



**400 KV OVERHEAD POWER TRANSMISSION LINE FROM THE ALYTUS
TRANSFORMER SUBSTATION TO THE LITHUANIAN-POLISH BORDER.
ENVIRONMENTAL IMPACT MONITORING PROGRAMME FOR 2016-2018**

Klaipėda, 2016

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INTRODUCTION

Environmental impact monitoring of the 400 kV overhead power transmission line (OPTL) from the Alytus Transformer Substation to the Lithuanian-Polish border is an important preventive measure aimed at avoiding or mitigating the negative impact upon the environment. Components of natural environment (habitats and flora and fauna species) change in time due to both natural and anthropogenic factors. An analysis of the data collected in the monitoring process allows identifying of hazards to the environment and proposing appropriate environmental protection measures.

The monitoring programme (the 'Programme') has been prepared in accordance with the Regulations on the Environmental Monitoring of Entities approved by Order of the Minister of Environment No D1-546 of 16 September 2009 (the 'Regulations'). Information provided by a local community (Rudamina town community) has been taken in to account in the preparation of the Programme.

The Programme covers a three-year period.

1. BACKGROUND

1.1. Information about the Entity

1. Legal status:

Legal person

Structural division (branch, representative office) of a legal person

Natural person engaged in economic activities

X

2. Name of the legal person or its structural division / the natural person

3. Business ID of the legal person or its structural division in the Register of Legal Entities / ID of the natural person

LITGRID AB	302564383
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4. Address of registered office of the legal person or its structural division / permanent place of residence of the natural person

Municipality	Location (town / village)	Street name	Building / block No	Block	Apartment / other premise No
Vilniaus	Vilnius	A. Juozapavičiaus g.	13		

1.5. Contact details

Telephone No	Fax No	Email
+370 5 278 2777	+370 5 272 3986	info@litgrid.eu

1.2. Object of Economic Activities and Its Location

Object of economic activities: a 400 kV double-circuit overhead power transmission line (approx. 51 km) from the Alytus transformer substation to the Lithuanian-Polish border. The OPTL route extends across the districts of Alytus and Lazdijai (Annex 1).

1.3. Type of Potential Environmental Impact of the Economic Activity

High-voltage power transmission lines can be a cause of perish of migrating or brooding birds. Overhead lines extending across open spaces pose the greatest hazard. Large birds such as birds of prey, storks, swans etc. suffer (either perish or are injured) most often. Birds of prey often use towers of power transmission lines as places for rest or hunting (watching). When power lines are constructed near bird colonies or places of accumulation of migrating birds, some birds may perish as a rising flock of birds hits the wires of the lines.

The impact of the OPTL in the construction period is also linked to the damage to natural habitats at the tower construction points and in the OPTL route safety zone between the towers. The damage includes partial and temporary damage to the vegetation cover (in forest-free habitats) and destruction (forest cutting). Both changes in and damage to natural habitats have an effect on biodiversity. The status of protection of rare plant species, amphibian and reptiles populations can also be affected.

Electromagnetic fields and radiation emitted by overhead power lines are classified as physical environmental factors. A constant impact of electrical field exceeding the maximum permissible levels may cause functional disorders of the nervous, cardio-vascular and endocrine systems as well as certain disorders in metabolism, immune reactivity and reproductive function of the human body. Strong electromagnetic fields that exceed the limit values cause irritation of both peripheral and central nervous systems. While research into the impact of electromagnetic fields upon human health is being conducted for a number of decades, there is no final evidence yet of them having a carcinogenic impact. However, setting and applying limit values and implementing other protective measures that prohibit or limit economic activities near overhead power lines is required to protect people from potentially harmful effect of electromagnetic radiation.

1.4. Necessity of Environmental Monitoring

The Regulations on the Environmental Monitoring of Entities (approved by Order of the Minister of Environment No D1-546 of 16 September 2009) state that an entity is obliged to conduct monitoring of impact upon biodiversity and landscape if this has been provided in a report on the assessment of the planned economic activity's impact on the environment ('EIA Report') prepared according to a procedure prescribed by law.

The Report on the Assessment of the Environmental Impact of the Construction and Operation of the 400 kV overhead power transmission line from the Alytus Transformer Substation to the Lithuanian-Polish Border states that environmental monitoring is necessary in the operation phase. The length of monitoring recommended in the EIA Report is 3 years after the completion of construction works. Environmental monitoring components (nature and physical environment) are not detailed in the recommendations in the EIA Report.

The EIA Report also states that, upon summarisation of the results received in the process of monitoring, the monitoring programme will have to be reviewed and a decision on the necessity to continue the monitoring will be taken.

1.5. Purpose and Tasks

Purpose of environmental monitoring: Monitor, assess and project the impact of the OPTL upon components of the natural environment (habitats, birds, amphibians and reptiles) in order to reduce the negative impact on both natural and social environment to the largest extent possible.

Tasks of environmental monitoring:

- Collect, on a systemic basis, data on the condition of the components of the natural environment (habitats, ornithofauna (brooding and migrating birds), herpetofauna) in the area affected by the OPTL route;
- On the basis of the monitoring results, assess and project the OPTL's impact on the condition of the environment and components of nature;
- Make proposals and recommendations in case if a threat of significant negative impact arises;
- Gather information about the condition of the environment and components of nature in the OPTL impact area, submit such information to state and municipal authorities, and ensure publicity of the information;
- Collection of data on the values of the parameters of electromagnetic fields created by the power transmission lines in the premises of residential and public buildings and in living environment is planned as an auxiliary task.

2. ENVIRONMENTAL MONITORING

The environmental monitoring covers the following objects falling within the area of impact of the OPTL route: valuable flora complexes (OPTL route safety zone); birds (OPTL route safety zone and adjacent areas); and amphibians and reptiles (OPTL route safety zone).

The determination of the values of the parameters of electromagnetic fields created by the power transmission lines in the premises of residential and public buildings and in living environment is planned as an auxiliary task.

2.1. Monitoring of Habitats

Purpose of habitats monitoring: Assess self-reparation trends in valuable habitats.

Main tasks: Record and assess the areas and type of damage in valuable habitats; assess the condition of valuable habitats in the area of impact of the OPTL route.

2.1.1. Monitoring Locations

Locations of monitoring have been selected in the area of impact of the OPTL route, in the territories in which valuable habitats or sites of rare plant species have been found and which are crossed by the OPTL area (damage during the construction of the OPTL is unavoidable). Locations of monitoring points are provided in Table 1 and Annexes 2 and 3.

Table 1. Habitats monitoring locations

Item No	Co-ordinates* LKS - 94	Tower No	Valuable objects	Note
1	470423,04 6024445,08	92-93	6210 Semi-natural dry grasslands (steppes)	The route crosses a habitat of Community interest
2	466306,72 6017612,62	117	6450 Northern boreal alluvial meadows, 6510 Lowland hay meadows, <i>Dactylorhiza incarnata</i>	The route crosses a habitat of Community interest
3	464657,94 6013630,00	130-131	6450 Northern boreal alluvial meadows	The route crosses a habitat of Community interest
4	460887,98 6010964,86	145-146	6210 Semi-natural dry grasslands (steppes)	The route crosses a habitat of Community interest

* Central point coordinates

2.1.2. Description of Monitoring Methodologies and Evaluation Criteria

The damaged areas (m²) and the intensity of the damage will be determined during the vegetation period (June – August) in valuable habitats (meeting the criteria for the identification of habitats of Community interest (Table 2, Figures 2 and 3). The damaged areas will be determined by means of a GPS device.

Table 2. Assessment of damage to the vegetational cover (Rašomavičius, 2012; Riepšas, 1990)

Damage to cover		Evaluation indicators	
Score	Intensity	Area of mineral part of soil, %	Are of typical flora, %
0	Conditionally not damaged	< 1	> 95
1	Not intense	1 – 5	94 - 50
2	Moderate	6 – 40	< 50

Upon determination of the areas and intensity of the damage, the percentage share of the damaged area compared with the total habitat area will be calculated.

The aim is to ensure that the self-repairing habitats would meet, prior to starting the works of the OPTL construction, would meet the main criteria for the habitats of Community interest (in terms of characteristic and typical flora species etc.). A description of the selection criteria for habitats of Community interest is provided in the Inventory Manual for Habitats of Community Interest (editor in chief V. Rašomavičius, 2012).

2.2. Birds Monitoring

Purpose of birds monitoring: Birds' monitoring is conducted with the aim of determining the impact of the completed OPTL in terms of the birds' perish upon hitting the wires of the line.

Main tasks: Estimate the numbers of birds in the areas adjacent to the OPTL by recording the birds' accumulations and the cases of the birds' perish and injury in the OPTL route's area.

The birds' part of the monitoring programme has been prepared in accordance with the methodologies for the monitoring of birds of Community interest approved by Order of the Director of the State Protected Areas Authority under the Ministry of Environment No V-16 of 26 February 2016.

2.2.1. Monitoring of Accumulation of Migrating Birds

The largest accumulations of migrating birds in the areas adjacent to the OPTL are around the Žuvintas Biosphere Reserve. Every year flocks of thousands of water birds accumulate there. Birds flying in bad visibility conditions (fog, dusk) can hit the wires and perish.

2.2.1.1. Monitoring Locations

The locations of monitoring of migrating birds' accumulations have been selected near water bodies (between Žuvintas Lake and Simnas Lake) adjacent to the OPTL route, where there is a birds' accumulation potential.

Preliminary monitoring locations have been identified in the programme; the locations will be specified more accurately during field works, depending on the location characteristics. As far as possible, higher locations with good observation conditions will be selected. The observation posts will be allocated in such a way that the observers could count the birds accurately irrespective of the flight direction. More than one observation post can be selected. The observers must be knowledgeable about the bird counting and familiar with the locality.

Monitoring/recording points will be marked in cartographic materials (maps scaled 1:10 000) and each of them will be assigned identification numbers and/or conventional names which will be specified in the recording form.

The recommended locations of monitoring points are shown in Table 3 and Annexes 4 and 5.

Table 3. Co-ordinates of migrating bird accumulations' recording zones

Item No	Recording zones (Co-ordinates LKS – 94)		Note
	Start co-ordinates	End co-ordinates	
1	475082,86; 6030881,26	472250,32; 6028522,84	At Žuvintas and Simnas lakes
2	467764,58; 6020337,14	467261,79; 6020196,91	At Rimietis lake
3	467007,34; 6019914,35	467052,98; 6018994,33	At Rimietis lake

2.2.1.2. Description of Monitoring Methodologies and Assessment Criteria

Recording of migrating birds' accumulations is carried out in autumn (5 recordings) and in spring (3 recordings). Factors affecting the formation of birds' accumulations include weather conditions, allocation of crops and pastures, and timing of agricultural works. Peak numbers of migrating birds' (main goose species) vary, from year to year, within very wide limits (up to one month). Table 4 shows the estimated periods within which the recording dates are specified taking account of the current year's situation.

Table 4. Periods when migrating birds' accumulations are recorded

Recording	Recording periods		
Spring season	3 recordings between the beginning of March and the end of April		
Summer season		2 recordings in decade I and decade II of August	3 recordings in decades I, II and III of October

The spring recording dates must be planned in such a way that peak accumulations of three goose species (the greylag goose (*Anser anser*), the white-fronted goose (*Anser albifrons*) and the barnacle goose (*Branta leucopsis*)) are recorded. The recording dates may vary from year to year depending on the spring weather conditions in various areas.

Upon selection of specific monitoring points, the observers agree on the sections of the space being monitored in which each of them will count birds.

Geese and cranes feeding in the fields are counted in the daytime, starting no earlier than 2 hours after the sunrise and ending no later than 2 hours before the sunset in order to avoid morning and evening relocations of the birds. A telescope is used for the recording as often the distance to the birds is longer than 0.5 km. The abundance of various species and the share of the young (of the white-fronted geese) in the flocks is determined.

Recording of the data is most convenient by means of a dictaphone, with the later writing down in the recording forms (Form B designed for the recording of the geese feeding in the fields or flood-meadows. The maximum size of geese/crane accumulations for the year is determined by selecting a recording when the maximum number of units of the species has been recorded and by summing up data from all the posts collected during the same recording.

Form B. Recording of Water Birds Counted at Feeding Places

				Responsible person and institution:				
Name of area/water body:				Address:				
				Tel.:				
				Email:				
Date:		Recording No:		Observations performed by:				
Observation start:								
Weather conditions:								
Temperature:								
Wind direction								
Wind strength (underline): weak, moderate, strong								
Recording zone (co-ordinates)	Feeding place	White-fronted goose	Bean goose	Greylag goose	Barnacle goose	Cranes and other species	TOTAL	Notes

Rules for completing of recording forms:

Date – recording date; **Recording zone** – the start and the end of the recording zone are specified in Table 3; **Start of observations** – time (hours and minutes) of the start of recording at each point; **Feeding place** – geese/crane feeding place (meadow, cultivated pasture, crop stubble, crops, ploughed area, flood-meadow etc.). Then the information about the observation results is presented. First of all the recorded number of geese and cranes is specified. Where counting individuals is difficult, the total number of geese and cranes and the species' structure (%) is specified. If the geese cannot be identified by species, total number is specified. **Migrating geese species** – columns intended for the numbers of geese species (the table is extended by adding more columns if there more geese species).

Assessment of monitoring points

When recording the numbers of geese and cranes in their feeding places, a note is made of whether they are disturbed or not disturbed. The scope of potential conflict with land users is assessed by recording where specifically the birds feed: a) among shoots/in fresh grass, in the fields that had just been sown; b) crops stubblings; c) meadows or pastures. Any noticed cases of hunting are to be recorded.

Assessment criteria

The assessment criteria include the fact of finding of accumulations of migrating birds and the determination of their abundance. The monitoring results obtained in the first year are used as reference values for multi-year comparisons.

2.2.2. Monitoring of OPTL-related Bird Deaths

High-voltage power transmission lines in an open landscape may be a hazard to migrating birds. The hazard is particularly great if the OPTL extends near the existing accumulations of migrating birds. Birds flying in bad visibility conditions (fog, dusk) can hit the wires and perish.

2.2.2.1. Monitoring Locations

Recording of bird deaths is carried out in the territories (within the OPTL safety zone) where most intensive flows of migrating birds are anticipated: from Skituriai village to Vytautiškės village and near the Rimietis lake (Annexes 4 and 5). The co-ordinates of the start and end of the transecta are provided in Table 5.

