September 2014

Visual Impact Assessment of DPM Krumovgrad Mine Project

DPM Krumovgrad

denkstatt Bulgaria

denkstatt Bulgaria Ltd ■ 115 Arsenalski Blvd., fl. 5, apt. 7, 1421 Sofia, Bulgaria
■ **T** +359 2 470 75 08 ■ **M** +359 888 29 57 67 ■ **E** office@denkstatt.bg ■ **W** www.denkstatt.bg

Contents

1 Introduction

1.1 Goals of the Visual Impact Assessment

According to EBRD's environmental and social policy, all EBRD financed projects requiring an EIA must elaborate and submit as part of their EIA procedure a description of the existing environment at the project location, which includes the aspect of "Landscape and Visual Issues". In the approved EIA report for the Krumovgrad project the landscape aspect of the environment does not include a detailed assessment of the "visual impacts" that would be generated by the operation and subsequent restoration of the proposed Krumovgrad project. These consist of the visual effects that could arise from the loss of existing land cover; changes to local topography; the visibility of the proposed project facilities and plant and the lighting during hours of darkness. The changes generated by these activities could affect the existing views and visual amenity of local residents.

The purpose of the present study is to supplement the analysis in the existing approved EIA report to provide an assessment of the likely visual impacts of the operation of the proposed development using the baseline and operational information that is readily available, in compliance with EBRD's environmental and social policy.

1.2 Existing studies

1.2.1 EIA Report Landscape Assessment

The Krumovgrad mining project has undergone a systematic Environmental Impact Assessment (EIA), conducted in compliance with Bulgarian national legislation standards, which harmonize the requirements of EU EIA Directive (85/337/EEC). The EIA procedure also included elaborating an Appropriate Assessment to determine and minimize potential impact of the project on sites of the Bulgarian Natura 2000 network has been conducted, as the Krumovgrad project site falls entirely within the borders of the Natura SCI site BG0001032. The EIA has been approved by the competent authority, the Ministry of the Environment and Water with Decision No. 18 from November 8, 2011.

The scope of the EIA includes a review of the baseline conditions and expected impacts from the project for all key components of the natural environment, including landscape **(Sections IV.7 and V.9 of the EIA report)**. The analysis characterizes the types of landscapes in the immediate vicinity of the project site, and the main types of landscape impacts and their severity, expected as a result from project construction and operation.

According to the landscape assessment contained in the EIA (p.237):

"The changes in the landscape will be direct but on a local scale involving significant modification of all landscape components. The natural landscape types will be transformed into technogenic landscapes as the project continues. The changes will essentially be

irreversible because the landscape within the project footprint will remain as changed after the mine closure. "

The landscape assessment also notes that (p.237):

"The neighboring lands will sustain indirect negligible or minor changes, mainly in the bio-component of the physical environment, but the landscape will retain its functional sustainability. The main impact on the landscape will be on a local scale affecting visual perception and aesthetics. "

The visual and aesthetic perception aspect is not analyzed in detail in the EIA. The Krumovgrad project EIA is currently under review and informal update. Consequently, in accordance with the Environmental and Social Policy of the EBRD, it has been determined that the EIA should be supported by the provision of a visual impact assessment (VIA).

2 Methodological approach

2.1 Reviewed methodologies

Several internationally established methodologies for analysis of visual/aesthetic impact, and impact of light pollution have been reviewed, in order to create a practical methodological approach for the present studies. The methodology selected as being the most applicable is the **Guidelines for Landscape and Visual Impact Assessment, Third edition 2013,** published by the UK Landscape Institute and Institute of Environmental Management and Assessment. We note however that only the visual effects assessment methodology (Chapter 6 of the GLVIA guidelines) may be applicable for the present study, as general landscape impact assessment has already been conducted in the national EIA report (also see Annex 1). An adapted approach has been chosen for the VIA. This methodology replicates to a large extent the general step-wise approach proposed by GLVIA 3 (**Section 6.4, Figure 6.1**), also taking into account the methodology utilized within and findings of landscape assessment in the approved EIA and the preliminary findings of the project SIA assessment. The specific findings, considerations and assumptions, taken into account during each step of the VIA assessment are described in the sub-sections below.

In evaluating the methods and results we also consider the outcome of previously conducted VIAs and LVIAs for similarly extensive industrial projects in rural areas, including the following studies:

- Landscape and Visual Impact Assessment for the Mt Arthur Coal Open Cut Modification, prepared by Urbis for Hunter Valley Energy Coal, January 2013;
- Visual Impact Assessment for Continuation of Bengalia Mine Project, prepared by JPV Visual Planning and Design for Rio Tinto, June 2013;

- Visual Assessment Report for the New Liberty Gold Mine (NLGM) Project, prepared by Golder Associates for Aureus Mining INC., May 2012.

2.2 Description of the Characteristics of the Proposed Development

The project requires the formation and operation of an open pit mine comprised of a process plant, employing conventional crushing, grinding and flotation processing for gold extraction, with an expected ore treatment rate of about 0.85 million tons per year. The project alternative that was approved by authorities requires a total land footprint approximately 85 ha and includes:

- Open pit (Ada Tepe);
- ROM ore stockpile;
- Facility for the production of gold-silver concentrate (process plant);
- Integrated Mine Waste Facility (IMWF);
- Soil stockpile,
- Water abstraction and piping facilities, roads and other support infrastructure.

The production process at these facilities will have three main components:

- **Ore mining** - The ore at Ada Tepe will be open-pit mined. The mining method will be a conventional open cut drill, blast, load and haul operation (See **Section II.4.1** of the EIA for detailed description of the mining process);
- **Ore crushing, grinding & flotation** – after primary crushing, grinding is to happen within the process plant with fully enclosed transfer. Flotation using reagents, followed by gravity separation and dewatering will produce the end product - gold-silver concentrate (See **Sections II.4.2**-**4.4** of the EIA for detailed description of the overall process and respective technological steps for processing of the ore);
- **Mine waste disposal** - co-disposal of tailings and waste rock in the IMWF cells of a total design footprint area of 41 ha (See **Section II.4.5** of the EIA for detailed description of the mining waste management process and the IMWF).

2.3 Definition of the Scope of the Assessment

As defined in Section 6.1 of the GLVIA Guidelines "*the assessment of visual effects deals with the effects of change and development, available to people and their visual amenity*". The scoping of the present study has taken this consideration into account and defined the following geographic scope (study area) and settlements/populations that could be affected by the proposed development:

- A study area of **5km** around the development site has been selected for the VIA on the basis of a site visit and review of other LVIAs such as those listed in section 2.1;
- The visual baseline identifies the settlements within this 5km radius study area as these settlements are the location of the overwhelming majority of the potential residential visual receptors. Some settlements lying outside the 5km radius are also

considered based on the study of hypothetical visibility and included as viewpoints. In addition the visual baseline also identifies road traffic locations with higher concentrations of drivers or pedestrians, who may have views of the proposed project facilities, and constitute potential visual receptors.

2.4 Definition of the Visual Baseline

As defined in Section 6.3 of GLVIA 3, establishing a visual baseline is a good practice for VIA assessments. The visual baseline establishes:

- The area(s) from which the project may be visible;
- The groups whose existing views may be altered as a consequence of the proposed development;
- A series of illustrative, representative and specific viewpoints for the identified visual receptors.

As already stated in Section 2.3 above, in the case of the Krumovgrad project, these visual receptors include the residents of the settlements, where topography and land cover allow outward views towards the development site and other areas, such as road traffic locations where congregation of people can be expected. An initial identification of these locations was carried out based on initial field visit and desk research information (see **Annex 3**)

2.4.1 Establishing Theoretical Visibility

As defined in Section 6.6 of the GLVIA Guidelines, it is good practice to identify and map the visibility area - the areas, from which the proposed development could potentially be seen by visual receptors.

As a first step, the theoretical visibility within the 5km zone has been established for all has been established, drawing digital topographical cross-sections (using **Google Earth** topographic cross-section functionality) for all potential receptors (identified settlements and high traffic points) within the 5km perimeter. Making an allowance for intervening tree cover, theoretical visibility has been established, and is summarized in Annex 3.

2.4.2 Identifying Actual Receptors

In order to verify the theoretical visibility results outlined above a second site visit has been conducted in August, 2014 to establish actual visibility and identify viewpoints. Visibility was established for each of the potential receptors, identified previously.

The Actual receptors for which visibility was verified, include the following towns, villages and hamlets[1]:

Residential Visual Receptors:

- Town of Krumovgrad and its standalone Izgrev neighborhood;
- Villages of Dazhdovnik, Edrino, Gulya, Golyamo Kamenyane, Polkovnik Zhelyazkovo, Rogach, Skalak, Vransko and Zvanarka and their respective hamlets.

Road Traffic Visual Receptors:

- Road Edrino-Kamenyane (5904 III class)
- Road Ivailovgrad-Polkovnik Jelyazovo (59 II class)
- Road Zvanarka-Lozino 3 (509 III class)
- Road Krumovgrad-Izgrev (509 III class)

Other Visual Receptors:

- Nearby Tobacco field –The potential visual receptor are agricultural laborers at work.

It is acknowledged that some long distance views of the proposed development may be available to a limited number of visual receptors located at separation distances from the proposed development that are greater than 5km. However based upon reviews of LVIAs undertaken for similar developments and the understanding of the visual baseline gained from the site visits, the visual assessors do not consider it likely that for visual receptors located more than 5km away the proposed development could result in the medium or high magnitudes of visual change that are required to generate significant visual effects.

2.4.3 Identification of Viewpoints

As a consequence of the desktop assessment and review made during site visits, a total of 40 viewpoints are identified, in accordance with Section 6.16 of the GLVIA 3. The majority of these viewpoints are representative viewpoints i.e. they represent the views that are available to at least a proportion of the residents at a particular settlement. A small number such as the viewpoint form the Krumovgrad – Izgrev road (Viewpoint 40) are more accurately categorised as specific viewpoints under the categorization advocated in Section 6.19 of GLVIA 3. The selected viewpoints and visual receptor groups are associated with the identified settlements and the most heavily used road in 5km radius study. As such they

[1] *a "hamlet" refers to the informal Bulgarian designation of "mahala" – a standalone cluster of homes/buildings, which is administratively grouped with a larger adjacent village but functions as a spatially separated residential community. Where distance separation from the main village to the hamlet has been deemed significant during the desktop analysis and field survey, separate viewpoints have been selected.

cover visual receptors located in at various directions, elevations and separation distances from the proposed development as shown in Annex 2 and Annex 3. In accordance with the approach set out in GLVIA 3 the actual viewpoints are located in publically access areas such as roads, streets or walking paths or by the fences of houses.

Table 1 GPS coordinates of the selected viewpoints

№	Name of viewpoints (based on the name of corresponding town, village, hamlet or road)	GPS coordinates (WGS 84)	
		Latitude	Longitude
VP1	Krumovgrad	41°27'59.90"N	25°39'22.44"E
VP2	Road Ivailovgrad-Polkovnik Jelyazovo (59 II class)	41°27'54.15"N	25°40'08.58"E
VP3	Polkovnik Zhelyazovo	41°27'48.47"N	25°40'21.12"E
VP4	Edrino	41°27'05.74"N	25°39'58.59"E
VP5	Road Edrino-Kamenyane (5904 III class)	41°26'44.19"N	25°40'46.66"E
VP6	Kedikler	41°26'43.93"N	25°40'59.97"E
VP7	Mehmedoular	41°26'47.18"N	25°41'39.89"E
VP8	Slivarka	41°27'09.49"N	25°42'25.51"E
VP9	Guliyka	41°27'07.51"N	25°43'20.99"E
VP10	Tobacco field near Guliyka	41°26'39.46"N	25°43'23.28"E
VP11	Podrumche	41°25'50.62"N	25°43'04.28"E
VP12	Chobanka	41°26'16.09"N	25°39'37.38"E
VP13	Kupel	41°26'00.74"N	25°40'04.56"E
VP14	Dazhdovnik	41°26'01.00"N	25°40'43.89"E
VP15	Belook	41°24'38.40"N	25°41'04.95"E
VP16	Golyamo Kamenyane	41°24'26.31"N	25°42'26.47"E
VP17	Kokoshar	41°24'32.13"N	25°38'27.69"E
VP18	Shturbina	41°24'45.20"N	25°38'51.75"E
VP19	Synap	41°25'18.15"N	25°38'43.72"E
VP20	Piperitsa	41°25'36.55"N	25°37'02.54"E
VP21	Laka	41°25'48.97"N	25°37'07.18"E
VP22	Skalak	41°25'54.06"N	25°38'01.80"E
VP23	Pobeda	41°26'08.97"N	25°38'23.84"E
VP24	Belagush	41°26'02.68"N	25°38'17.31"E
VP25	Koprivnik	41°26'09.65"N	25°37'53.20"E
VP26	Kremenik	41°26'02.70"N	25°38'06.97"E
VP27	Dranovets	41°26'07.56"N	25°36'52.39"E
VP28	Lozino 3	41°26'25.76"N	25°37'13.90"E
VP29	Lozino 1	41°26'40.26"N	25°37'22.17"E
VP30	Road Zvanarka-Lozino 3 (509 III class)	41°26'24.74"N	25°37'33.92"E
VP31	Zvanarka	41°26'34.13"N	25°37'46.85"E
VP32	Soyka	41°26'38.51"N	25°38'45.66"E
VP33	Bitovo	41°26'49.30"N	25°38'28.41"E
VP34	Taynik	41°26'51.51"N	25°38'09.78"E
VP35	Varhushka	41°27'05.83"N	25°38'57.75"E
VP36	Konsko	41°27'26.68"N	25°38'45.57"E
VP37	Izgrev	41°27'40.46"N	25°38'37.93"E
VP38	Lulichka	41°28'05.24"N	25°36'10.85"E
VP39	Vransko	41°29'12.36"N	25°38'08.47"E
VP40	Road Krumovgrad-Izgrev (509 III class)	41°28'09.61"N	25°38'59.85"E

