

#### **2.2.5.1.2. Pollution sources**

There are no significant sources of biodiversity pollution in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției.

#### **2.2.5.1.3. Evolution forecast**

In case of non-implementation of the plan "Bridge over Tisa in Teplița area in Sighetu Marmăției" the evolution of the environmental factor biodiversity would be linear, there would be no significant changes compared to the current situation. Neither implementation of the plan will have a significant impact on flora.

#### **2.2.5.2 Fauna**

##### **2.2.5.2.1 General characterization**

On the Romanian bank of the Tisa river the works will be carried out within the overlapped territories of the site of community importance ROSCI0251 Tisa Superioră and of the special bird protection area ROSPA0143 Tisa Superioară.

Forwards will be carried out the analysis **of the species of community interest for whose protection the two natural protected areas have been designated from the biology / ecology perspective as a potential presence in the territory proposed for the bridge over the Tisa River and for the connecting road.**

- ❖ **Presence of the species for whose protection has been designated the ROSCI0251 Tisa Superioară**

- ✚ **Mammals species**

- **1355 *Lutra lutra* – European otter**

The European otter is a characteristic species to the wooded shores of lakes, ponds, rivers and any watercourses, which is widespread throughout the country. The feeding habitat is very large, being present in areas where fish are abundant.

European otter monitoring it is based both on direct observation and identification of the otter tracks (footprints on the riverbanks, in silt, mud, sand or snow, feeding traces, turd, anal jelly) and the otter gallery.

The galleries are carved in the riverbanks deeply imbedded by the trees roots.

The European otter it is a territorial animal that frequently mark their territory. The faeces withstand long time in the periods without rainfall, thus they are a good indicator for the presence of European otters. Also, another indicator of the otter presence it is represented by the otter debris: amphibians, fish skeleton.

The location of the bridge over the Tisa it is not used by otters, that so have not been observed otter specimens or traces left by the otter (tracks on soil or sand tracks, droppings, jelly anal). Also, there are no other galleries.

The otter specimens can appear in the location of the bridge over Tisa in Teplita area only in search of food, but will not be affected in any way by the construction and operation of the bridge because the construction works will not be carried out in the Tisa minor riverbed.

 **Amphibians and reptiles species**

➤ ***Bombina variegata* - Yellow-bellied Toad**

The yellow-bellied toad lives preferably in swamps, in stagnant waters, appearing on the shores during morning and evening. In October – November are hiding in mud or buried in the ground for winter.

Almost any water body within the area is populated by the species that can achieve impressive agglomeration of individuals in small puddles. Can withstand in very polluted ecosystems.

Can move well on dry land and can quickly colonize new ponds appeared. It is among the first amphibian species occupying areas damaged by human activities (deforestation, road construction, etc.) where are formed temporary pools. Can occupy any water body, mostly temporary pools, it is able to reproduce even in subsided of soils containing one liter of water. It is found almost everywhere where he finds a minimum of moisture from 150 m to almost 2000 m. Deposits the eggs in May and even twice a year. Eggs are grouped in small piles on the bottom or stuck on plants. The larvae metamorphose in autumn (September).

The yellow-bellied toad specimens lives more on land, from 400 m altitude upwards, but can be found even on high valleys of mountains up to 1500 m. The food consists of aquatic animals, but also from terrestrial insects.

The species is present in the plan area, having favorable and available habitats. Have been forecasted the presence of dozens of individuals in the plan area. Site-wide population is not significant, but locally is an important gene pool.

The risks of this plan for the species are present both during execution of the works, but even after its completion. Through its biology, the species rapidly colonize any slop or water eye, even artificially created. Pits, excavations, trenches generated by machinery wheels can generate false habitats for submitting the eggs and taking the fauna specimens. In order to avoid such losses are required special measures for training the constructor employees and periodic inspection of the plan location in order to relocate the specimens that could get accidentally in the working fronts. In order to reduce the potential impact on this species, construction works will not be carried out in March-April period (the breeding season for this species), that so the impact on this species will be reduced / insignificant.

➤ ***Emys orbicularis* – European pond turtle**

It is a species characteristic to muddy stagnant waters and of those with slow course. It is a common species in Romanian fauna. The appropriate habitat for European pond turtle it is represented by isolate area, out of human reach, semi-aquatic micro-habitats (prefers a water level below 1 m) with reeds, swamp, but at the same time opened for effective thermo-regulation. European pond turtle specimens migrates, the males looking for partners even in nearby water bodies, and females leave the water for oviposition. A European pond turtle population can be considered viable on long-term (up to 100 years), if the adult number at balance sex ratio (male = female) exceeds 50 specimens. This is possible only if they are protected in used habitats: aquatic and terrestrial habitats. Protection of the areas for oviposition it is very important for this species protection. Design turtles corridors it is very important in the areas where the roads segment the turtle habitats.

The diet of these frogs consists in: crustaceans, terrestrial invertebrates, rodents, even young birds, fish, insects, worms and rarely, some plant components. This species overwinters in the bottom waters, starting in late

autumn until early April. In late May or early June, the female lays 3-16 eggs the size of pigeon egg, usually on the shore, a short distance from the water surface.

The location of the bridge over Tisa is very anthropic to be favorable to a population sufficiently numerous of turtles. The existence of this species is unlikely in the plan site. The impact on species will be: non-existent.

➤ ***Triturus cristatus* – Northern crested newt**

It is a predominantly aquatic species, which prefers stagnant waters, large and deep, with paludous vegetation. It can also be frequent in artificial ponds (watering places, ponds, swimming pools), and in terrestrial periods prefers wet meadows. This species could not reproduce in small temporary pools due their dimensions. .

The Northern crested newt enters in water in March and, depending on its level, can remain until May or June. It reproduces in April-May in ponds and puddles. Although deposit many eggs (over 100), many do not develop due to frequent chromosomal mutations. After 13 days, the larvae hatch the eggs and remain in the water three months, reaching 50-85 mm. By winter, the adults and youth retreat under rocks, roots and tree bark. It is an extremely voracious species which consume earthworms, slugs, arthropods, tadpoles and smaller newts (especially *T. vulgaris*). It has many enemies: fish, turtles, birds. On land, can be found in water boundaries. Despite the large size, can move quickly, both in aquatic and terrestrial environment. It is a vulnerable species, even jeopardized in certain areas.

Decrease of breeding areas has affected a lot this species, more demanding than other species of newts. It is a predominantly aquatic species, preferring large stagnant waters, with palustre vegetation. Often could be identified in artificial ponds (watering places, ponds, swimming pools). It is found at altitudes between 100 -1000 m.

Even if in the evaluation period, the species has not been observed on the plan location, its environmental requirements are provided by habitats conformation. We estimate that on the bridge location could be present dozens of newts specimens. In order to eliminate the potential impact on this species, the construction works will not be carried out in the breeding season of this species (April-May) and the personnel of the constructor will be trained to protect this species (especially for relocating adults and clutches from watering holes accidentally occurring in the plan area), the potential impact on species will be low / insignificant.

 **Fish species**

➤ ***Aspius aspius* – asp**

It is a common species that can be found in all freshwater, in large rivers and lakes, in plains areas, in deep waters, with sand, clay or gravel substrate. It hunts only at water surface and only during the day, especially in sunrise and sunset, smaller fish, it prefers common bleak.

The species have not been identified in the location of the bridge over Tisa in Teplița area in Sighetul Marmăției and it is improbable their presence in plan location during construction and operation of the bridge. The impact on the species will be: insignificant.

➤ ***Barbus meridionalis* – Mediterranean barbel**

It is species that could be often observed in the upper and middle courses of mountain rivers, with a good oxygenation of the water, wherein the substrate is wide. Live even in muddy streams, but prefer habitats with strong current and rocky substrate.

His food consists mainly of aquatic insect larvae, worms, small crustaceans and plant debris. Oviposition later than big barbel in the banks without climb up the water course, forms only small groups.

Her presence in Tisa in the construction area of the bridge is possible, its environmental requirements being covered by habitat, but because the construction works will not be carried out in riverbed, the potential impact on species will be very low to non-existent.

➤ ***Eudontomyzon danfordi* – Carpathian brook lamprey**

The Carpathian brook lamprey it is a species that can be found in mountain rivers, especially in the area with Brown trout, Grayling and Romanian barbell, rarely can be seen in some trout plants or reservoirs.