Table 5. Locations of monitoring of OPTL- related bird deaths

Item No	Transecta co-ordinates LKS - 94				Location
	Start co-ordinates		End co-ordinates		
	X	Y	X	Y	
1	475082.86	6030881.26	472250.32	6028522.84	from Skituriai village to Vytautiškės village
2	467348.36	6020286.57	466613.12	6018394.70	near the Rimietis lake (between towers 111 and 116)

2.2.2.2. Description of Monitoring Methodologies and Assessment Criteria

Monitoring will be conducted by the route method. All the perished or damaged birds or their remains found will be photographed and described (species, age, gender). When bodies of recently perished birds are found (not started to decay), they have to be examined in order to determine whether hitting the wires is the cause of death. The data will be entered in the recording form:

Item No	Monitoring date	Location/co-ordinates (LKS-94)	Nearest OPTL tower, No	Distance from OPTL	Number of perished birds	Characteristics of findings	
						Bird species	Gender/age (ad., juv.)

Recording of perished birds will be carried out at the time of most intensive migration (two one-month periods per year): in spring (end of March – April) and autumn (end of September – October).

Every 7 days, perished or injured birds and their remains will be collected throughout the OPTL safety zone. At least 10 recordings must be performed every year.

Assessment criteria

The assessment criteria include the perished/injured birds found and the determination of their abundance. The monitoring results obtained in the first year are used as reference values for multi-year comparisons

2.3. Monitoring of Amphibians and Reptiles

The EIA Report states that 11 species of amphibians and 6 species of reptiles live in the OPTL safety zone. The following protected amphibian species have been found here: Northern crested newt (*Tripuris cristatus*), European fire-bellied toad (*Bombina bombina*), European green toad (*Bufo viridis*), natterjack toad (*Bufo calamita*). These species are on the list of the Protected Fauna, Flora and Fungal Species in the Republic of Lithuania approved by Order of the Minister of Environment of the Republic of Lithuania No 504 of 13 October 2003 (the ‘List of Protected Species’).

Purpose of amphibians and reptiles monitoring: Assess the amphibians’ and reptiles’ distribution and abundance trends as well as the characteristics of sites and habitats in the OPTL safety zone.

Main tasks: Record the amphibians’ and reptiles’ sites, assess their abundance and the characteristics of the sites and habitats in the OPTL safety zone.

The part of the monitoring programme for amphibians and reptiles has been prepared according to the Methodology for the Monitoring of Mammals, Fish, Amphibians, Reptiles, Molluscs, Insects and Plants Species of Community Interest approved by Order of the Director of the State Protected Areas Authority under the Ministry of Environment No V-16 of 26 February 2016 (the ‘Methodology’).

2.3.1. European fire-bellied toad (*Bombina bombina*)

The species has been included in the List of Protected Species, Annexes II and IV to the EU Habitats Directive, and Annex II to the Bern Convention.

The species is spread locally in southern, eastern and south-eastern Lithuania; almost not found in western and northern parts.

Habitats of the European fire-bellied toad are shallow water bodies that warm up quickly. The toads form small colonies that settle in new places readily provided that suitable conditions exist. They winter in various hiding places. A highly vital population has been found in the environs of the Žuvintas Biosphere Reserve, from which it has spread to adjacent areas.

2.3.1.1. Monitoring Locations

Locations for the monitoring of the European fire-bellied toad have been selected in the OPTL route impact area at the same points where EIA investigations were conducted. The monitoring locations are shown in Table 6 and Annex 7.

Table 6. European fire-bellied toad monitoring locations

Item No	Co-ordinates LKS - 94				Towers No
	Start co-ordinates		End co-ordinates		
	X	Y	X	Y	
1	462059	3011716	460894	6010996	141-145

2.3.1.2. Description of Monitoring Methodologies and Assessment Criteria

Parameters monitored, frequency and monitoring procedures

Parameters recorded during the monitoring: male voices, adult individuals and condition of sites and habitats; for the assessment of the proliferation success, tadpoles and juveniles are recorded (recommended additional monitoring).

First of all spawning places are identified based on male voices (present/absent). Upon identification of spawning places, abundance of toad males is assessed based on voices and adults' observations. Recommended additional (not mandatory) observations: presence of tadpoles and juveniles.

Monitoring of the European fire-bellied toad is conducted at least 2 or 3 times per season in May and June. If recording is carried out only twice, the 2nd recording must take place 10 to 15 days after the first one. Recording of tadpoles is carried out at the end of June – July, in the daytime.

Recording of male voices is carried out by walking on the shores of the water body and recording individuals' voices. Only voices that are well heard and readily identified are recorded. The recording person has to stop and record the male voices, then walk a few steps further so that the recorded voices are left behind, and record again. The recording is continued around the water body. The recording takes place in the second half of the day (at 5 – 10 p. m.). If the surface of the water body is well seen, visual observations are carried out as well.

Visual recording is carried out subject to suitable observation conditions: the water body is not overgrown with plants, there is a convenient observation point, and good visibility. The toad males are observed and counted using binoculars.

The results of the voice recording and visual observations are recorded and their locations are marked on the water body layout.

Where the accurate numbers of singing males cannot be determined, voice intensity categories may be used:

- 1 – individual voices,
- 2 – individual voices and overlapping 5–10 voices are heard,
- 3 – voice buzz, the voices are constant and overlapping.

It is recommended (but not obligatory) to check the presence of tadpoles of the fire-bellied toad in the identified spawning sites. The tadpoles are caught using a hand-held herping net: 10 times in smaller water bodies and up to 50 times in larger water bodies. The tadpoles caught are described, counted and released. All parts of the water body must be covered. The results are written down in the recording form.

European fire-belied toad monitoring recording form

Territory:	Person responsible for monitoring:
	Tel.:
Repetition and date	Email:
Weather conditions	List of persons conducting the monitoring:
Water temperature	

General information on monitoring points									
Point No (code)	Name of location			Centre coordinates (LKS: X,Y)					
Monitoring data, European fire-belied toad (<i>Bombina bombina</i>)									
Point No/ code	Adult individuals		Depositions*		Tadpoles*		Juveniles*		Notes
	ind. or ind./area unit (m ²)	Voice intensity category	yes	no	yes	no	yes	no	

* Additional (not mandatory) data.

Instructions on how to complete the form:

Adult individuals: Where the exact number of individuals cannot be determined, the voice intensity category is recorded (1, 2 or 3). Where the number of individuals can be determined according to voices or by observation, the total number of individuals or the number of individuals per m² is indicated, specifying the area in which they were counted; sometimes it is more convenient to record the average number per m².

***Depositions, *Tadpoles, *Juveniles:** If observations were carried out, present/absent is marked.

Notes: Other amphibians species observed are indicated.

Any hazards and factors noticed are recorded, specifying the factor code and score as well as the factor direction (positive (+), negative (-)). Scores: 1 – not strong, 2 – moderate, 3 – strong. The list of hazard, impact and factor codes is provided in Annex VII to the Methodology.

All potential sources of disturbance are specified, in particular changed in the water body's hydrological conditions and overgrowth of the shores (for water habitats). Any other information that is deemed to be relevant by the observer and explanations/detailing of the results are provided in the Notes.

Assessment of sites and habitats

At each monitoring point, the spawning site and its environment is assessed, recording the degree of preservation of the monitoring point (Table 7).

Negative habitat factors: changes in the water body related to marked overgrowth and hydrological conditions (deepening or drying up of the water body), fragmentation of adjacent habitats; high concentration of fish or large 'green' frogs is one of the strongest negative factors.

As there is a hazard of tadpole perishing in shallow and small water bodies if they dry up, the depth variations in such water bodies have to be observed (from mid-July until mid-August), and whether the larvae have developed or not. A land area 500 m wide around the spawning site is to be assessed

specifying the main objects/activities; a detailed assessment of a 300 m area is to be made.

Table 7. Assessment of the degree of preservation of the monitoring point characteristics

Area of water body (at the time of observation), m ² :		Approximate depth of water body, m:	Yes / No
B1	*** 'Green' frogs present		
B2	***Fish present		
B3	***Water body dries up by August		
B4	** Water body dries up, becomes shallow in August		
B5	** Water body does not dry up; slight fluctuations of the water level		
B6	* Water body has deeper and shallower zones		
B7	* Subwater flora		
B8	**Silty bottom		
B9	* Many adjacent (within 500 m) similar suitable water bodies		
B10	***Nearest suitable water habitats at a distance longer than 1000 m;		
B11	* Water body with sloped shores (5°– 25°)		
B12	*Open water surface accounts for 10 %–40 %		
B13	** Open water surface accounts for < 10 % or > 90 % of the water body area		
B14	*< 20 % of the water body always in the shade		
B15	**20 %–40 % of the water body always in the shade		
B16	**41–60 % of the water body always in the shade		
B17	*** 61 %–80 % of the water body always in the shade		
B18	***> 80 % of the water body always in the shade ***		
B19	*Spawning environment (within a 300 m radius) not fragmented by roads, is natural		
B20	**Arable lands present in the spawning environment (within a 300 m radius)		
B21	**Shores of the spawning site overgrown with bushes		
B22	***Residential or household buildings in the spawning environment		
	Notes		

* Positive environmental factors; ** Factors deteriorating the habitat's condition;

***Factors of unsatisfactory condition of the habitat.

Factors present/absent at the monitoring point and its environment are evaluated as: Yes (+)/ No (-)

Explanations of factors' evaluation:

Area of the water body (the area is entered during observation) – aerophotographs (scaled appropriately) should be used for the determination of the quantitative area parameters, with the boundaries marked manually, or GPS devices with appropriate functions.

Green frogs present – ‘green frog’ is a generic name including three frog species (pool frog, edible frog and marsh frog). The assessment does not require to identify the species; recording the fact of presence or absence is sufficient. These frogs are quite predatory amphibians, quickly colonising habitats that are suitable to them. They are characterised by a typically bright green colour of the body, the blowing-up resonators of frog males while croaking, and male vocal sounds.

Fish present – the presence of fish is determined through observations of the water body (fish swimming in the water, larvae, jumping fish seen/observed), catching with the hand-held net, or indirectly (scales found on the shore, fishermen paths and fishing places, questioning of fishermen and water body users/owners).

Presence of residential or household buildings in the spawning site environment – farmsteads where extensive farming takes place are not included in this item because their presence is favourable for the toads as finding a wintering place is easier.

Assessment criteria

The assessment criteria have been identified in accordance with the Methodology.

Analysing of the monitoring data enables to:

1. Assess the habitat occupancy: the percentage of monitoring points at which the toad presence has been recorded. Recording of positive distribution points is an effective method enabling the analysis of long-term changes in populations;
2. Compare the site abundance classes and the habitat characteristics.

Habitat characteristics are assessed by calculating the habitat’s qualitative score (on the basis of the monitoring point assessment – see Table 7). The habitat qualitative score is calculated on the basis of environmental factors (*Positive environmental factors; **Factors deteriorating the habitat’s condition; ***Factors of unsatisfactory condition of the habitat).

The overall qualitative score of a habitat is determined from the following formula:

$$B_B = \sum_1^n B_n / n$$

where

B_b is the overall qualitative score of a habitat,

n is the number of factors assessed,

B_n is the value of the factor according to the value scale provided above.

Methods for the calculation of habitats’ qualitative scores and the examples are provided in the Methodology.

The following is assessed on the monitoring points level: changes in the spawning site area and depth and changes in the individuals abundance; based on the values of Factors B12 and B13 – the trends of the habitats’ overgrowth with plant; based on the values of Factors B14–B18 – changes in the habitats’ darkening levels.

Changes in the spawning site area are determined on the basis of multi-year monitoring data

Criteria for the habitat quality assessment:

Where the overall habitat score (B_b) is 1 to 1.44, the condition of the habitat is deemed to be favourable,

Where B_b is 1.45 to 2.44, the condition of the habitat is deemed to be satisfactory,

Where $B_b > 2.45$ the condition of the habitat is deemed to be unfavourable.

2.3.2. The Northern Crested Newt (*Triturus cristatus*)

The species has been included in the List of Protected Species, Annexes II and IV to the EU Habitats Directive, and Annex II to the Bern Convention.

Spawning sites of the Northern crested newt are clean and quite deep small water bodies surrounded by forests or parks. Terrestrial habitats must be humid, with abundant fallings for hiding places. The species winter and spend the end of summers in terrestrial hiding places. Another species frequently found in Lithuania – the common newt has similar habitats.

According to the EIA Report, the common newt was found in almost all water bodies but no crested newt even though habitats near the Sabališkės and Bartkūniškis forests and the Galadusis lake meet the criteria required for this species.

2.3.2.1. Monitoring Locations

Locations for the monitoring of the crested newt in the OPTL route impact area have been selected within the habitat suitable for the species: in a water body at the Kavolis lake. The locations are shown in Table 8 and Annex 6.

Table 8. Locations of Northern crested newt monitoring

Item No	Co-ordinates LKS - 94				Towers No.
	Start co-ordinates		End co-ordinates		
	X	Y	X	Y	
1	495705	6033218	495209	6033294	7 - 8

2.3.2.2. Description of Monitoring Methodologies and Assessment Criteria

Parameters monitored, frequency and monitoring procedures

Parameters recorded during the monitoring: adult individuals and larvae in water bodies and adult individuals under cover in terrestrial habitats; (recommended additional monitoring) condition of sites and habitats.

At first potential crested newt spawning places are identified for subsequent recordings of adult individuals and larvae.

Recording of Northern crested newt adults in water bodies

Recording of adult individuals of the crested newt is carried out from the second half of April until the end of June, twice during the season at 10 days' intervals.

Adult individuals are caught in the water body by a hand-held herping net on a long handle, net mesh max. 3 x 3 mm, recommended shape triangle or 'D', frame side length between 35 and 45 cm. The sweeps are made in the water, between water plants at various depths, from 0.1 m to the maximum depth (where possible) in order to catch the individuals hiding among the plants and at the bottom. In all, five repeated (double) sweeps have to be made at each point. Such catching is performed at 10 to 20 m intervals in order to check the largest possible water area that is accessible. The newts caught are put into a vessel with water and are released back into the water body after the recording and characterisation.

The monitoring is conducted in warm weather (at least +16°C), the recommended time is before noon or after 4 p.m.

Recording of Northern crested newt larvae

Recording of larvae of the Northern crested newt is performed from the second half of June until the second half of July, twice per season at a 10 days' interval.

