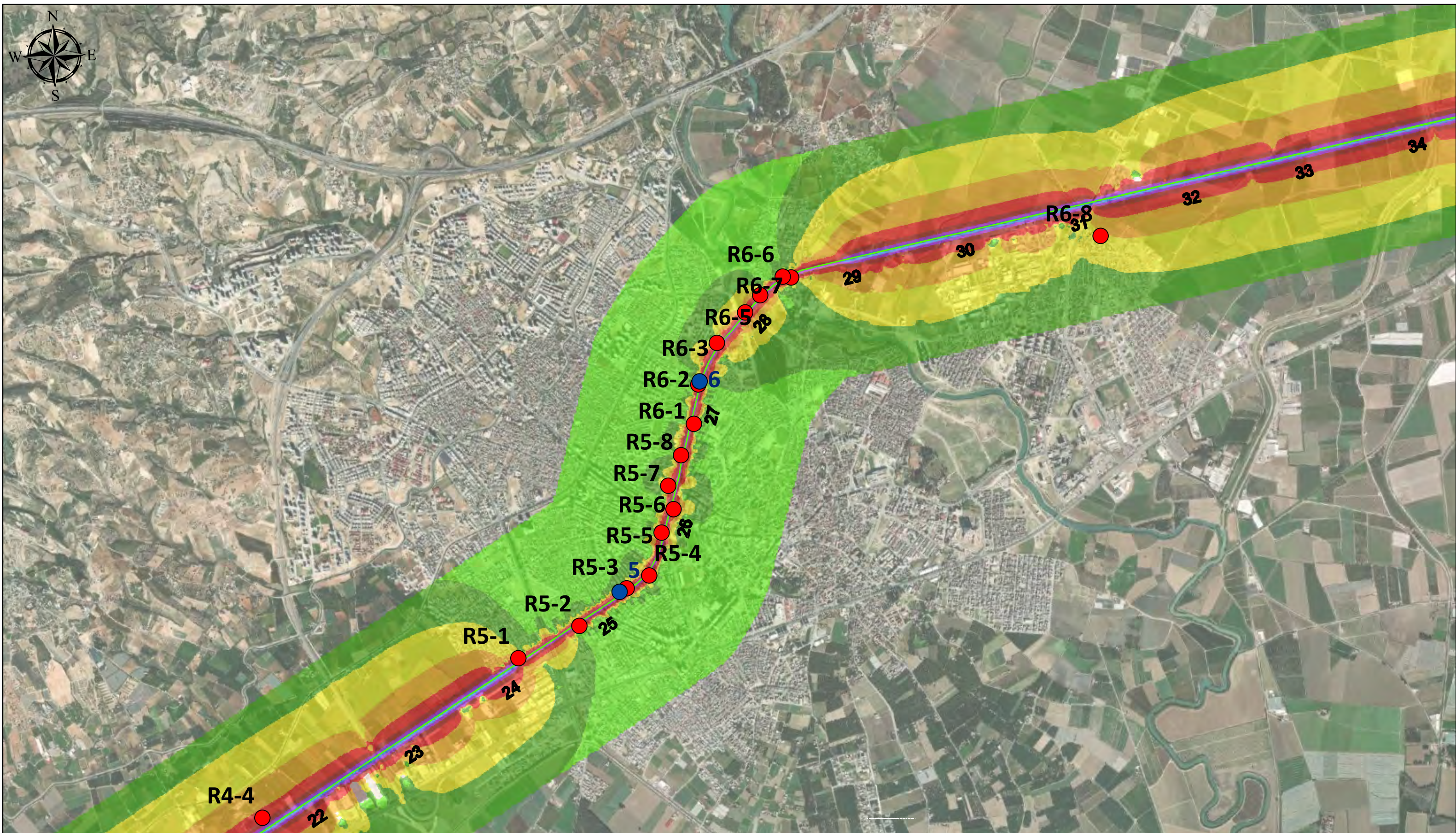
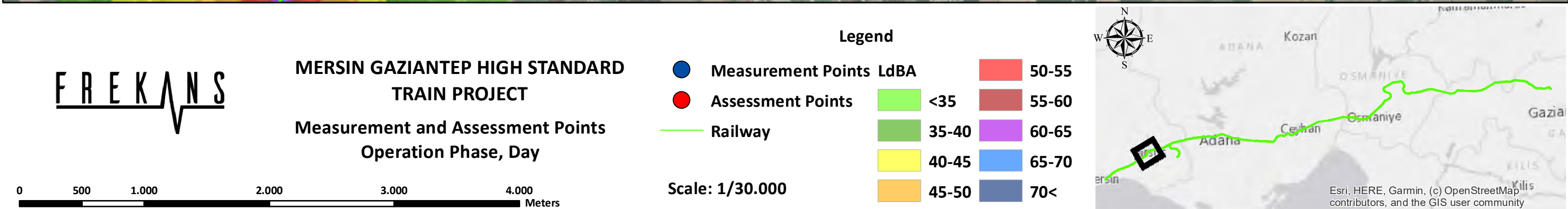


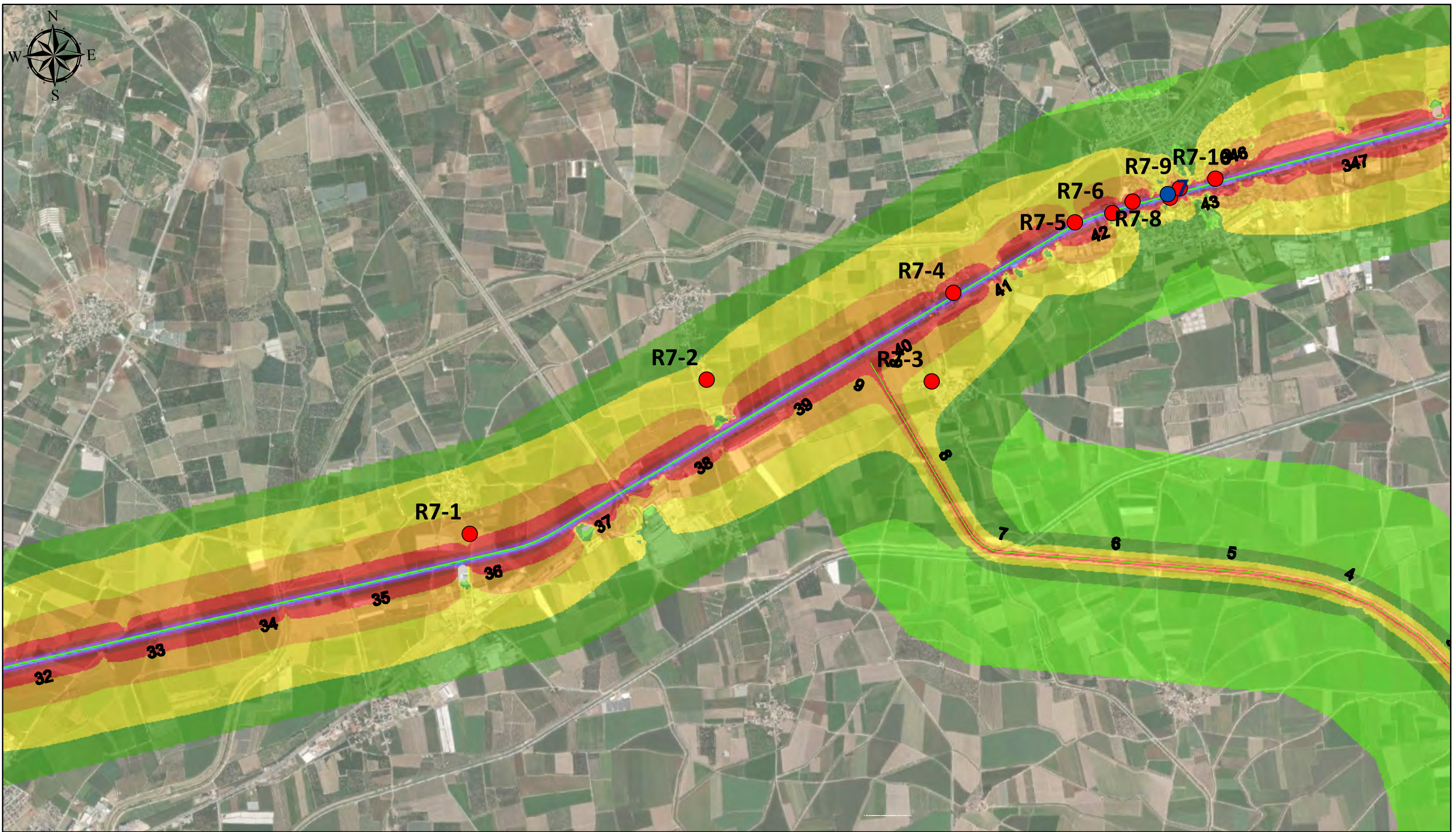


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

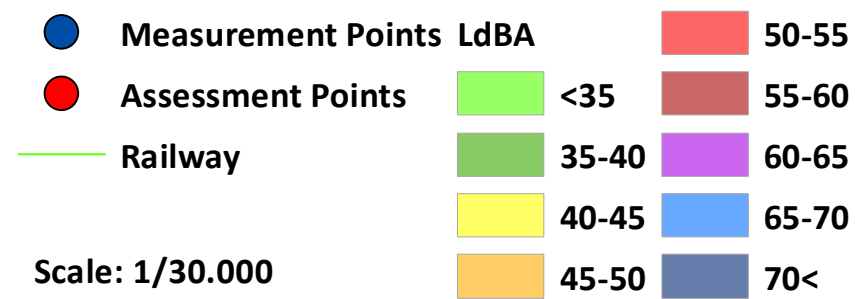
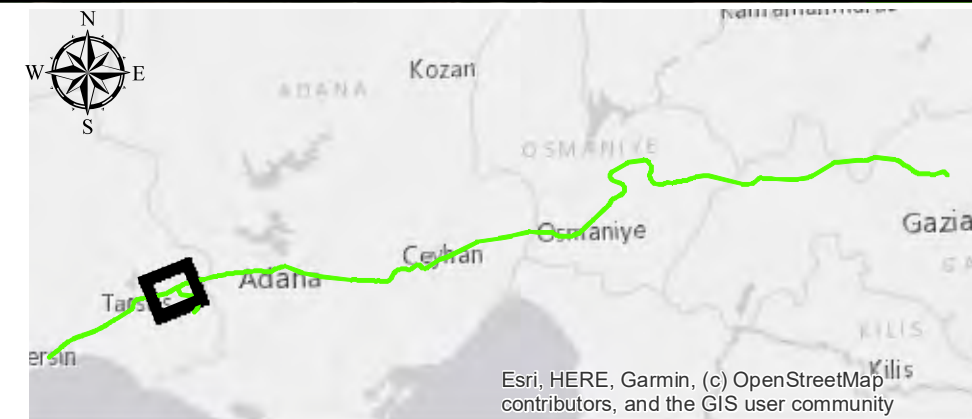




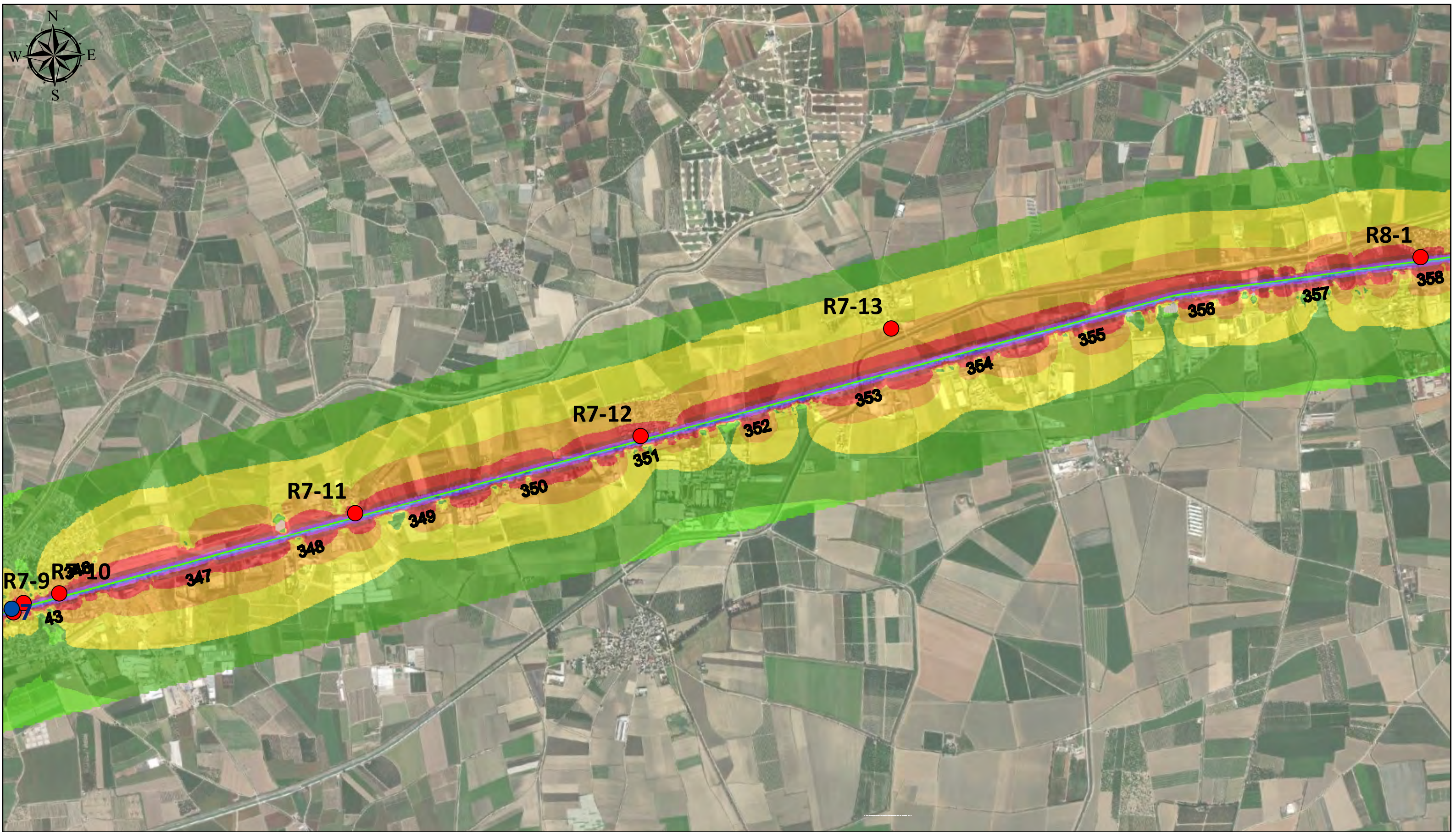


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



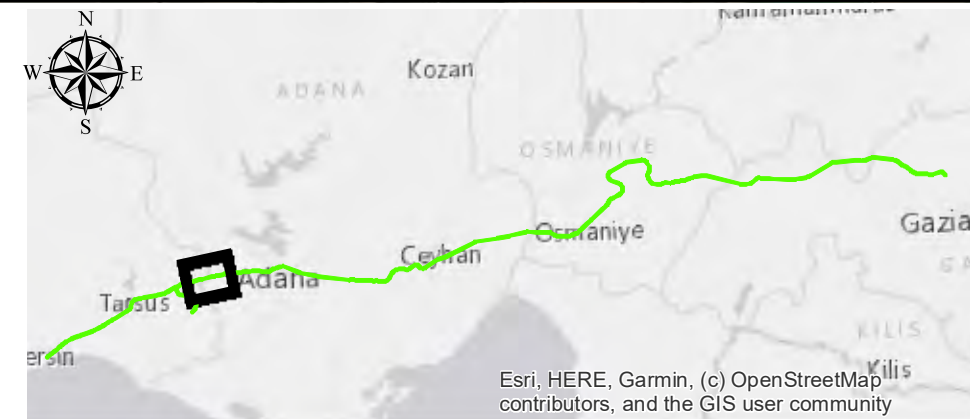
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

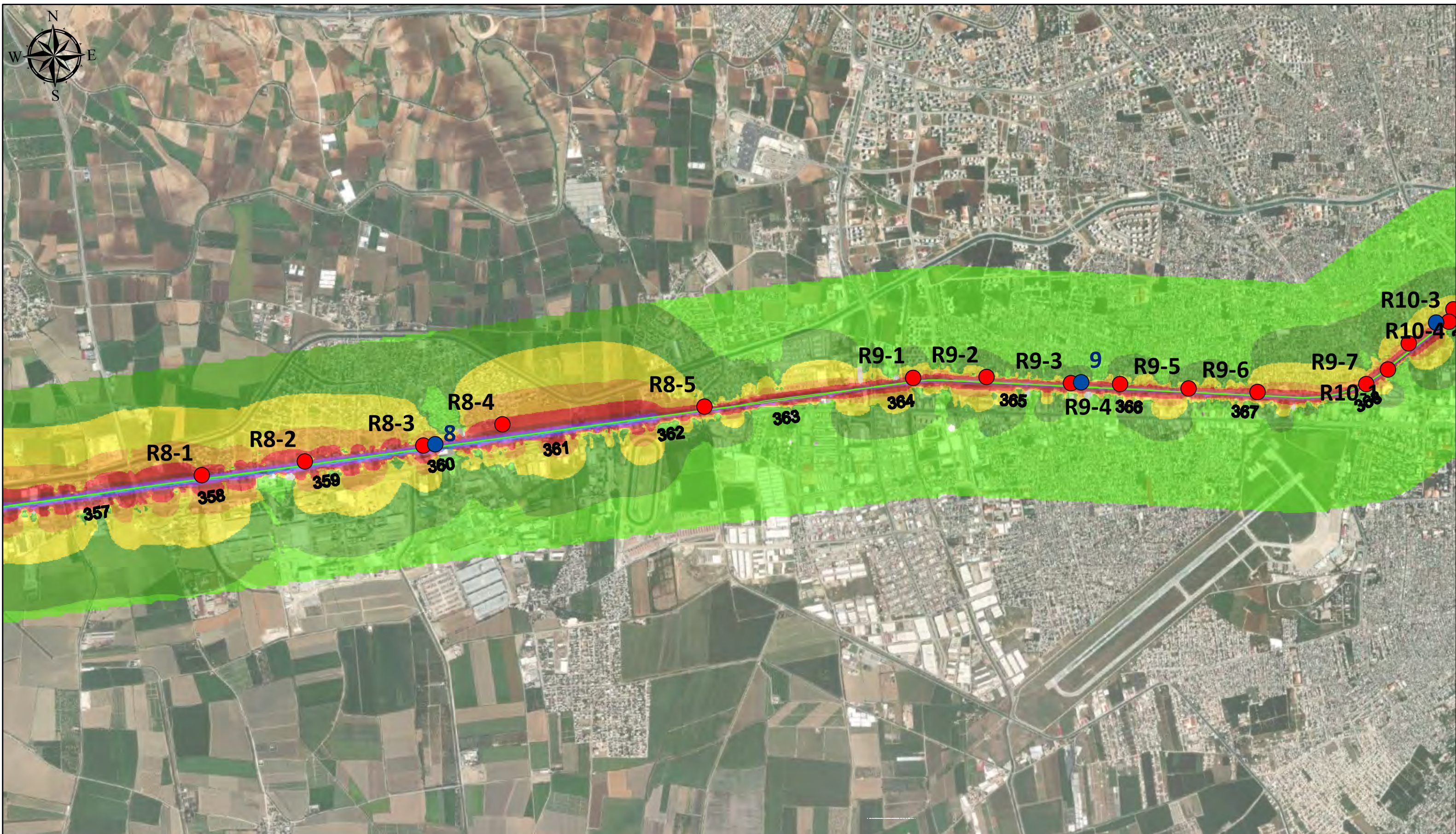
- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway

Scale: 1/30.000

- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70< |

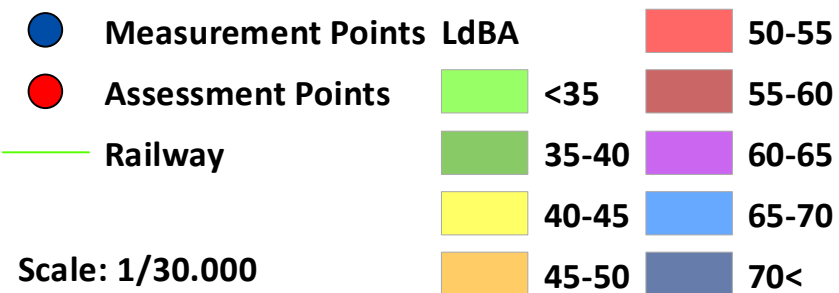


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

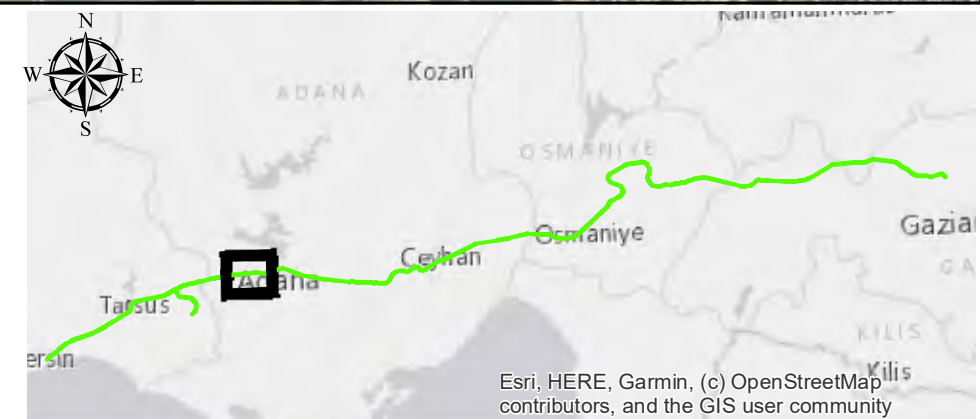


FREKANS

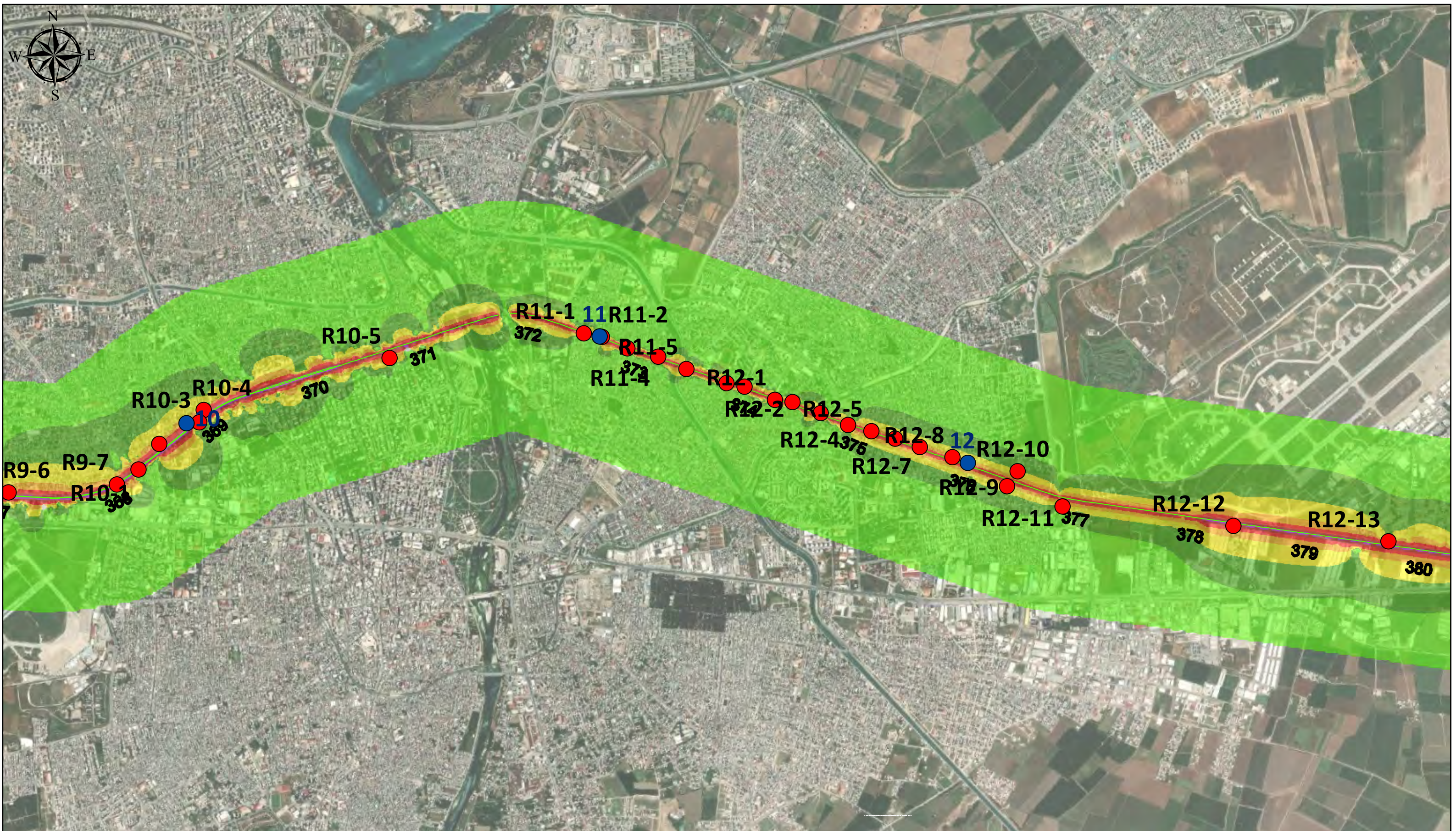
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



Scale: 1/30.000

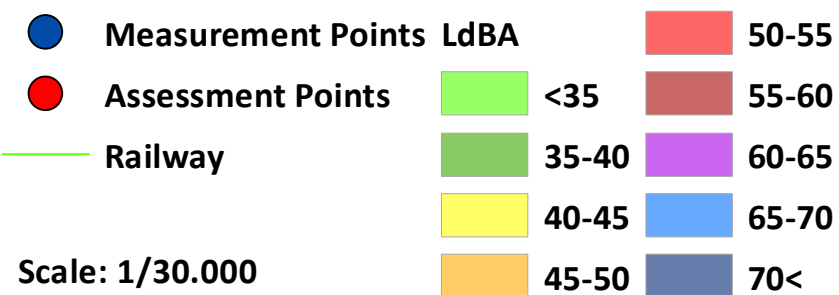
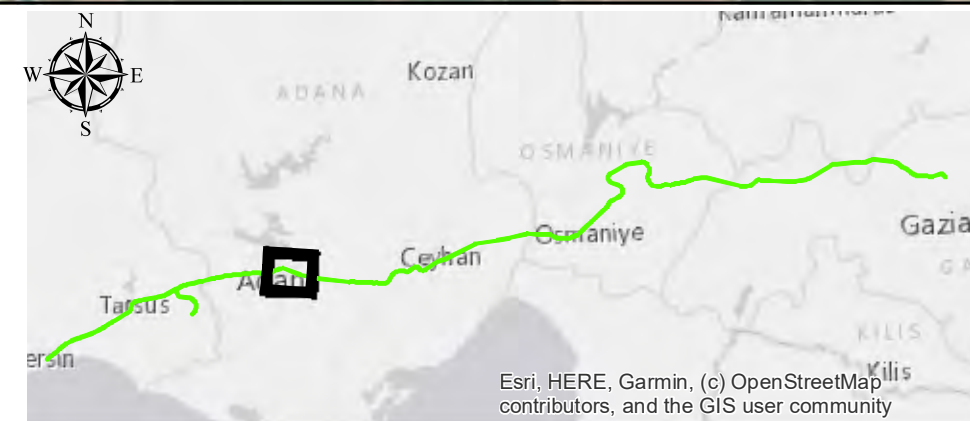


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

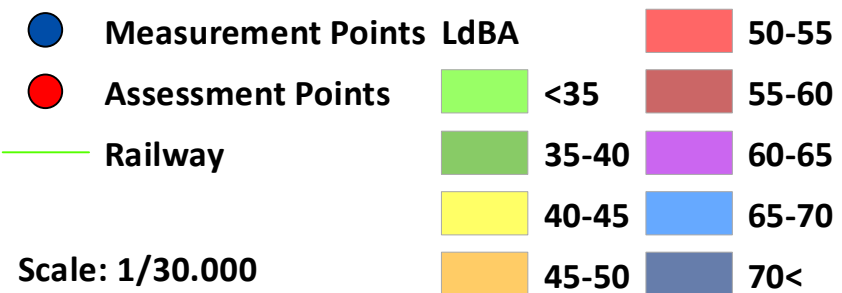
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



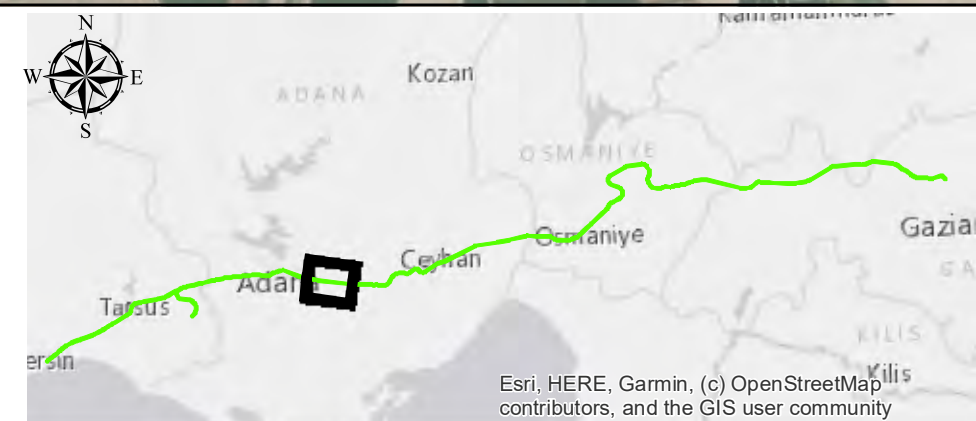
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



Scale: 1/30.000



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



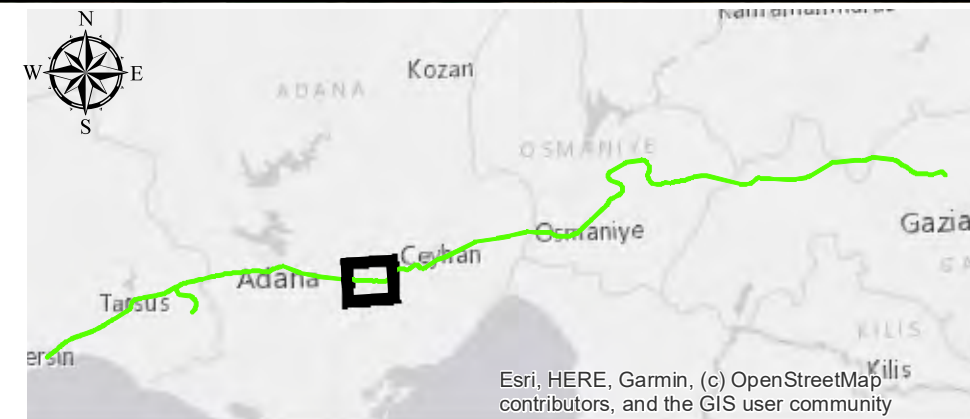
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

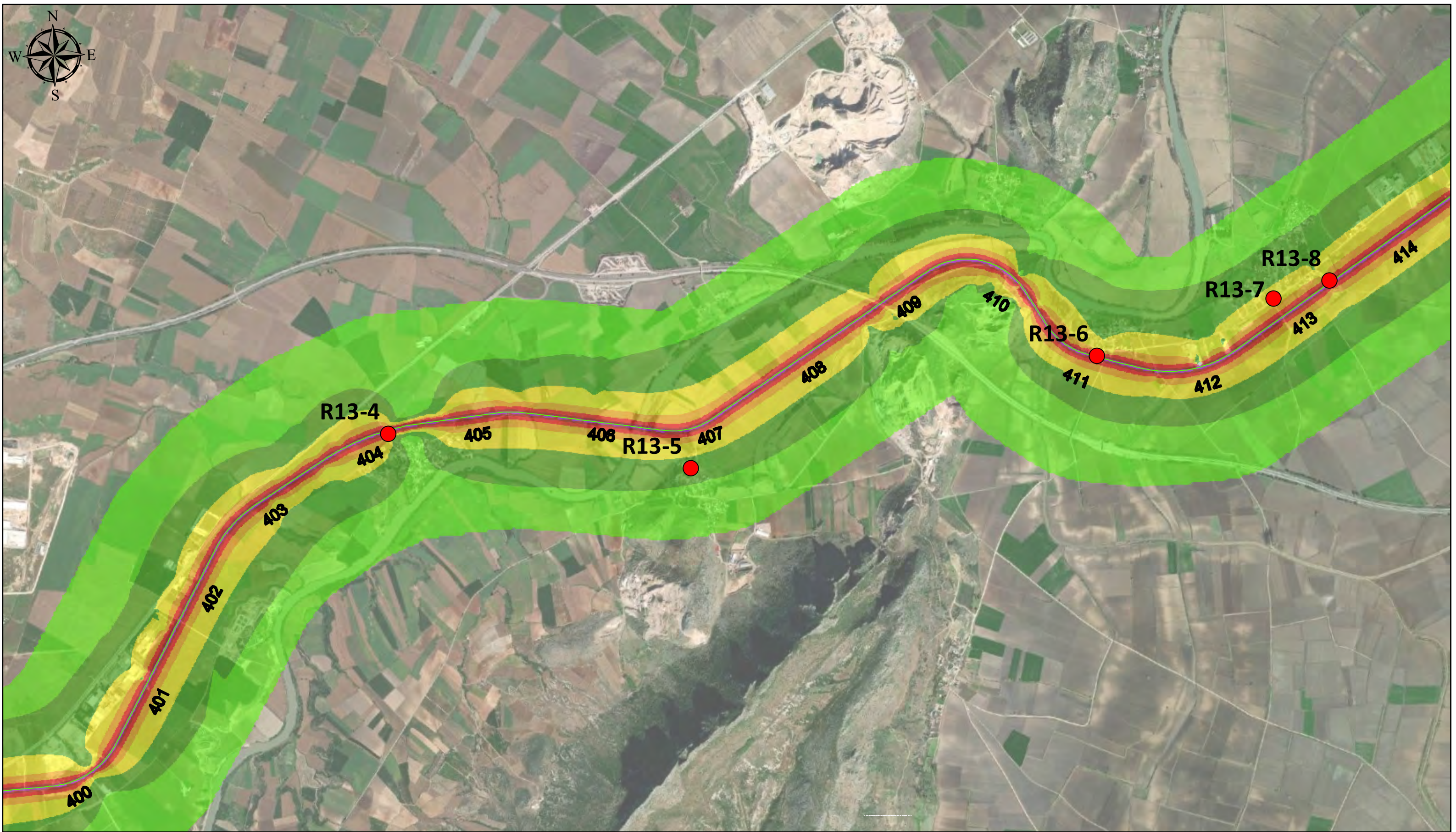
- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway

	50-55
	55-60
	60-65
	65-70
	70<

Scale: 1/30.000



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



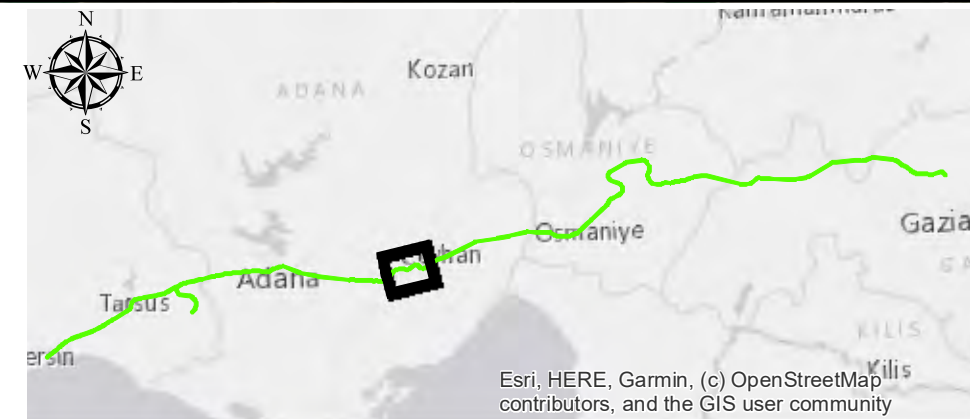
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

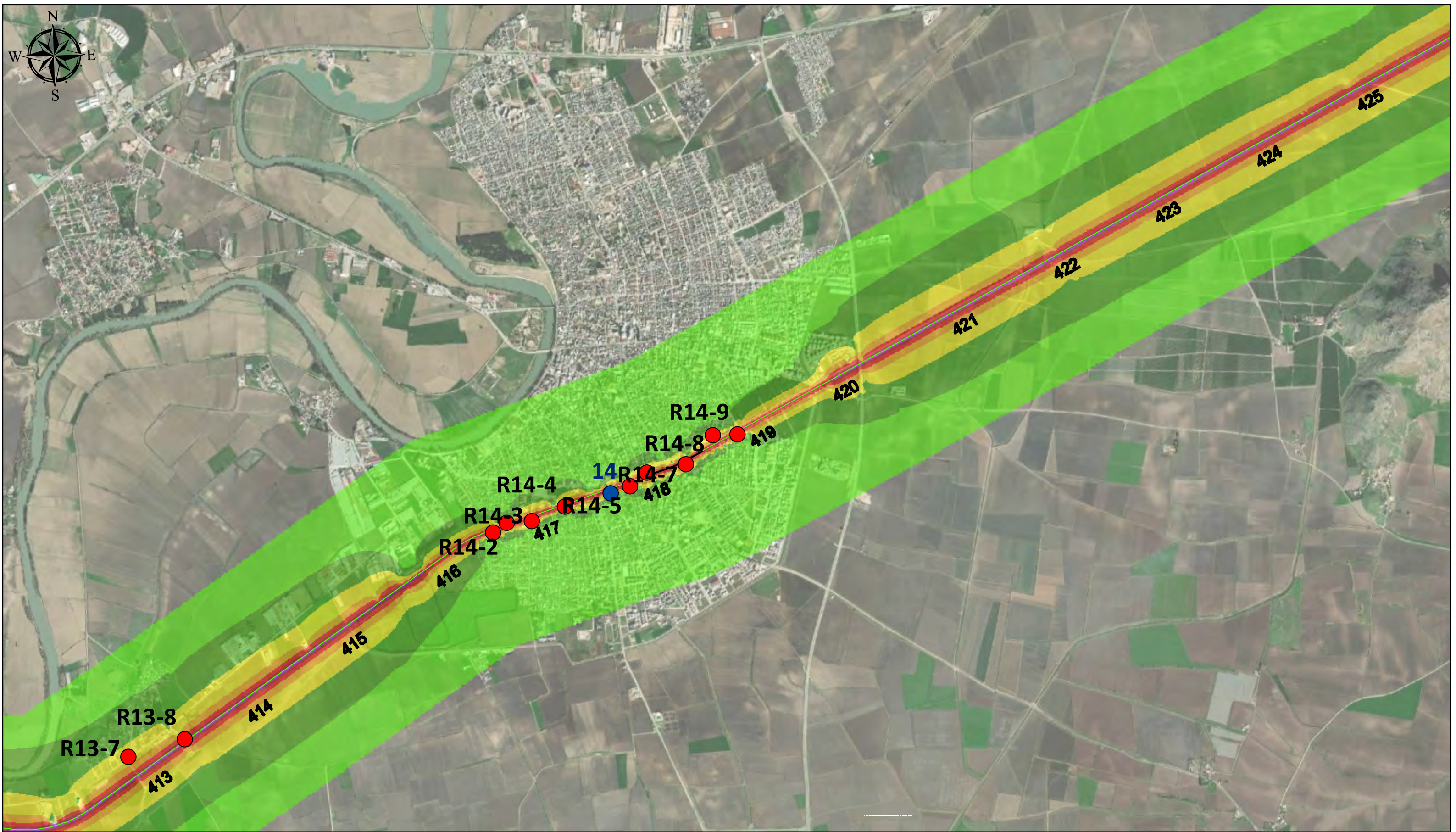
- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway

Scale: 1/30.000

<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70<

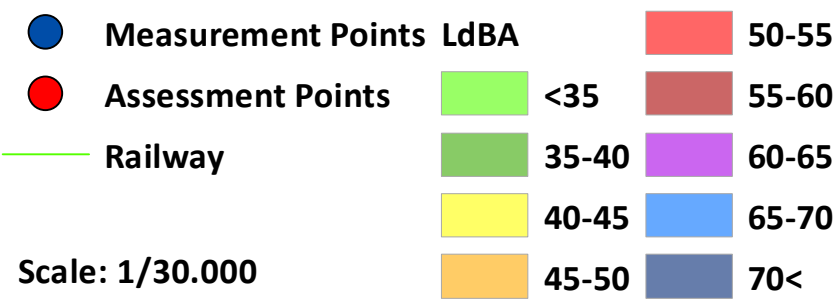
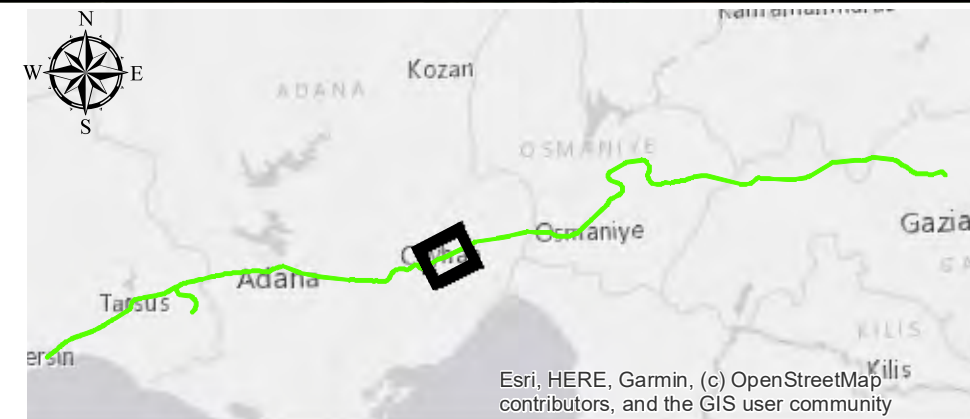


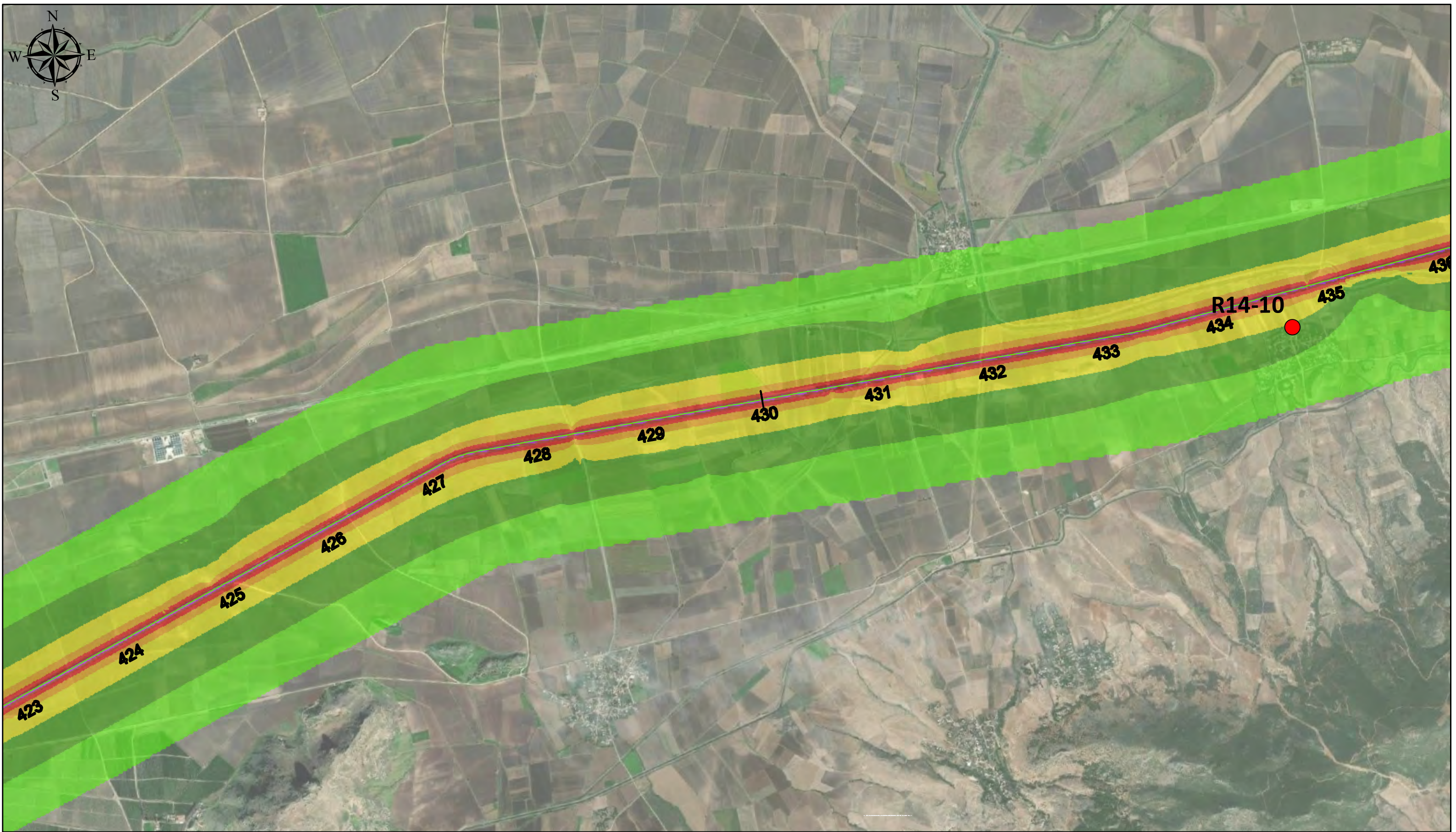
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day





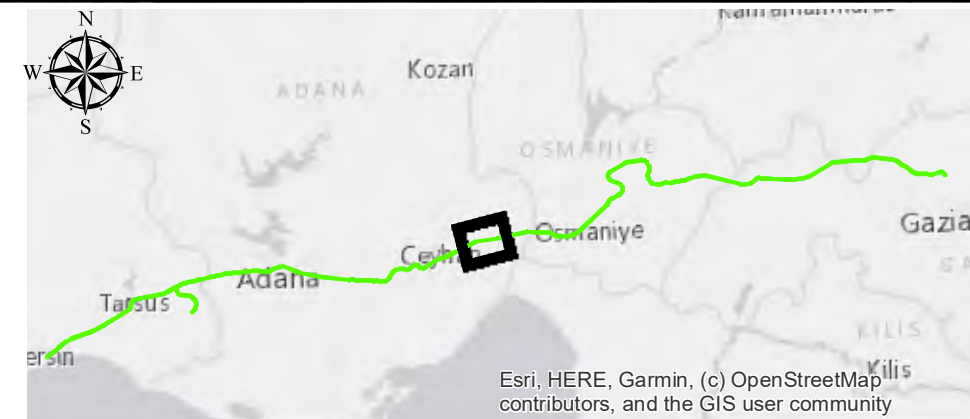
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

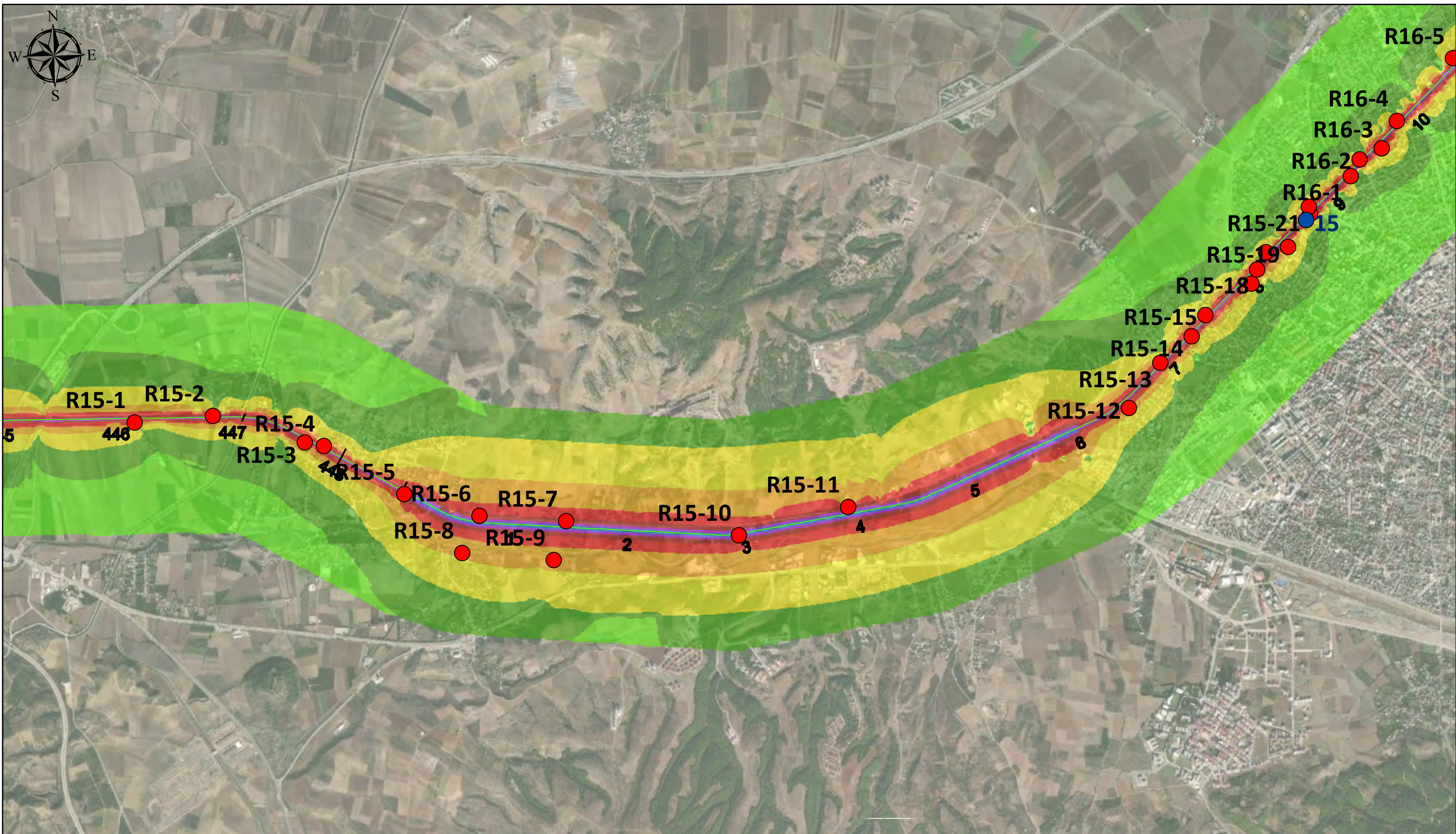
- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway

Scale: 1/30.000

<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70<

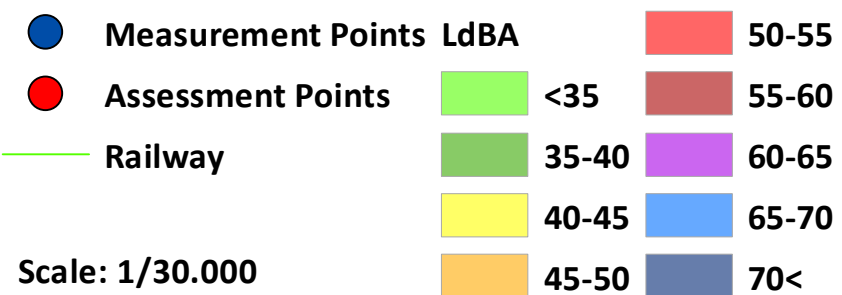


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

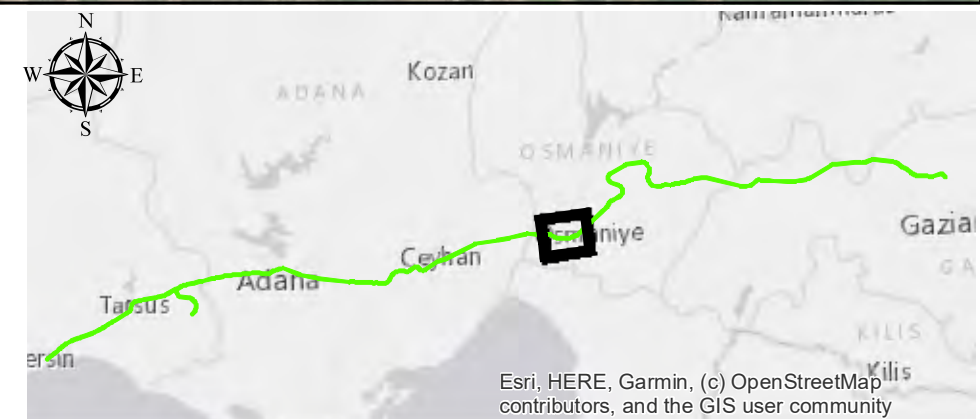


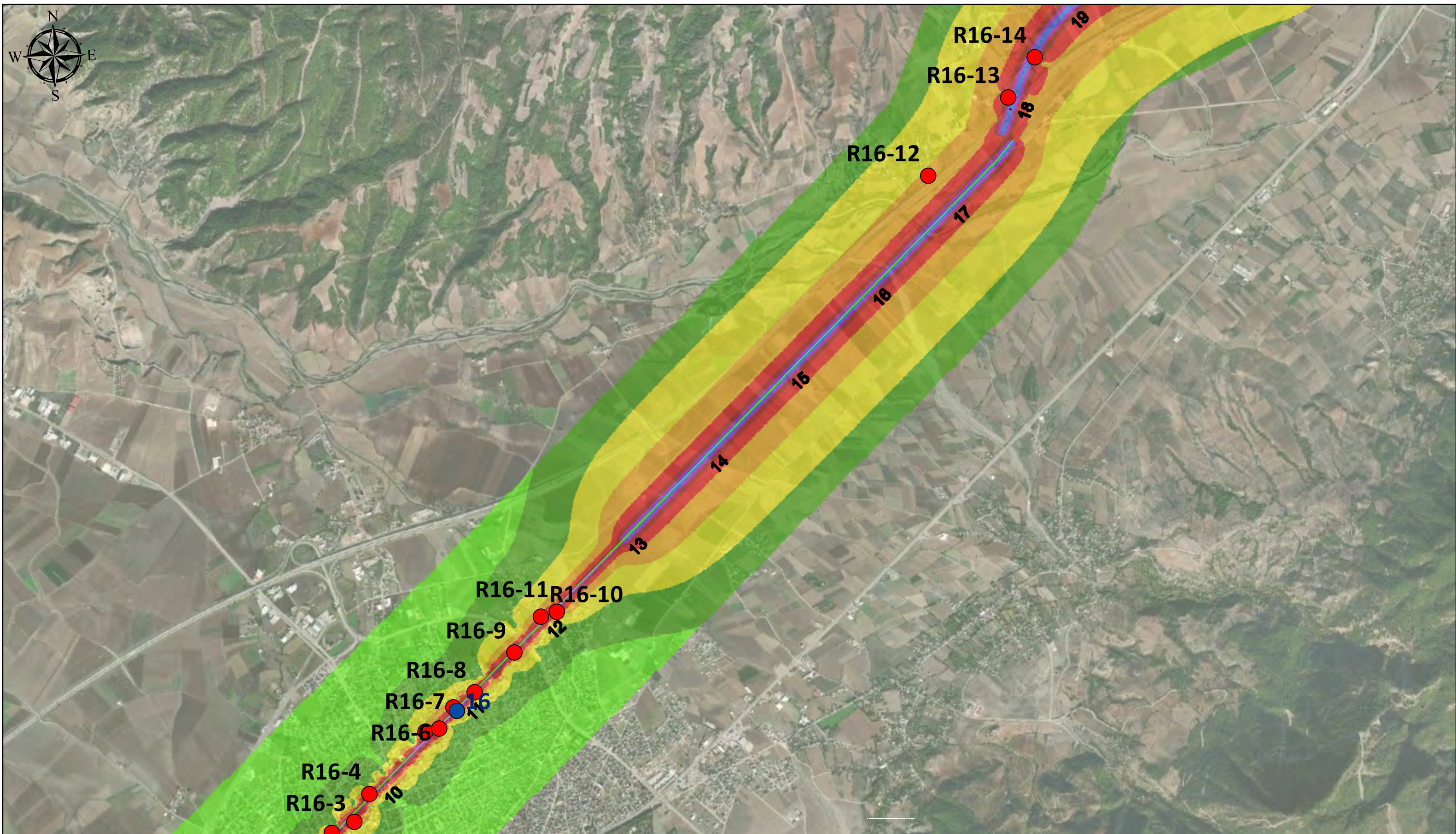
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



Scale: 1/30.000





FREKANS

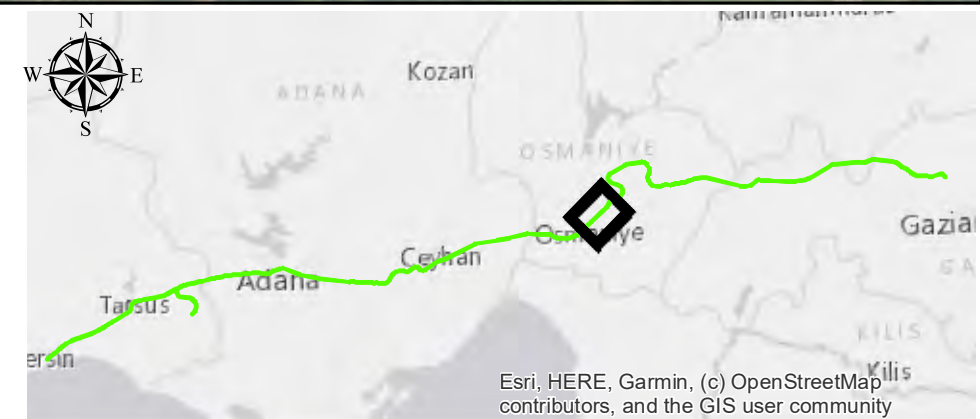
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