It prefers habitats with soft water, well oxygenated and muddy substrate.

The Carpathian brook lamprey reproduce in April - May, migrate upstream during spawning. Females lay 2000 - 3000 eggs, most of which die. The larvae have worm form and live buried in mud, like adults, feeding on small animals and organic debris. Adult phase ends after 17-21 months.

The species has not been observed on the river sector within will be build the bridge over Tisa in Teplița area because the habitats identified in the bridge site does not comply the characteristic habitat requirements of this species. The impact on this species will be: non-existent.

➤ ***Hucho hucho* – Danube salmon**

The Danube salmon is a freshwater species, which lives in mountain rivers with deep water and strong current among the boulders at the waters bottom or below the ravine banks.

It reproduces in spring in late March or April, after melting the ice floes and the water temperature fluctuates between 5 and 10 °C. Once the female has migrated to the spawning are, sets up a nest in the stream riverbed, in valve form, where submit 5.000-12.000 eggs with a diameter of 4.8 - 6 mm.

It feeds on fish, preferring European bullhead, European chub, Mediterranean barbel, Common nase, Bleak, Stone loach, etc., as well as frogs, mice, rats and waterfowl. It can be found in areas where the current is variable, but greater water depth, lowering downstream, with weight increase. During the day rests in deeper holes and is very active during the night. It is a solitary fish, rapacious predator, which could attack even specimens of the same species.

The species was not found in the river section proposed for construction of the bridge over Tisa, but its presence is not excluded, being a very mobile fish and very hard to be observed. Despite the fact that it is possible the presence of the species in the plan area, because the construction works will not be carried out in Tisa minor riverbed, will not be registered any impact form on this species.

➤ ***Leuciscus souffia* – vairone**

The vairone is a widespread species in Romanian rivers, from the Brown Trout area until the Danube, in places with moderate – fast waters, sometimes rapids in areas with sandy, stony or clay substrate. The vairone does not live in stagnant waters or in very slow lateral sidearms. Live solitary or in small groups, in dark places.

It is a predatory fish with a varied diet: insects, fish, frogs, mice, crayfish, worms, beetles, plant. It reproduces in April-May, when moves towards shallow waters with sandy substrate or fine silt.

Its presence in the section designed to bridge construction is very likely, but because the construction works will not be carried out in minor riverbed of the Tisa river, will not be registered any impact form on this species.

➤ ***Cottus gobio* – bulhead**

It is a species that can be found exclusively in cold mountain freshwater, generally in rivers and streams, rarely in mountain lakes. It sits under rocks in places with waters not very deep and relatively slow, often to the shore or sidearms. It feeds on insect larvae, water snails, spawn, frog eggs and especially trout roe. Reproduction takes place from February to April, after internal fertilization. Females lay eggs in holes dug under the rocks by the males which guard them until they hatch.

The bulhead has not been seen in the location of the bridge over Tisa in Teplița area because the habitats identified in the bridge location does not accomplish the habitat requirements specific of this species.

➤ ***Sabanejewia aurata* – Golden Spined Loach**

It is a reofil benthic freshwater fish spread to the middle and lower Danube and lower courses of its tributaries. Live on the sandy and rocky substrate, in deep lowland rivers. It feeds on diatoms and benthic invertebrates, small insects and insect larvae, worms, small crustaceans and molluscs.

It reproduces in the period April-June, some specimens ingress from Danube in lower rivers. The eggs adhere to aquatic vegetation or other substrate elements. A female lays several hundred eggs per season.

The species has not been found in the location of the bridge over Tisa, but his presence in the section designed to construction of the bridge is very likely. Despite that, due the fact that the construction works will not be carried out in minor riverbed of Tisa river, will not be registered any form of impact on this species.

➤ ***Gymnocephalus schraetzer* – schraetzer**

It is a species that can be encountered frequently on Danube course and rarely on the rivers in the west of the country and is characteristic of rivers, large rivers with moderate currents and good oxygenation, with rocky or sandy substrate. It feeds on worms, amphipods, insect larvae, fish eggs. It reproduce in April – May period. The eggs are attached to stones in wide strips.

The Schraetzer has not been seen in the location of the bridge over Tisa in Teplița area because the habitats identified in the bridge location do not accomplish the habitat requirements specific to this species.

➤ **Zingel streber – Danube streber**

The Danube streber it is a benthic fish, small, living in clear waters, on substrates, with gravel or clay from Danube Basin, being a widespread species.

The Danube streber has not been found in the location of the bridge over Tisa, but his presence in the section designed to construction of the bridge it is very likely. Despite that, because the construction works will not be carried out in Tisa minor riverbed, will not be registered any impact on this species.

➤ **Zingel zingel - common zingel**

The common zingel it is a reophile species that prefers large rivers and relatively deep, sandy bottom, gravel or clay, during floods could penetrate even in ponds. It is an endemic species in the Danube basin, can climb up almost to the middle course of the river.

It feeds on insect larvae, fish eggs and spawn.

It reproduces in April – May period, the females depositing the eggs on rocky substrates.

The species has not been identified in the location of the bridge over Tisa, but his presence in the section designed to construction of the bridge is very likely. Despite that, because the construction works will not be carried out in the minor riverbed of Tisa river, will not be registered any impact on this species.

Due the fact that the plan does not provides construction works in the minor riverbed and will be taken measures to prevent the water pollution by spills, crossings with equipment, will not be affected the qualitative parameters of the river and ichthyofauna populations will not be affected.

➤ **Gobio kessleri – Kessler's Gudgeon**

The kessler's Gudgeon lives in the middle course of the large rivers, from the lower part of the Common nase area to the Common carp area and in some small rivers in the lowlands in the European Chub area, in areas where the water velocity is 45-65 cm / s, rarely up to 90 cm / s, especially in lowland rivers, on shallow sectors, with sandy bottom.

The Kessler's Gudgeon has not been identified in the location of the site of the bridge over Tisa in Teplița area in Sighetu Marmăției due the fact that the habitats identified in the bridge location does not accomplish the specific habitat requirements of this species.

❖ **Presence and effective / areas covered by bird species for which protection has been designed ROSPA0143 Tisa superioară**

The presence of some species in one location is determined both by the habitats characteristics and habitat requirements for each species, both by the availability of food resources. Below are presented the data about the habitats specifics for bird species for whose protection has been designated ROSPA0143 Tisa Superioară and if those species have been identified in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției. The relevancy of the site for each species for whose protection has been designated ROSPA0143 Tisa Superioară is presented in table 13. The species mentioned in Natura 2000 standard form and identified in the location of the bridge over Tisa have been observed only in search of food or in migration. On the location of the bridge have not

been observed nests of these birds (except the nests of the white stork observed on the detachment area from DN 18) or juvenile of these birds species.

The estimated number of each species and prediction about population trends on the location will be presented unitary in table 4.

**Bird species listed in Annex I of the Council Directive 2009/147 / EC and mentioned in Natura 2000 standard form of ROSPA0143 Tisa Superioară**

➤ ***Lanius minor* - Lesser Grey Shrike**

It is a species characteristic of open agricultural areas with bushes and isolated trees. It can be observed frequently in the lurking places that offer good visibility, with a height of up to 6 m or sitting on wires crossing characteristic habitats.

The lesser grey shrike specimens have been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmatei, in search of food. Since the species has high mobility, the specimens will withdraw in nearby similar habitats, that so, will be registered a diminished / insignificant impact on the species.

➤ ***Nycticorax nycticorax* - Night Heron**

It can be observed in a wide range of wetlands, such as lakes with paludous vegetation, larges waters streams, ponds, canals with vegetation and shallow water, ponds, especially at the edge of water bodies in areas where it is present paludous rich vegetation.

Builds its nest exclusively in trees, trees or bushes of willow, in floodplain forests, poplar plantations or willows in reeds.

The Night Heron specimens has not been seen in the location of the bridge over Tisa in Teplița area in Sighetu Marmatei, because the habitats identified in the location of the bridge does not accomplish the specific habitat requirements of this species, that so the impact on this species will be: non-existent.

➤ ***Pernis apivorus* – European Honey – buzzard**

The European Honey – buzzard is a characteristic species of deciduous forests with glades, where soils are light and dry, that so they can easily dig for food. The specimens use updrafts streams to soar.