Table 2 List of identified viewpoints with corresponding receptors and distances to the site

Viewpoint №	Name	Distance to the center of project site (m)	Direction from the site	Criteria for choosing viewpoint
VP1	Krumovgrad	3 560	N	Residential visual receptors - Municipal center town
VP2	Road Ivailovgrad-Polkovnik Jelyazovo (59)	3 120	NE	Secondary road with potential road traveller vehicular receptors of the visual impacts
VP3	Polkovnik Zhelyazovo	4 130	NE	Residential visual receptors - village
VP4	Edrino	1 770	NE	Residential visual receptors - village
VP5	Road Edrino-Kamenyane (5904)	2 180	E	Local road with vehicular receptors
VP6	Kedikler	2 500	E	Residential visual receptors – hamlet (representing the entire Rogach village)
VP7	Mehmedoular	3 450	E	Residential visual receptors - hamlet
VP8	Slivarka	4 680	E	Residential visual receptors
VP9	Guliyka	5 900	E	Residential visual receptors - hamlet
VP10	Tobacco field near Guliyka	5 720	E	Potential visual receptors by agricultural laborers
VP11	Podrumche	5 470	E	Residential visual receptors - hamlet
VP12	Chobanka	513	E	Residential visual receptors - hamlet
VP13	Kupel	1 310	E	Residential visual receptors - hamlet
VP14	Dazhdovnik	2 160	E	Residential visual receptors - hamlet
VP15	Belook	4 100	S	Residential visual receptors- hamlet
VP16	Golyamo Kamenyane	5 650	S	Residential visual receptors - village
VP17	Kokoshar	3 630	S	Residential visual receptors - hamlet
VP18	Shturbina	3 100	S	Residential visual receptors- hamlet
VP19	Synap	2 160	S	Residential visual receptors - hamlet
VP20	Piperitsa	3 440	W	Residential visual receptors - hamlet
VP21	Laka	3 230	W	Residential visual receptors - hamlet
VP22	Skalak	1 970	W	Residential visual receptors - hamlet- hamlet
VP23	Pobeda	1 330	W	Residential visual receptors
VP24	Belagush	1 570	W	Residential visual receptors- hamlet
VP25	Koprivnik	2 030	W	Residential visual receptors- hamlet
VP26	Kremenik	1 780	W	Residential visual receptors
VP27	Dranovets	3 480	W	Residential visual receptors – hamlet (representing the entire Sarnak village)
VP28	Lozino 3	2 930	W	Residential visual receptors - hamlet

Viewpoint №	Name	Distance to the center of project site (m)	Direction from the site	Criteria for choosing viewpoint
VP29	Lozino 1	2 800	W	Residential visual receptors - hamlet
VP30	Road Zvanarka-Lozino 3 (509)	2 490	W	Local road with vehicular receptors
VP31	Zvanarka	2 190	W	Residential visual receptors - village
VP32	Soyka	960	NW	Residential visual receptors - hamlet
VP33	Bitovo	1 480	NW	Residential visual receptors-hamlet
VP34	Taynik	1 930	NW	Residential visual receptors-hamlet
VP35	Varhushka	1 500	N	Residential visual receptors-hamlet
VP36	Konsko	2 300	N	Residential visual receptors-hamlet
VP37	Izgrev	2 650	N	Residential receptor- suburb of the town of Krumovgrad
VP38	Lulichka	5 460	N	Residential visual receptors
VP39	Vransko	5 590	N	Residential visual receptors
VP40	Road Krumovgrad-Izgrev (509)	3 400	N	Local road with vehicular receptors

It is considered that the viewpoint selection methodology whose implementation lead to the selection of these 40 viewpoints is sufficiently robust that an assessment of the visual effects that would be sustained by the visual receptors groups represented or illustrated by these viewpoints is sufficiently comprehensive to allow firm conclusions to be reached as to the nature, extent and acceptability of the visual impacts and their effects that would be sustained by visual receptors within the study area.

2.5 Identifying the Specific Visual Effect

The **main visual impact** will be due to the presence of the project facilities on and around the Ada Tepe Hill. Based on project footprint maps and 3D model representations, and after consultation with DPM Staff, the VIA team has established that the principal elements of the project that will potentially be visible in visual receptors' views from at least some parts of the settlements and roads as listed in Table 2. These elements will be:

- Mining pit (for detailed description see **Section II.3** of the EIA report);
- Crusher and thickener installations (see **Section II.4.2** of the EIA report);
- Processing plant (see **Section II.4.3** of the EIA report);
- IMWF (see **Section II.4.5** of the EIA report).

The combined landscape and visual/aesthetic effect of the presence of these elements has already been assessed by the landscape assessment in the EIA as being **adverse, significant and generally non-reversible**.

2.6 Adapted Criteria for Visual Impact Assessment methodology

The detailed assessment of the visual/aesthetic impacts, in accordance with good practices such as the GLVIA 3, is based on two central concepts:

- **Magnitude of visual effects** – in accordance with the approach advocated in GLVIA 3 factors that have been taken into consideration include: the scale of the changes in the views including the loss (e.g. tree cover) or addition of new features (e.g. the processing plant) and the proportion of the view affected; the degree of visual contrast of new elements or landscape changes; the nature of the view of the proposed development (e.g. is the viewpoint representative of widely available views or highly site specific) and whether the visual receptors' views would be full, partial, oblique, angled, glimpsed, framed or filtered; whether the visual receptors would be moving or static; and the distance of the viewpoint from the proposed development.
- **Visual Sensitivity** – The VIA has taken into account the guidance on this issue that is provided in Sections 6.31 - 6.36 in GLVIA 3. It is based upon the primary occupation or activity of the visual receptors at or close to a viewpoint, their visual amenity and consideration of the extent to which their attention is likely to be focused upon the available views.

The criteria for assessing these two concepts are outlined in the sub-sections below:

2.6.1 Visual Change

The magnitude of visual change that would be sustained by the visual receptors at or close to the selected viewpoints are assessed with respect the criteria listed above. Other factors include the duration of the visual effects (although for all the identified visual receptors these would last for the operational life of the proposed development – at least 10 years), any changes to the visual impacts as a result of the aspects of the phased restoration scheme that will be implemented during operational period and whether or not the lighting of the proposed development would be likely to be visible in hours of darkness. The magnitude of visual change of the Krumovgrad project facilities is established by taking into account a 4-point scale, consistent with the GLVIA methodology, outlined below:

Table 3 Magnitude of Visual Change Categorization

Magnitude of Change	Criteria
High	The elements of the proposed development dominate the view and define its key characteristics
Medium	Readily discernible and affecting a large proportion of the available view, altering its key characteristics
Low	Readily discernible but affecting a small proportion of the available views and not altering the key characteristics of the view
Negligible	The elements of the proposed development are not discernible or barely discernible

2.6.2 Visual Receptor Sensitivity

This VIA has used the definition of visual sensitivity that is set out in GLVIA 3. This states that sensitivity in this context relates to visual receptors' (who are represented by each viewpoint) principal purpose for being at or near the viewpoint; the importance of the views available in allowing them to achieve that purpose; and the value that they might attach to that view. This is manifest in the categories summarised in Table 4.

Table 4 Visual Sensitivity Categorization

Visual Receptor Types	Visual Sensitivity
Residential (from residents in towns to those in isolated properties)	H
Visitors to tourist/recreation areas	H
Vehicular visual receptors travelling along	H

viewpoint 8, which is made from four instead of two frames because of the small distance to the object and the inability to be captured the whole development in two frames.

The final step to complete the photographic simulation is the superimposition of the outlines of the mine site objects and installations on the photographs. The outlines of the proposed development shown on the viewpoint photographs have been drawn by hand based on detailed plans of the proposals, the extent of which were verified during the site visits.

2.6.4 Combined Visual Impact Assessment

Based on the methodological approach described in the previous section, and using the annotated viewpoint photographs, the potential level of visual effect for receptors at each viewpoint as assessed in the manner set out in the matrix in Table 5. In accordance with the need for transparency in assessments noted in GLVIA 3, a short rationale has been produced for the visual effects assessed for the visual receptors at each viewpoint

Table 5 Visual Impact Matrix

Visual Sensitivity / Magnitude of Visual Change	**High**	**Moderate**	**Low**	**Very Low**
High	**H**	**H**	**M**	**L**
Medium	**H**	**M**	**L**	**L**
Low	**M**	**L**	**L**	**VL**
Negligible	**L**	**L**	**VL**	**VL**
Level of Visual Effect – H=High, M=Moderate, L=Low, VL= Very Low				

For all the viewpoints and the visual receptors that they represent, the individual viewpoint assessment sheets also state whether the visual effect should be assessed as being adverse or neutral. There are no visual receptors for whom it is assessed that the operation of the proposed development would result in beneficial visual effects arising. Neutral visual effects are considered to potentially arise when the level of visual effect would be low or very low.

2.6.5 Differentiating Project Stages

When undertaking visual (and landscape) impact assessments it is sometimes considered to be best practice to sub-divide the assessments to reflect different activities and their effects for the construction, operation and decommissioning periods and/or to sub-divide the operational period, sometimes in accordance with different development phases. With regard to the VIA for the proposed Krumovgrad development the way in which gold mines are designed and operated means that the visual impacts starts with the construction period and restoration works are initiated and integrated within the operation period. In accordance with the description from the Project Technical Restoration Plan from May 2013, it is recognised that after end of operations some visual receptors will sustain visual impacts from the gradual reestablishment and maturation of the proposed restoration planting.

The VIA has adopted the approach of consistently applying a worst case scenario and therefore it has focused upon the visual effects that will be sustained by the visual receptors during the operation of the proposed development. Operations are programmed to for 8 years, after which the gradual establishment of the restoration planting and seeding should result in most of the visual effects diminishing and in many cases being removed. Within the operational period the assessments at the individual viewpoints have assumed and been annotated to show the operational activities at their greatest spatial extent i.e. the worst case scenario. Consequently for all the viewpoints and the visual receptors that they represent, visual effects are assessed as being **long term** and only **partly reversible**.

2.7 Measurements of Light Pollution

After reviewing the information available on the detailed operation of the proposed development and the available methodologies for light pollution assessment, it was determined that it is impractical to estimate the amount of light pollution that could arise as a consequence of the operation of the proposed Krumovgrad development. The details of the lighting regimes that might be required for the operation and security of the proposed Krumovgrad development are not available at present.

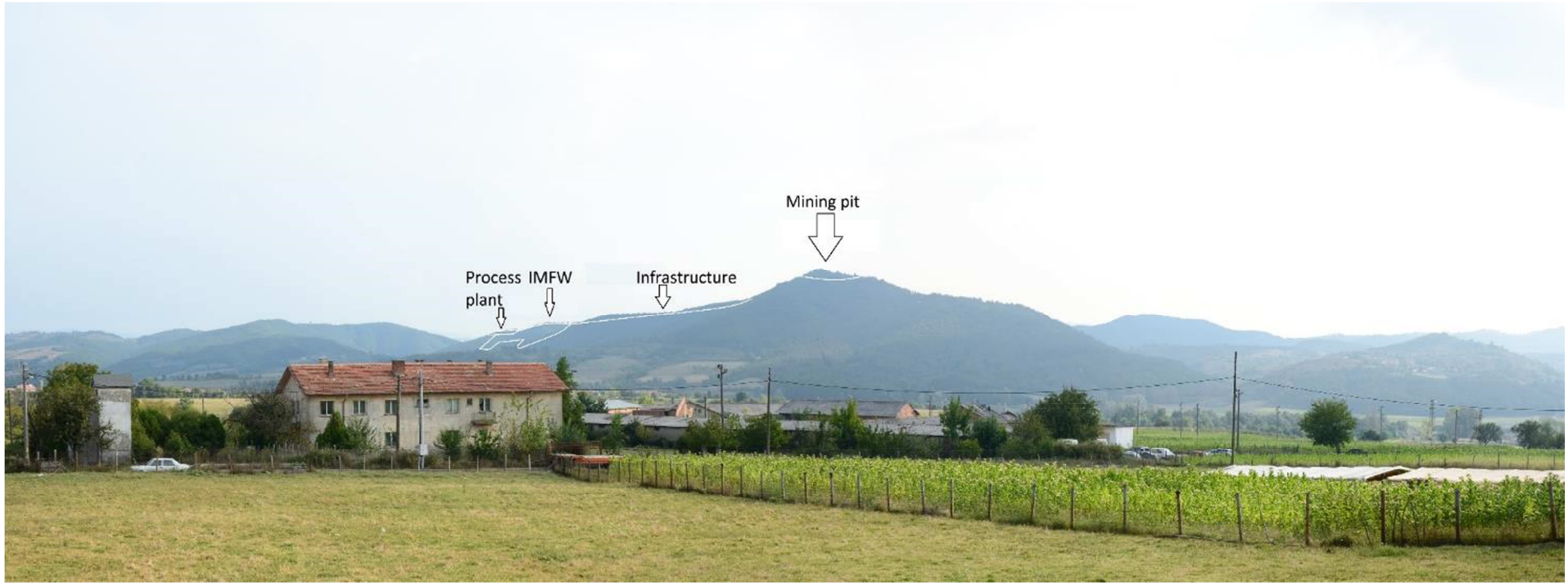
Nevertheless, the baseline or background levels of light pollution in sensitive locations in 10 of the nearest settlements were established by taking measurements between 12:00 and 1:00 AM on July 4, using an HF1330A Lux meter. It was established that Lux measurements ranged between 4 and 1 lux in the darker of the selected locations, however, it was also established that glare from street lamps was present in all locations throughout the night. Based on this baseline observation, it can be concluded that light pollution from the development site's operation would be unlikely to pose significant additional disturbance for visual receptors residing in nearby settlements. It is recommended that actual measurements of lux levels in selected nearby settlements should be made to confirm this after the start of the operation of the proposed development. Should it become apparent that residential visual receptors in any settlement are sustaining changes to the established night time lighting regime that could adversely affect their residential amenity there should be scope for introduction of appropriate design mitigation measures for the lighting regime. Such measures might include the introduction of baffles on certain lights to reduce light spillage and sky glow and the use of movement sensors and/or timers for some lighting elements particularly security lighting.