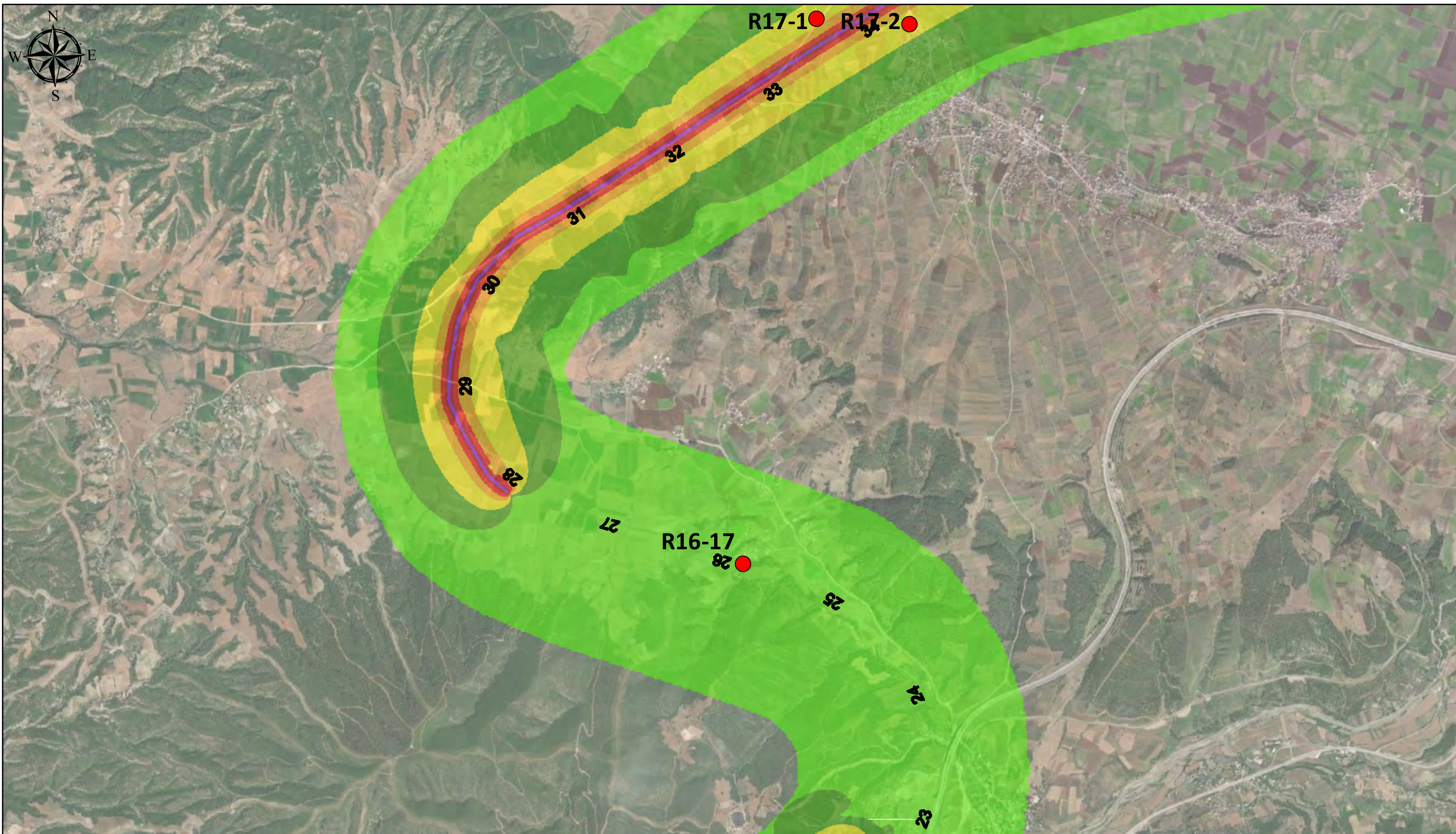
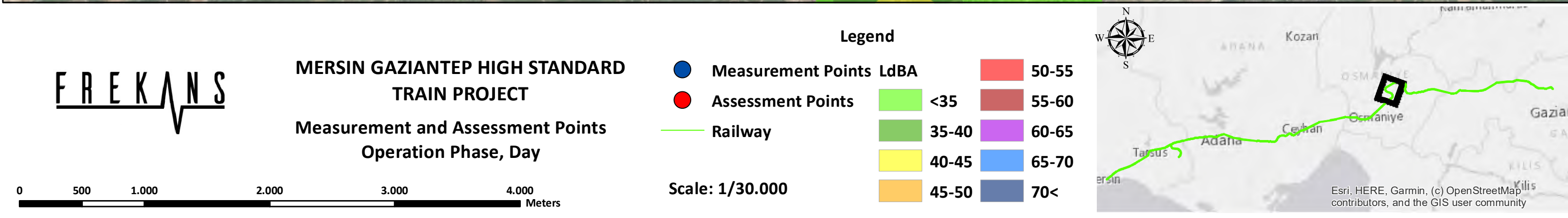
- Measurement Points LdBA
- Assessment Points
- Railway

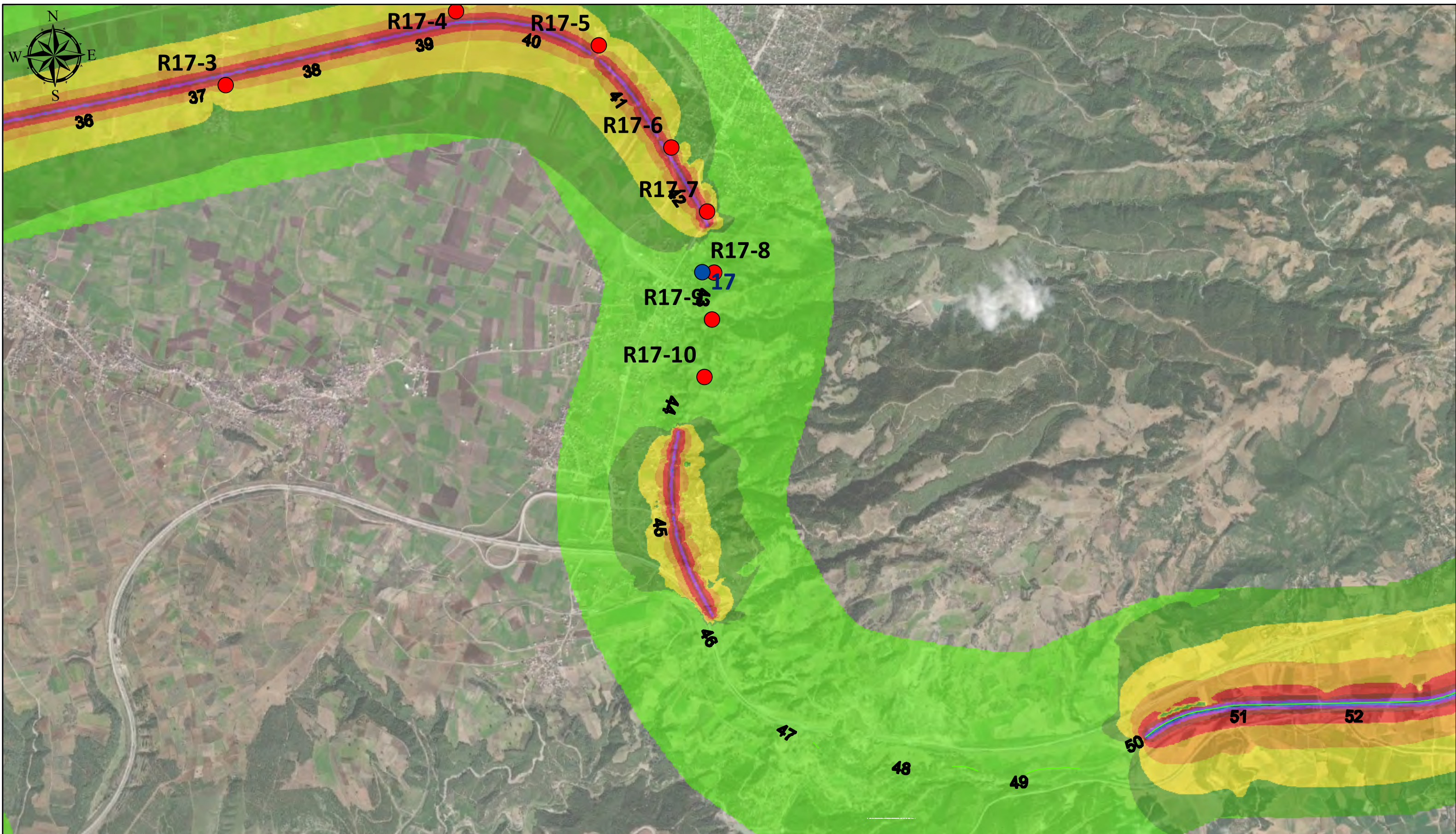
Scale: 1/30.000

Legend

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<







FREKANS

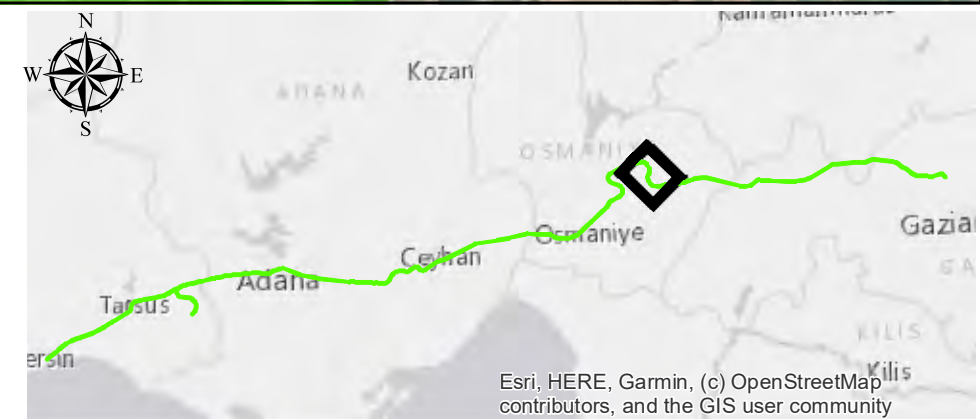
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

- Measurement Points LdBA
- Assessment Points
- Railway

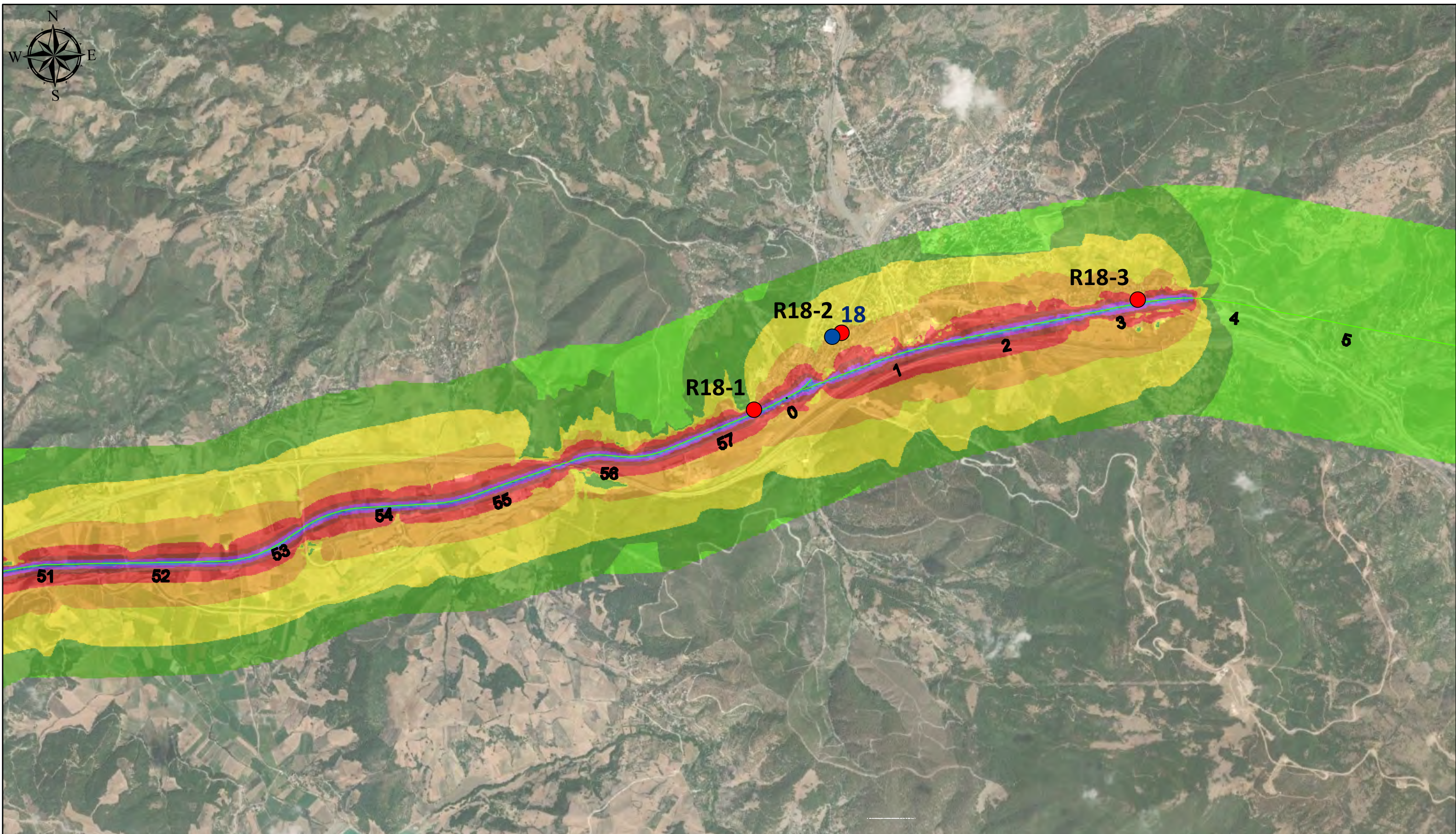
Scale: 1/30.000

Legend

- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70< |

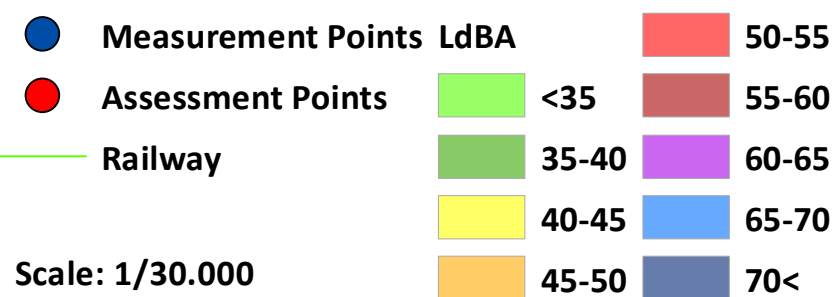
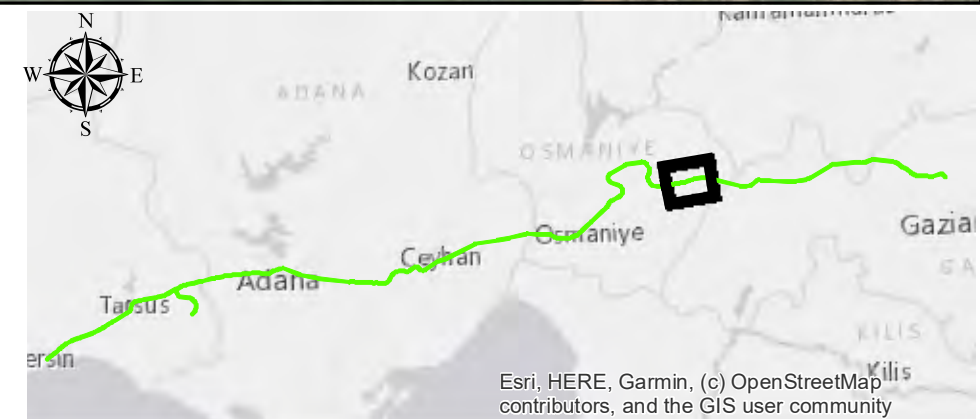


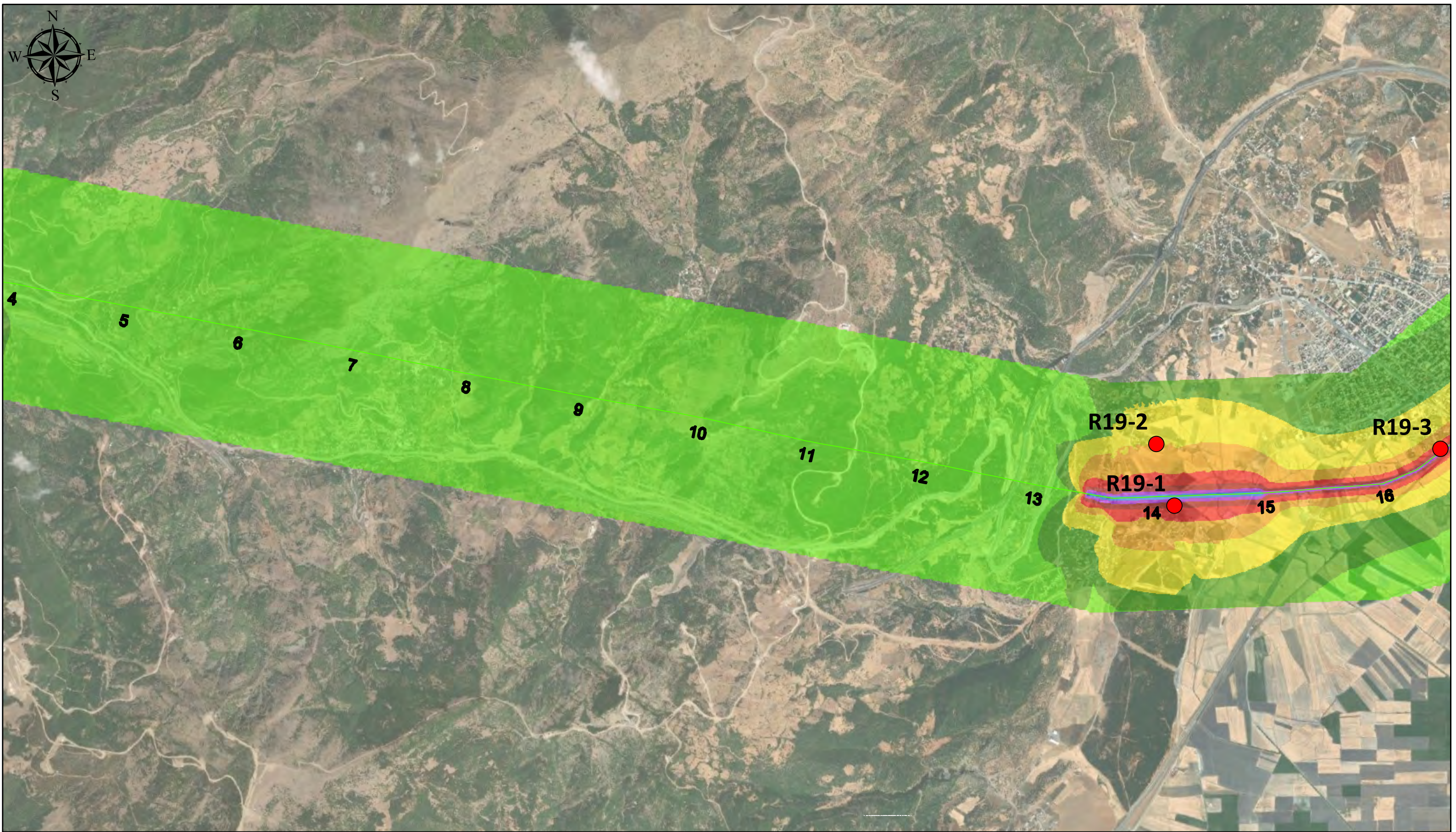
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

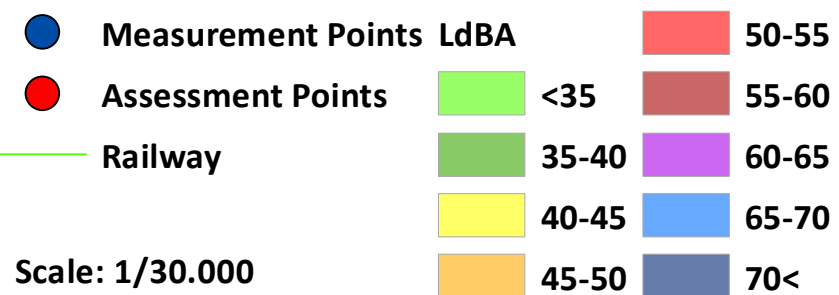
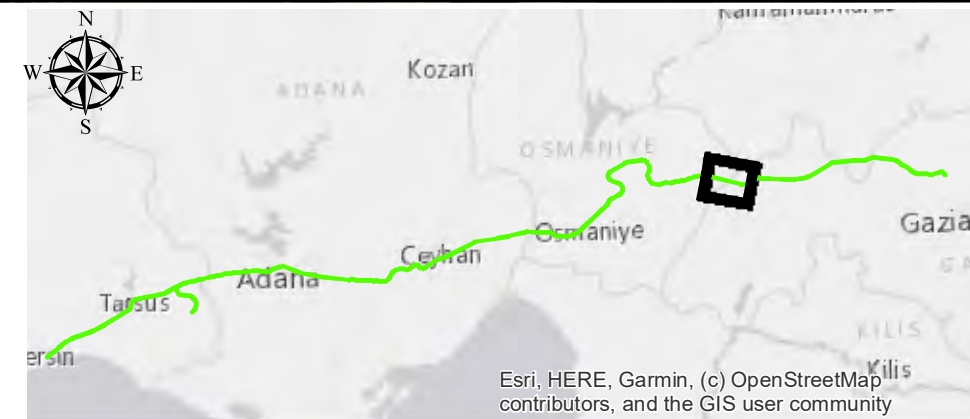
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Day**



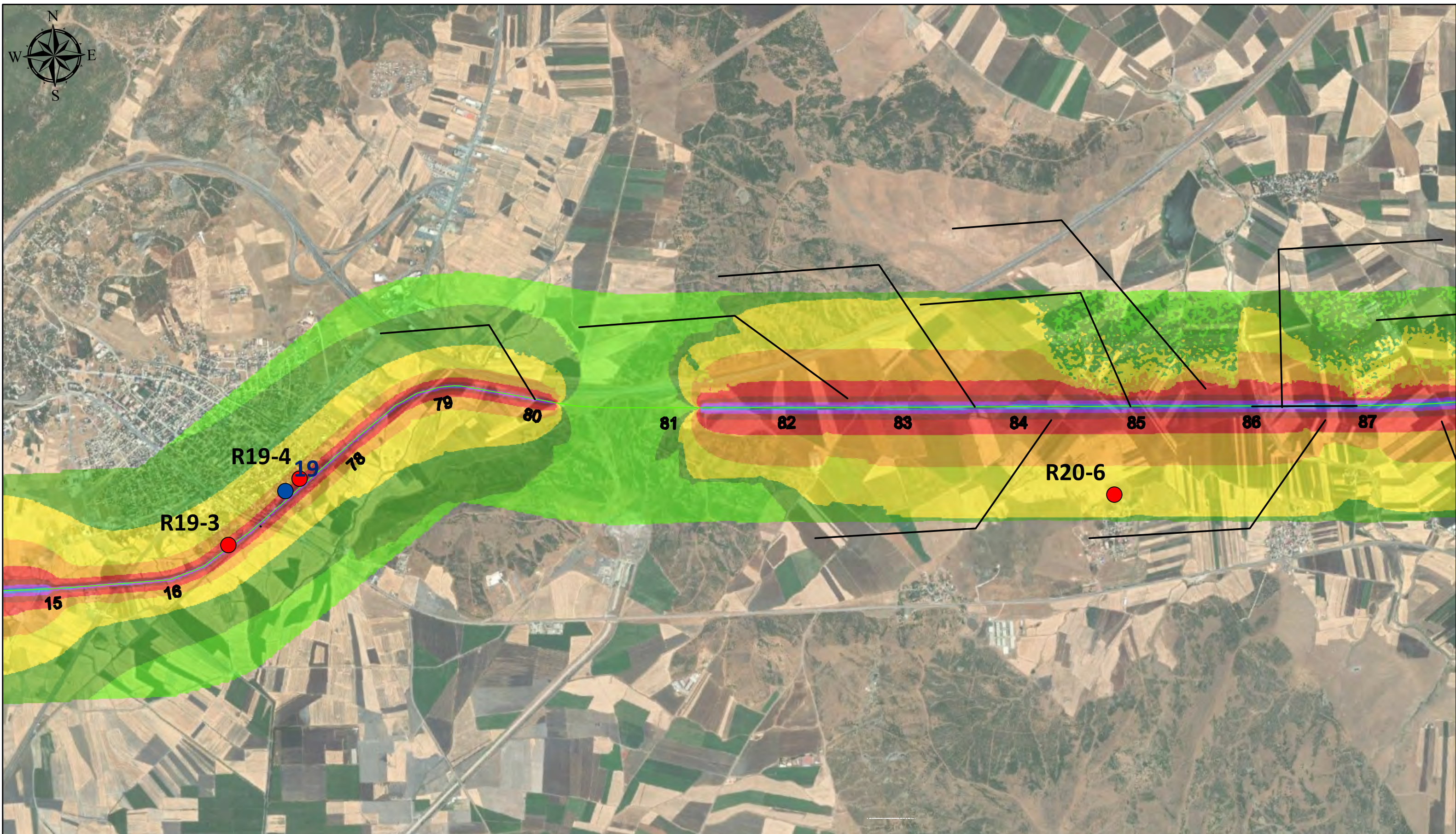


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

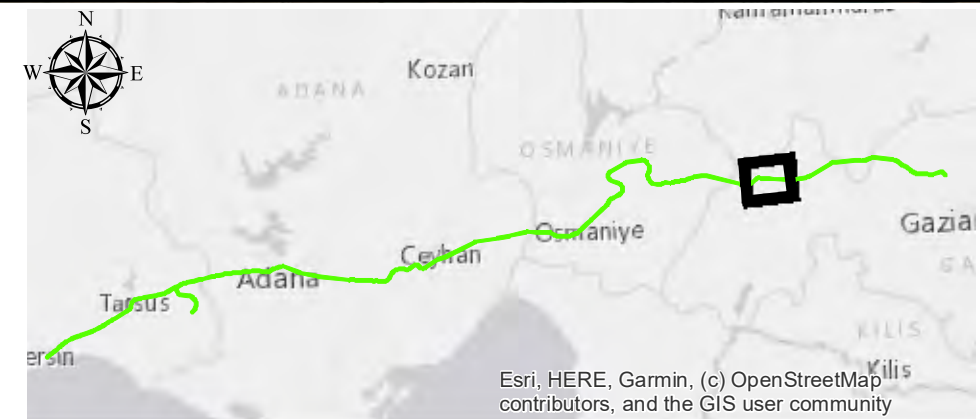
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

- Measurement Points LdBA
- Assessment Points
- Railway

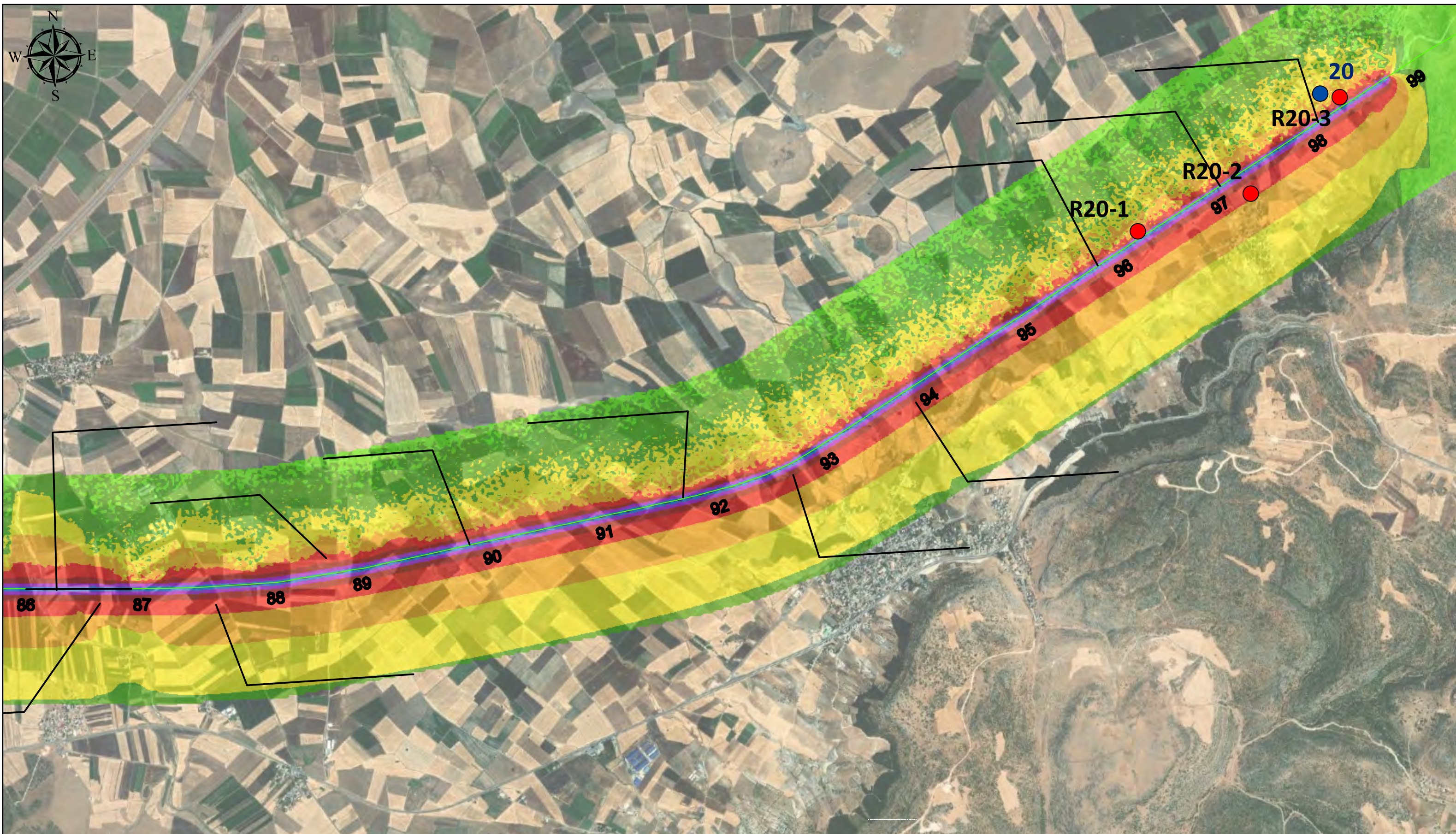
Scale: 1/30.000

Legend

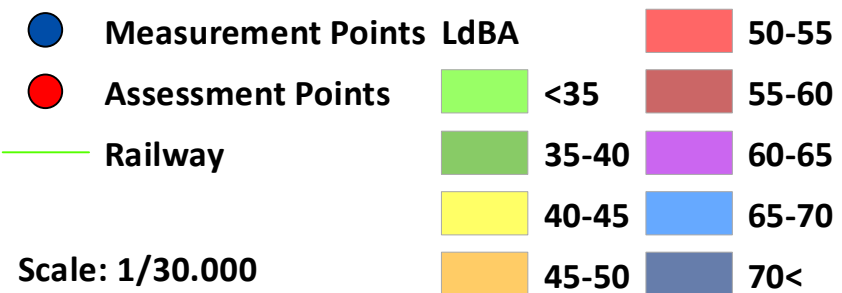
- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70< |



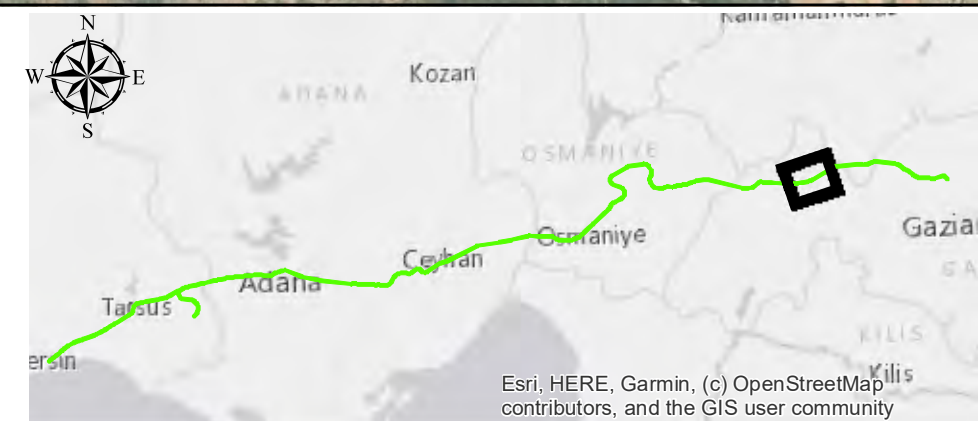
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



Scale: 1/30.000



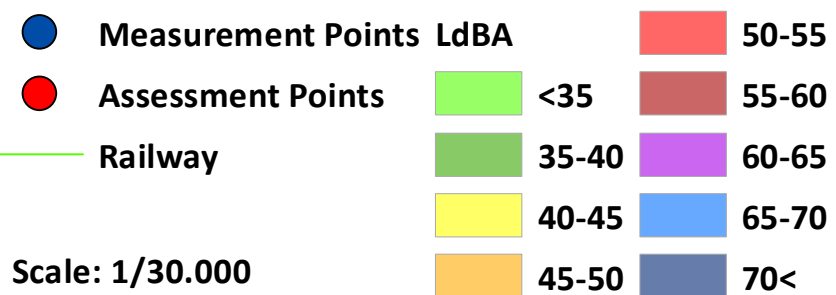
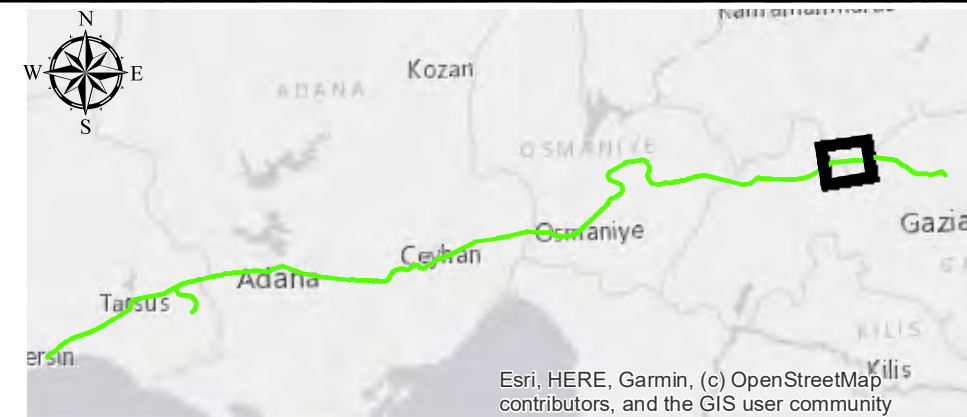
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

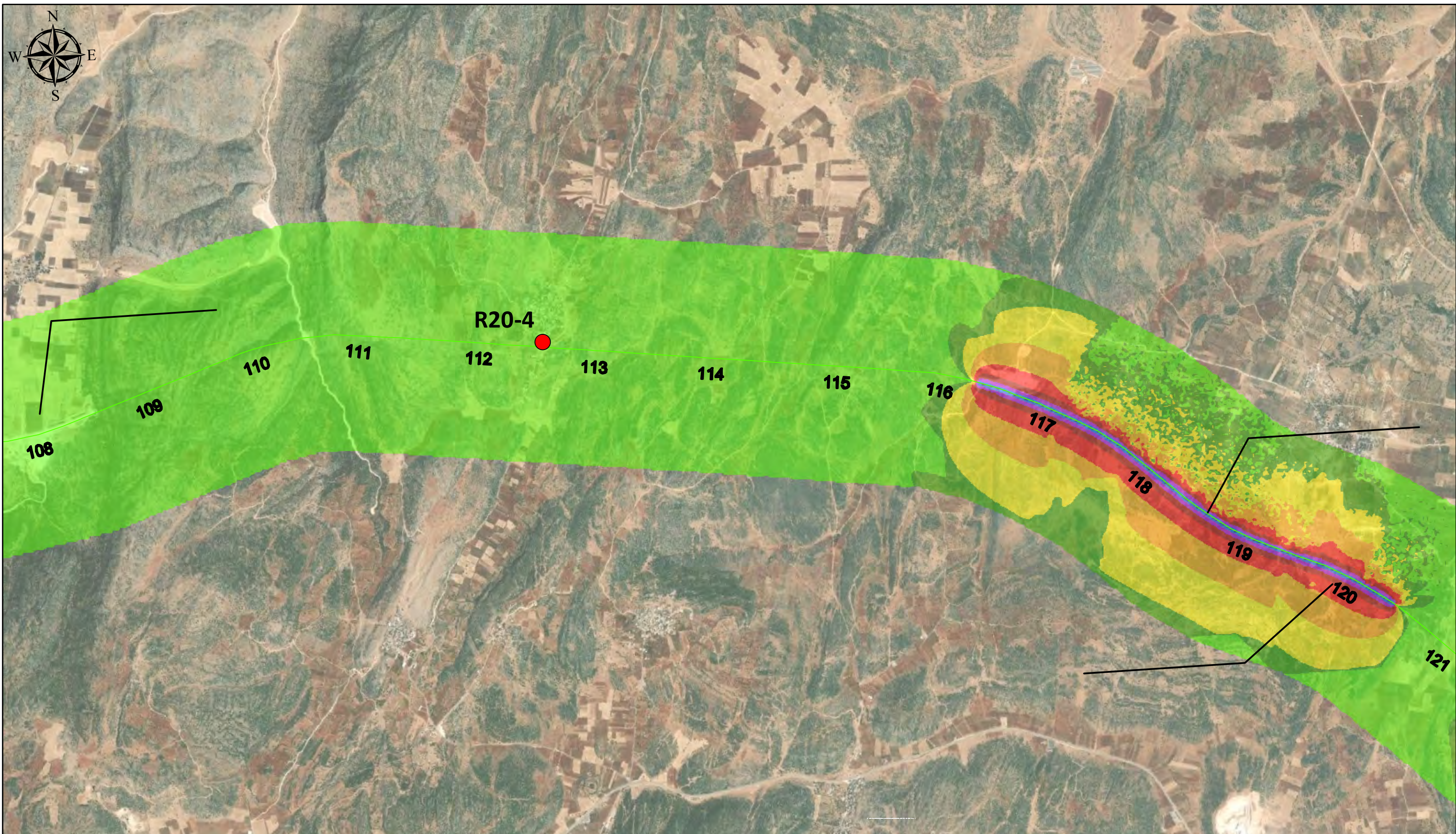
0 500 1.000 2.000 3.000 4.000 Meters



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



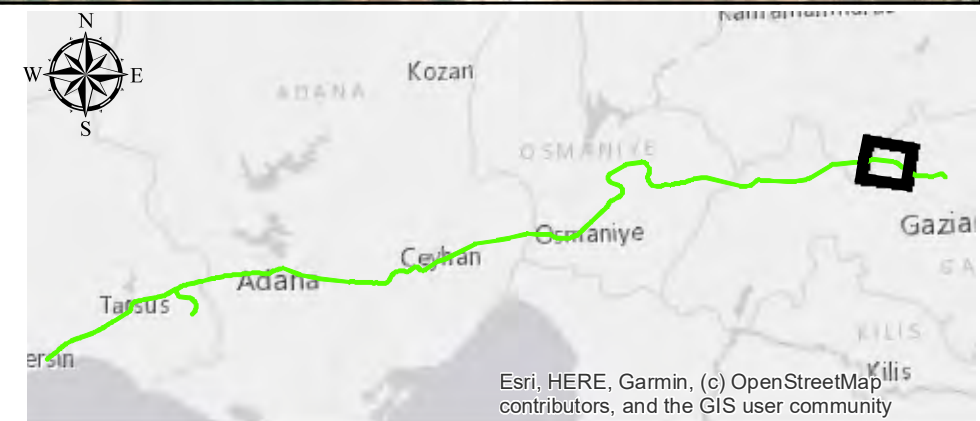


FREKANS

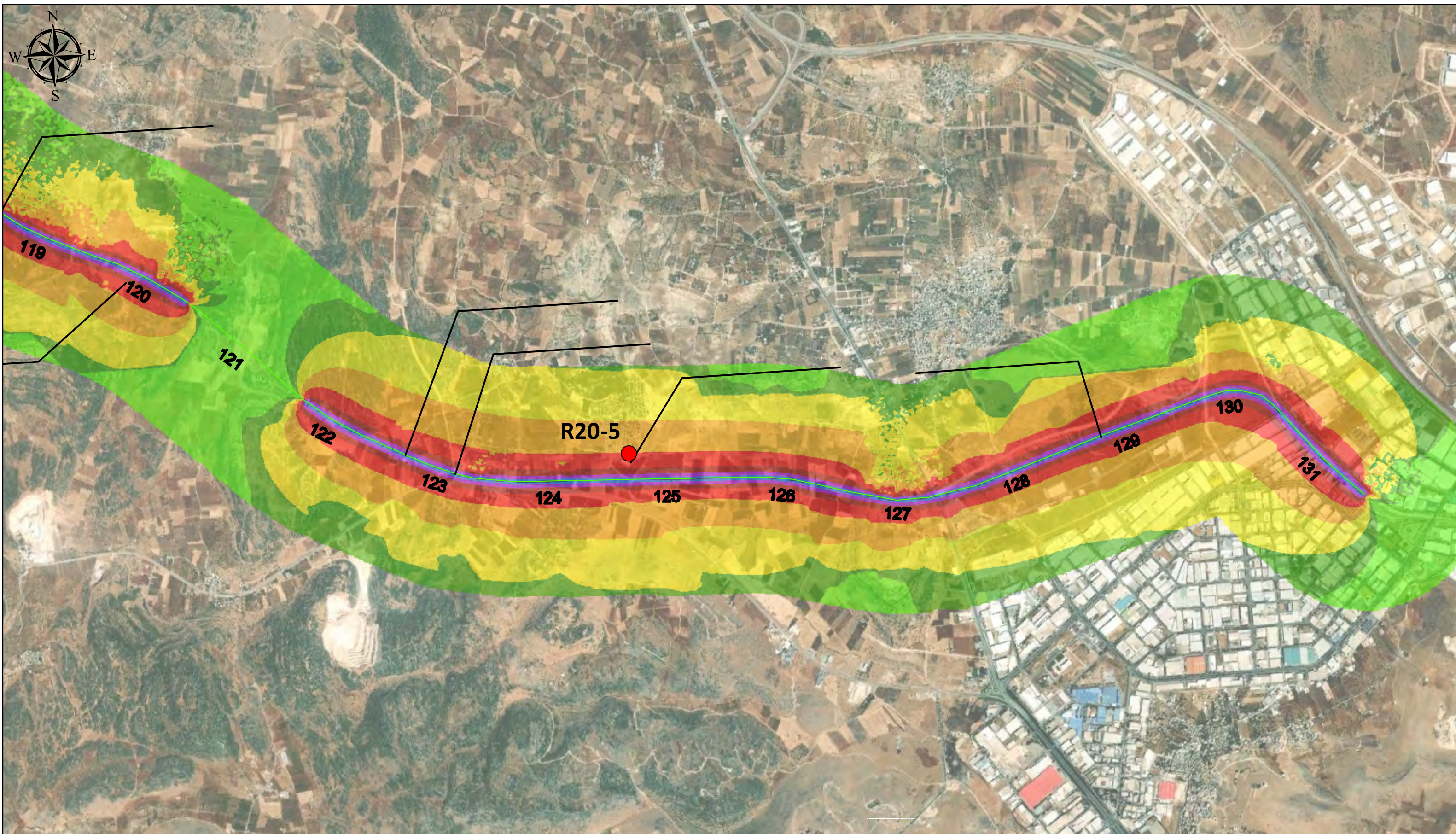
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day

- Legend**
- | | | |
|----------------------|-------|-------|
| ● Measurement Points | LdBA | 50-55 |
| ● Assessment Points | <35 | 55-60 |
| — Railway | 35-40 | 60-65 |
| | 40-45 | 65-70 |
| | 45-50 | 70< |

Scale: 1/30.000

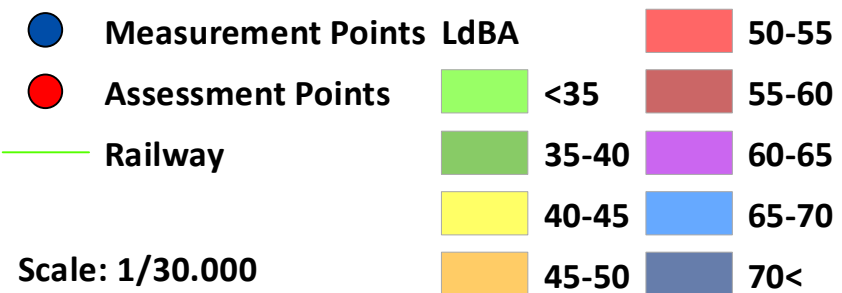
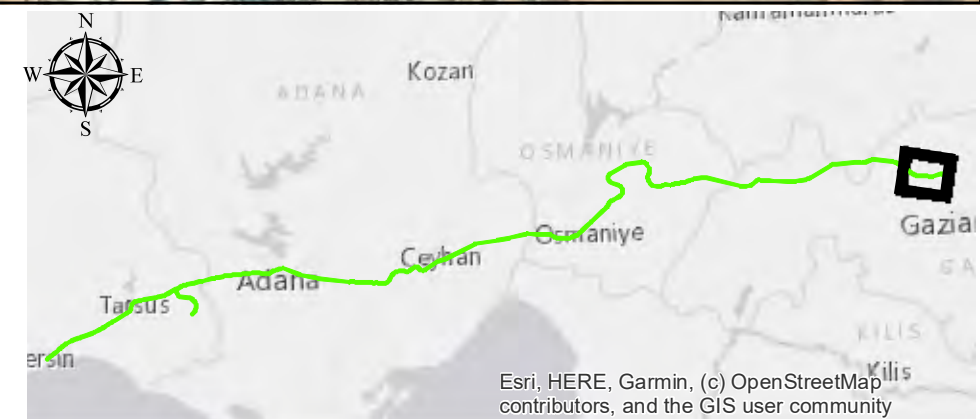


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

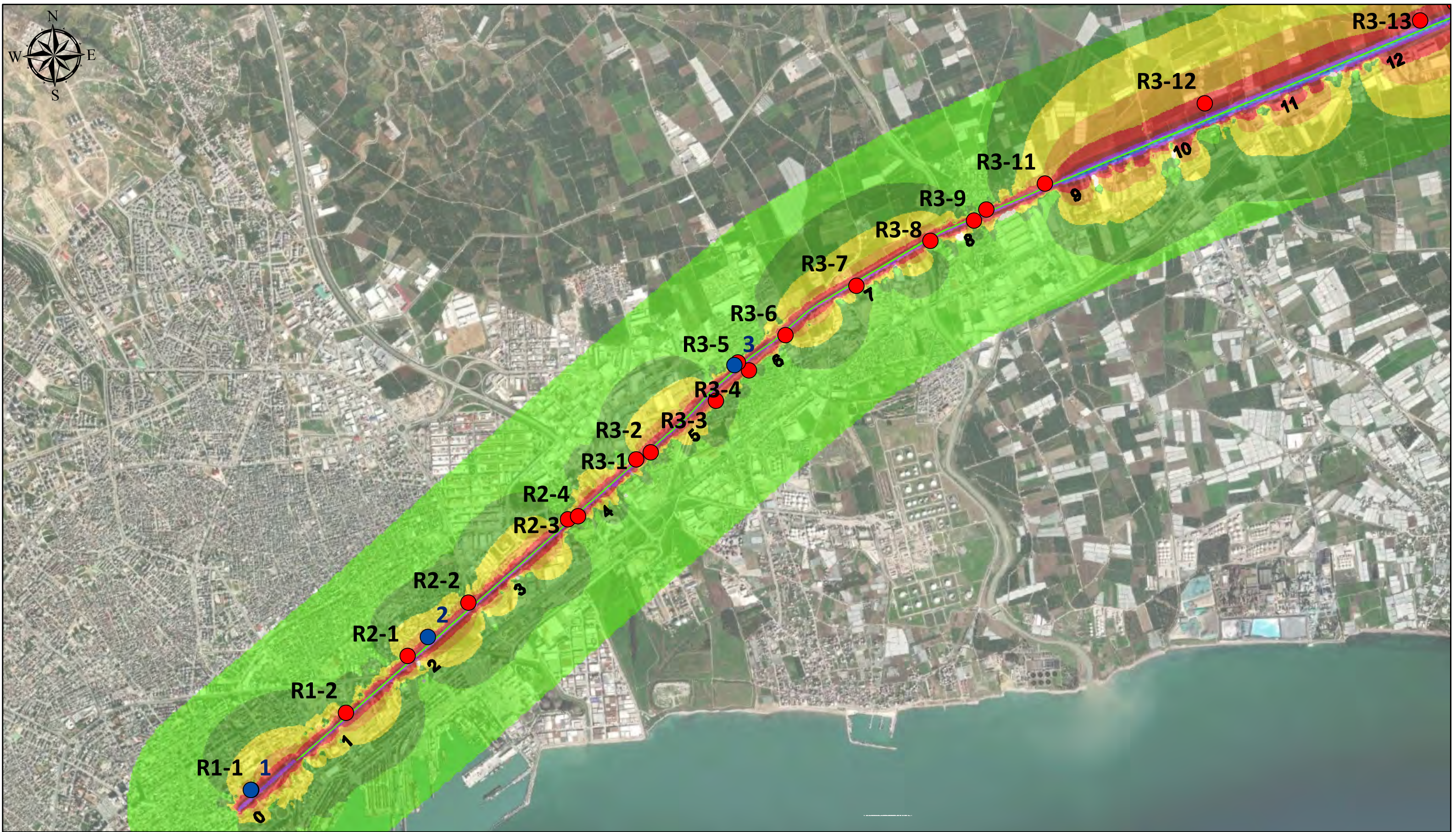


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Day



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

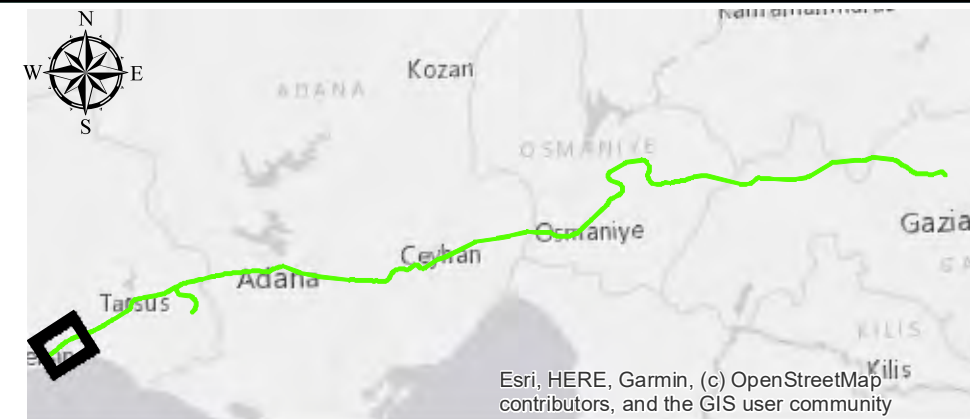
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

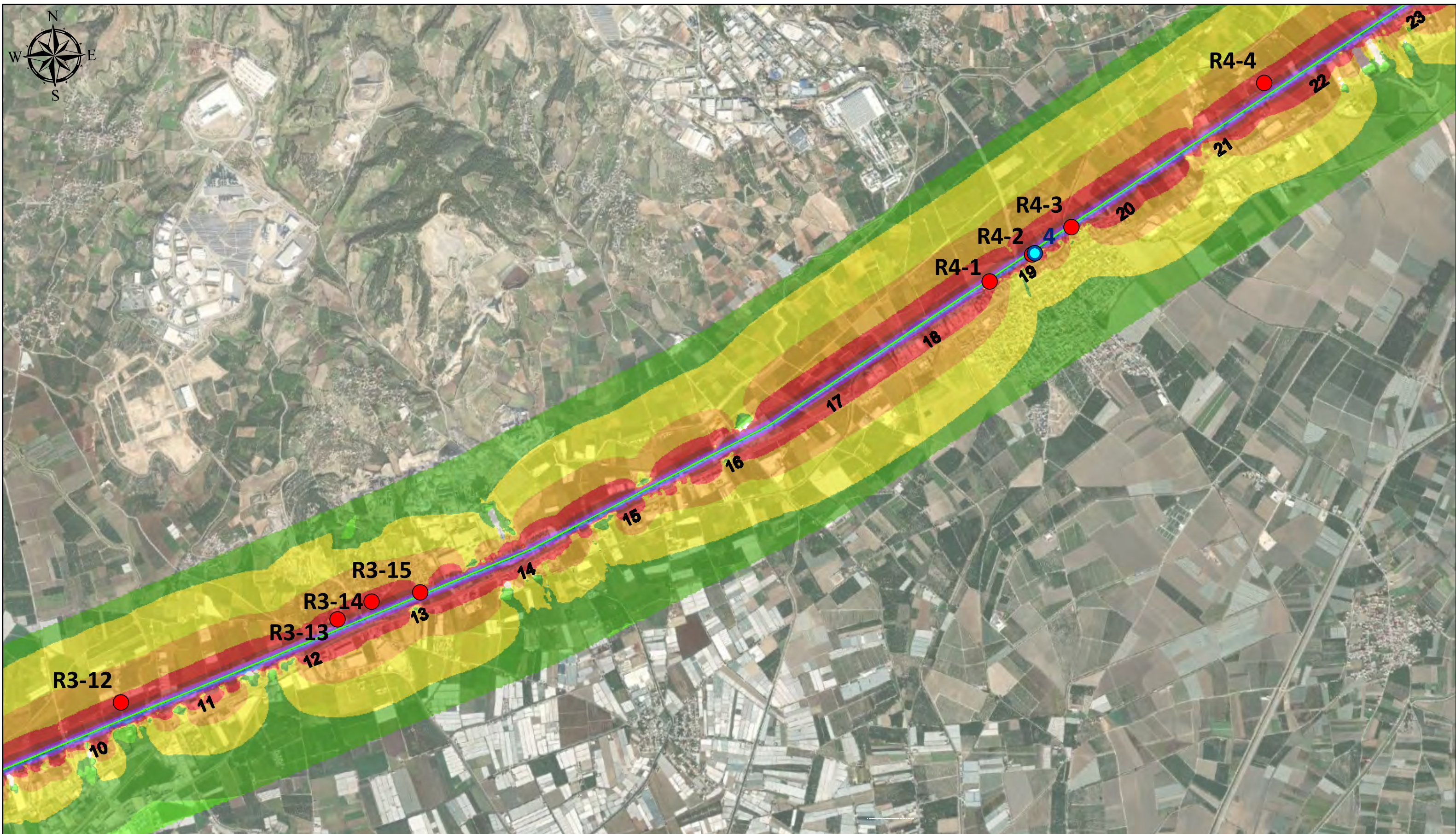
- Measurement Points
- Assessment Points
- Railway

Scale: 1/30.000

Legend

LdBA	50-55
<35	55-60
35-40	60-65
40-45	65-70
45-50	70<





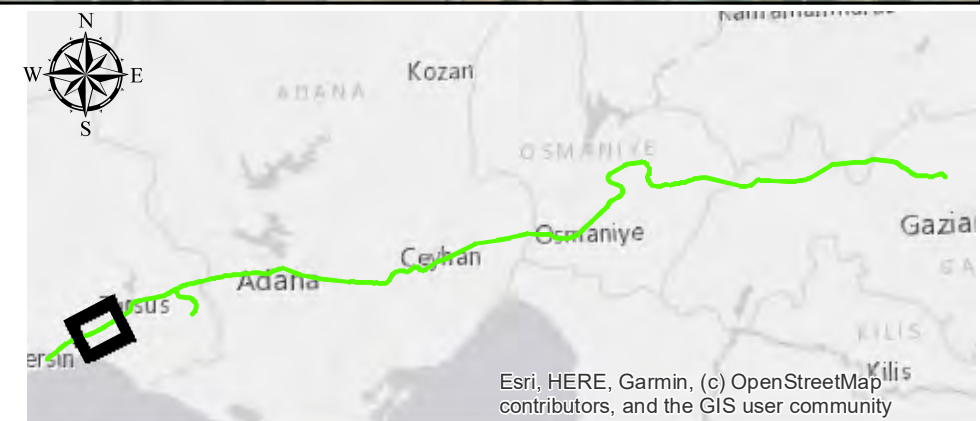
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

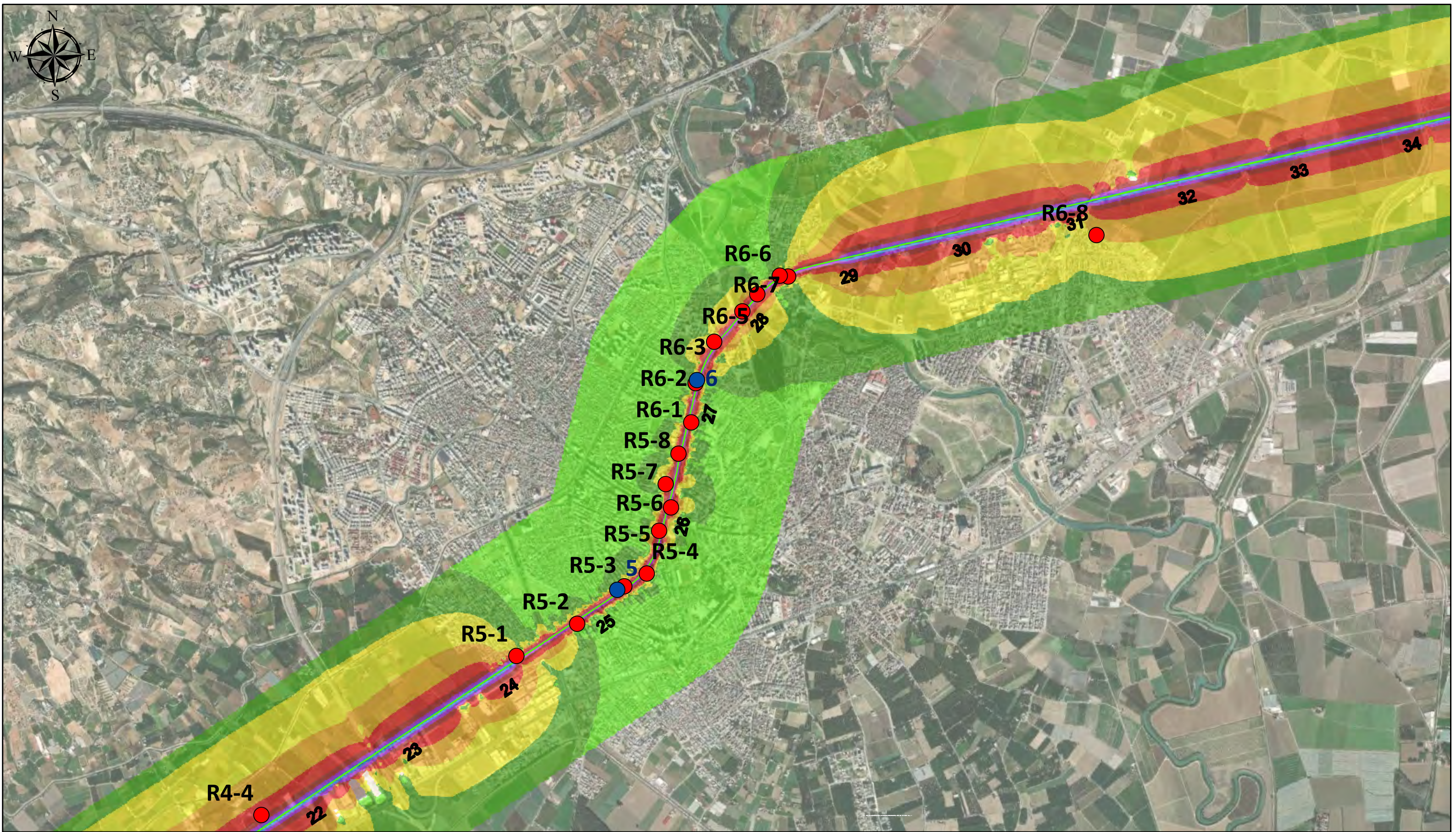
- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway

Scale: 1/30.000

	50-55
	55-60
	60-65
	65-70
	70<
	<35
	35-40
	40-45
	45-50

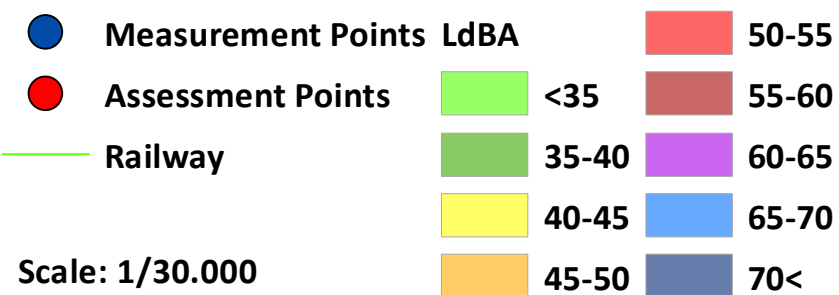
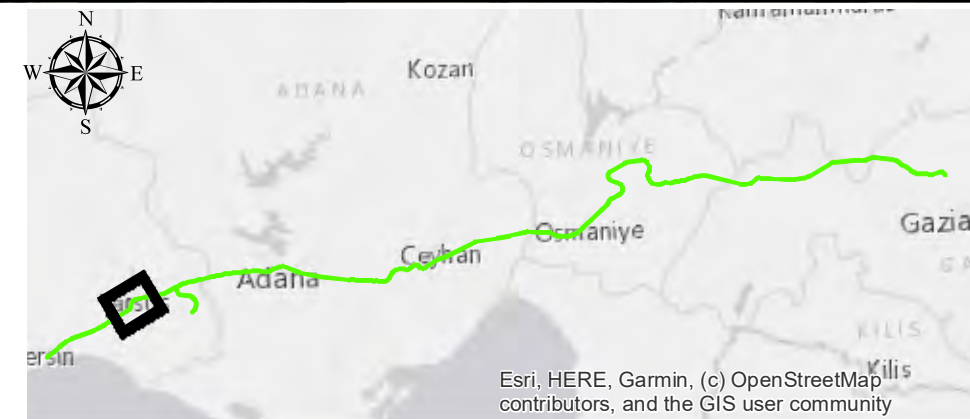


