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ASSESSMENT OF ENVIRONMENTAL BURDEN FROM NOISE

LILW REPOSITORY, VRBINA, KRŠKO

August 2018

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1 GENERAL PART

1.1 SUBJECT AND PURPOSE OF ASSESSMENT

The subject and purpose of the assessment is to determine the impact owing to emissions of noise during the construction and operation of the LILW repository at Vrbina, Krško.

1.2 CONTRACTING AUTHORITY AND OPERATOR OF SOURCE OF NOISE

Republic of Slovenia, Gregorčičeva 20-25, 1000 Ljubljana, by authorisation of ARAO, Ljubljana, Celovška cesta 182, 1000 Ljubljana

Responsible person: Acting Director mag. Sandi Viršek

1.3 ASSESSMENT PROVIDER

Kova d.o.o.,
Opekarniška cesta 15 d
3000 Celje

The Ministry of the Environment and Spatial Planning, Slovenian Environment Agency has by decision 35435-37/2017-2 of 3 January 2018, authorised the company KOVA d.o.o. to conduct the first assessment and operational monitoring of noise for the source of noise based on the measurement of noise according to standard SIST ISO 1996-2 in connection with standard SIST ISO 1996-1.

The Ministry of the Environment and Spatial Planning, Slovenian Environment Agency has by decision 35435-32/2017 authorised the company KOVA d.o.o. to assess noise using a model calculation based on the following calculation methods:

- NMPB-XPS 31-133
- RMR
- SIST ISO 9613-2

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1.4 LOCATION OF SOURCE OF NOISE

The site of the planned LILW repository lies southeast of the town of Krško and southwest of the village of Spodnji Stari Grad, on the left bank of the River Sava on a gravel plain with the old fallow field name of Vrbina. The site and its wider impact zone are part of the Krško or Krško-Brežice plain, with the wider surroundings stretching to the local hilly parts of the Krško basin.

1.5 CHARACTERISTICS OF CONSTRUCTION AND SETTLEMENT IN THE AREA OF NOISE SOURCE ASSESSMENT

The Vrbina site lies within the municipality of Krško. The closest towns to the site are Krško and Brežice, which are located 2.5 and 5 km from the site respectively. The site is located a little over 12 km from the border with the neighbouring country Croatia. Krško NPP is situated approximately 300 m from the western edge of the site. Approximately 400 m north-east of the site is the settlement of Spodnji Stari Grad. The plain on the southern side of the site is bounded by the Sava riverbed, which is approx. 650 m from the repository site at its nearest point.

To the south of the planned activity (approx. 600 m), the construction of a reservoir of the Brežice hydroelectric plant was finished in 2017 (start of trial operation in September 2017).

To the north, the plain extends towards Libna Hill. In the east, the site is bounded by a local road leading from the settlement of Vrbina towards the south-east, i.e. towards the banks of the Sava. The wider area of the site is used for agriculture and is officially designated prime agricultural land. There are fields within the site itself and a commercial orchard at the site's far western edge.

The wider area is used for agriculture and is officially designated as prime agricultural land. There are fields within the envisaged site and a commercial orchard in the site's direct vicinity.

1.6 DESIGNATED USE OF SPACE AND LEVEL OF NOISE PROTECTION

In the core area of the activity the following spatial use zones are in effect:

- prime agricultural land: The programme of conditioning agricultural land permits lowland melioration – An3, Stari Grad and commassation K11 and irrigation N1, Stara vas;
- energy infrastructure zones: Krško NPP – Krško nuclear power plant with protective buffer zone (500, 650 and 1500 m), transmission line – 20 kV with corridor; 110 kV above-ground transmission line; 2x400 kV above-ground transmission line, Zagreb - Krško;

Municipal services with infrastructure

- the closed urban waste landfill and Spodnji Stari Grad Waste Management Centre
- the area of Cerklje airfield: restricted use of space.

Types of activity in the core area:



- farming;
- energy activity in the area of the nuclear power plant;
- municipal services work within the closed urban waste landfill and Spodnji Stari Grad Waste Management Centre.

Under the provisions of the Decree on limit values for environmental noise indicators (Official Gazette of the RS, No. 43/2018) the nearest residential buildings are classified in zone III noise protection, while the Spodnji Stari Grad Waste Management Centre is classified in zone IV noise protection.

Zone III noise protection covers the following areas of detailed designated use of space:

- residential area: residential areas, special-purpose residential areas, rural settlement areas or holiday homes,
- area of central activity: main areas of central activity or other areas of central activity,
- special area: sports centres or areas for tourism,
- green area: areas for rest, recreation and sports, parks, allotments, other arranged green spaces or cemeteries
- areas of dispersed settlement and
- dispersed construction

Zone IV noise protection covers the following areas of detailed designated use of space:

- area of manufacturing activity: areas for industry, commercial zones or areas with industrial production facilities,
- transport infrastructure area,
- energy infrastructure area,
- communication infrastructure area,
- environmental infrastructure area,
- water infrastructure area,
- mineral raw material area: all areas,
- agricultural land area: all areas, except outdoor quiet area, and
- forest land area: all areas, except outdoor quiet area.



1.7 REGULATIONS, STANDARDS AND TECHNICAL RULES

Regulations applied:

- Decree on the assessment and regulation of noise in the environment (Official Gazette of the RS, No. 121/2004)
- Decree on the limit values of noise indicators in the environment (Official Gazette of the RS, No. 43/2018)
- Rules on initial assessment and operational monitoring for sources of noise and conditions for the implementation of monitoring (Official Gazette of the RS, No. 105/2008)

Standards applied:

- SIST ISO 9613-2: 1997
- NMPB-XPS 31-133:2011

1.8 NOISE INDICATOR LIMIT VALUES

The limit values of noise indicators, as laid down by the Decree on the limit values of noise indicators in the environment (Official Gazette of the RS, No. 43/2018), are shown in tables 1, 2 and 3.

Table 1: noise indicator limit values for the entire environmental noise burden $L_{noč}$ (L_{night}) and L_{dvn} (L_{daily}) for individual areas of noise protection

Noise protection area	$L_{noč}$ dB(A)	L_{dvn} dB(A)
Area IV	65	75
Area III	50	60
Area II	45	55
Area I	40	50

Table 2: Noise indicator limit values L_{dan} , $L_{noč}$, $L_{večer}$ and L_{dvn} (L_{day} , L_{night} , $L_{evening}$ and L_{daily}) for noise caused by a device, plant, industrial complex, airport that is not a major airport, heliport, goods transfer facility or open car park

Noise protection area	L_{dan} dB(A)	$L_{večer}$ dB(A)	$L_{noč}$ dB(A)	L_{dvn} dB(A)
Area IV	73	68	63	73
Area III	58	53	48	58
Area II	52	47	42	52
Area I	47	42	37	47



Table 3: noise indicator limit values L_{dan} , $L_{noč}$, $L_{večer}$ and L_{dvn} for noise caused by construction sites

	L_{dan} dB(A)	$L_{večer}$ dB(A)	$L_{noč}$ dB(A)	L_{dvn} dB(A)
Source of noise	65	60	55	65

1.9 METHOD OF ASSESSING NOISE, CALCULATION METHODS USED, SOFTWARE USED AND MEASURING EQUIPMENT

Noise was assessed using a model calculation based on computing methods in accordance with the standards:

- NMPB-XPS 31-133 for noise due to the operation of roads
- SIST ISO 9613-2 for noise due to the operation of devices and plants

We used the software Bruel & Kjaer: LimA Plus MS1 7812 B, certificate No. 1-78566741.



2 ASSESSMENT OF ENVIRONMENTAL NOISE BURDEN

2.1 SOURCE OF NOISE WITH DESCRIPTION OF ITS MAIN TECHNICAL CHARACTERISTICS AND OPERATING STATE OF SOURCE OF NOISE

2.1.1 Embankment work

During the construction of the embankment, the greatest source of noise will be construction machinery and the movement of lorries bringing in and removing building materials from the LILW repository construction site. Construction will be carried out during the daytime.