The species has not been seen in the location of the bridge over Tisa in Teplița area in Sighetu Marmatei, because the habitats identified in the location of the bridge do not accomplish the specific habitats requirements of this species, that so the impact on this species will be: non-existent.

➤ ***Picus canus* – Grey – faced woodpecker**

It is a characteristic species of deciduous forests of hilly and mountainous regions, could be observed frequently in the beech and oak forest, more rarely in larch forests. It nests near streams, in floodplain forests or wooded pastures.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmatei, because the habitats identified in the location of the bridge do not accomplish the specific habitat

requirements of this species, that so impact on this species will be: non-existent.

➤ ***Porzana parva* – little crane**

It is a species characteristic of eutrophic lakes, freshwater, natural or semi-natural, slow flowing or stagnant waters that have a lot of vegetation (reeds or rushes). Outside the nesting period can be observed in paddy fields, flooded meadows, marshes and ponds rich in vegetation, and during migration in a wider range of habitats.

The species has not been seen in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because the habitats identified in the bridge location do not accomplish the specific habitat requirements of this species, that so the impact on this species will be: non-existent.

➤ ***Porzana porzana* – Spotted crane**

Spotted crane is a characteristic species of wetland, swamp, rich in vegetation. It nests in shallow habitats with waters depth less than 15 cm, but it feeds in habitats where water is less than 7 cm, with low vegetation and bushes, where the invertebrates are numerous. Both during breeding and wintering periods could be observed on wet meadows, at the edges of drainage ditches, ponds, grassy edges of lakes and slow flowing rivers.

The species has not been observed on the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, due the fact that the habitats identified in the location of the bridge do not accomplish the specific habitat requirements of this species, that so the impact on this species will be: non-existent.

➤ ***Sterna hirundo* – Common tern**

It is a characteristic species of coastal wetlands, and inland freshwater lakes. Frequently nests on sandy beaches or islands, dunes, ponds inside, less on plant debris or on floating vegetation.

The species has not been observed on the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because strictly in the bridge location does not exist the habitats characteristic of this species, that so the impact registered on this species will be: low to non-existent.

➤ ***Strix uralensis* – Ural owl**

It is a characteristic species of deciduous and mixed forests, which have opened large areas. It is a predominantly sedentary species that during winter can be observed in the vicinity of villages and parks in search of food.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because the habitats identified in the location of the bridge do not accomplish the specific habitat requirements of this species. Species may occur accidentally in the plan location, so that the registered impact will be: low to non-existent.

➤ ***Alcedo atthis* – common kingfisher**

It nests in the vicinity of stagnant or slow flowing water, with small fish and enough places to wait, preferring streams, small rivers and channels with steep and sandy shores where they dig the nest. During reproduction prefer fresh water to salt water or brackish.

Although the species is present along the Tisa, have not been observed nests or adult specimens on the bridge location, that so the recorded impact will be: low to nonexistent.

The species has not been observed on the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because the habitats identified in the bridge location do not accomplish the specific habitat requirements of this species.

➤ ***Asio flammeus* – Short-eared owl**

It is a species that can be observed in a wide range of habitats, being more common in agricultural areas, on lands with herbaceous vegetation or in areas with reeds and rush. It nests on the ground, in marshy areas or derelict, at the edge of meadows or open boreal forests.

The habitats of the bridge location and the surrounding area accomplish the species requirements. Have not been observed specimens or nest, but its presence is not excluded. However if Short-eared owl specimens will be present in the plan area, they will be able to withdraw in similar habitats in the vicinity, being very mobile specimens. The recorded impact on the species will be: low to non-existent.

➤ ***Aythya nyroca* - ferrous duck**

The species could be observed in a wide range of habitats, prefers shallow water (30-100 cm), with pools of water left vacant in dense reed. In the breeding season can be found frequently in the vicinity of plains lakes with abundant submerged vegetation and dense emerging paludous vegetation (reed, rush and willow).

The species is present along the Tisa, but have not been observed specimens or nests in the location of the bridge and the connection road, so that the recorded impact on species will be: low to non-existent.

➤ ***Aquila clanga* – greater spotted eagle**

The Greater spotted eagle is a species characteristic to wooded areas with low altitude, located near wetlands. It can be observed in all seasons in the vicinity of water or wetlands, even in the vicinity of anthropogenic areas.

The plan location does not present the habitats typical for this species, so that the impact registered on the species will be: non-existent.

➤ ***Aquila pomarina* - Lesser Spotted Eagle**

The Lesser Spotted Eagle is a species characteristic to wooded areas near open territories such as grasslands, farmland and wet meadows.

The Lesser Spotted Eagle doesn't have nests in the area analyzed area either in the surrounding of the plan area. Although it was not noticed any hovering specimen, it is likely that the territory to be used occasionally as a

feeding area, but the eagle control more extensive surfaces, so that it could be accidentally encountered over the territory. Because the species is highly mobile, the impact on the species will be: low to non-existent.

➤ ***Ardea purpurea* – Purple heron**

The species can be observed frequently in ponds, lakes or ponds with rich paludous vegetation, in areas with reed, where the water is shallow and permanent.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because it has different habitat requirements than those offered by the Tisa grove in the reference area. The impact on species will be: non-existent.

➤ ***Bubo bubo* – Eurasian eagle owl**

The Eurasian eagle owl it is the largest species of night raptors and can be seen in wooded areas, where there exist rocks.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, due the fact that the habitats identified in the bridge location do not accomplish the specific habitat requirements of this species, that so the impact will be: non-existent.

➤ ***Bonasa bonasia* – Hazel Grouse**

It is a characteristic species of coniferous and mixed forests, rich in fruit-producing bushes, in berry shapes, but also in large clearings with bushes. It can be observed especially on slopes with southern exposure, warm, near springs and streams and lush vegetation with a vegetable mosaic as varied. Avoid uniform monocultures, the circulated forests or forests without undergrowth. Open lands, wider than 200-400 m or pure coniferous forests constitute a barrier to the species spread.

The species has not been observed on the location of the bridge over Tisa in Teplița area, due the fact that the habitats identified in the bridge location do not accomplish the specific habitat requirements of this species, that so the impact registered on the species will be: non-existent.

➤ ***Botaurus stellaris* - Eurasian Bittern**

It is a more restrictive species in terms of habitat conditions. Can be observed in low marshes, quiet, around lakes and rivers at elevations below 200 m, with reed flooded, where the water depth is less than 30 cm and with fewer fluctuations in water. The water must have a low acidity and the nesting grounds are surrounded by open and covered areas of deeper water.

The bridge location does not provide full conditions for this species and its presence has not been highlighted and is very unlikely, so that the registered impact on the species will be: non-existent.

➤ ***Ciconia ciconia* – white stork**

The White Stork is a species characteristic of wet grasslands and wetlands. It can be observed in most localities of the country, except mountain.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, in search of food or in the vicinity of the Teplița Lake. Also, have been observed nests of this species in the vicinity of the detachment area from DN 18.

The impact on species will be very low to non-existent due the fact that the construction works are punctual, the Tisa floodplain is extensive and offers enough feeding habitats and the white stork populations are in numerical growth and are not threatened at present.

➤ ***Ciconia nigra* - Black Stork**

The Black Stork is a species characteristic of lowland forests and hills which have in their boundaries wetlands. It nests in forested areas.

The Black Stork specimens have nor been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, due the fact that there are no characteristic habitats. Have not been observed specimens or nest of Black stork.

➤ ***Circus aeruginosus* – Western Marsh – harrier**

The Western Marsh Harrier is a species that use for nesting wetlands with extensive reed, rarely in crops. It feeds commonly in wetlands and farmland.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției. The surrounding lands on the bridge location could be used like feeding area, but being a top predator that controls large territories in search of food will not be affected by construction of the bridge. The impact recorded on species will be: low to non-existent.

➤ ***Circus cyaneus* – Hen harrier**

The Hen harrier is a species characteristic of open areas, pastures, marshes and agricultural areas. Overnight in trees or on the ground. It nests on the ground near water. Outside the nesting period sometimes gather to overnight in large numbers.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției. Specimens of this species can arise in the area of interest, flying over fields in search of food. In the bridge location does not exist nests of this species. Due the fact that controls large territories in search of food will not be affected by the bridge construction, the impact on the species will be very low to non-existent, due the fact that the habitats identified in the bridge location do not accomplish the habitat requirements of this species.