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

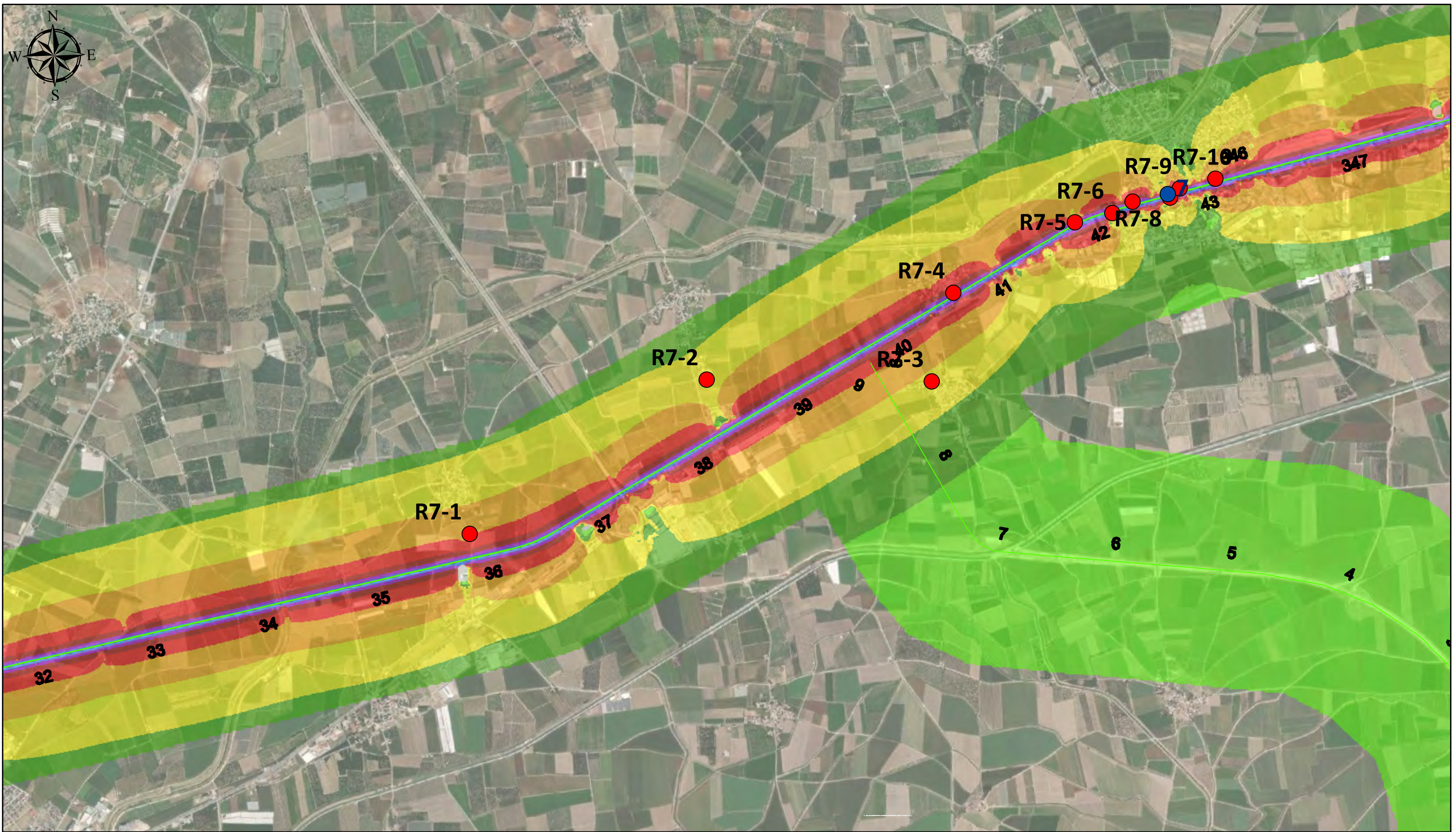


FREKANS

MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT
Measurement and Assessment Points
Operation Phase, Night

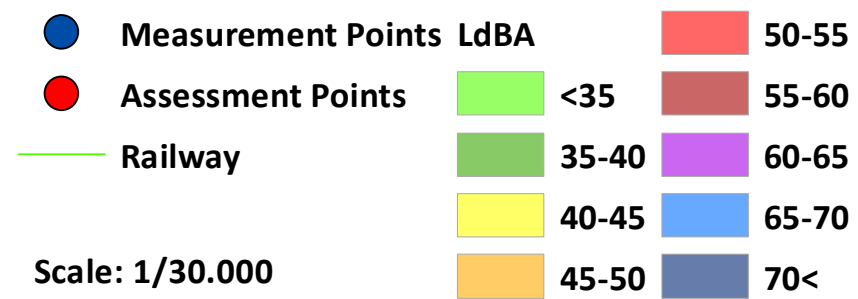
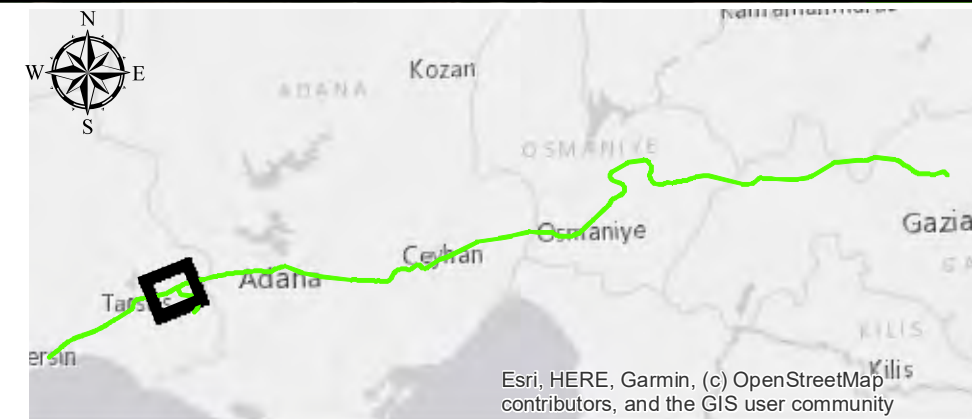


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

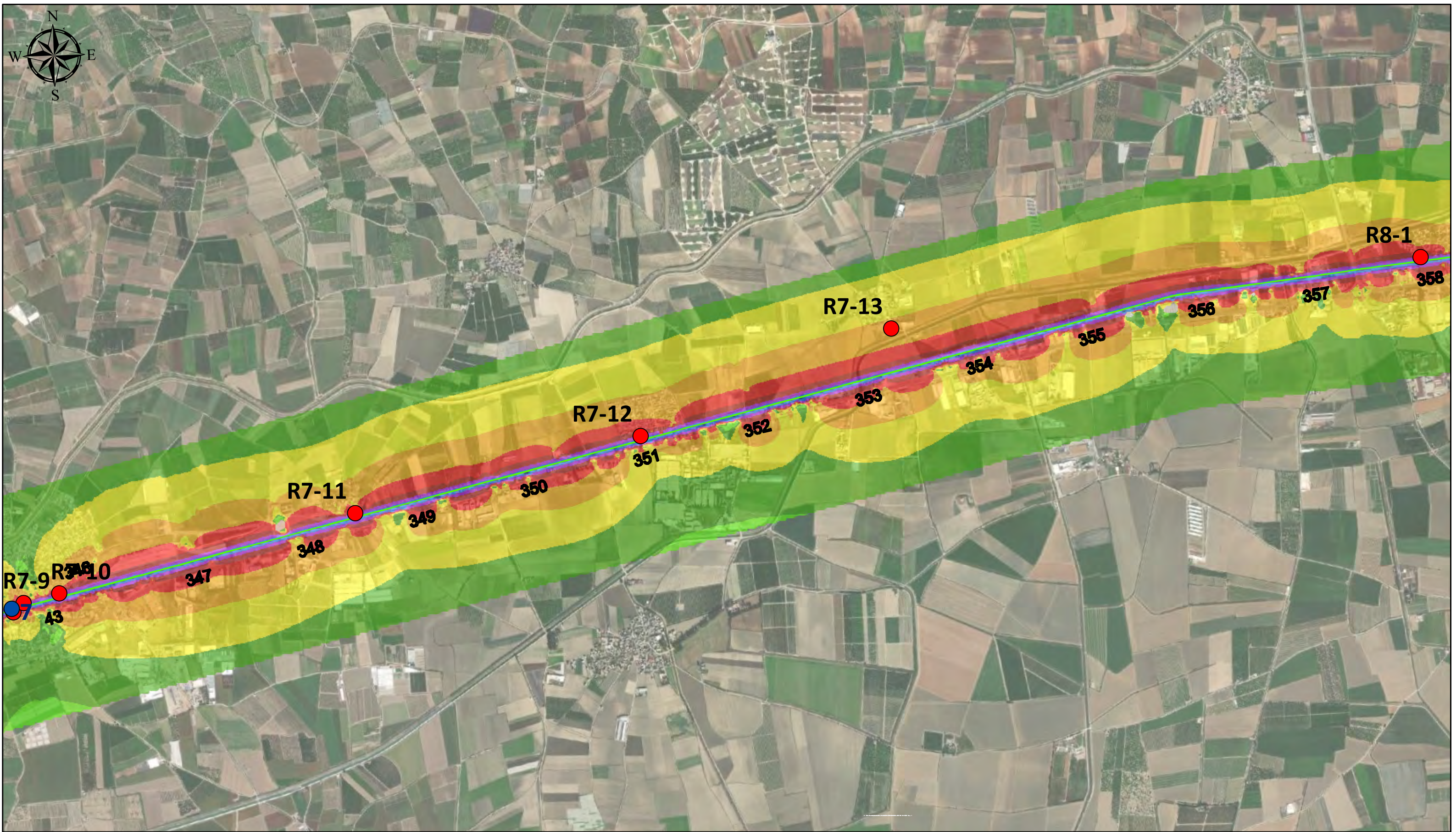


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

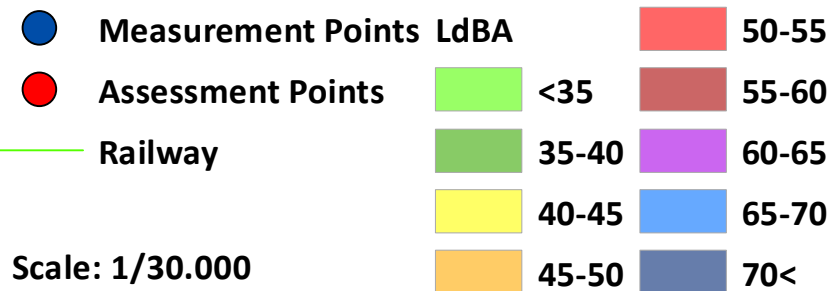
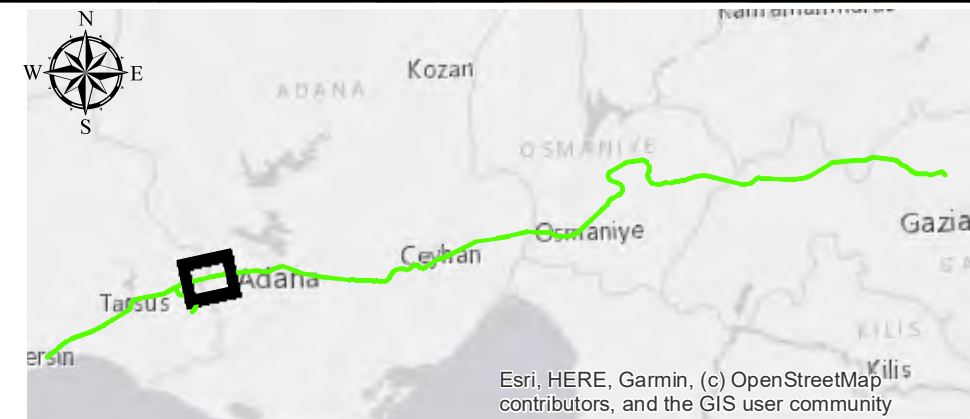


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

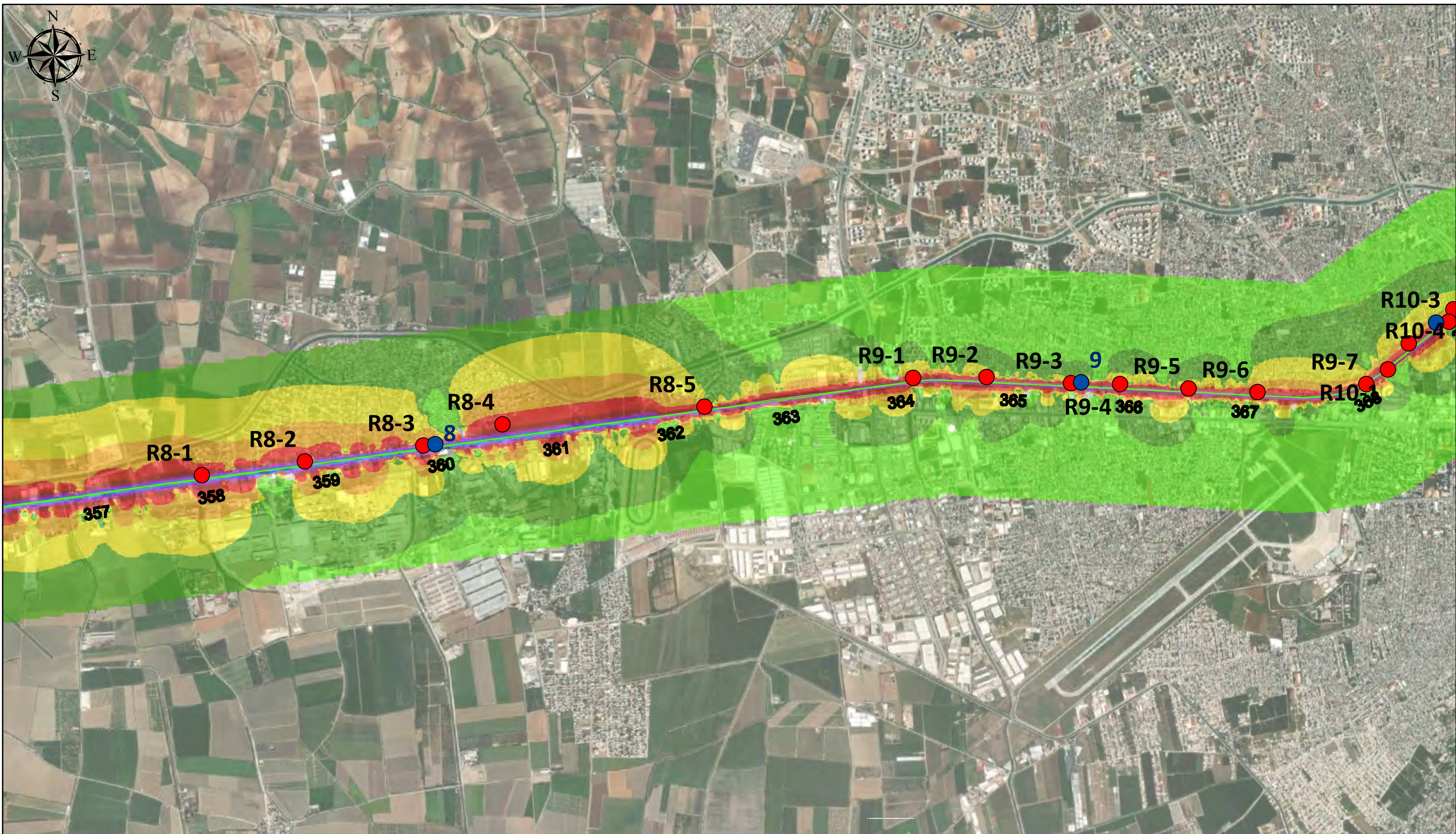


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

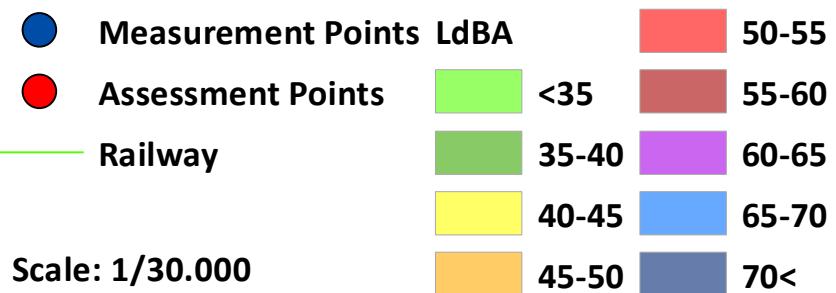
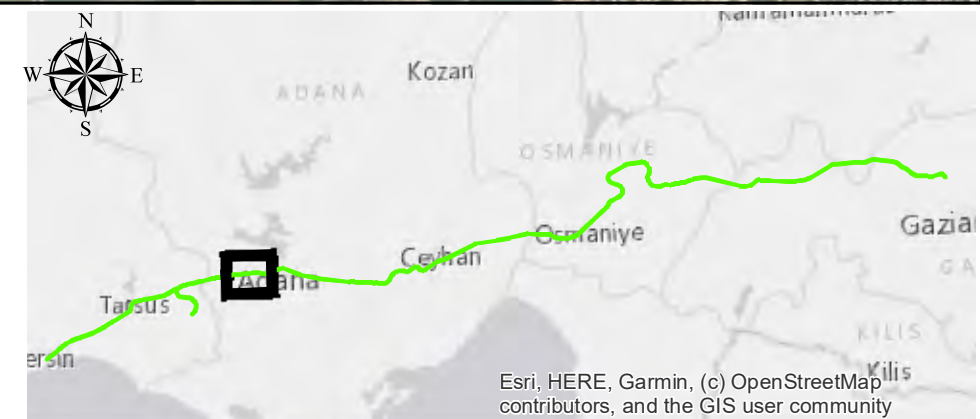


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

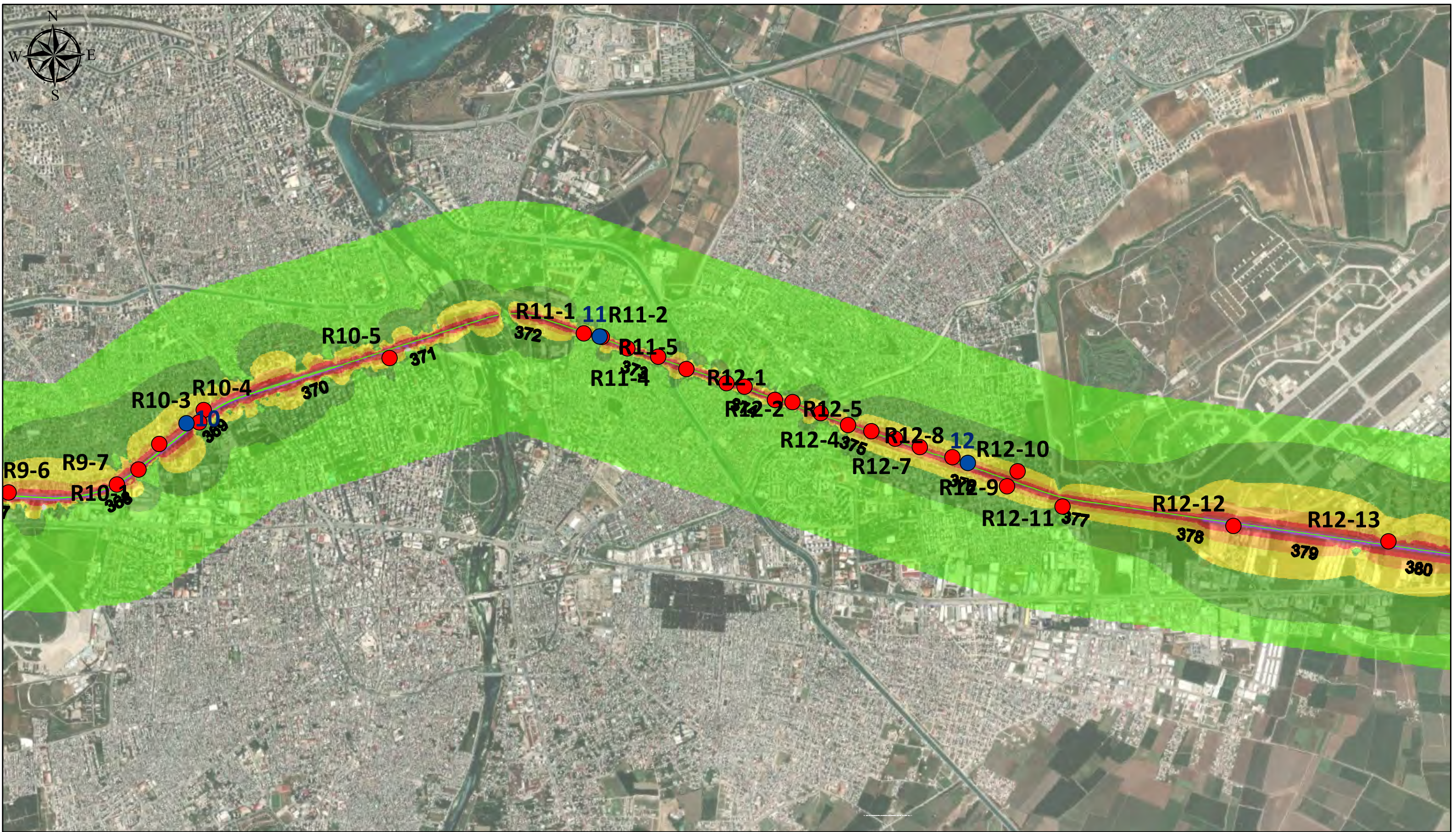


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

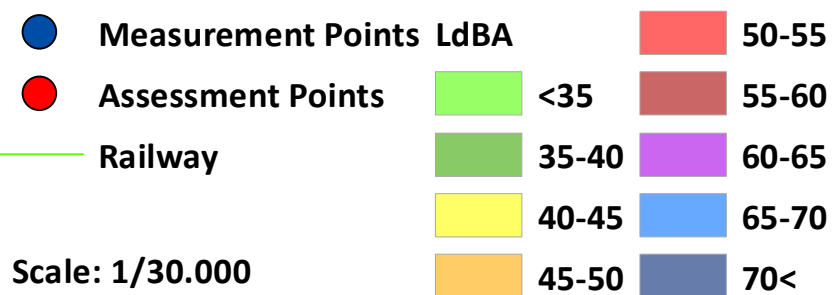
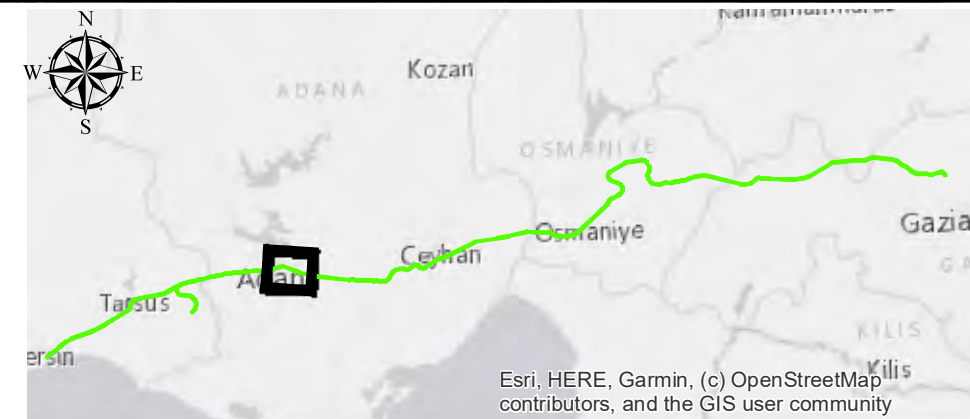


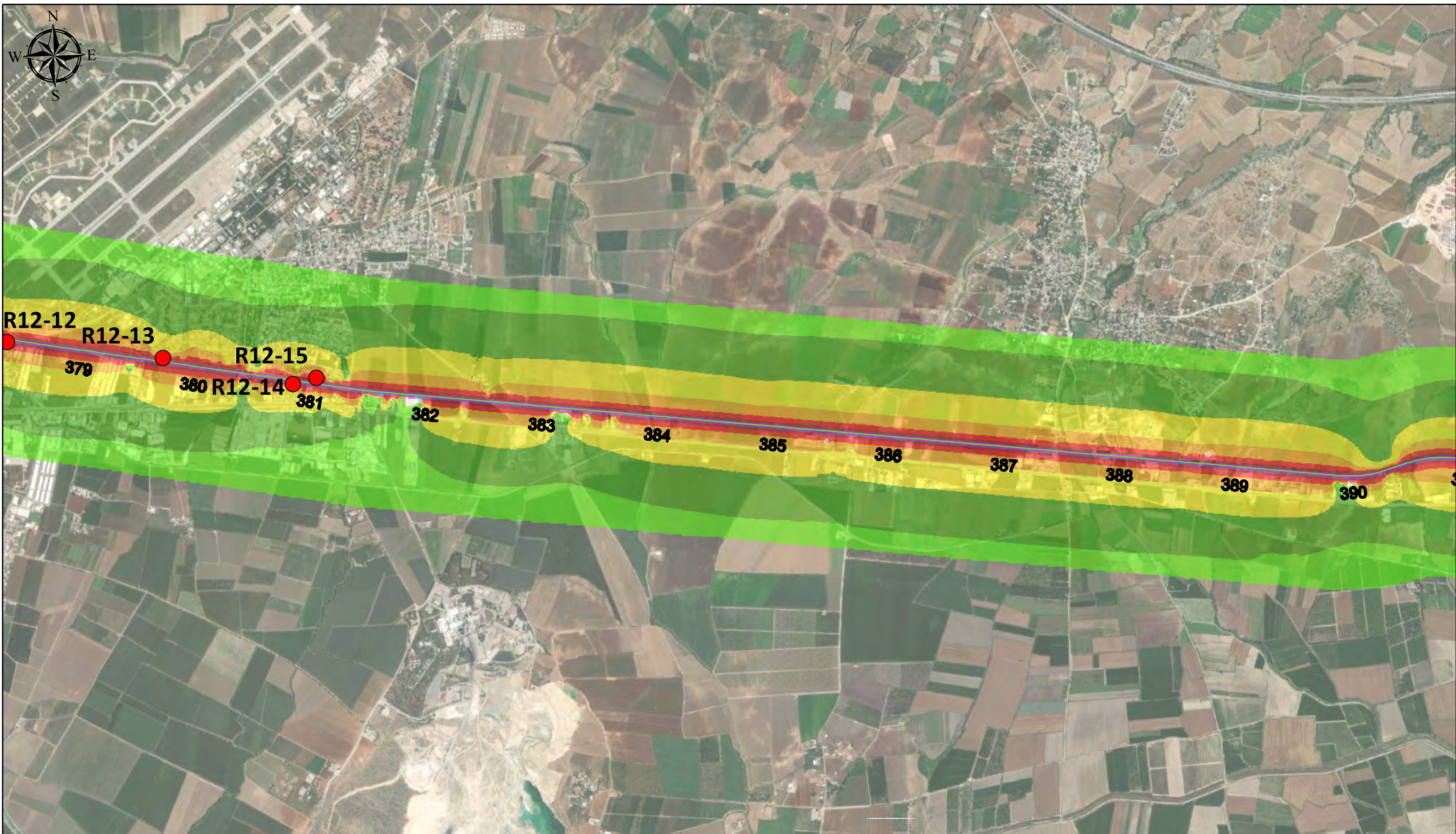
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night





FREKANS

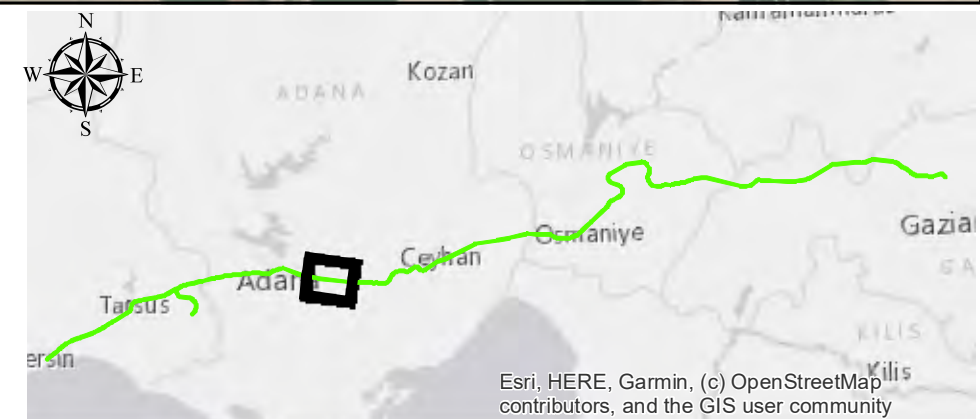
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**

- Measurement Points LdBA
- Assessment Points
- Railway

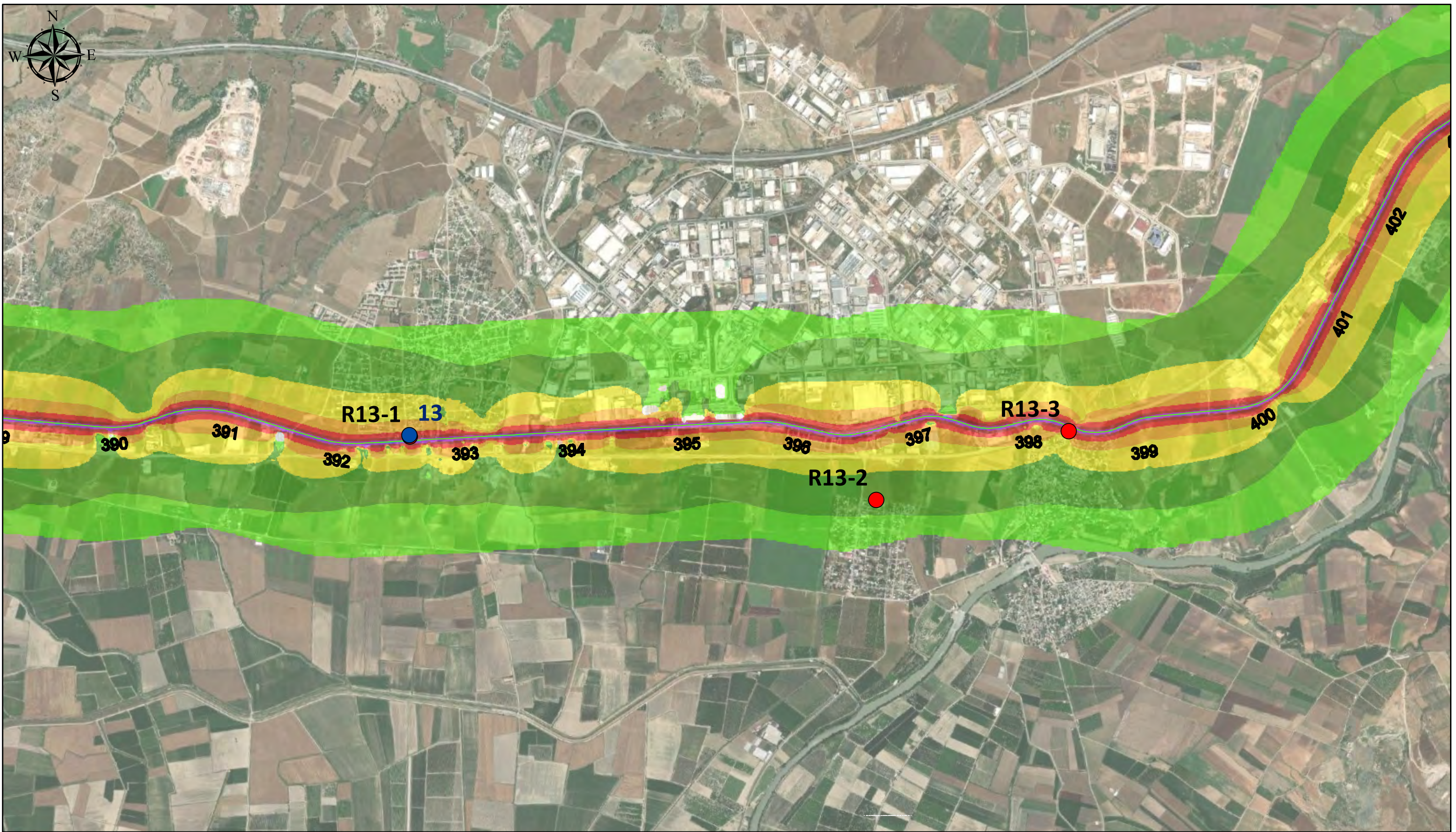
Scale: 1/30.000

Legend

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<

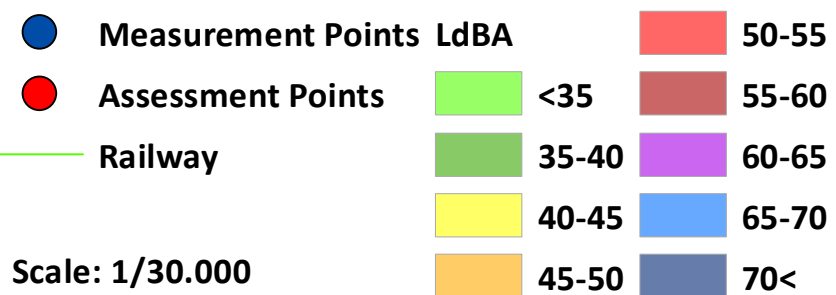
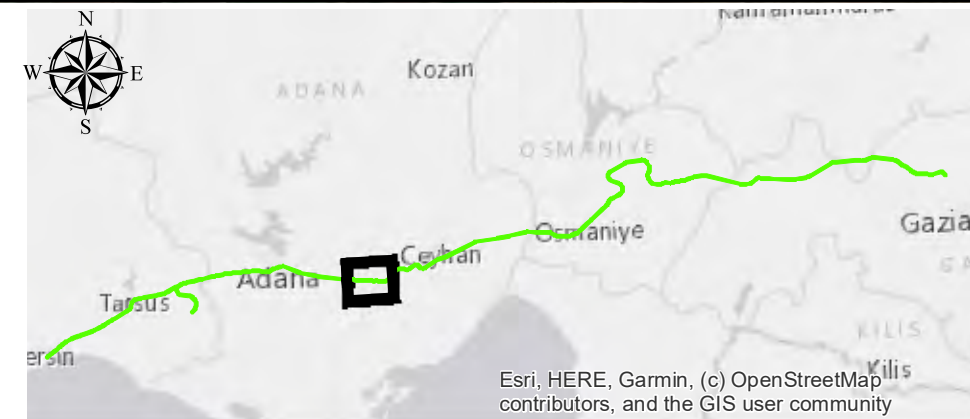


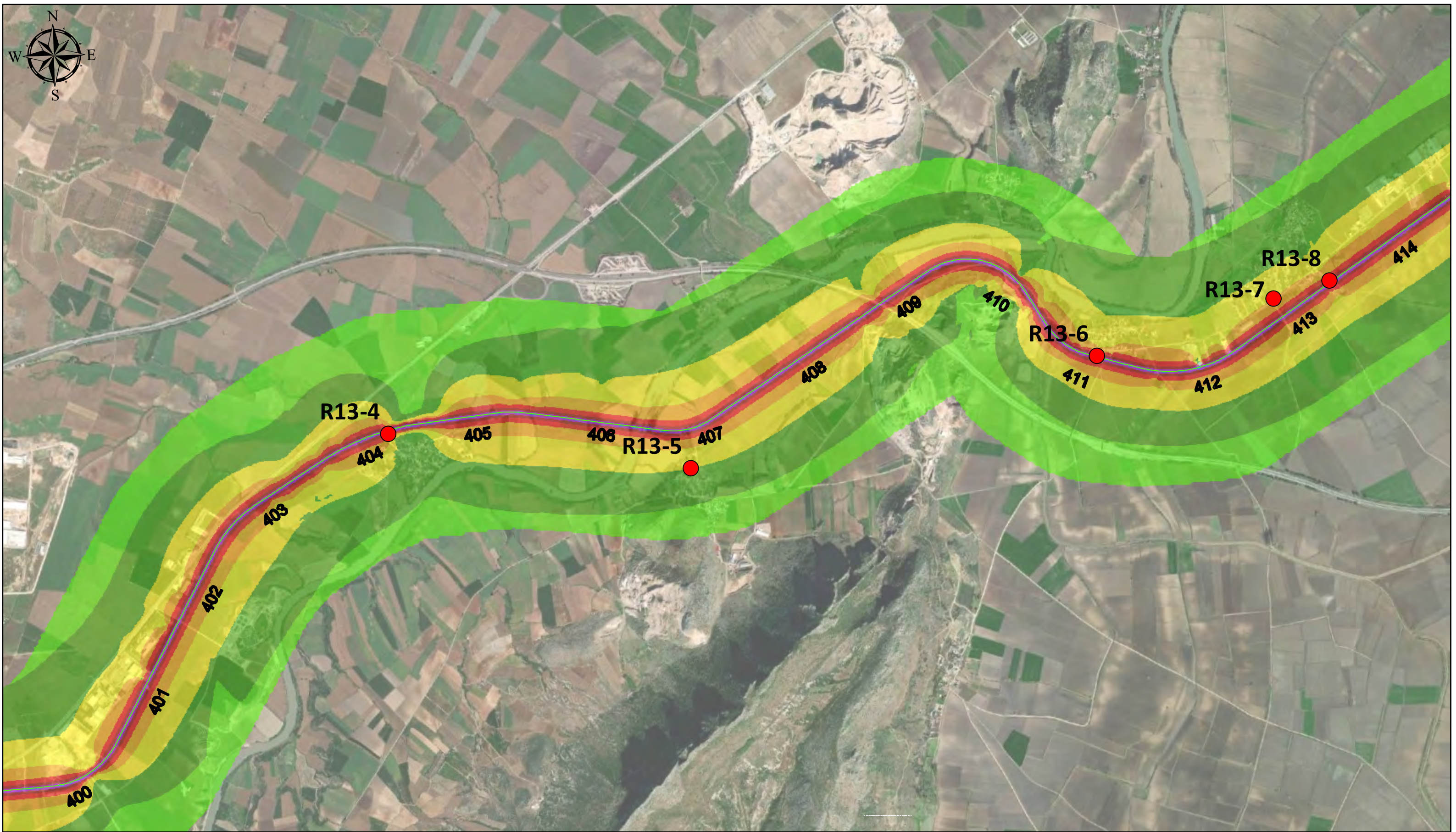
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**





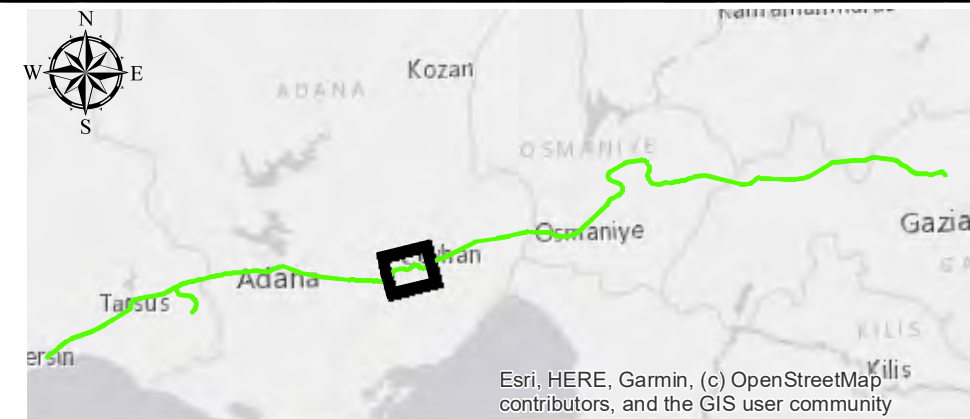
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

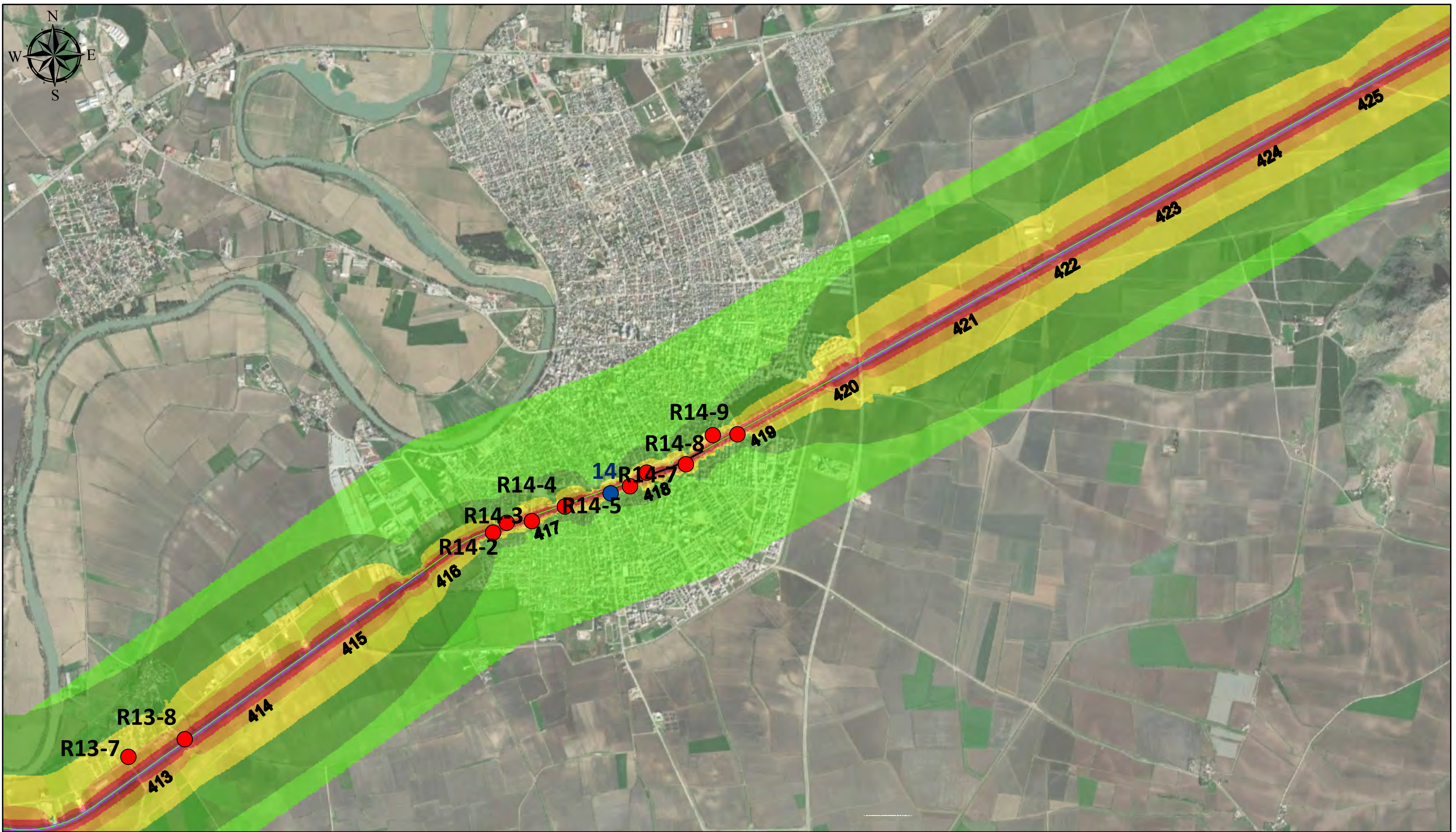
- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway

50-55
55-60
60-65
65-70
70<

Scale: 1/30.000

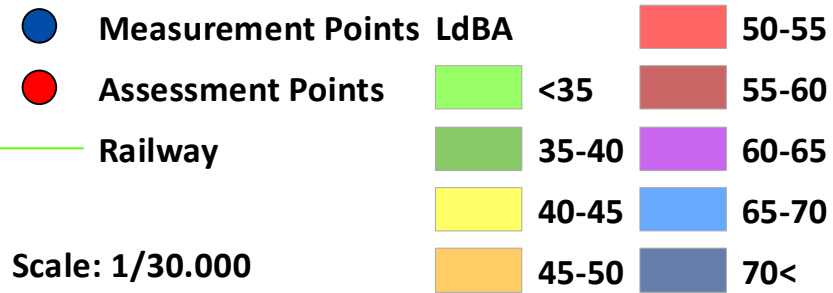
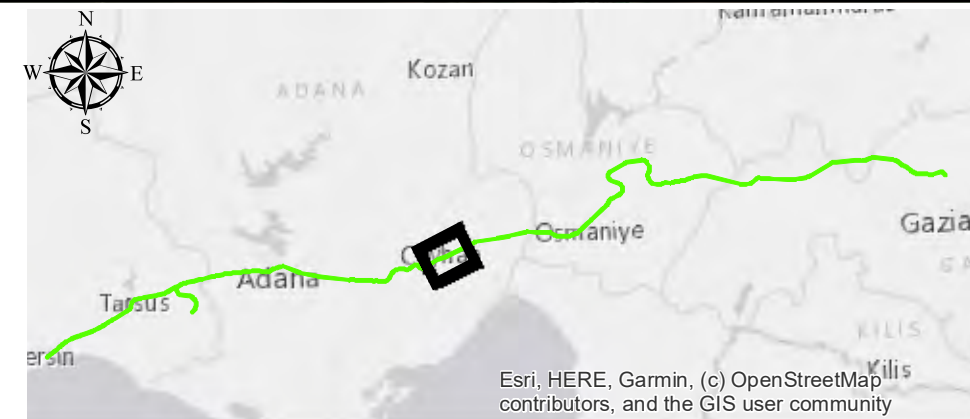


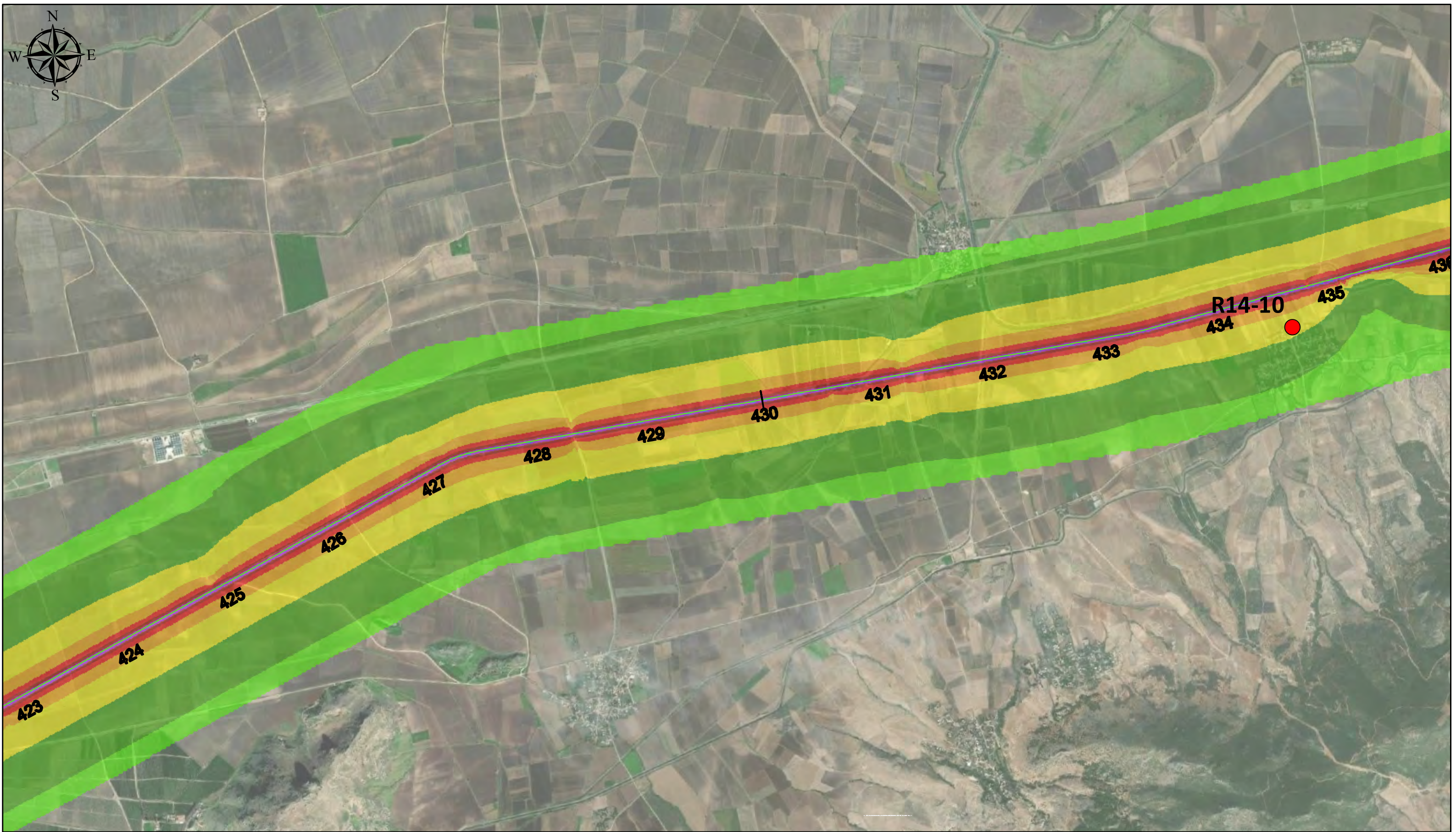
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

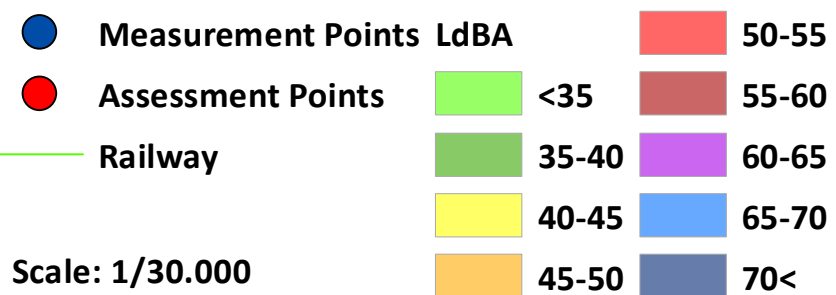
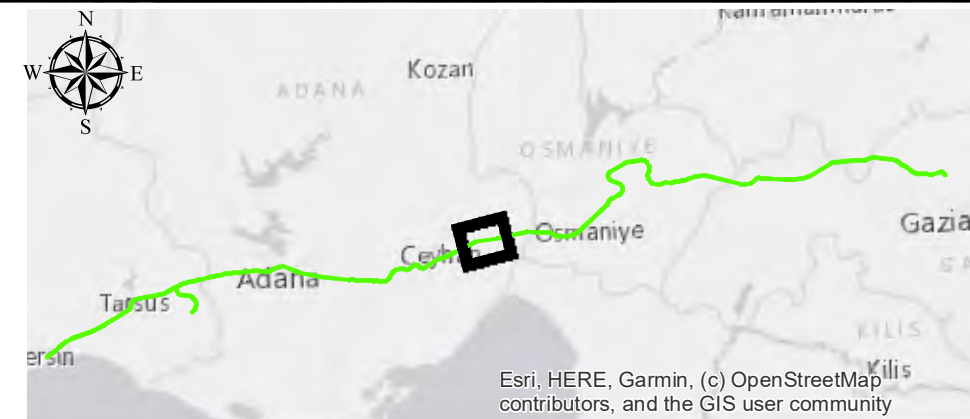
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night



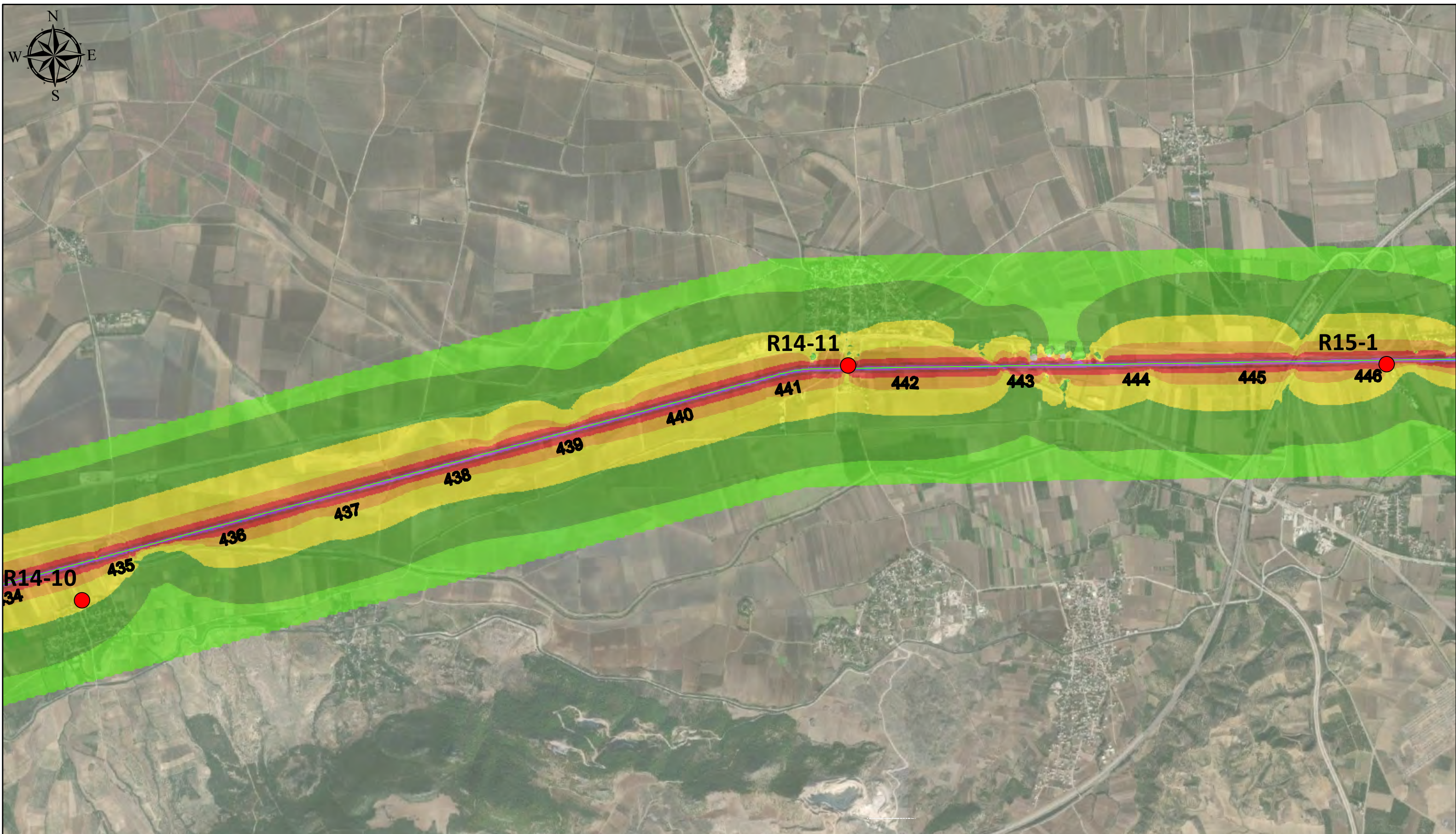


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

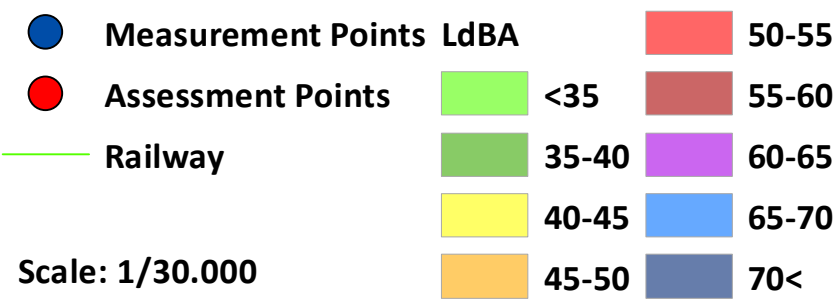
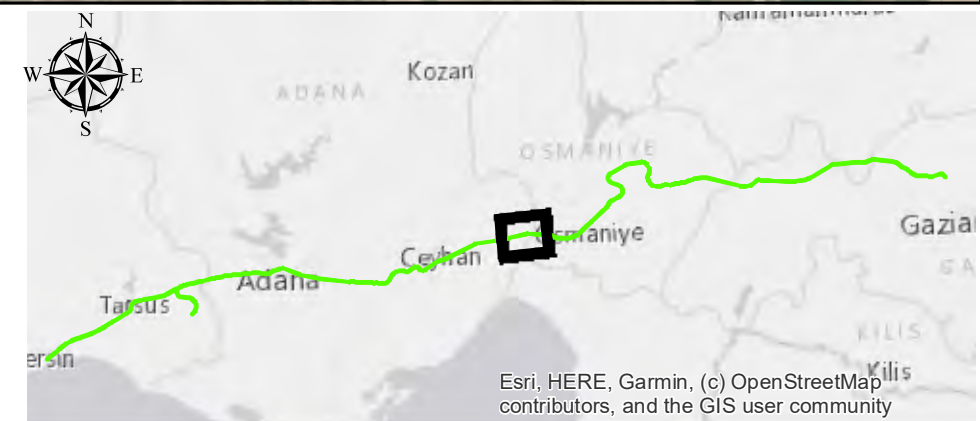


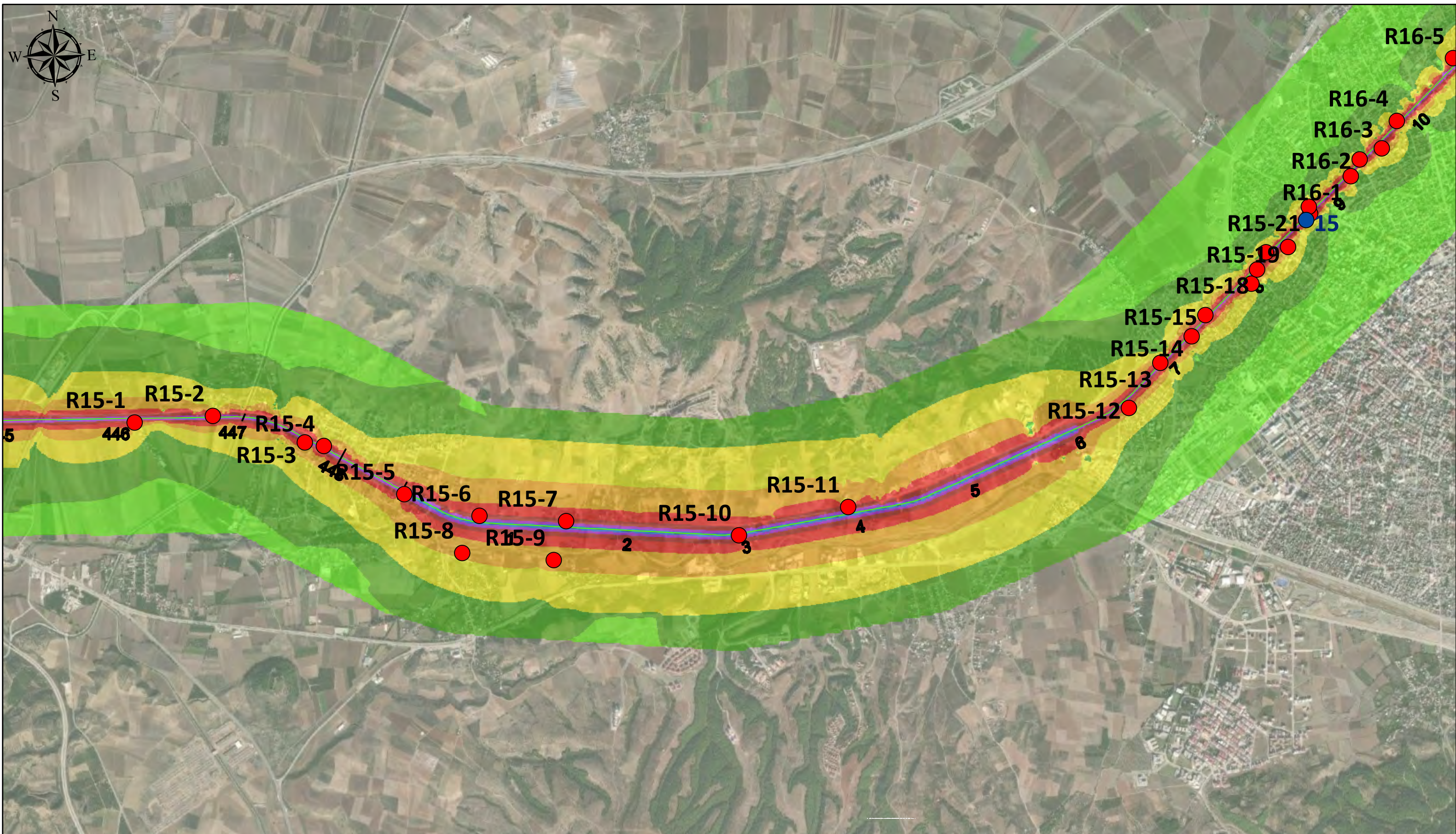
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night