3 Assessment of Potential Visual Impact

Viewpoint 1: Krumovgrad

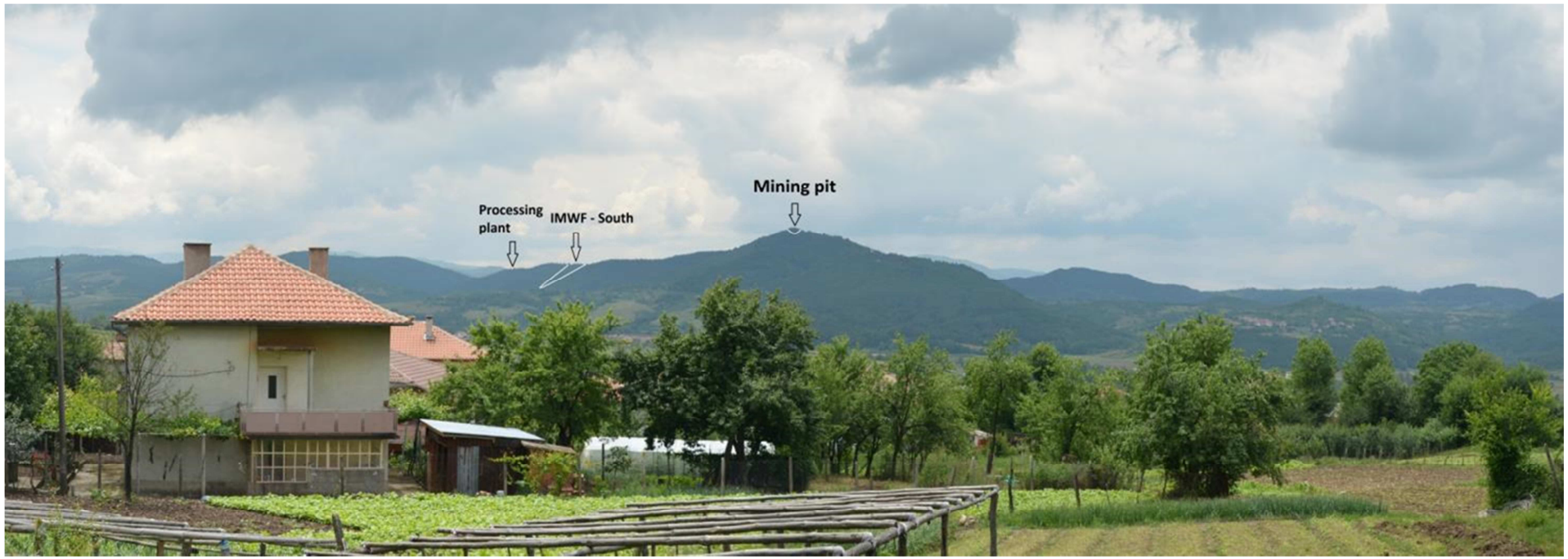
Distance to the proposed development	3 560m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view that is available to residential visual receptors in the town of Krumovgrad.

Viewpoint 2: Road Ivailovgrad-Polkovnik Jelyazovo (59 II class)



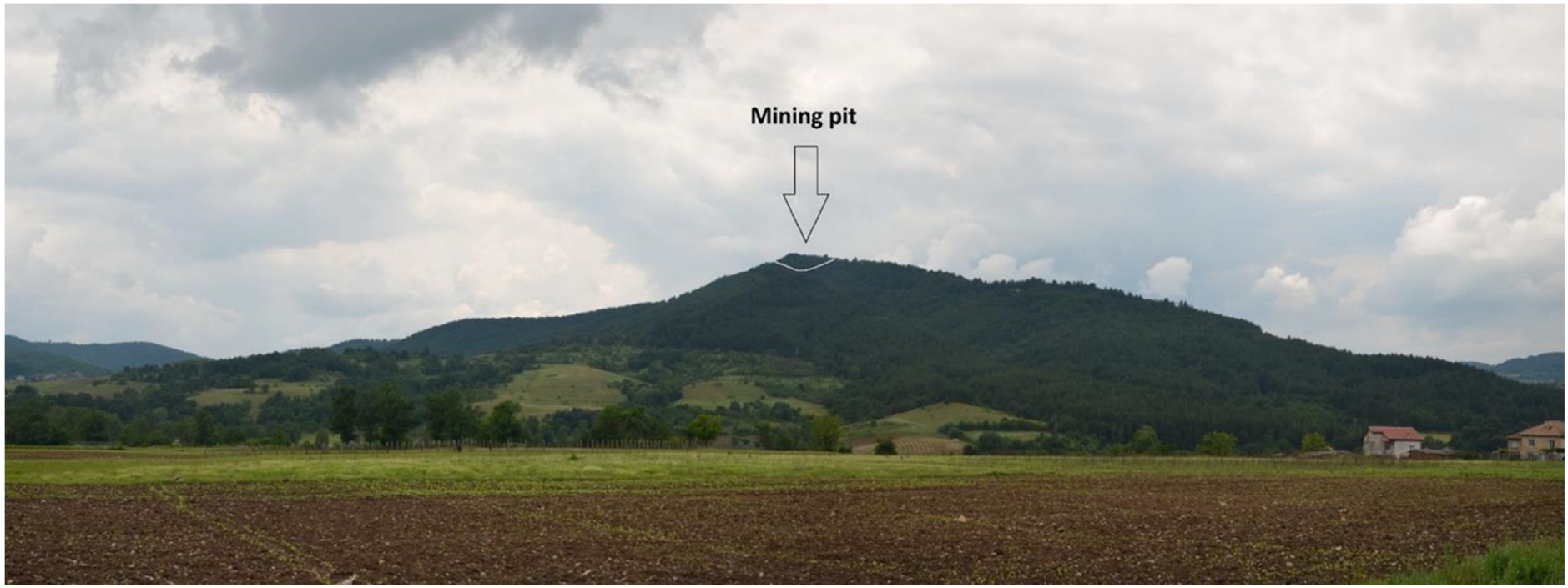
Distance to the proposed development	3 120m
Visual sensitivity of main group(s) of visual receptors	Moderate
Magnitude of Visual Change	Medium
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The depression of the mining pit will be quite discernible, but it will only be fully visible from a few residential properties at this location – approximately 70% of the residential properties. There are no public places where people may gather on the road (e.g. stores, cafes) in this vicinity.

Viewpoint 3: Polkovnik Zhelyazovo



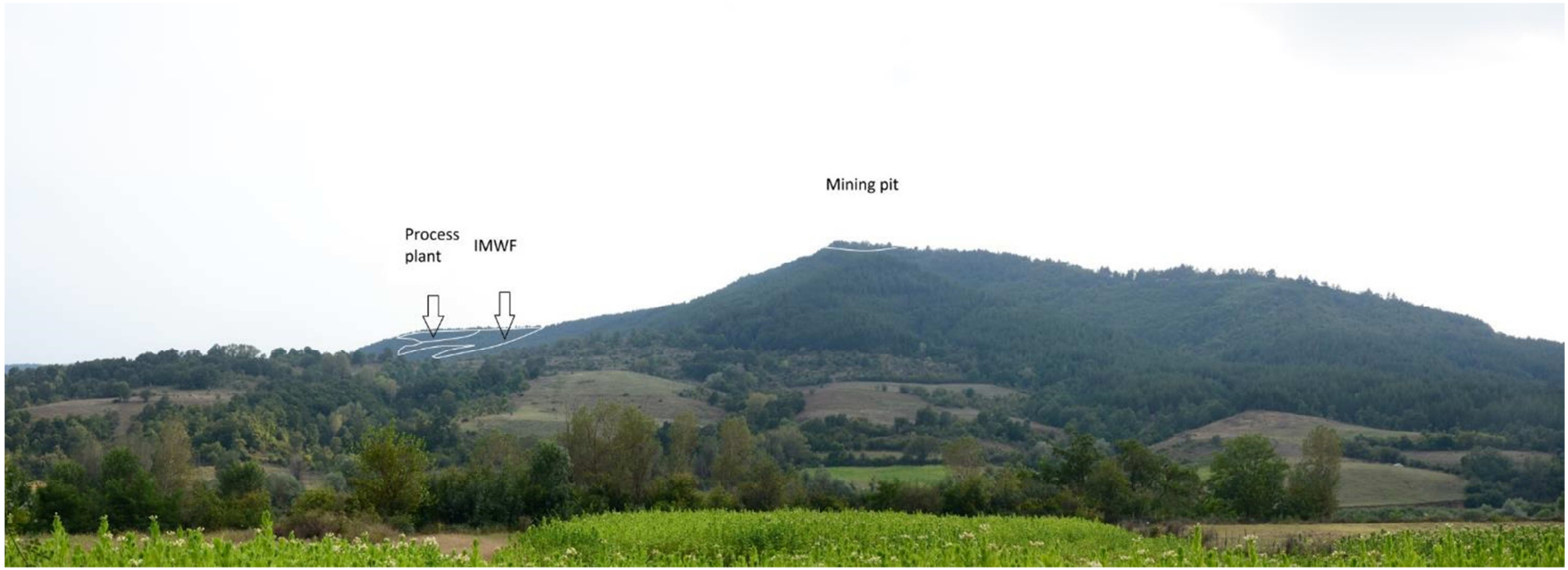
Distance to the proposed development	4 130m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, but it does not significantly affect the overall composition of the view because of the presence of screening vegetation for most of the houses in this residential cluster.

Viewpoint 4: Edrino



Distance to the proposed development	1 770m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Medium
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The mining pit will be discernible and fully visible from approximately 80% of the properties, as there will be unhindered view to the hill – the mine will affect the overall composition of the view.

Viewpoint 5: Road Edrino-Kamenyane (5904)



Distance to the proposed development	2 180m
Visual sensitivity of main group(s) of visual receptors	Low
Magnitude of Visual Change	Medium
Potential visual impact	**Low**
Type of Effect	Adverse
Rationale	The IMWF, processing plant and mining pit will be discernible, however, from this location it has a small effect composition of the view because most of the direct view of the development will be screened by the hill, and the third grad local road is not frequented by travellers.

Viewpoint 6: Kedikler

Distance to the proposed development	2 500m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Medium
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, and there will significant be effect on the view composition, although approximately 40-50% of the houses in this hamlet will have direct visibility hampered by nearby tree vegetation.

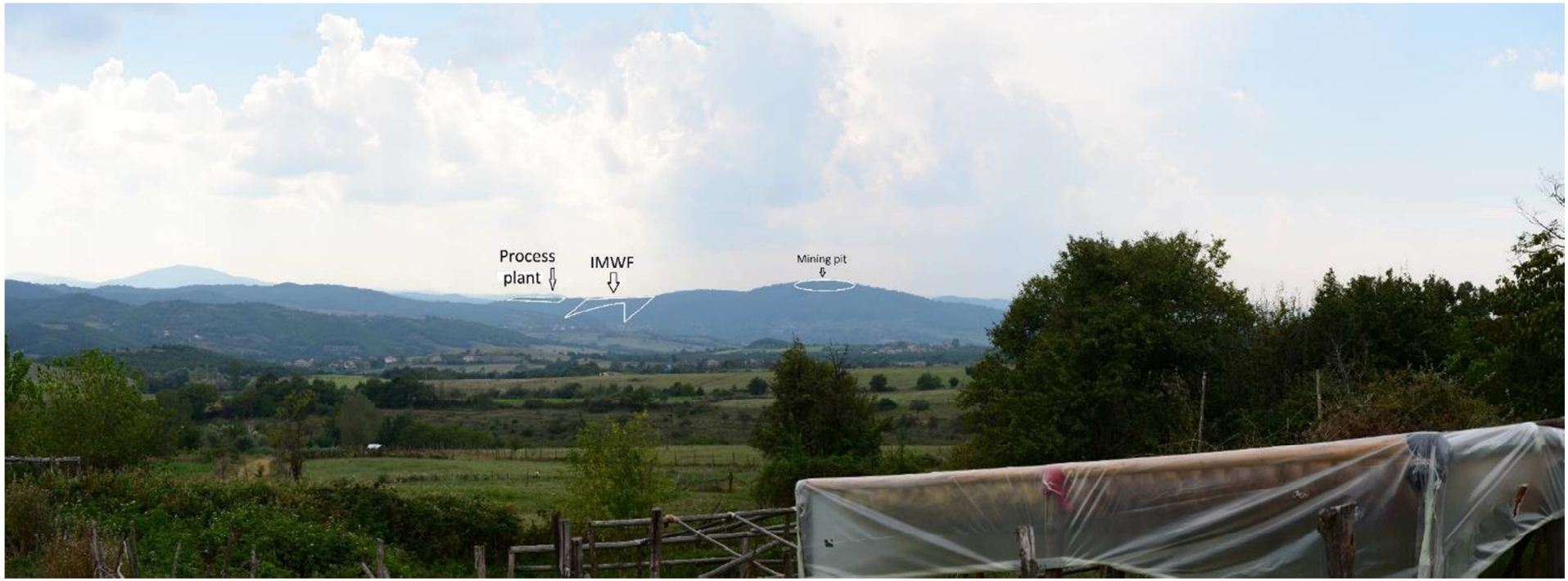
Viewpoint 7: Mehmedoular

Distance to the proposed development	3 450m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit, IMWF and process plant will be discernible, however, from this location it does not significantly affect the overall composition of the view. The hill is only visible from 20-30% of the houses in this hamlet due to the terrain.

Viewpoint 8: Slivarka

Distance to the proposed development	4 680m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The process plant, IMWF and mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view – it will be visible from approximately 80% of the houses in this hamlet, and also from several public spaces – a convenience store and a pub, which was closed at the time of the visit.