➤ ***Caprimulgus europaeus* – European nightjar**

The European nightjar is a characteristic species to meadows or pastures where exist secular trees. It is difficult to observe because due the gray-brown plumage could be confused with a stump or tree bark when resting in trees.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because the reference area does not represent characteristic habitat for this species. The impact registered on species will be: non-existent.

➤ ***Crex crex* - corncrake**

It is a species characteristic to lowlands, pastures and meadows as wetlands, and agricultural crops (cereals, peas, rape, clover, potatoes).

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, but may accidentally occur in the bridge location. Bridge perimeter is very narrow, and any specimens at most one or two can be easily relocated, the impact on the species will be: low to non-existent.

➤ ***Dendrocopos medius* – Middle spotted woodpecker**

Is a species characteristic of oak mature forests, but also in larger parks or wooded grassland. The presence of the species is independent of land slope, humidity or boundaries of water courses. The species lives in mixed forests with oak, ash, beech, even spruce.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției in search of food. Because the plan location does not exist nests of this species and the woodpecker specimens have high mobility, the impact recorded on the species will be: low to non-existent.

➤ ***Dryocopus martius* - Black Woodpecker**

It nests in the mountain forests, prefers old and tall trunks of the aged forest on climax stage of plant succession. It can be observed frequently in more rare forests, but even in isolated trees bunches.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because the habitats identified in the bridge location do not accomplish the specific habitats requirements of this species, the impact on the species will be: non-existent.

➤ ***Egretta alba* – Great egret**

It is a species characteristic to reed wetlands, flooded meadows, canals, ponds, etc. It feeds in shallow waters in flooded areas with abundant vegetation, swamps, on the water banks, on banks of water channels.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției in search of food and in the vicinity of Teplița Lake. Because in the plan location does not exist nests of this species and specimens have high mobility, the impact recorded on the species will be: low to non-existent.

➤ ***Ficedula albicollis* - Collared Flycatcher**

Collared Flycatcher is a species characteristic to small deciduous forests. Can nestle even in localities, in parks, orchards and gardens.

The species has been observed in the vicinity of Teplița Lake. Because in the plan location does not exist nests of this species and the specimens have high mobility, the impact recorded on the species will be: low to non-existent.

➤ ***Ficedula parva* – Red-breasted Flycatcher**

The Red-breasted Flycatcher is a species characteristic to forests over 100 years old, who have a large amount of dead wood and a smaller shrubs layer. It can be seen in deciduous or mixed forests, in shady areas, less humid. It is difficult to observe due its behavior rather withdrawn.

The species was observed in the vicinity of Teplița lake. Because in the plan location does not exist nests of this species and the specimens have high mobility, the impact recorded on the species will be: low to non-existent.

➤ ***Gavia arctica* – Arctic loon**

It is an aquatic species that nests on inland lakes and marine bays, which does not manifest tides.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because the habitats identified in the bridge location do not accomplish the specific habitat requirements of this species, the impact on the species will be: non-existent.

➤ ***Grus grus* – Common crane**

The Common crane is a species characteristic of wetlands with shallow water (20-40 cm) and marshes, wet meadows, floodplain forests, rivers and shallow lakes. Migrate in numerous flocks, at high altitude, "V" formation or slash.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because the habitats identified in the bridge do not accomplish the specific habitat requirements of this species, the impact recorded on the species will be: non-existent.

➤ ***Ixobrychus minutus* – Common little Bittern**

It is a characteristic species to wetland, with reed and surface waters, especially in areas with more aquatic vegetation such as reeds, *Typha* sp., eed, *Phragmites* sp., or any other dense aquatic vegetation, which forms compact clumps. It can also be seen at the edges of lakes, ponds, riparian edges of rivers where woody vegetation predominates.

The species has been observed in the vicinity of Teplița Lake. Because in the plan location does not exist nests of this species and the specimens have high mobility, the impact recorded on the species will be: low to non-existent.

➤ ***Lanius collurio* – Red backed shrike**

It is a characteristic species of open grassland agricultural areas with many bushes and brakes, that could be found at altitudes up to 1,700 m.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmatiei in search of food, but because they have high mobility will move in similar habitats in the vicinity of the plan site, the impact recorded on the species will be reduced.

**Species with regular migratory bird not listed in Annex I of the Council Directive 2009/147 / EC and listed in Natura 2000 standard form of the ROSPA0143 Tisa Superioară**

➤ ***Anser fabalis* – Bean goose**

It nests near lakes, lagoons, ponds and rivers in the Arctic tundra or taiga zone. Winter can be seen frequently in the marshes, farmland, meadows with short vegetation, floodplains, rivers and shallow coastal areas.

The species has not been seen in the location of the bridge over Tisa in Teplița area in Sighetu Marmatiei, because the habitats identified in the bridge location do not accomplish the specific habitat requirements of this species, the impact on the species will be: non-existent.

➤ ***Aythya ferina* – Common Pochard**

It is a species that can be found in a wide range of habitats, showing preference for fresh or brackish lakes at least several hectares, with 1.5 – 2 m depth, with sub-emergent abundant vegetation, which are surrounded by dense areas of reed. In winter and migration can also be seen on reservoirs, marine waters etc.

The species has not been observed in the location of the bridge over Tisa in Teplița area because the habitats identified in the bridge location does not accomplish the specific habitat requirements of this species, the impact on the species will be: non-existent.

➤ ***Anser anser* – Greylag goose**

During the nesting period can be observed in aquatic habitats surrounded by vegetation located in open fields, meadows and marshes. It nests near water courses, wetlands, flood plains, aquatic areas with reed, deltas, lakes and estuaries. It feeds on grassland or cropland. During the summer can be seen in farmland and during the winter on lakes or watercourses. Outside the nesting period gather in large flocks for migration.

Intermingle frequently with other geese species, in mixed flocks.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmatiei in search of food and in migration. Because the bridge location does not exist nests of Greylag goose and the specimens of this species have very high mobility, the impact on the species will be very low.

➤ ***Anas penelope* – Eurasian wigeon**

It nests in shallow aquatic areas, with abundant vegetation, sub-emergent and natant vegetation. It is more rarely observed in areas with high and dense adjacent vegetation.

During the winter period or in migration use the wetlands near the sea, lagoons, inland lakes, rivers with low flow speed, estuaries, flooded grasslands and wetlands.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmatiei, because the habitats identified in the bridge location do not accomplish the specific habitat requirements of this species, the impact on the species will be: non-existent.

➤ ***Anas crecca* – Common teal**

In Romania can be found especially in migration and during winter, in a range of aquatic habitats: shallow coastal waters, natural and artificial lakes, ponds, estuaries, deltas, lagoons and swamps. During nesting period, could be observed small populations in Transylvania and northern Moldavia, in mountain aquatic areas, lowland and coastal areas.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmatiei in search of food and during migration. Because in the bridge location does not exist nests of Common teal and the specimens of this species have very high mobility, the impact on the species will be very low.

➤ ***Anas platyrhynchos* – mallard**

The Mallard is a species that can be observed in a wide range of habitats such as rivers or stagnant waters, relatively sheltered estuaries and deltas, lagoons, coastline with shallow water, lakes, rivers, ponds and puddles. Generally avoids deep waters or those exposed, showing preference for shallow waters, with sub-emergent adjacent vegetation, sub-emergent or floating.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmatiei in search of food and in migration. Because the bridge location does not exist mallard nests and the specimens of this species have very high mobility, the impact on the species will be very low.

➤ ***Anas acuta* – Northern pintail**

The species nests rare in Romania (have been recorded five nesting pairs), but can be observed more often in passage or in winter, when can be found in habitats such as protected coastal areas, deltas, estuaries and flooded lands, lagoons and lakes which have in their boundaries farmland.

The species has not been seen in the location of the bridge over Tisa in Teplița area in Sighetu Marmatiei, because the habitats identified in the bridge location do not accomplish the specific habitat requirements of this species. It is possible the presence of this species in the areas in boundaries of the plan location during migration, but the impact registered on the species is: very low to non-existent.

➤ ***Anas querquedula* – Garganey**

It is a characteristic species of freshwater habitats, shallow, hidden, rich in vegetation, adjacent to larger adjacent wetland, flooded grasslands or marshes. Avoid aquatic habitats with very high or very dense vegetation.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmatiei in search of food and in migration. Because in the bridge location does not exist garganey nests and the specimens have very high mobility, the impact on the species will be very low

➤ ***Anas clypeata* - Northern Shoveler**

Is a species that use a wide range of habitats, that can be observed in all aquatic habitats with shallow waters, but permanent, productive, with abundant aquatic vegetation, which are edged with reeds and rushes.