The recording of larvae is similar to that of adult individuals in a water body but the catching by means of hand-held net is performed at shallower places (at the depth of 0.1 to 0.5 m).

Northern crested newt adults' recording on land (recommended additional monitoring)

Recordings are performed in August. A search for adult and young individuals is conducted in natural hiding places by lifting branches and logs, inspecting tree stubs, lifting other covers, around the spawning place at a distance no longer than 300 m from the shore.

If the recording of adult individuals and larvae at the spawning site was successful, terrestrial recording of the crested newt is not required.

Each monitoring point is assigned a unique ID and all cases of recording of the crested newt are marked on the map. A separate data recording form with a map is used for each repetition and for each recording place. The monitoring data is entered in the recording form provided below:

Northern crested newt monitoring recording form

Territory:	Person responsible for monitoring:
	Tel.:
Repetition and date	Email:
Weather conditions	List of participants in the monitoring:
Water temperature	

General information on monitoring points		
Point No (code)	Name of location	Centre co-ordinates (LKS: X,Y)

Point No (code)	Adults		Larvae	Notes
	Water	*Land	Ind./No sweeps	
	Ind./No sweeps	of	Ind./Route length	

* Additional parameters marked

Instructions on how to complete the form:

Adult individuals in the water: The number of individuals caught and the number of sweeps are to be specified. If no individuals have been found, '0' is entered, if no search was conducted – the column is left blank. **Larvae:** The number of individuals caught and the number of sweeps are to be specified.

Notes: Any hazards and factors noticed are recorded, specifying the factor code and score as well as the factor direction (positive (+), negative (-)). Scores: 1 – not strong, 2 – moderate, 3 – strong. The list of hazard, impact and factor codes is provided in Annex VII to the Methodology.

Can be specified additionally (not mandatory): approximate numbers of newt eggs found and their places in the water body. Other amphibian species observed should be indicated.

Methodological details should be provided (intervals between points, catching equipment used etc.) so that other observers can conduct the monitoring by the same method.

Assessment of sites and habitats

Water habitats (spawning sites) are assessed by determining important characteristics of the water body (area, depth) and the habitat factors. Homogeneity, naturality and isolation of terrestrial habitats (300 m around the spawning place) are to be assessed.

Assessment of a water habitat (spawning environment) of the Northern crested newt

Area of water body (at the time of observation), m ² :		Approximate depth of water body, m:		Yes / No
Factor code and factor				
B1	*** Fish present			
B2	*** Water birds under constant monitoring			
B3	*** Abundant green frogs			
B4	** Water body dries up by mid-July			
B5	* Water body dries up, becomes shallow in the 2 nd half of August			
B6	** Water body does not dry up; slight fluctuations of the water level			
B7	* Water body has deeper and shallower zones (up to 30 cm deep)			
B8	* Subwater flora < 80 % of water volume			
B9	*** Subwater flora > 80 % of water volume			
B10	*** Silty bottom			
B11	* Open water surface accounts for ≥ 80 % of the water body area			
B12	*** Open water surface accounts for < 80 % of the water body area			
B13	* < 30 % of the water body always in the shade			
B14	** 30–70 % of the water body always in the shade			
B15	*** > 70 % of the water body always in the shade			
	Notes			

* Positive environmental factors; ** Factors deteriorating the habitat's condition;

*** Factors of unsatisfactory condition of the habitat.

Factors present/absent at the spawning place are evaluated as: Yes (+)/ No (-)

Explanations of factors' evaluation:

Area of the water body (the area during observation) – aerophotographs (scaled appropriately) should be used for the determination of the area parameters, or GPS devices with appropriate functions.

Green frogs present – 'green frog' is a generic name including three frog species (pool frog, edible frog and marsh frog). The assessment does not require to identify the species; recording the fact of presence or absence is sufficient. These frogs are characterised by a typically bright green colour of the body, the blowing-up resonators of frog males, and vocal sounds.

Fish present – the presence of fish is determined through observations of the water body (fish swimming in the water, larvae, jumping fish seen/observed), catching with the hand-held net, or

indirectly (scales found on the shore, fishermen paths and fishing places, questioning of fishermen
and water body users/owners).

Assessment of a terrestrial habitat (spawning environment) of the Northern crested newt

Factor code and factor		Yes / No
BS1	*Spawning site surrounded by leaf-bearing forest or mixed forest	
BS2	*Abundant natural hiding places (old tree stubs, fallen trees)	
BS3	**Open habitat	
BS4	**Shrub areas	
BS5	*** Spawning site surrounded by agrarian landscape; active economic activities	
BS6	***Habitat divided by a road with vehicle traffic	
BS7	*Distance to nearest potential spawning site < 500 m	
BS8	*** Nearest potential spawning site >1000 m	
BS9	**Non-homogeneous habitat (divided by roads, agrarian areas) between nearest spawning sites	
	Notes	

* Positive environmental factors; ** Factors deteriorating the habitat's condition; ***Factors of unsatisfactory condition of the habitat.

Assessment criteria

The assessment criteria have been identified in accordance with the Methodology.

Analysing of the monitoring data enables to:

1. Assess the habitat occupancy: the percentage of monitoring points at which the crested newt presence has been recorded. Recording of positive distribution points is an effective method enabling the analysis of long-term changes in populations;
2. Compare the site abundance classes and the habitat characteristics.

Habitat (spawning site, terrestrial habitat) characteristics are assessed by calculating the habitat's qualitative score. The habitat qualitative score is calculated on the basis of environmental factors (*Positive environmental factors; **Factors deteriorating the habitat's condition; ***Factors of unsatisfactory condition of the habitat).

The overall qualitative score of a water habitat is determined from the following formula:

$$B_b = \sum_1^n Bn / n$$

where

B_b is the overall qualitative score of a habitat,

n is the number of factors assessed,

Bn is the value of the factor according to the value scale provided in the Methodology.

The overall qualitative score of a terrestrial habitat is determined from the following formula:

$$B_{sb} = \sum_1^n BSn / n$$

where

B_{Sb} is the overall qualitative score of a habitat,

n is the number of factors assessed,

B_{Sn} is the value of the factor according to the value scale provided above.

Methods for the calculation of habitats' qualitative scores and the examples are provided in the Methodology.

The following is assessed on the monitoring points level: changes in the spawning site area and depth and changes in the individuals abundance, and based on the values of Factors B13–B15 – changes in the habitats' darkening levels.

Changes in the spawning site area are determined on the basis of multi-year monitoring data.

Criteria for the habitat quality assessment:

Where the overall habitat score (*Bb*) is 1 to 1.44, the condition of the habitat is deemed to be favourable,

Where *Bb* is 1.45 to 2.44, the condition of the habitat is deemed to be satisfactory,

Where *Bb* > 2.45 the condition of the habitat is deemed to be unfavourable

2.3.3. Monitoring of other protected amphibian species

The EIA Report states that 13 amphibians' species were found/could be present in the OPTL safety zone. Information about other amphibians species (excluding the European fire-bellied toad and the Northern crested newt) is provided in Table 8.

Table 8. Other amphibians species found in the OPTL safety zone (and adjacent areas)

Item No	Species	Protection status	Note
1	Common toad (<i>Bufo bufo</i>)	Bern Convention, Annex III	Not rare; abundant populations
2	Natterjack toad (<i>Bufo calamita</i>)	Lithuanian Red Book Cat. 5 (Rs), Bern Convention, Annex II, Habitats Directive, Annex IV	Not rare; abundant populations (in sandy biotopes)
3	European green toad (<i>Bufo viridis</i>)	Lithuanian Red Book Cat. 4(I) Bern Convention, Annex II, Habitats Directive, Annex IV	Not rare; abundant populations
4	Moor frog (<i>Rana arvalis</i>)	Bern Convention, Annex II, Habitats Directive, Annex IV	Not rare; abundant populations
5	European common frog <i>Rana temporaria</i>)	Bern Convention, Annex III, Habitats Directive, Annex IV	Not rare; abundant populations
6	Edible frog (<i>Rana esculenta</i>)	Bern Convention, Annex III, Habitats Directive, Annex V	Not rare; abundant populations
7	Pool frog (<i>Rana lessonae</i>)	Bern Convention, Annex III, Habitats Directive, Annex IV	Not rare; abundant populations
8	Marsh frog (<i>Rana ridibunda</i>)	Bern Convention, Annex III	Not rare; abundant populations
9	Garlic toad (<i>Pelobates fuscus</i>)	Bern Convention, Annex II, Habitats Directive, Annex IV	Not rare; abundant populations (in sandy biotopes)
10	Smooth newt (<i>Triturus vulgaris</i>)	Bern Convention, Annex III	Frequent in suitable biotopes
11	European tree frog (<i>Hyla arborea</i>)	Lithuanian Red Book Cat. 3R, Bern Convention, Annex II, Habitats Directive, Annex IV	No information about finding

Protection categories according to the Lithuanian Red Book: RK 3(R) – rare species due to biological properties; RK 4(I) – species with an undefined status; RK 5 (Rs) – preserved species.

2.3.3.1. Monitoring Locations

Some amphibian species are typical for and are not rare in Lithuania and are found frequently and form abundant populations near the OPTL. No specific monitoring points have been assigned for various species of amphibians (Table 8). Recording of these amphibians in the OPTL safety zone is conducted in the same territories where the monitoring of the European fire-bellied toad, Northern crested newt and European pond turtle is conducted and where suitable habitats are present (Annexes 6 and 7).

2.3.3.2. Description of Monitoring Methodologies and Assessment Criteria

A combination of methods is used for the recording of amphibians: recording by voices, during night time, and under covers.

Recordings are performed in the period from April until September. The start of recording in April depends on the temperature conditions.

Recording of amphibians by voices

A point is selected for the recording, at which the listening/recording takes place during 5 minutes and the location and date are noted. Other important details such as the start and end of the recording, air temperature, wind and cloud conditions, rain, numbers of individuals heard/recorded may be entered in the monitoring diary.

The recordings are performed at breeding places in spring (April and May) – two recordings in the daytime. A recording device with high microphone sensitivity (external microphone) must be used.

Recording of amphibians at night

The amphibians recording at night-time is performed at water bodies and in other open biotopes. Light is directed to the hiding places under logs and stones, in the leaves cover on the ground using a searchlight. The search must be conducted silently so that the individuals in open places are not scared. At the same time, voices of known amphibians are recorded; those of unknown amphibians are recorded for subsequent identification.

One man-hour is allotted per 200 m of the shore of a water body. When a recording is performed in an open biotope, 1 km of the route is taken as a unit of measure (the calculations are made in advance using a topographic survey).

The search is conducted from 8 p. m. until 6 a. m. All the individuals notices are characterised and counted. The recordings can be performed from April until September – two recordings.

Recording of amphibians under cover

Searching for amphibians under covers is particularly efficient for the purposes of toad studies. The amphibians choose pieces of construction waste (tin, veneer, roofing etc.) as hiding places. Such places are allocated on the transecta at 20 to 50 m intervals and are checked during 5 days in succession. The recordings can be performed from April until September – two recordings.

The recording data is entered in the recording form:

Territory		Observer	
Date		Method	
Air conditions (underline): sunny, cloudy, rain			
Air temperature			
Water temperature			
Observation location			
No	Co-ordinates	Amphibians species	Number

Assessment criteria

The assessment criteria include the fact of finding of the species and the determination of their abundance. The monitoring results obtained in the first year are used as reference values for multi-year comparisons

2.3.4. The European pond turtle (*Emys orbicularis*)

The species has been included in the List of Protected Species, Annexes II and IV to the EU Habitats Directive, and Annex II to the Bern Convention.

Habitats of the European pond turtle are small, shallow, silted water bodies. The turtles winter in the bottom silt in the period from October until March. A habitat is suitable for breeding if the shores to the south are open, dry and sandy.

2.3.4.1. Monitoring Locations

The European pond turtle monitoring locations have been selected within the OPTL safety zone at places where habitats suitable for the species are present, having regard to the information received from the Rudamina town community. The locations are shown in Table 9 and Annex 7.

European pond turtle

Table 9. European pond turtle monitoring locations

Item No	Co-ordinates LKS – 94				Tower Nos
	Start co-ordinates		End co-ordinates		
	X	Y	X	Y	
1	464745	6013641	464682	6013546	130-131
2	464458	6013195	464372	6013057	132-133
3	463823	6012551	463718	6012501	135-136
4	461749	6011567	4599695	6010278	142-Lithuanian-Polish border

2.3.4.2. Description of Monitoring Methodologies and Assessment Criteria

Parameters monitored, frequency and monitoring procedures

Number of individuals at the point under investigation (local abundance) is the main parameter. Adult individuals and young (immature) individuals are recorded. Recordings have to be conducted

under optimal local conditions - cannot be performed in cold weather and on very cloudy days. The observer must be knowledgeable about the biology and ecology of the species. In addition, observations of terrestrial habitats are performed by checking the potential egg deposition sites. Assessments of site and habitat characteristics are to be made.

Recordings of individuals are performed in water bodies twice per season: (1) in the second half of April and (2) at the end of April – beginning of May. A water body is to be observed (using binoculars) on a warm sunny day, when the water body is lighted well. It is recommended that the recording should be started 4 to 6 hours after sunrise. The length of observation at the same point is 20 min. If the weather is favourable, 2 to 3 observations should be performed on the same day – once before noon and 1-2 times after noon. There must be at least 1 hour interval between observations. During the observation of a water body attention should be focussed on lighted open shores, shallow areas, piasas and stones, and logs in the water.

Monitoring of terrestrial habitats (potential egg deposition sites) are checked and assessed 1 to 2 times per season (from mid-May until beginning of July). First of all the potential deposition sites should be checked for destroyed depositions (holes, egg shells) as this is one of the simplest methods to find the pond turtles' deposition sites.

All the pond turtle recording cases are to be entered in the layout of the area. A layout of monitoring points in the area, with the points' co-ordinates marked, must be presented together with the monitoring data form.

European pond turtle's abundance registration form

Territory					
Person conducting the monitoring:					
Telephone:			Email:		
Monitoring date:					
European pond turtle's abundance registration form					
Point No	No of individuals		Number of depositions (recommended)		Notes
	Adults	Not mature	Intact	Destroyed	

Assessment of sites and habitats

The condition of both water and terrestrial (egg deposition) habitats of the European pond turtle is assessed including both known and potential sites. The forms recording the degree of preservation of the water and terrestrial habitats are to be completed. A layout of monitoring points in the area, with the points' co-ordinates marked, must be presented.

