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Environmental Impact Assessment

RECONSTRUCTION AND ELECTRIFICATION OF THE ZAPREŠIĆ – ZABOK RAILWAY SECTION

NON – TECHNICAL SUMMARY

Zagreb, December 2010

Developer:	**HŽ Infrastruktura Ltd.**	
Project:	**RECONSTRUCTION AND ELECTRIFICATION OF THE ZAPREŠIĆ – ZABOK RAILWAY SECTION**	
Type of documentation:	**ENVIRONMENTAL IMPACT ASSESSMENT (NON-TECHNICAL SUMMARY)**	
Contract No.:	656/10 (129/10/2.2.1./TP)	
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A.1 PROJECT CHARACTERISTICS

A.1.1 Current state

The railway sections Zaprešić (exclusively)-Zabok (inclusive) is approx. 23.9 km in length, and intersects through the area of Zagreb County (City of Zaprešića and Luka County) and Krapina-Zagorje County (City of Zabok and Veliko Trgovišće County).

The railway is located in the Krapina River valley, and is actually at the beginning of the Sava plain and has a relatively stretched route with all the characteristics of a flatland route. A major part of this railway is on course (almost 70%). Maximum slope of the railway is 4 ‰, and the smallest ground plan radius is 250 m. The route is single-railed and not electrified.

The technical condition of the Zaprešić-Zabok railway is not satisfactory, and there are speeding restrictions of 20km/h on certain sections. Drainage is poor, rainwater channels are clogged, and a large part of the culvert does not function, in part due to age, and in part due to inadequate maintenance. Zaprešić station is the only one that has been adequately maintained, and equipment of other stations is quite outdated.

A.1.2 Design phase

The planned project includes modernization of the Zaprešić section (exclusively) – Zabok (inclusively), and reconstruction of individual arcs for maximum speed $V_{max} \leq 120$ km/h, reconstruction of stations: Novi Dvori, Luka, Veliko Trgovišće and Zabok, reconstruction of platforms Pojatno, Kupljenovo and Žeinci, installation of new security signal systems, update/reconstruction and construction of completely new railway objects (bridges, culverts, canals), security /construction of railway-road crossings or their removal and arcing to the previous or next one, track and station electrification, etc.

The branch station on railway Zaprešić- Zabok is Zaprešić Station (km 0+000 = station building Zaprešić) however, the reconstruction point is at the beginning of branch point (existing branch point no. 27) at km 0+403,12 (≡ 439+971,00 railway M101 (Dobova)-State line Savski Marof-Zagreb Central Station). By reconstructing the railway, locations of station facilities on route are also modified.

Railway reconstruction, on section Zaprešić-Zabok will mainly be undertaken by repairing the existing tracks, and partially by constructing new shorter railway sections – so called deviations, on sections where existing arcs, whose current ground plan elements do not satisfy the planned V_{max} 120 km/h. There will be expansion of the existing railway body due to expansion of the existing formation levelfrom 5,5 or 6,0 m to a new 7,0 m, drainage organization, partial separation of the existing route, raising the of level line, installation of future contact network foundations and similar.

The section is planned to be electrified with a 25 kV, 50Hz system that would satisfy conditions for network connection to rural traffic of passengers from Zagreb, and outdated signal-safety systems would need to be replaced with newer ones.

Shifts of new designed - existing axis
1) From **approx. km 8 +389,22 do km 10+163,75**; the deviation replacing the current „S“ arc with two new arcs with straight line. Shifts of 25 m.

2) From **approx. km 11 +224,77 to km 12+023,45**; deviation replacing the current arc with a new one. Shifts of 23 m.

3) From **approx. km 13 +420,85 to km 14+572,03**; deviation consists of three new arcs. Current arc 10 is replaced with arc no. 9, shift of the existing- newly designed arc is 16m. Further existing arcs 11 and 12, that form „S" arc, are replaced with new arcs no. 10 and no. 11 with straight line shifts in arc no. 10 are approx. 16 m, and in arc no.11, approx. 15 m.

4) From **approx. km 15+258,78 to km 16+285,80**; two same direction arcs are replaced with one arc no.12, and there is a shift of approx. 8-9 m from the current axis.

5) From **approx. km 16+943,21 to km 17+623,85**; arc no. 13 transitions are extended and there is a shift of approx. 5m in newly designed axis from the existing one

6) From **km 18+603,39 to km 19+166,65**; maximum shifting in arc no. 14 is to 6 m.