Viewpoint 9: Guliyka

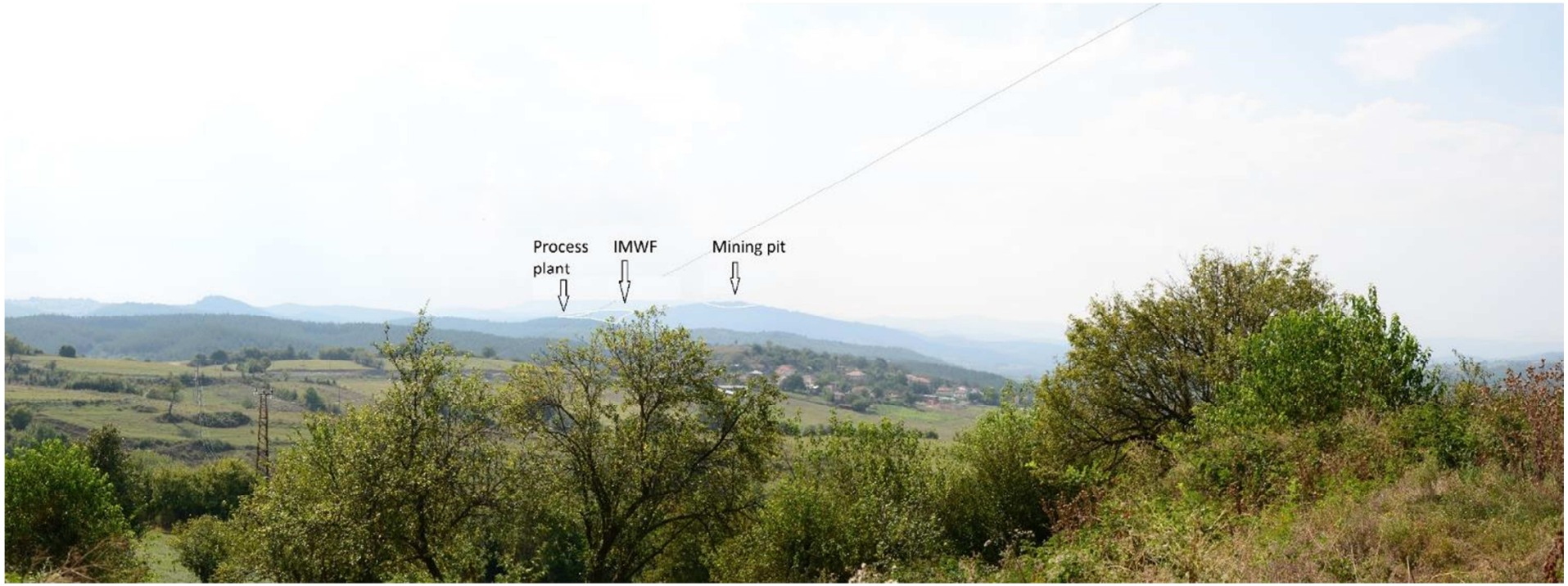


Distance to the proposed development	5 900m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The IMWF can be discerned with the mining pit and process plant also discernible, despite a significant distance beyond 5 km. There is some screening from vegetation allowing visibility from only 60-70% of the houses.

Viewpoint 10: Tobacco field near Guliyka

Distance to the proposed development	5 720m
Visual sensitivity of main group(s) of visual receptors	Low
Magnitude of Visual Change	Low
Potential visual impact	**Low**
Type of Effect	Adverse
Rationale	The mining pit and process plant will be barely discernible from this location it does not significantly affect the overall composition of the view that is available to residential visual receptors.

Viewpoint 11: Podrumche

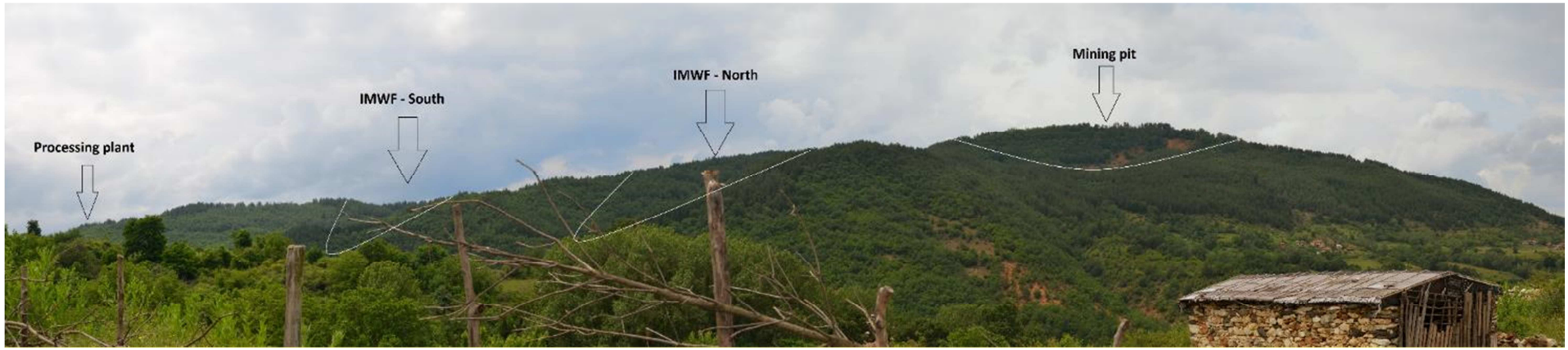


Distance to the proposed development	5 470m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit, IMWF and process plant are discernible, but from a distance over 5km they do not affect the view composition. Approximately 30% of the residential houses and the top floor of the local school would have visibility of the proposed development.

Viewpoint 12: Chobanka

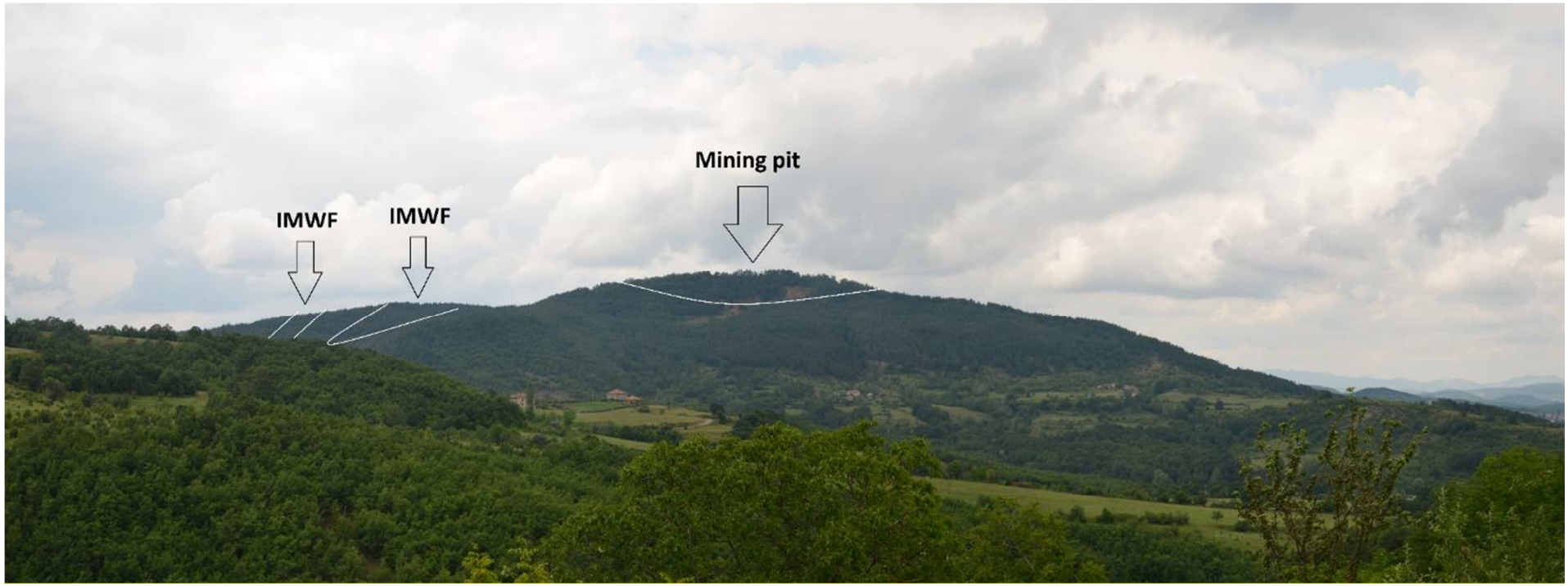
Distance to the proposed development	513m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The processing plant and the mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view. At present only one residential property/household is the potential visual receptor from this location.

Viewpoint 13: Kupel



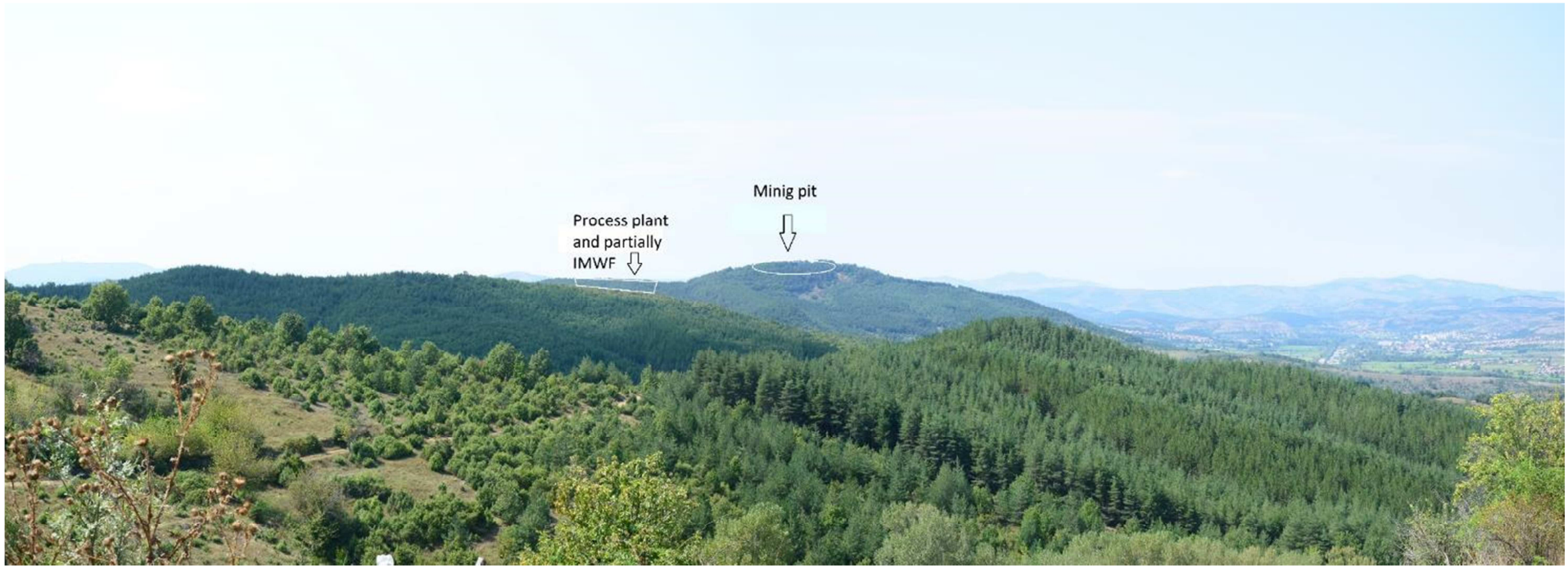
Distance to the proposed development	1 310m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	High
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The elements of the development will dominate the view and radically out of its composition. Note: This is the only Panorama which has been made from 4 frames (not from two as the methodology says), because of the small distance.

Viewpoint 14: Dazhdovnik



Distance to the proposed development	2 160 m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	High
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The elements of the development will define the key characteristics of the view from this location. There is some screening from local tree vegetation, although about 90% of the houses will have full view of the development.

Viewpoint 15: Belook



Distance to the proposed development	4 100m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view, and the development is partially screened by topography.

Viewpoint 16: Golyamo Kamenyane

Distance to the proposed development	5 650m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view. Among the residential visual receptors are also some public places – pub, convenience store and a post office, but their fronts face in a different direction from the development.

Viewpoint 17: Kokoshar

Distance to the proposed development	3 630m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Medium
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The facilities of the proposed development occupy a significant proportion of the available view. The residential visual receptors were found to include two permanent residents.

Viewpoint 18: Shturbina

Distance to the proposed development	3 100m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible and affect a significant portion of the view, however, there is significant screening from local tree vegetation.

Viewpoint 19: Synap

Distance to the proposed development	3 560m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view that is available. No vegetation screening is available.