Assessment of the European pond turtle's water habitat

Territory					
Person conducting the monitoring:					
Telephone:			Email:		
Monitoring date:					
European pond turtle water habitats' preservation recording form*					
Point No	I – Water flora	II – Hydrolog.	III – Shading	IV – Human act.	Notes

* – Scores assigned to categories:

I – Water plants: 0 – abundant subwater flora, there are palsas, stubs, logs, stones; 1 – subwater flora is present but no palsas, logs, stones; 2 – deep water body with scarce flora. II– Hydrological conditions: 0 – the water body never dries up completely; there are both deeper and sufficiently shallow areas; 1 – does not dry up completely until second half of August; 2 – dries up completely before the second half of August; III – Shading: 0 – the surface of the water body is in the shade < 30 %; 1 – the surface of the water body is in the shade 30–60 %; 2 – the surface of the water body is in the shade > 60 %; IV – Human activities: 0 – indications of anthropogenic activities absent or almost absent; 1 – water is being taken from the water body, nearby cattle pasture; 2 – frequently visited by people for fishing and bathing

Assessment of the European pond turtle's terrestrial habitat

Territory					
Person conducting the monitoring:					
Telephone:			Email:		
Monitoring date:					
European pond turtle terrestrial habitats' preservation recording form *					
Point No	I – Coverage	II – Soil	III-Isolation	IV – Human act.	Notes

* – Scores assigned to categories: I – Coverage with plants: 0 – not overgrown with high grass, shrubs or trees; 1 – there are perennial grasses, shrubs and trees – individual, no tracts; 2 – forest stand (shrubs and trees) forms tracts or ploughed arable land. II – Soil: 0 – light, sandy; 1 – gravel; 2 – clay. III – Isolation (distance to the nearest water body): 0 – deposition site near the water body (up to 100 m); 1 – distance to the nearest water body 100–300 m; 2 – distance to the nearest water body > 300 m. IV – Human activities: no roads within 0–200 m radius; 1 – the environment not significantly fragmented by roads; no roads between deposition site and water bodies; 2 – fragmentation by roads and paths within the 200 m radius, some roads used intensively.

The greatest hazards to the turtles' habitats and deposition sites are posed by changes in the water bodies, i. e. their overgrowth with plants, changes in hydrological conditions (dredging and cleaning of the water body); intensive human activities: cultivation of lands neat deposition places, fishing with nets; natural overgrowth or afforestation of potential deposition sites.

Assessment criteria

The assessment criteria include the fact of finding of the species (or the signs of the turtles' activities) and the determination of their abundance. Assessment indicators: numbers of the European pond turtles found; largest number recorded per observation; and number of deposition

sites. The monitoring results obtained in the first year are used as reference values for multi-year comparisons.

Scoring of water habitats:

Water plants:

- 0 – abundant subwater flora, there are piasas, stubs, logs, stones;
- 1 – subwater flora is present but no piasas, logs, stones;
- 2 – deep water body with scarce flora.

Hydrological conditions:

- 0 – the water body never dries up completely, there are both deeper (> 1m) and sufficiently shallow areas (0–0,5m);
- 1 – does not dry up completely until second half of August;
- 2 – dries up completely before the second half of August;

Shading:

- 0 – the surface of the water body is in the shade < 30 %;
- 1 – the surface of the water body is in the shade 30–60 %;
- 2 – the surface of the water body is in the shade > 60 %;

Human activities:

- 0 – indications of anthropogenic activities absent or almost absent;
- 1 – water is being taken from the water body, nearby cattle pasture;
- 2 – frequently visited by people for fishing and bathing.

Scoring of terrestrial habitats (deposition sites):

I – Coverage with plants:

- 0 – not overgrown with high grass, shrubs or trees;
- 1 – there are perennial grasses, shrubs and trees – individual, no tracts;
- 2 – forest stand (shrubs and trees) forms tracts, or ploughed arable land.

II – Soil:

- 0 – light, sandy;
- 1 – gravel;
- 2 – clay.

III – Isolation (distance to the nearest water body):

- 0 – deposition site is near a water body (up to 100 m);
- 1 – distance to the nearest water body 100–300 m;
- 2 – distance to the nearest water body > 300 m.

IV – Human activities:

- 0 – no roads within 0–200 m radius;
- 1 – the environment not significantly fragmented by roads; no roads between deposition site and water bodies;
- 2 – fragmentation with roads and paths within the 200 m radius, some roads used intensively.

The data analysis is to be made according to the recommendations provided in the Methodology.

2.4. Electromagnetic Fields Investigations

Purpose of investigations into electromagnetic fields: Determine the values of the electromagnetic radiation parameters in the premises of residential and public buildings and in the living environment.

Main tasks: Perform and assess the electromagnetic radiation parameters in the residential areas where the distance between residential/public buildings and the boundary of the safety zone of the existing power transmission lines is no longer than 100 m.

2.4.1. Locations of Investigations

The electromagnetic field monitoring points have been selected according to the Lithuanian Hygiene Standard HN 104:2011 ‘Protection of Residents against Electromagnetic Field Created by Power Transmission Lines’. Premises of residential and public buildings as well as residential environment within the distance of 100 m from the boundary of the OPTL safety zone have been identified. Locations of the investigation points are provided in Table 10 and Annexes 8 to 16. No addresses have been specified for the identified residential environment (farmsteads F, K, L, M and O) falling within the monitoring area (up to 100 m from the boundary of the OPTL safety zone) (Figures 1 - 4).

Table 10. Locations of investigations into electromagnetic fields

Item No	Farmstead	Address	Coordinates (LKS94)	
			X	Y
1	A	Ūdrijos kel. 91, Butrimiškių k., Alytaus r. sav.	496213	6033228
2	B	Kabinių k. 3, Alytaus r. sav.	495893	6033356
3	C	Ežero g. 2, Butrimiškių k., Alytaus r. sav.	495854	6033141
4	D	Kabinių k. 2, Alytaus r. sav.	495652	6033109
5	E	Kabinių k. 1, Alytaus r. sav.	495505	6033102
6	F	-	495068	6033380
7	G	Ežero g. 2, Duselninkų k., Alytaus r. sav.	494994	6033288
8	H	Ežero g. 1, Duselninkų k., Alytaus r. sav.	494899	6033305
9	I	Ežero g. 10, Duselninkų k., Alytaus r. sav.	494676	6033081
10	J	Karjero g. 3, Čižikų k., Alytaus r. sav.	491062	6031655
11	K	-	490606	6031663
12	L	-	490260	6031567
13	M	-	490164	6031568
14	N	Bernotiškių k. 1, Alytaus r. sav.	489918	6031555
15	O	-	484956	6030742
16	P	Skiturių g. 23, Skiturių k. Alytaus r. sav.	475062	6030979



Figure 1. Farmstead ‘F’



Figure 2. Farmstead 'K'



Figure 3. Farmsteads 'M' and 'L'



Figure 4. Farmstead 'O'

In addition, locations for the monitoring of the electric field strength (E) kV/m and the magnetic field strength (H) A/m were identified: under the line and at the boundary of the safety zone (30 m from the outer wire). The measurement points are shown in Table 11 and Annexes 8 to 16.

Table 11. Additional measurement points (see Annexes 8 to 16)

Item No	Co-ordinates (LKS94)		Item No	Co-ordinates (LKS94)	
	X	Y		X	Y
1	495715	6033218	14	482910	6030477
2	495718	6033188	15	475099	6030882
3	495001	6033352	16	475095	6030912
4	494997	6033322	17	472024	6025460
5	494298	6032989	18	472054	6025458
6	494315	6032953	19	468281	6022323
7	490904	6031565	20	468304	6022304
8	490901	6031595	21	465313	6014615
9	490237	6031483	22	465342	6014619
10	490232	6031512	23	464554	6013343
11	484788	6030772	24	464579	6013327
12	484787	6030803	25	461685	6011538
13	482912	6030447	26	461698	6011511

2.4.2. Description of Investigation Methods and Assessment Criteria

In Lithuania, protection of the public from power transmission lines and their equipment operating at the 50 Hz industrial frequency is governed by the Lithuanian Hygiene Standard HN 104:2011 ‘Protection of Residents against Electromagnetic Field Created by Power Transmission Lines’ (‘HN 104:2011’).

The strongest electromagnetic field are created in the environment of overhead power transmission lines of 330 kV and higher voltage. The permissible levels for the premises of residential and public buildings and for the living environment are presented in HN 104:2011. This Hygiene Standard applies to the areas of residential environment where the distance between residential/public buildings and the boundary of the safety zone of the existing power transmission lines (in the territory of the Republic of Lithuania) is not longer than 300 m.

This Hygiene Standard does not apply to the power lines’ safety zones (technical areas) where special conditions for the land and forest use are in force. In the Republic of Lithuania, electromagnetic fields created by power transmission lines are monitored by means of devices designed for industrial (50 Hz) measurements.

Monitoring points identification methods

Buildings situated within the distance of 100 m from the boundary of the OPTL safety zone have been identified using GDR10LT, the georeference data base of the territory of the Republic of Lithuania scaled M 1:10 000 (29/07/2015). According to the information provided by the Centre of Registers (*VĮ Registrų centras*), farmsteads A, B, C, D, E, G, H, I, J, N and P have been identified. Farmsteads F, K, M, L and O have been identified visually using ORT10LT, the digital raster orthophoto map of the territory of the Republic of Lithuania scaled M 1:10 000 (2012-2013).

There are no public buildings within the distance of 100 m from the boundary of the OPTL safety zone.

General requirements for the electromagnetic field measurements

The electromagnetic field measurements are to be organised by the transmission system operator (TSO) on completion the power transmission line construction/reconstruction works.

All the electromagnetic field parameters specified in Table 12 must be covered by the measurements.

Values of the parameters of electromagnetic field created by power transmission lines are measured by means of devices designed for measuring the 50 Hz electric and magnetic field strength and the magnetic flow density. Measurements must be performed at the height of 1.5 m. Measurements of the parameters of electromagnetic field are performed under normal operating conditions of the power transmission lines.

Measurements of the electromagnetic field parameters in residential environment and the premises of residential and public buildings (Table 10) are performed by laboratories accredited or certified for this purpose. Additional measurements under the lines and at the boundary of the safety zone (Table 11) may be performed by specialists of LITGRID AB'S Health and Safety at Work and Environmental Safety specialists.

Assessment criteria

The values of the electromagnetic field parameters in the residential environment and the premises of residential and public buildings may not exceed the permissible values set in the Lithuanian Hygiene Standard HN 104:2011.

Table 12. Permissible values of the electromagnetic field parameters

Item No	Description	Permissible values of electromagnetic field parameters (maximum)		
		Electric field strength (E), kV/m	Magnetic field strength (H), A/m	Magnetic flow density (B), T
1.	Premises of residential and public buildings	0.5	16.0	20.
2.	Residential environment	1.0	32.0	40.0

The TSO operating high-voltage power transmission lines must ensure that the permissible values of the electromagnetic field parameters specified in the table are not exceeded. Should it be determined that the said values are exceeded, measures must be taken to reduce the values to the permissible level.

Periodicity of monitoring: measurements of the electromagnetic field parameters are carried out under normal operating conditions of the power transmission lines, upon completion of construction works, once in a year.

3. ENVIRONMENTAL MONITORING PLAN

Table 13. Plan on the monitoring of the OPTL impact on the environment

Item No	Object of monitoring	Parameters assessed	Assessment criterion *	Measurement location	Measurement frequency	Measurement method **
1	2	3	4	5	6	7
Habitats monitoring						
1	Habitats	Damaged area. Plant species structure and habitat structure	Multi-year comparisons	4 monitoring points (Annexes 2 & 3)	1 per vegetation season	Determining the damaged area with GPS. Habitat condition: visual observation [1]
Birds monitoring						
2	Accumulations of migrating birds	Number of birds' accumulations, birds' abundance and species structure	Multi-year comparisons	2 monitoring points (Annexes 4 & 5)	8 recordings (3 in spring, 2 end of summer, 3 in autumn)	Visual observation [2], [3], [5]
3	Perished birds	Number of perished birds	Multi-year comparisons	2 monitoring points (Annexes 4 & 5)	10 recordings (5 in spring and 5 in autumn)	Route observation
Amphibians & reptiles monitoring						
4	Fire-bellied toad	Abundance of individuals, condition of sites & habitats	Multi-year comparisons	1 monitoring zone (Annex 7)	2-3 times in the warm season	Visual observation [6]
5	Northern crested newt	Abundance of individuals, condition of sites & habitats	Multi-year comparisons	1 monitoring zone (Annex 6)	Twice in spring and 1-2 in summer	Visual observation [6]
6	European pond turtle	Abundance of individuals, condition of sites & habitats	Multi-year comparisons	4 monitoring zones (Annex 7)	2-3 times in spring and 1-2 times in summer	Visual observation [6]
7	Other amphibians	Abundance of individuals, condition of sites & habitats	Multi-year comparisons	4 monitoring zones (Annexes 6 & 7)	2 recordings (in spring and summer)	Visual observation [2]
Electromagnetic field investigations						
8	Electromagnetic field	Electric field strength (E) kV/m, magnetic field strength (H) A/m, magnetic flow density (B), T	Permissible values of electromagnetic field parameters according to HN 104:2011	8 monitoring points (Annexes 8 - 16)	Once on completion of construction works	HN 104:2011 [4]

Notes:

* Limit values, target values or other normative values with which investigation results will be compared. For biological measurements and observations for which no limit values have been set, values of control measurements or

*other normative or reference values are to be specified; ** A valid legal act that establishes a measurement method, a valid standard, or another method is to be specified.*

1. Rašomavičius V. (ats. red.), 2012. EB svarbos natūralių buveinių inventorizavimo vadovas. Vilnius.
2. Arbačiauskas, K. (red.) 2009. Gyvūnijos monitoringo metodai. Vilnius, Vilniaus universiteto Ekologijos institutas.
3. Raudonikis L. ir kt., 2006. Europos bendrijos svarbos gyvūnų rūšių monitoringo metodikos. Paukščiai. Vilnius.
4. Lietuvos higienos norma HN 104:2011 „Gyventojų sauga nuo elektros linijų sukuriama elektromagnetinio lauko“.
5. “Europos Bendrijos svarbos paukščių monitoringo metodikos“.
6. “Europos Bendrijos svarbos žinduolių, žuvų, varliagyvių, roplių, moliuskų, vabzdžių ir augalų rūšių monitoringo metodikos”.