Generally avoid waters edged by forests and stands of trees and salty waters. Rarely can be seen in ponds, lagoons, paddy fields, ponds etc.

The species was observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției in search of food and in migration. Because in the bridge location does not exist nest of Northern Shoveler and the specimens have very high mobility, the impact on the species will be very low.

➤ ***Aythya fuligula* – Tufted Duck**

During nesting period can be observed in a wide range of lakes, from eutrophic lakes less deep to deeper lakes with a small percentage of paloudous vegetation, reservoirs, lakes in parks. Outside of the nesting period can be found in a wide range of wetlands. It can dive to great depths (3-14 m).

The species has been observed in the location of the bridge over Tisa in Teplița area in Teplița area in Sighetu Marmăției in search of food and in passage. Because the bridge location does not exist nest of Tufted Duck and the specimens have very high mobility, the impact on the species will be very low.

➤ ***Fulica atra* – Common Coot**

The Common Coot is a species that uses a wide range of habitats such as shallow water areas, tranquil lakes, ponds, irrigation canals, storage dams, marshes and gravel pits. In winter they assemble in large flocks on lakes and rivers.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției in search of food or in passage. Because in the bridge location does not exist nests of Common Coot and the specimens have very high mobility, the impact on the species will be very low.

➤ ***Gallinago gallinago* – Common snipe**

It is a characteristic species to marshes and wetlands, often on the edge of lakes and rivers. During the winter stays in coastal areas or wetlands.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because the habitats identified in the bridge location do not accomplish the specific habitat requirements of this species, the impact on the species will be: non-existent.

➤ ***Anser albifrons* - greater white-fronted goose**

It is a characteristic species that can be observed during winter in grasslands and farmlands in low, open areas, in the vicinity of wetlands and swamps, flooded plains, sheltered bays, estuaries and deltas, in inland natural and artificial lakes. It is a very gregarious species outside the breeding period. It can feed in territories located at 20 km from overnight places.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, but her appearance is not dissbared in the surrounding areas, in Tisa meadow, so that the impact registered on species will be: low to nonexistent.

➤ ***Vanellus vanellus* – Northern Lapwing**

The species pay preference to natural meadows or wet meadows with areas without vegetation. It can be observed in farmland or wetlands. Migrate in large flocks which remain very compact during winter.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, but its presence is likely in adjacent site, the impact on the species will be: low to non-existent.

➤ ***Podiceps nigricollis* – Black – necked grebe**

Is a species characteristic to temporary or permanent basins, strongly eutrophic, with shallow water and abundant vegetation such as swamps and lakes with submerged vegetation and scattered clumps of reeds.

It can be observed in ponds and fish ponds, irrigation canals, ponds formed along rivers and in floodplains.

The species has not been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției, because its habitat requirements do not correspond with the conditions offered by the bridge location, the impact on the species will be: non-existent.

➤ ***Phalacrocorax carbo* – Great cormorant**

It is a species characteristic both for coastal habitats, even to inland wetlands. Pay preference to lakes, rivers, flooded areas, swamps with pools of water, fish ponds etc. It is a very good swimmer and diver.

The species has been observed in the location of the bridge over Tisa in Teplița area in Sighetu Marmăției in search of food and in passage. Because in the bridge location does not exist nests of Great cormorant and the specimens have very high mobility, the impact on the species will be very low.

➤ ***Larus ridibundus* – Black-headed Gull**

It nests frequently in shallow wetlands, temporary flooded, with tall vegetation, on the banks of lakes, lagoons, slowly flowing rivers, in deltas, estuaries and marshes with hummocks, but can nestle in high areas of salt marshes, dunes and islands off the coast.

Can nestle in artificial habitats, such as ponds, drains, gravel pits, canals and flooded areas, drained marshes, coastal dunes in coastal areas and on rocky islands.

It can be observed in arable land, wet grassland, parks, wastewater treatment plants, water reservoirs and staying overnight on the banks with sand or gravel of the lakes.

The species has not been observed in the location of the bridge over the Tisa in Teplița area in Sighetu marmăției, that so the impact registered on the species will be: non-existent.

Below are presented the data about the habitat requirements of other species identified in the location of the bridge over the Tisa, but not listed in Natura 2000 standard form of ROSPA0143 Tisa Superioară. All these species have been observed in search of food or in passage. Have not been identified

nesting areas or juveniles of these species. Due the fact that the plan area does not represent breeding habitat for the identified species and the birds have high mobility and can withdraw in similar habitats in boundaries of plan location, the impact will be low / insignificant and temporary.

➤ ***Alauda arvensis* – Eurasian skylark**

It is a characteristic species of farmland, open areas with moist and leveled soil, covered with herbaceous vegetation. It can be observed in pastures or meadows, on the periphery of wetlands, steppes and dunes or in regions with extensive deforestation.

Avoid forests and xerics habitats. In Europe, the population reaches the maximum density in farmland, especially in meadows left unattended or moderately grazed.

➤ ***Ardea cinerea* – Gray heron**

It is a species that can be observed in a wide range of habitats: large lakes, ponds, rivers and streams, where exist scattered trees. It feeds on banks of lakes, ponds, channels, flooded meadows etc. and often nests in the canopy of trees.

➤ ***Carduelis cannabina* – Common linnet**

The Common linnet is a species characteristic of open areas. It nests in bushes, particularly in the lowlands and hills, climbing the river valleys to mountainous areas.

It is highly gregarious outside the breeding season, forming flocks of hundreds of individuals for feeding, roosting or migration. It can be seen in mixed flocks.

➤ ***Carduelis carduelis* – European goldfinch**

It is a species that can be observed in a wide range of habitats, from open areas in forests, settlements, gardens, orchards or parks, where it can find food in abundance.

➤ ***Columba livia* – *domestica* – Domestic pigeon**

It is a species present in a wide range of anthropogenic habitats, especially suburban, rural and agricultural regions.

➤ ***Corvus corax* – Common raven**

The Common Raven is a sedentary bird that nests in forested areas with large expanses of open land or nearby coastal regions. Could nestle within human settlements, in areas that finds food in abundance.

➤ ***Corvus frugilegus* - Rooks**

The rook is a very common species in lowland and hilly areas. It can be observed frequently in large flocks on cultivated fields, but also in the vicinity of human settlements.

➤ ***Corvus monedula* – Eurasian jackdaw**

The Eurasian Jackdaw is a species characteristic to forested steppe, grasslands, cultivated lands and coastal cliffs, being present in large numbers even within villages.

It pay preference to areas with a mixture of large trees, buildings and open land.

➤ ***Dendrocopos leucotos* – White-backed Woodpecker**

It is a species characteristic to deciduous forests in hilly and mountainous regions, paying preference for forests consisting of beech (*Fagus* spp.), Birch (*Betula* spp.), Maple (*Acer* spp.), Ash (*Fraxinus* sp.), Elm (*Ulmus* sp.), poplar (*Populus* sp.).

Also, it can be observed in mixed forests, sometimes in coniferous forests. It nests on the southern slopes of the hills and the mountains and in gallery forests located along creeks dominated by trees species of light essence, but even old forests of beech or mixture forests.

➤ ***Dendrocopos syriacus* – Syrian woodpecker**

It is a species that can be observed in a wide range of habitats, being present in forests, parks, farms, grassland or woodland gardens. It is the anthropogenic species of woodpecker, most of the population nesting in gardens or near settlements in secondary habitats such as strips of poplar trees on roadsides. Avoid extended and closed forests.

It show preference to groups of trees, forest edge, old trees, isolated, can be observed in deciduous and coniferous trees, where the tree trunks excede 25 cm in diameter.

➤ ***Egretta garzetta* – Little egret**

It is a characteristic species wetlands, Delta and ponds, with trees clumps necessary for nesting. It nests in mixed colonies with other herons and cormorants species.

➤ ***Oenanthe oenanthe* – Northern wheatear**

It is a characteristic species of open areas such as pastures, fallow land and rocky stretches. It can be observed in crops and in the vicinity of human dwellings.