FREKANS

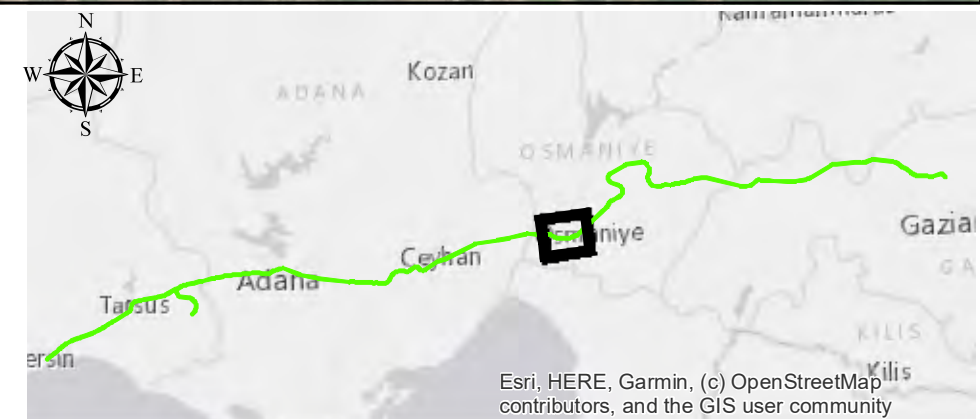
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**

- Measurement Points LdBA
- Assessment Points
- Railway

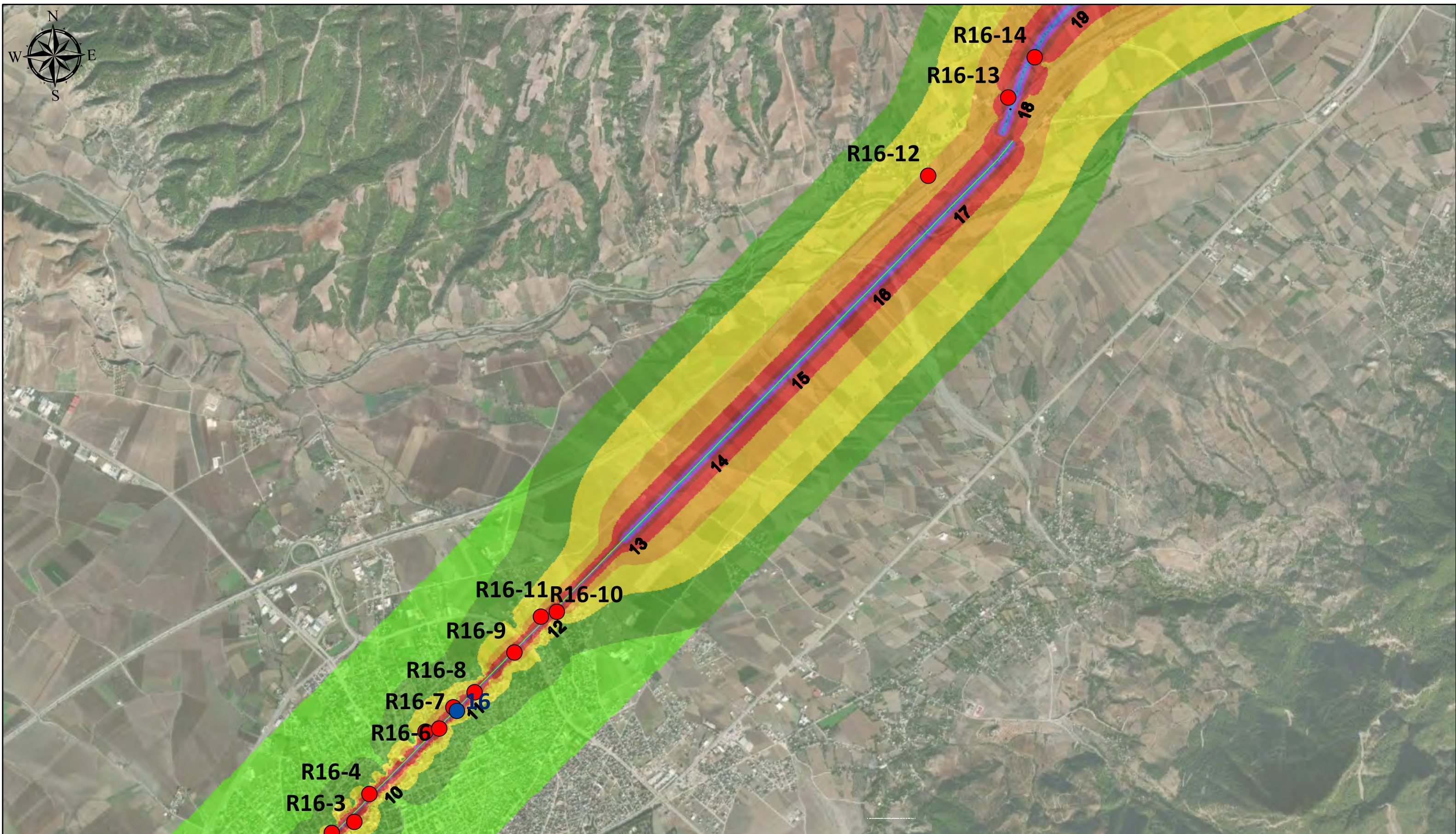
Scale: 1/30.000

Legend

- <35
- 35-40
- 40-45
- 45-50
- 50-55
- 55-60
- 60-65
- 65-70
- 70<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

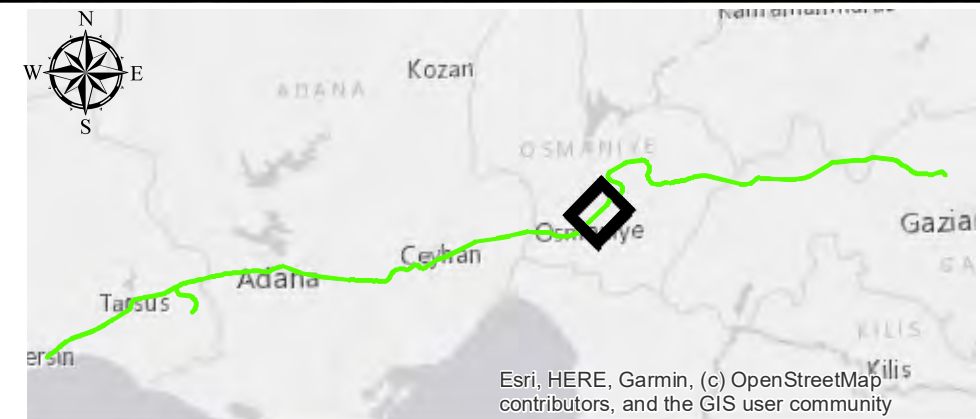
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

- Measurement Points
- Assessment Points
- Railway

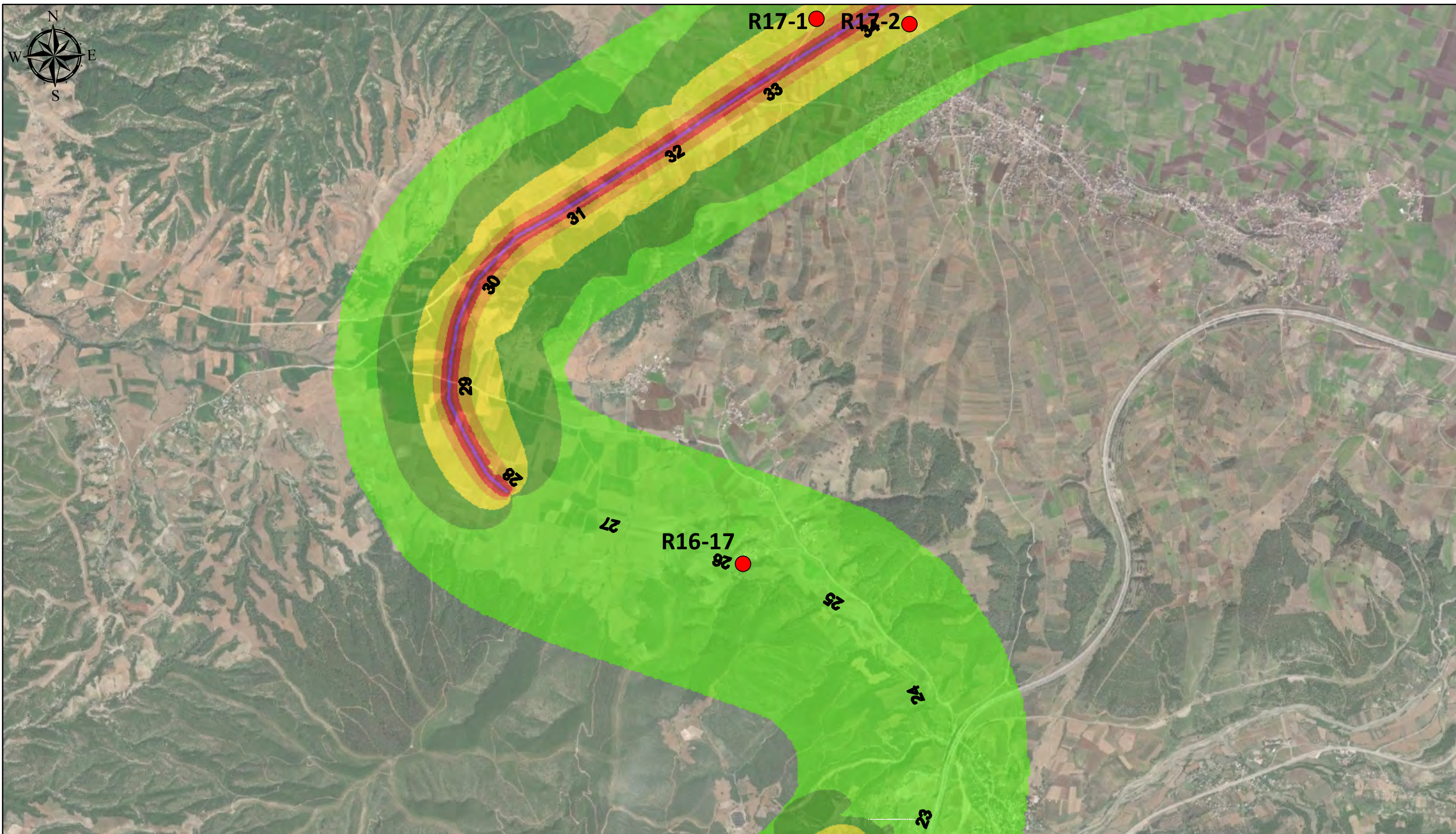
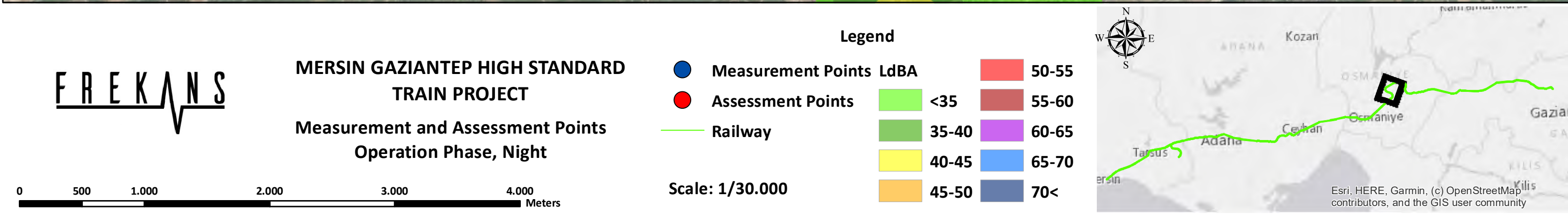
Scale: 1/30.000

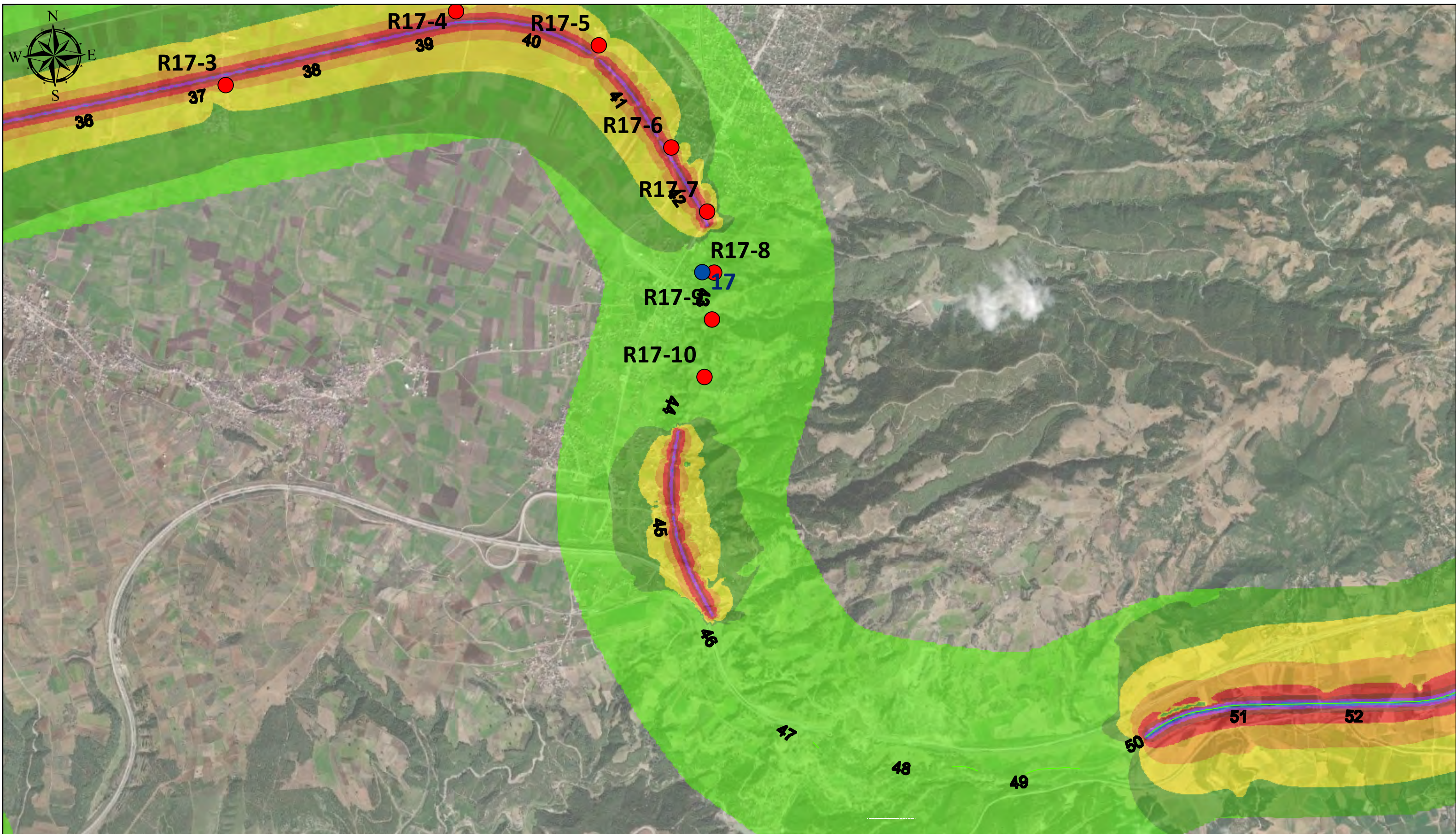
Legend

LdBA	
<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70<



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community





FREKANS

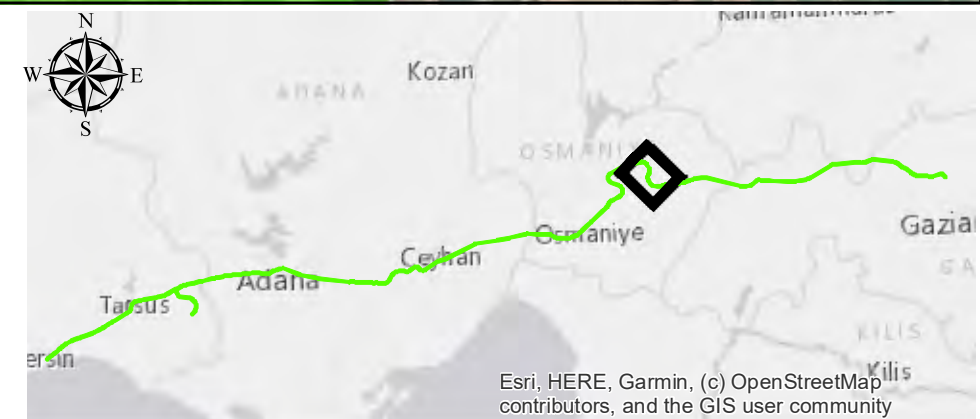
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

- Measurement Points LdBA
- Assessment Points
- Railway

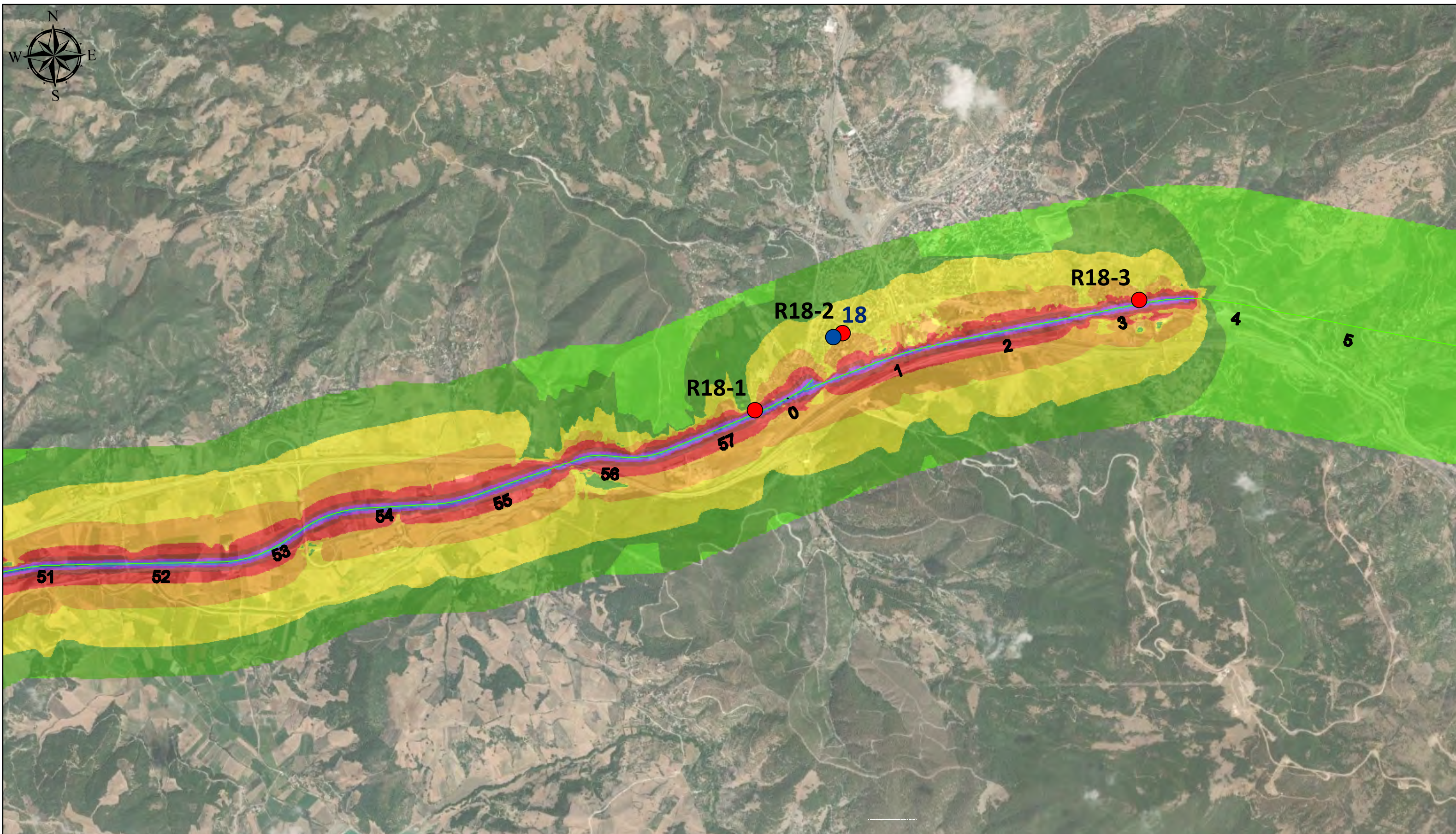
Scale: 1/30.000

Legend

- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70< |



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

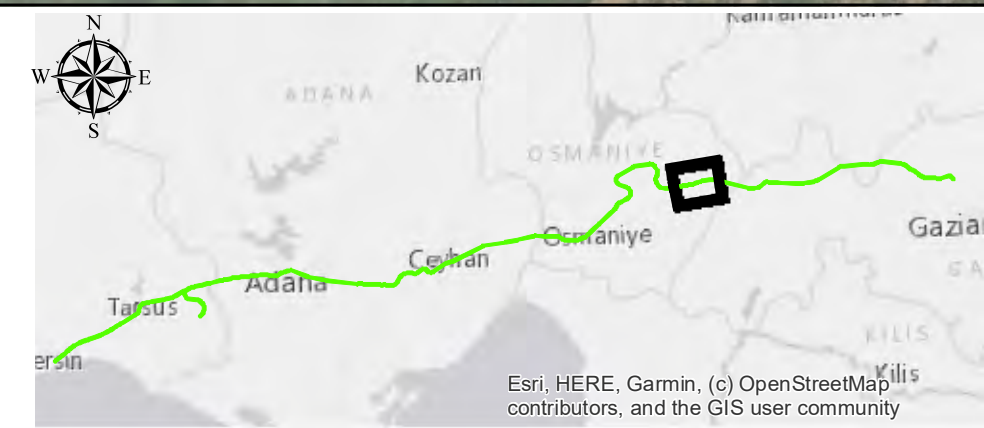
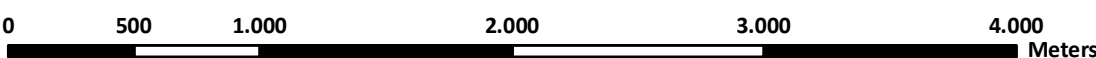


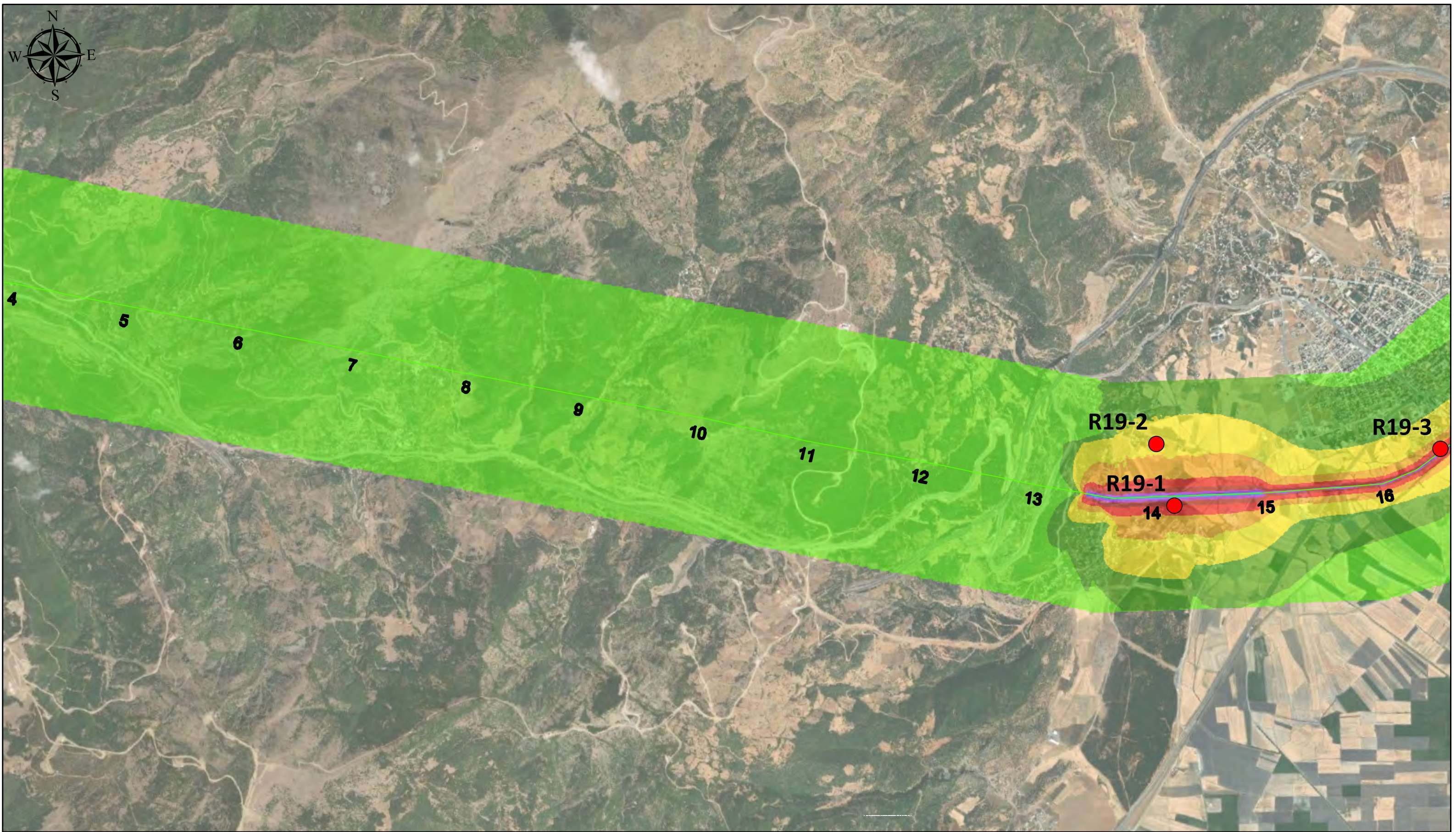
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

Legend

Measurement Points LdBA	Assessment Points	Railway
<35	50-55	
35-40	55-60	
40-45	60-65	
45-50	65-70	
	70<	

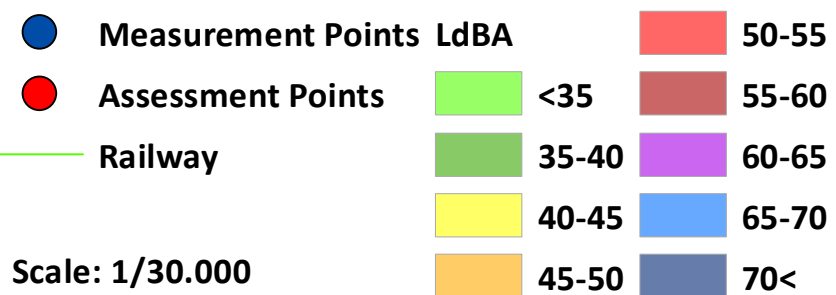
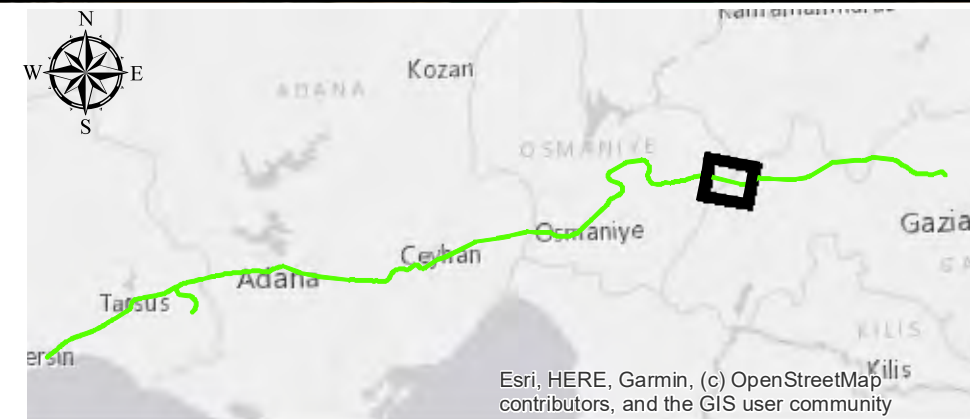
Scale: 1/30.000



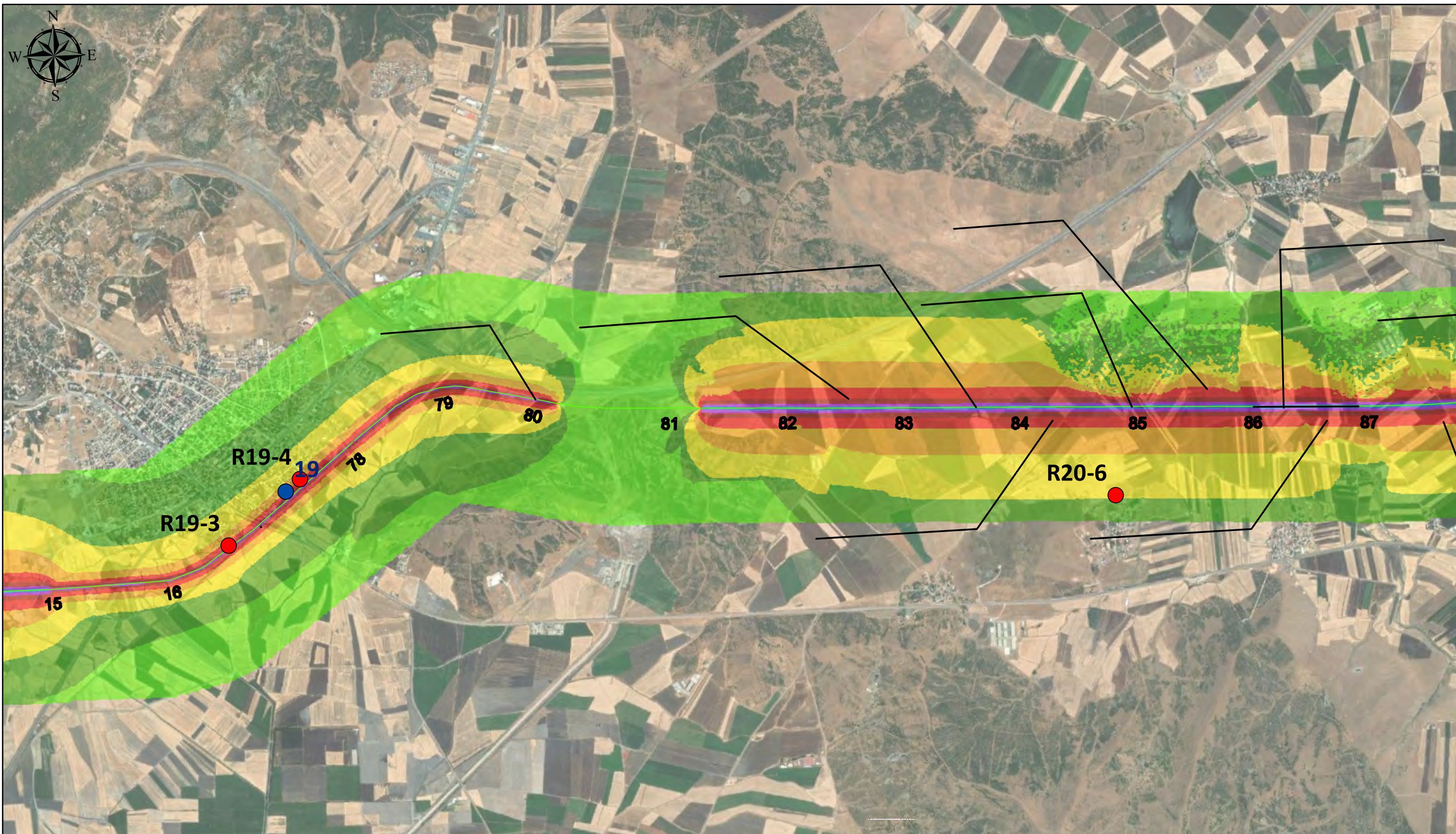


FREKANS

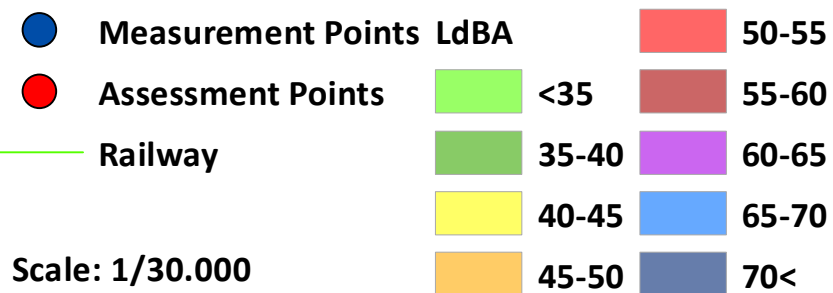
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**



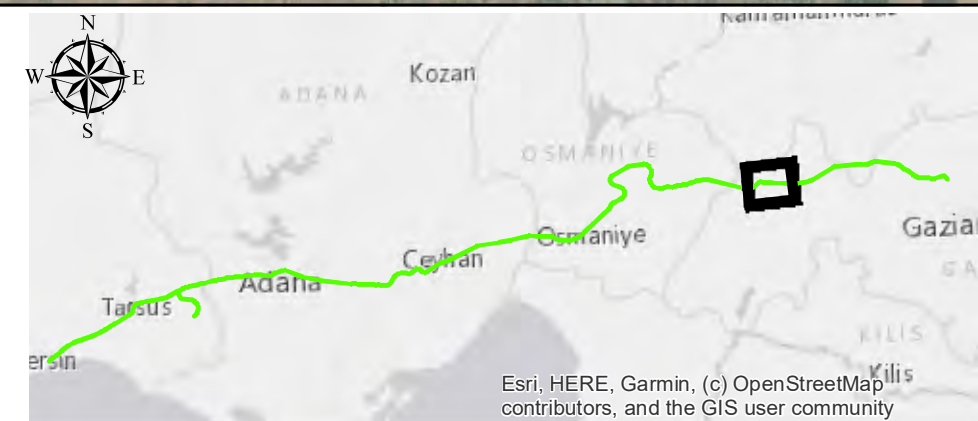
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



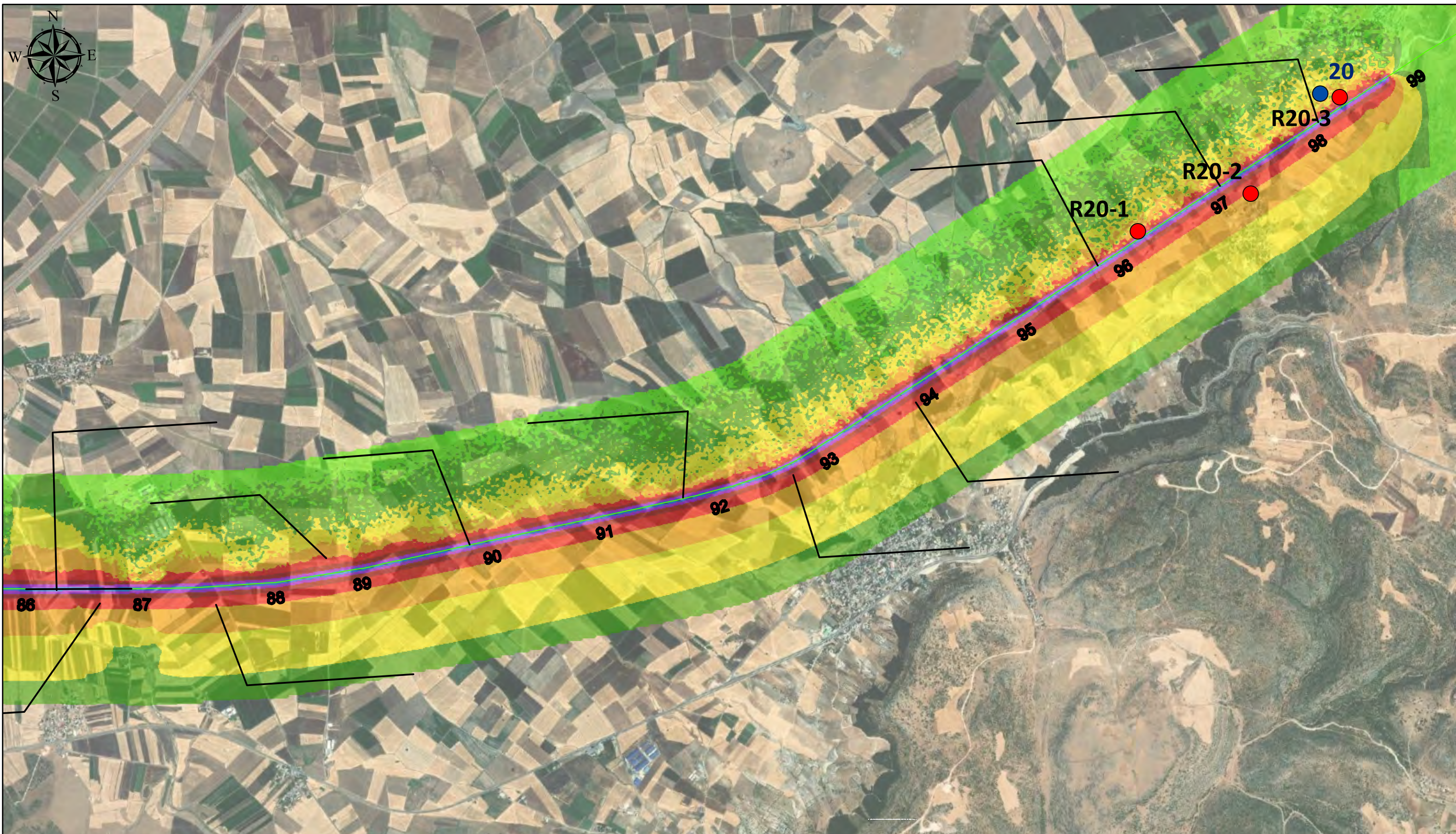
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**



Scale: 1/30.000



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

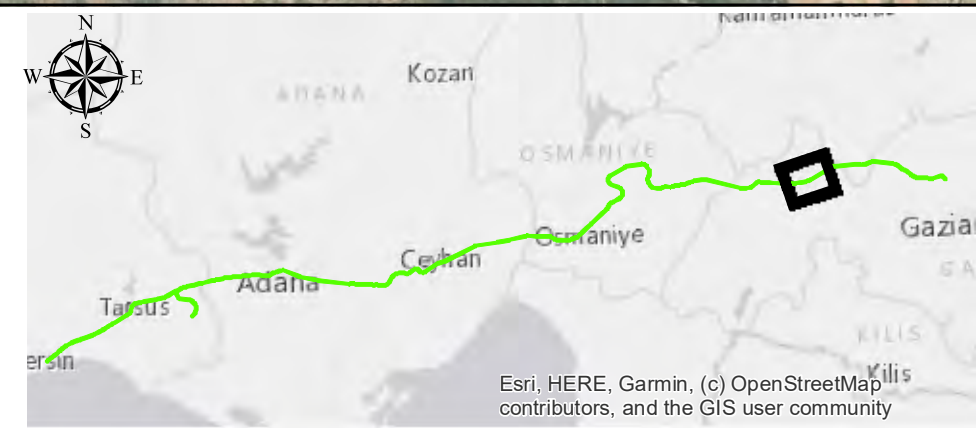
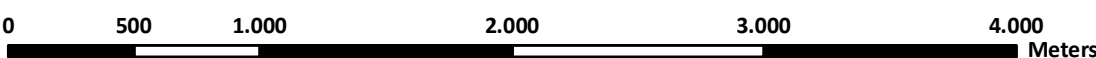


**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**

Legend

Measurement Points LdBA	Assessment Points	Railway
<35	35-40	40-45
45-50	50-55	55-60
60-65	65-70	70<

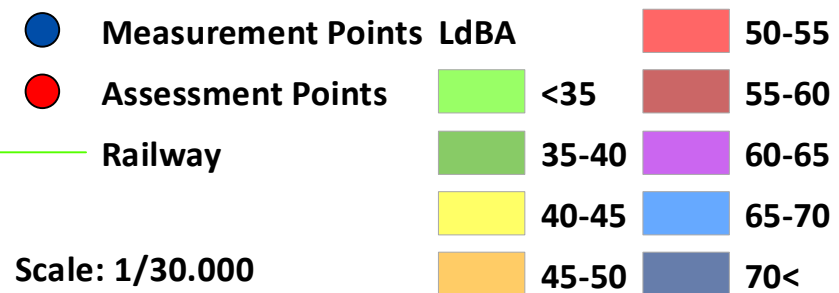
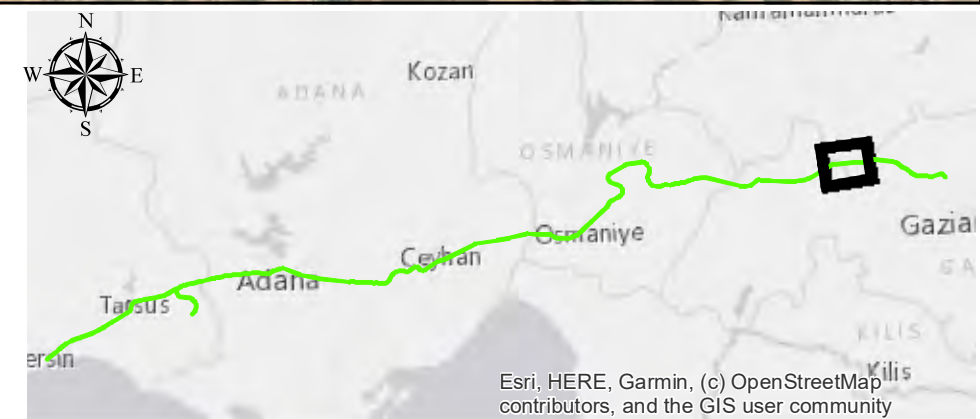
Scale: 1/30.000

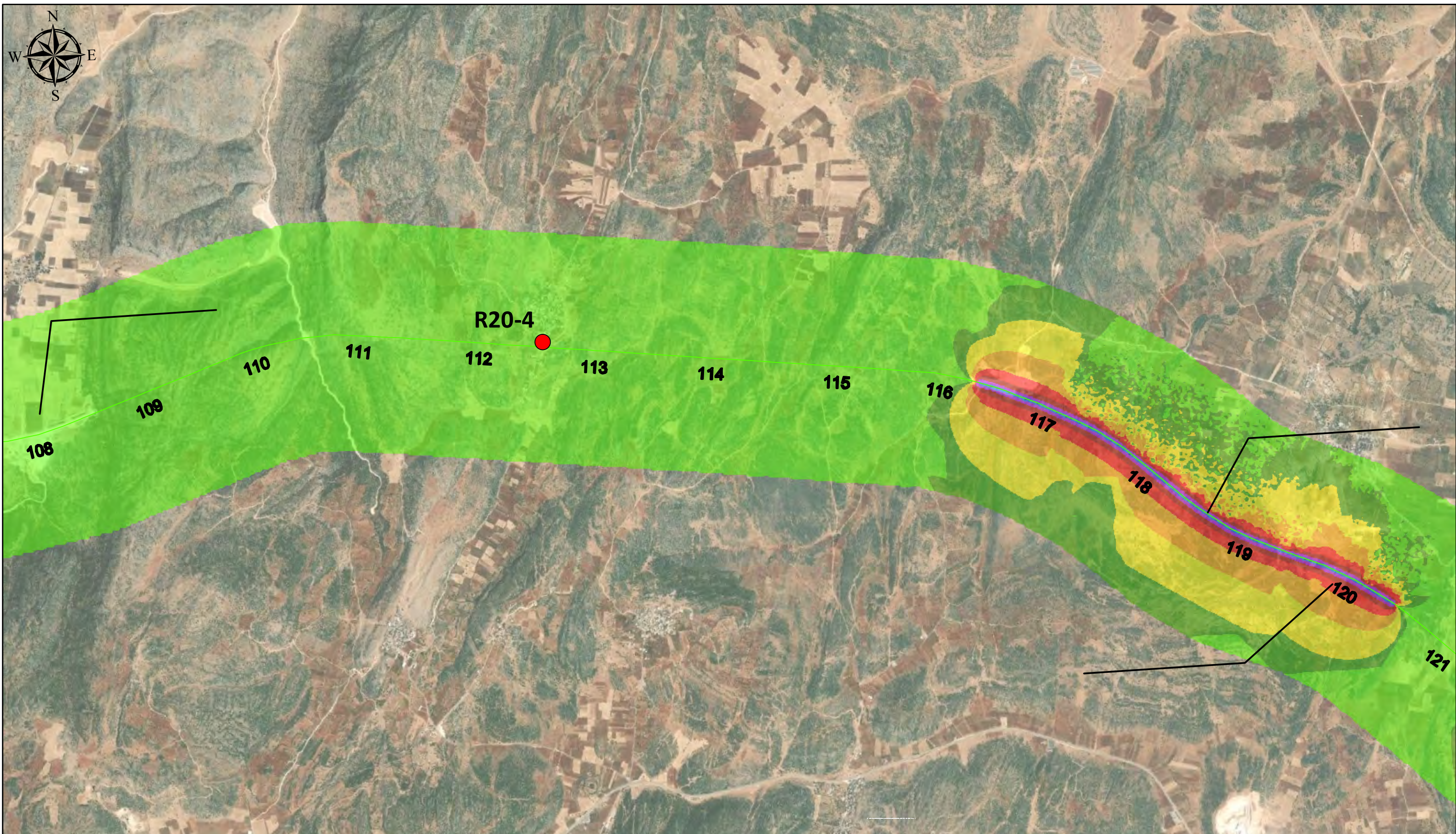




FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**

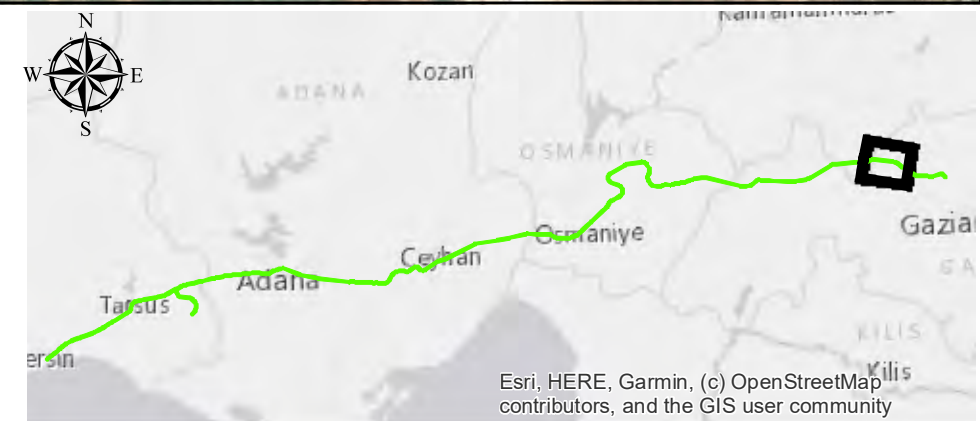




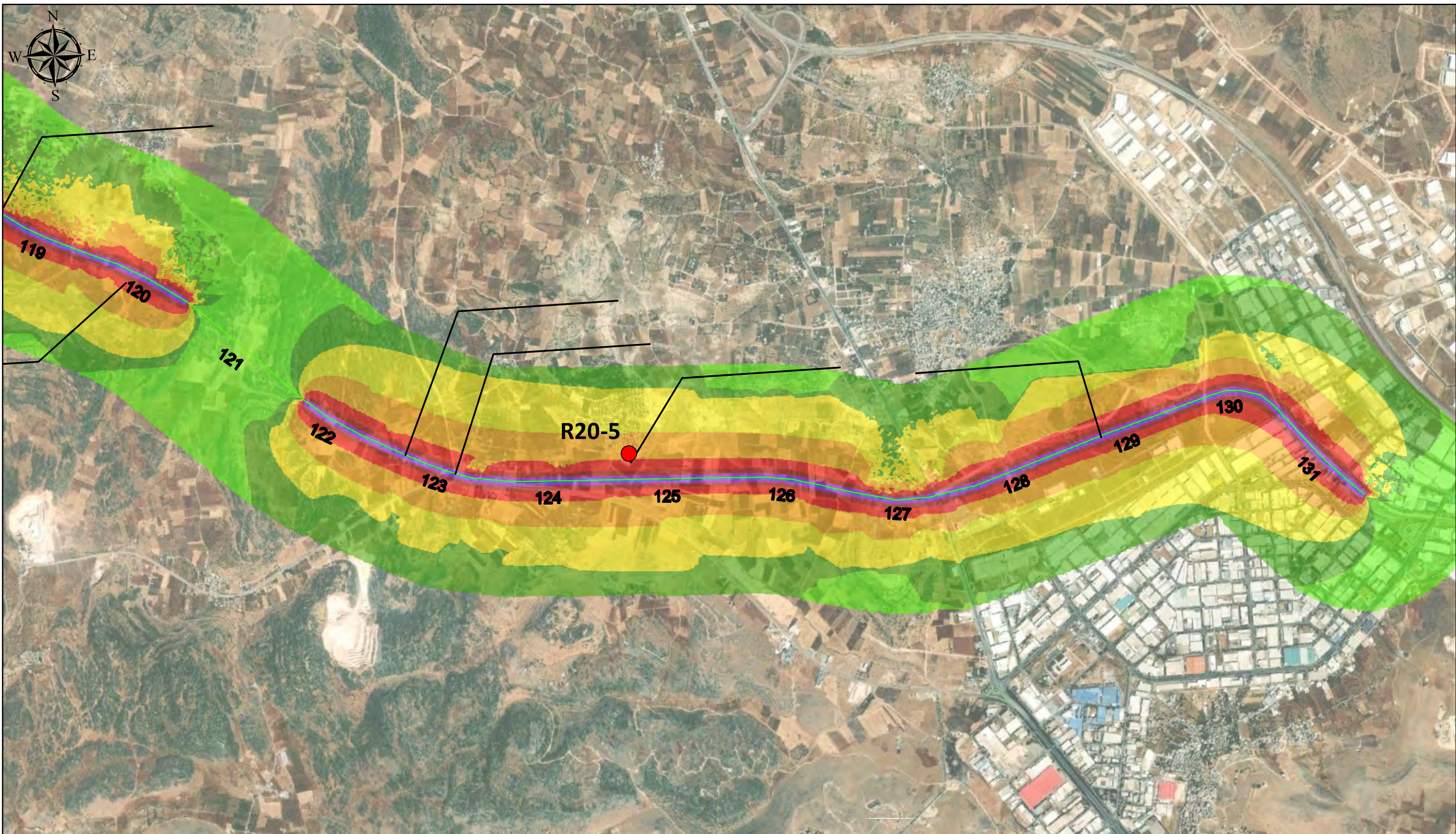
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase, Night**

- Legend**
- Measurement Points LdBA
 - Assessment Points
 - Railway
- | | | | | |
|-------|-------|-------|-------|-----|
| 50-55 | 55-60 | 60-65 | 65-70 | 70< |
|-------|-------|-------|-------|-----|
- Scale: 1/30.000



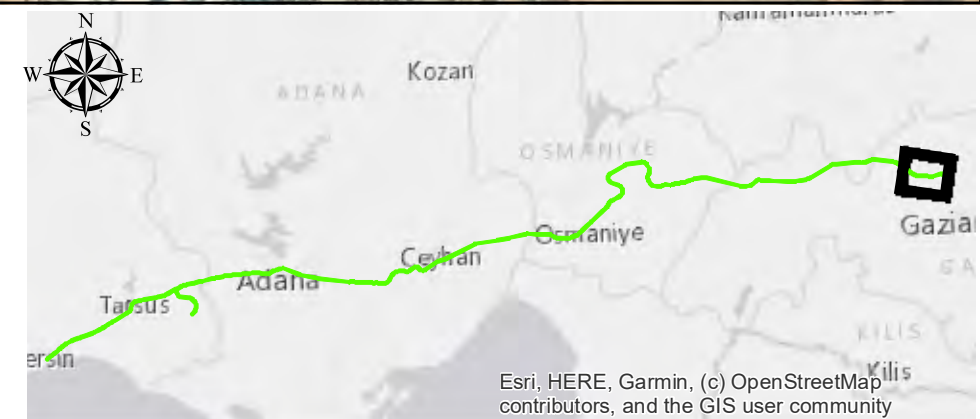
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase, Night

- Legend**
- Measurement Points LdB(A)
 - Assessment Points
 - Railway
- | | |
|-------|-------|
| <35 | 50-55 |
| 35-40 | 55-60 |
| 40-45 | 60-65 |
| 45-50 | 65-70 |
| | 70< |
- Scale: 1/30.000



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

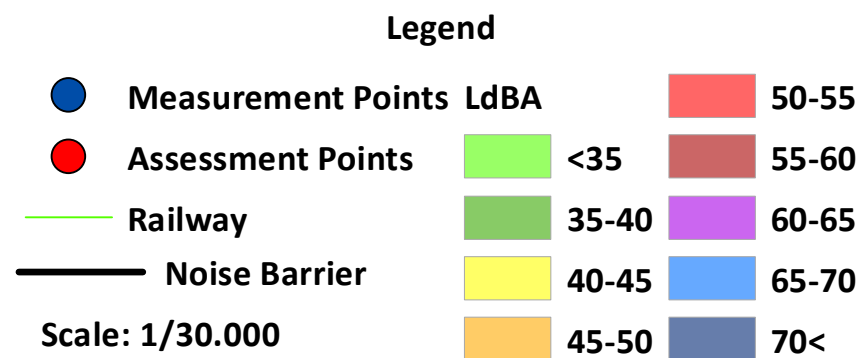
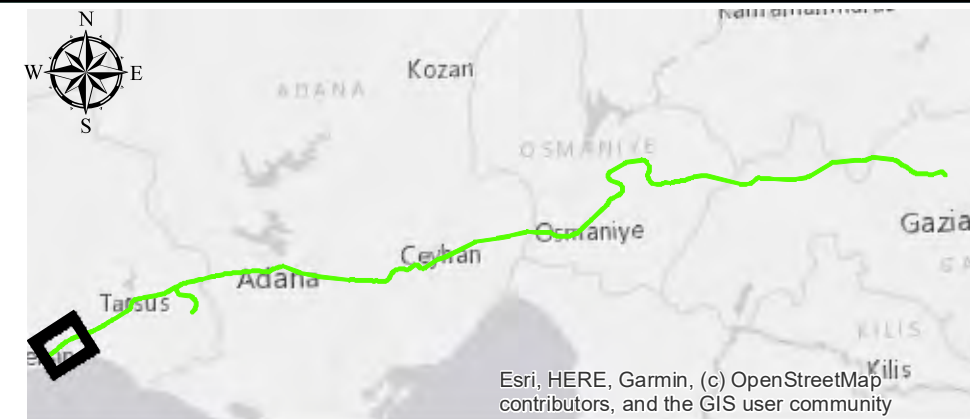
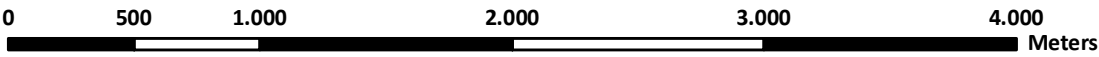
Appendix 5: Operation Noise Maps - After Mitigation

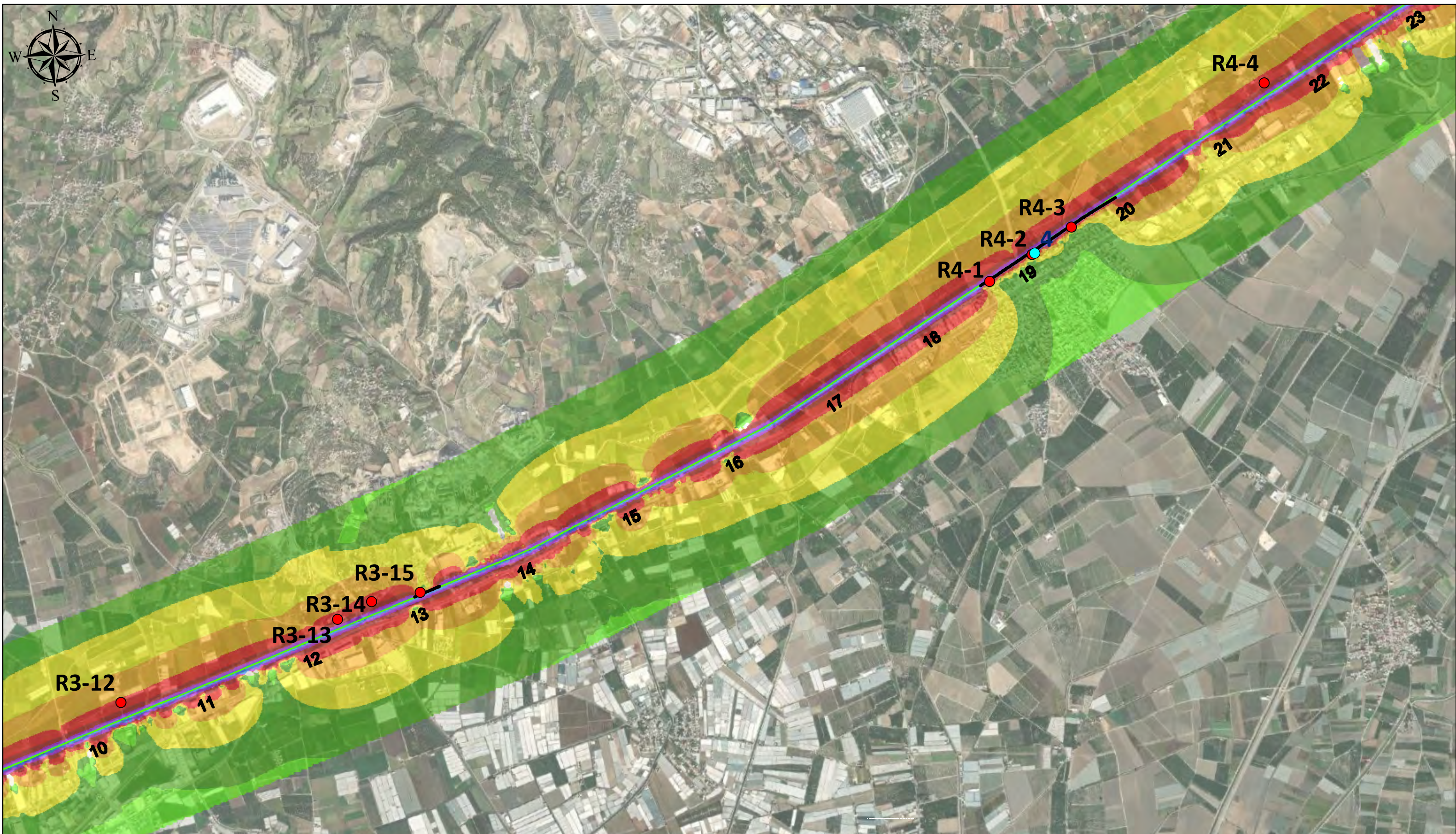
Day-Night (DN) Rating



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day





FREKANS

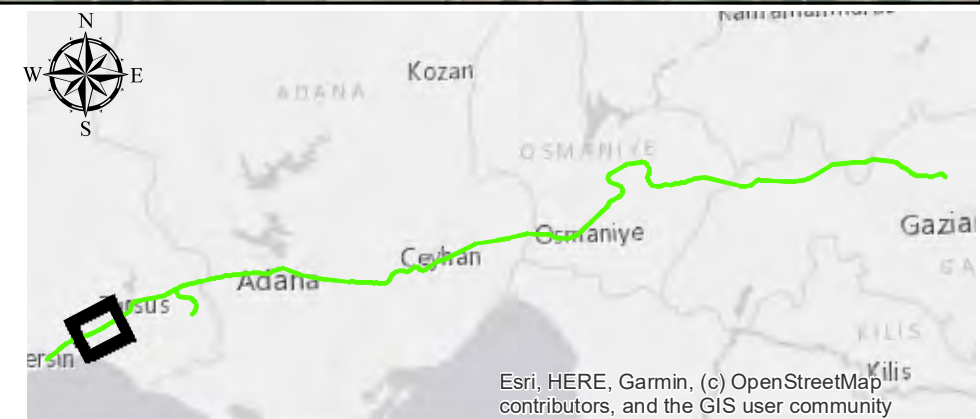
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