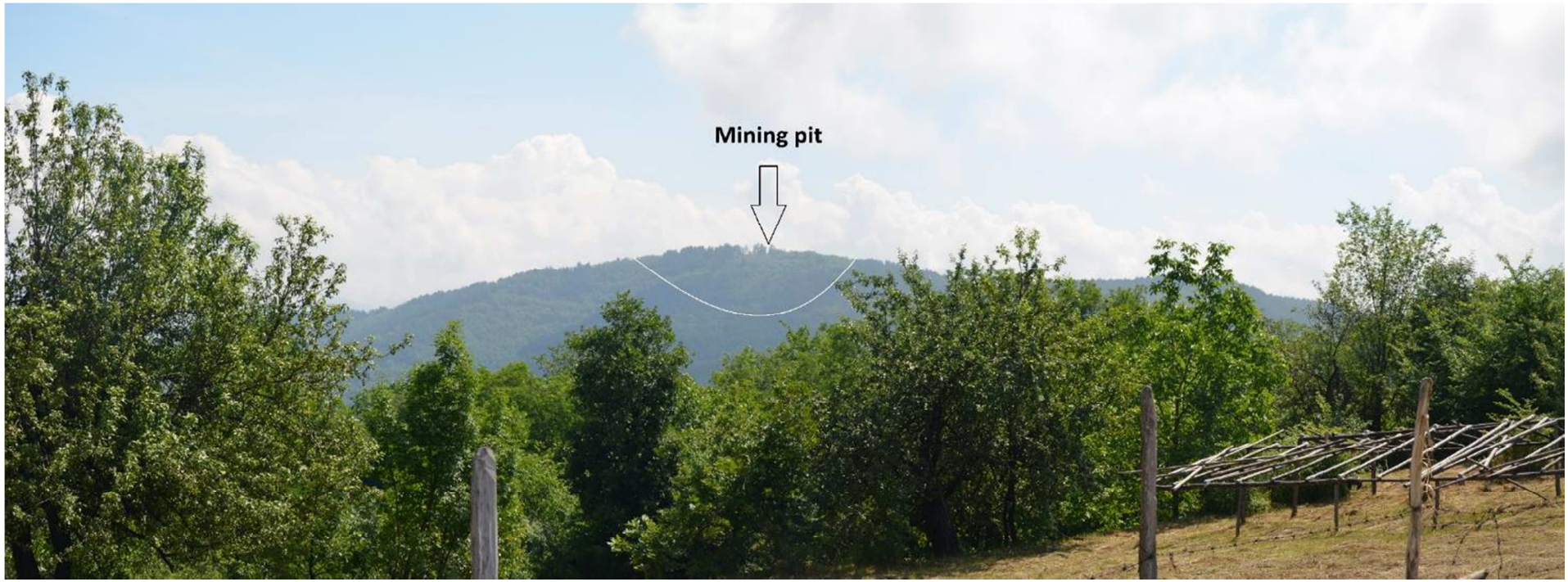
Viewpoint 20: Piperitsa

Distance to the proposed development	3 440m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view. There is some vegetation screening and only about half of the residential visual receptors have clear view of the development.

Viewpoint 21: Laka

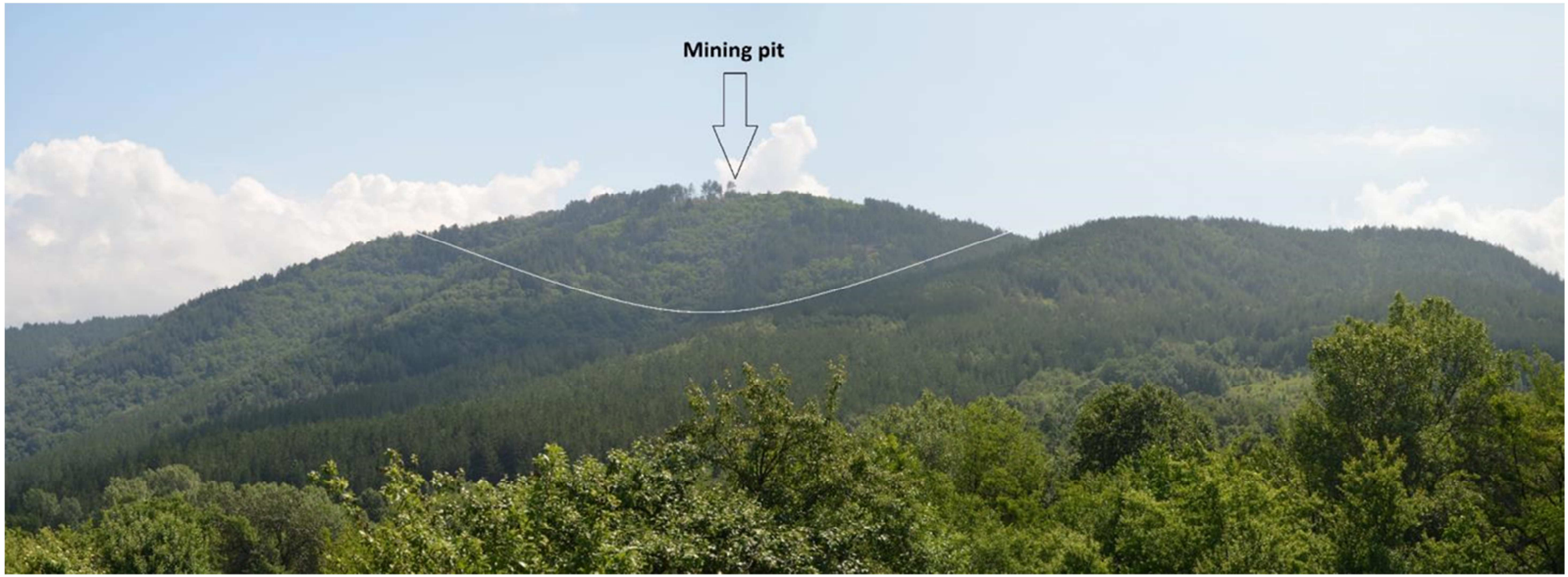
Distance to the proposed development	3 230m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view. Only about half of the residential visual receptors will have visibility of the development because of local tree vegetation and topography.

Viewpoint 22: Skalak



Distance to the proposed development	1 970m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Medium
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The mining pit will be discernible and will significantly alter the composition of the view. Despite some vegetation screening most of the residential visual receptors will have a direct view of the development.

Viewpoint 23: Pobeda

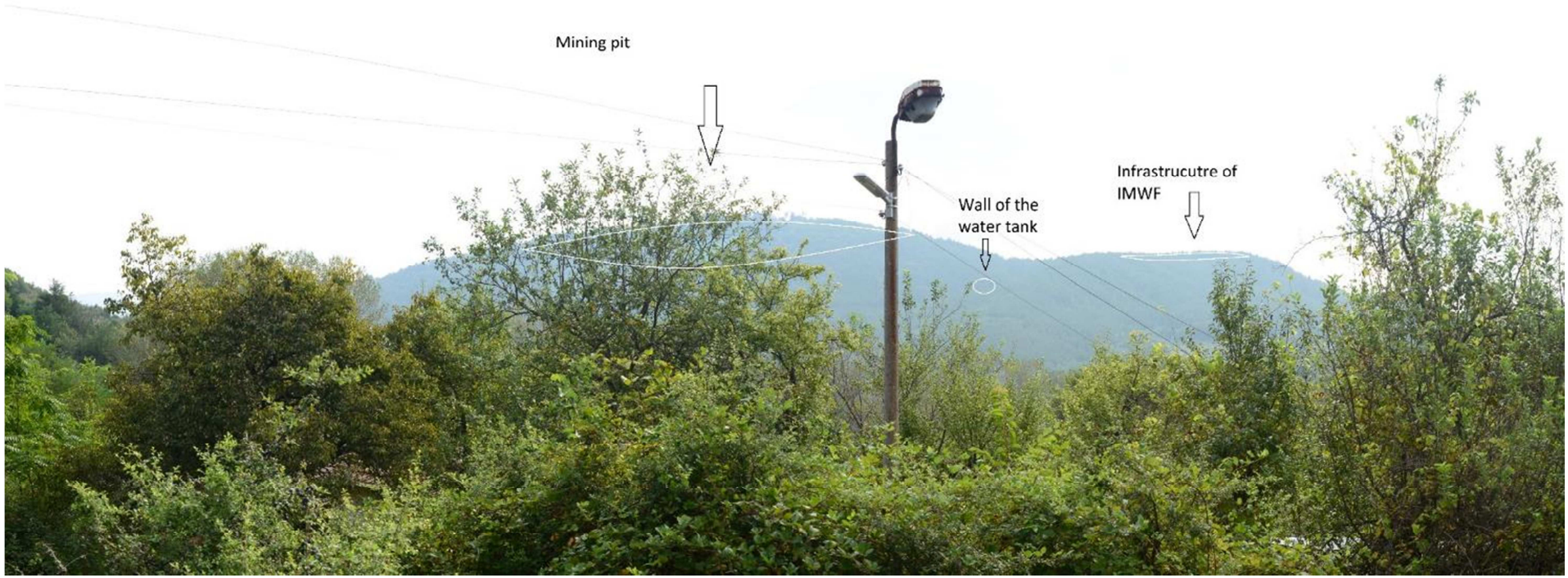


Distance to the proposed development	1 330m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	High
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The mining pit will dominate the view from this location. Despite significant local tree vegetation most of the residential visual receptors will have direct view of the development.

Viewpoint 24: Belagush

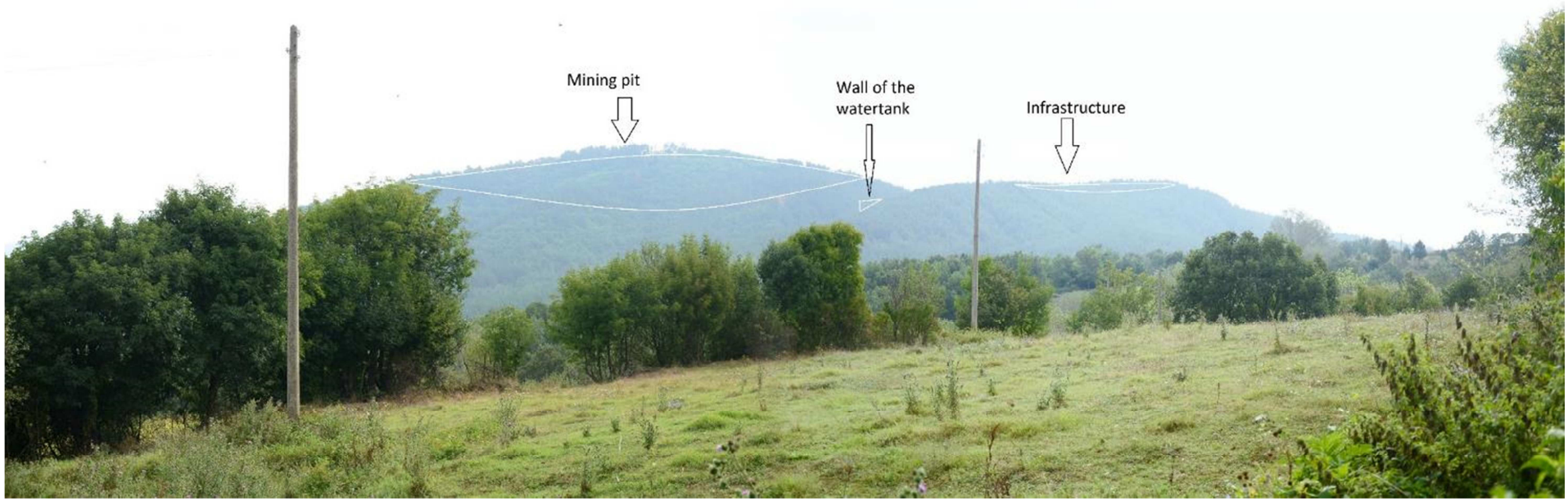
Distance to the proposed development	1 570m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Medium
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The mining pit will be affect a large proportion of the available view, despite some screening from vegetation. During the visit it was found that only one house in this hamlet was inhabited by two persons.

Viewpoint 25: Koprivnik



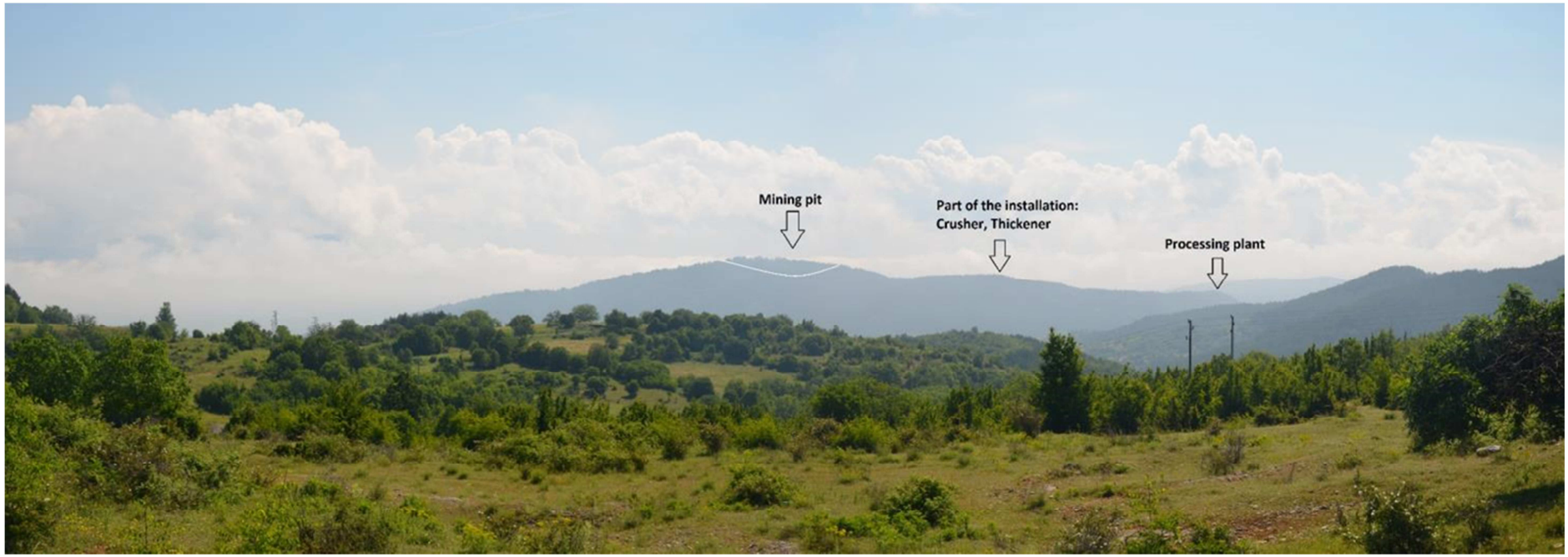
Distance to the proposed development	2 030m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Medium
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be affect a large proportion of the available view, despite some screening from vegetation. Only one house in this hamlet was found to be inhabited during the visit.