The existing 'S" arc in front of Station Veliko Trgovišće (approx. km 17+800 to km 18+100) is not listed here since it is mentioned in the reconstruction of Veliko Trgovišće Station.

By cancelling railway and road crossings (RRC), a need for reducing level crossing paths between the cancelled railway and road crossings and the ones that are left becomes necessary. On some crossings that are cancelled, these types of crossings already exist.

RRC (6) at km 8+454,30 – cancellation without reduction, or design of new connection roads. Traffic is enabled on nearby local roads
RRC (7) at km 9+814,50 - cancellation by reduction on RRC at km 7+729,28,80. Traffic is enabled on nearby local roads. A connection road is not foreseen.
RRC (9) at km 11+916,36 – cancellation by reduction on RRC at km 12+516,41. New connection road runs on the right side of the track.
RRC (12) at km 14+764 - cancellation by reduction on RRC at km 16+199,38. New connection road run on both sides of Zaprešić-Zabok track.
RRC (14)at km 17+670,10 – cancellation by reduction on RRC at km 18+617,63. New connection road is positioned on the right side of the existing track.
RRC (19) at km 22+207,67 – cancellation by reduction on RRC at km 22+820,06 and the new connection road runs on the right side of the track.
RRC (20) at km 23+645,07 – cancellation by reduction on previous RRC at km 22+820, and new connection road runs on the right east side of the existing station.

On the observed railway section there are four (4) iron bridges bright opening to 20 m, five (5) culverts opening to 5 m, several smaller openings to 2 m. There is also one road overpass. Some of the culverts and bridges will need to be elongated or newly built during reconstruction. Some of the buildings will undergo elongation and elevation of parapet walls, fences, and arrangement of culvert entrances and exits on the retained route sections.

Reconstruction of all terminals and stations includes construction and design of new platforms, paths for people of reduced mobility via ramps, parking areas, etc. Installation of UIC 60 rail system is planned for the main tracks, and S 49 rail system for other tracks. The same applies to branches. A timetable information system for travellers is planned to be introduced as well as information on late trains.

Graphics

Graphic annex 1. Site layout (M 1:35 000)

A.2 LOCATION AND POSSIBLE IMPACTS DESCRIPTION

A.2.1 Data from physical planning documentation

The project has been determined by the following valid physical planning documentation:

- **PHYSICAL PLANNING STRATEGY** (1997)
- **PHYSICAL PLANNING PROGRAM OF THE REPUBLIC OF CROATIA RH** (NN 50/99)
- **PHYSICAL PLANS OF ZAGREB COUNTY** («ZAGREB County Gazette», no. 3/02, 6/02, 8/05, 8/07, 4/10)
- **PHYSICAL PLANS OF KRAPIN-ZAGORJE COUNTY** ("Official Gazette of Krapina-Zagorje County", no. 4/02)
- **PHYSICAL PLANS OF THE CITY OF ZAPREŠIĆ** (ZAGREB County Gazette, no. 10/05, 24/05, 15/07; Sl. Newspaper of the City of Zaprešić, no. 1/07)
- **PHYSICAL PLANS OF LUKA COUNTY** («Zagreb County Gazette», no 15/04,9/09, 1/10)
- **PHYSICAL PLANS OF VELIKO TRGOVIŠĆE COUNTY (**Official Gazette of Krapina-Zagorje County",no. 5/04, 15/07, 27/08)
- **PHYSICAL PLANS OF ZABOK CITY** ("Official Gazette of Krapina-Zagorje County", NO. 07/09)
- **ZAPREŠIĆ URBAN SPATIAL PLAN (**Newspapers of Zaprešić, no. 5/08)

The project location is in the corridor of existing railways and in compliance with planned purpose in higher and lower order, through which areas it passes. The railway passes through settlement construction areas in Zaprešić and Zabok, while other settlements are in minimal proximity of the railway (Pojatno, Kupljenovo, Luka, Veliko Trgovišće). The main facilities that appear along the railway, particularly on the right (east) side are of a business, production or storage nature. In regards to traffic infrastructure, the railway is crossed with state roads D-225 at Zaprešića, and D 205 by Gubaševa (overpass) and with a few county roads. Considering that this regards to reconstruction of an existing railway, its reconstruction will not create conflict in area usage in regards to existing or planned purpose.