At the construction site, machinery with the following sound powers will be used:

- Bulldozer $L_w=106$ dBA
- Roller $L_w=104$ dBA
- Excavator $L_w=96$ dBA
- Loader $L_w=96$ dBA
- Dumper $L_w=106$ dBA

The number of transports will be 30 per day.

2.1.2 Repository structures including silo 1 and infrastructure facilities

During the construction of the repository structures including silo 1 and infrastructure facilities, the greatest source of noise will be construction machinery and the movement of lorries bringing in and removing building materials from the LILW repository construction site. Construction will be carried out during the daytime.

At the construction site, machinery with the following sound powers will be used:

- Bulldozer $L_w=106$ dBA
- Roller $L_w=104$ dBA
- Excavator $L_w=96$ dBA
- Loader $L_w=96$ dBA
- Dumper $L_w=106$ dBA

The number of transports will be 20 per day for gravel and 5 per day for cement and reinforcement.



2.1.3 Silo 2

During the construction of silo 2, the greatest source of noise will be construction machinery and the movement of lorries bringing in and removing building materials from the LILW repository construction site. Construction will be carried out during the daytime.

At the construction site, machinery with the following sound powers will be used:

- Bulldozer $L_w=106$ dBA
- Roller $L_w=104$ dBA
- Excavator $L_w=96$ dBA
- Loader $L_w=96$ dBA
- Dumper $L_w=106$ dBA

The number of transports will be 30 per day.

During construction of the underground concrete wall (diaphragm), works will also take place in the evening and night. The greatest source of noise will be hydrophoresis, which according to the manufacturer's information will generate a sonic pressure of 80 dBA at 15 m.

2.1.4 Operation

The greatest sources of noise during operation will be:

- Two reversible heat pumps for the administrative and service building, on the roof of the building – $L_w=80$ dBA
- Three reversible heat pumps for the technological building, on the roof of the building – $L_w=80$ dBA
- Air exhaust from ventilation of the radiologically monitored area phase 1
- Air exhaust from ventilation of the radiologically monitored area phase 2
- Air exhaust from ventilation of the radiologically monitored area – silo
- Transport – 1 lorry per day
- Filling in empty spaces in the silo with cement mortar or concrete 1 x annually for around 1 month, total estimate of 100 lorries for transport of concrete

2.2 DESCRIPTION OF IMPLEMENTED AND/OR PLANNED MEASURES TO PROTECT AGAINST NOISE

2.2.1 Measures from the environmental report

The need for mitigation measures does not stem from the assessment of impacts, but mainly from the valid legislation on noise, which identifies a new project as a new source of noise governed by the noise source indicator limit values, which will not be exceeded in the nearest residential buildings.



2.2.2 Measures under the Decree on the detailed plan of national importance for the low- and intermediate-level radioactive waste repository at Vrbina in the Municipality of Krško (Official Gazette of the RS, No. 114/2009)

During construction, the legally defined noise levels may not be exceeded, and the following measures to protect against noise must be applied:

- use of construction machinery equipped with certificates of sound power that may not exceed the legally prescribed values,
- noisy work may be performed only between 7 a.m. and 7 p.m.
- appropriate organisation of the construction site to be ensured (limitation of sonic signals, machine engines not to idle unnecessarily).

2.2.3 Measures stemming from sectoral legislation

The sound power of construction machinery must meet the requirements of the Rules on noise emissions from machinery used in the open air (Official Gazette of the RS, Nos. 106/2002, 50/2005, 49/2006, 17/2011).

2.3 PERIOD AND AREA FOR ASSESSMENT OF NOISE

For construction of the embankment and structures of the repository, including silo 1 and infrastructure facilities, we assessed the noise for the period of a day, while for construction of silo 2 we assessed the noise for the period of a day, evening and night. The area of assessment was the LILW site and the closest settlement.

2.4 ASSESSED BUILDINGS WITH SECURED SPACES AND ASSESSMENT PLACES

Table 3 and Figure 1 show the locations of immission points at which noise assessment was performed.

Table 4: Location of immission points

Immission point	Y	X
1	541542	88805
2	541339	88889
3	540998	89047
4	539924	89122
5	541429	88416



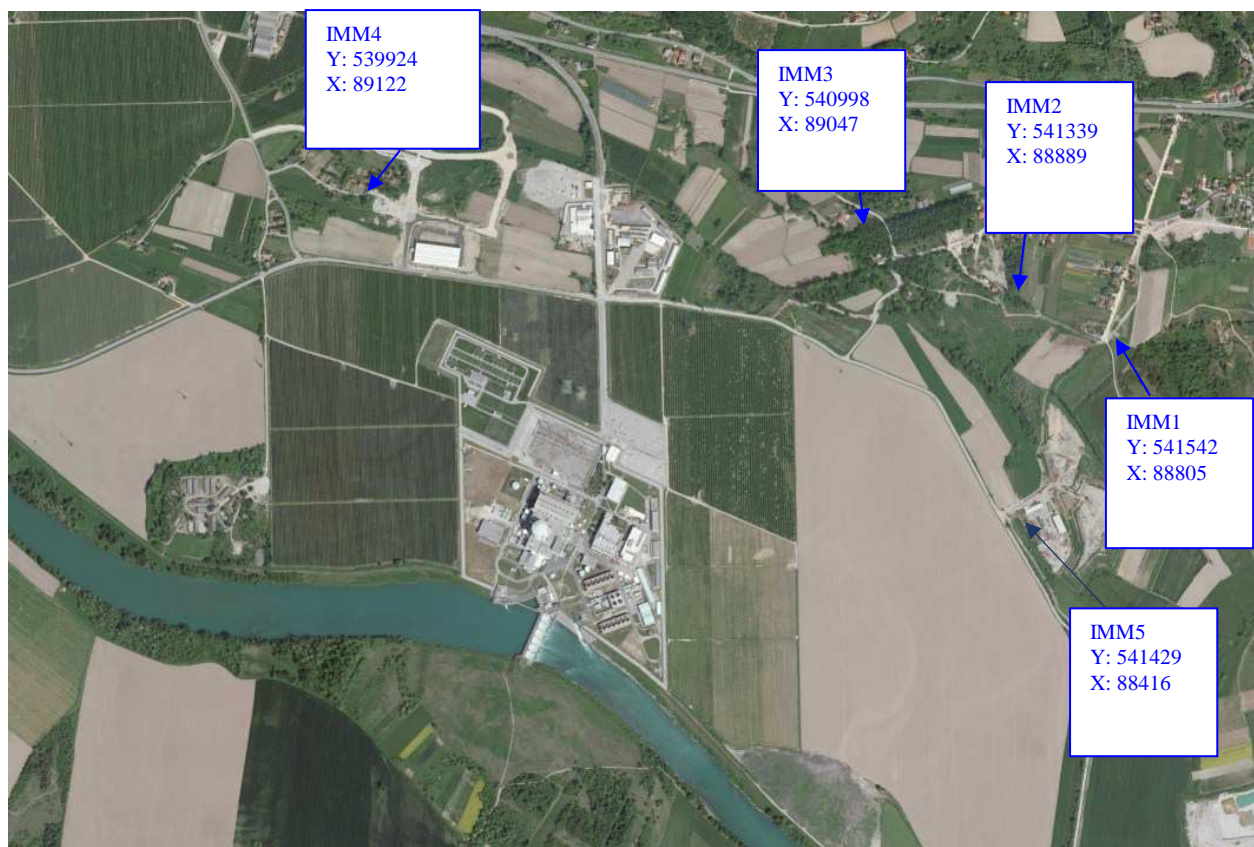


Figure 1: Location of immission points (Atlas of the Environment)

2.5 RESULTS OF NOISE ASSESSMENT

2.5.1 Existing sources of noise

We determined the existing burden of noise at the site of the future LILW repository Vrbina on the basis of:

- Expert assessments of the impact of noise on the environment – Emission of noise from the Spodnji Stari Grad Waste Management Centre, produced by the National Laboratory for Health, the Environment and Food; Environment and Health Centre; Environment and Health Department Novo mesto, report No. 44-4/14-11SKOK of 8 January 2014.
- Report on the state of ambient noise – Krško nuclear power plant, produced by ZVD, report No. LFIZ-20100179-EB/P of 31 January 2011
- Report on the measurement of ambient noise – Krško nuclear power plant, produced by ZVD, report No. LFIZ-20100179-EB/M of 31 January 2011
- model calculation (LimA Plus MS1 7812B)

The greatest impact contributing to the existing burden of noise at the site of the future LILW repository Vrbina comes from the Spodnji Stari Grad Waste Management Centre operated by the company Kostak, while there is no noise contribution from the Krško nuclear power plant. The Waste Management Centre is 300 m from the envisaged LILW site.