Viewpoint 26: Kremenik



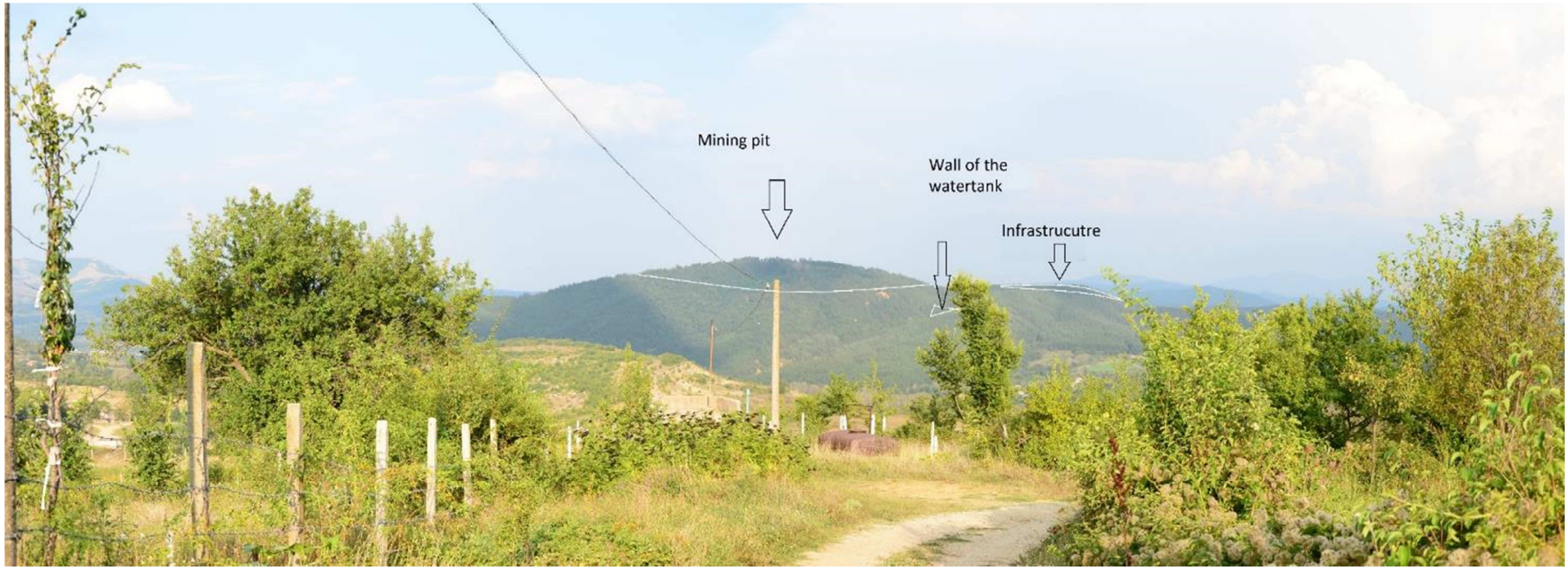
Distance to the proposed development	1 780m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	High
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The mining pit will be dominate the local view. During the visit it was found that currently only one residential house in this hamlet house is inhabited.

Viewpoint 27: Dranovets



Distance to the proposed development	3 480m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view. Only about half of local residential receptors will have a direct view due to topography.

Viewpoint 28: Lozino 3

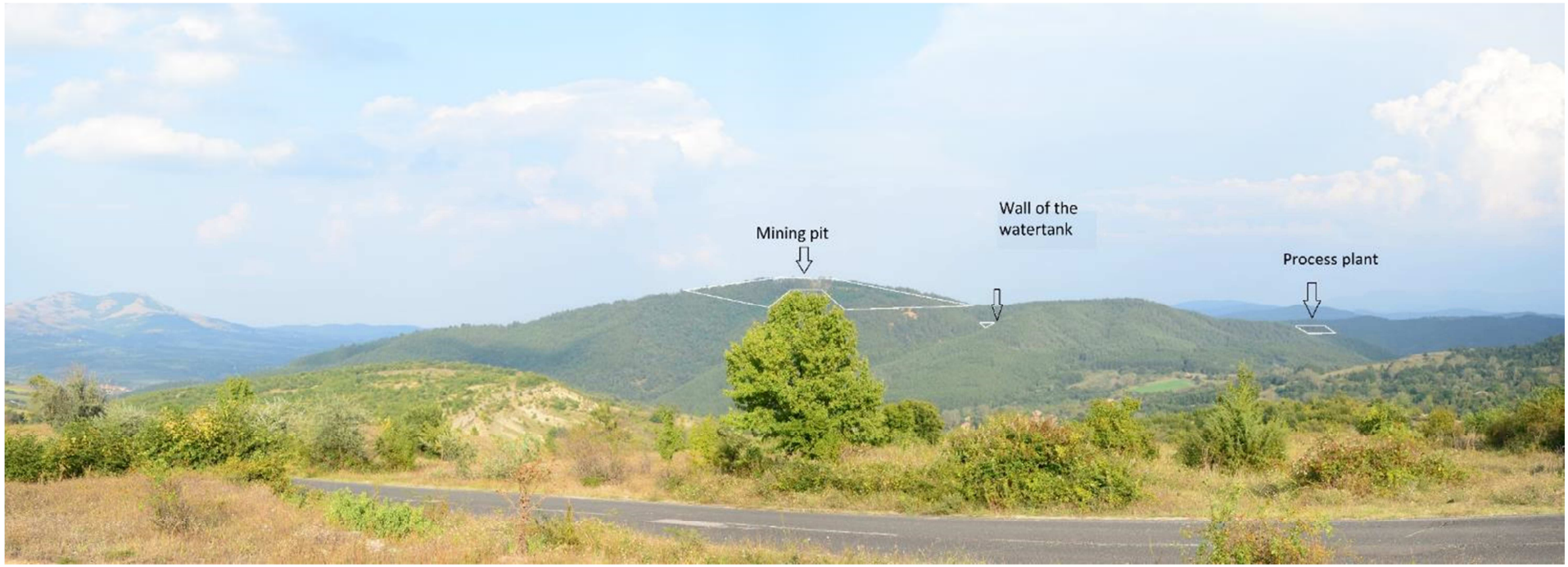


Distance to the proposed development	2 930m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Medium
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will affect a significant proportion of the view. Despite some vegetation screening, most of the residential visual receptors will have a direct view of the development.

Viewpoint 29: Lozino 1

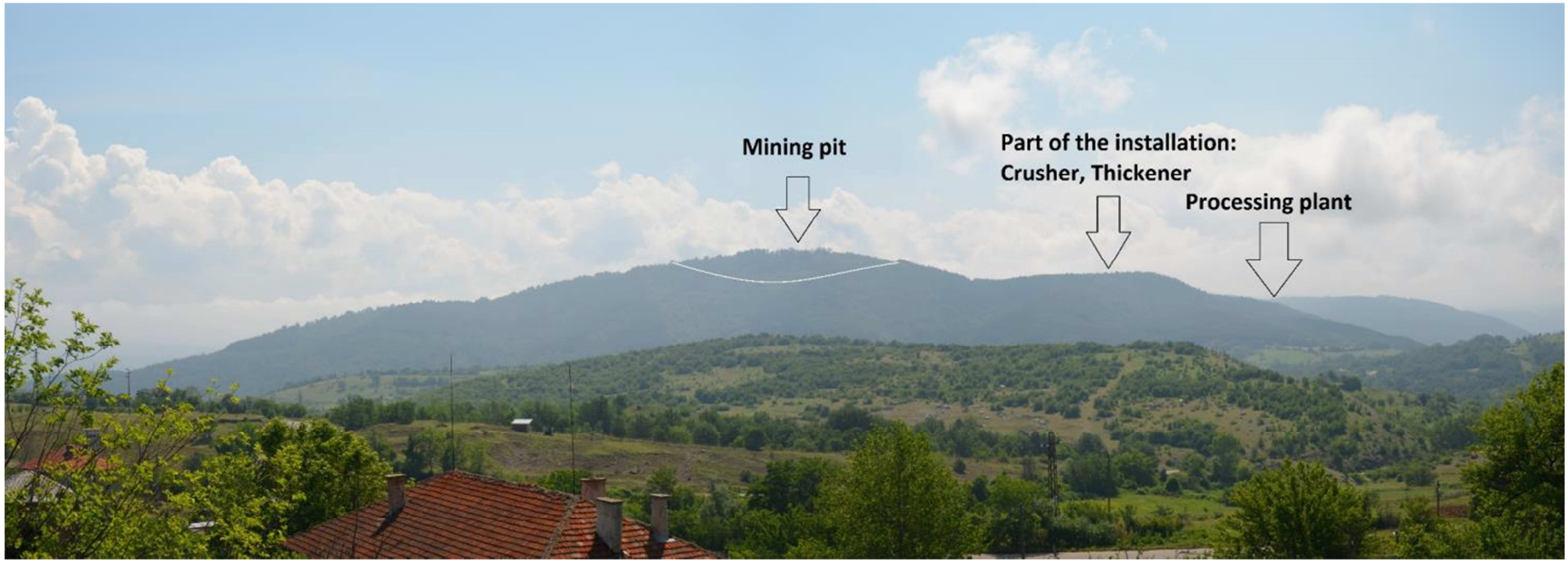
Distance to the proposed development	2 800m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view. Most of the residential visual receptors will have a view toward the development although houses and tree vegetation will screen some receptors.

Viewpoint 30: Road Zvanarka-Lozino 3 (509 III class)



Distance to the proposed development	2 490m
Visual sensitivity of main group(s) of visual receptors	Low
Magnitude of Visual Change	Medium
Potential visual impact	**Low**
Type of Effect	Adverse
Rationale	The mining pit will be discernible and affect a significant portion of the view. This is a local road with very infrequent traffic.

Viewpoint 31: Zvanarka

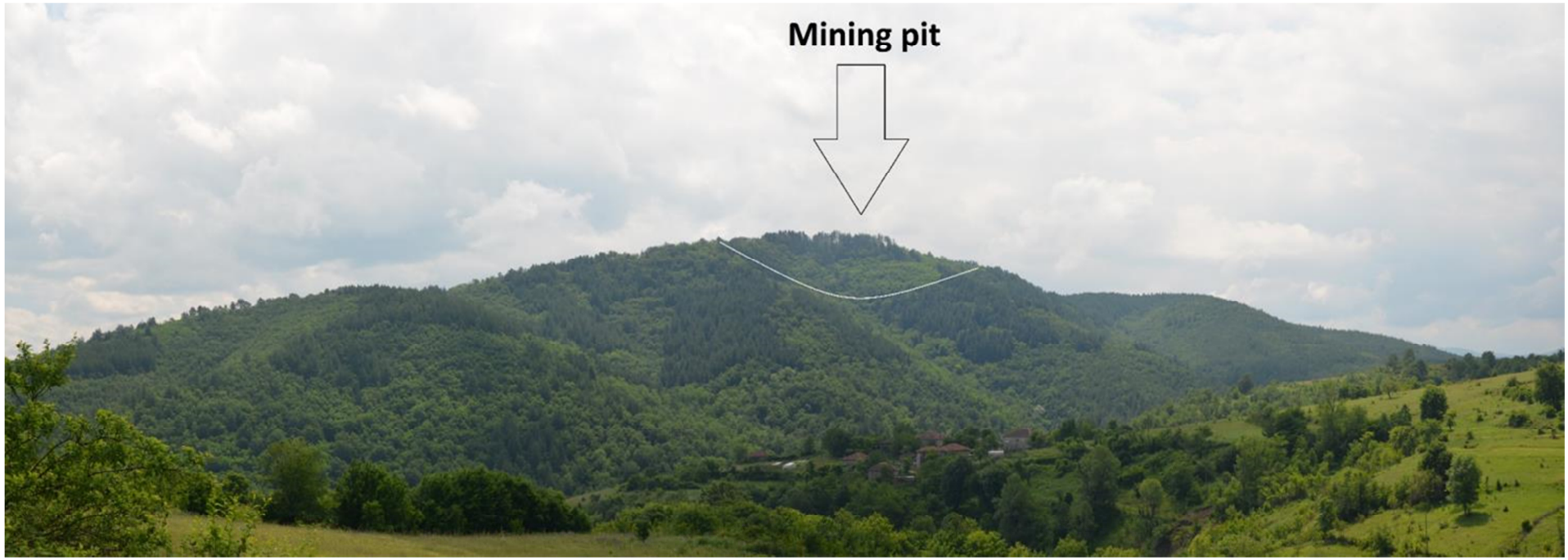


Distance to the proposed development	2 190m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Medium
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The development will affect a large proportion of the view and the mining pit will significantly alter the outline of the hill from this viewpoint. In addition to the residential visual receptors there are also two public places – a pub and a school with direct view of the development.