Graphic annex:

Annex 1. Excerpt from Physical Plans of Zagreb County – cartographic overview: 1. Use and allocation of land

Annex 2. Excerpt from Physical Plans of Zagorje-Krapina County – cartographic overview: 1. Use and allocation of land

A.3 DESCRIPTION OF ENVIRONMENTAL ASPECTS AND IMPACTS

Climate and meteorology

Climate in the area of railway reconstruction Zaprešić-Zabok is best described by meteorological station Novi Dvori, located near the middle of the railway. There is numerous data available since 1971 to 1990. The area where the railway passes is located in an area of moderate continental climate. During several years of observation, an average yearly air temperature is 10,4°C. The lowest average monthly temperature is in January (0°C), and the highest in July (20,3°C).
The yearly amount of rain is approx. 987 mm, and average monthly is 82 mm, with highest amounts occurring in June (118 mm).
During the period of 1971 to 1990, winds stronger than over > 8Bf have not been recorded. It is therefore expected that winds will not cause traffic jams or accidents during traffic.
Days with fog have been recorded every year in the period of September to December, while in other months there has been an absence of fog in certain years (mainly during April and July). Therefore, the highest dangers of accidents in traffic due to decreased visibility are in the autumn period.

Water quality and water-regime of the Krapina River

An approximate area of 5 km at each side of the Zaprešić-Zabok railway is made up of sediment rock of statisgraphic origin from the older Mesozoic to Quarternary.

Most of the area along the railway Zaprešić-Zabok, according to hydro geological regionalization is located within the water catchment area of Krapina. Only the area of Zaprešić Station belongs to the Samobor lowland water catchment area of Sava Basin. In the Krapina water catchment area, poorly permeable and impermeable sediments are dominant which along with the morphological characteristics of the terrain results in surface runoff and low infiltration of rainwater. Several streams of a torrent nature are formed.

The area made of alluvial sediment from the Krapina River stretches from north to south, and the Zaprešić–Zabok railroad tracks run along its western edge. The nearest water well "Šibice" is located on the left Sava bank, east of Zaprešić and south of the Zaprešić-Savski Marof rail road. According to the decision on protection of waterwell "Šibice", the reconstruction site of Zaprešić -Zabok railway is not within the sanitary zone.

The section of Zaprešić Zabok railway crosses through the right bank of the Krapina River, as well as the right bank of the Krapinica waterway. The railway is threatened by the Krapina River only under outstanding water levels in locations where it passes in its near proximity (areas in Kupljenovo, Žeinci and Luka). At the observed route section, there are four iron bridges bright opening to 20 m, five culvert openings to 5 m and several ducted and laminar openings to 2 m.

Analysis of water impact has proved that during works on reconstruction of the railway there could be possible adverse impact to „public water resources" as a result of improper storage and handling of oil derivatives and lubricants, higher levels of hazardous waste during project works, and absence of adequate sewerage system, as well as of rainfall at the construction site.

Another possible difficulty lies with the existing structures, particularly the smaller plate and pipe culverts that have up till now during maintenance of the existing railway, been subject to canal filling at the entrance of the culvert with ballast track materials. In turn, this decreases the free-section of culvert, its culvert capability and causes flooding of the surrounding area. Special attention should be paid to new necessary hydraulic structures on the railway and to new connection roads that should be compliant with their design and execution to existing water management projects in the area.

Soil and agricultural land

A larger area influenced by Zaprešić – Zabok railway (200 m impact zone) is agricultural area. It is mostly mosaics of cultivated areas on small plots, which alternate with elements of rural settlements and / or natural and semi-natural vegetation. Considering the type of geological substrate, the influenced area is dominantly gravel and sands, occupying 89,7% land in a 200m impact zone. With them, somewhat larger areas (5,5%) are occupied by marls and sands, while the rest of the surface consists of marl, sand and / or sandstone, loess and sandstone and clay. Considering surface type, five types of soils have developed within the 200m impact zone.

To assess the production potential of soils along the railway route Zapresic - Zabok, prudential valuation of land was conducted. On the research route Zapresic – Zabok there are three categories of land use. Category P1 land use, which is very valuable arable land, occupying 69.2 hectares (or 14.4% of the total land area within the mapping zone of 200 m). Category P2, which is valuable arable land, occupying 45.0 hectares, representing 9.4% of the land in the studied route. P3 spatial land use category represents other arable land, and occupies the largest area, which amounts to 354.1 ha or 73.8% of the land.

The main negative impacts on soil and agricultural land are related to the period of construction of the planned project, when there will be permanent and temporary land repurposing. Since this is a reconstruction of existing railways, the planned works will mainly be carried out on the existing facility. In places of curve modification for adjustment of railways for greater speeds, there will also be some occupying of new areas and permanent repurposing. In addition, there can be a temporary repurposing of areas along the railroad tracks to ensure access to site. During works, there may pollution caused by improper or careless handling of equipment and machinery (e.g., fuel, motor oil, etc.), which would affect larger surface areas along the railway tracks.