➤ ***Galerida cristata* – Crested Skylark**

It is a species characteristic to dry plains and arable land, as agricultural lands, steppe areas, desert and semi-desert, deforested areas, on extensive lands and xerice pastures, where vegetation covers only 50 % of the surface.

Can be observed frequently even near human settlements, roads, construction sites, railway stations, parks, markets, landfill, in all these areas looking for places without vegetation.

➤ ***Galinula chloropus* – Common Moorhen**

The Common Moorhen is a species characteristic to areas with calm waters where exist abundant vegetation, showing preference for rivers, ponds, lakes, canals and swamps adjacent to forest or having high vegetation nearby.

Generally avoid places exposed, the oligotrophe or saline lakes.

During migration could be observed on pastures, even away from water.

➤ ***Hirundo rustica* – Barn Swallow**

The Barn Swallow is a species that can be observed frequently in villages, being very adapted to man-made environment.

The Barn Swallow can be found on agricultural land in towns, along roads, wherever she finds appropriate places to nest and gather food, often near water. Avoid large forests and very dry areas.

➤ ***Passer domesticus* – House sparrow**

It is a characteristic species to human settlements. It nests frequently in towns and villages under roof tiles, crevices, rarely in trees or near residential areas, arable land, gardens and parks.

It is a very sociable and opportunistic species that form large flocks.

➤ ***Passer montanus* – Eurasian Tree Sparrow**

It is a sedentary species which nests in human settlements, arable land, orchards, gardens and parks.

➤ ***Phalacrocorax pygmeus* – Pygmy cormorant**

The Pygmy Cormorant is a characteristic species of freshwater habitats, generally located along the Danube floodplains or in fisheries. It can be seen frequently in areas with high coverage of water surface, with large trees nearby ponds with fresh water and reed beds, ponds or temporary lakes, in paddy fields, marshes and flooded fields, in areas where the water depth does not exceed 1.5 - 2 m.

It winters in coastal lagoons and deltas, along rivers which have floodplain forests, fisheries, etc.

➤ ***Pica pica* – Magpie**

It is a species that can be observed in a wide range of habitats: grasslands, bushes, groups of trees or forests edges. It prefers open places, bright as parks, gardens, farmland and meadows in the vicinity of water.

More rarely could be observed in regions of reedbeds and swamps or in forests.

➤ ***Saxicola rubetra* – Whinchat**

It is a species that can be observed in a wide range of habitats: water banks, crops bordered by brakes, forest edges, windbreaks, vacant land, uncultivated areas, mowed land or plowed surfaces bordered by bushes or rare trees.

Oversees the area from highest points such as high grass vegetation, brakes, stakes, bushes or fences.

➤ ***Saxicola torquatus* - Common Stonechat**

The species can be observed in open areas with bushes and brakes.

In Romania is present in all regions, as a summer guest. The first birds arrive in the wintering territories in September and return in late February.

➤ ***Streptopelia decaocto* – Eurasian Collared Dove**

It is a species with a very wide spread and can be observed in all localities, showing preference for the city edges, with gardens and households with balanced climate, with clusters of trees and mild winters.

It is a sedentary species.

➤ ***Sturnus vulgaris* – Common starling**

It is a species that can be observed in a wide range of habitats, often in urban or suburban anthropogenic areas. They feed in agriculture lands, pastures, sports areas or airfields, but can also be found in open forests with old and hollow trees.

➤ ***Turdus merula* – Eurasian blackbird**

It is a species that can be found in very diverse habitats, from dense forests to pastures, diverse cultures, wetlands, human settlements. It tolerate better the areas with low temperatures, with wind and humidity than those with high temperature and / or drought.

Can be observed more rare in areas where does not finds refuge at a greater distance of 100-200 m.

➤ ***Turdus pilaris* – Fieldfare**

It nests at the edges of forests, trees, various plantations, parks and gardens in the hilly and mountainous regions.

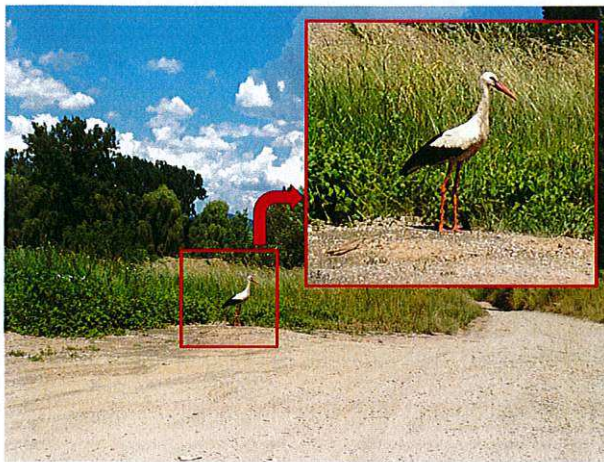
It is the most gregarious species of thrushes.

➤ ***Tachybaptus ruficollis* – corcodel mic**

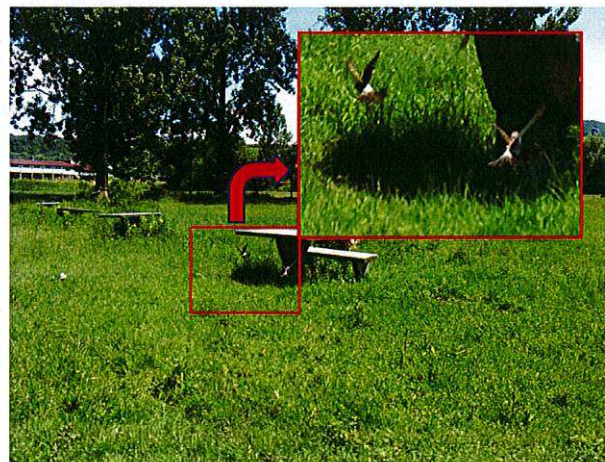
The species is found in a wide variety of aquatic habitats with rich flora and a high density of aquatic invertebrates, where the water depth is less than 1 m.

Prefer small lakes, ponds, bays in areas with large areas of water, but which have the banks covered by vegetation, alkaline or saline lakes, reservoirs, slow rivers, chanel, flooded meandres, costal lagoons, seasonal flooded swamps, lakes in gravel pits and even rice crops.

Birds effectives observed in the plan location are very small. Dominant are the rooks (*Corvus frugilegus*) and Eurasian Jackdaw (*Corvus monedula*). Most of the water birds specimens have been observed in migration or on the Teplița Lake. Birds have been observed in passage in the analysed area or in search of food. The plan location is not used as breeding areal or shelter by those species.



**Figure 27.** White Stork specimen (*Ciconia ciconia*) observed in the vicinity of Teplița Lake



**Figure 28.** Common Stonechat specimens (*Saxicola torquata*) observed in the vicinity of Teplița Lake

The nearest breeding area are represented by the Teplița lake and the forest habitats from Tisa riverbed (forest from the area of Crăciunești and Tisa village), but these will not be affected in any form by the achievement of the plan, due the great distance between the plan location and these areas.



**Figure 29.** Teplița Lake

#### 2.2.5.2.2 Evolution forecast

In the case of non-implementation of the plan "Bridge over Tisa in Teplița area in Sighetu Marmăției" the evolution of the environmental factor biodiversity would be linear, there would be no significant changes compared to the current situation. Neither implementation of the plan will have a significant impact on fauna.

In Table 4 are presented the populational effectives of identified species and prediction of species evolution at site level in case of implementation of the plan. Also, the impact of building and operating of the bridge over Tisa is assessed in Chapter 6.