The main sources of noise in the area of the Spodnji Stari Grad Waste Management Centre are:

- existing waste sorting facility
- the new sorting facilities for mechanical processing of mixed urban waste
- a sorted waste compactor
- construction waste processing installation
- mobile plant
- compost rotator
- suction units for the composting plant
- internal transportation for shifting containers using lorries and self-loaders
- external movement of lorries (3/h lorries arriving at the landfill and 1/h departing the landfill)

Annexes 1, 2, 3 and 4 show the model calculations for operation of the Waste Management Centre. The noise model L_{dan} shows the model calculation for the indicator of daytime noise, the noise model $L_{večer}$ the indicator of evening noise, the noise model $L_{noč}$ the indicator of night noise and the noise model L_{dvn} the combined noise indicator. The model calculations derive from the document: Expert assessments of the impact of noise on the environment – Emission of noise from the Spodnji Stari Grad Waste Management Centre, produced by the National Laboratory for Health, the Environment and Food; Environment and Health Centre; Environment and Health Department Novo mesto, report No. 44-4/14-11SKOK of 8 January 2014.

Annex 5 shows the model calculation for transport into and out of the Spodnji Stari Grad Waste Management Centre. The model calculation also took into account transport to the gravel works.

Table 5 shows the results of the calculation of the value of the daily noise indicator for the existing environmental noise burden.

Table 5: Results of the calculation of the value of the daily noise indicator for the existing environmental noise burden.

	Value of the indicator of daytime noise (dBA)
	L_{dan}
Immission point 1	56
Immission point 2	38
Immission point 3	39
Immission point 4	30
Immission point 5	65



2.5.2 Operation of the specific source of noise

Embankment work

Table 6 shows the calculated value of the noise indicators during construction of the embankment.

Table 6: Results of calculation of the value of the indicators of daily noise during construction of the embankment

	Value of the indicator of daytime noise (dBA)
	L_{dan}
Immission point 1	48
Immission point 2	48
Immission point 3	45
Immission point 4	35
Immission point 5	60

Repository structures including silo 1 and infrastructure facilities

Table 7 shows the calculated value of the noise indicators during construction of the repository structures including silo 1 and infrastructure facilities.

Table 7: Results of the calculated value of the daily noise indicators during construction of the repository structures including silo 1 and infrastructure facilities.

	Value of the indicator of daytime noise (dBA)
	L_{dan}
Immission point 1	55
Immission point 2	57
Immission point 3	55
Immission point 4	42
Immission point 5	64



Silo 2

Table 8 shows the calculated value of the noise indicators during construction of silo 2.

Table 8: Results of the value of the indicators of daily noise during construction of silo 2

	Value of the indicator of daytime noise (dBA)
	L_{dan}
Immission point 1	39
Immission point 2	40
Immission point 3	39
Immission point 4	31
Immission point 5	45

Table 9 shows the calculated value of the noise indicators during construction of the diaphragm.

Table 9: Results of the calculated value of the noise indicators during construction of the diaphragm

Immission point	Calculated value L_{dan} (dBA)	Calculated value $L_{večer}$ (dBA)	Calculated value $L_{noč}$ (dBA)	Calculated value L_{dvn} (dBA)
1	42	39	39	46
2	43	40	40	47
3	41	38	38	45
4	33	30	30	37
5	45	45	45	50



Operation

Table 10 shows the calculated value of the noise indicators during operation.

Table 10: Results of the calculated value of the noise indicators during operation

Immission point	Calculated value L_{dan} (dBA)	Calculated value $L_{večer}$ (dBA)	Calculated value $L_{noč}$ (dBA)	Calculated value L_{dvn} (dBA)
1	<35	<35	<35	<35
2	<35	<35	<35	<35
3	<35	<35	<35	<35
4	<35	<35	<35	<35
5	30	30	30	30

2.5.3 Overall environmental noise burden

Construction of embankment

Table 11 shows the overall environmental noise burden during construction of the embankment.

Table 11: Overall environmental noise burden during construction of the embankment

	Value of the indicator of daytime noise (dBA)
	L_{dan}
Immission point 1	57
Immission point 2	48
Immission point 3	46
Immission point 4	36
Immission point 5	66



Construction of repository structures including silo 1 and infrastructure facilities

Table 12 shows the overall environmental noise burden during construction of the repository structures including silo 1 and infrastructure facilities.

Table 12: Overall environmental noise burden during construction of the repository structures including silo 1 and infrastructure facilities

	Value of the indicator of daytime noise (dBA)
	L_{dan}
Immission point 1	57
Immission point 2	57
Immission point 3	55
Immission point 4	42
Immission point 5	67

Construction of silo 2

Table 13 shows the overall environmental noise burden during construction of silo 2.

Table 13: Overall environmental noise burden during construction of silo 2

	Value of the indicator of daytime noise (dBA)
	L_{dan}
Immission point 1	41
Immission point 2	42
Immission point 3	42
Immission point 4	33
Immission point 5	65



Construction of diaphragm

Table 14 shows the overall environmental noise burden during construction of the diaphragm.

Table 14: Overall environmental noise burden during construction of the diaphragm

Immission point	Calculated value L_{dan} (dBA)	Calculated value $L_{večer}$ (dBA)	Calculated value $L_{noč}$ (dBA)	Calculated value L_{dvn} (dBA)
1	56	39	39	54
2	44	40	40	47
3	43	38	38	45
4	35	30	30	37
5	65	48	48	63

Operation

Table 15 shows the overall environmental noise burden during operation.

Table 15: Results of the calculation of the value of the daily noise indicator during operation and of the existing environmental noise burden

Immission point	Calculated value L_{dan} (dBA)	Calculated value $L_{večer}$ (dBA)	Calculated value $L_{noč}$ (dBA)	Calculated value L_{dvn} (dBA)
1	36	<35	<35	<35
2	38	<35	<35	<35
3	39	<35	<35	<35
4	<35	<35	<35	<35
5	65	45	45	62



3 EVALUATION OF THE ESTIMATED NOISE INDICATORS

3.1 EVALUATION IN TERMS OF LIMIT VALUES

Based on the estimated values of the indicators of noise during construction and operation of the Vrbina LILW repository, Krško, we may conclude that the limit values of noise indicators, as laid down by the Decree on the limit values of noise indicators in the environment (Official Gazette of the RS, No. 43/2018), will not be exceeded. Equally, noise indicator limit values for the entire environmental noise burden will not be exceeded.

3.2 DEFINITION OF SOURCE OF NOISE IMPACT AREA

3.2.1 Embankment work

We set as the limit of the impact area the limit value of the indicator of daily noise generated by the construction site, which is 65 dBA. The impact area is shown in Figure 2.



Figure 2: Impact area during construction of embankment

3.2.2 Construction of repository structures including silo 1 and infrastructure facilities

We set as the limit of the impact area the limit value of the indicator of daily noise generated by the construction site, which is 65 dBA. The impact area is shown in Figure 3.