- Measurement Points LdBA
- Assessment Points
- Railway
- Noise Barrier

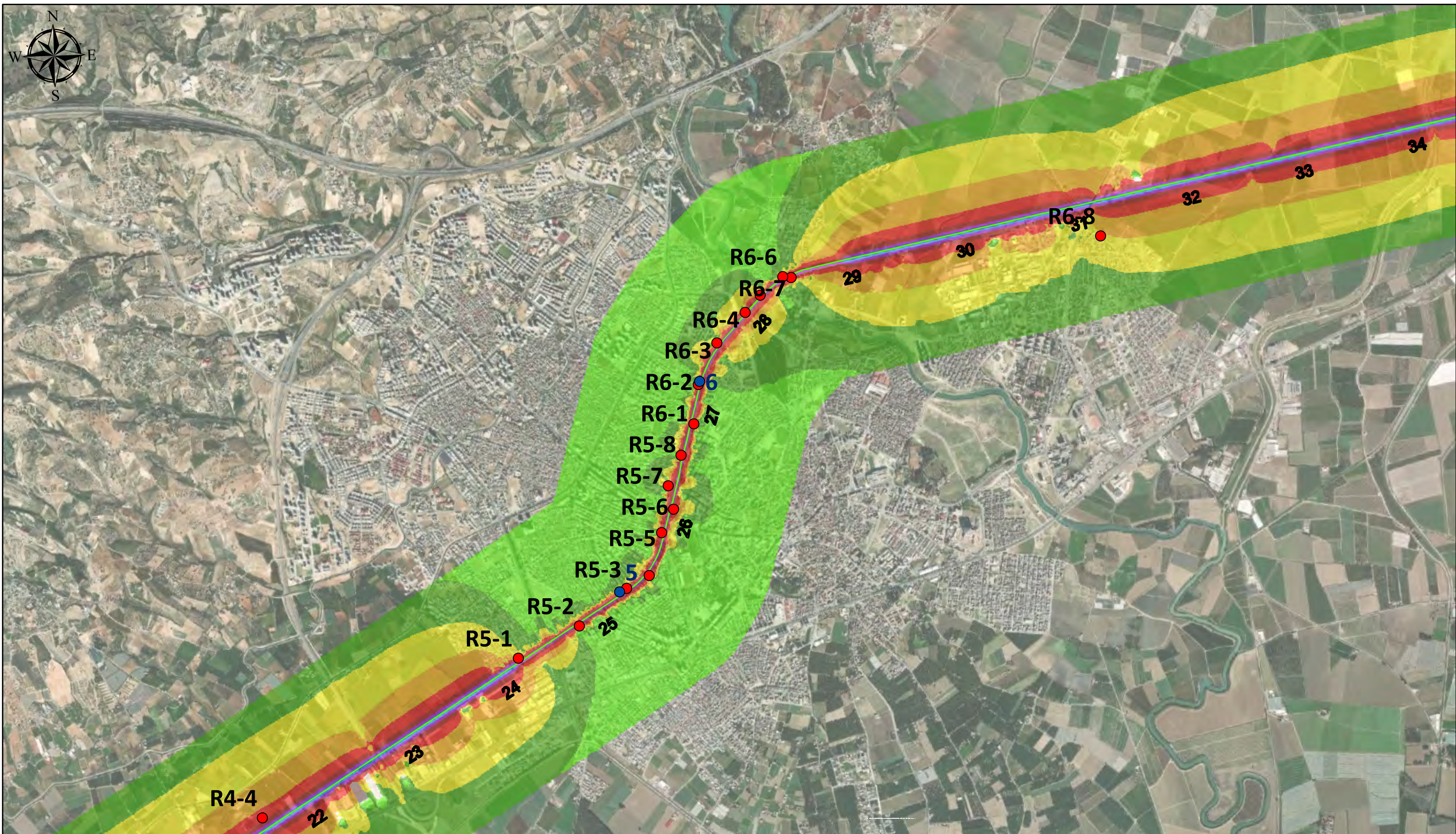
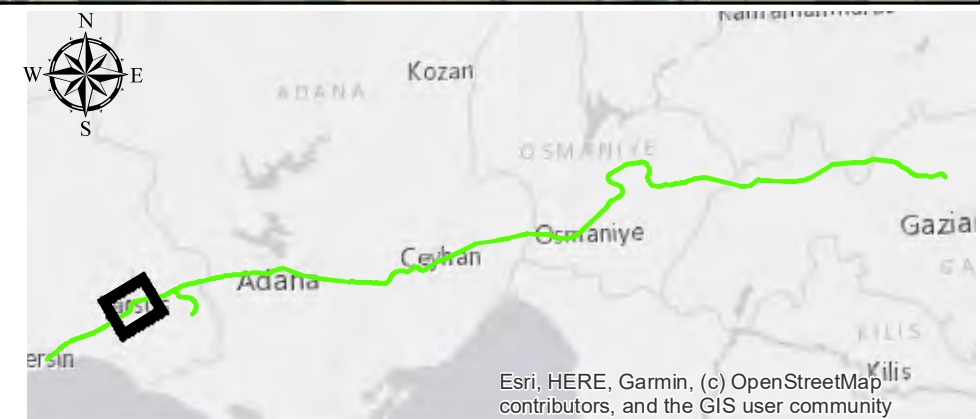
Scale: 1/30.000

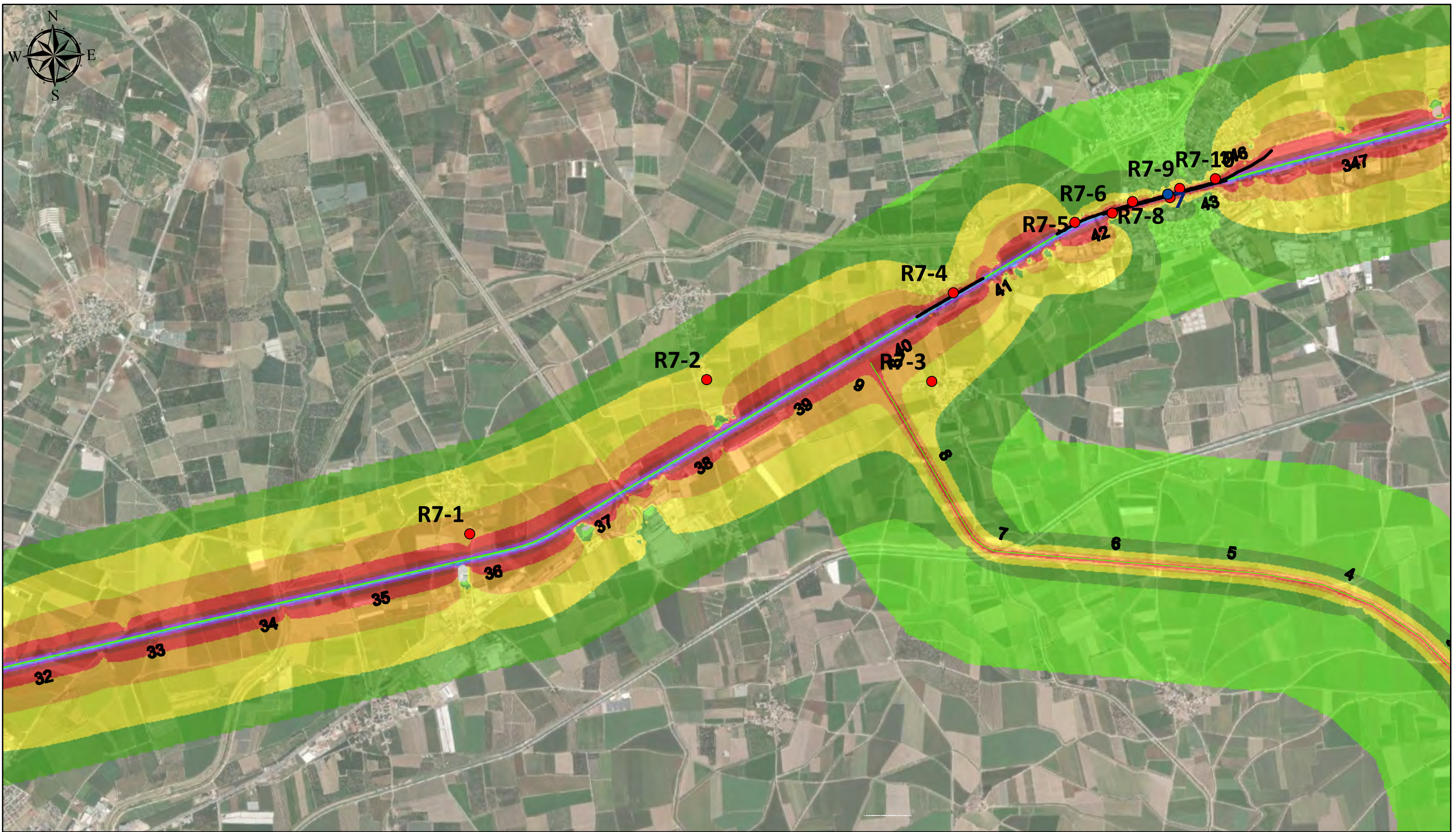
Legend

●	<35	50-55
●	35-40	55-60
●	40-45	60-65
●	45-50	65-70
●		70<



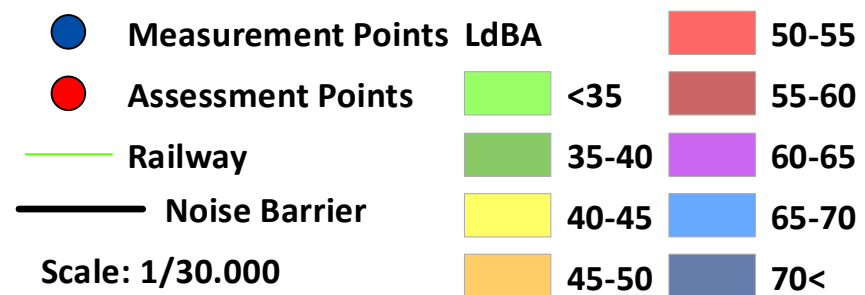
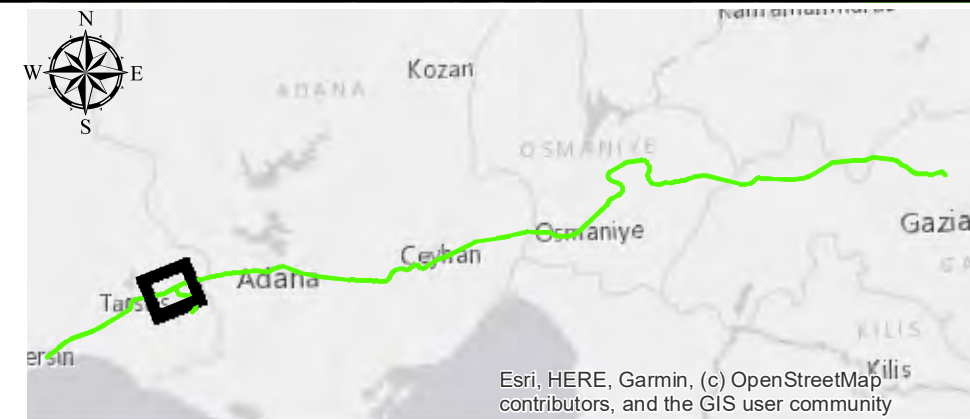
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



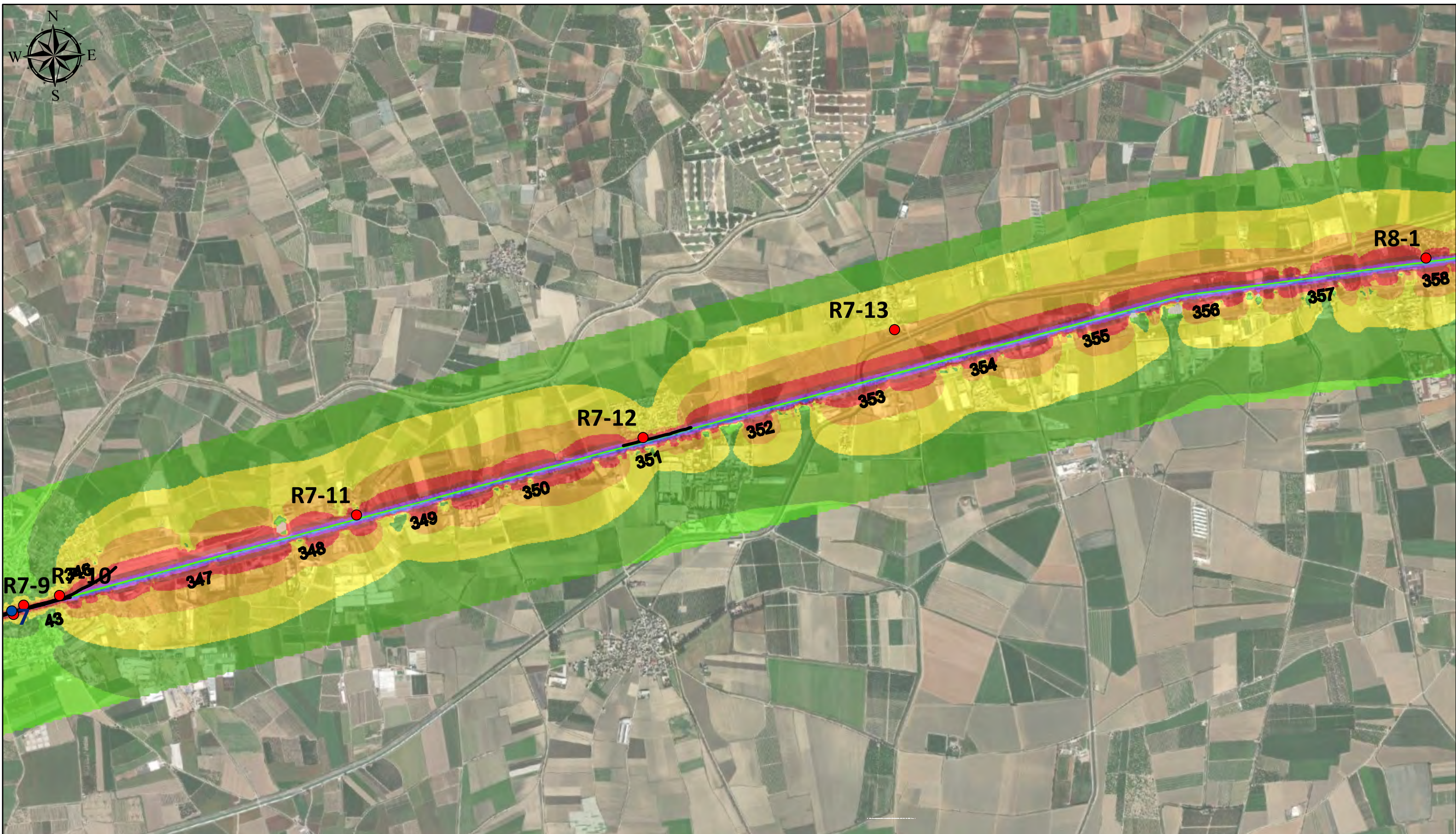


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day



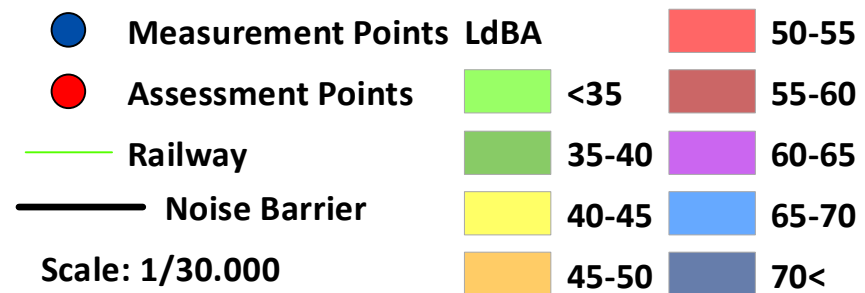
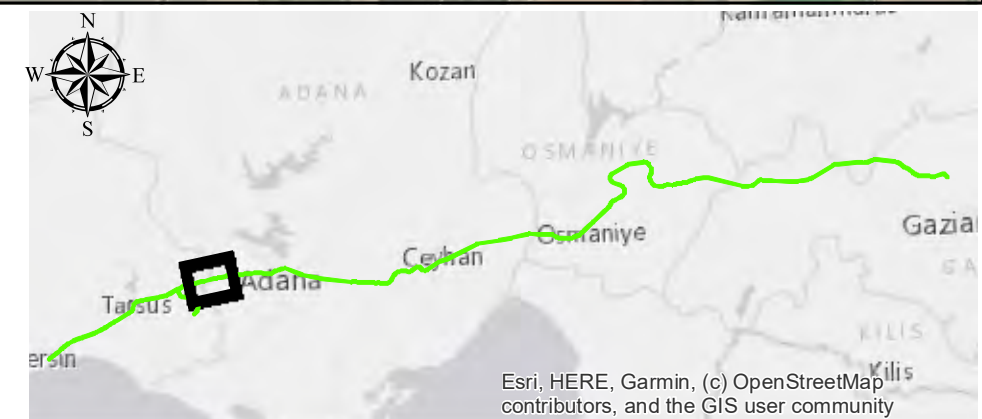
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

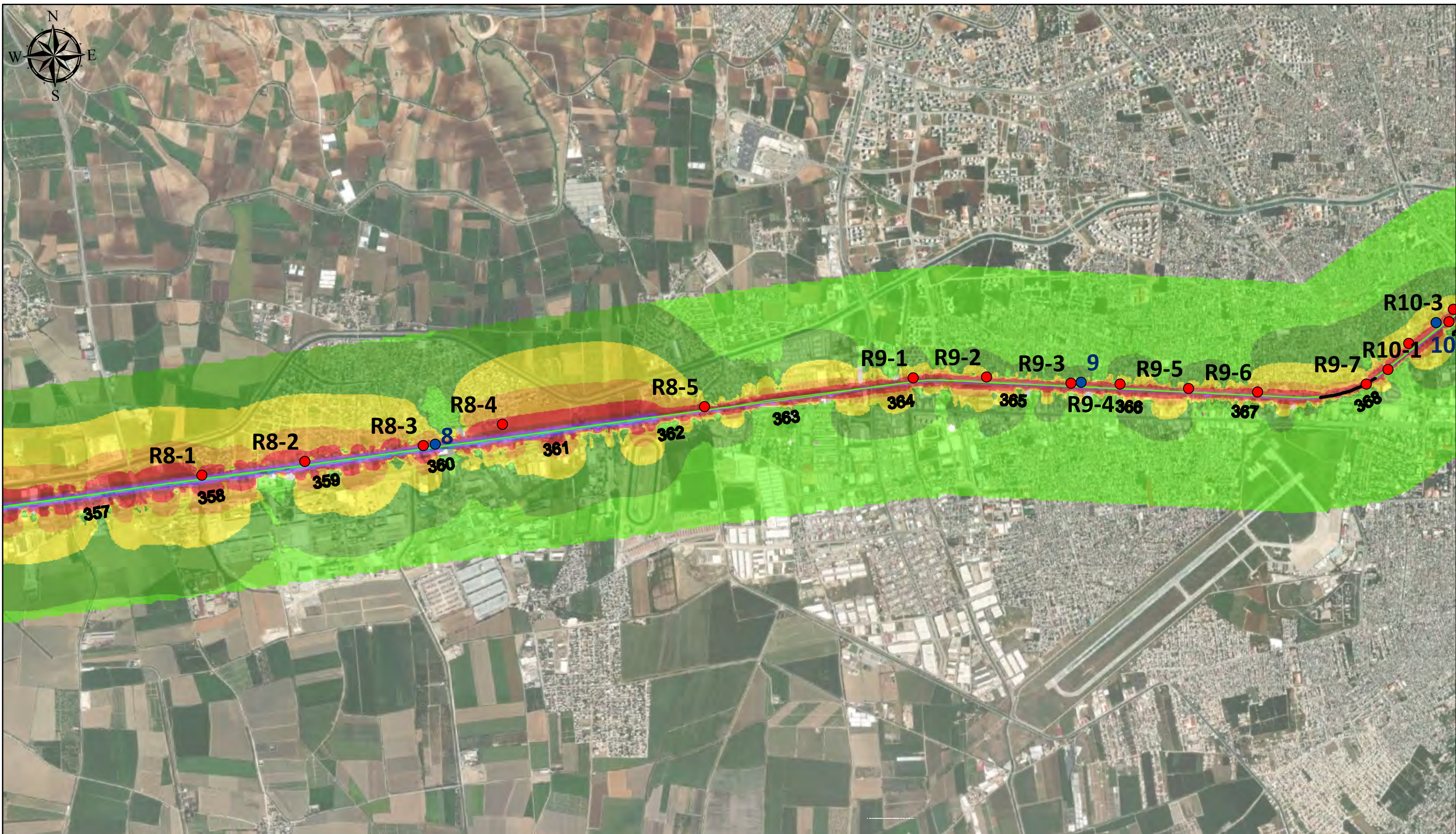


FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

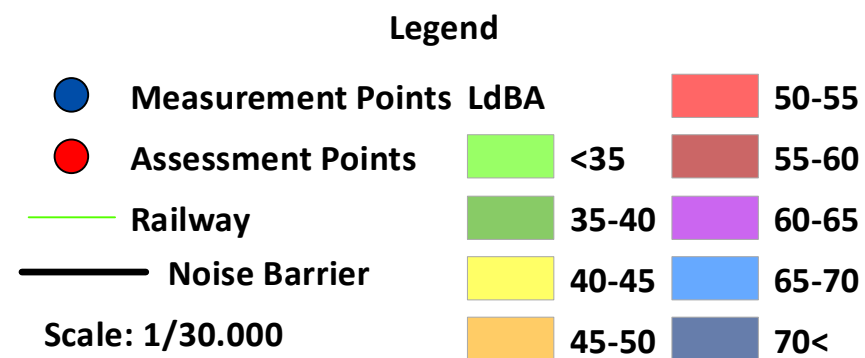
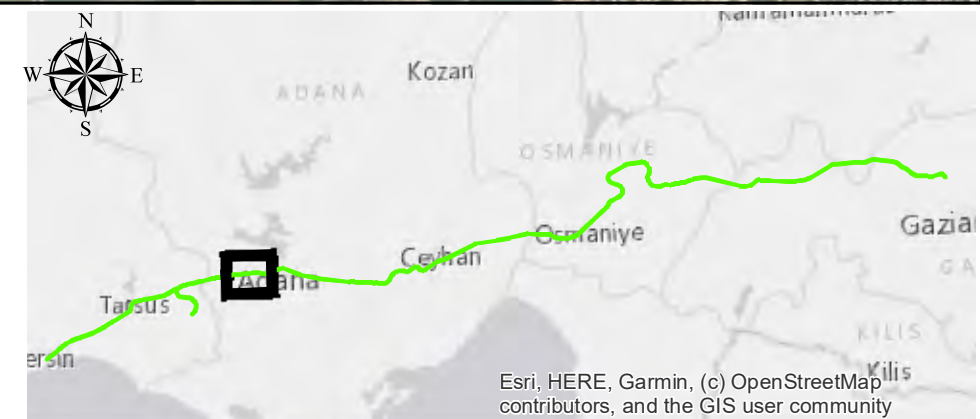
Measurement and Assessment Points
Operation Phase - Mitigated, Day



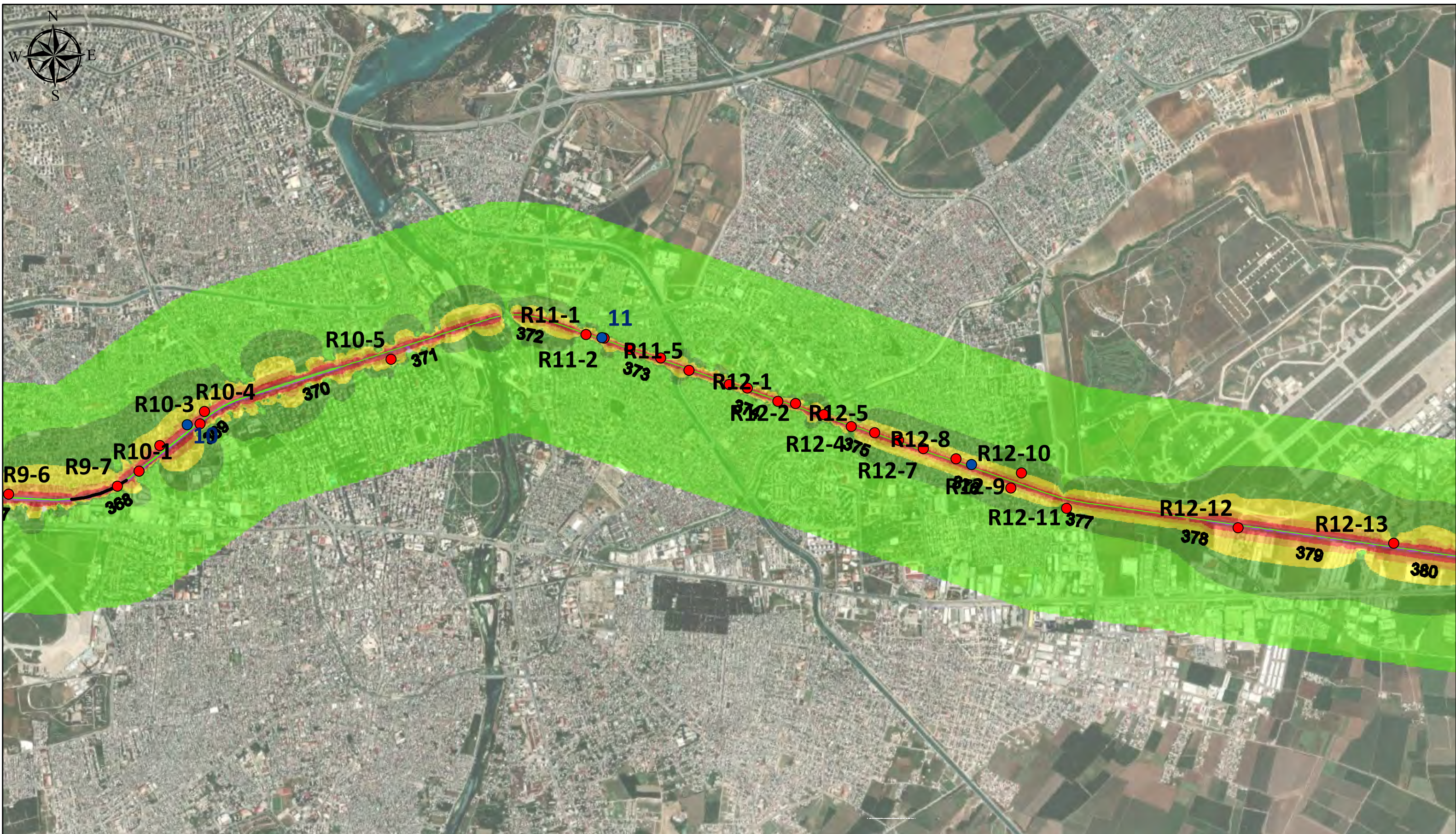


FREKANS

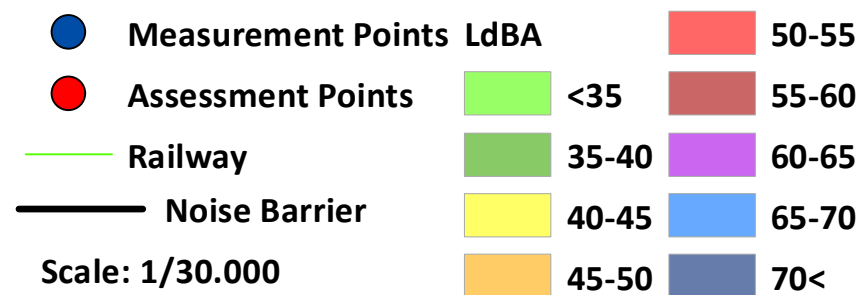
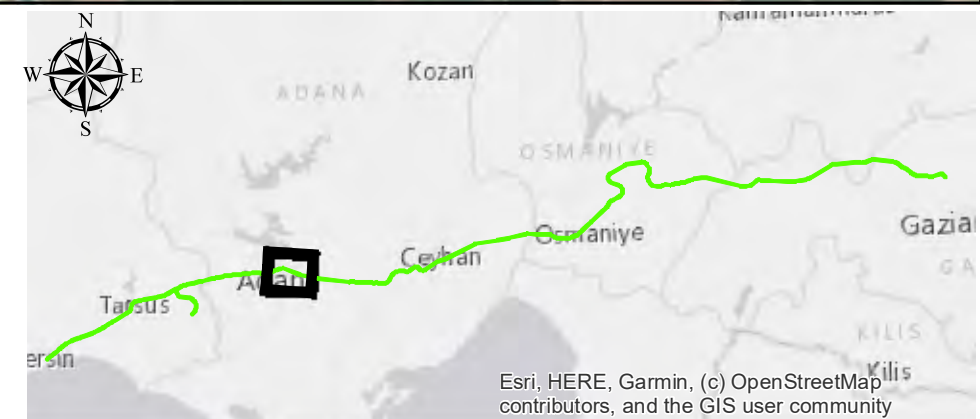
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

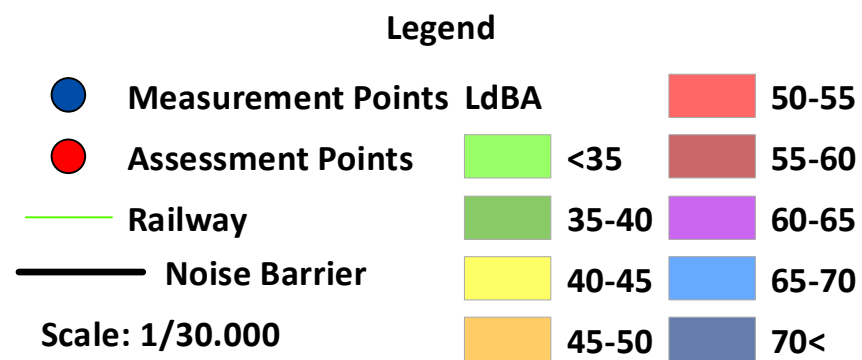
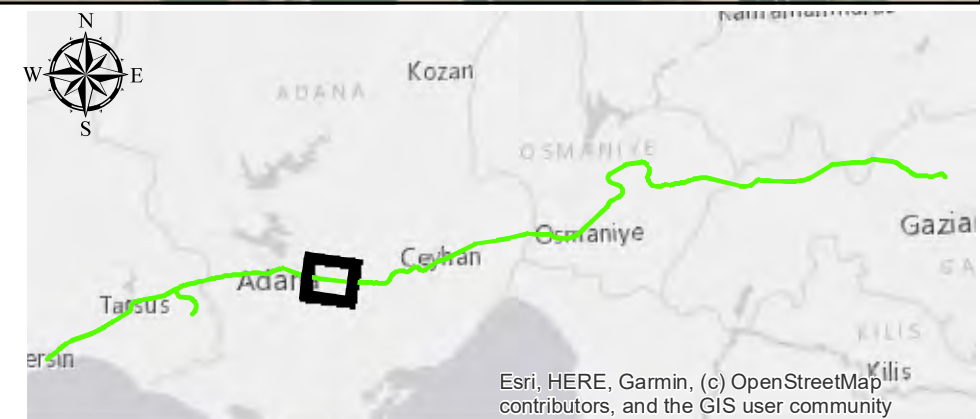


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

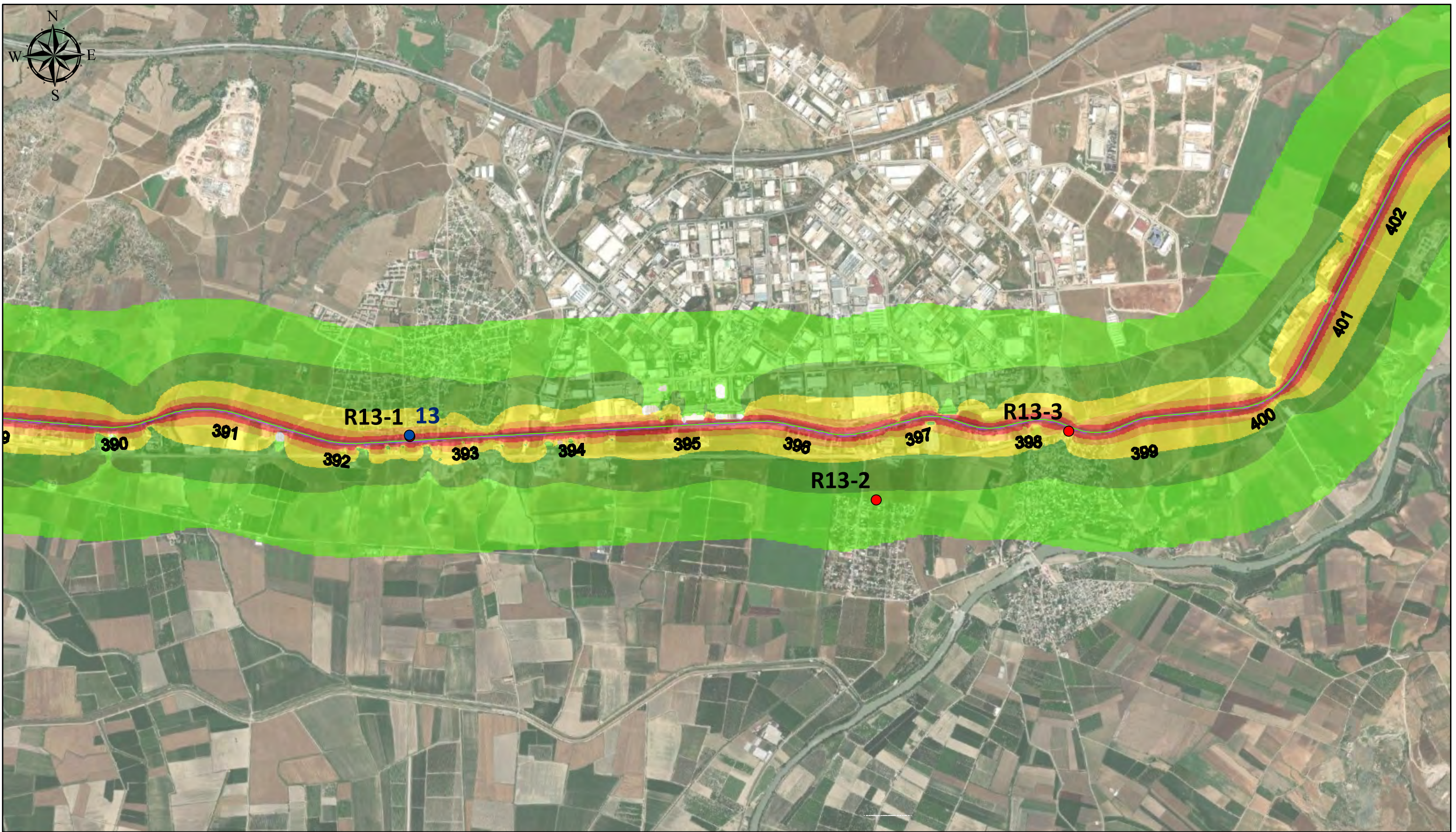


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

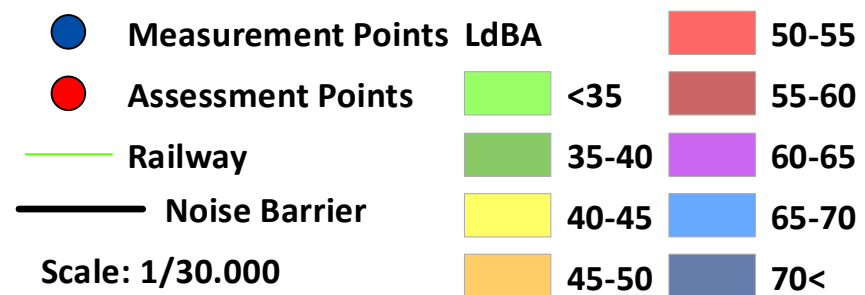
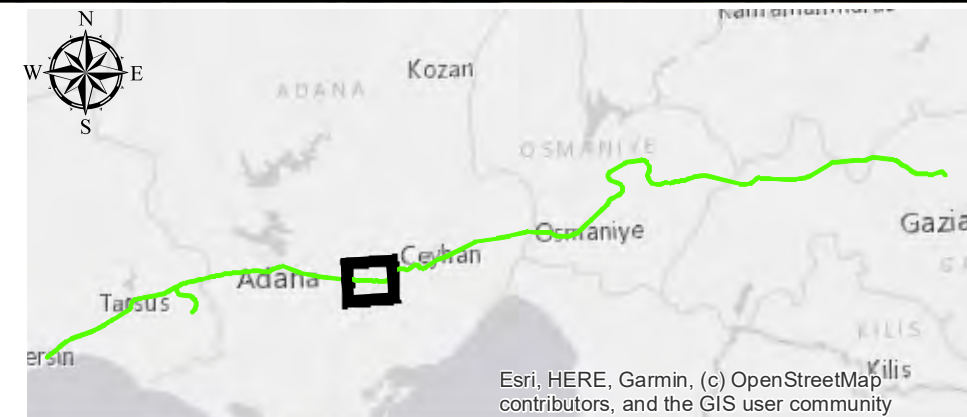


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

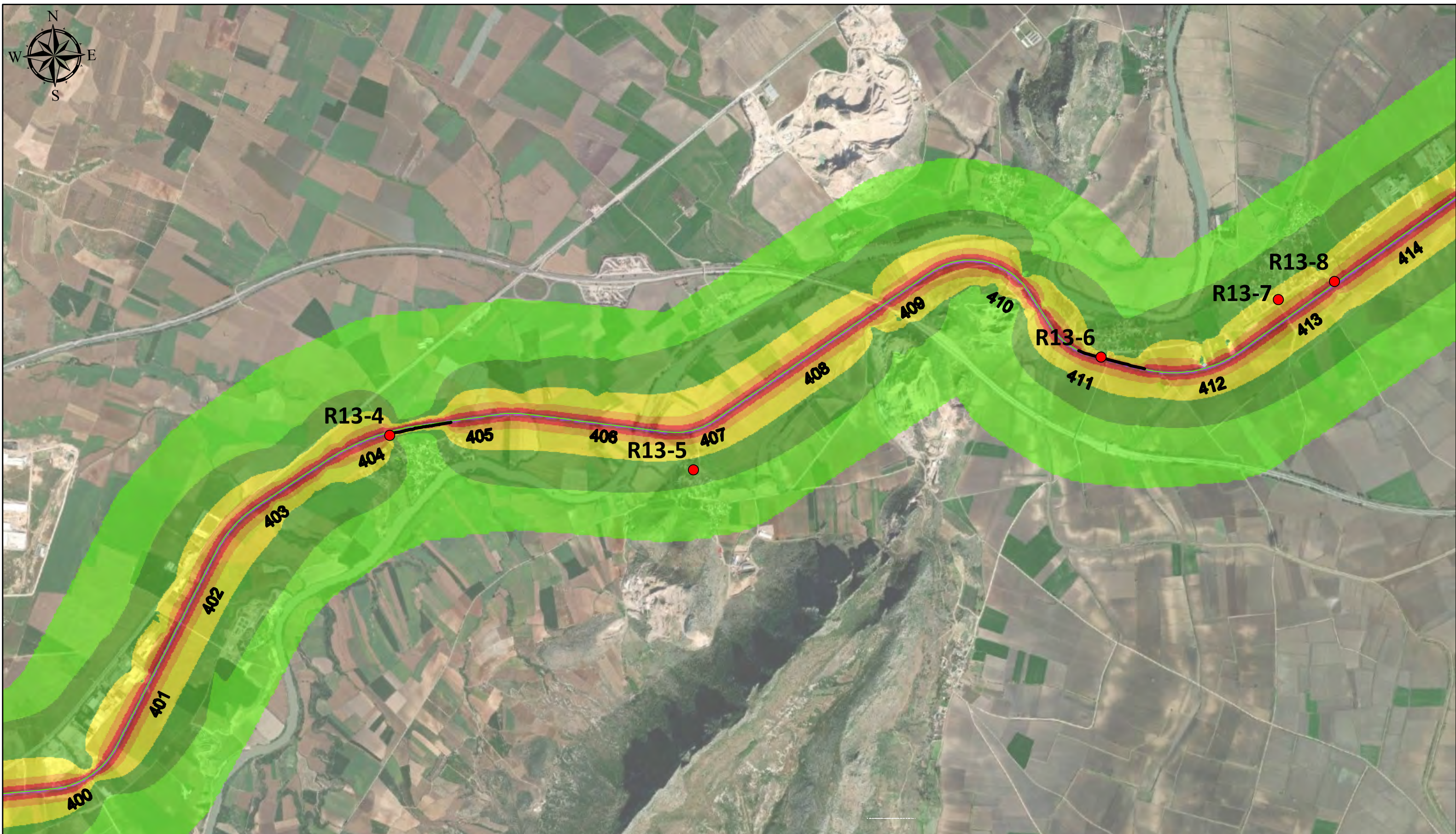


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day



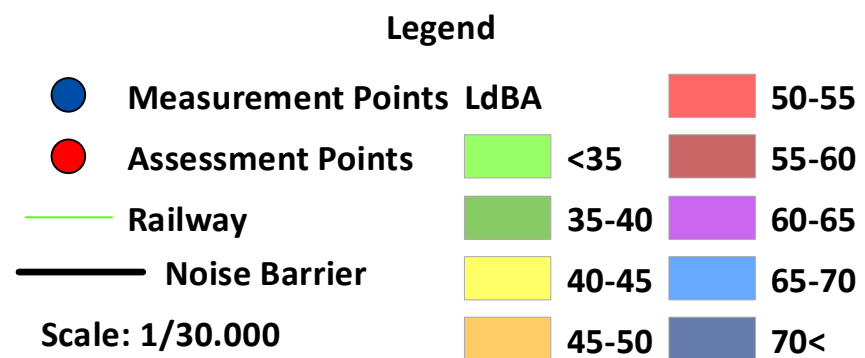
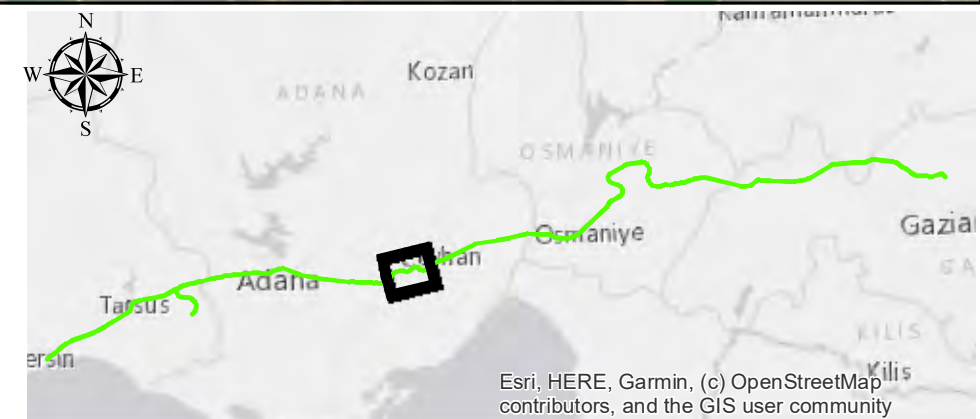
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



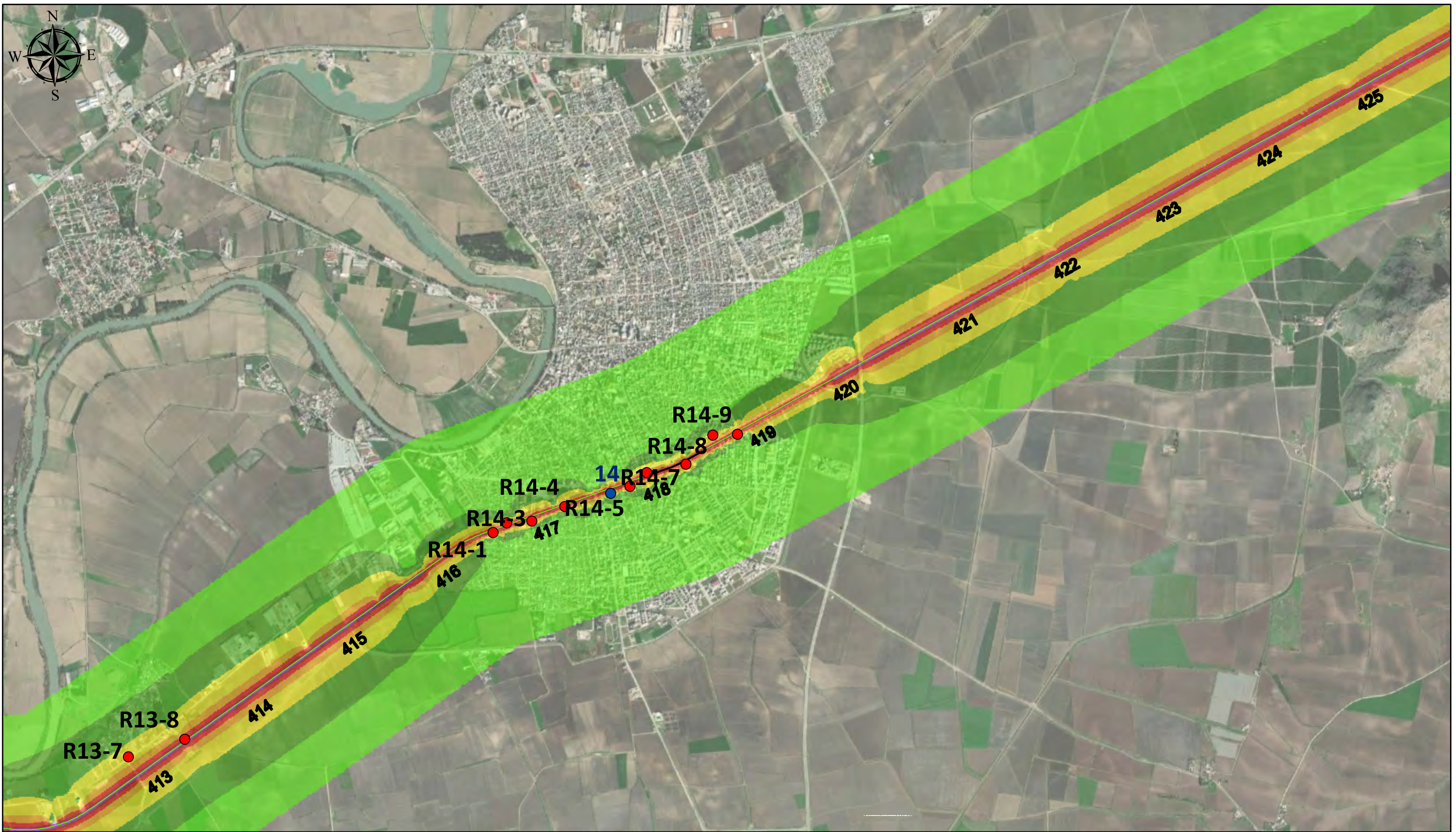
FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

Measurement and Assessment Points
Operation Phase - Mitigated, Day

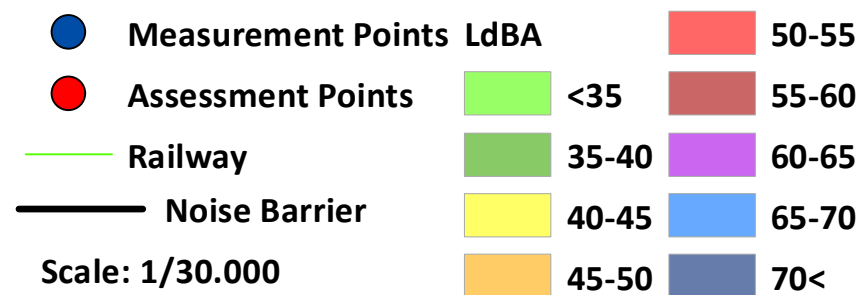
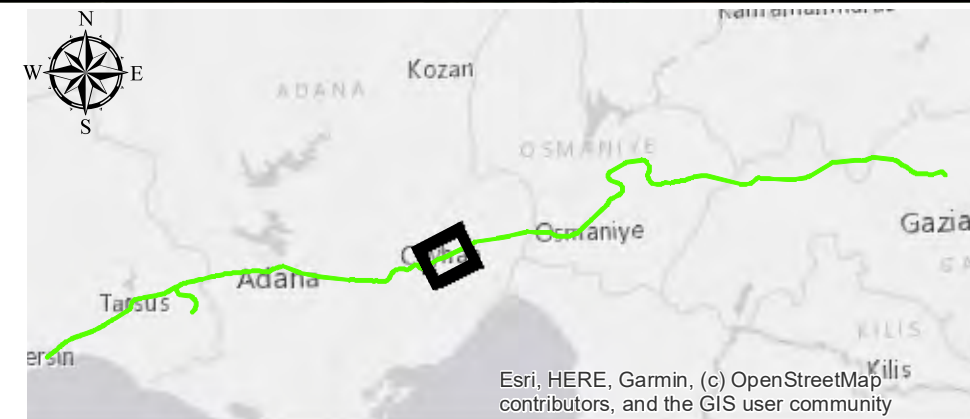


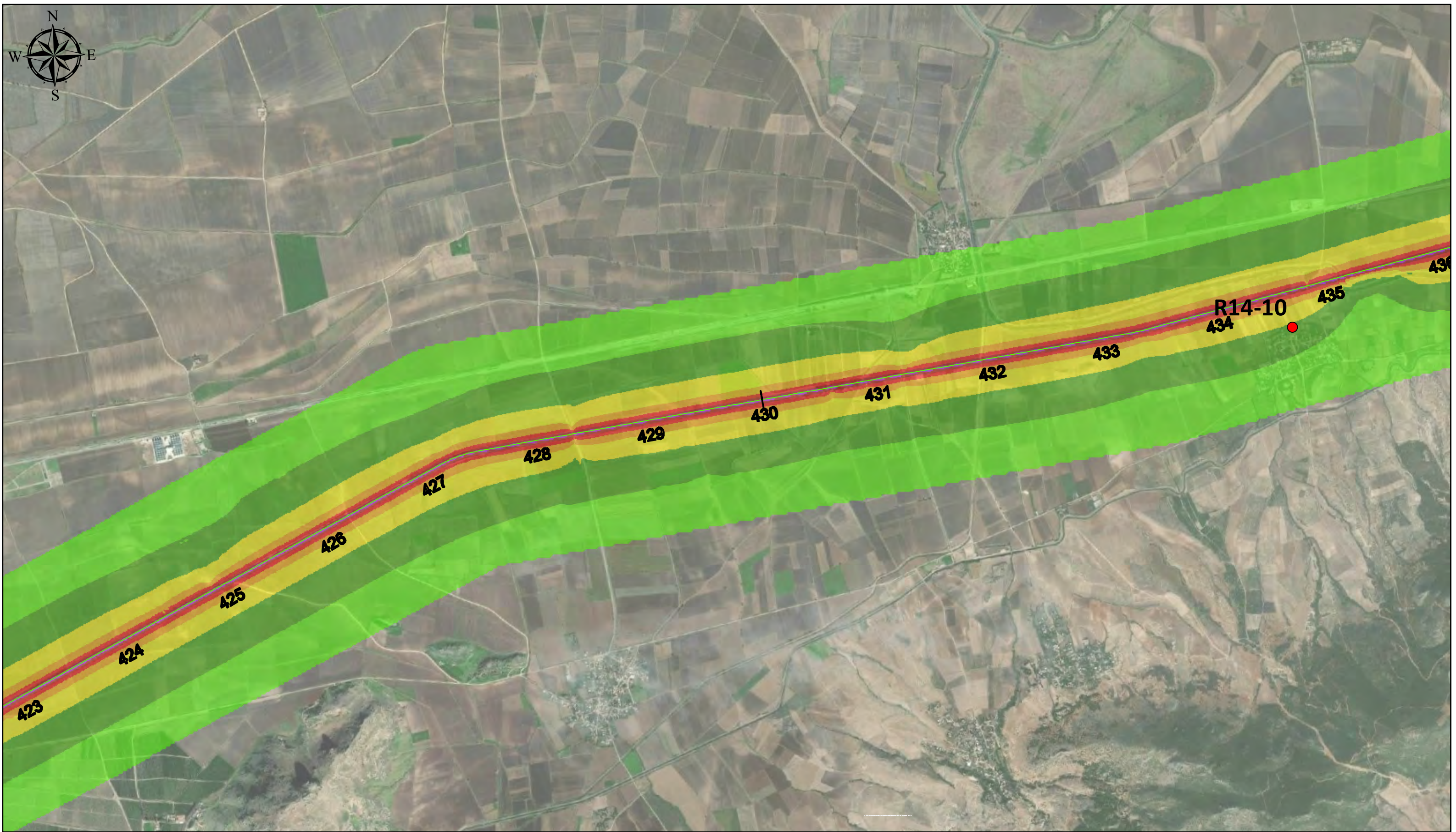
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

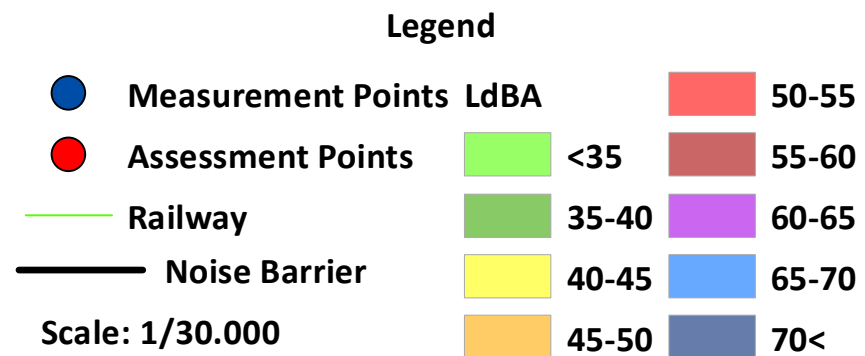
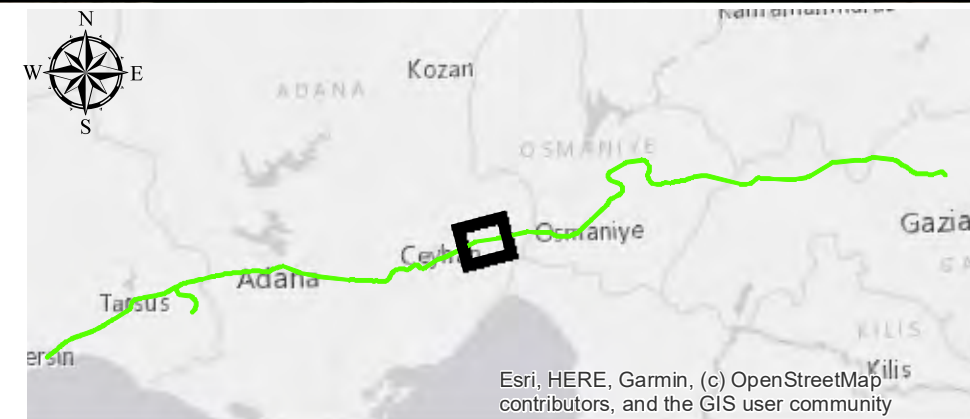
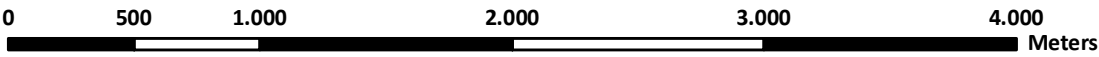
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

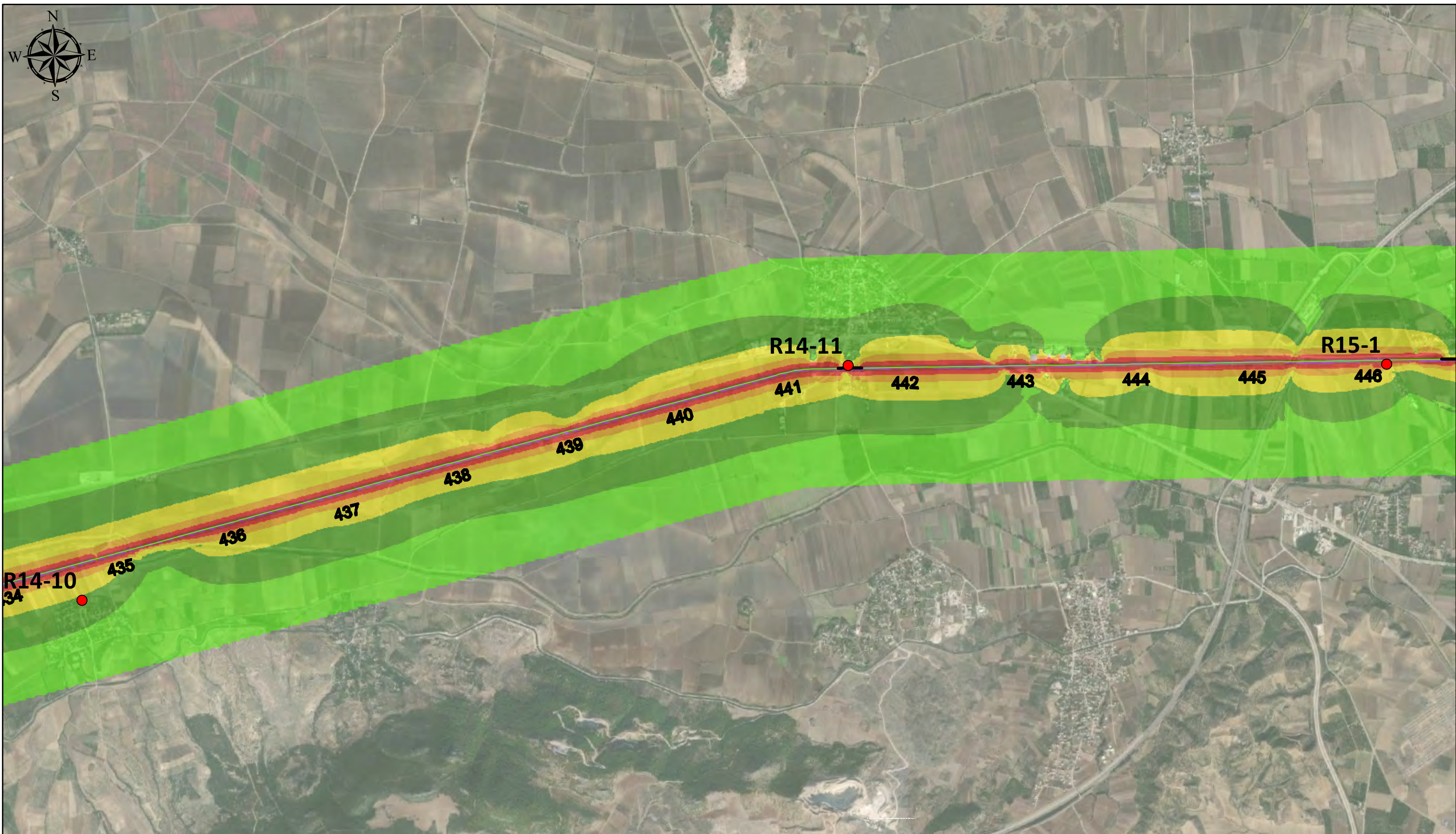




FREKANS

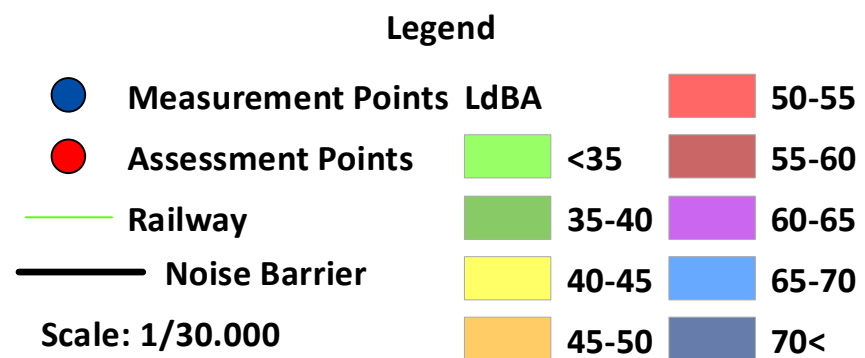
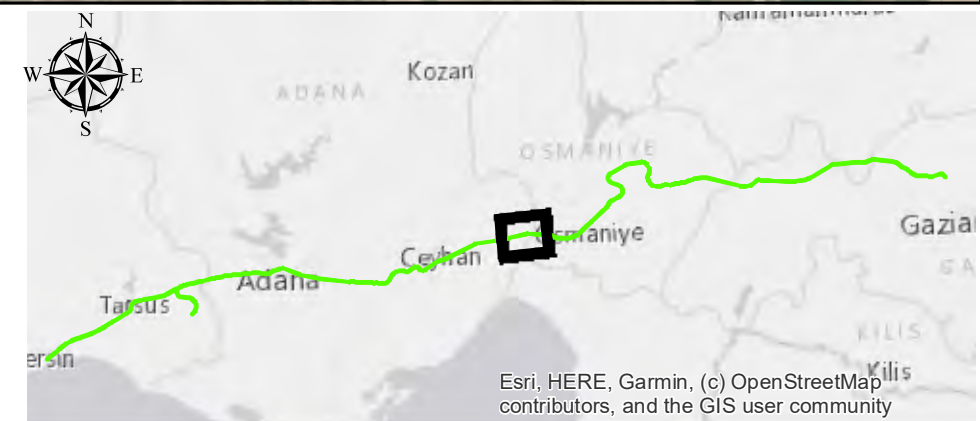
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