Viewpoint 32: Soyka

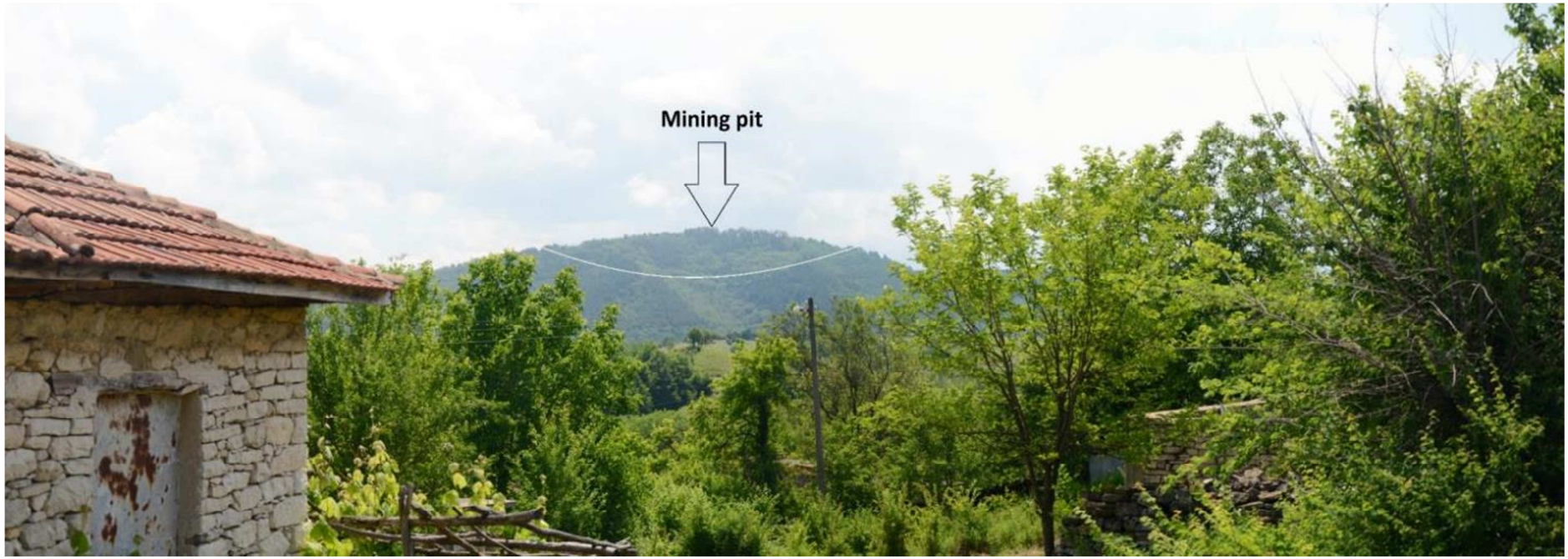
Distance to the proposed development	960m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	High
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The mining pit will dominate the view with the IMWF also discernible. Despite local tree vegetation about 90% of the residential visual receptors will have a view toward the development.

Viewpoint 33: Bitovo



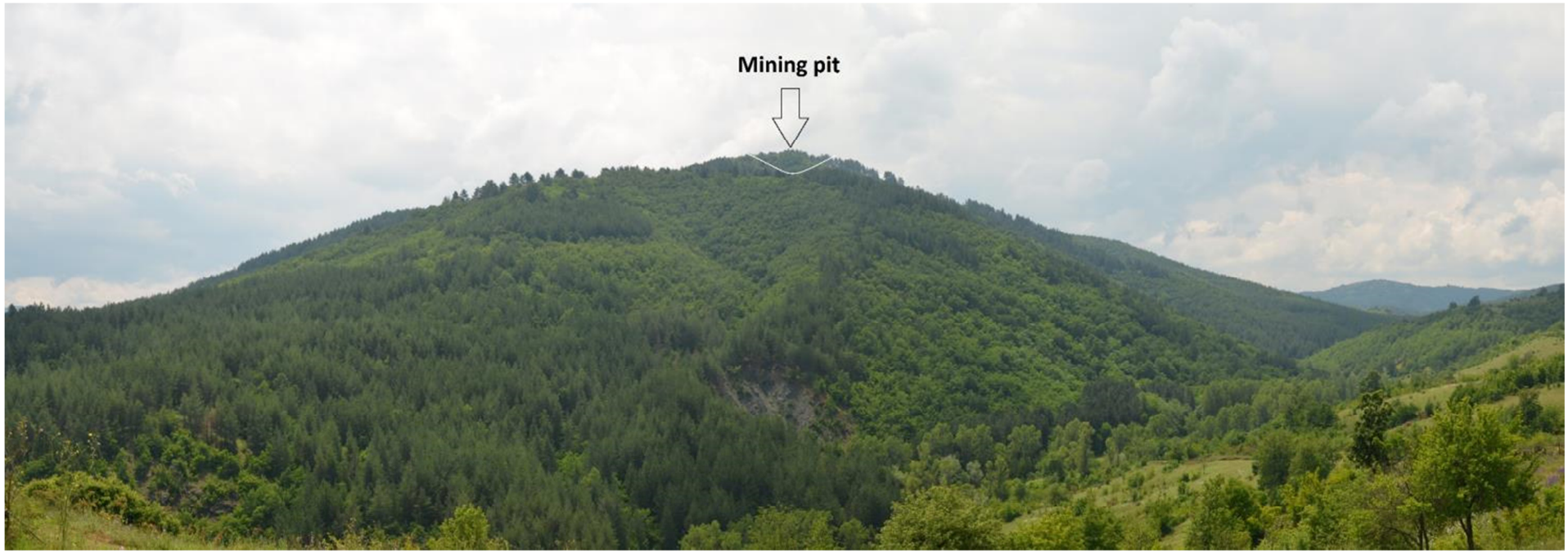
Distance to the proposed development	1 480m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	High
Potential visual impact	**High**
Type of Effect	Adverse
Rationale	The mining pit will dominate the view. Despite the presence of local tree vegetation most residential visual receptors will have a view.

Viewpoint 34: Taynik



Distance to the proposed development	1 930m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Medium
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible and alter significant characteristics of the view – the hill outline. However, it will only be visible to some residential visual receptors in the hamlet due to tree vegetation screening.

Viewpoint 35: Varhushka

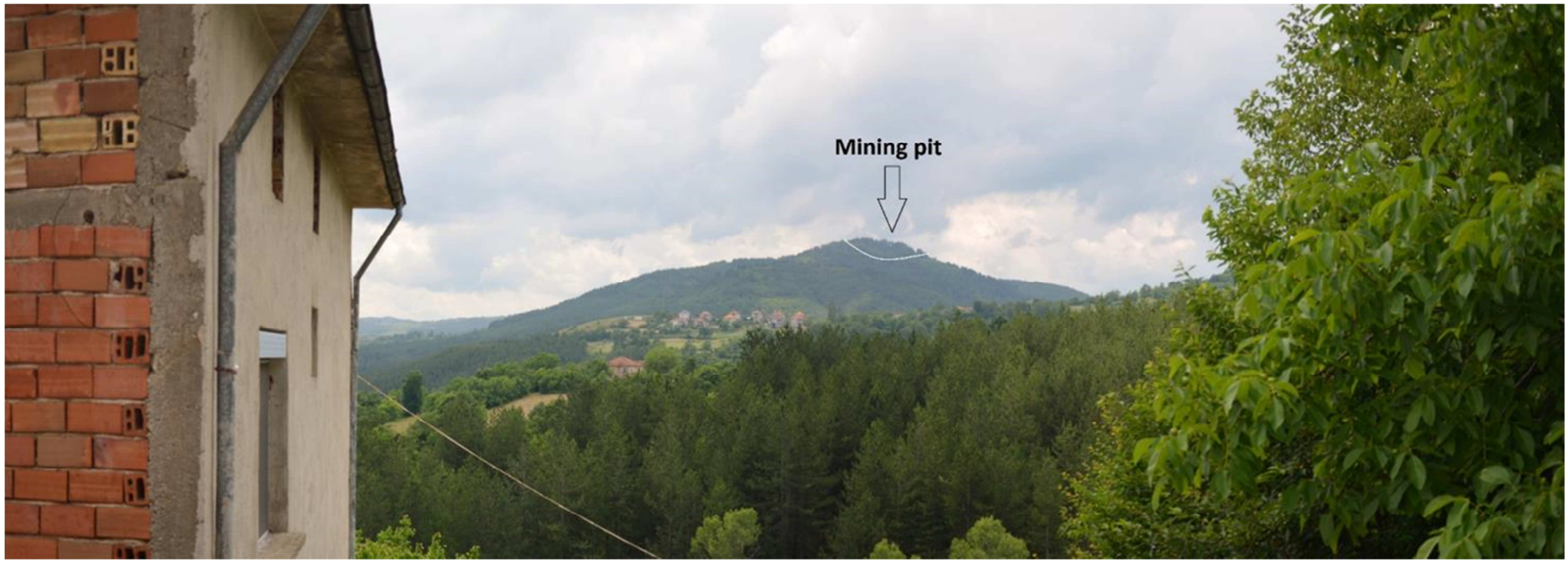


Distance to the proposed development	1 500m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view. Only about 60% of the residential visual receptors will have direct view because of screening afforded by other residential houses.

Viewpoint 36: Konsko

Distance to the proposed development	2 300m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view. There is extensive tree vegetation screening. During the visit it was found that all residential houses in this hamlet were uninhabited.

Viewpoint 37: Izgrev



Distance to the proposed development	2 650m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The mining pit will be discernible, however, from this location it does not significantly affect the overall composition of the view. While there is local tree vegetation it offers no screening of the view to the residential receptors.

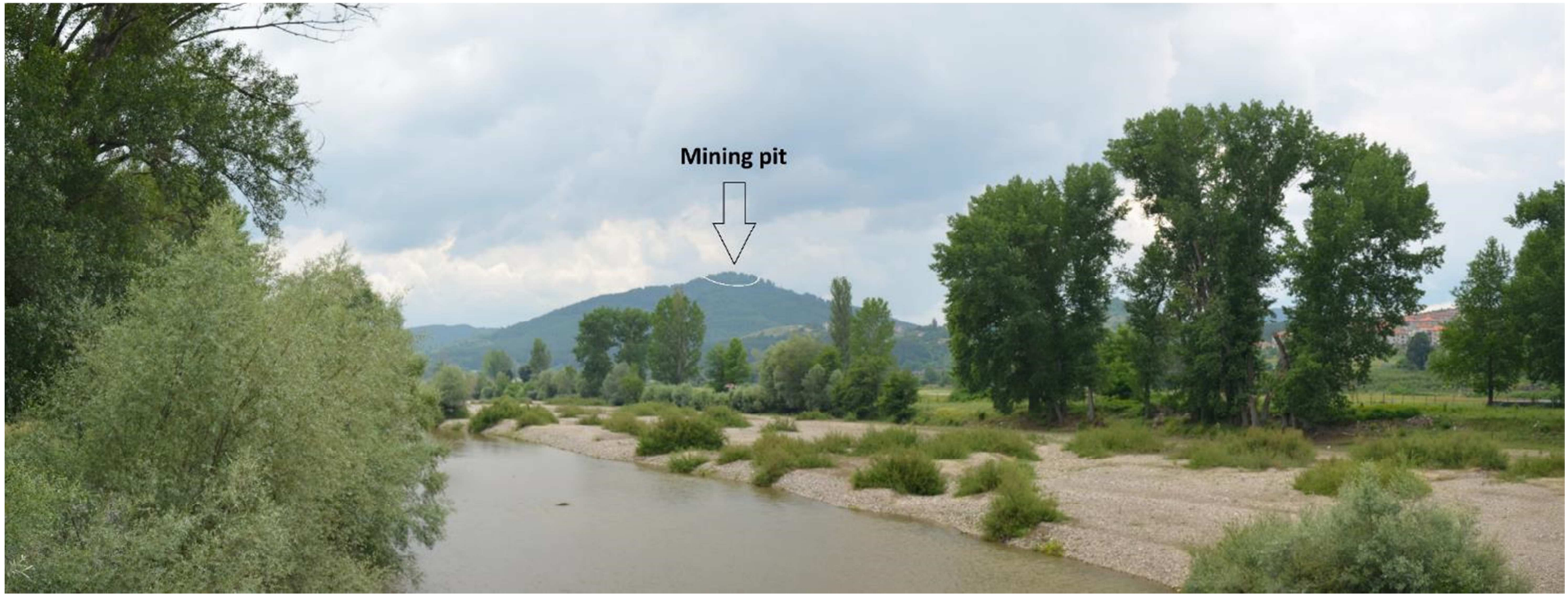
Viewpoint 38: Lulichka

Distance to the proposed development	5 460m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The development facilities will be discernible, despite the distance of more than 5km from the site. The local tree vegetation offers sufficient screening for most of the residential visual receptors due to this great distance.

Viewpoint 39: Vransko

Distance to the proposed development	5 590 m
Visual sensitivity of main group(s) of visual receptors	High
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	The development facilities will be discernible, despite the distance of more than 5km from the site. The local tree vegetation offers sufficient screening for most of the residential visual receptors. In addition to the residential receptors there are public places – a convenience store and a pub with a view of the development.

Viewpoint 40: Road Krumovgrad-Izgrev (509)



Distance to the proposed development	3 400m
Visual sensitivity of main group(s) of visual receptors	Low-to-Medium
Magnitude of Visual Change	Low
Potential visual impact	**Moderate**
Type of Effect	Adverse
Rationale	While this is a local road, it has significant work commuter pedestrian traffic between the town of Krumovgrad and Izgrev suburb, so it is classified as low-to-medium sensitivity. The mining pit will be discernible but it will not significantly affect the overall composition.

4 Summary of Visual Impacts

The following summary observations can be made from the viewpoint analysis:

- Within a 2.5 km radius to the mining development, 10 of the 18 studied residential visual impact receptors were found to have a high impact. In 5 of these cases the mining development fully dominates the view;
- Between 2.5 and 5 km from the development, only 1 of the 15 of the residential visual receptors was found to have high impact and 14 moderate impact;
- Beyond the 5km study area there are some viewpoints where the development is discernible. However, the visual impacts are generally of low magnitude and moderate impact (due to the high sensitivity of residential receptors).
- In almost all residential areas where viewpoints were located, local tree vegetation offered some screening and prevented a view of the project from a significant number of residential buildings.
- No non-residential visual receptors with high visual impact were identified, mostly due to the absence of recreation areas and main highways and/or tourist routes.
- During the visit many of the smaller hamlets were found to be inhabited by several people and in one case the hamlet appeared completely uninhabited.

5 Conclusions and recommendations

It can be concluded from the above analysis that the potential daytime visual impact for the visual receptors located at or close to a number of representative viewpoints will be **moderate-to-high**. During the operational period a number of mitigation and restoration measures will be implemented, so that once mining and processing operations have ceased the establishment of restoration planting will gradually reduce the magnitude of many of the visual effects. Appropriate mitigation measures are set out in Section 6. DPM has been consulted on these measures and agreed to implement them.

While it is not certain whether significant night lighting impact will occur from the project, it is advisable that any potential impact is addressed upon the start of operations.