Effects on soil and agricultural land use during use of the future railway can be expected only in the case of accidents, such as when transporting hazardous materials or an extremely large fire, which can be prevented by compliance with all rules and regulations related to traffic safety on the railways

Forests and forest ecosystems

The area and spatial distribution of the forests at the project location have been acquired based on land use maps developed according to CORINE classification, photo interpretation of digital ortho-photo, and amounts to 22,60 ha.

Forest communities that appear in this area are:

- Subas. *Carpino betuli-Quercetum roboris "typicum"* Rauš 1973
- Subas. *Carpino betuli-Quercetum roboris fagetosum* Rauš
- As. *Epimedio-Carpinetum betuli* (Horvat 1938) Borhidi 1963

Forests at the planned project site are privately owned and are distributed and classified in the Zagreb Branch, Zagreb Office and in Zagorje – Međimurje Branch, Zabok Office. Forests of low growth shape (coppice) and degraded forest (thickets and scrubs) prevail.

Since this is reconstruction of an existing railway, there will be no significant impacts on forest areas. The only possible occurrence is acquisition of forest land along the railway to ensure access to construction site and for works on the border areas of the formation level.
Negative impacts may occur during construction, and regard:

- Affecting a larger area than planned
- Damage to border forest areas with heavy machinery
- Opening new forest edges in areas of the construction site
- Extreme situations that may occur during construction (fires, pollution)

During use and regular track sanding, there is a possibility of sparking which presents a fire hazard to surrounding vegetation in the event that it catches fire and develops into one.

Communities -flora

The project area is located in the lowland area of Zagreb County and Krapina-Zagorje County, which has for centuries been under the influence of various anthropogenic activities; therefore the potential forest vegetation in the greatest part of this area has been replaced with different stable anthropogenic vegetation types – grassland, ruderal and weed vegetation types.

Direct impact on flora and vegetation during railway reconstruction will be visible by reduction of local plant community area due to assimilation of the railway for higher speeds, damage of surrounding area (material dumps, parking lots), reconstruction of existing stations and platforms and reconstruction of existing and construction of new railway facilities. However, considering the general distribution of the communities in Croatia, the high natural vegetation degradation level and necessary safety measures, railway reconstruction is not expected to have negative results on plant community composition during various project phases. The use of different herbicides during maintenance of the future railway may pose a negative impact on surrounding flora and it is therefore necessary to consult with an expert prior to use. The work zone and railway maintenance zone may present a corridor for expansion of allochthonous invasive species (e.g. *Ambrosia artemisiifolia*), however, timely observation and removal of these species will reduce the negative impact on indigenous plant species.

Communities -fauna

Negative impact on fauna during project works will be observed through a higher activity level on the location site that will result in a higher level presence of people and machinery as well as higher noise levels. Animals will temporarily abandon the construction site and immigrate to surrounding areas. This is a temporary impact regarding reconstruction duration, and is therefore considered insignificant. On locations where new railway sections are planned for construction, as well as new embankments and cuttings, and expansion of formation level, there will be permanent habitat occupation. This will directly negatively impact species that are situated near or under the ground all their lives or for a part of their life cycles. Since this is mainly reconstruction of an existing facility, the project will not have significant impact on that area's fauna.

Protected nature areas

Rare and protected plant species

Although protected, rare, and strictly endemic plant species have not been recorded in proximity of the project area, the wider project area may expect to contain 17 species listed in the red Book of Vascular flora of Croatia (Nikolić and Topić ur., 2005) – 1 in the category of endangered species (EN), 6 vulnerable (VU), 5 near threatened (NT), 3 within the category of least concern (LC) and 2 species data deficient (DD). Of these 17, 9 are strictly protected, and 6 protected by Regulation proclaiming wild species protected and strictly protected (NN 99/09). Since this is mainly reconstruction of an existing facility, and by abiding by appropriate precautions, no negative impacts are expected on populations of rare and protected plant species during various project phases.

Endangered and rare habitat types

Within the project area and project impact zone, 7 types of rare and endangered habitats important for Croatian ecological network have been recorded. These are: permanent stagnant water habitats (A.1.1.); free-floating hydrophytic vegetation with duckweed (*Lemna)* (habitat type code A.3.2.1., Class *Lemnetea*); rooted hydrophytic vegetation (A.3.3., Order *Potamogetonetalia*), growths with common reed, cattail and tall sedges (A.4.1., Class *Phragmiti-Magnocaricetea*), Central European mesophilic meadows (C.2.3., Order *Arrhenatheretalia*), mixed oak-hornbeam and pure hornbeam forests (E.3.1.) Central European acidophilous forests with sessile oak and silver birch (E.3.2.).