**Table 4.** Population effective of the species identified and prediction on the population evolution on the site

No.	Scientific name	Common name	Aproximation of herds species observed in plan location and in its boudaries	Prediction on the populations on the site evolutions	
				During construction	During operation
1.	<i>Alauda arvensis</i>	Eurasian Skylark	b	<	=
2.	<i>Anas crecca</i>	Eurasian Teal	a	=	=
3.	<i>Anas platyrhynchos</i>	Common Malard	c	=	=
4.	<i>Anas querquedula</i>	Garganey	b	=	=
5.	<i>Anser anser</i>	Greylag goose	c	=	=
6.	<i>Ardea cinerea</i>	Gray Heron	a	<	=
7.	<i>Aythya fuligula</i>	Tufted Duck	a	=	=
8.	<i>Carduelis cannabina</i>	Common linnet	b	=	=
9.	<i>Carduelis carduelis</i>	European goldfinch	a	<	=
10.	<i>Ciconia ciconia</i>	White stork	a	=	=
11.	<i>Columba livia domestica</i>	Domestic pigeon	c	=	=
12.	<i>Corvus corax</i>	Common raven	b	=	=
13.	<i>Corvus frugilegus</i>	Rook	c	=	=
14.	<i>Corvus monedula</i>	Eurasian jackdaw	c	=	=
15.	<i>Dendrocopos leucotos</i>	White-backed Woodpecker	a	=	=
16.	<i>Dendrocopos medius</i>	Middle spotted Woodpecker	a	=	=
17.	<i>Dendrocopos syriacus</i>	Syrian Woodpecker	a	=	=
18.	<i>Egretta alba</i>	Great Egret	a	=	=
19.	<i>Egretta garzetta</i>	Little Egret	a	=	=
20.	<i>Ficedula albicollis</i>	Collared flycatcher	b	=	=
21.	<i>Ficedula parva</i>	Red-breasted flycatcher	a	<	=
22.	<i>Fulica atra</i>	Common Cot	c	=	=
23.	<i>Galerida cristata</i>	Crested Lark	b	=	=
24.	<i>Galinula chloropus</i>	Common Moorhen	a	=	=
25.	<i>Hirundo rustica</i>	Barn Swallow	b	=	=
26.	<i>Ixobrychus minutus</i>	Common Little Bittern	a	=	=
27.	<i>Lanius collurio</i>	Red-backed Shrike	a	<	=
28.	<i>Lanius minor</i>	Lesser Grey Shrike	b	<	=
29.	<i>Netta rufina</i>	Red-crested Pochard	a	=	=
30.	<i>Oenanthe oenanthe</i>	Northern Wheatear	a	=	=
31.	<i>Passer domesticus</i>	House Sparrow	c	=	=
32.	<i>Passer montanus</i>	Eurasian Tree Sparrow	c	=	=
33.	<i>Phalacrocorax carbo</i>	Great Cormorant	a	=	=
34.	<i>Phalacrocorax pygmeus</i>	Pygmy Cormorant	c	=	=
35.	<i>Pica pica</i>	Magpie	b	=	=
36.	<i>Saxicola rubetra</i>	Whinchat	b	=	=
37.	<i>Saxicola torquatus</i>	Common Stonechat	a	=	=
38.	<i>Sterna hirundo</i>	Common Tern	b	=	=
39.	<i>Streptopelia decaocto</i>	Eurasian Collared Dove	c	=	=
40.	<i>Sturnus vulgaris</i>	Common Starling	c	=	=
41.	<i>Tachybaptus ruficollis</i>	Little Grebe	a	=	=

42.	<i>Turdus merula</i>	Eurasian Blackbird	b	<	=
43.	<i>Turdus pilaris</i>	Fieldfare	a	=	=
44.	<i>Vulpes vulpes</i>	Red fox	b	<	=
45.	<i>Microtus arvalis</i>	Common vole	d	<	=
46.	<i>Apodemus agrarius</i>	Striped field mouse	d	<	=
47.	<i>Lepus europaeus</i>	European Hare	b	<	=
48.	<i>Talpa europaea</i>	Common mole	c	<	=
49.	<i>Ondatra zibethicus</i>	Common muskrat	b	<	=
50.	<i>Bombina variegata</i>	Yellow-bellied Toad	c	<	=
51.	<i>Triturus cristatus</i>	Great Crested Newt	b	<	=

#### Superscription:

**Intervals:** "–" - 0 individuals; a: 1-10; b: 10-30; c: 30-100; d: 100-300; e: 300-600; f:>600

">>" there will be a substantial increase in the number of individuals using the site and implicitly of their populations;

">" the possibility of slight increases of the number of individuals using the site will be created, with the possibility of slight increases in the populations;

"=" the population will be maintained, with no additional pressure to influence the species ethology;

"≈" the population will be maintained subject to compliance with the mitigation measures;

"<" a low presence on the site is assessed, individuals turning to other areas, with the possibility of slight decreases in their populations;

"<<" a substantial decline in population due to the impacts of the implementation of the objective.

#### 2.2.5.3 Maps and drawings on "BIODIVERSITY" chapter



Figure 30. *Vicia cracca* (bird vetch)

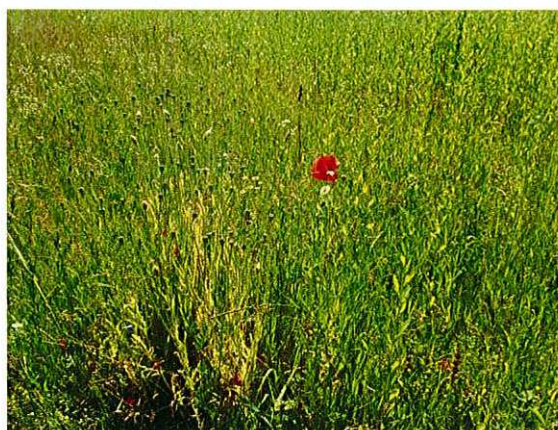


Figure 31. *Papaver rhoeas* (corn poppy),



**Figure 32.** *Echium vulgare* (common viper's bugloss)



**Figure 33.** *Lotus corniculatus* (Common Bird's-foot Trefoil)

## **2.2.6 Landscape**

### **2.2.6.1. General information**

Sighetu Marmatiei is a municipality in Maramures County, located at the border between Romania and Ukraine. The city has a population of 37.640 inhabitants according to the 2011 Census. Sighetu Marmatiei is the second largest and important centre of the county after county residence and is located at a distance of 600 km from Bucharest, 65 km from Baia Mare, 110 km from Satu Mare, 220 km from Cluj Napoca and 240 km from Oradea. The road transport is more difficult because it requires passage of Gutai, Tibles, Rodnei and Maramures Mountains.

The main communication route in the analyzed area is the national road DN 18.

The area of Sighetu Marmatiei is represented by a plateau slightly inclined from east to west with an average altitude of 274 m. The city is framed by three rivers: the Tisa River (in the north), the Iza River (in the south) and the Ronisoara River (in the east) and numerous hills: Dobaies Hill and Bagna Hill (in the East), Solovan Hill (in the South) and the Iepi Hills (of the West ).

### **2.2.6.2 Evolution forecast**

In the case of non-implementation of the plan "Bridge over Tisa in Teplița area in Sighetu Marmatiei" the evolution of the landscape environmental factor would be linear, there would be no significant changes compared to the current situation. Also, neither implementation of the plan will have a significant impact on landscape.

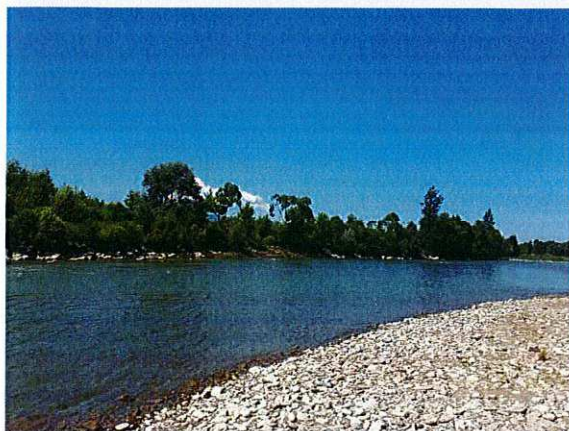
At the design of the bridge over Tisa River in Teplița area of Sighetu Marmatiei, has been given great importance to preserve the natural environment of the area by using natural building materials: rock stone and local filling material.

Achievement of the construction works and the exploitation of the bridge and the connection road will generate the appearance of a new landscape element with great spatial development, but it will harmoniously integrate into the landscape.

At the selection of the new connection road, it was considered that it follow the level curves and be connected to other communication paths, thus achieving perfect integration into the anthropic space.

The landscape will not be affected by the achievement of the plan but the construction works are completed, upon their completion the environment will return to the original condition, except for the areas permanently occupied.

### 2.2.6.3 Maps and drawings on "LANDSCAPE" CHAPTER



**Figure 34.** General view of the location of the bridge over Tisa

## 2.2.7 Population

### 2.2.7.1. General information

According to census carried out in 2011, the stable population of Sighetu Marmăției municipality is 37.640 habitants. The total number of inhabitants of the city have decreased related to 2002 census, when 41.640 people have been registered (about with 9.6%). Most citizens in Sighetu Marmăției are Romanians (76.07%). In order of dominance, they are followed by Hungarians (11.73%), Ukrainians (1.99%) and Roma (1.3%). In the case of 8.65% of the population are not available data on ethnicity.