A one-year monitoring plan is set out in Table 13. Analogous plans are to be implemented throughout the period of environmental monitoring of the OPTL. Electromagnetic field measurements are to be carried out once on completion of construction works.

4. ENVIRONMENTAL MONITORING PROCEDURES

Main responsibility for the organisation of the monitoring and the data gathering, systemisation, summarisation and submission to the stakeholders according to legal acts lies with LITGRID AB.

Institutions conducting environmental monitoring or their laboratories involved in the monitoring must provide documentary evidence proving that their technical facilities and qualifications of responsible persons are sufficient for the managing and/or performing of observations/measurements under the environmental monitoring programme.

Investigations and measurements provided in the environmental monitoring programme must be carried out by statutory methods or valid methodologies (with the best available techniques – European, international or national employed).

The environmental monitoring programme may be updated/amended according to a procedure prescribed by law and can be continued, having regard to the monitoring results, upon agreement with the EPA.

The conduct of the environmental monitoring, quality of data, and the monitoring methods’ compliance with legal acts is controlled by regional environmental protection departments.

Monitoring data is submitted to the EPA. It is recommended that monitoring data on protected species should be submitted to the Protected Species Information System.

5. GATHERING, STORAGE AND PRESENTATION OF ENVIRONMENTAL MONITORING DATA AND INFORMATION

Monitoring results are summarised in an annual report that contains the following main information:

1. General:

- Legal form, name and address of a legal entity;
- Calendar year for which the report is submitted.

2. Analysis of monitoring data and conclusions:

- Description of sampling and sample analysis methods;
- Cartographic materials with investigation points indicated;
- Investigation results;

- Discussion and evaluation of results, comparison with previous year's monitoring data, trends, projections of the activity's impact on natural environment;
- Conclusions and recommendations.

3. Monitoring data:

Item No	Object of monitoring	Parameters identified	Assessment criterion	Measurement location, co-ordinates, distance to pollution source	Measurement frequency	Measurement date and time	Measurement results	Measurement method*	Laboratory performing measurements, licence No, date

Note:

A valid legal act that establishes a measurement method, a valid standard, or another method is to be specified.

6. TIMING AND RECIPIENTS OF DATA AND REPORT SUBMISSIONS

The annual environmental monitoring report, in both hardcopy and digital formats, is to be submitted to the Environmental Protection Agency no later than by 1 March next year. The annual environmental monitoring report is to be submitted also to the administrations of Alytus district municipality and Lazdijai district municipality.

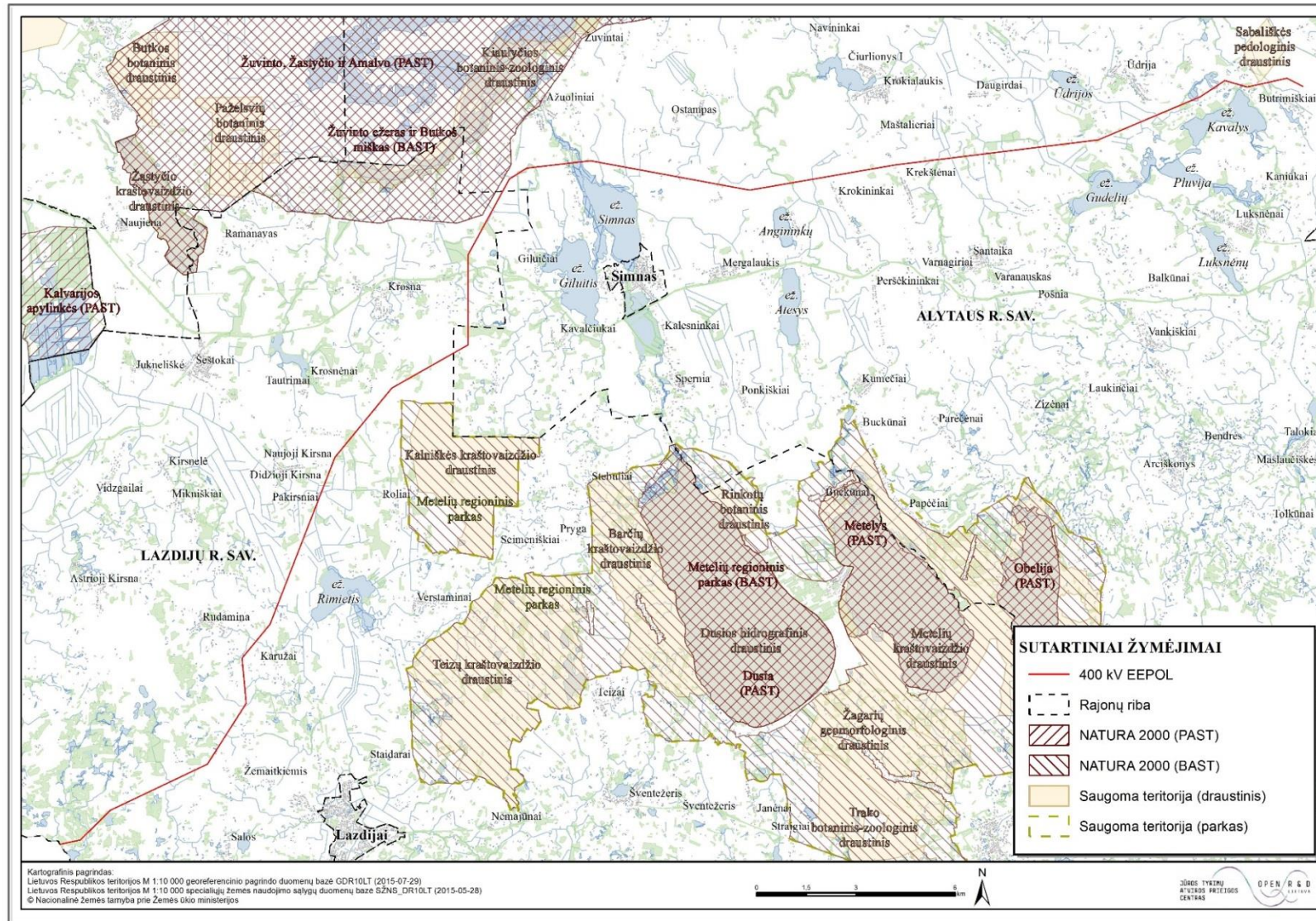
Full information on the environmental monitoring is to be gathered and stored by LITGRID AB. The period of retention of monitoring data is 10 years.

REFERENCES

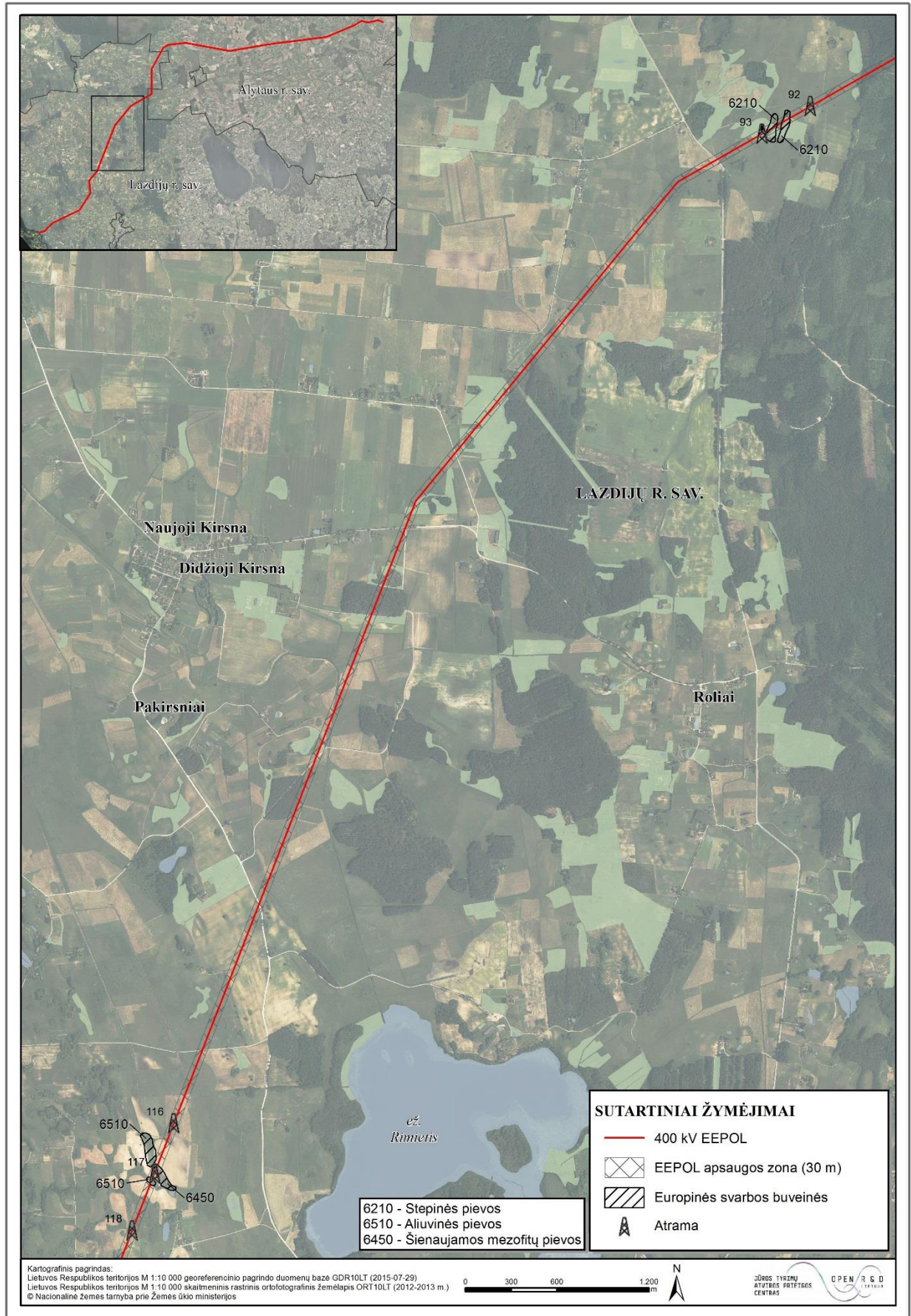
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- Order of the Minister of Health of the Republic of Lithuania No V-552 of 30 May 2011 'On the approval of the Lithuanian Hygiene Standard HN 104:2011 'Protection of Residents against Electromagnetic Field Created by Power Transmission Lines'.
- Order of the Minister of Environment of the Republic of Lithuania No D1-546 of 16 September 2009 'On the approval of the Regulations on the Environmental Monitoring of Entities'
- Methodology for the Monitoring of Bird Species of Community Interest approved by Order of the Director of the State Protected Areas Authority under the Ministry of Environment No V-16 of 26 February 2016.
- Methodology for the Monitoring of Mammals, Fish, Amphibians, Reptiles, Molluscs, Insects and Plants Species of Community Interest approved by Order of the Director of the State Protected Areas Authority under the Ministry of Environment No V-16 of 26 February 2016.