6 Mitigation Measures

Table 7 Mitigation measures for visual effects from the Krumovgrad mine Project

Construction phase		
Measures	**Impact before**	**Impact after**
• All constructed facilities and buildings should cause minimum visual disturbance through reducing the contrast and blending in with the surrounding vegetated natural area. This could be achieved by painting rooftops and walls of buildings in the hues and tones of the surrounding forest and/or by adding matt paints to highly reflective surfaces, as well as sharp protruding features on the structures. All of these solutions are subject to the technical design of individual buildings and facilities and should be pursued by the technical design and/or construction team, taking into consideration added value from reduced visibility, engineering feasibility and cost. • Upon choosing the design and specifications of lighting, technical designers and/or construction engineers should be aware of requirements to minimize light pollution beyond the perimeter of the project. Once the lighting is installed and is being tested, new measurements should be made in the sensitive locations (surrounding settlements identified in this report). The results should be analysed and recommendations for reduction of light pollution, in accordance with good practices, such as the UK Guidance • Recommendations for the Reduction of Obtrusive Light should be made. These may include redirecting or blocking unneeded fugitive light, however, at all times, the safety and security light requirements for the sight should be respected	Moderate to High	Low to Moderate

Operational phase		
Measures	**Impact before**	**Impact after**
• The progressive restoration of the Integrated Mining Waste Facility should start as soon as possible after the start of operations – preferably in the first year of operation. For this purpose a Technical Restoration Project is elaborated, whose implementation is planned to start in the first year and carry on in steps (the duration of each step associated by the speed of filling the cells) until 3 years after ceasing of operations. The plan, as stated, should be implemented strictly and without undue delays. Its implementation will result in quicker reduction of visual impact for some of the observed locations.	Moderate to High	Moderate to High

Decommissioning and Closure phase		
Measures	**Impact before**	**Impact after**
• The biological recultivation, which is carried out through the end of the operations and into the decommissioning and closure phase, achieves an optimum quality of the landscape value, which, in terms of the type of vegetation (and also underlying ecosystem services) should in some places be better than the landscape quality before the start of the project. Residual visual impacts, such as those caused by the mining pit depression could be partially addressed by selective tree planting within the contours of the project, as part of the biological recultivation process;	Moderate to High	Low to Moderate

Annex 1. Excerpt from the EIA report Landscape Impact Chapter

9. Landscape

9.1. Assessment of the Expected Landscape Alteration

Construction and Operation

The main anthropogenic impact from the implementation of the project will be on the landscape component. A two-stage process of landscape change will occur during project implementation.

The first stage will occur during the construction (operation) of the open pit and the key contributing process will be ore mining, which will change the existing landforms. Another process that is linked with landscape alteration is the construction of site and access roads, stockpiles, waste facilities, production facilities, etc. A pit with stepped walls will progressively be developed, i.e. the existing physical environment will be affected by changing the surface profile and visual perception and aesthetics. The landscape will be modified to some extent in terms of its functions resulting in limited accessibility due to the relatively steep slopes that will remain after shutdown of operations.

The changes in the landscape will be direct but on a local scale involving significant modification of all landscape components. The natural landscape types will be transformed into technogenic landscapes as the project continues. The changes will essentially be irreversible because the landscape within the project footprint will remain as changed after the mine closure.

The formation of a deep pit may encourage some erosion and landslide but these processes will be confined to the pit only. Neither the ore nor the overburden material contain or generate pollutants. The mining method, rock material handling, ore processing and the mining plant and equipment will not be conducive to pollutant generation either.

The irreversible changes that will occur during project operation will alter the structure of the existing local landscapes. The degraded technogenenic landscape consisting of the open pit, the soil stockpiles and the IMWF will have a modified structure and will temporarily be not able to perform its resource and environment regeneration functions. This will be caused mainly by the alteration of the socio-economic functions of the landscape within the project footprint. It should be said that the alteration of landscape functions is linked to the higher public significance of the site due to its potential – the gold deposit. The implementation of the project will not cause critical deterioration of the physical environment despite that the landscape structure on the site will be modified. The neighboring lands will sustain indirect negligible or minor changes, mainly in the bio-component of the physical environment, but the landscape will retain its functional sustainability. The main impact on the landscape will be on a local scale affecting visual perception and aesthetics.

Closure

The second stage will involve a permanent change in the topography through the creation of a negative landform – an open pit.

The following alterations linked with the project development are expected to have occurred by the end of project operation:

The depth of the pit on completion of operations will vary according to the location.

- The north end pit bottom is at RL 340 m, which gives final pit depths of 120 m to the east, 100 m to the north, and 40 m to the west.
- The south end haul road exits to the west at RL 380 m, with the southern part of the pit being above the road at RL 400 m. The depths from this point will be 50 meters to the east, 20 meters to the south, and 0 meters (open) to the west.

This stage will cause a direct and lasting change in the environment and significant alteration of the visual aesthetics of the landscape and the dominant landscape features. The new negative landforms will stand out as technogenic disturbances against the natural physical environment with significant changes in the existing spatial structures and resembling urbanised environment to some extent.

The anthropogenic changes occurring in the relatively open landscape after shutdown of operations will primarily have a negative aesthetic impact on landscape appearance.

Appropriate designing and planning of mining and processing operations will limit and mitigate the negative impact of the open pit on the local landscape, and a closure plan will further be developed.

The proposed closure process will involve a set of activities whose objective will be to improve the environmental and aesthetic value of the affected landscapes – the open pit, the IMWF and other production and ancillary structures.

The successful rehabilitation of the technogenic landscapes will be achieved as a two-stage process. The technical rehabilitation stage will include planning (a landscape design plan), re-profiling of artificial slopes, trucking and placement of soil, construction of hydrotechnical and amelioration facilities.

The biological rehabilitation stage will include application of soil fertility restoration techniques and a set of phyto-amelioration activities whose objective will be to rehabilitate the biological components of the landscape. The mine closure practices across the world indicate that such sites may become extremely attractive habitats for certain animal and plant species and a valuable nature conservation resource.

Assessment of the Changes in the Landscape Structure and Functions

The deposit will be open-pit mined, which will inevitably involve rock blasting and excavation, and operation of heavy-duty plant and equipment. The project development will substantially modify the physical appearance of the project site by creating a devegetated landform with clearly expressed elevation. Landscape structure and functions will change - the structure will change from horizontal to vertical and will affect the bedrock, topography, soil and vegetation components. The designation of about 8.5 ha of forest land will be changed to a technogenic landscape for a period of 9 years.

The site rehabilitation will modify the visual perception and aesthetics of the landscape and restore some of its functions.

The negative impacts from the project development will include:

- physical occupation of land;
- devegetation;
- short-term derogation of the quality of environmental media.

The open pit mining will undoubtedly have an irreversible impact on the existing landscape. The footprint of technogenic landscapes will be expanded at the expense of other landscapes during the project operation. The open pit mining will change the topographic forms and land use, and contribute to elevated rates of erosion, pollution of the local environment with non-toxic dust and aerosols, changes in the feeding base of wild fauna and its disturbance. Noise, dust and aerosol pollution of the surrounding areas will disturb the normal life of local populations and may be instrumental for the death of few individuals but not entire populations.

Conclusion:

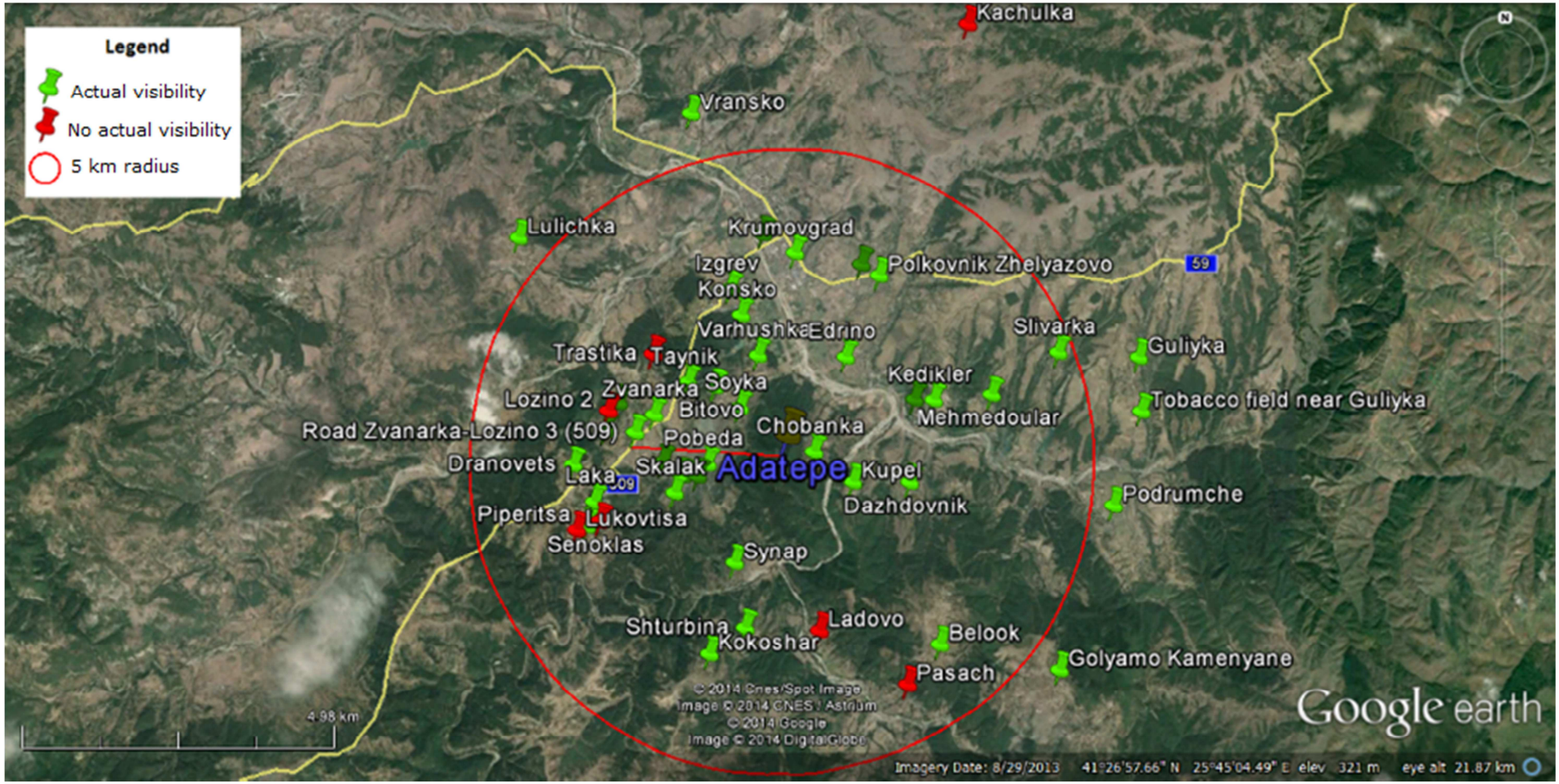
The implementation of the project will not cause critical deterioration of the physical environment despite that the landscape structure on the site will be modified. The neighbouring lands will sustain indirect changes, mainly in the bio-component of the physical environment, but the landscape will retain its functional sustainability.

The main impact on the landscape will be on a local scale affecting visual perception and aesthetics.

Impact forecast:

- **Area of impact** - direct, confined to the pit footprint;
- **Severity of impact** - significant on the surface topography and the overall appearance of the site. The overall impact will be mitigated after the site rehabilitation;
- **Duration** - in the long-term;
- **Reversibility** - limited, through rehabilitation and introduction of suitable vegetation in compliance with the landscape zoning;
- **Cumulative impacts**: None.

Annex 2 Map of the 5km Study Area with identified potential receptors



Annex 3 Actual Visibility for Potential Receptors

Potential Receptor (village/hamlet*/road)	Distance to the center of development (m)	Actual Visibility (selected as VP)	
		Yes	No
Chobanka	513	X	
Soyka	960	X	
Kupel	1 310	X	
Pobeda	1 330	X	
Bitovo	1 480	X	
Varhushka	1 500	X	
Belagush	1 570	X	
Edrino	1 770	X	
Kremenik	1 780	X	
Taynik	1 930	X	
Skalak	1 970	X	
Koprivnik	2 030	X	
Synap	2 160	X	
Dazhdovnik	2 160	X	
Zvanarka	2 190	X	
Konsko	2 300	X	
Kedikler**	2 500	X	
Road 509 (near to Zvanarka)	2 490	X	
Izgrev neighborhood	2 650	x	
Trastika	2 640		X
Road 5904	2 180	X	
Lozino 1	2 800	X	
Lozino 3	2 930	X	
Lozino 2	2 970		X
Shturbina	3 100	X	
Ladovo	3 130		X
Senoklas	3 200		X
Laka	3 230	X	
Guliya	3 430		X
Piperitsa	3 440	X	
Mehmedoular	3 450	X	
Sarnak***	3 480	X	
Dranovets***	3 480	X	
Town of Krumovgrad	3 560	X	
Lukovitsa	3 600		X
Kokoshar	3 630	X	
Oreh	3 900		X
Kaklitsa	4 050		X
Belook	4 100	X	
Polkovnik Zhelyazovo	4 130	X	
Road 59 (near to Polkovnik Zhelyazov)	3 120	X	
Pasach	4 420		X

Potential Receptor (village/hamlet*/road)	Distance to the center of development (m)	Actual Visibility (selected as VP)	
		Yes	No
Slivarka	4 680	X	
Lulichka	5 460	X	
Podrumche	5 470	X	
Vransko	5 590	X	
Golyamo Kamenyane	5 560	X	
Guliyka	5 900	X	
Malko Kamenyane	6 000		X
Kandilka	6 280		X
Gorna Kula	7 090		X
Sindeltsi	7 100		X

*a "hamlet" refers to the informal Bulgarian designation of "mahala" – a standalone cluster of homes/buildings, which is administratively grouped with a larger adjacent village but functions as a spatially separated residential community.

**Selected viewpoint represents the entire village of Rogach and its hamlet Kedikler.

***Selected viewpoint represents the entire village of Sarnak and its hamlet Dranovets.