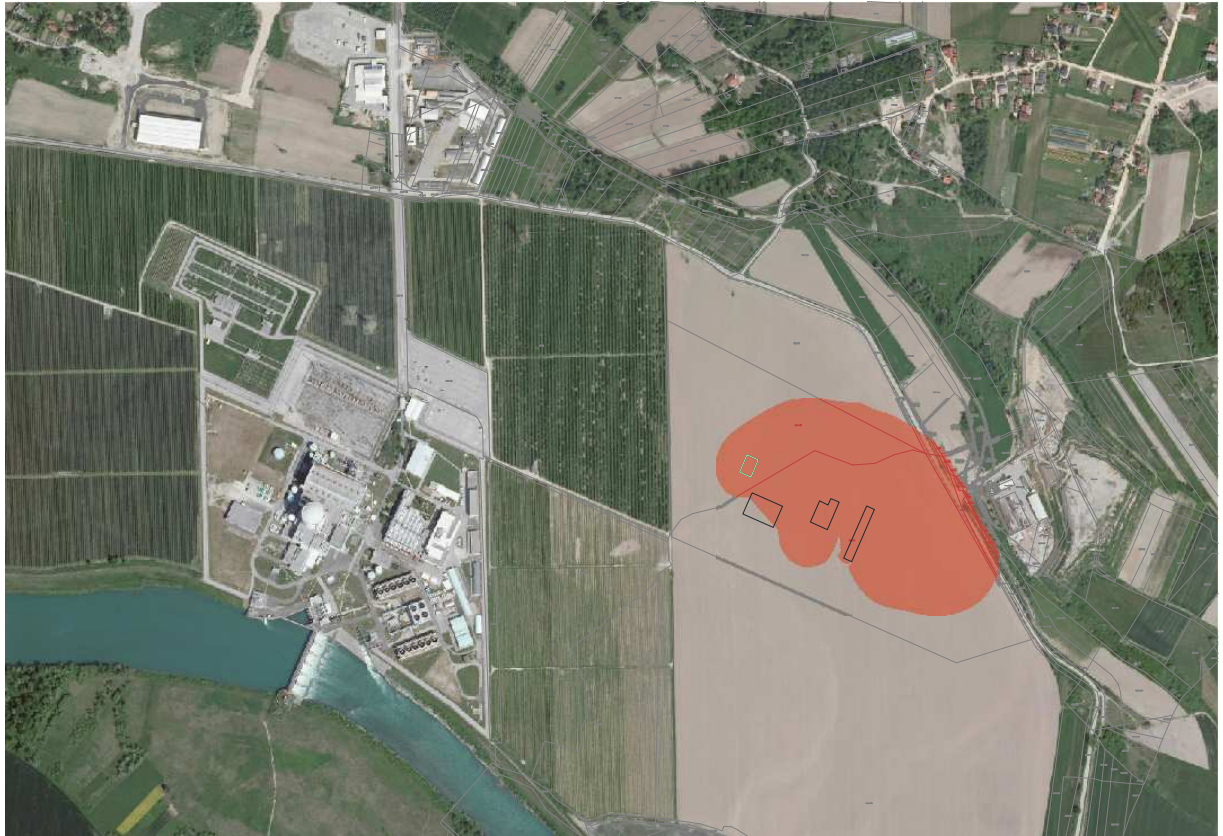


Figure 3: Impact area during construction of repository structures including silo 1 and infrastructure facilities

3.2.3 Construction of silo 2

We set as the limit of the impact area the limit value of the indicator of daily noise generated by the construction site, which is 55 dBA. The impact area is shown in Figure 4.



Figure 4: Impact area during construction of silo 2

3.2.4 Operation

We set as the limit of the impact area the limit value of the indicator of night-time noise, which is 48 dBA. The impact area is shown in Figure 5.



Figure 5: Impact area during operation

4 PLANNED OR NECESSARY ADDITIONAL MITIGATION MEASURES TO REDUCE ENVIRONMENTAL NOISE BURDEN

4.1 DESCRIPTION OF PLANNED/ADDITIONAL MEASURES

With the proper implementation of envisaged measures, no additional measures to limit noise during construction are necessary.



5 CONCLUDING ASSESSMENT

Based on the estimated values of the indicators of noise during construction and operation of the Vrbina LILW repository, Krško, we may conclude that the limit values of noise indicators, as laid down by the Decree on the limit values of noise indicators in the environment (Official Gazette of the RS, No. 43/2018), will not be exceeded. Equally, noise indicator limit values for the entire environmental noise burden will not be exceeded.



6 SOURCES OF DATA AND INFORMATION

- Expert assessment of the impact of noise on the environment – Emission of noise from the Spodnji Stari Grad Waste Management Centre, produced by the National Laboratory for Health, the Environment and Food; Environment and Health Centre; Environment and Health Department Novo mesto, report No. 44-4/14-11SKOK of 8 January 2014.
- Report on the state of ambient noise – Krško nuclear power plant, produced by ZVD, report No. LFIZ-20100179-EB/P of 31 January 2011
- Report on the measurement of ambient noise – Krško nuclear power plant, produced by ZVD, report No. LFIZ-20100179-EB/M of 31 January 2011
- Technical basis for the EIA for the LILW repository, Protection against noise, August 2015 – supplemented following review in November, December 2015, KOVA d.o.o., EK2015-1500501b