ANNEXES

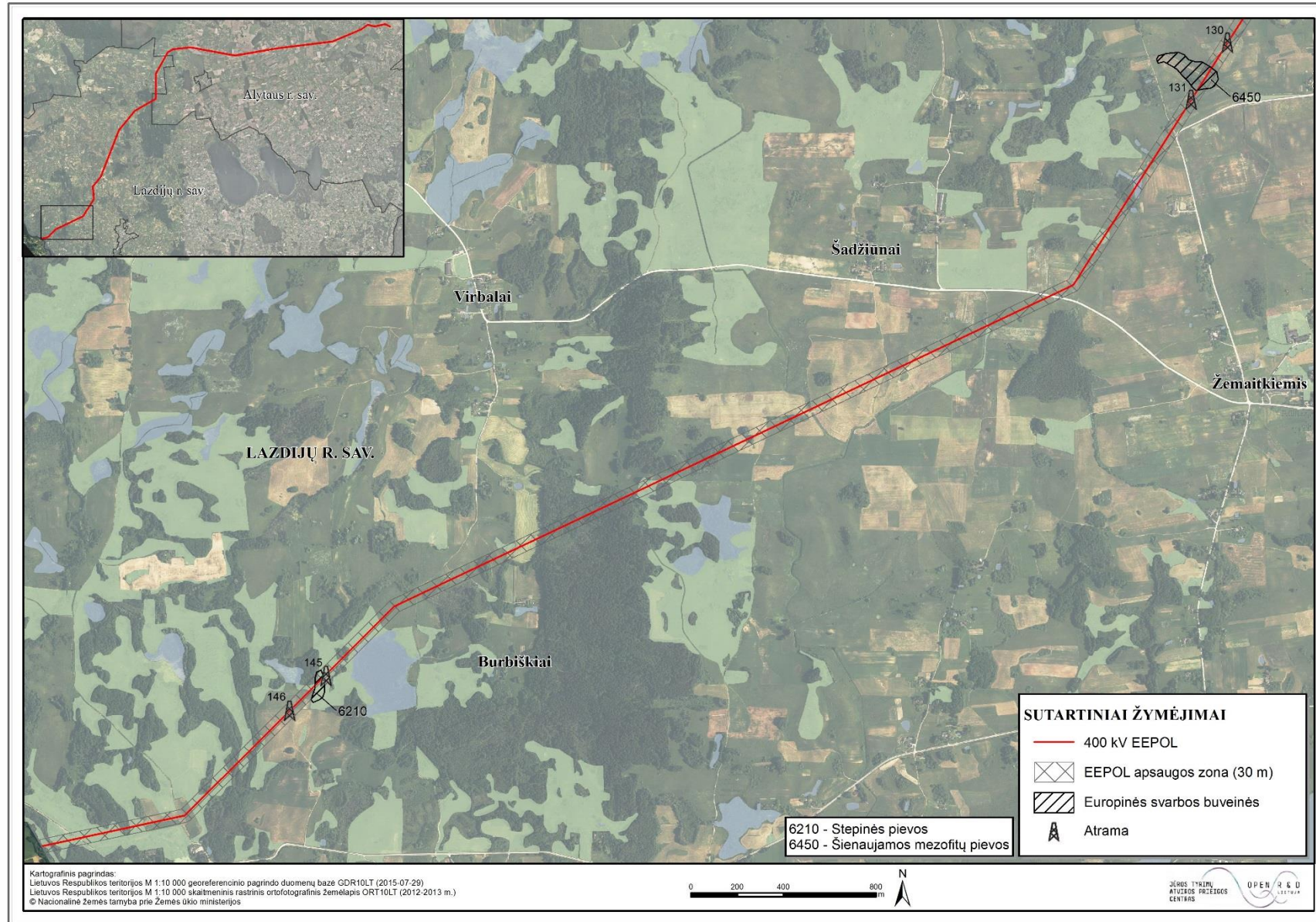
Annex 1. Location of the OPTL route



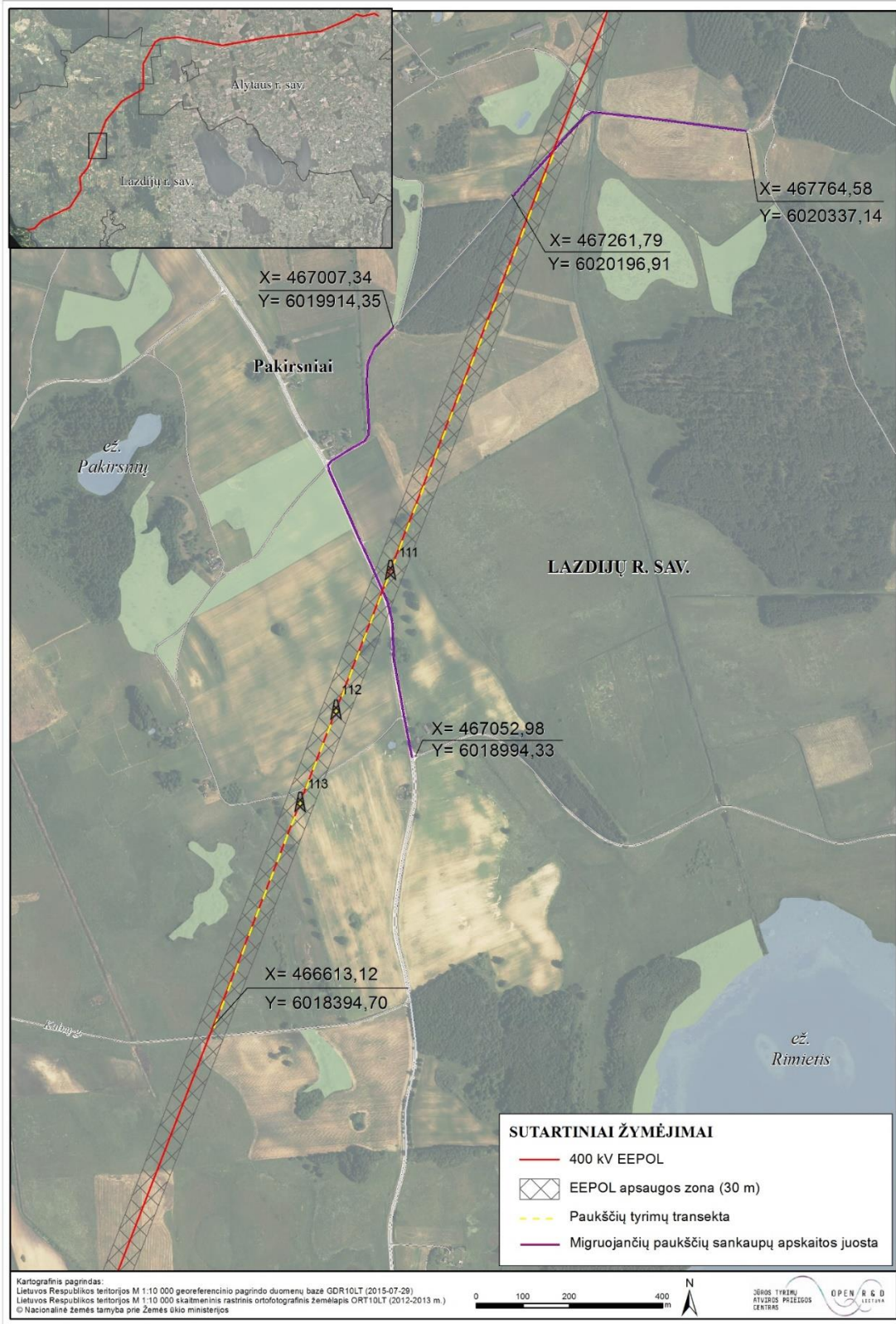
Annex 2. Locations of habitats monitoring



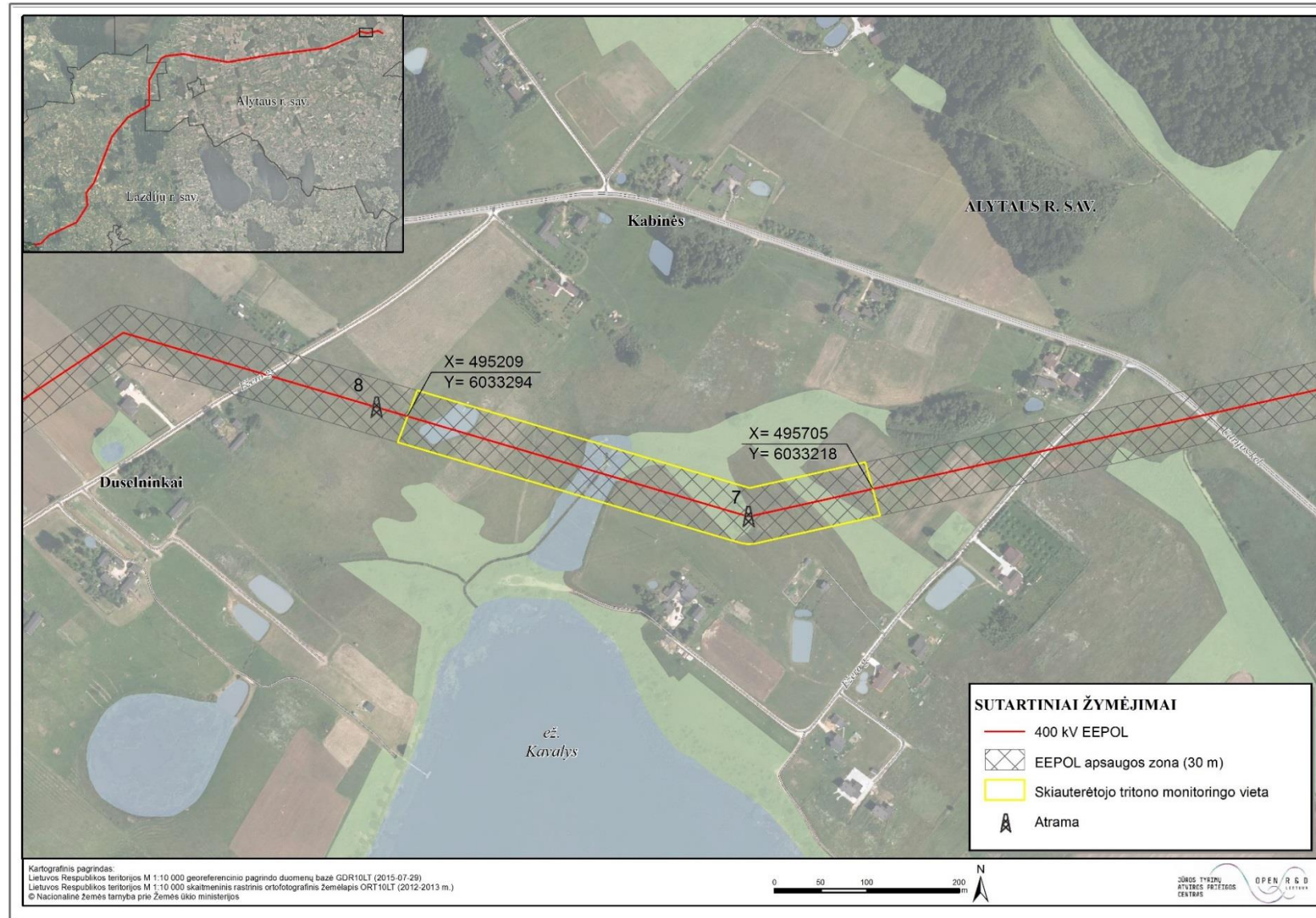
Annex 3. Locations of habitats monitoring



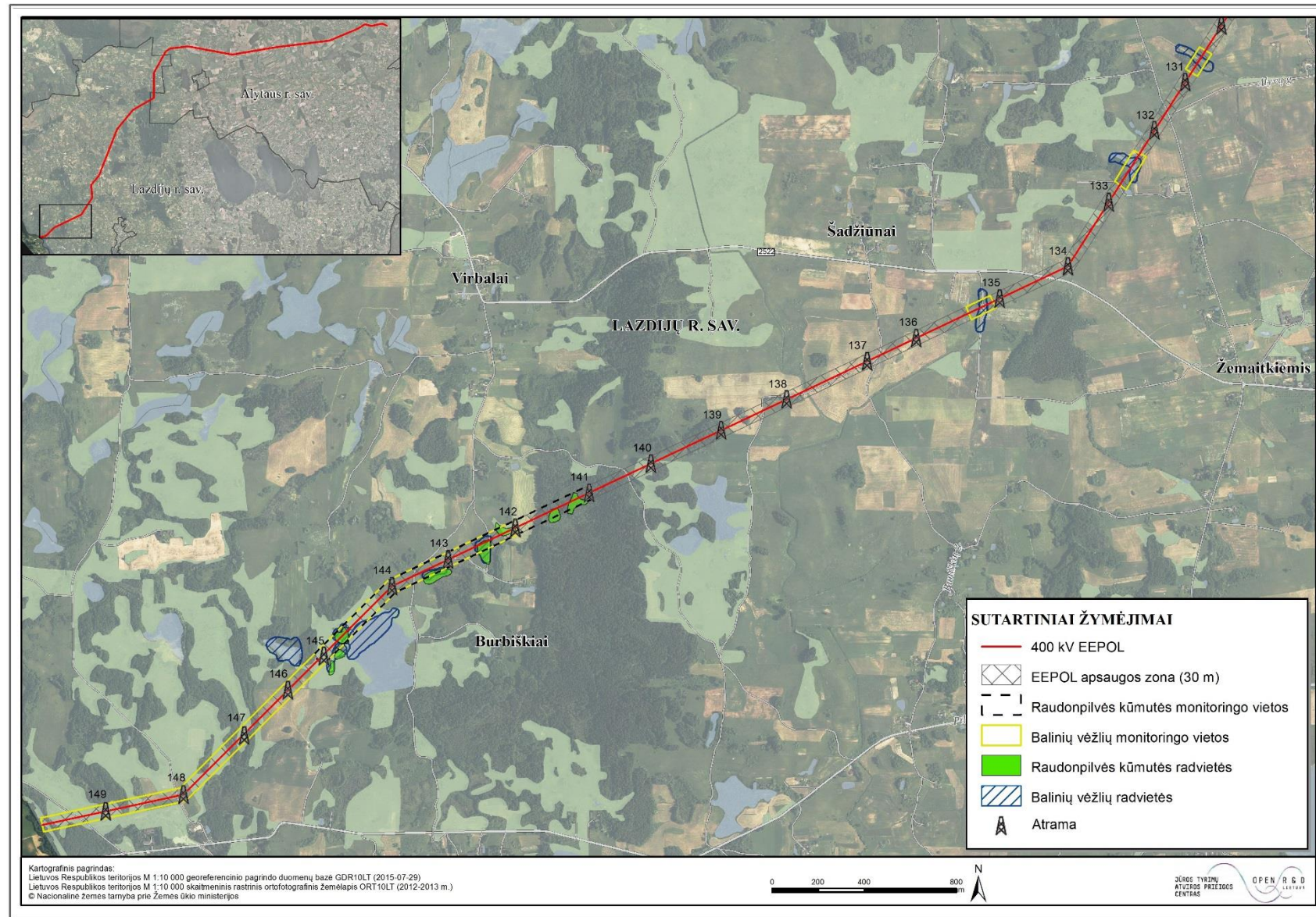
Annex 5. Birds' monitoring locations at Rimietis Lake



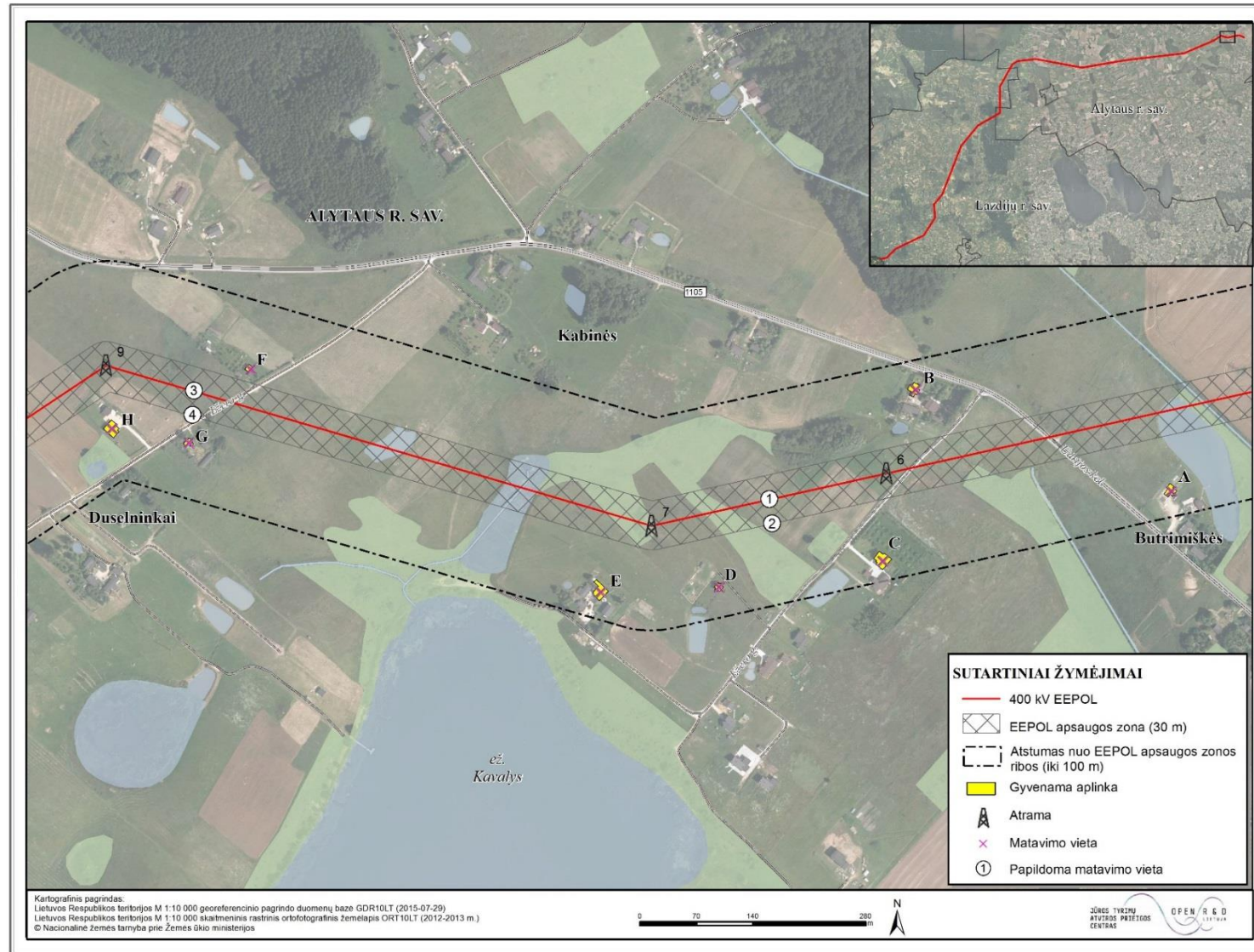
Annex 6. Locations of monitoring of the Northern crested newt