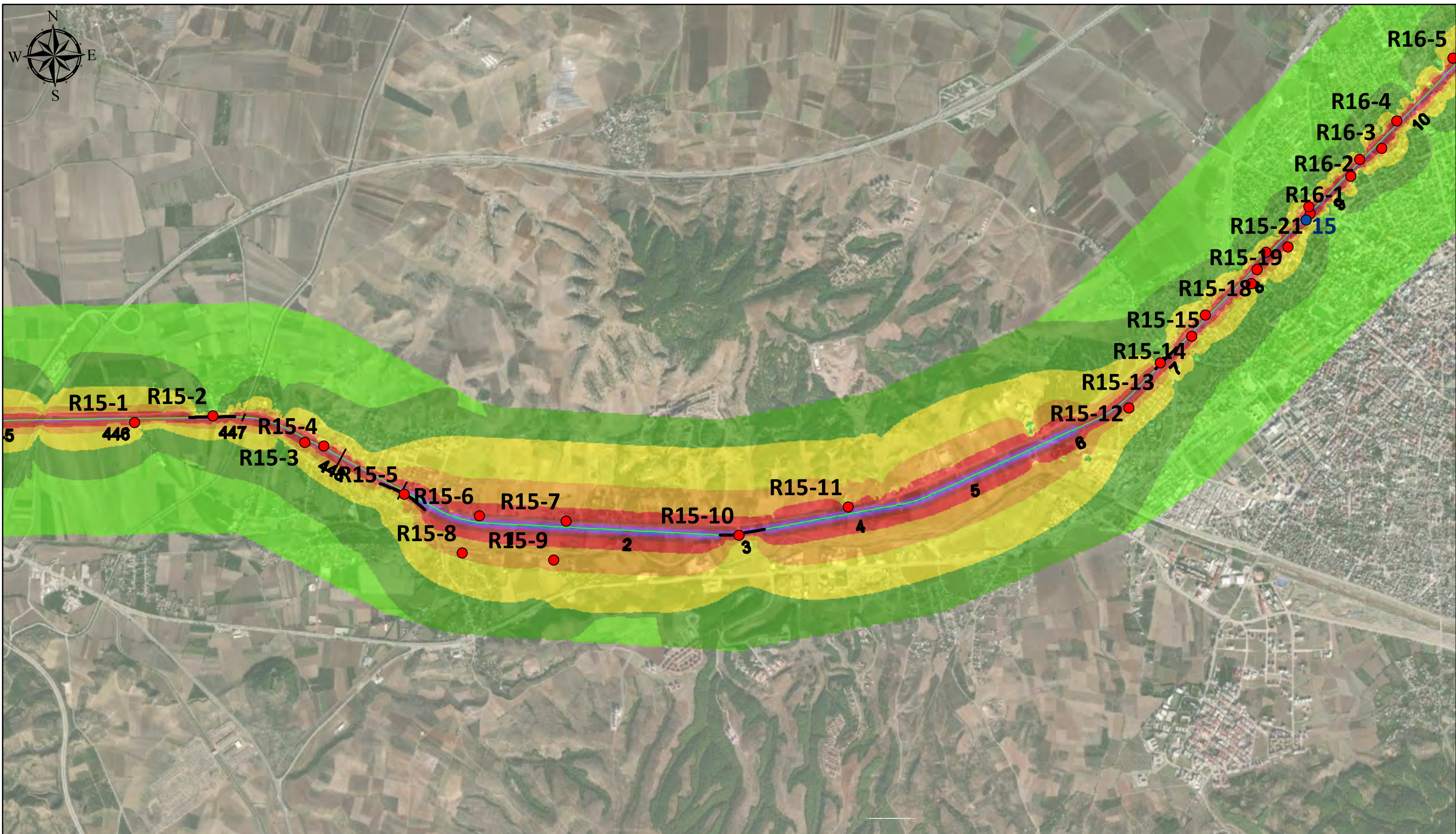




FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

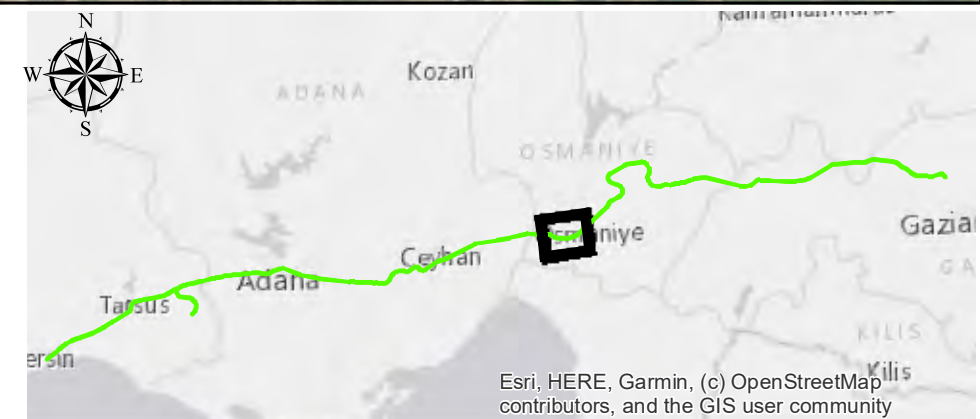


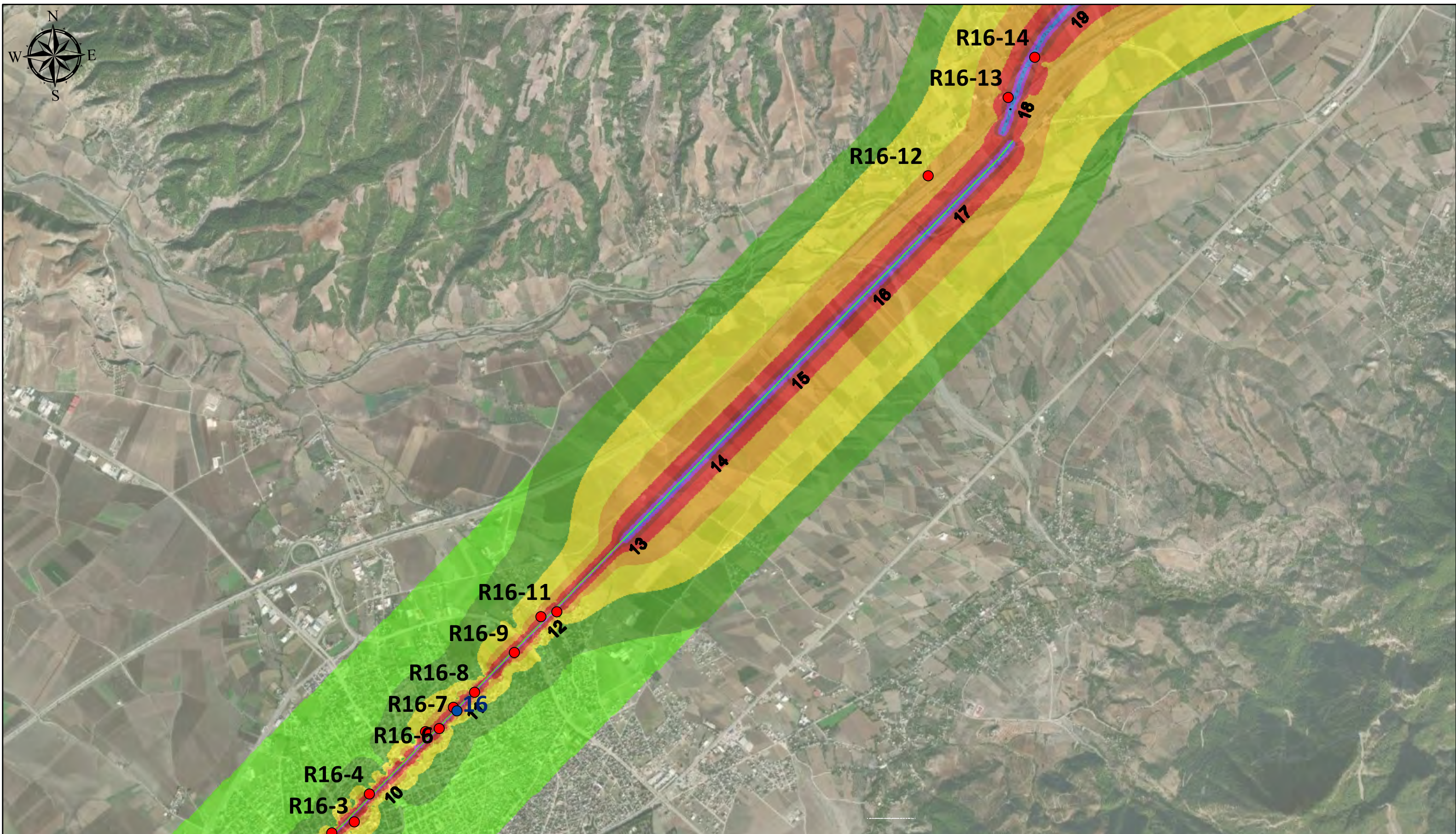


FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

Measurement and Assessment Points
Operation Phase - Mitigated, Day





FREKANS

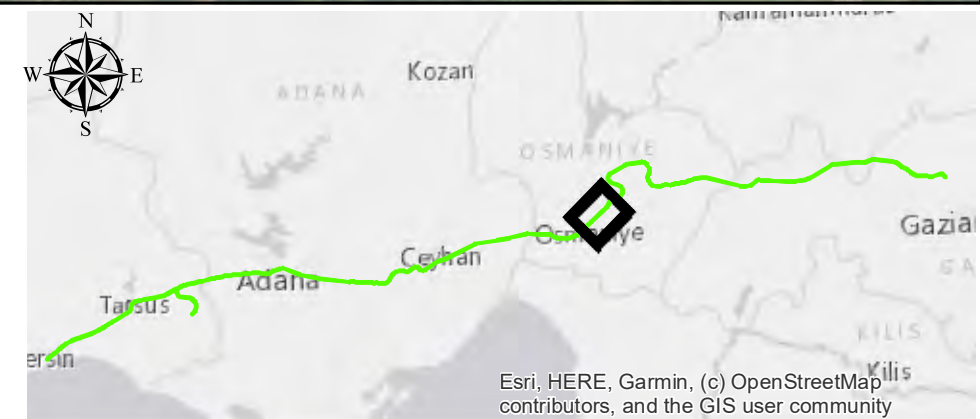
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

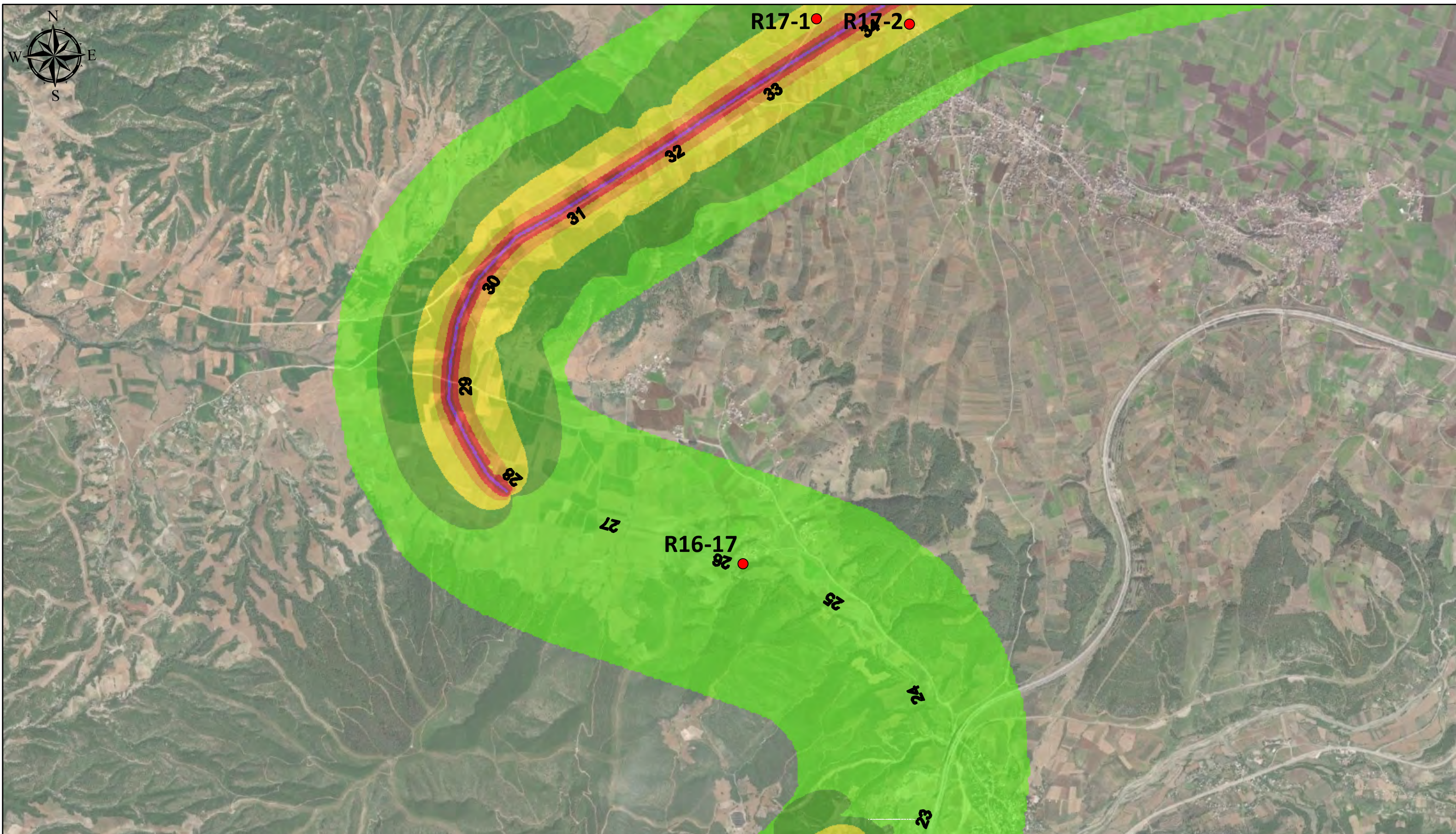
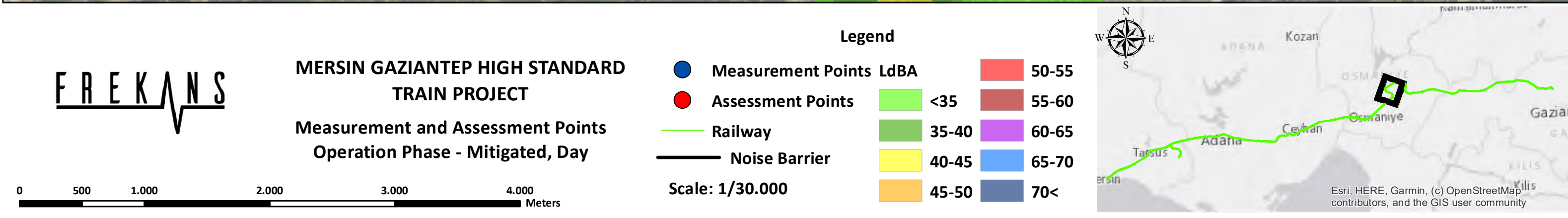
- Measurement Points LdBA
- Assessment Points
- Railway
- Noise Barrier

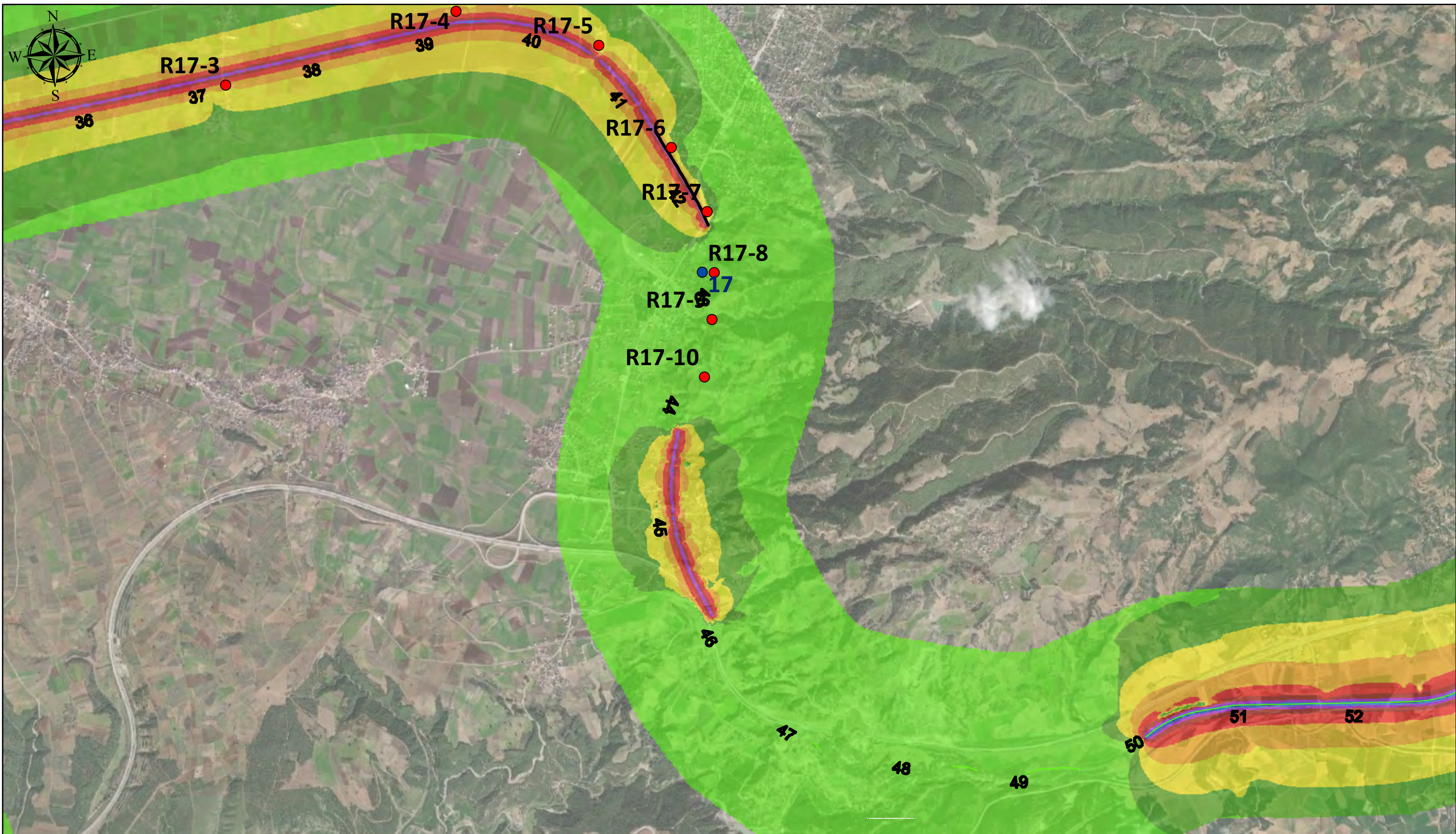
Scale: 1/30.000

Legend

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<



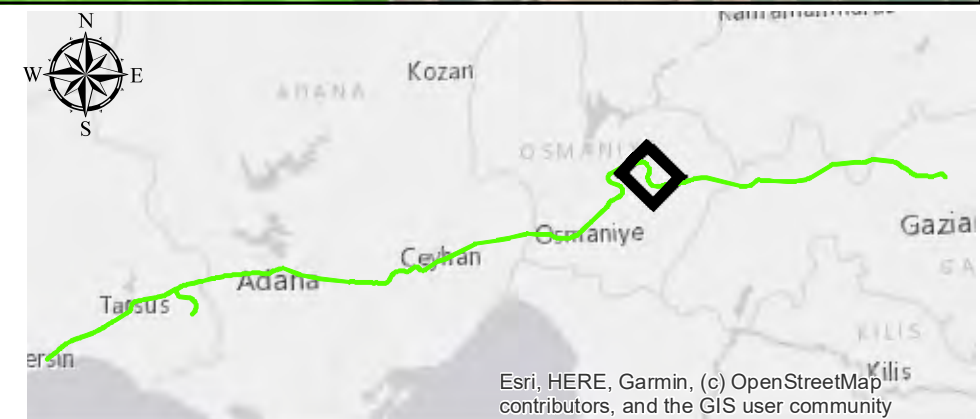


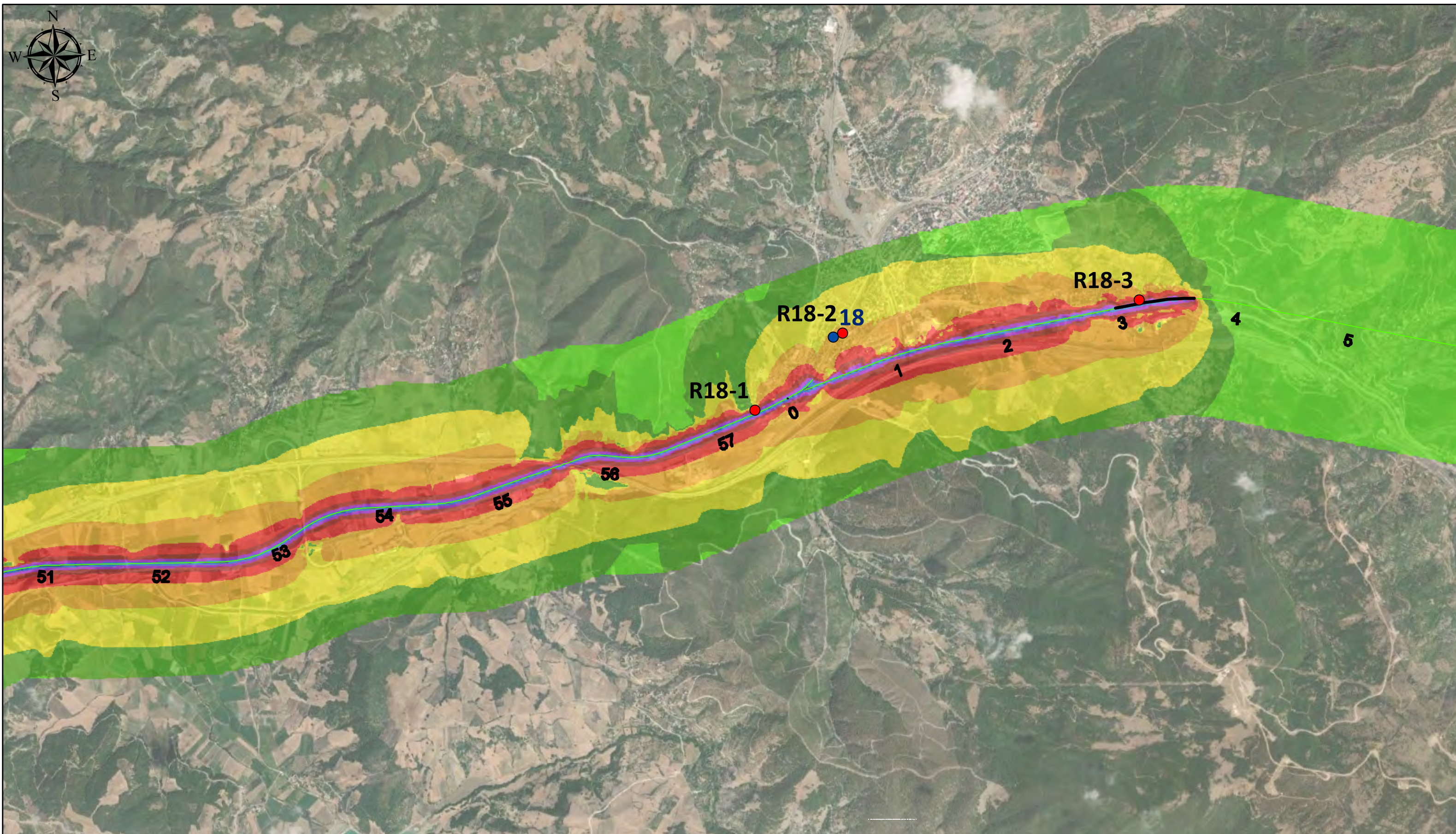


FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

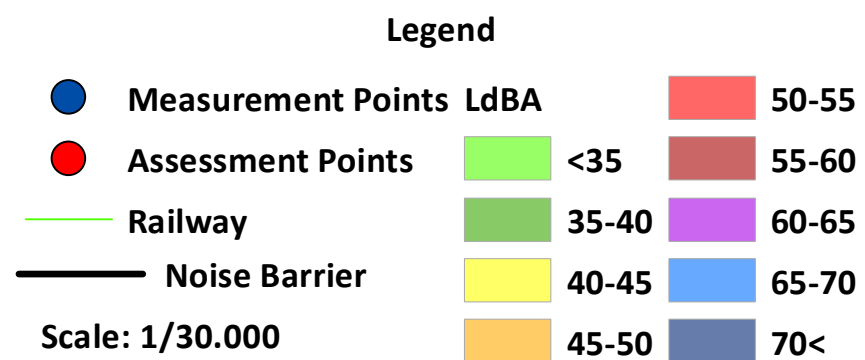
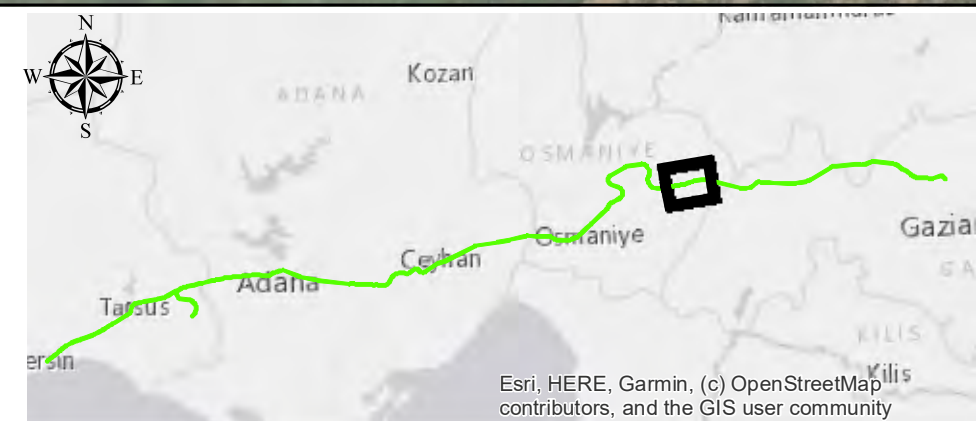
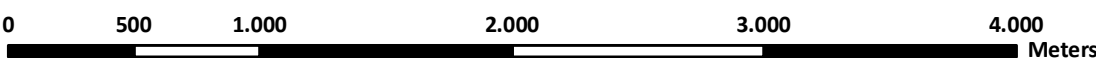
Measurement and Assessment Points
Operation Phase - Mitigated, Day

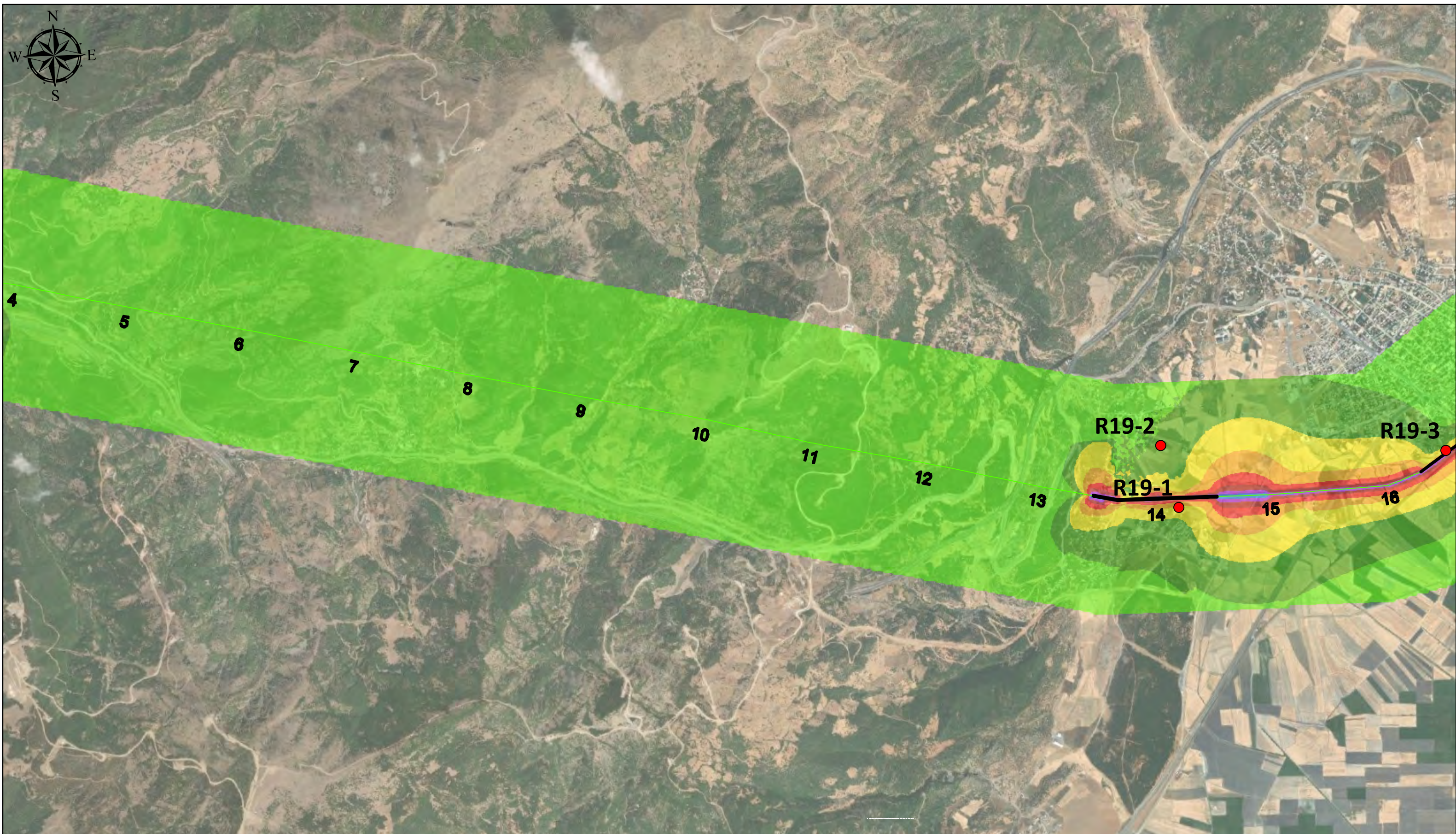




**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**

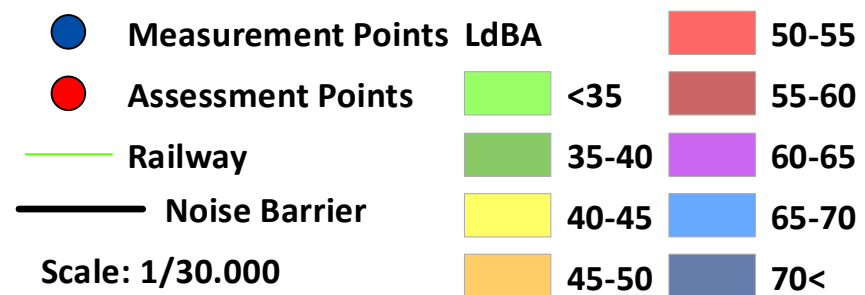
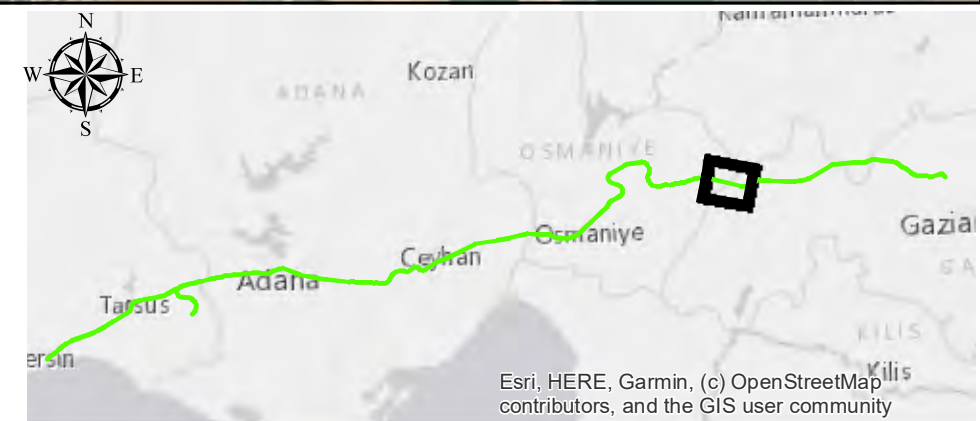
Measurement and Assessment Points
Operation Phase - Mitigated, Day



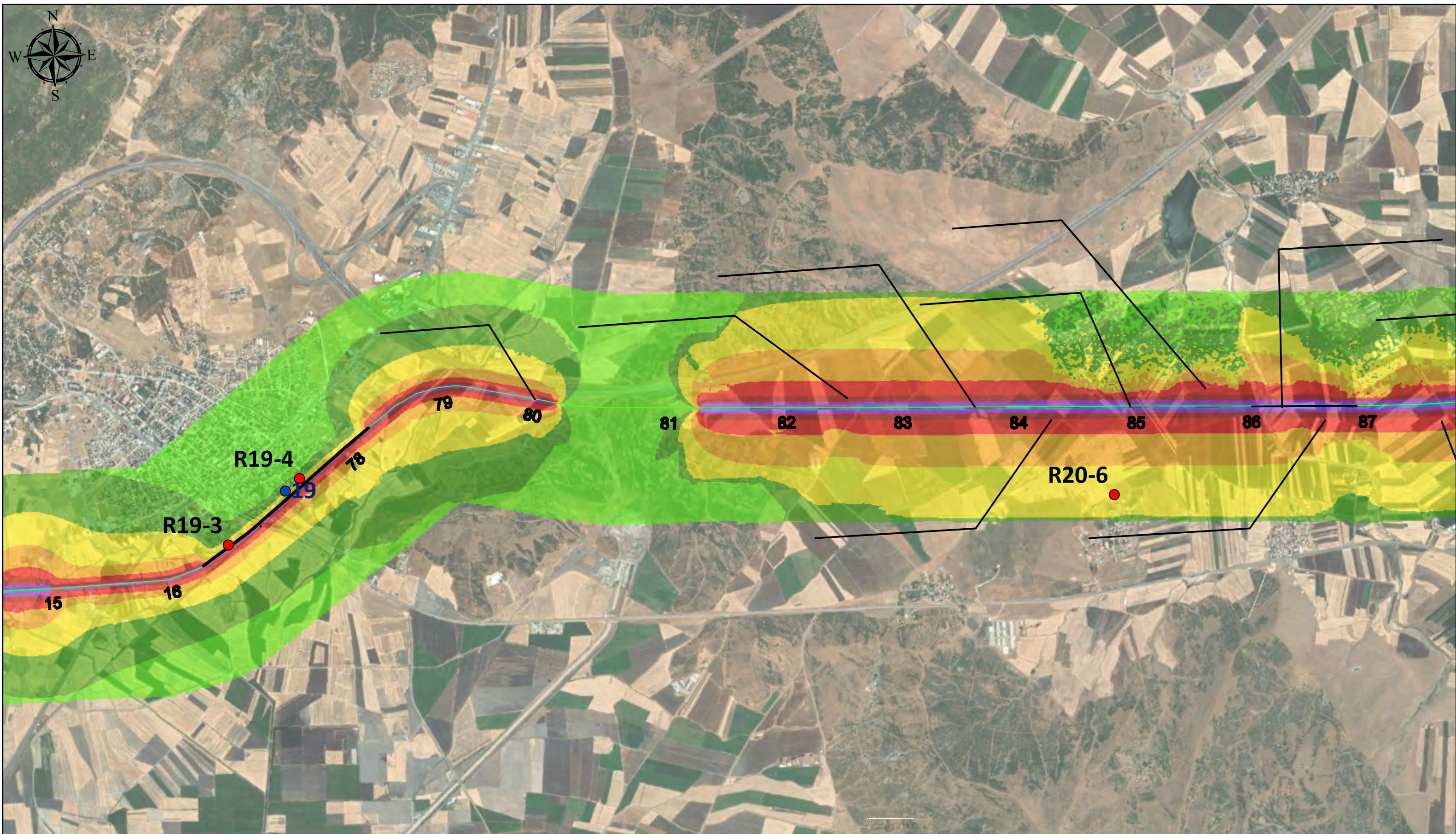


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day



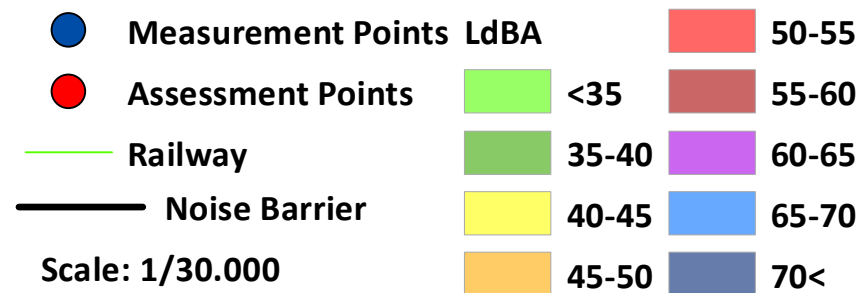
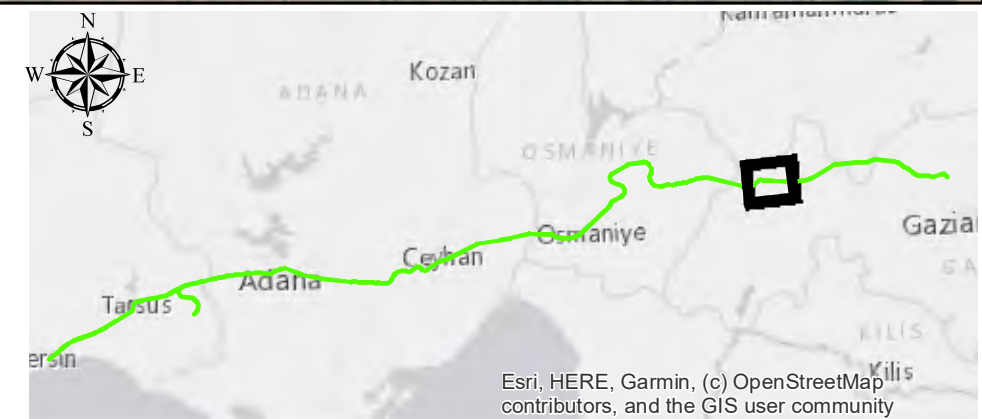
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

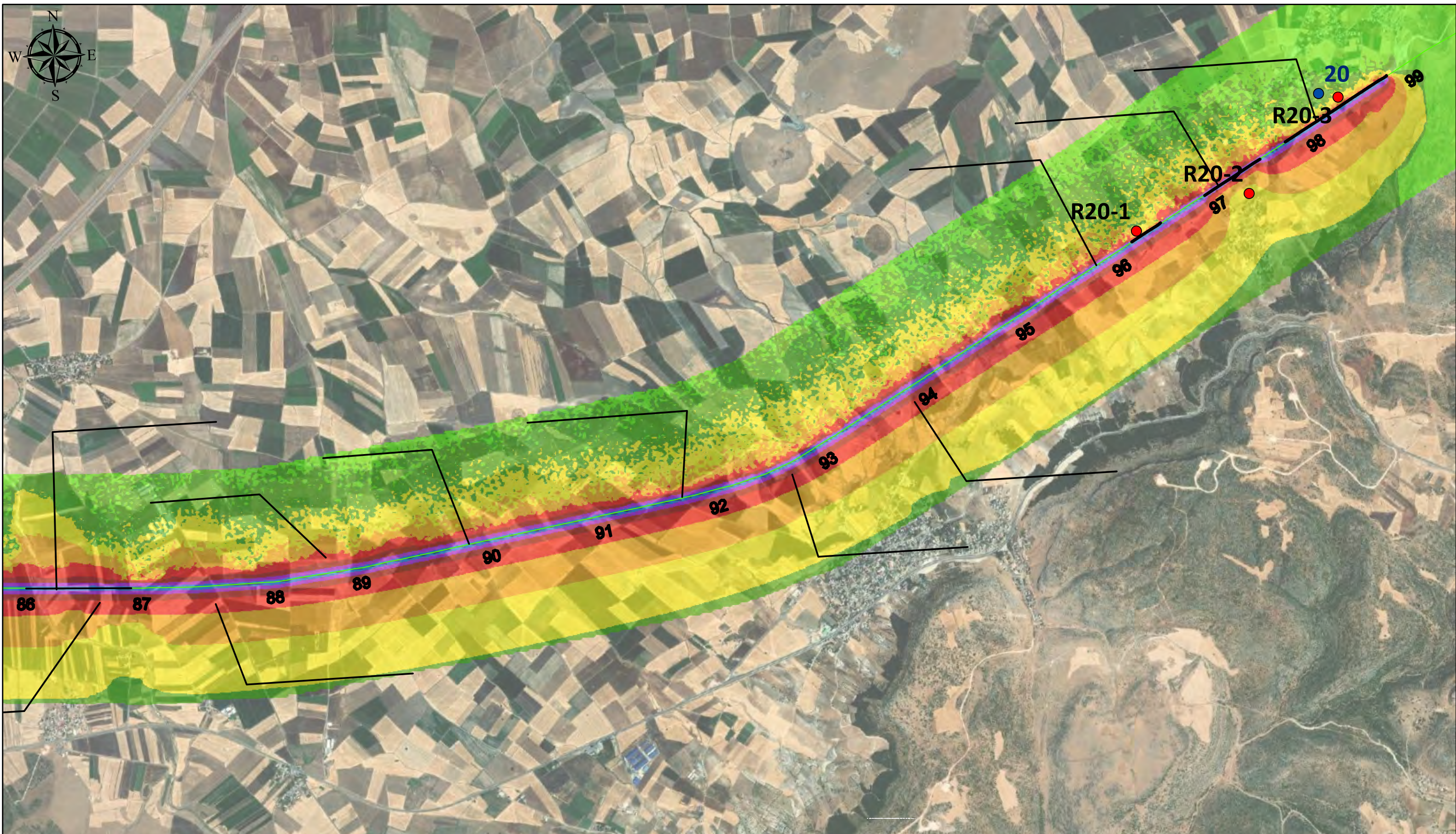


FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

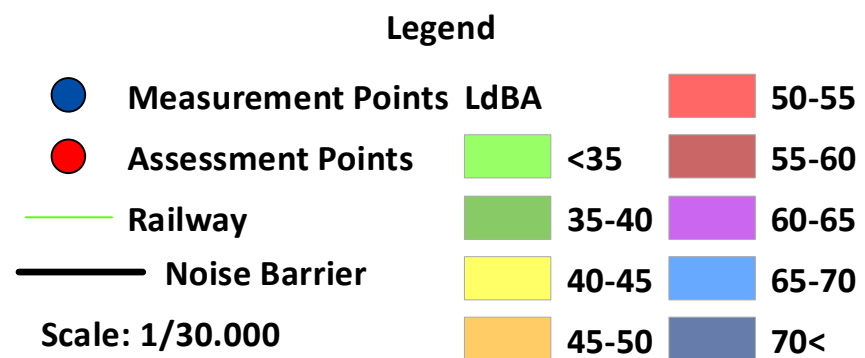
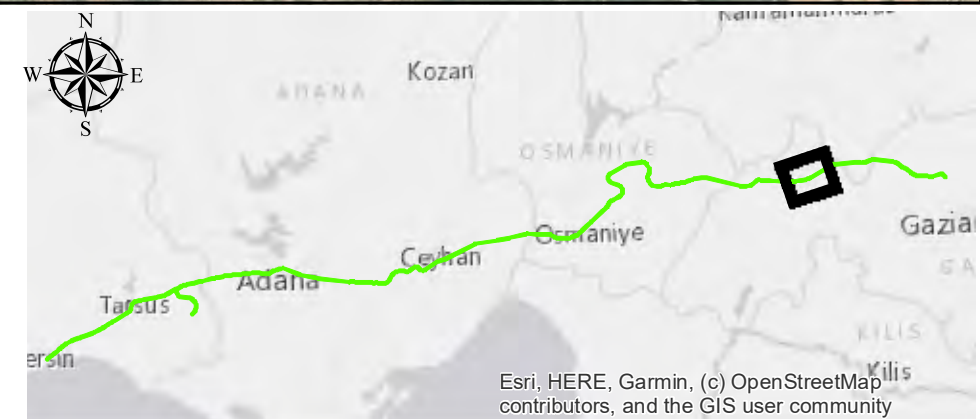
**Measurement and Assessment Points
Operation Phase - Mitigated, Day**





FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

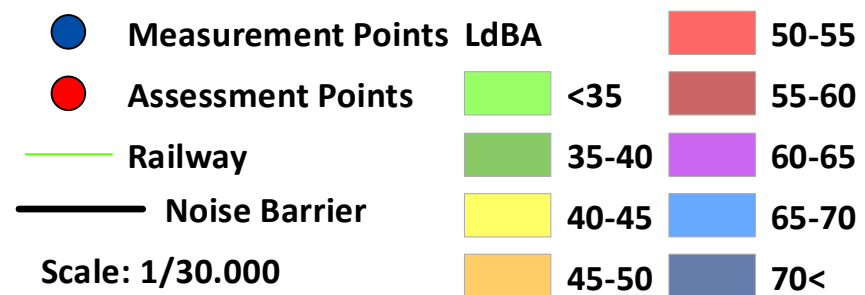
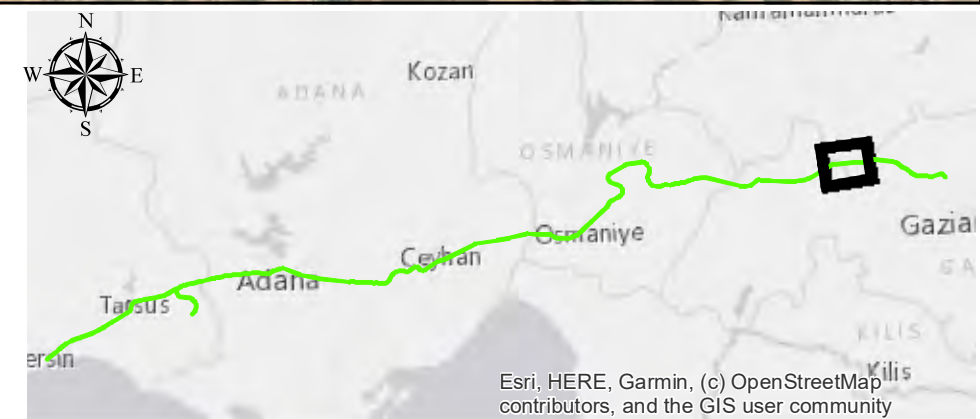


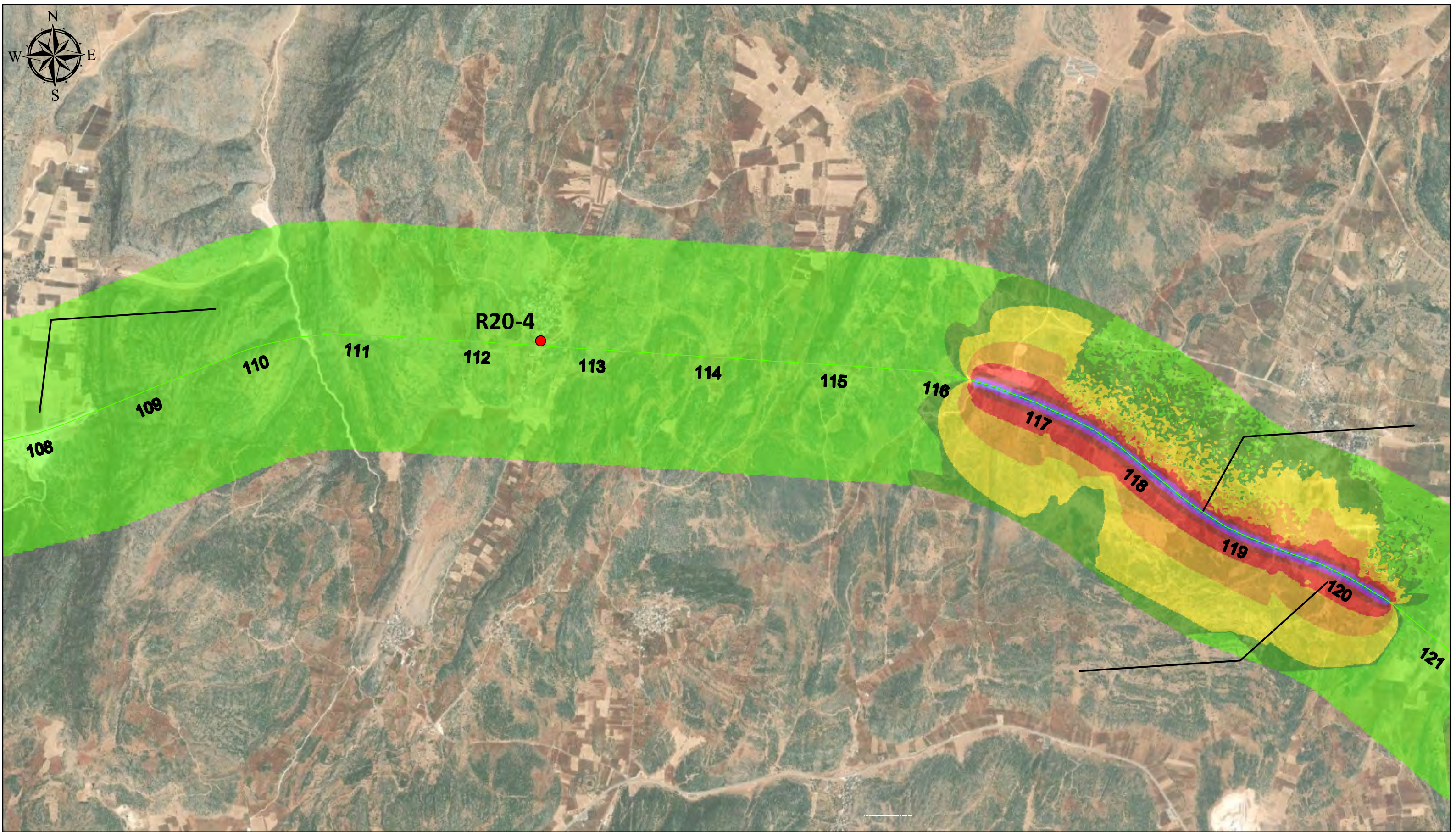
0 500 1.000 2.000 3.000 4.000 Meters



FREKANS

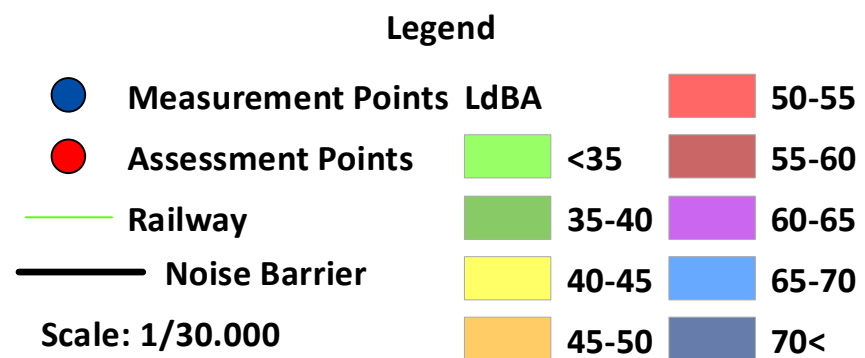
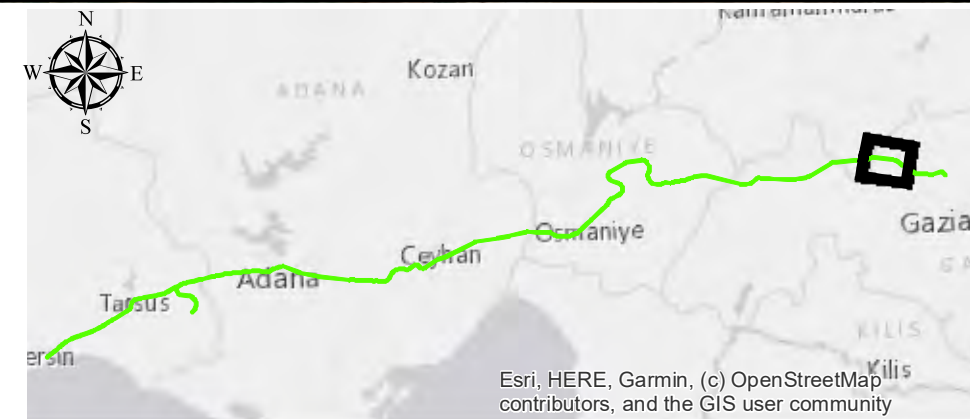
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

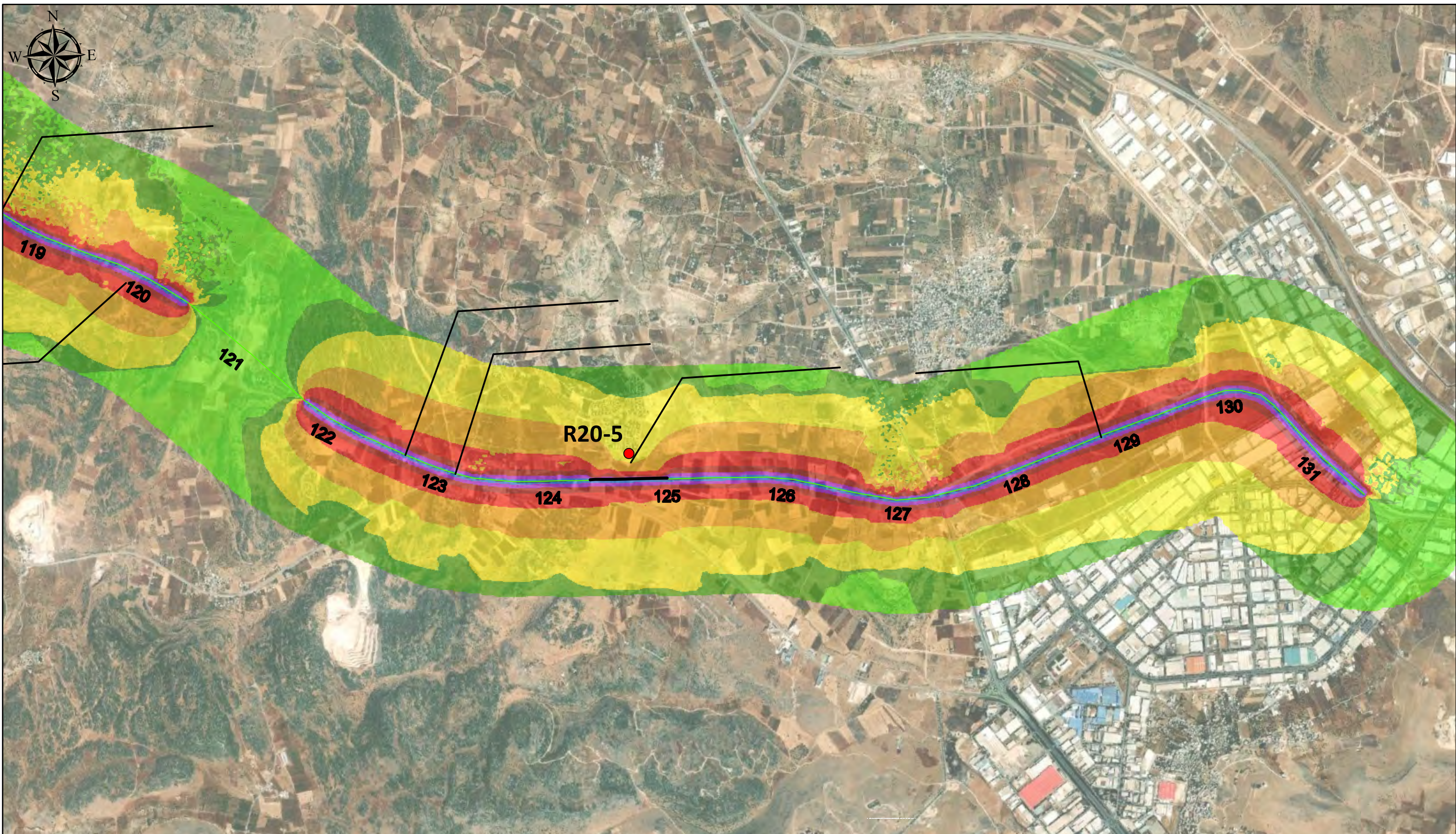




FREKANS

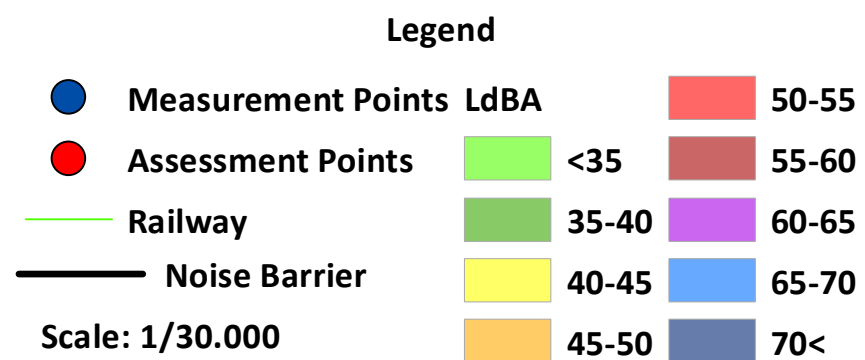
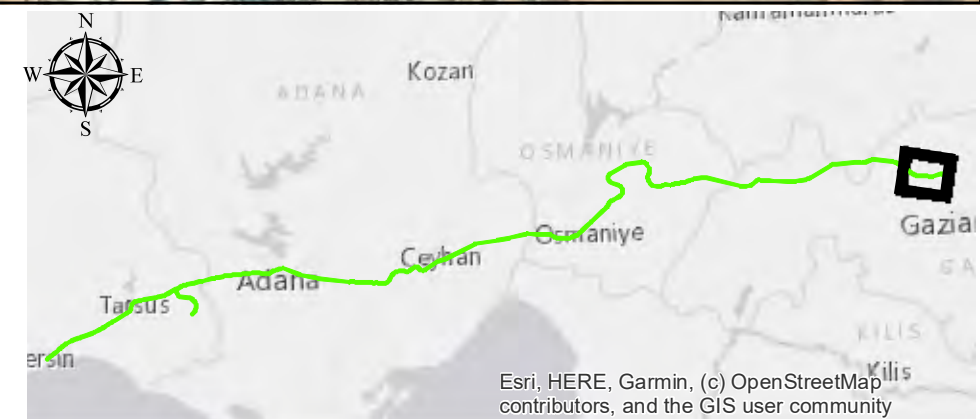
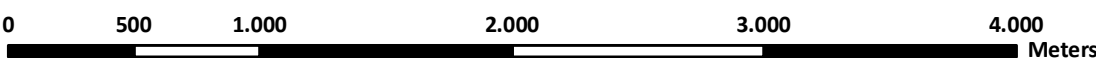
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day