The listed habitats are distributed fragmentarily at the location and are mainly degraded by long term anthropogenic impacts. Furthermore, very small areas may be lost, and because of this, the impacts during various project phases are considered acceptable. A somewhat more pronounced negative impact may present itself during accident situations, however since the possibility of these events are minimal, impact is not considered significant.

Rare and protected animal species

Within the wider area of Zaprešić - Zabok railway reconstruction location, 8 endangered species and 21 protected species of mammals, 223 strictly protected and 31 protected species of birds, 7 strictly protected and 3 protected species of reptiles, 8 strictly protected and 8 protected species of amphibians, 3 strictly protected species of insects and one protected species of mollusc have been recorded. The list of strictly protected and protected animal species indicates ecological sensitivity of this area. Amongst the species that may reflect the mentioned negative impacts, and are considered rare and endangered and are protected by Nature Protection Law (NN70/05, NN139/08) are bats (Chiroptera), dormouse (Muscardinus avellanarius, Myoxus glis), buzzard (Pernis apivorus), peregrine falcon (Falco peregrinus), Spotted Eagle (Aquila pomarina), Red Backed Shrike (Lanius collurio), etc. Since impact is temporary and lasts only during the reconstruction period, impact is not considered significant.

Protected areas according to Law on Nature Protection and Physical Plans

Since the project area does not include areas protected by law, there are no impacts on these protected areas during various project phases. Upon review of current physical plans, the railway project area passes through the following areas which have been proposed for protection are protected with regulations from spatial documentation:

Črnec Stream Valley

The Črnec Stream Valley, within the Spatial Plans of Zagreb County, urban spatial plan Zaprešić, was proposed for protection in the category of significant landscape. The railway

crosses the Črnec Stream at approx. km 1+650. At the crossing location there is currently an iron bridge planned to be replaced with a new reinforced-cement bridge.
It is estimated that there will no significant impacts, i.e. significant changes comparing to the current state of the area, since this is reconstruction of an existing railway that has been integrated into the surrounding landscape through decades.

Krapina River Valley
Krapina River Valley, within the Spatial Plans of Zagreb County has been recognized as a particularly significant area – natural landscape. Within the framework of the Spatial plan for the City of Zaprešić, the Krapina River Valley has been recognized as a significant landscape area, or category II cultural landscape. Also, in the urban spatial plan of Zaprešić this area has been recognized as immobile cultural heritage, valued under as category II landscape (of regional significance).

Possible impacts during construction and usage of the railway (vegetation removal, visual exposure, new area repurposing, etc.) will not be significant, since they are of a temporary nature or are of small areas. Other than that, the project area does not contain particular or significant landscape elements; only those characteristic for the Krapina Valley (mosaic various agricultural land, lawns with bushes, and transition areas of underbrush and forests, and a stretch of vegetation along the railway). When considering all elements, it can be concluded that the project when applying proposed measures, will not have significant impact on the area.

Krapinica Inflow
The Krapinica inflow, within the Spatial plan for the City of Zabok is recognized as a particularly valuable area – natural landscape. Since the project area does not cross through this particularly significant area of natural landscape, and the right corridor of the railway constitutes a border area, works on formation level expansion planned for this area will cause insignificant changes to the current state.

Ecological network of the Republic of Croatia

According to the database of the State Institute for Nature Protection, the outer modernization and electrification of railway Zabok-Zaprešić project area border, overlap with the area of the Croatian ecological network – and internationally significant area for birds HR1000007 # Croatian Zagorje region. The wider zone of possible area impact has been considered and includes significant areas to wild species and habitats HR2000583 Medvednica, HR2001116 Sava, HR2001121 Sava – Podsused.

Due to project area distance and local and temporary impact during construction and use, no possible individual impacts are expected on conservation i i goals of the area of the ecological network HR2000583 Medvednica, HR2001116 Sava i HR2001121 Sava – Podsused.

Upon analysis of possible project impacts on conservation goals within the area of ecological network HR1000007 Croatian Zagorje region it has been determined that impacts on conservation goals in regards to spatial changes of habitats and changes in habitat conditions during railway reconstruction, i.e. noise occurrence during use and maintenance will be limited mainly to the narrow area along the railway. It is not expected that the described changes will affect significantly habitats which are considered to be favourable for the target species. Therefore it may be concluded that the project will not have significant impact on conservation objectives and integrity of the ecological network.