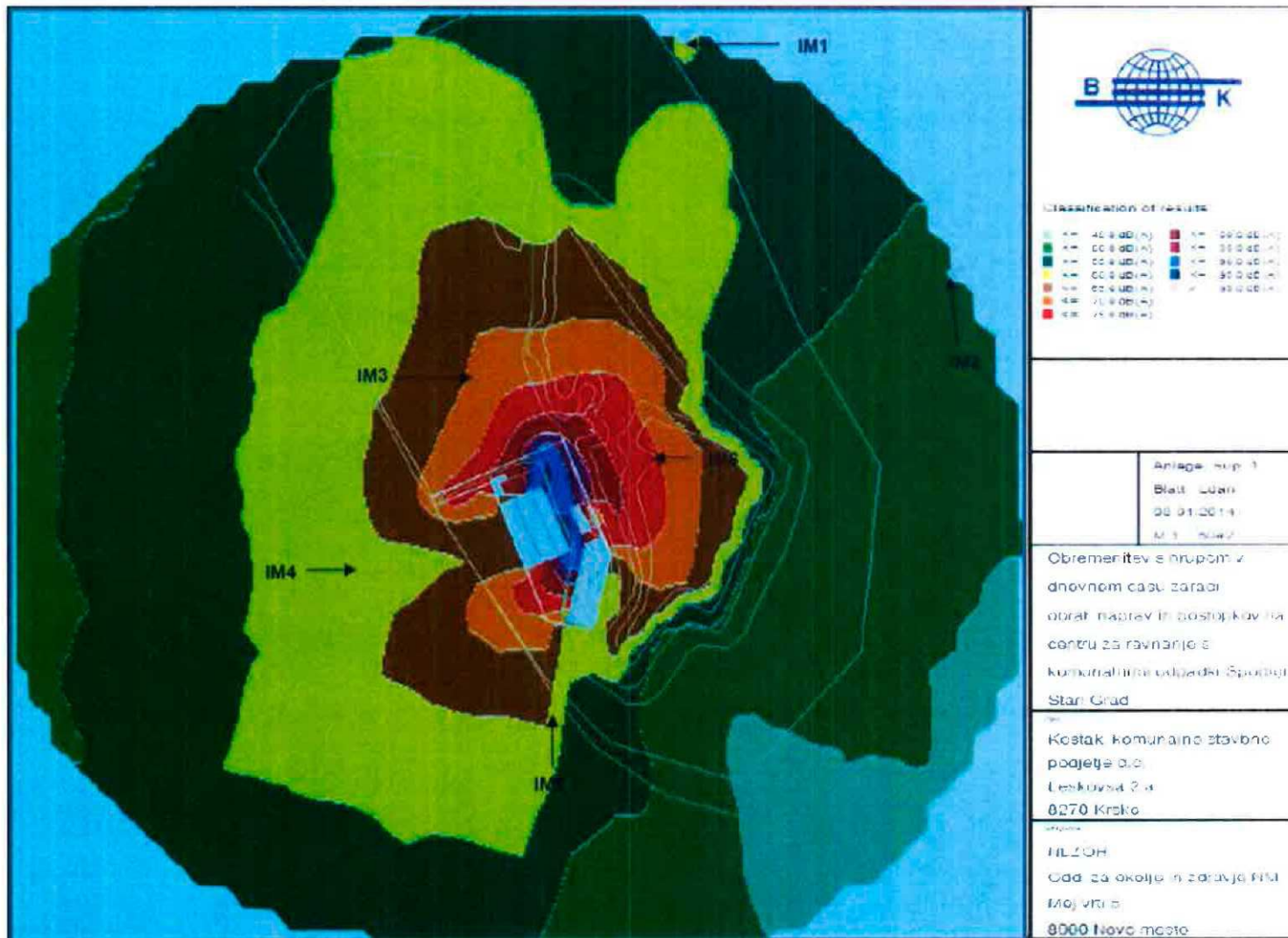
7 ILLUSTRATED ANNEXES

- Annex 1: Model of noise L_{dan} – daytime operation of the Spodnji Stari Grad Waste Management Centre
- Annex 2: Model of noise $L_{večer}$ – evening operation of the Spodnji Stari Grad Waste Management Centre
- Appendix 3: Model of noise $L_{noč}$ – night operation of the Spodnji Stari Grad Waste Management Centre
- Annex 4: Model of noise L_{dvn} – daily operation of the Spodnji Stari Grad Waste Management Centre
- Annex 5: Model of noise L_{dan} – daytime transportation to the Spodnji Stari Grad Waste Management Centre
- Annex 6: Model of noise L_{dan} during daytime construction of the embankment
- Annex 7: Model of noise L_{dan} during daytime construction of repository structures and infrastructure facilities
- Annex 8: Model of noise L_{dan} during daytime construction of silo 2
- Annex 9: Model of noise $L_{noč}$ during night-time construction of the diaphragm
- Annex 10: Model of noise during operation



ANNEX 1:

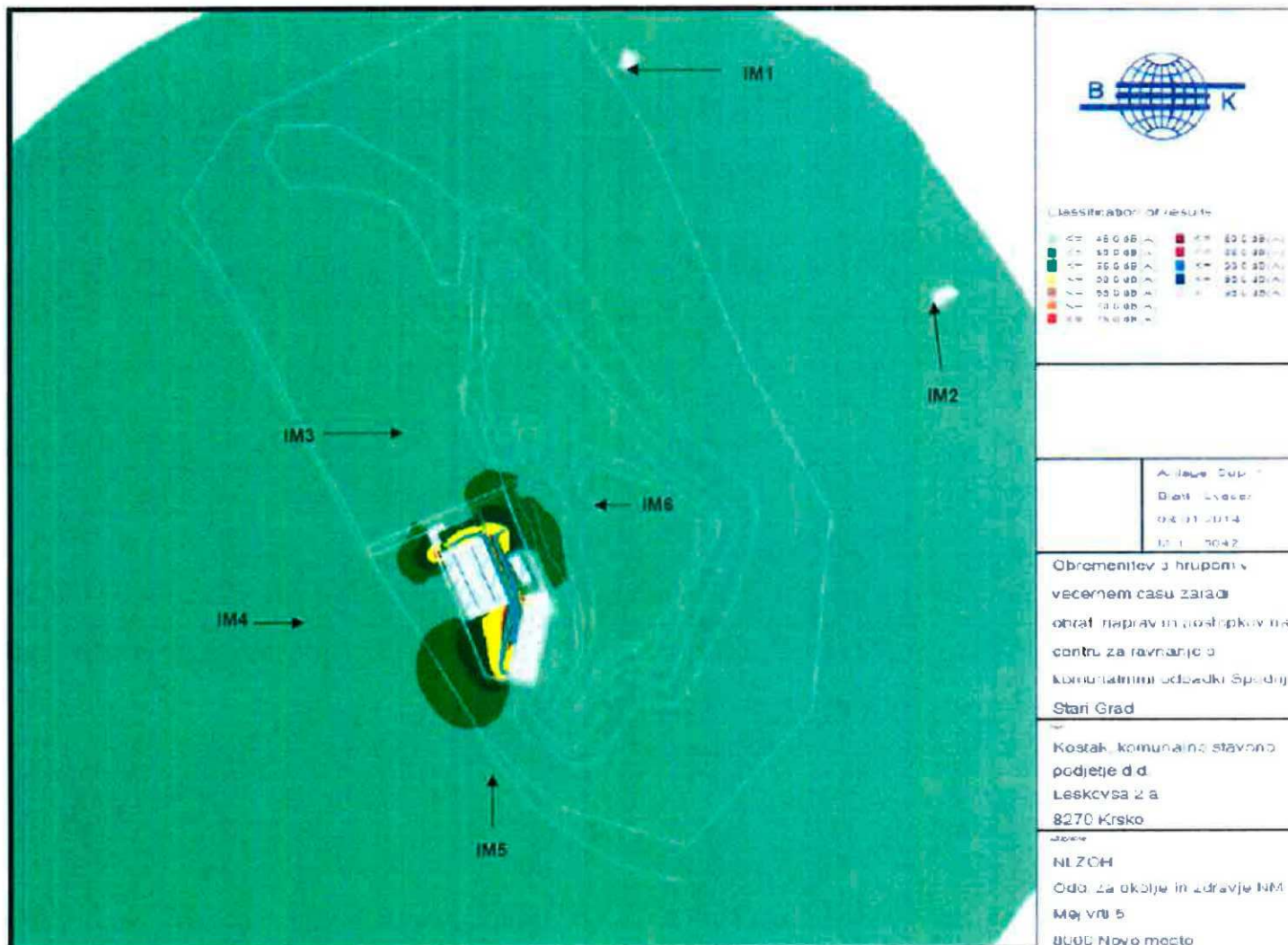
Model of noise L_{dan} – daytime operation of
the Spodnji Stari Grad Waste Management
Centre



Annex 1: Model of noise L_{dan} – daytime operation of the Spodnji Stari Grad Waste Management Centre

ANNEX 2:

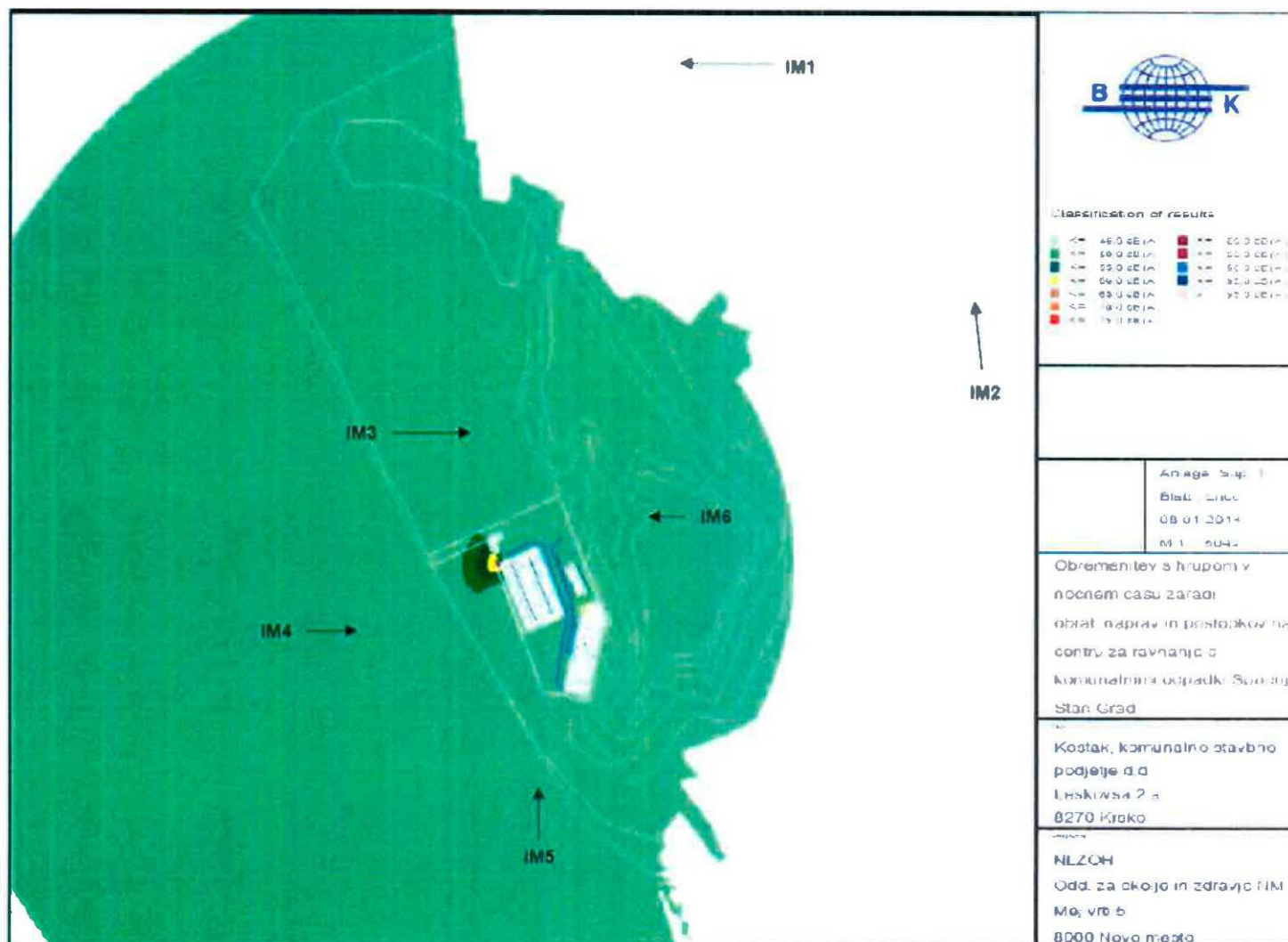
Model of noise $L_{\text{večer}}$ – evening operation of
the Spodnji Stari Grad Waste Management
Centre



Annex 2: Model of noise $L_{večer}$ – evening operation of the Spodnji Stari Grad Waste Management Centre

ANNEX 3:

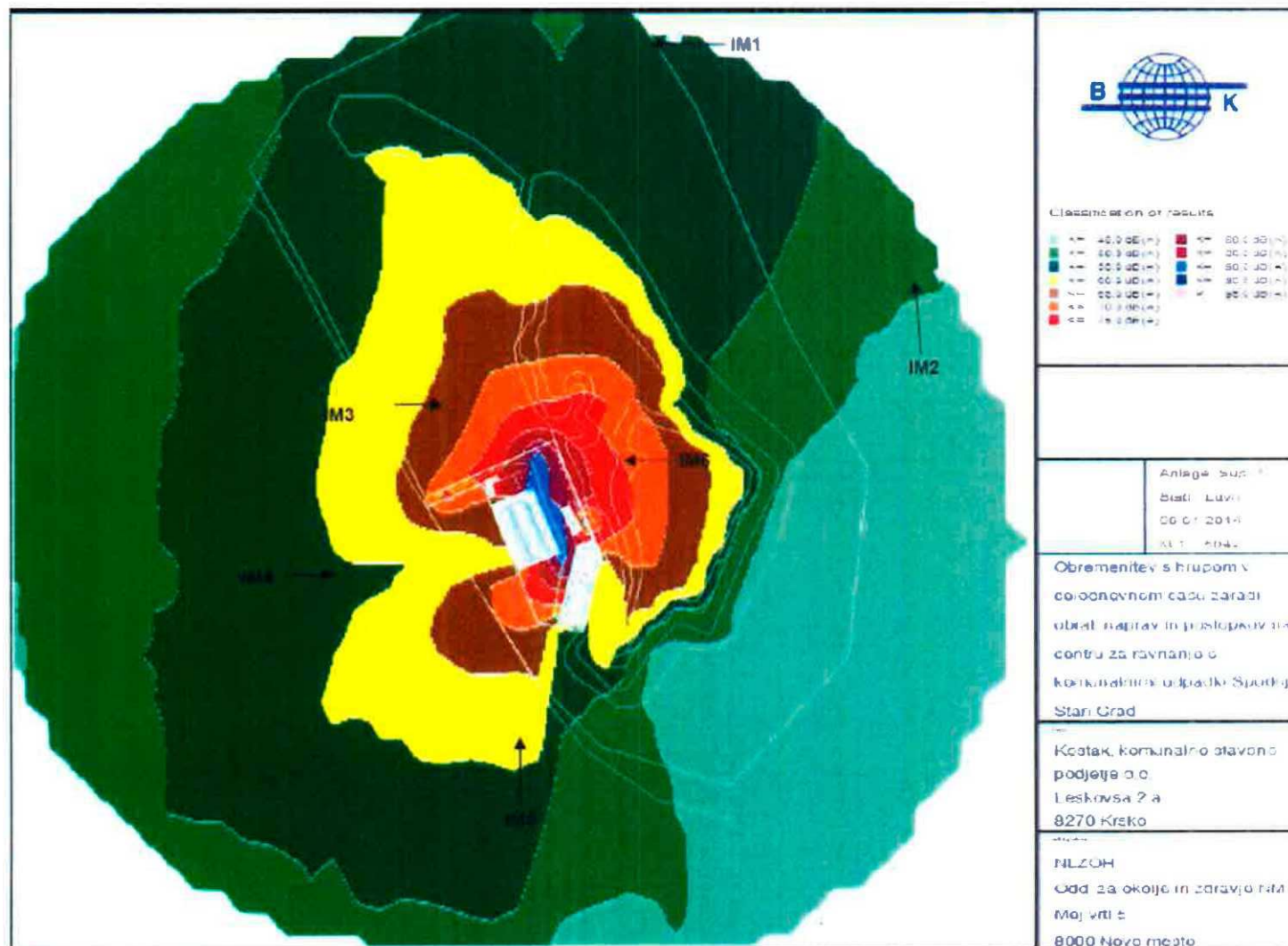
Model of noise $L_{no\check{c}}$ – night operation of the
Spodnji Stari Grad Waste Management
Centre



Appendix 3: Model of noise $L_{no\check{c}}$ – night operation of the Spodnji Stari Grad Waste Management Centre

ANNEX 4:

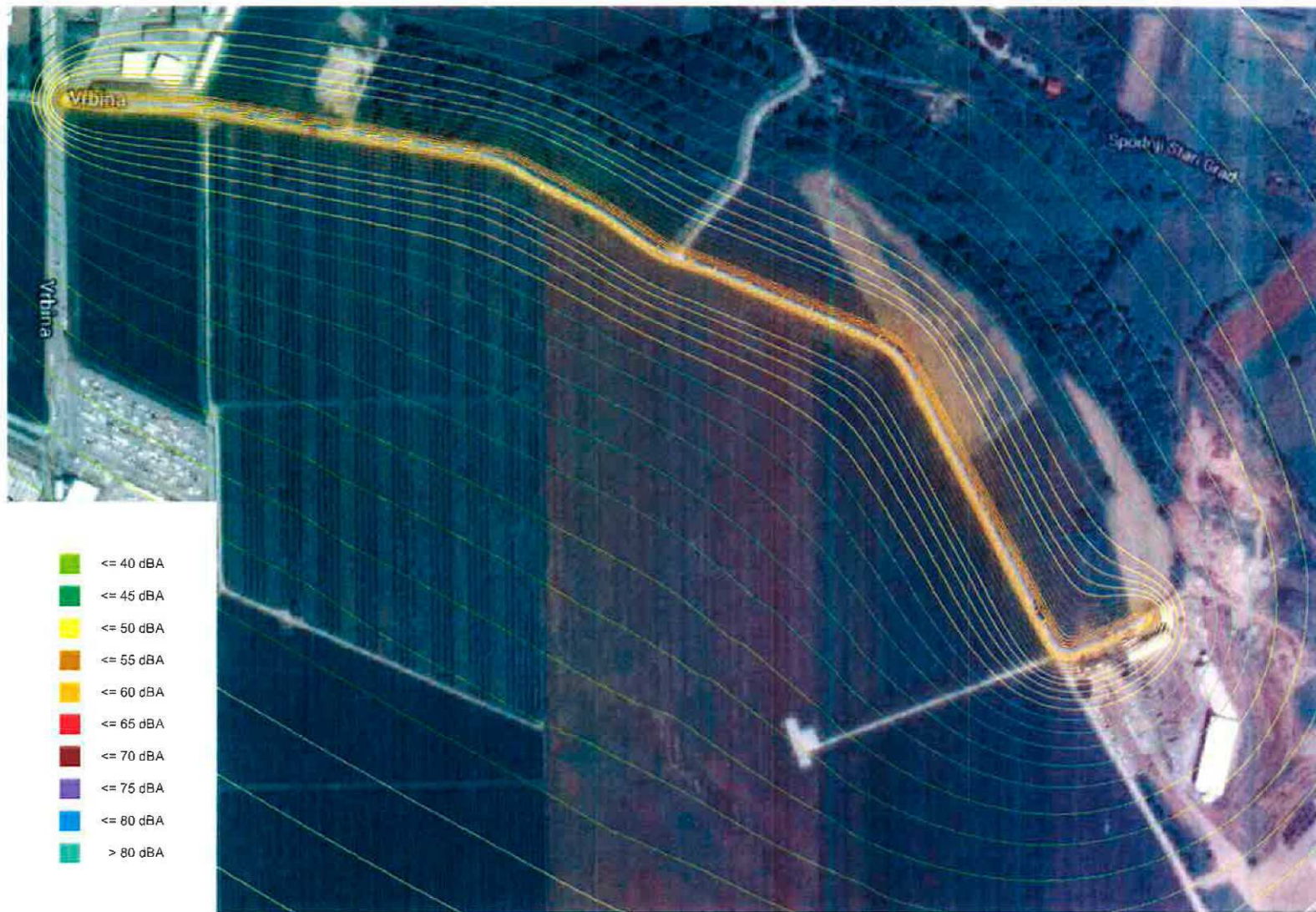
Model of noise L_{dvn} – daily operation of the
Spodnji Stari Grad Waste Management
Centre



Annex 4: Model of noise L_{dvn} – daily operation of the Spodnji Stari Grad Waste Management Centre

ANNEX 5:

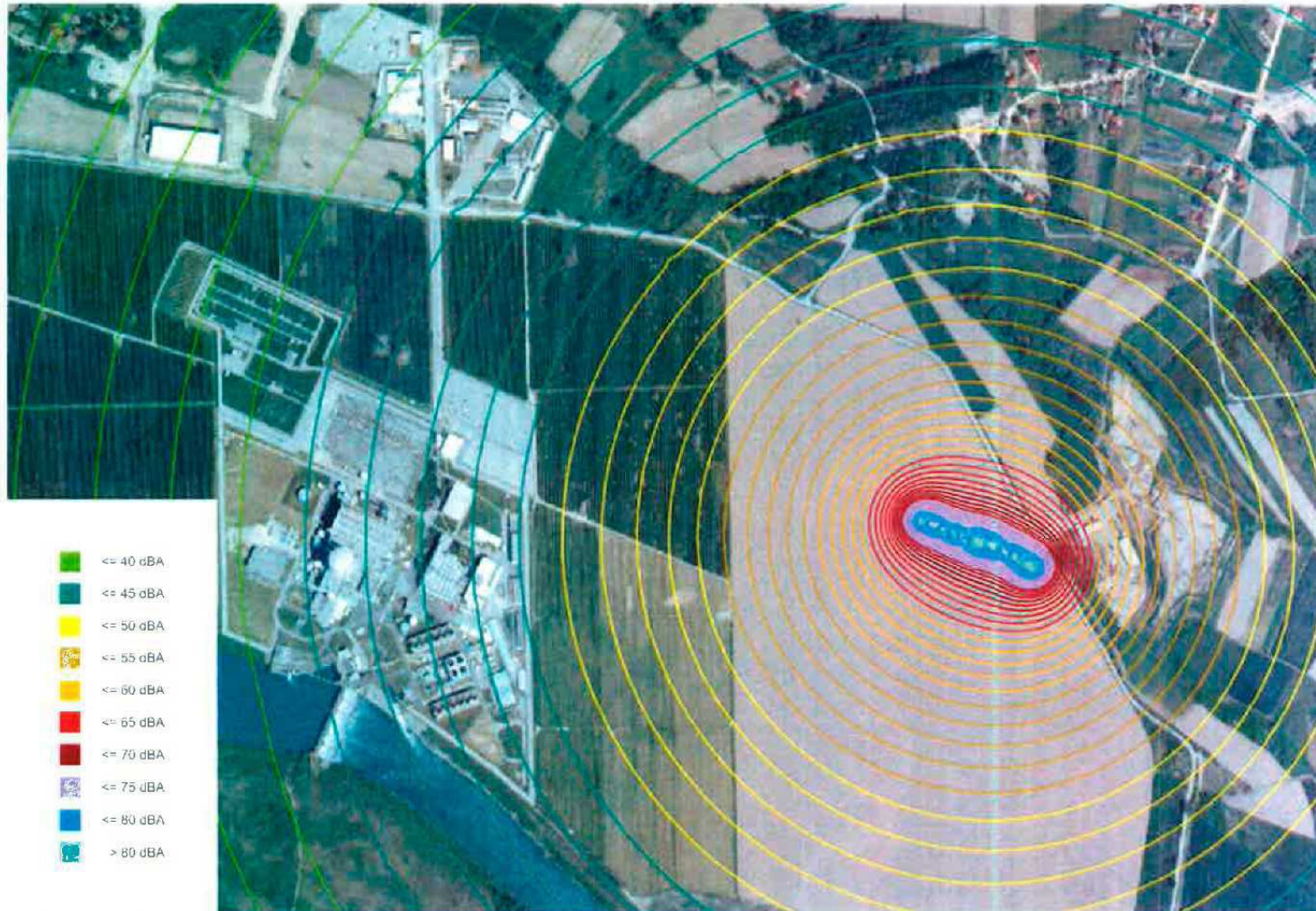
Model of noise L_{dan} – daytime transportation
to the Spodnji Stari Grad Waste Management
Centre



Annex 5: Model of noise L_{dan} – daytime transportation to the Spodnji Stari Grad Waste Management Centre

ANNEX 6:

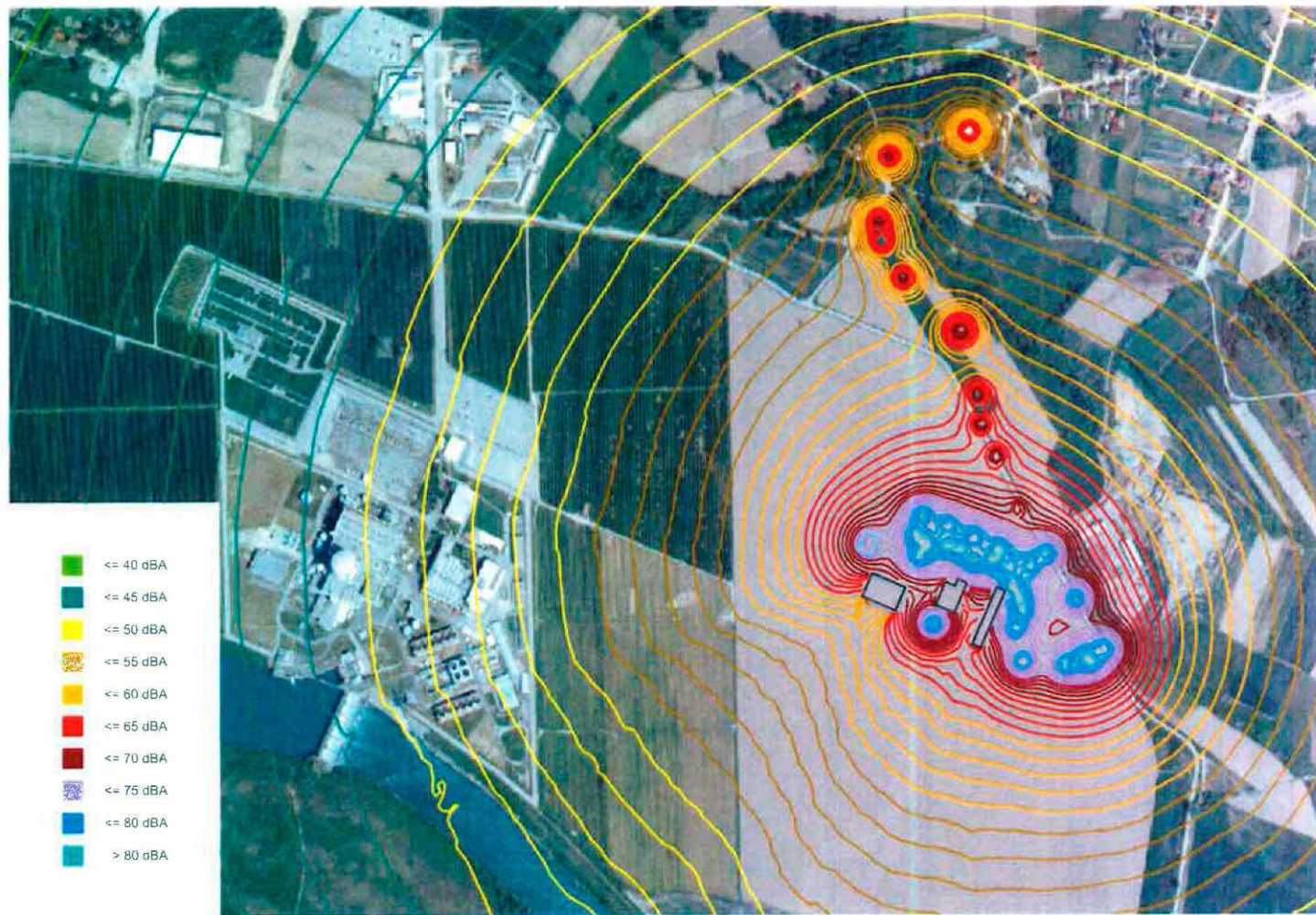
Model of noise L_{dan} during daytime
construction of the embankment



Annex 6: Model of noise L_{dan} during daytime construction of the embankment

ANNEX 7:

Model of noise L_{dan} during daytime
construction of repository structures and
infrastructure facilities



Annex 7: Model of noise L_{dan} during daytime construction of repository structures and infrastructure facilities

ANNEX 8:

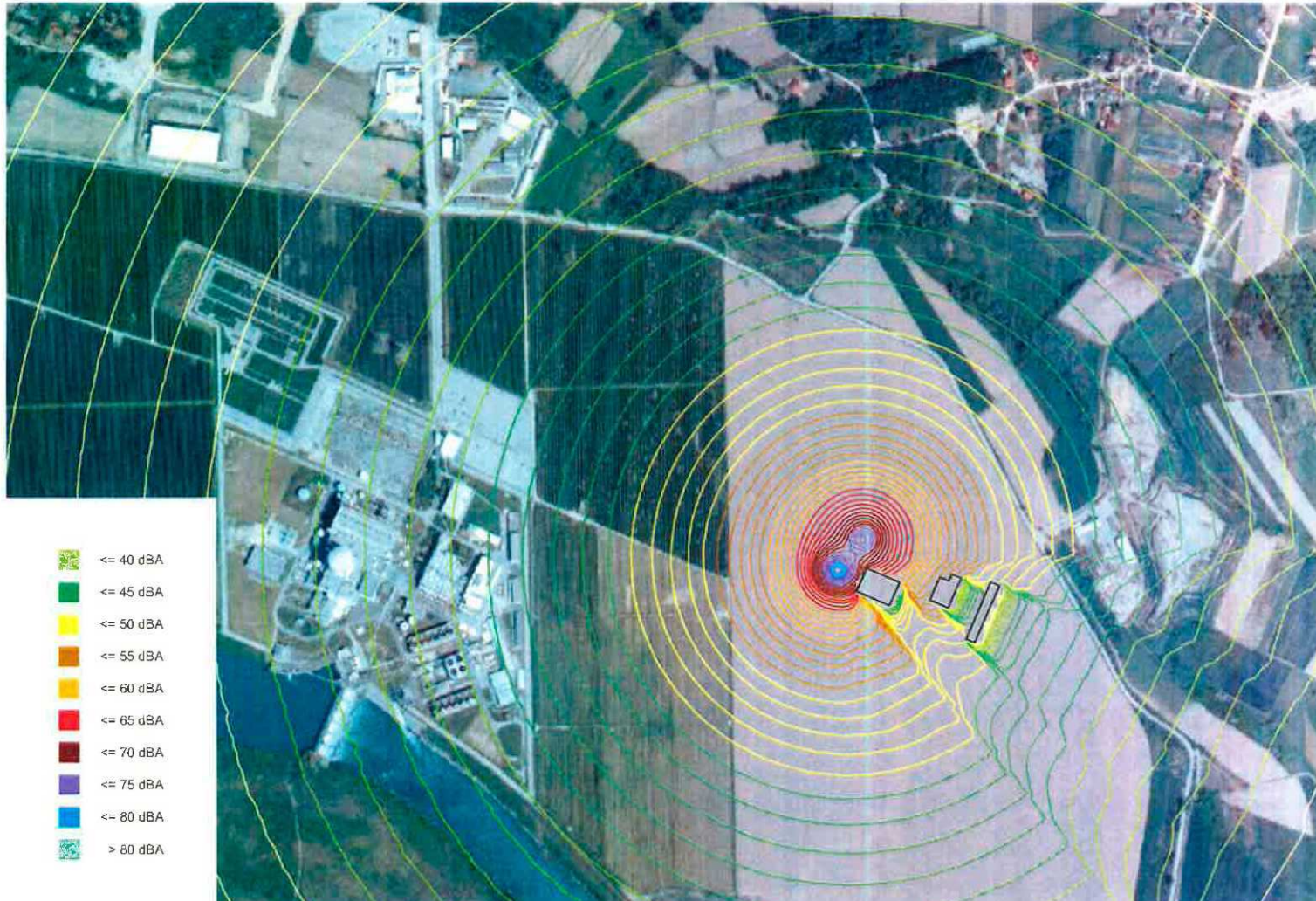
Model of noise L_{dan} during daytime
construction of silo 2



Annex 8: Model of noise L_{dan} during daytime construction of silo 2

ANNEX 9:

Model of noise $L_{\text{noč}}$ during night-time
construction of the diaphragm



Annex 9: Model of noise $L_{no\check{c}}$ during night-time construction of the diaphragm

ANNEX 10:
Model of noise during operation



Annex 10: Model of noise during operation