FREKANS

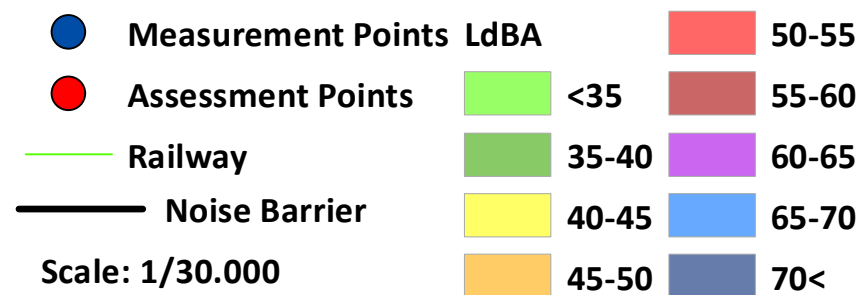
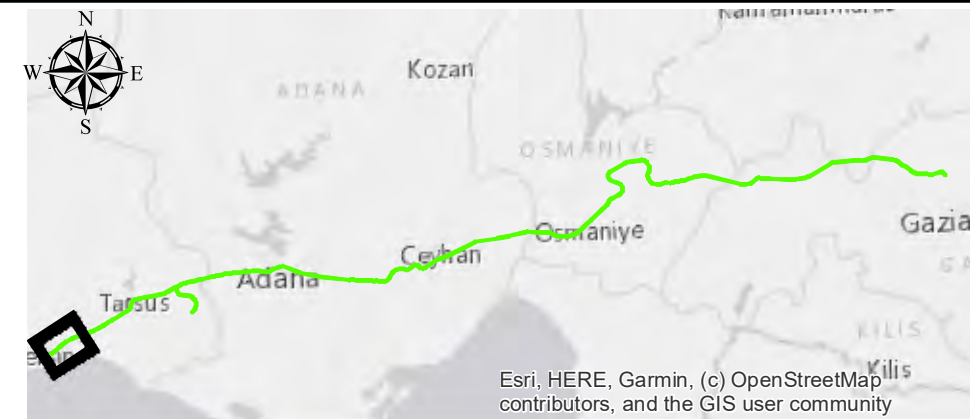
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Day

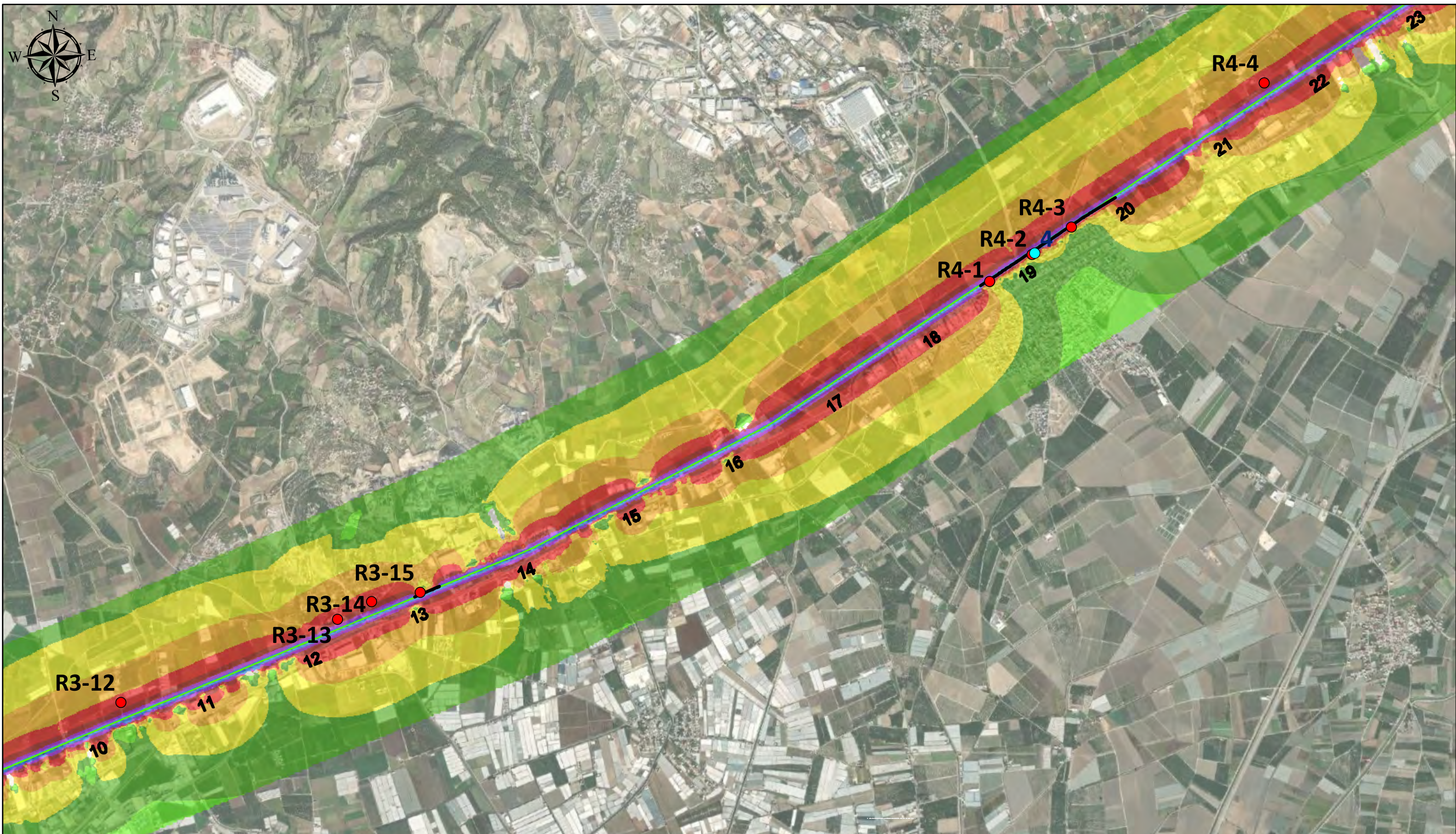




FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night





FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

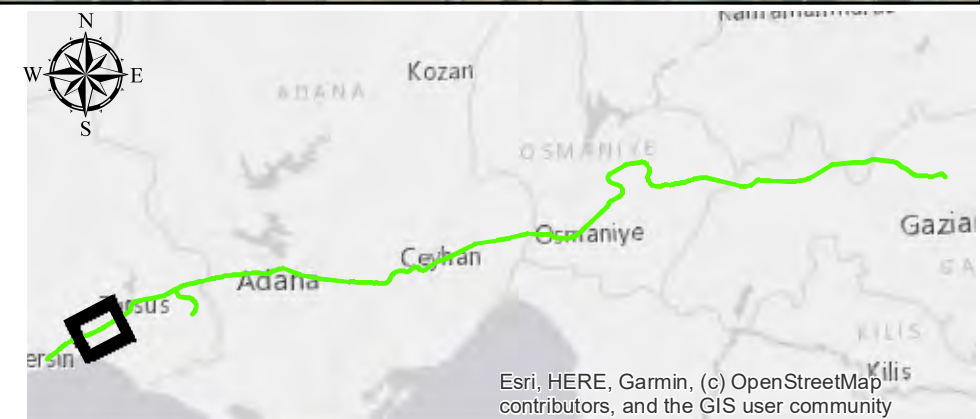
Measurement and Assessment Points
Operation Phase - Mitigated, Night

- Measurement Points LdBA
- Assessment Points
- Railway
- Noise Barrier

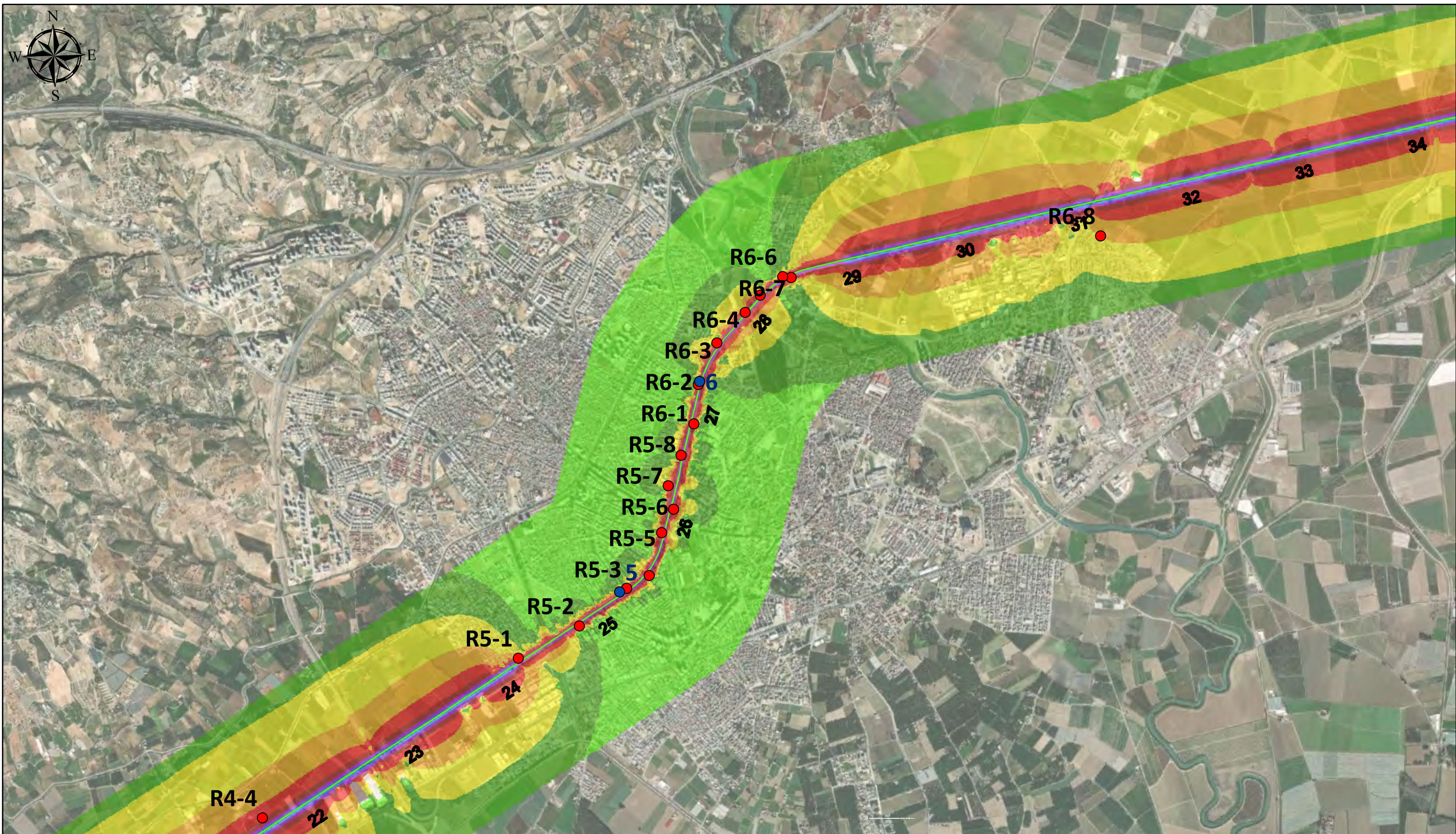
Scale: 1/30.000

Legend

<35	50-55
35-40	55-60
40-45	60-65
45-50	65-70
	70<



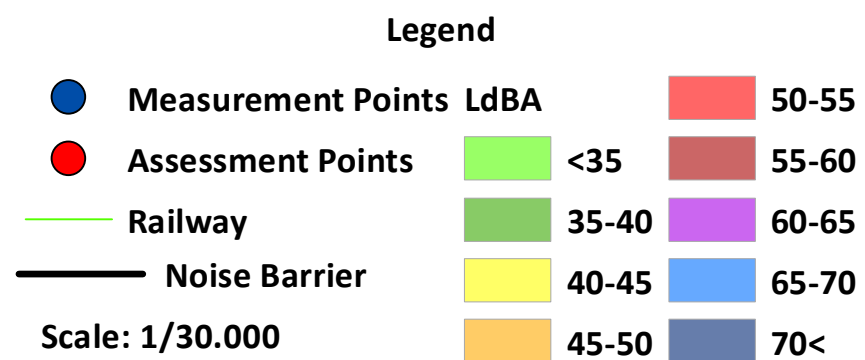
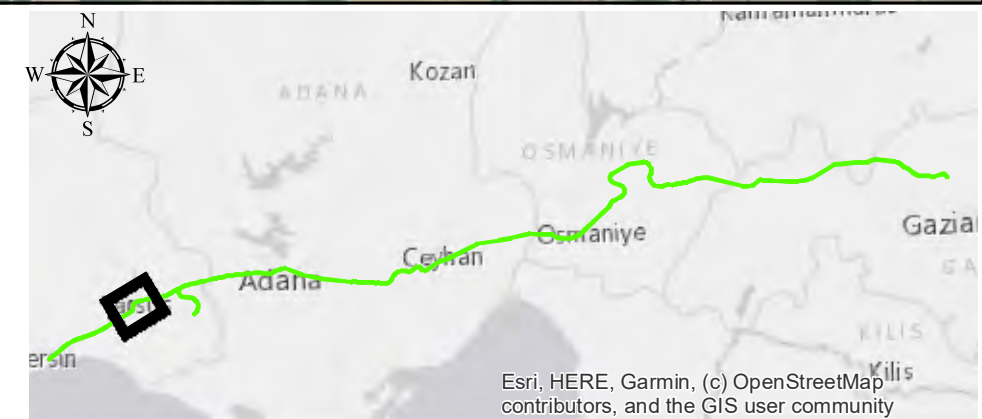
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



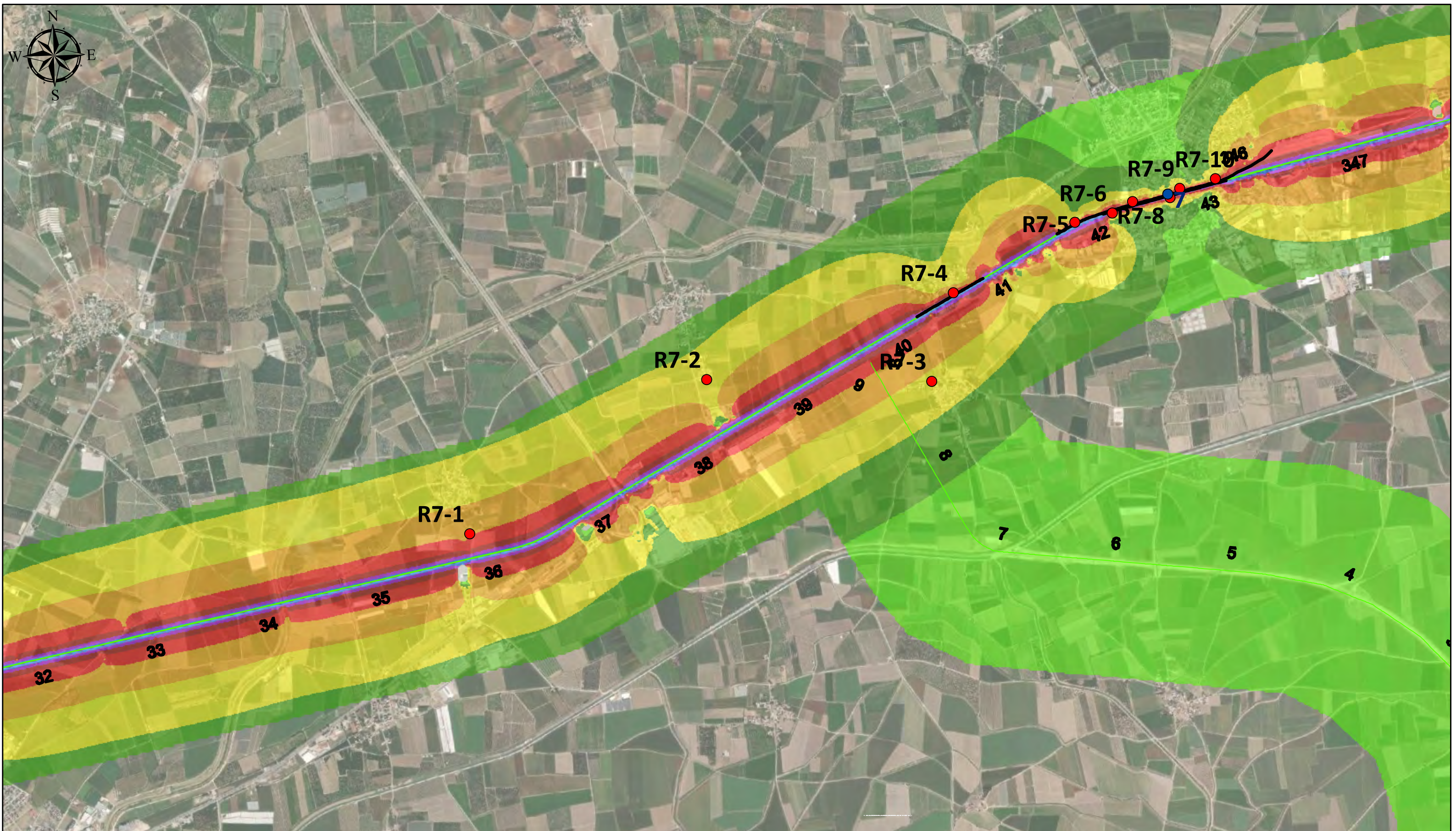
FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

**Measurement and Assessment Points
Operation Phase - Mitigated, Night**

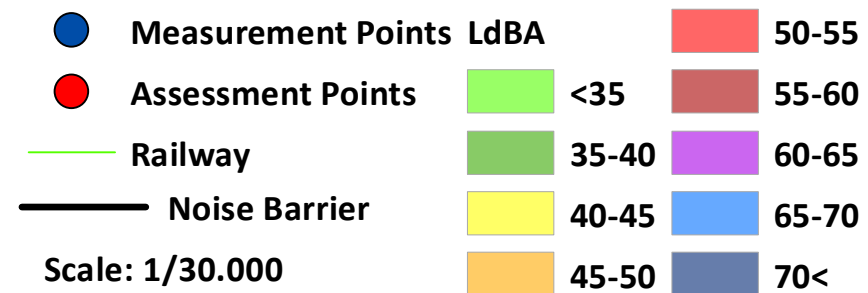
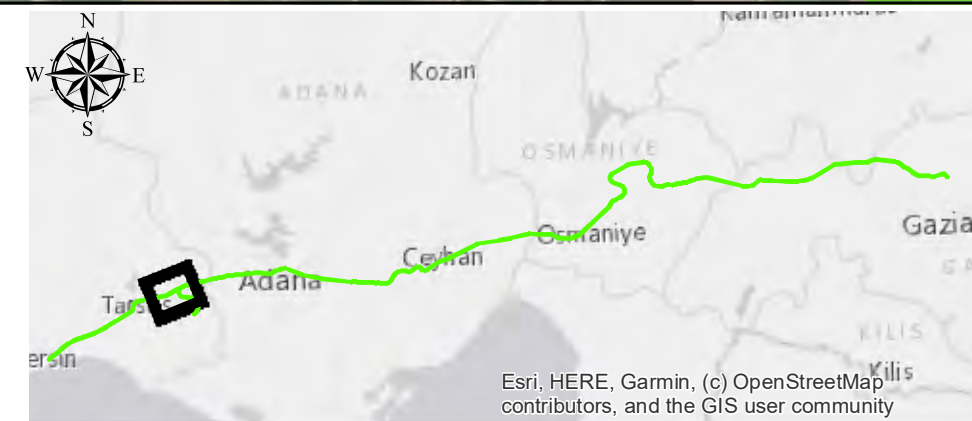


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

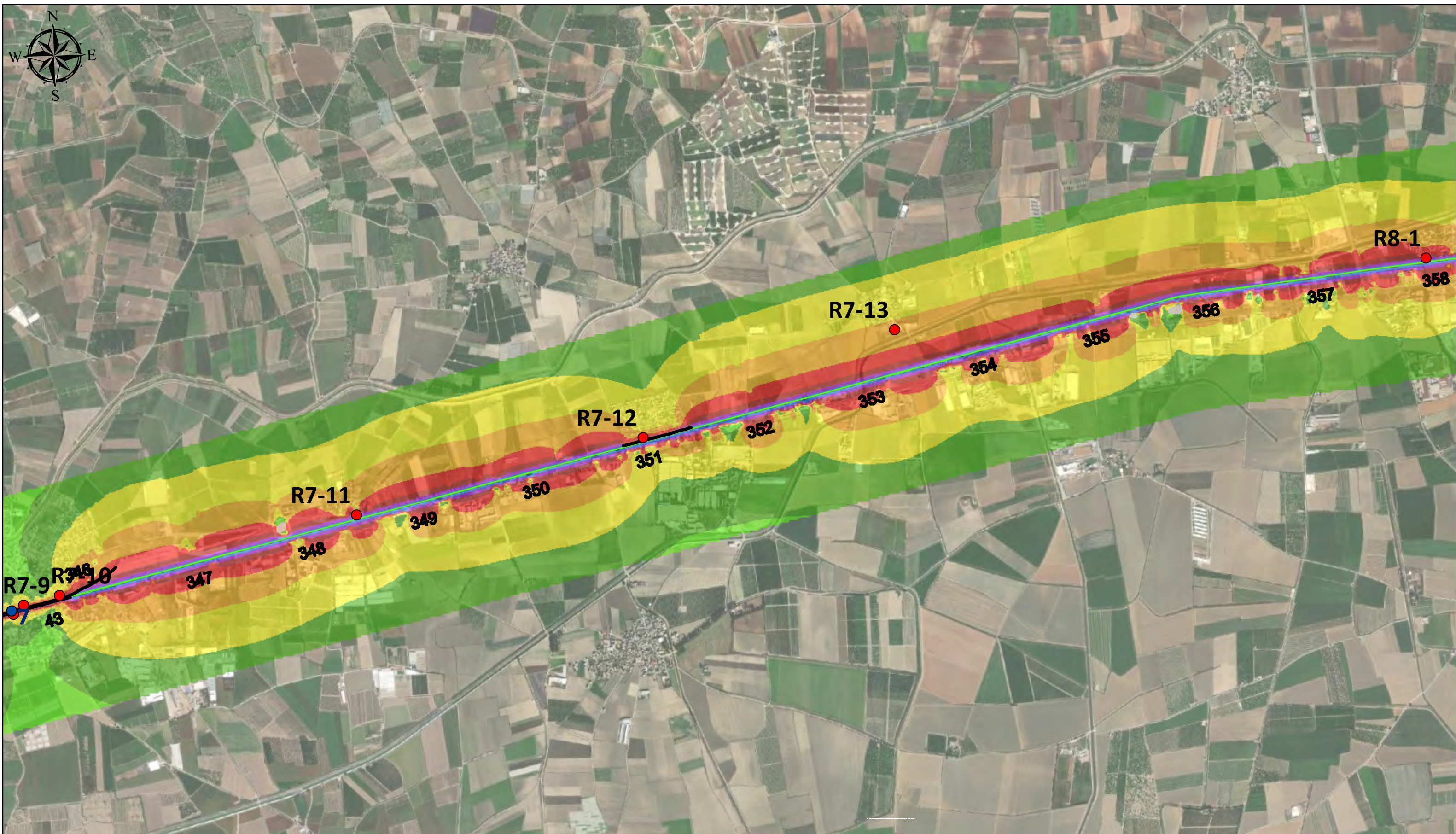


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

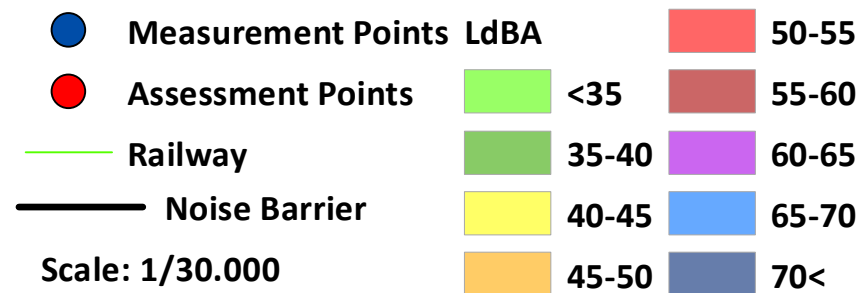
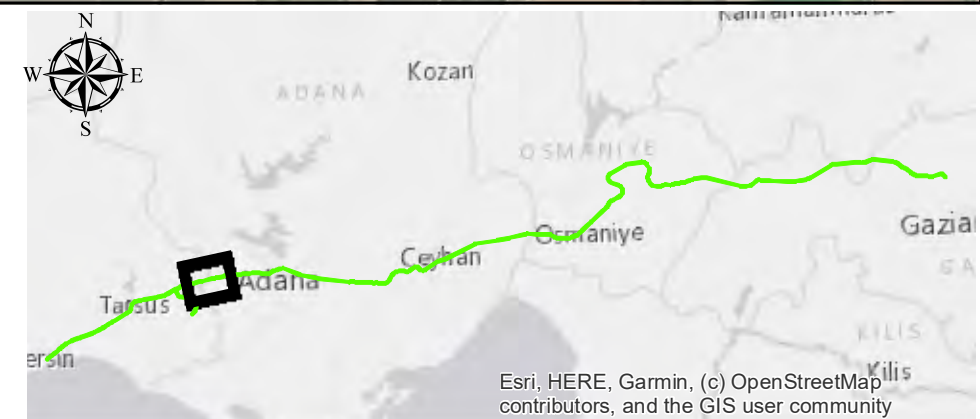


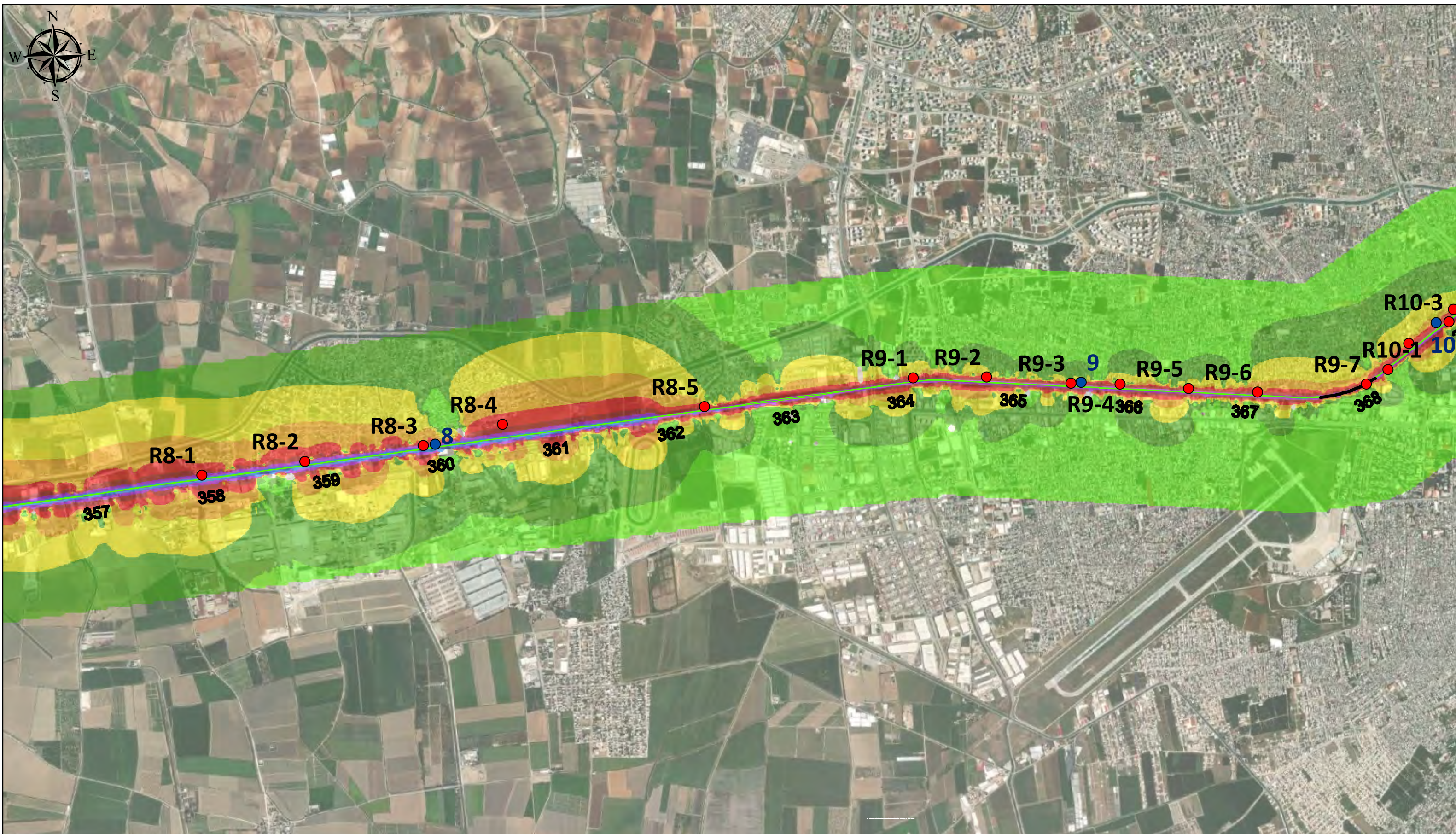
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

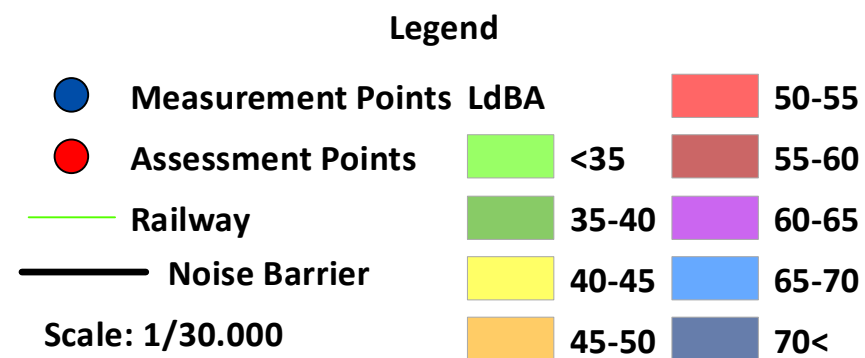
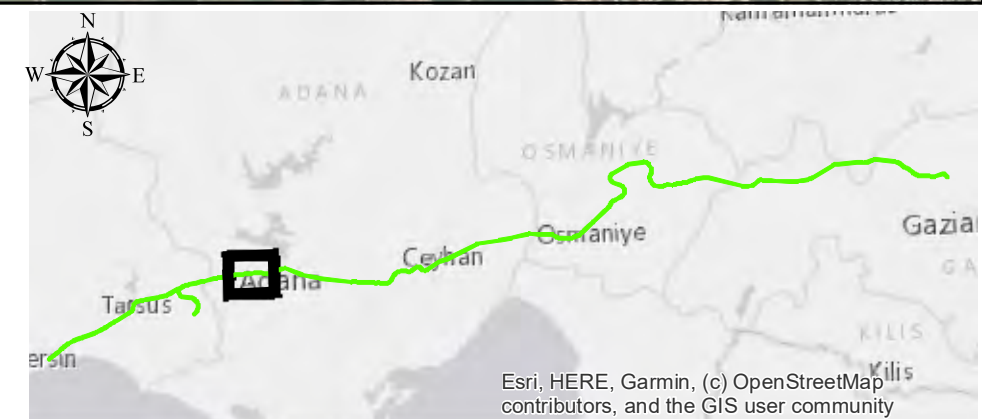




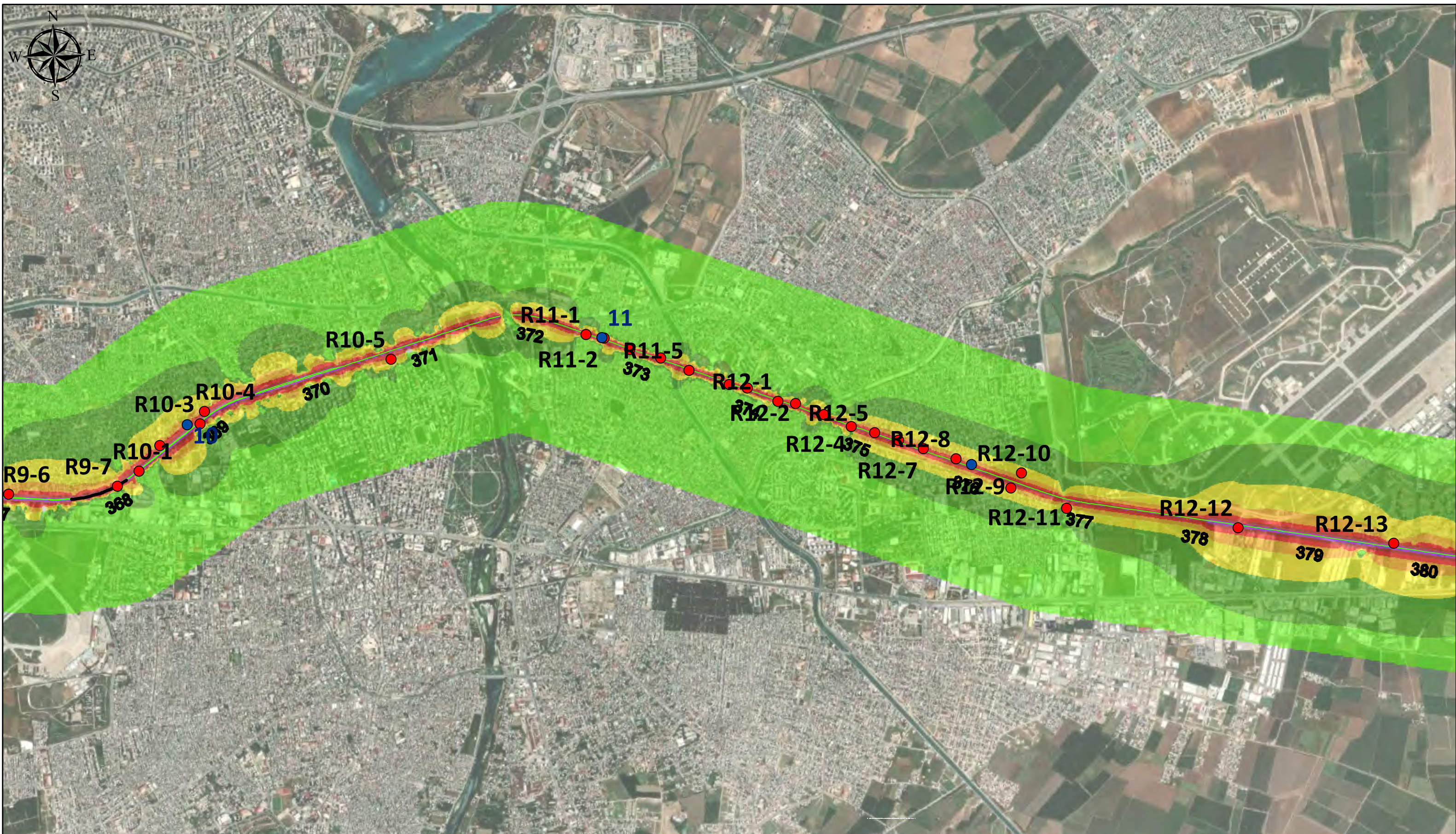
FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**

**Measurement and Assessment Points
Operation Phase - Mitigated, Night**



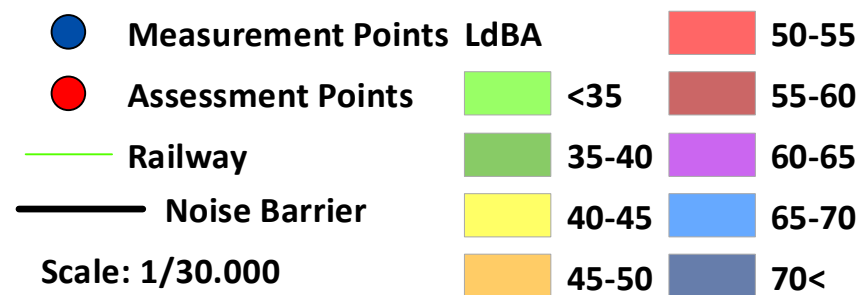
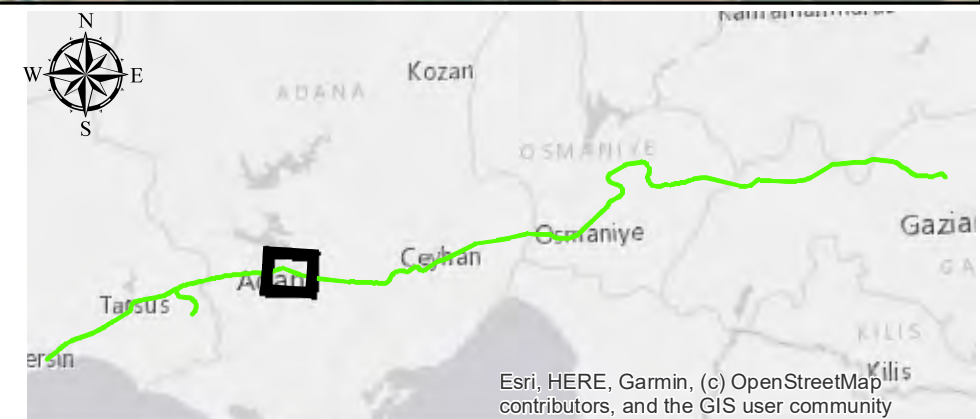
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



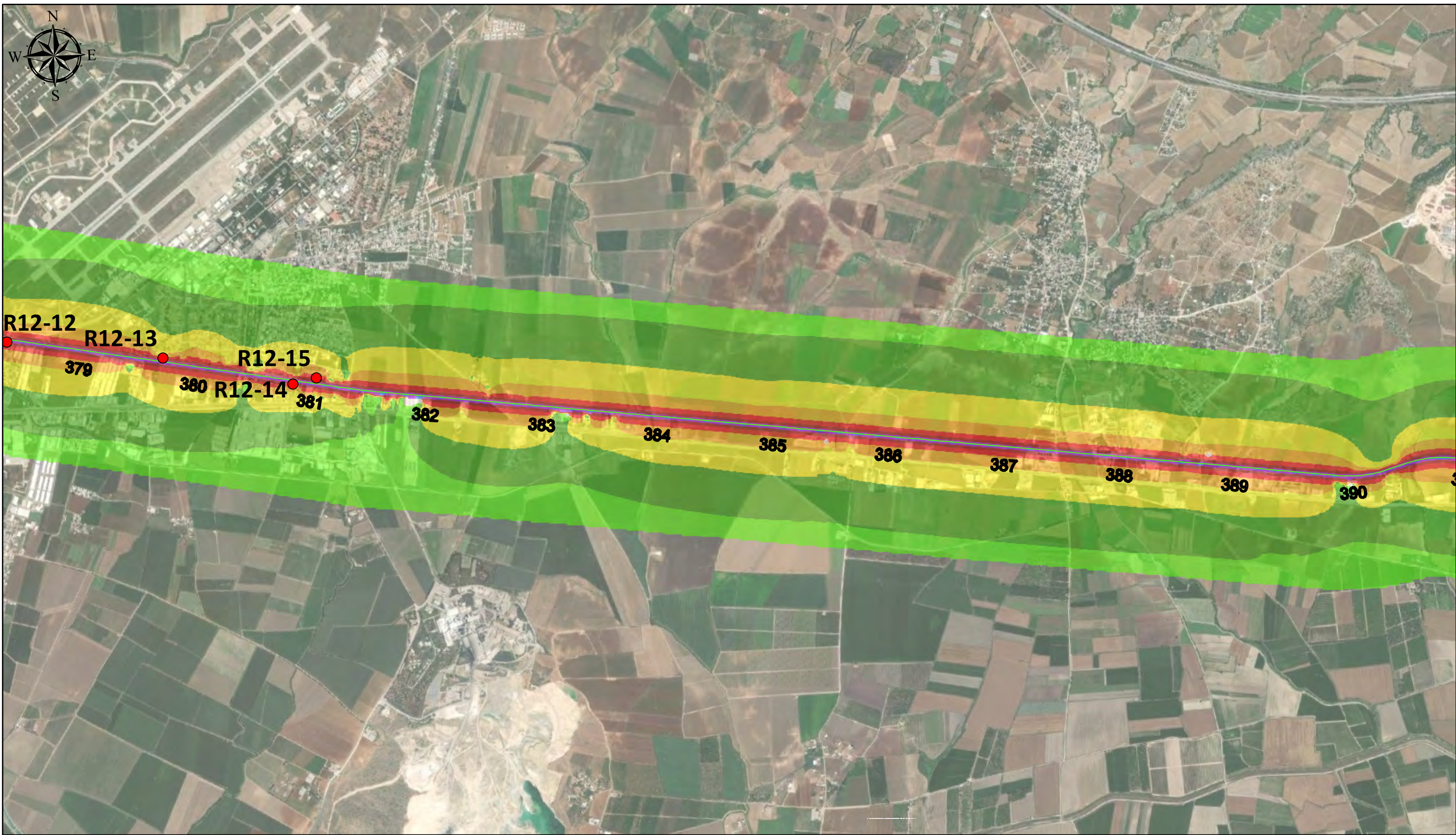
FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

**Measurement and Assessment Points
Operation Phase - Mitigated, Night**

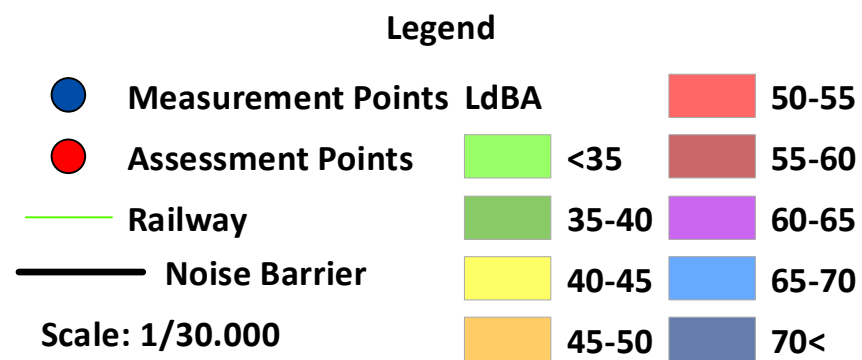
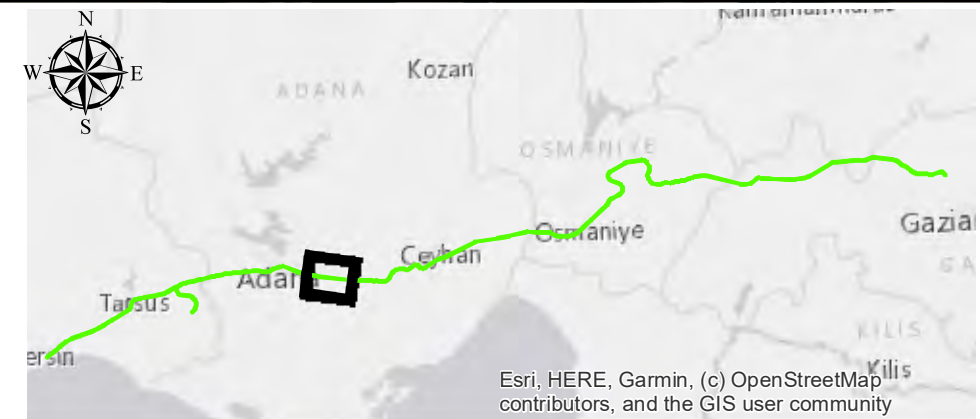


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

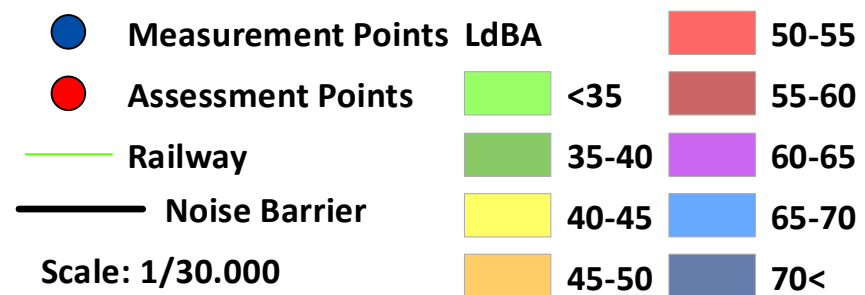
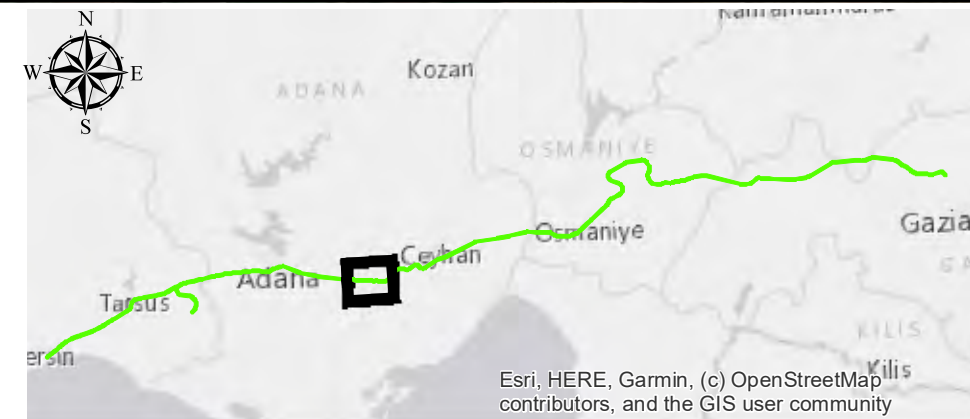


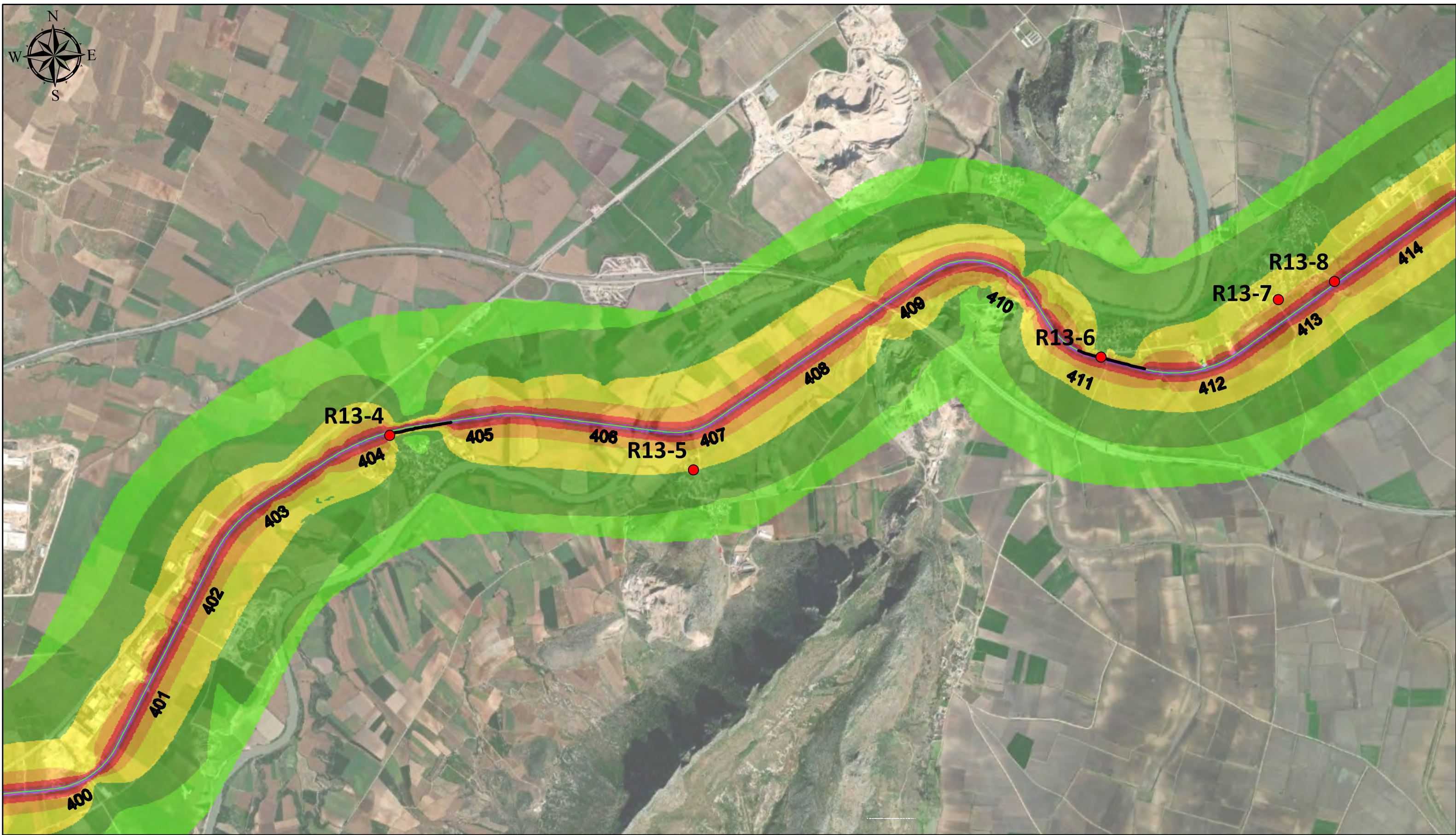
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

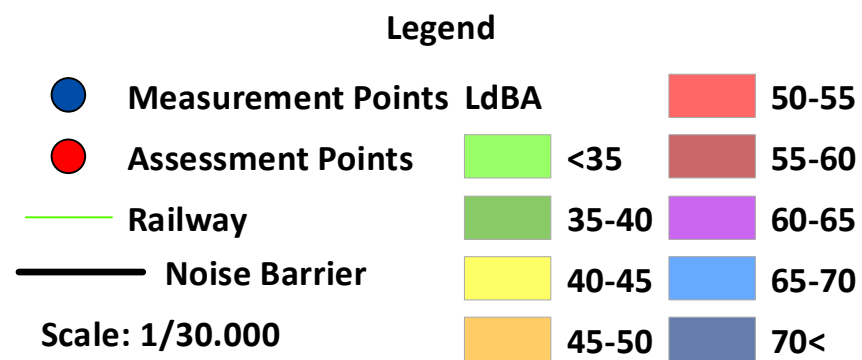
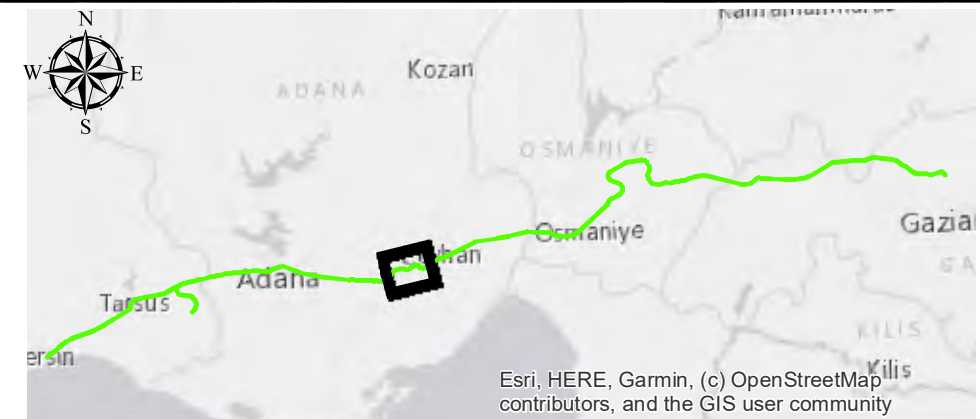
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night



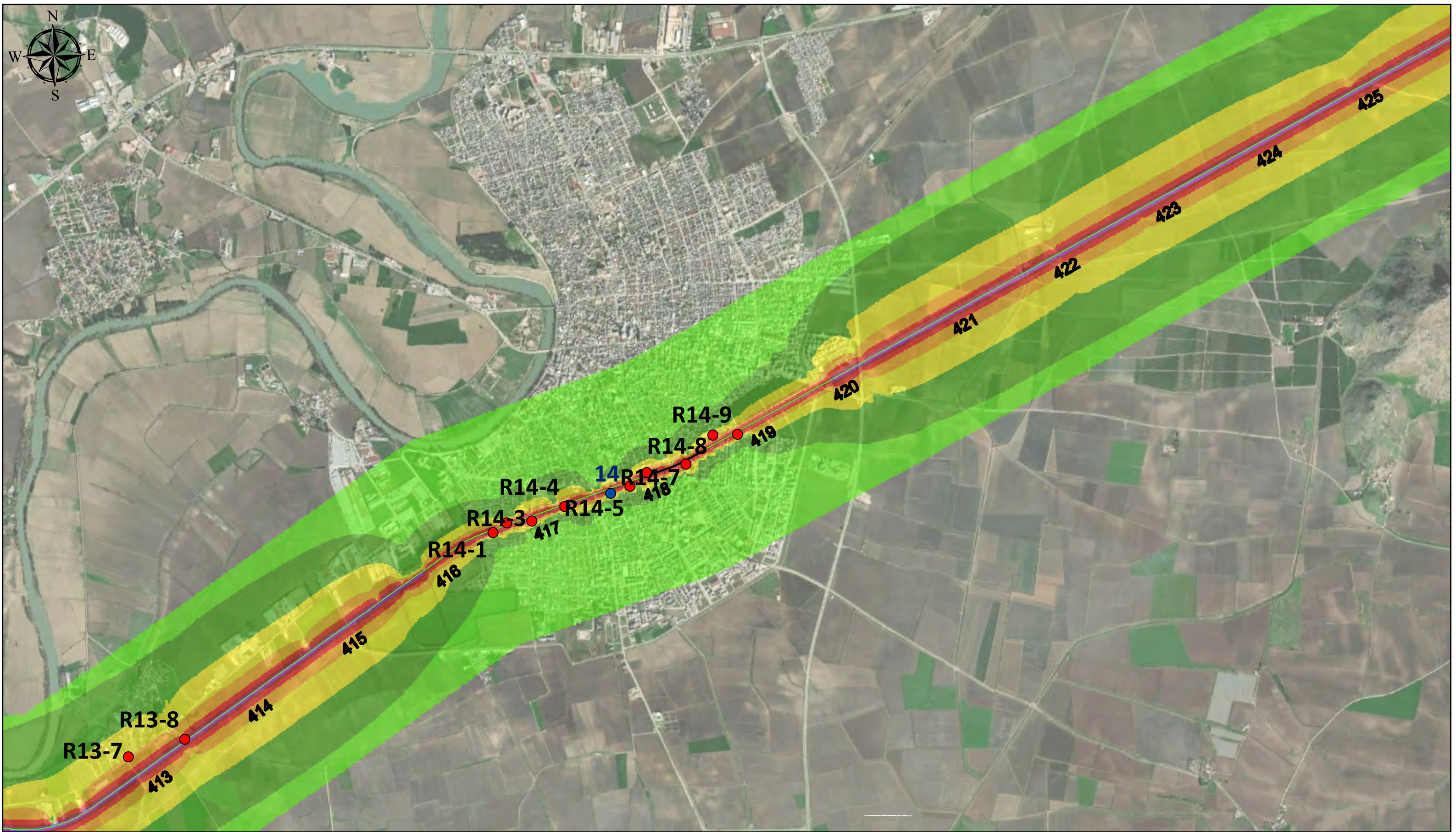


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

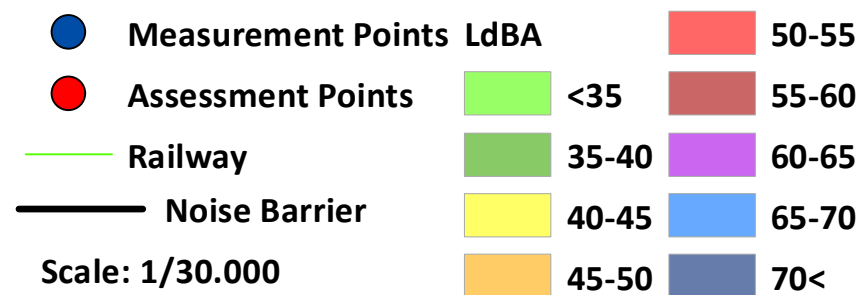
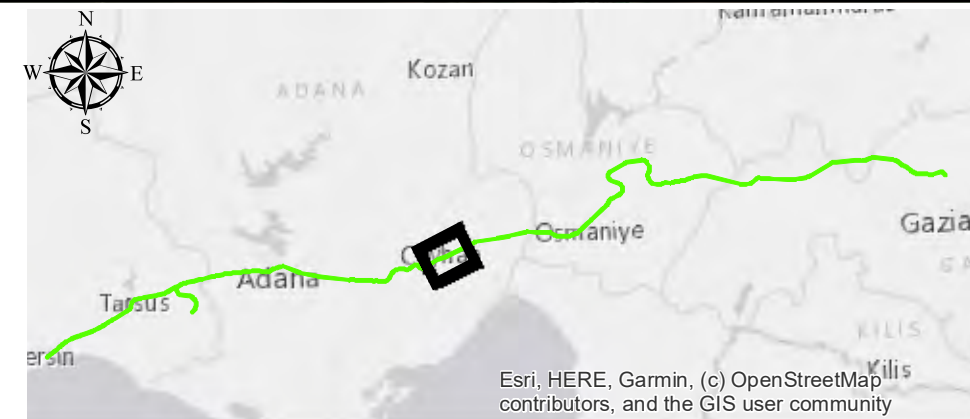


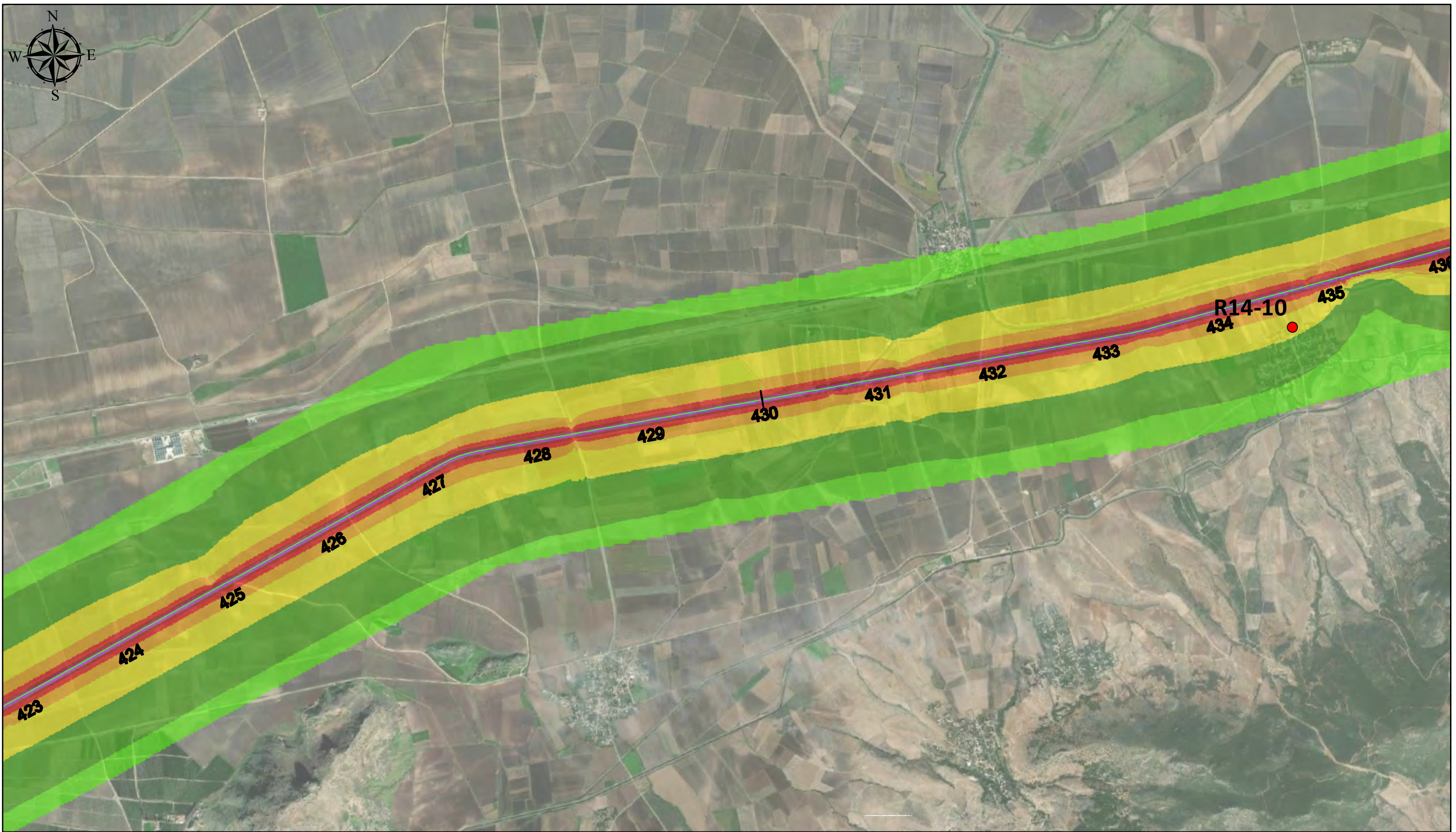
0 500 1.000 2.000 3.000 4.000 Meters



FREKANS

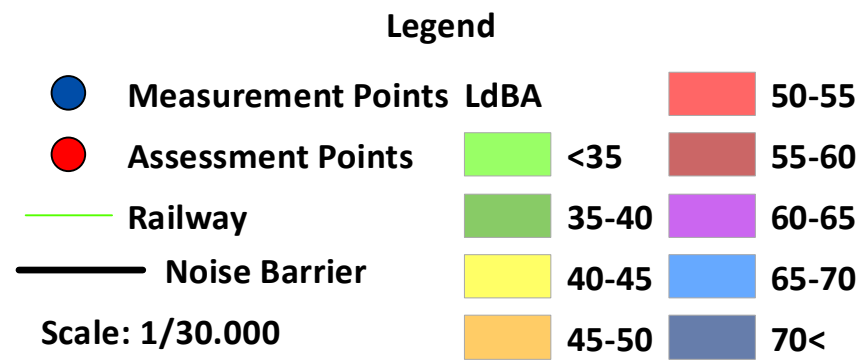
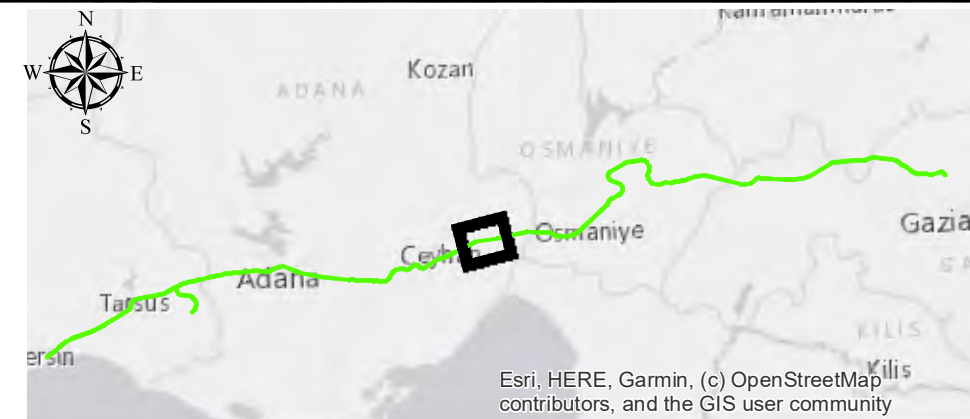
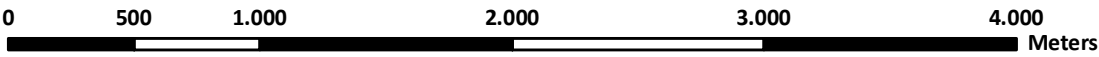
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