Upon review of physical plans and analysis of possible project impacts, it has been determined that the planned project will have no significant contribution to collective

impacts of other projects within the area of the ecological network, the main reason being the fact that individual impacts are mainly of a local and/or temporary nature.

Impact on the ecological network is possible only in the event of accidental situations, for example in the case of extremely large fire or emissions of pollution to the environment during construction and railways use, however since the possibility of such events is minimal, impact is not considered significant.

Culrual – historical heritage

In a 250m zone on both sides of the project area, there are a few cultural heritage elements, mainly of local significance and protected by physical plans. On the route or along the route itself are the following cultural heritage locations:

- *historical centar of Zaprešić City* (approx. km 0+650 – 0+900) –cultural heritage of local significance protected under physical planning regulations
- *Pojatno Railway Station Building* (km 7+540,22) – protected based on physical plans, proposed category III protection, as building of local significance.
- *Veliko Trgovišće Railway Station Building* (km 18+429,68) – preventively protected cultural heritage of local significance
- *Zabok Railway Station Building (on stac. 23+859)* - cultural heritage of local significance, protected under physical planning regulations

Since this is reconstruction of an existing railway, when caution is applied during works, no direct or indirect impact to cultural heritage on the route or in its proximity is expected either during construction or during its use.

Landscape characteristics

The existing Zaprešić – Zabok railway stretches along border areas of the Krapina River, by very levelled terrain 0-2° slope (exception for the stretch from Luka to Veliko Trgovišće, where there are somewhat steeper slopes from 2-20°), at above sea levels off approx. 178 m (average height 153m a.s.l.). The area of railway route passing has been totally changed by man. It is mainly covered with agricultural land areas formed around certain villages where it passes through (Novi Dvori, Pojatno, Kupljenovo, Luka, Žeinci, Veliko Trgovišće). Natural landscape elements are represented only by stretches of tall vegetation that have developed along the edges of lots, waterways and railway corridors, and by smaller areas of shrub-like vegetation.

The existing railway is partially in view of nearby villages. However, stretches of tall vegetation have grown along the route and partially hide the route from view and therefore greatly contribute to its removal from surrounding landscape. The existing railway through decades of existence and functionality has integrated into current landscape and has become part of its visual features.

During works, there will be direct but temporary negative impact to natural morphology of terrain that will be modified by formation level expansion of the existing railway (from a current 6 m to 7 m), and by construction of new banks at six locations where there will be axis displacement from the existing railway. For this purpose, surface layers will be removed, including natural vegetation, and also the visual edge that has successfully hidden the tracks at several places up till now and contributed to its visual integrate into the surrounding landscape. Other than this, removal from the existing railway will cause new areas to be repurposed, however these areas are minimal. Due to this, there will be change in visual perception of landscape, however the described impacts will not be

significant, since they are of temporary nature, and since there is no construction of a new railway mainly repair of an existing railway. Other than that, the listed areas do not have particular or significant elements; on the contrary, elements that are frequent and characteristic for the observed area (mosaic various agricultural land, lawns with bushes, and transition areas of underbrush and forests, and a stretch of vegetation along the railway)

The project will cause both direct, positive changes that will occur due to reconstruction of the station and platforms (construction of new platforms, marquees, parking lots, construction of ramps for persons of reduced mobility, light installation and urban equipment) and promote functionality, as well as the entire visual effect of certain train stations.

Noise

During reconstruction of Zaprešić – Varaždin – Čakovec Railway, section: Zaprešić - Zabok there will be additional noise in the environment as a result of construction works. This noise is temporary and ceases upon finalization of construction works, and when applying technical discipline no negative impact to surrounding areas is expected. During repair of the railway, due to increasing the travel speed, there will be higher levels of noise in the surrounding areas. Noise calculations along the railway have been made for foreseen travel in the year 2025, since highest traffic levels are then expected, and calculations are on the safe side. Since the railway already exists, and goes through areas with existing surrounding traffic infrastructure, the noise levels for surrounding areas are observed with consideration to Article 7. Regulation on maximum permissible noise levels in work and living environments (NN 145/04). Therefore, criteria for noise level exposure is observed at night noise levels, that according to the stated Regulation may not exceed the equivalent noise level of 50 dB(A).