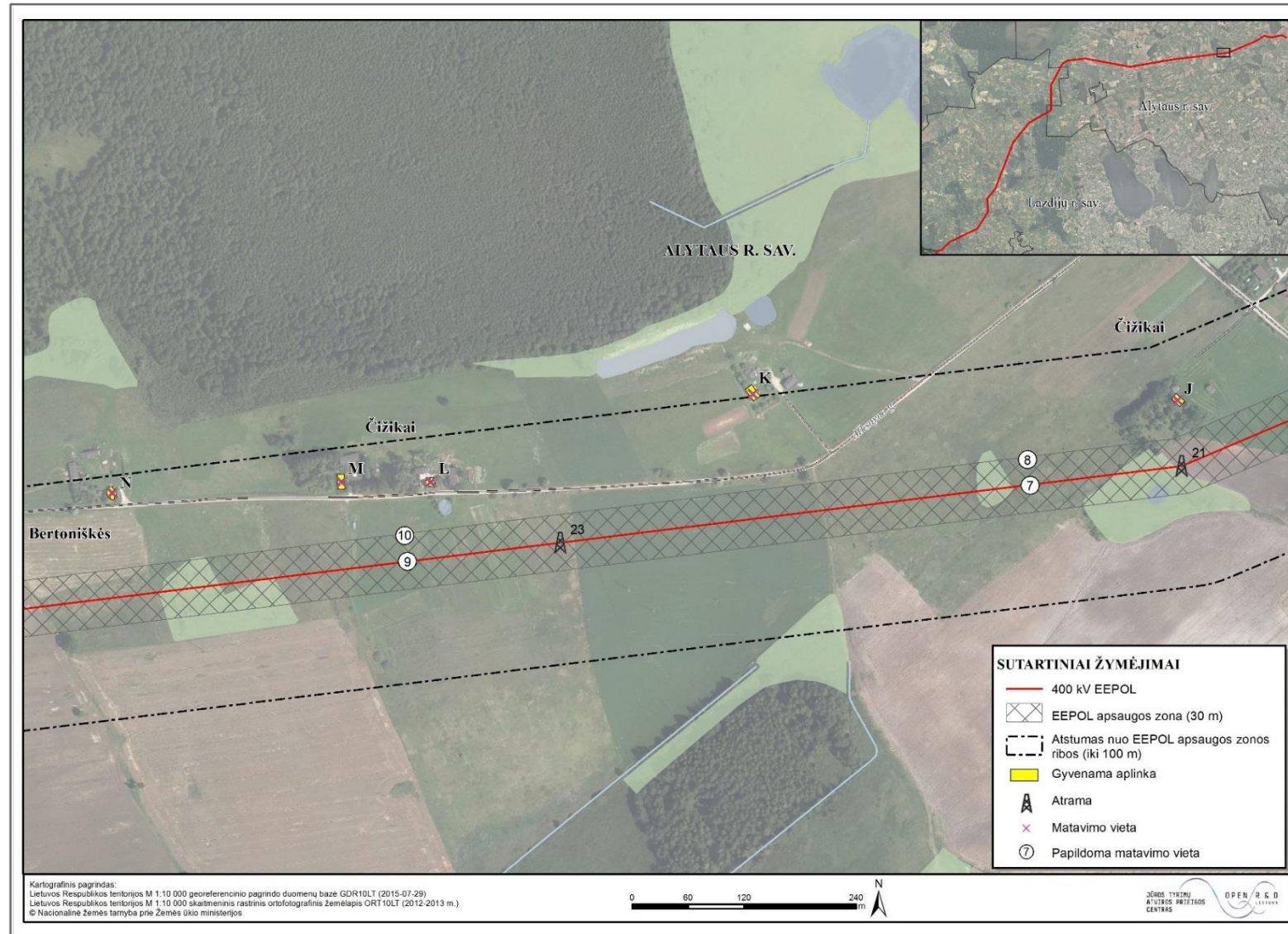
Annex 7. Locations of monitoring of the European fire-bellied toad and the European pond turtle



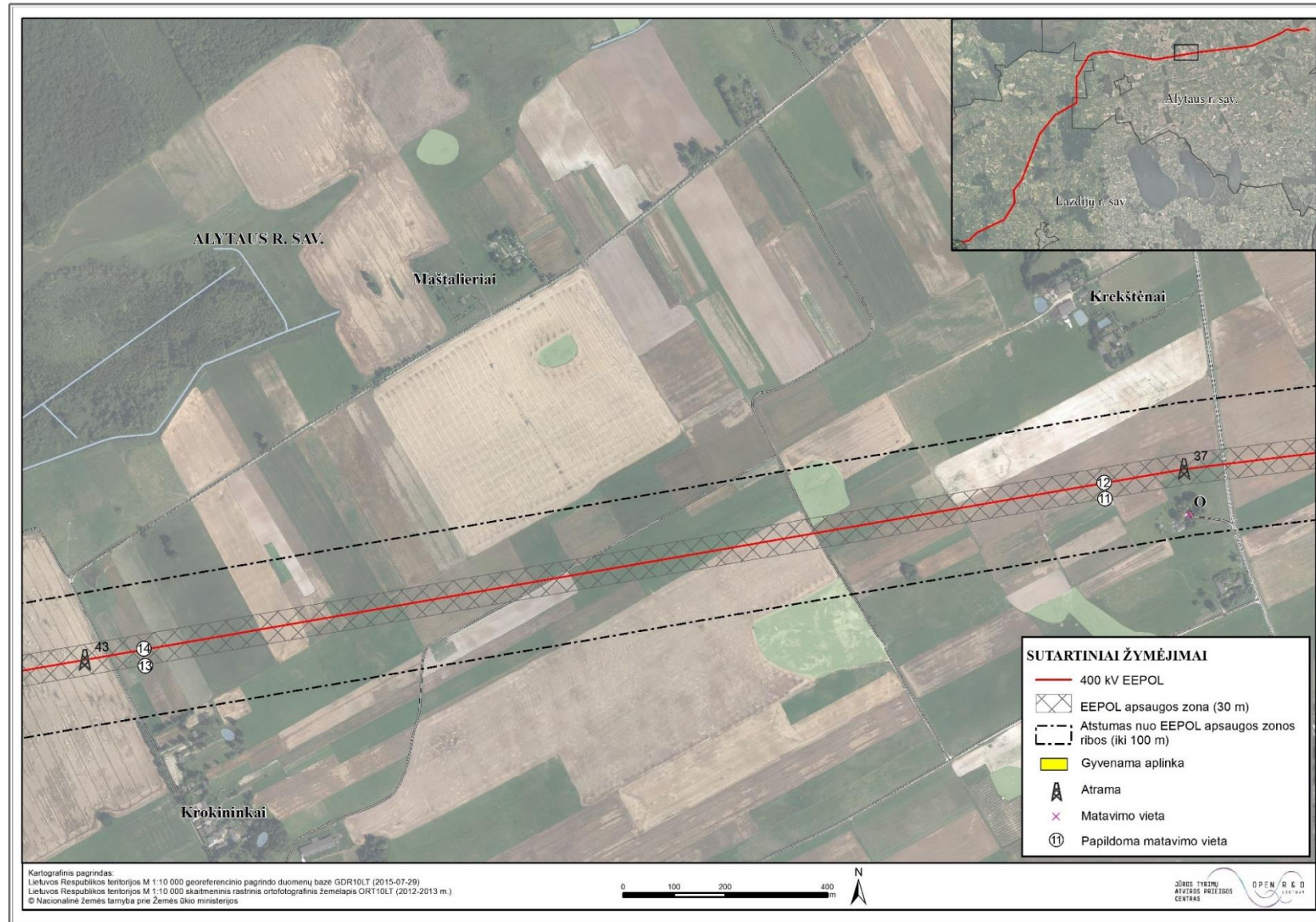
Annex 8. Locations of electromagnetic field investigations



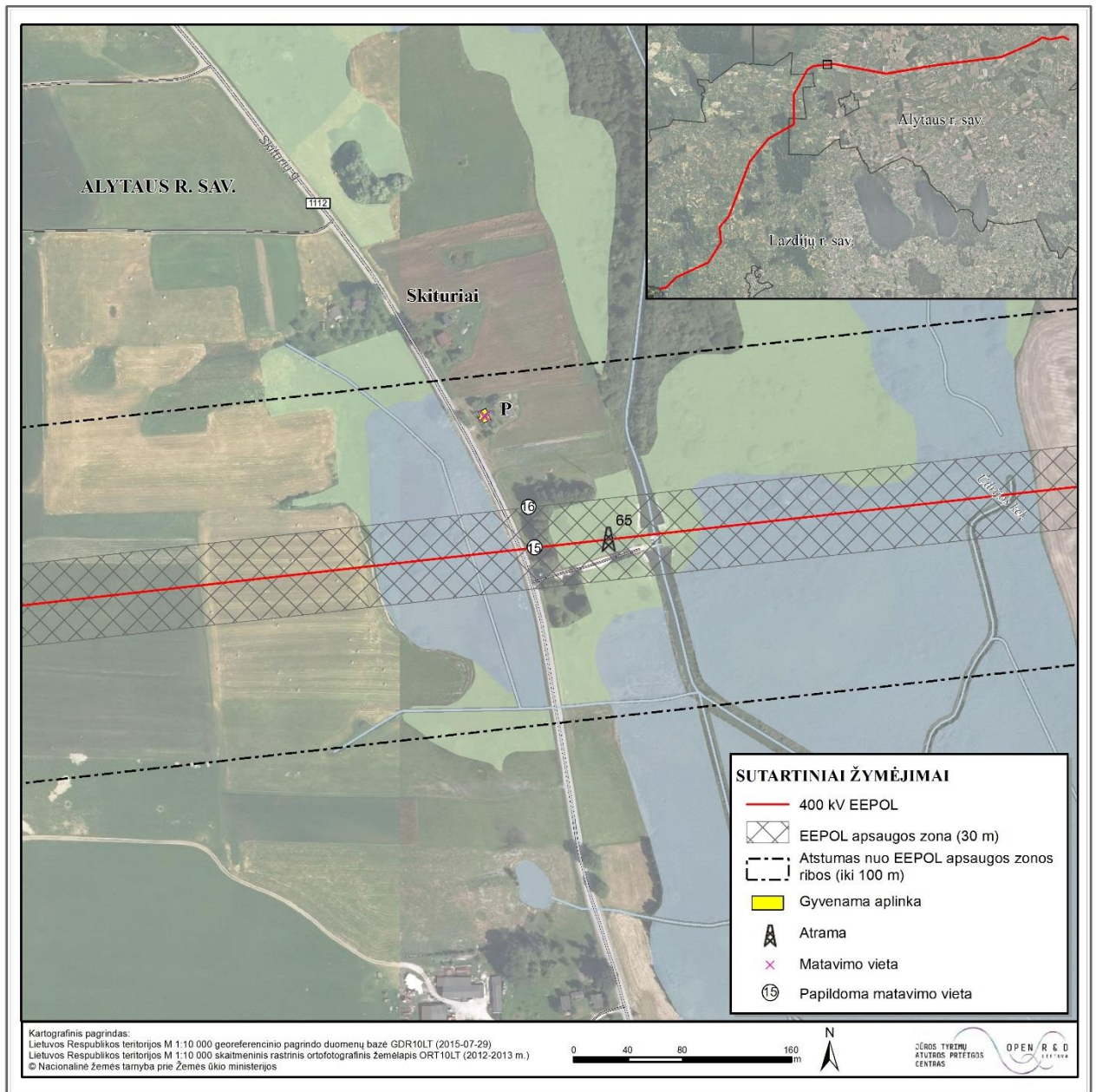
Annex 9. Locations of electromagnetic field investigations