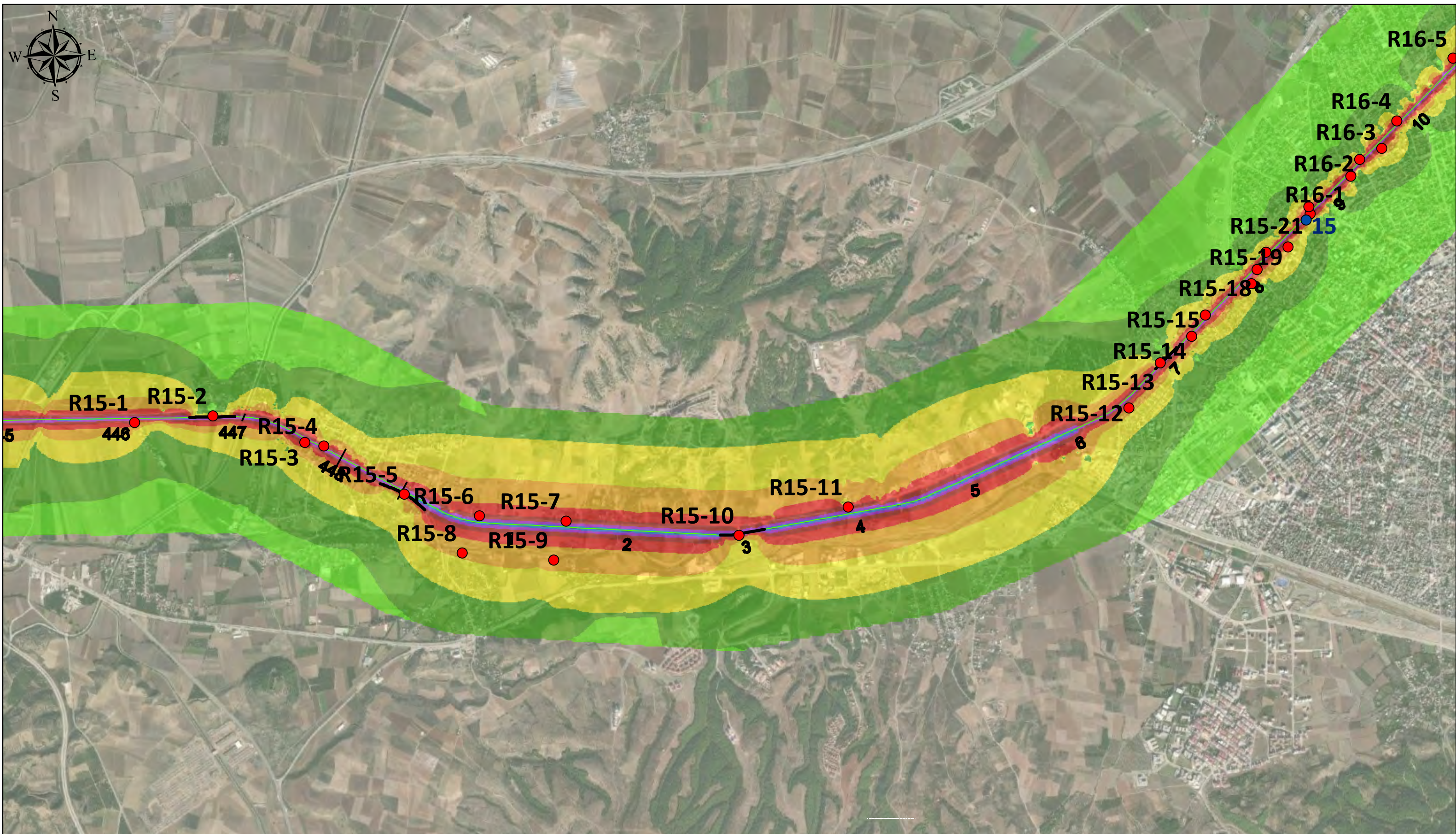




FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

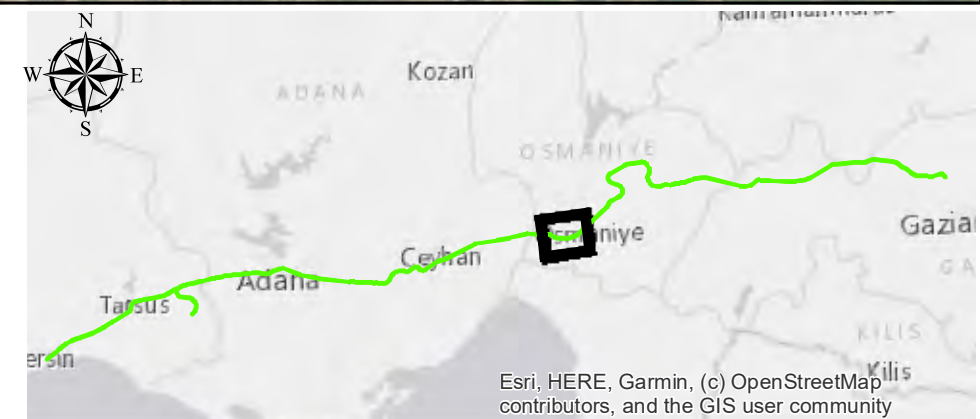


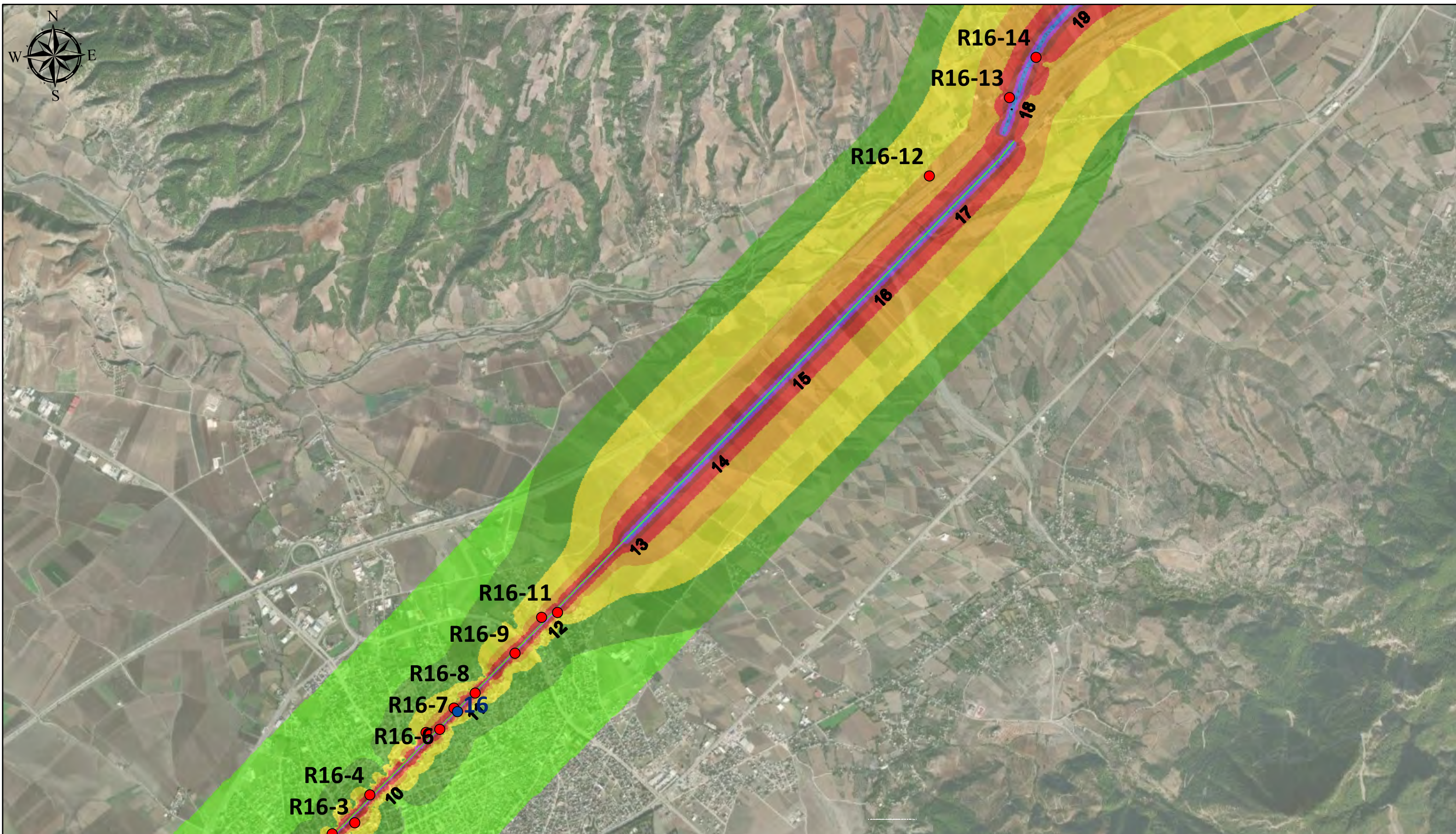
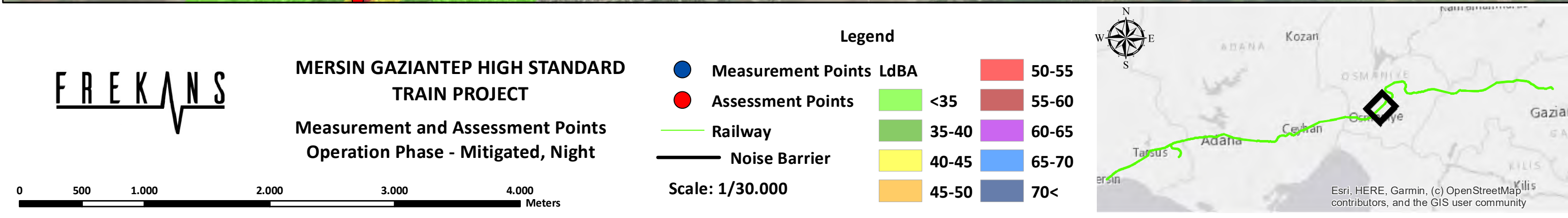


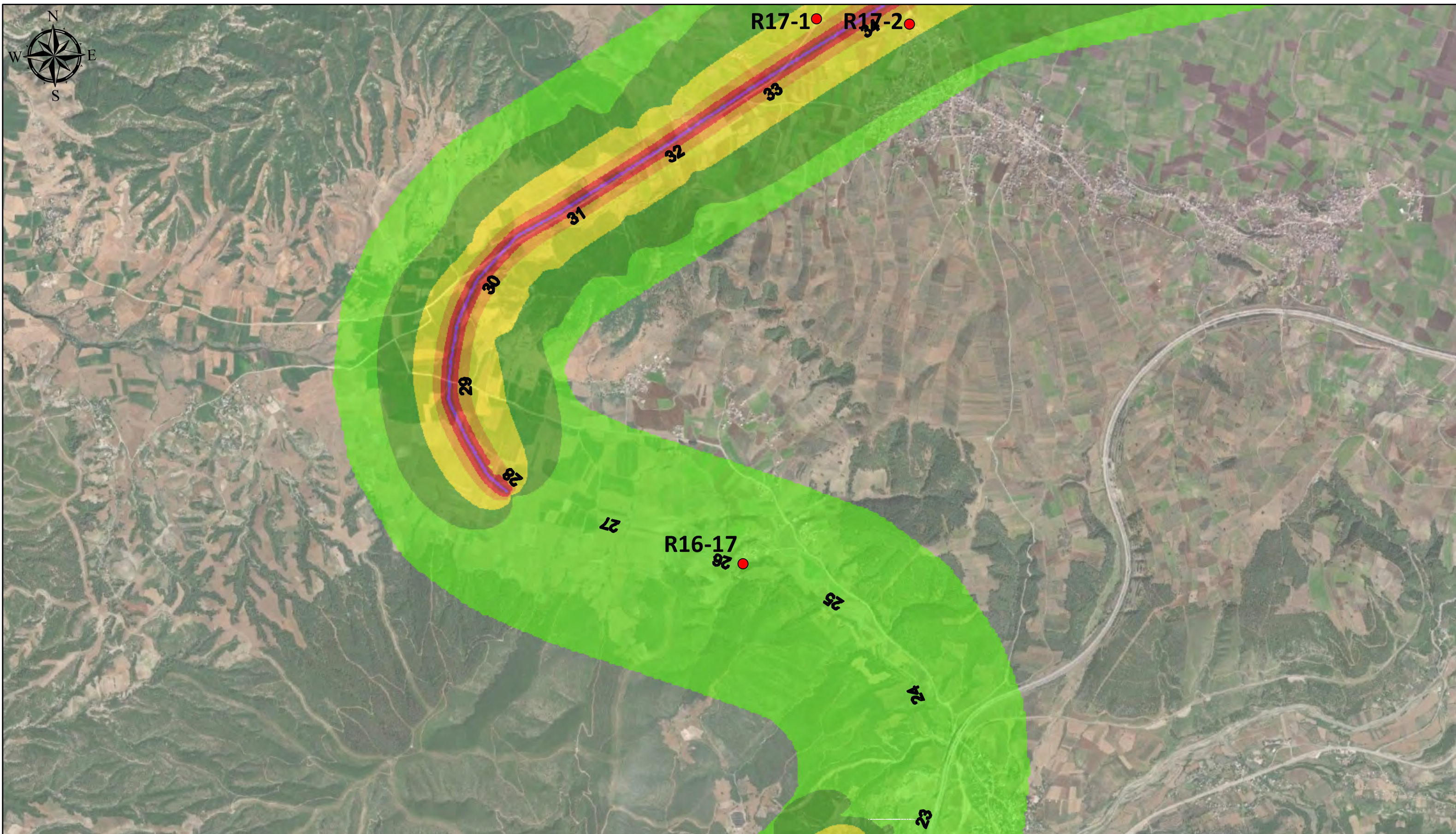
FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

Measurement and Assessment Points
Operation Phase - Mitigated, Night







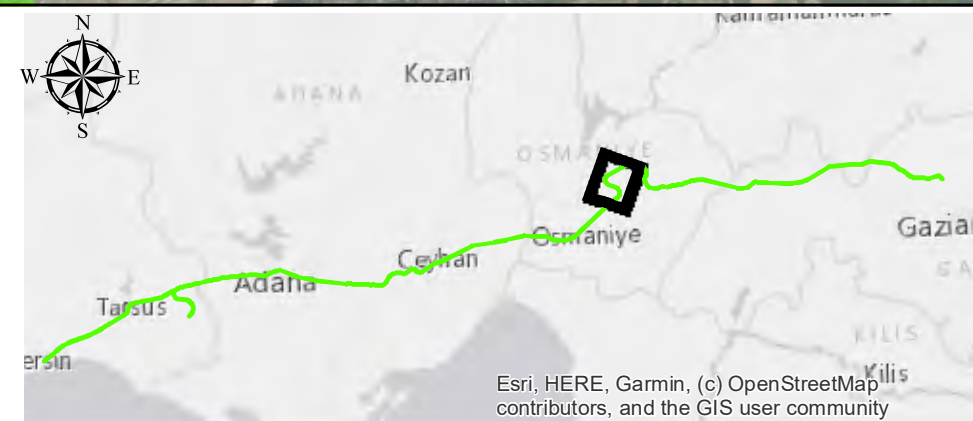
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase - Mitigated, Night**

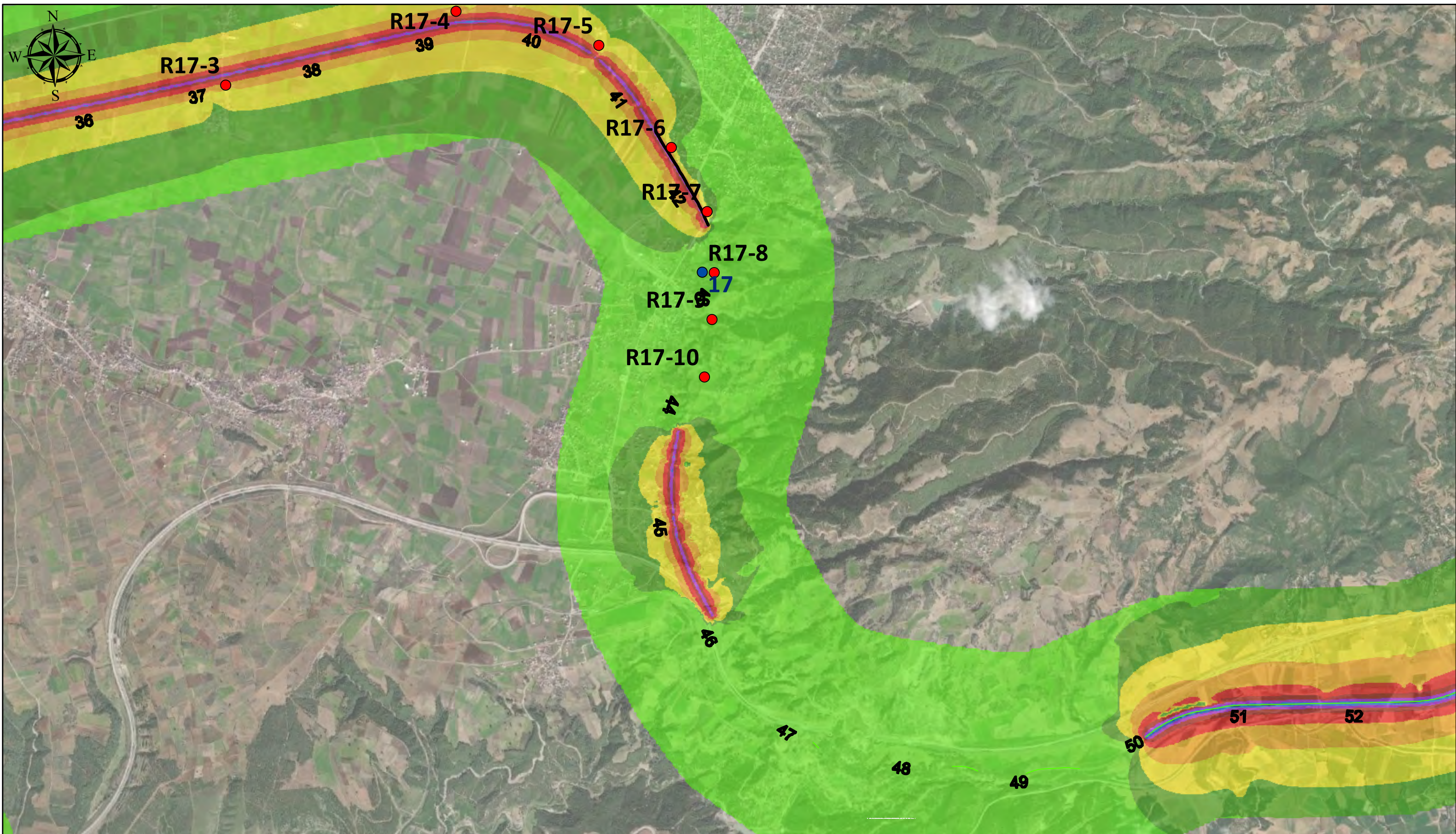
- Measurement Points
- Assessment Points
- Railway
- Noise Barrier

Scale: 1/30.000

Legend

LdBA	50-55
<35	55-60
35-40	60-65
40-45	65-70
45-50	70<





FREKANS

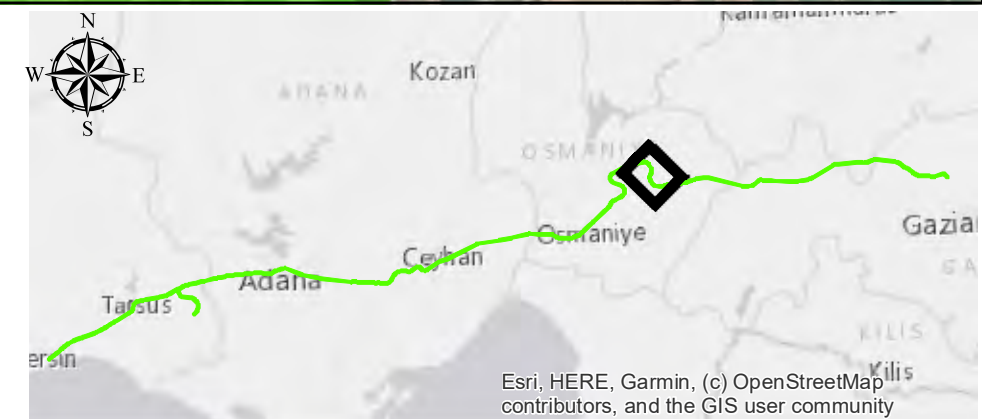
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

- Measurement Points LdBA
- Assessment Points
- Railway
- Noise Barrier

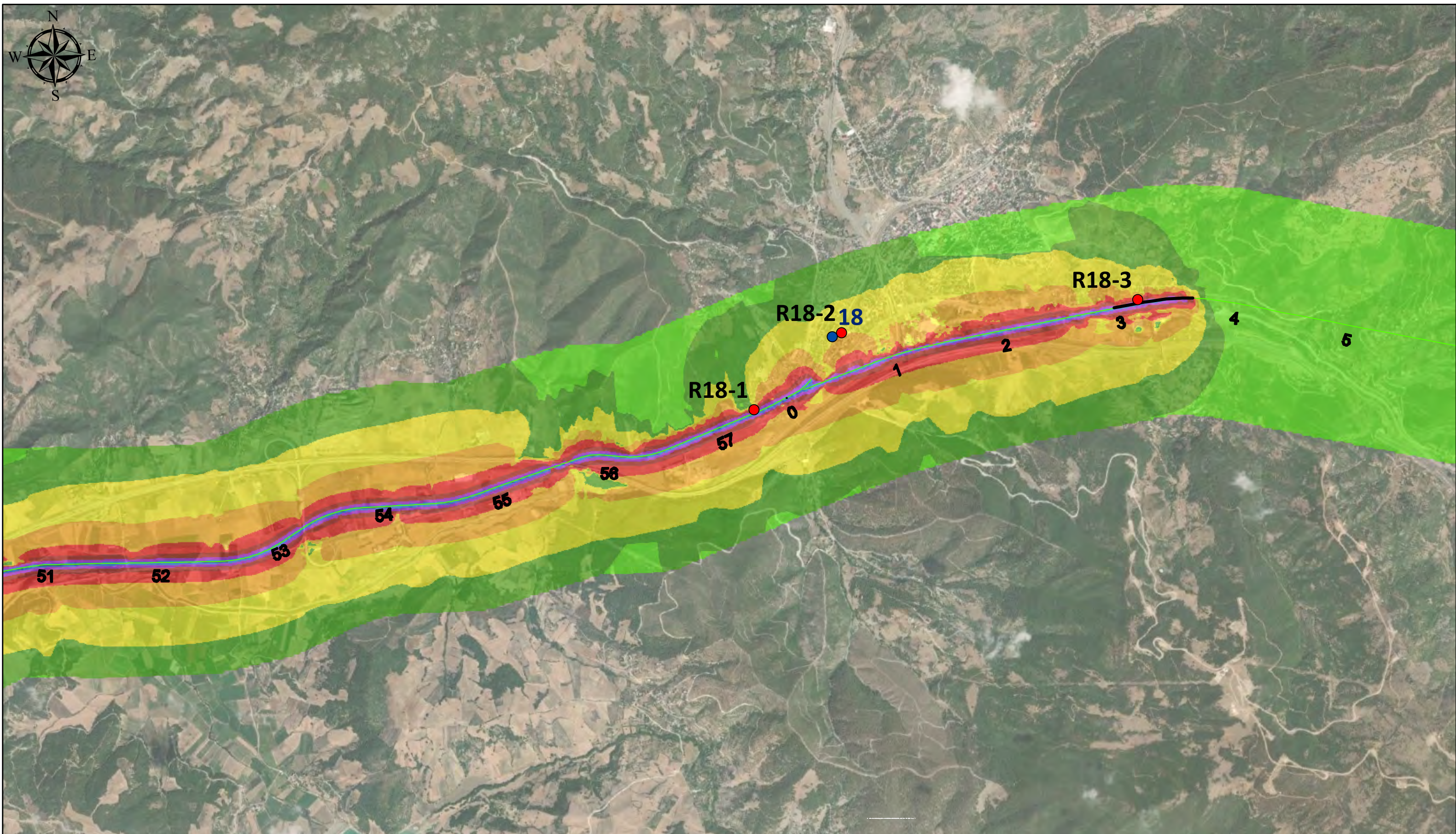
Scale: 1/30.000

Legend

	<35		50-55
	35-40		55-60
	40-45		60-65
	45-50		65-70
			70<

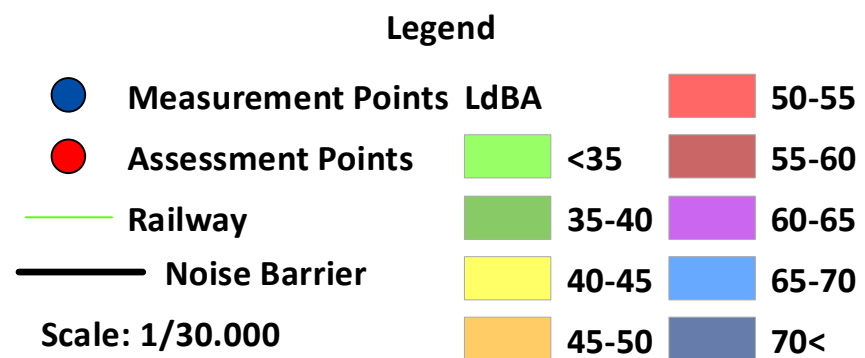
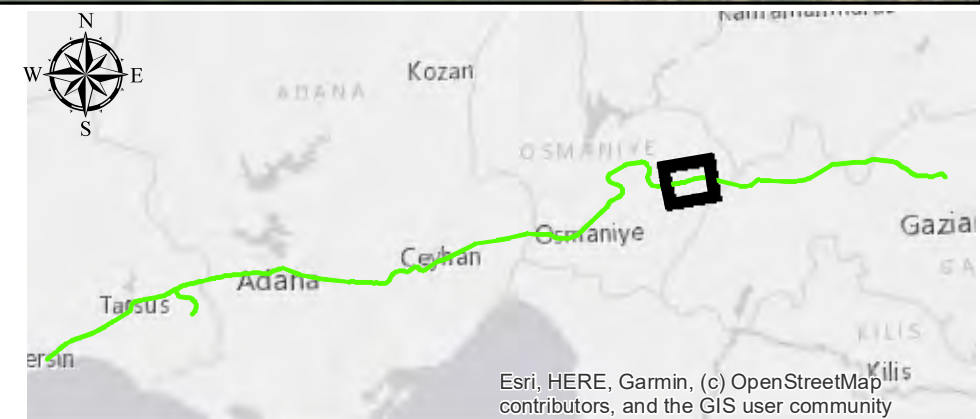


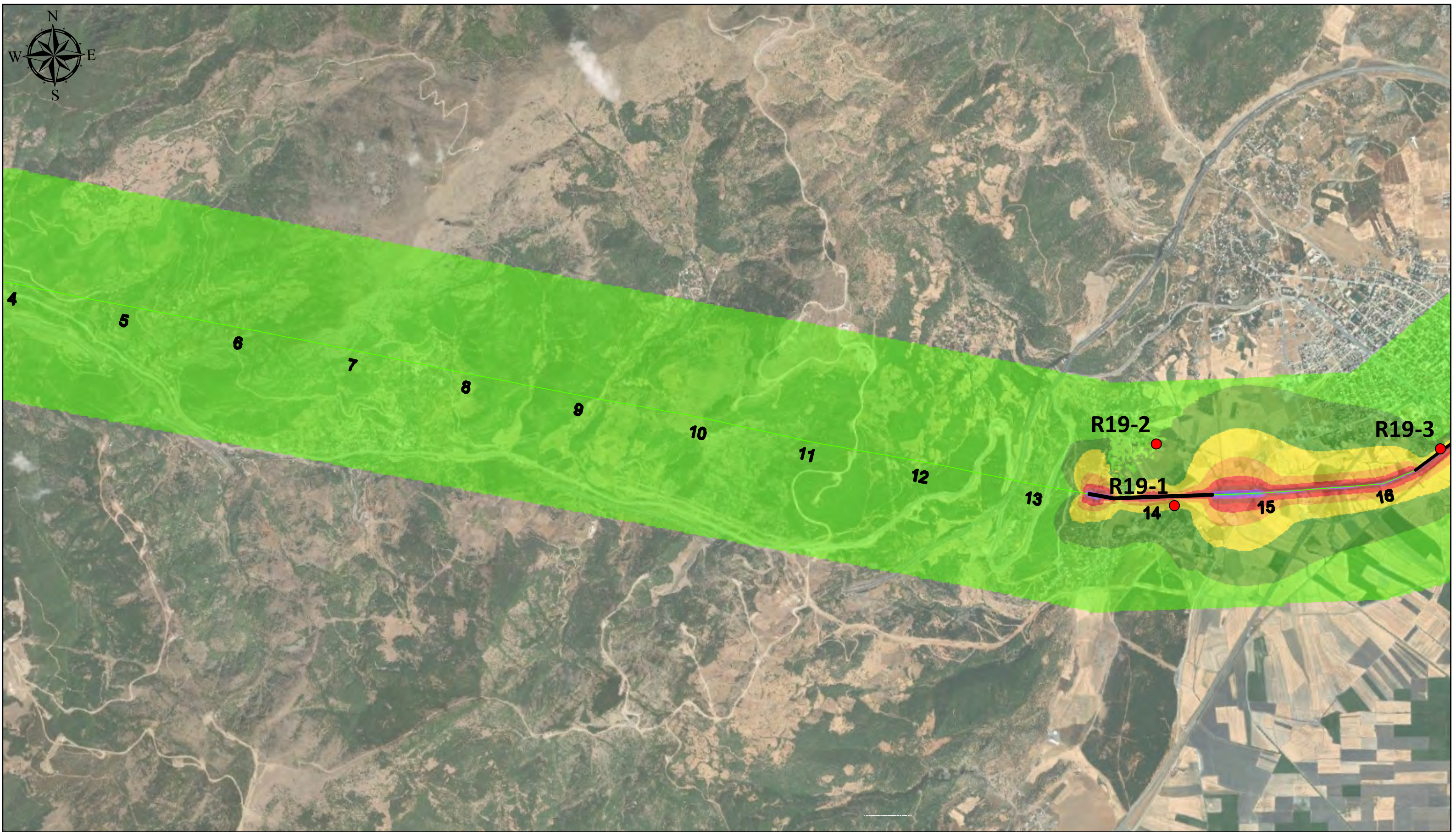
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

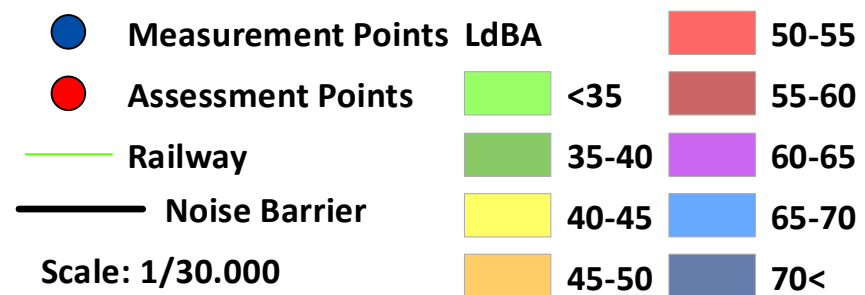
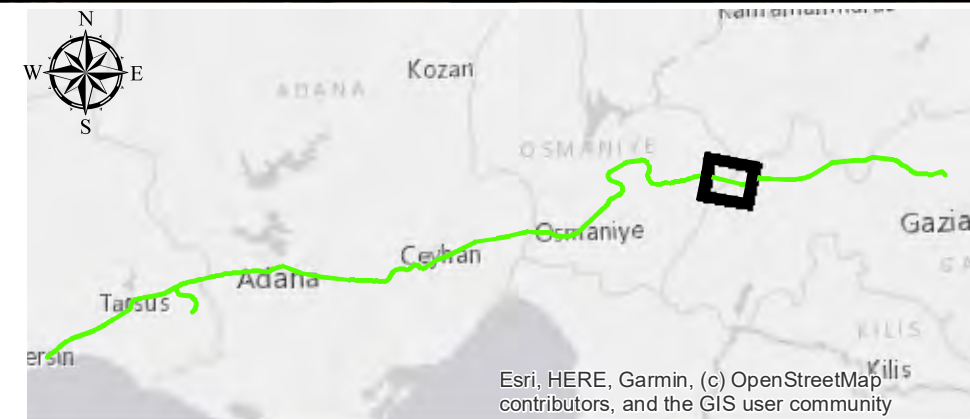
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night



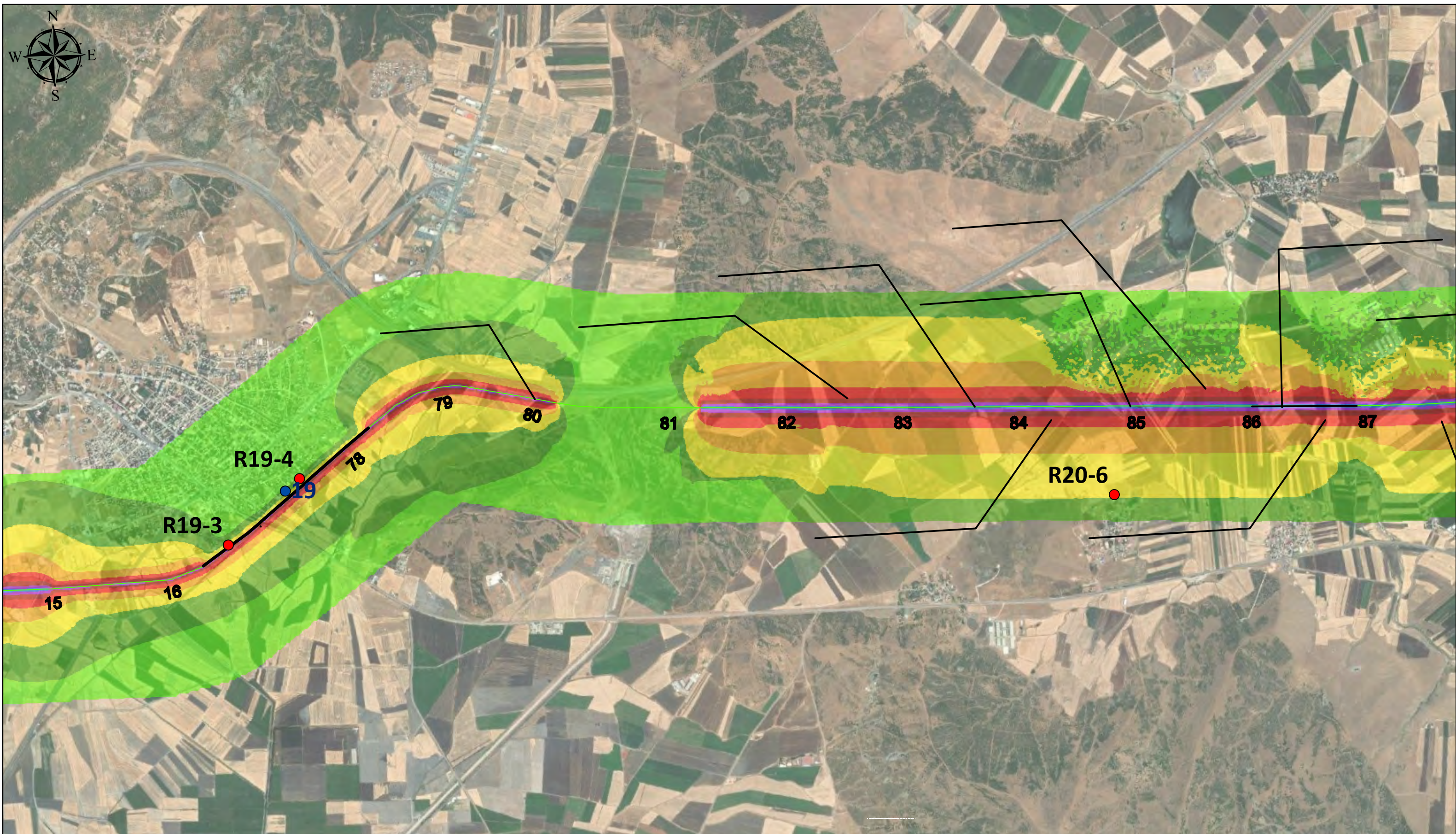


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

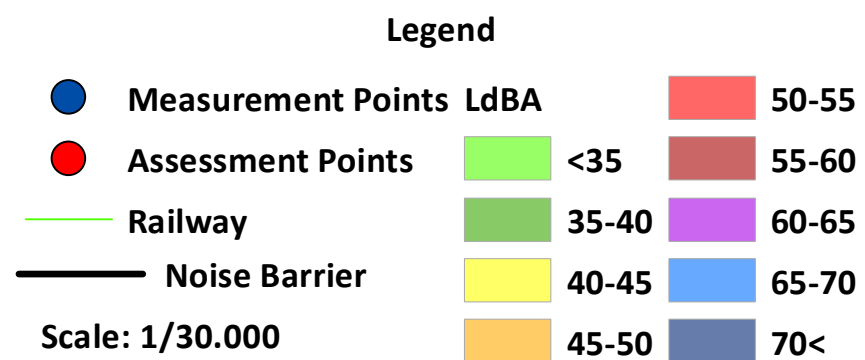
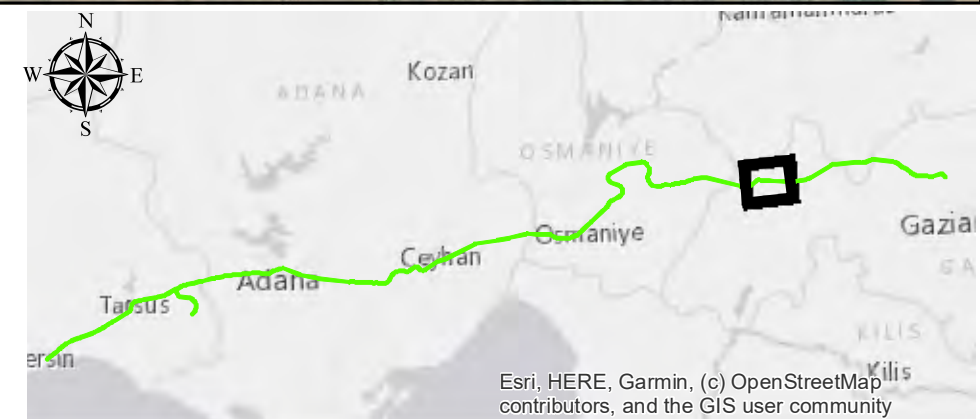


Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

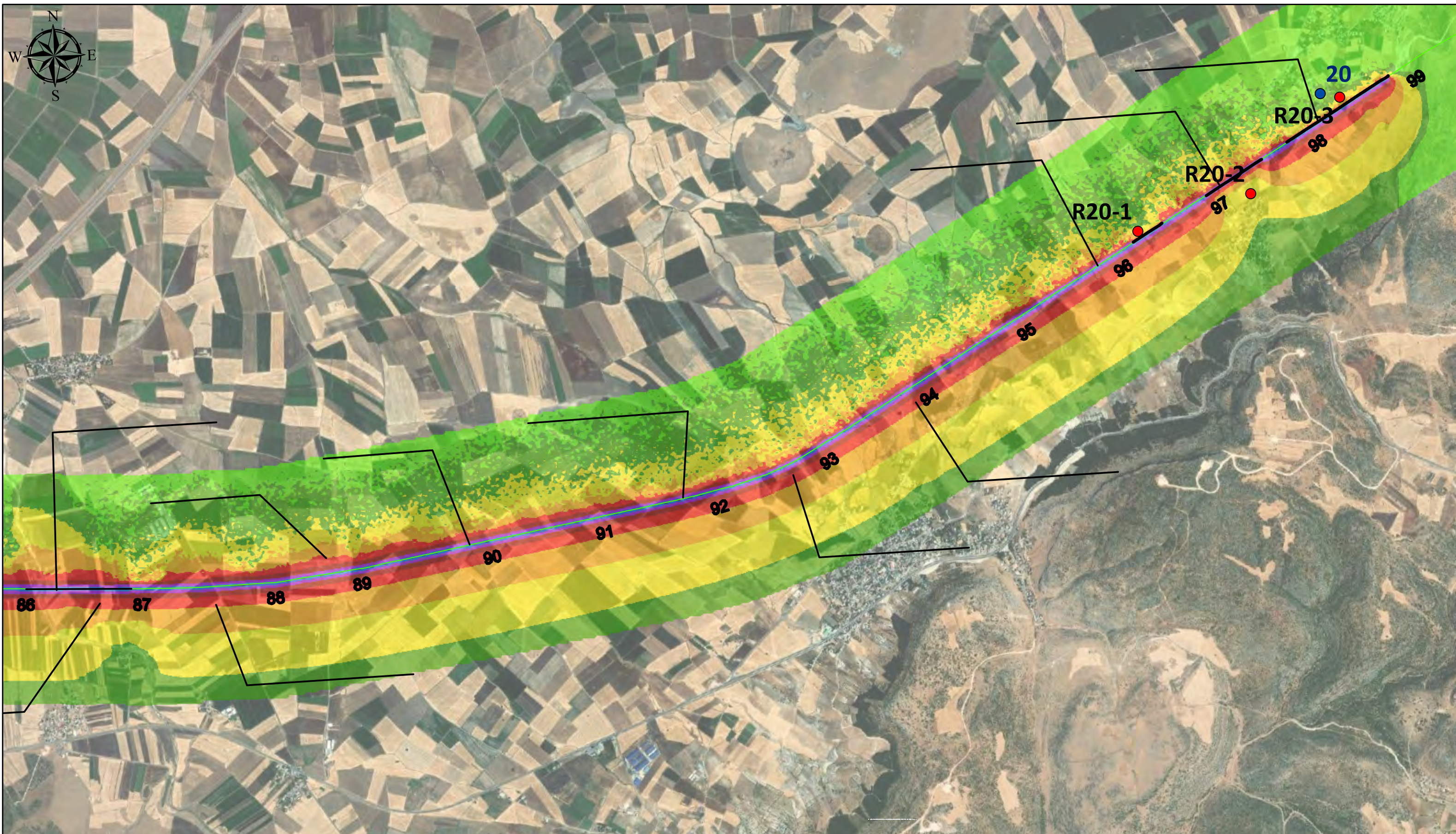


FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
**Measurement and Assessment Points
Operation Phase - Mitigated, Night**



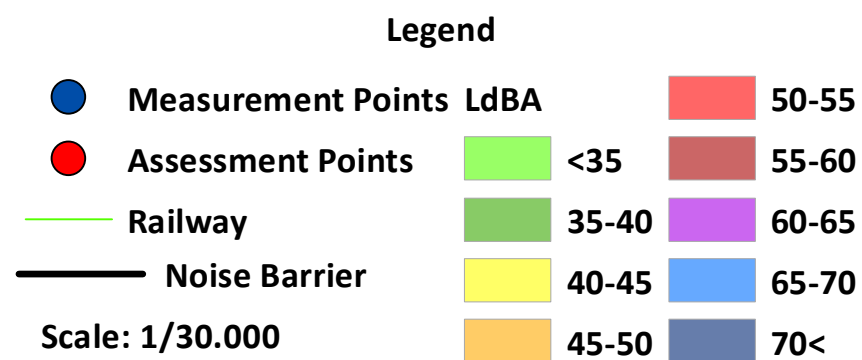
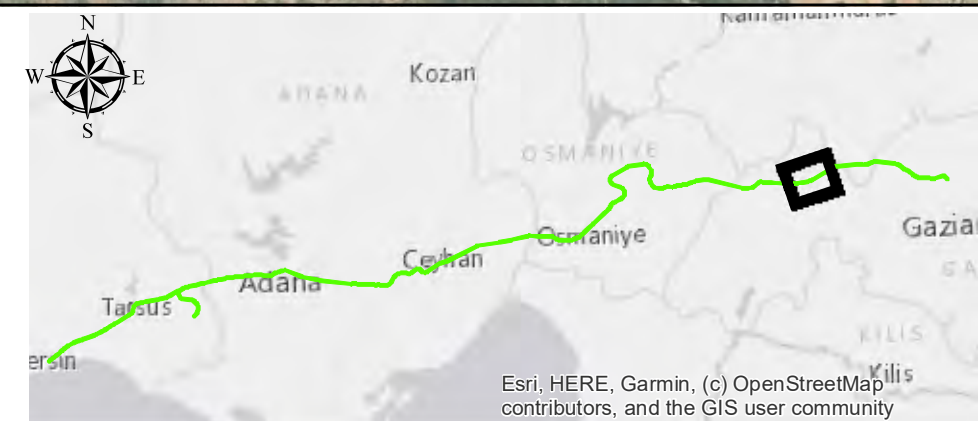
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

MERSIN GAZIANTEP HIGH STANDARD TRAIN PROJECT

**Measurement and Assessment Points
Operation Phase - Mitigated, Night**

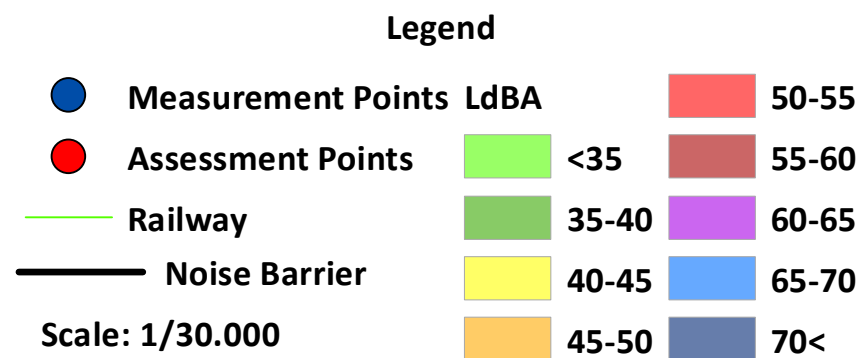
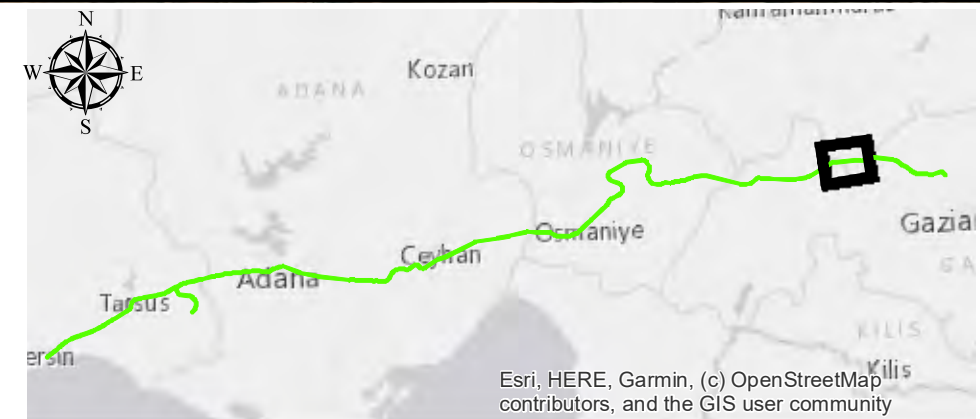


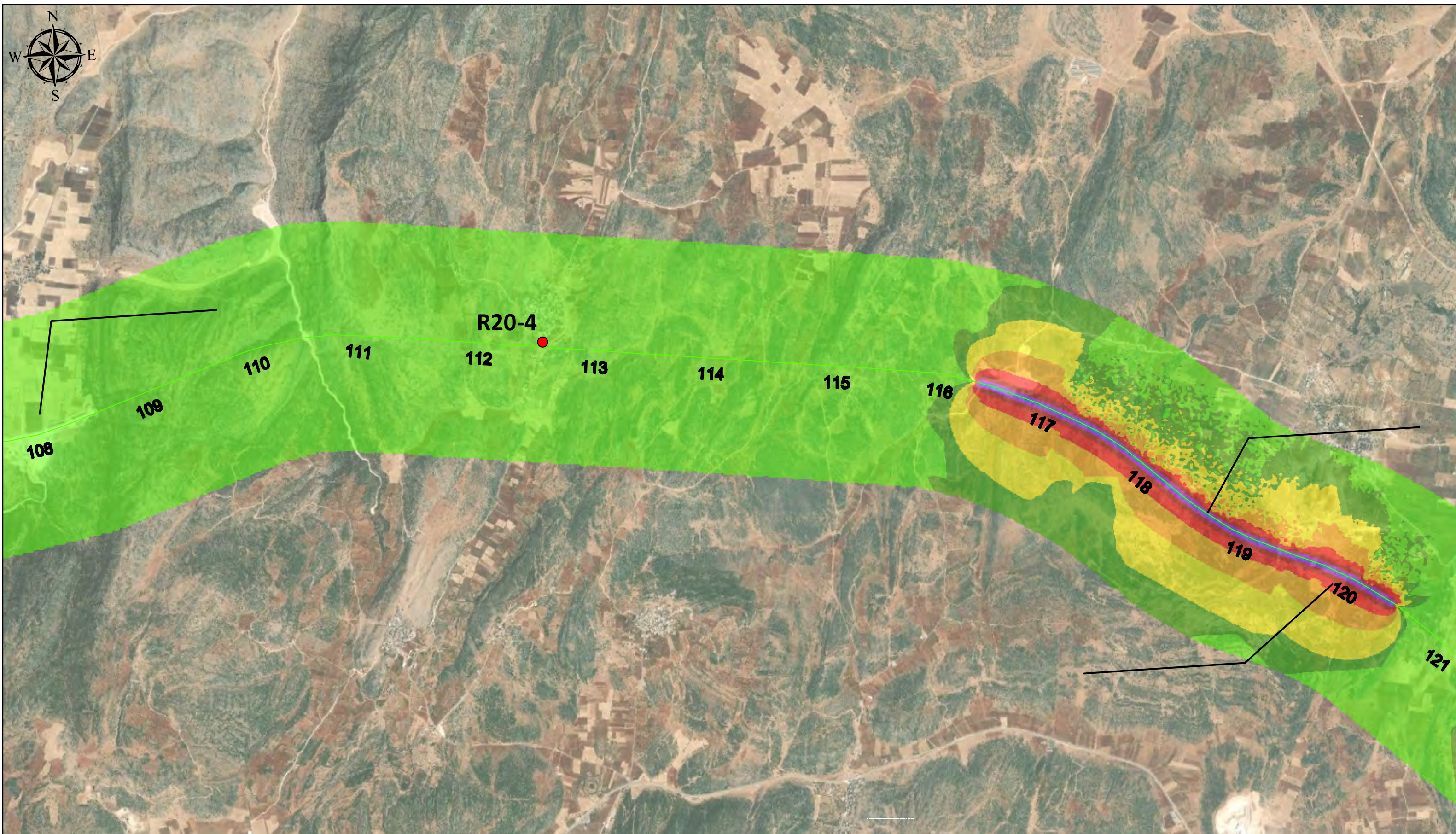
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



FREKANS

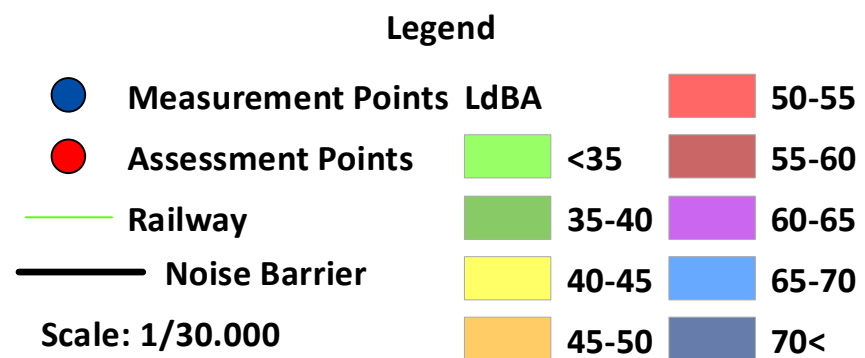
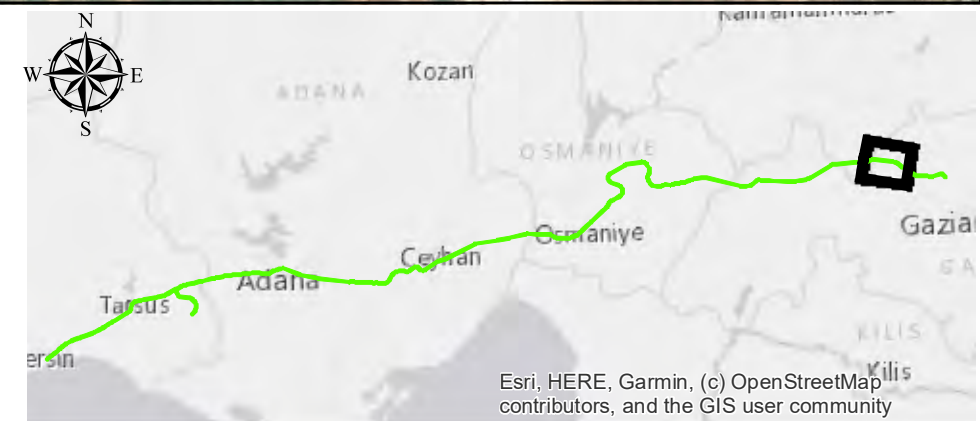
**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

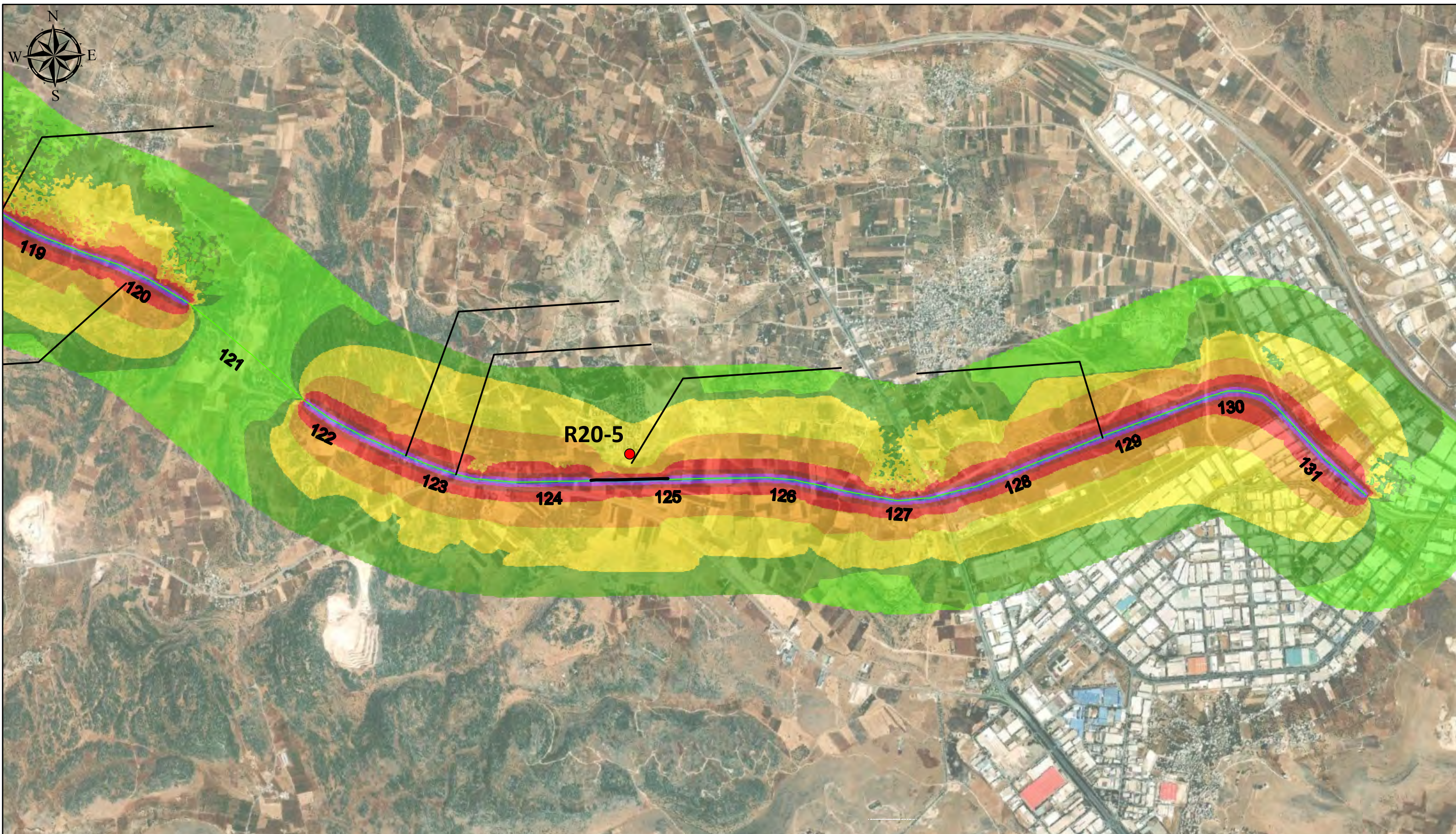




FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night





FREKANS

**MERSIN GAZIANTEP HIGH STANDARD
TRAIN PROJECT**
Measurement and Assessment Points
Operation Phase - Mitigated, Night

Legend

● Measurement Points LdBA	50-55
● Assessment Points	55-60
— Railway	60-65
— Noise Barrier	65-70
	70<

Scale: 1/30.000