Calculations have determined that the railway passes at such a distance from certain inhabited areas that without securing noise barriers the areas would be exposed to noise levels that exceed values determined by regulation. Noise protection will be necessary for the inhabitant areas within the framework of later project phases and solutions. Also, test noise measuring is planned to determine the real state prior to and after protective noise barriers are built, and according to these measurements, noise barrier building phases will be defined.

Waste

Certain types of waste will be produced during preparation works (demolition of existing facilities, terrain cleaning, surface ploughing, etc.) and land works. During construction works that include transport and machinery work, various types of construction waste and other types of waste will be produced (waste oils, packaging, etc.).

During use of the railway, waste will be produced due to regular maintenance activities, i.e. certain types of hazardous and harmless production waste, mainly in minimal quantities, that are removed according to regulations for each type of waste.

A.4 ENVIRONMENTAL PROTECTION MEASURES

A.4.1. Measures for environment protection during project design and preparation

General protection measures

1. Prior to construction start, places for temporary disposal of material and waste, and surfaces for movement and parking of vehicles should be determined, in order to minimize their negative impact on soil, vegetation and animal habitats
2. Organization of construction in the building area of the settlements, high-value agricultural land, forests and groundwater protection zone is forbidden.
3. Project of temporary traffic regulation should be designed

Protection measures of settlements, transport flows and infrastructure

1. On the parts of the alignment where the railway line intersects existing communications which are important for the spatial organization of the settlements, continuity of local roads should be ensured.
   In the areas where the railway line passes through construction areas of settlements or in their immediate vicinity, high vegetation should be planted unless it interferes with signalization.
3. All crossings of the railway line with state and county roads should be executed in two levels in the final solution, and until then the crossings are to be protected with appropriate devices, in accordance with the Programme for Resolution of Level Crossings on HŽ Railway Lines, in accordance with the set dynamics.
4. All cut communications should be dealt with as to maintain transport in operation
5. All infrastructure installations intersecting with the alignment should be protected.

Water protection measures and protection from harmful impact of water

1. Prior to the design of the main project detailed geotechnical exploration works should be performed and technical measures envisaged as to prevent settlement of the railway line (in particular in the section from Veliko Trgovišće to Zabok km 19+100-21+545) and formation of landslide or rock fall (on the section from Luka to Žeinci).
2. In the project documentation the solution for the drainage system should be envisaged through the earth channels and concrete hollow tiles. Installation of standard hollow tiles should be provided for bilaterally in the cuttings and at the embankment toe on the horizontal terrain and unilaterally on inclined terrains.
3. Through construction of the appropriate number of water facilities the free surface flow of the waters in the drainage basin of the intervention should be enabled.
4. In all stations drainage lines with installed drainage pipes for the drainage of the rainfall should be installed. In the lines manholes for inspection and cleaning of drainage pipes should be installed.
5. Rainfall drainage of the parking lots in the stations should be executed through the system for the rainfall drainage and through the purification in the separator before release in the surrounding soil.
6. The railway line design should provide for the lining of the basin under the objects (bridges and culverts) in the required length upstream and downstream from the edge of the objects.

7. With the technical solution of culverts and objects the backfilling of the watercourse channels with the ballast bed material from the railway line during its maintenance should be prevented.
8. Projects of the new redirection roads should be harmonized with existing water-related economy projects on the observed area.
9. Locations for the temporary disposal of excavation material will be determined in agreement with the local self-government unit.

Noise protection measures

1. Settlements should be protected from noise through application of active and passive measures. In the later phases of the design of project documentation, based on more detailed project databases, calculations of noise for legally built houses which are situated on locations threatened by noise should be made. For these locations the noise protection design should be prepared.

A.4.2. Environment protection measures during construction

General protection measures

1. Existing path network should be used to the greatest possible extent, and the new paths should be formed only when it is unavoidable. It is also necessary to ensure undisturbed drainage of the paths along the railway line.
2. During execution of railway line construction works care should be taken that cables and utility and infrastructure lines, which are laid along or across the railway line, are not damaged. Prior to start of the terrain earth works, sounding should be performed and alignments of all crossings of cables with the track and objects of longitudinal drainage marked (ditches, drainages).
3. During execution of works the stability of public roads, the existing drainage regime of the rainfall, seepage water and groundwater on the public road must not be jeopardized, road objects and equipment damaged, and safety of passengers in traffic on the public road threatened.
4. Damaged paths after the completion of works should be rehabilitated.
5. Undisturbed operation of the station and railway protection equipment must be ensured, until the future signalling and interlocking and telecommunication equipment are not put into operation.
6. After the construction, the existing railway line should be dismounted in places of shifting and the terrain should be restored to the previous condition.