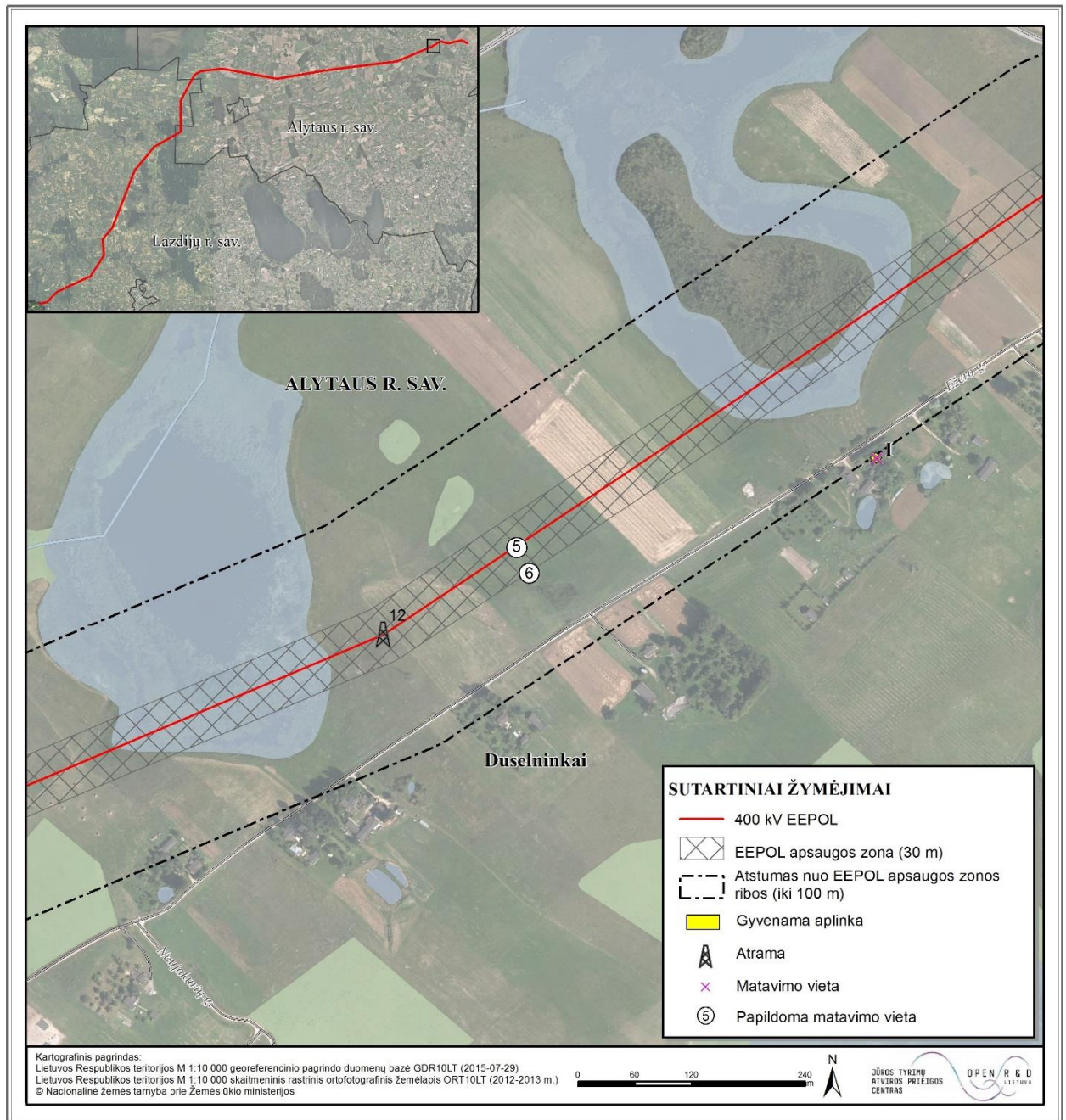
Annex 10. Locations of electromagnetic field investigations



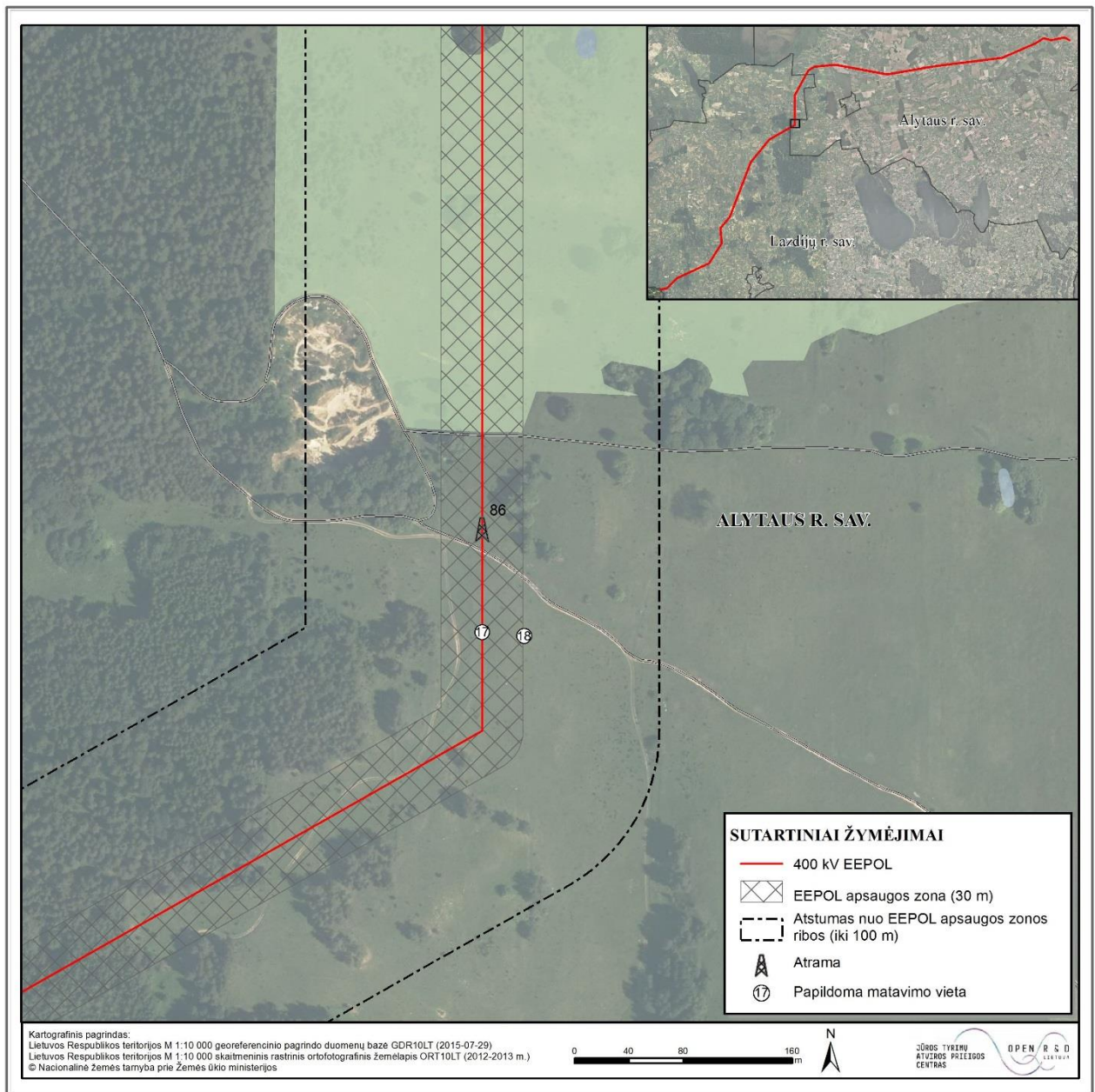
Annex 11. Locations of electromagnetic field investigations



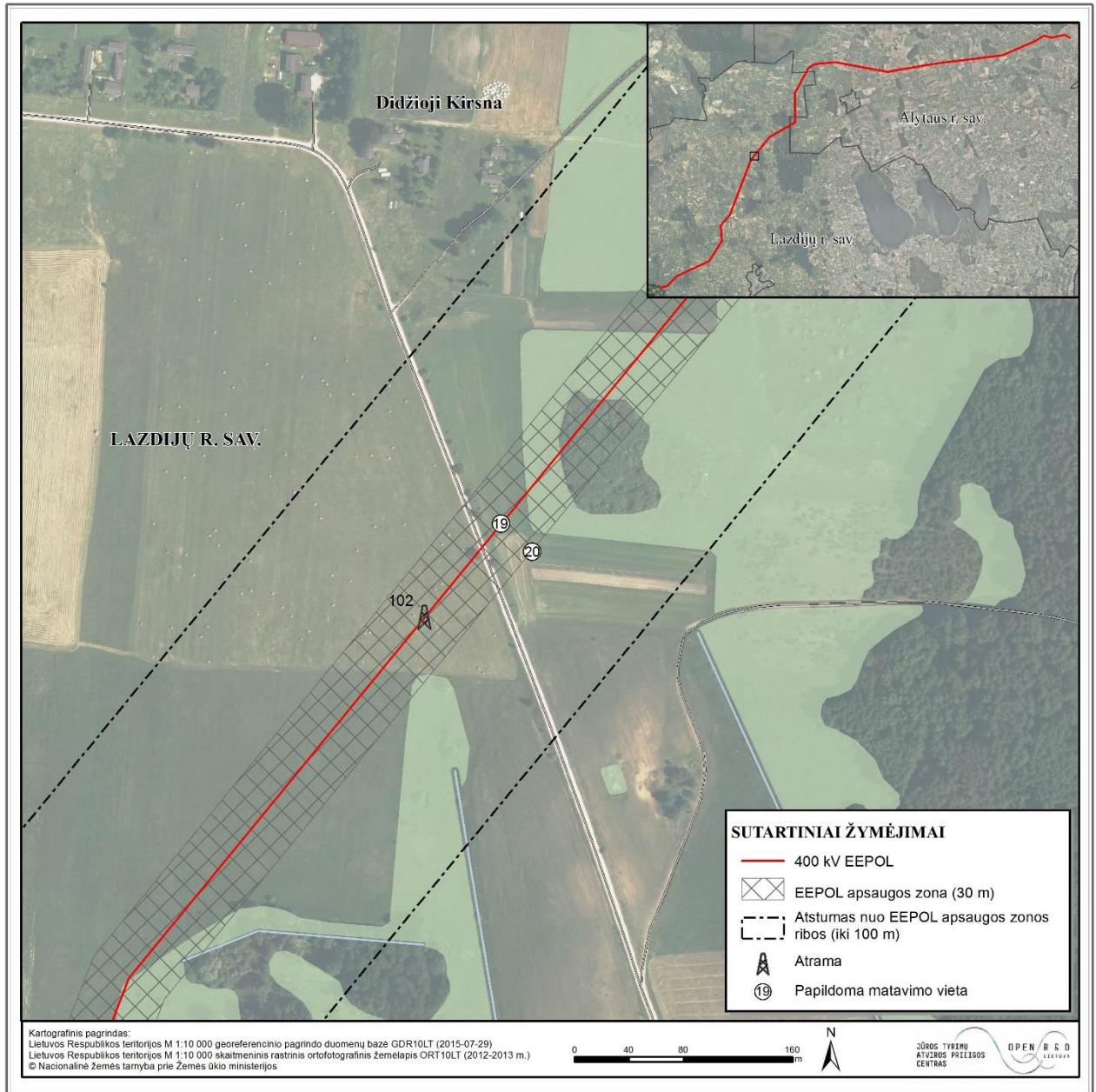
Annex 12. Locations of electromagnetic field investigations



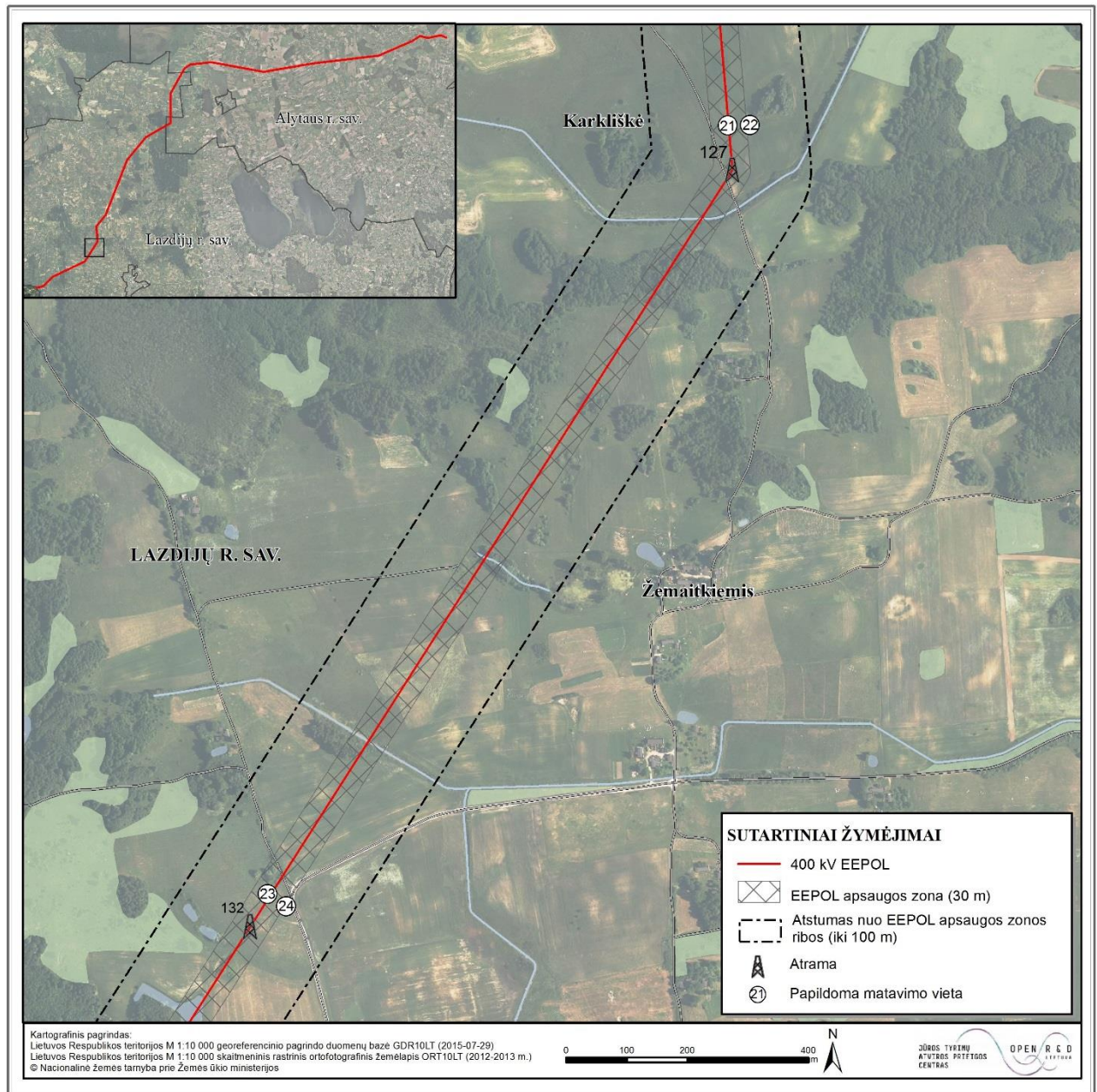
Annex 13. Locations of electromagnetic field investigations



Annex 14. Locations of electromagnetic field investigations



Annex 15. Locations of electromagnetic field investigations



Annex 16. Locations of electromagnetic field investigations