Water protection measures and protection from harmful impact of waters

1. The Operational plan for implementation of measures for prevention of spreading and for cleaning of sudden water pollution
2. Works using the mechanical plants should be executed with due caution, and in case of incidents the measures from the Operational plan for implementation of measures for prevention of spreading and for cleaning of sudden water pollution are to be taken
3. During reconstruction of the railway line in the area of the construction site it is forbidden to deposit dangerous substances and materials, oils, fuel, lubricants and similar.
4. Parking space for vehicles and construction machines should be adapted in the manner that the base is impermeable and surface water are to be passed through the oil and fat separator before being released into the surrounding soil.

5. For sanitary waste waters during construction due disposal should be ensured through mobile toilet facilities.
6. Execution of works on the railway line reconstruction must not reduce the permeability of the water course beds, or cause their erosion.
7. Movement of heavy mechanical plants across the inundation belt of the river Krapina and in other areas of the public water good is to be limited.
8. Free passage for machines and people who work on maintenance of river Krapina and other water courses intersected by the railway line should be enabled.
9. Existing and required new channels should be executed in the manner that they perform the function of drainage of the terrain in the back of the riverbank in the vicinity of the railway line
10. Level lines of the new channels required for drainage of the railway line or redirection roads should be selected in the way that acceptance of all waters from the melioration channels, cut by the railway line construction, is ensured.
10. Proper functioning of the existing drainage of the track formation (free flow of water along all channels which form the part of the railway line or are in its vicinity) during all phases of railway line construction. Channels for drainage of the rainfall should be continually cleaned and inspected during railway line construction, but also during railway line operation.
12. After the executed works the contractor of the works is obliged to restore the area into its previous condition.
13. Other measures in accordance with water management conditions are to be implemented.

Soil protection measures

1. During execution of earth works the topsoil layer is to be stockpiled and after the conclusion of works returned as the top layer during rehabilitation.
2. Free communication among the agricultural surfaces must be ensured.
3. Waste should be regularly disposed of by the authorised waste collector.

Protection measures of the forest ecosystems

1. Highly combustible materials must be manipulated with carefully to avoid fire.

Protection measures of the living communities

1. Prevent unnecessary damage of the trees, tree tops and root systems of the woody plants along railway line alignment.
2. Exert as little impact as possible on the area outside the limited belt of the railway line alignment. The movement of the heavy mechanical plants should be limited in order to reduce the size of the area devastated by the works.
3. Crossings over the watercourses should be executed during favourable hydrological circumstances (low water level) in order to reduce the negative impact on the living communities.

Noise protection measures

1. Works should be executed only during the day. Only when it is necessary works may be executed during evening or night hours.

Air protection measures

1. Manipulative surfaces and transport paths in the vicinity of the residential facilities during dry season (in case of intensive dust) should be poured with water. Wheels of the freight vehicles should be washed when leaving the construction site.
2. Bulk freight (construction and earthen material) should be transported in appropriate vehicles and during transport covered with protective blanket to prevent spreading of dust.

Measures for disposal of waste

1. All removed track material which is still usable should be used for the reconstruction of other railway line.
2. Waste should be sorted out on the spot where it was generated. It should be collected separately by the type. The conditions for its storage should be ensured, in order to preserve the quality and to enable its re-use.

A.4.3. Environment protection measures during operation

General protection measures

1. During the railway line maintenance only agents with water management permits for the chemicals which get into waters should be used.

Water protection measures and measures for protection from harmful impact of waters

1. Plan of interventions in case on incidental situations during transport of dangerous substances should be drafted, in order to reduce the risk of soil and water pollution and to minimize the possible consequences.
2. Objects where railway line crosses the water goods should be maintained in the manner to prevent their retention of water, which could threaten their stability and functionality.

Noise protection measures

1. When measurements show that it is necessary, active and possible noise protection measures should be applied, according to the budgets made in the project of noise protection.

A.5 PROGRAMME OF MONITORING

Monitoring of the living communities

1. Once a year (in late summer or autumn) the monitoring of the spread of the plant species along the railway line should be conducted. Invasive species (Ambrosia artemisiifolia) are to be regularly removed.

Noise monitoring

1. After the realisation of the intervention, during the first year control measurements of noise should be conducted on characteristic spots (spots most threatened by

noise) in settlements Zaprešić, Pojatno, Kupljenovo, Žeinci, Veliko Trgovište and Zabok. Measurements are to be repeated every three years.