Most residents are Orthodox (65.49%). Among these, there are Roman Catholics (10.99%), Greek Catholics (5.23%), Protestants (3.05%) and Jehovah's Witnesses (2.2%). For 9.38% of the population, no data are available regarding religion. (National Institute of Statistics, Census of 2011).

### 2.2.7.2 Evolution forecast

In case of non-implementation of the "Bridge over Tisa in Teplița area in Sighetu Marmăției" plan the evolution of the human population would be linear, there would be no significant changes compared to the current situation. Neither implementation of the plan will not have a significant impact on the human population. Moreover, during the bridge operation, there will be a positive impact on the local population.

## 2.2.8 Social and economic environment

### 2.2.8.1. General information

The Sighetu Marmăției City is the economic and cultural centre of Maramures Depression. Also, it represents an important touristic destination due to local customs and traditions.

The evolution of the economic situation of the Sighetu Marmăției city is linked to the decline of industrial activities within existing platforms (CPL, Maramureșeana, Unit, ASSIG), along with the emergence of new productive

units scattered in the city.

### **Agriculture**

The agriculture does not hold a significant weight in the economy of Sighetu Marmatiei City, as development of agricultural production recorded negative trends in recent years because of dwindling of activities of livestock farming in the territory of the city after functional reconversion of those farms.

The relatively extensive agricultural area from rural areas is considered appropriate basis for forming a food industry branch. Livestock and fruit cultivation are traditional activities in Northern Maramures area and conducted mainly in the households. On the municipality levels, act small entrepreneurs in the field of milk processing, bakery and butchers.

The food industry has a local character (industrialization of milk and bakery products), their products are consumed mainly in the municipality.

### **Industry**

The main branches of the industry in Sighetu Marmatiei are wood processing, furniture, textile and clothing industry and machinery industry. The processing of wood and furniture manufacturing hold a significant share and the products are exported (furniture, laminated wood pallets, elements):

- SC Mecanico Sighetu SA - Sighetu Marmatiei – founded in 1991, having as main activity the manufacture of screws, bolts and other threaded articles, rivets and washers, with an average number of 86 employees;
- SC Plimob SA Sighetu Marmatiei – founded in 1992, having as main activity the manufacture of furniture (chairs and small furniture), with an average number of 1203 employees;
- SC Transval Mob SA - Sighetu Marmatiei – founded in 2006, with the object of making furniture, with 304 employees.

### **Commerce**

After 1990, the commercial activities had a dynamic upward by steadily on the labour market from production activities in the sphere of commerce (mainly) and services sectors, according to Sighetu Marmatiei city development strategy.

### **Services**

Services provided at the Sighetu Marmatiei municipality level include: transport, internet, cable, hairdressers, shoemakers, leather goods, etc, most operators are micro companies, but the sector has an important contribution to economic activity of the municipality.

### **Tourism**

Highlighting of the architectural heritage of the Sighetu Marmatiei city is a viable alternative for tourism development.

Architectural objectives such as: Cultural Palace, Ioan Mihaly de Apsa building, Old Post Office building, the Prefecture old building, etc.) is a pole of attraction for both Romanian and foreign tourists and business people.

In the location of the bridge over Tisa in Teplița area on Sighetu Marmatiei, tourism is practiced in strictly controlled regime, because it is a protected area of community interest.

### **2.2.8.2. Evolution forecast**

In case of non-implementation of the "Bridge over Tisa in Teplița area in Sighetu Marmatiei" plan the evolution of the socio-economic environment would be linear, there would be no significant changes compared to the current situation. The construction of the Tisa bridge over the Teplița area in Sighetu Marmatiei will have both a short-term impact and a long-term impact on the socio-economic environment of the analyzed area.

**Short term impact will be positive:** creating new jobs (about 90 jobs during execution of the construction works of the bridge over Tisa) **and negative:** direct impact (caused by noise and vibration) and indirect impact (by changing air quality). The negative impact will occur only in the plan site and up to 30 -100 m from its limit in case of air and will not affect the health of the local population, but will create only a slight discomfort to population that live in this area or transit this area.

The construction activities will have temporary effect on the air quality within the works location and will lead to increase of the noise level. Upon completion of the construction works, the environment will return to its initial state: the noise level and emissions will be insignificant, without affecting the air quality. The only residual impact it is represented by permanent occupation of some land areas, but due the fact that those represent a very small percentage of the analysed area, the residual impact will not be significant and will not affect the socio-economical environment from the analysed area.

**The long term impact will be positive** by the improvement of traffic conditions and by increasing accessibility and degree of safety in the analyzed area.

## **2.2.9 Cultural, architectural and archaeological heritage**

### **2.2.9.1 General information**

In the Sighetu Marmatiei city operates the following touristic objectives:

➤ **Sighet prison (Memorial to the Victims of Communism and of the Resistance)**

The building of communist prison was arranged and converted into a museum since 1994, this building being the headquarter of the Memorial to the Victims of Communism and of the Resistance, known as Sighet Memorial Pain. Since 1995, the former prison was put under the aegis of Council of Europe.

The Pain Memorial is located in the vicinity of Sighetu Marmatiei City Hall and is the most important tourist attraction of the city. The first room of the museum was inaugurated in 1997, when the Memorial was declared "ensemble of national interest".

➤ **Maramures Village Museum (outdoor)**

The museum is set up as a sanctuary of peasant architectural monuments and reproduces a specific village, with houses and households grouped on the main subzones of historical Maramures.

➤ **Ethnographic Museum of Maramures**

Maramures Ethnographic Museum is located in the city centre and houses the objects used over time in the main activities in the area of Maramures. In the museum are icons on glass and wood, pieces of costumes, masks and costumes worn during the traditions of the winter holidays etc.

➤ **Jewish Culture Museum**

Jewish Culture Museum is hosting an exposition dedicated to the Sighetu Marmăției city inhabitants laureate of Nobel Price for Peace, Elie Wiesel and

➤ **Museum-house „Dr. Ioan Mihalyi de Apșa”.**

In Sighetu Marmăției are organized two festivals and city days:

➤ **Festival of Winter Traditions "Marmăția"**

This festival takes place every year on 27 December on the city streets. The main attraction of the festival is the parade of the groups and ensembles dressed in costumes typical of the area from which they came, "demons" and masked characters, chariots and wagons decorated for celebration.

➤ **City days in period 4 -7 October;**

➤ **Ancient and Medieval Festival Aeternus Maramorosiensis,**

It takes place every year in mid-September, starting with 2011.

**Archaeological Data**

According to preliminary archaeological study, the oldest traces of human presence in the area dates back to Paleolithic and appear on both sides of the Tisa. Isolated traces were found on the right bank of Iza, 350 m upstream of the point Grădina Morii, on the Valea Blidarului under the Solovan Hill, in point Cornu Dealului, in point Releu Doboeș on the hill Dobăieș and on the Tisa terraces, at north of Solovitno (Slatina) and Bila Tserkva (Biserica Albă).

A Paleolithic settlement (later gravetian or epigravetian) have been identified on the Valea Hotarului on the territory of the former village Cearda, in the point Acăstău. From this 20 m wide terrace, now bounded on three sides by Tisa, Iza and Valea Hotarului, have been collected finished pieces: blades and chips, flint cores etc. Another Paleolithic settlement has been identified on Dobăieș Hill, in point Releu Doboeș I.

Have been made discoveries from Neolithic and Bronze Age.

Two settlements from the Hallstatt period have been identified south of the Tisa. The one from Certeze / Lazuri point next Tisa town present the features of an intense habitation in sec. VIII-VII BCE (Pl. X). The second, more recent than the Certeze was identified during a ground discharge on the Făget Street, on the south-western slope of the Făget Hill. At north of Tisa in point Dealul Mănăstirii, 400 m east of Bila Tserkva (Biserica Albă), have been investigated a possible refuge citadel, datable at some point during the stages Hallstatt C - D Hallstatt, certainly after fortification from Dealul Cetății on the Solovan Hill ended its existence.

Over this Hallstatt living on the Dealul Mănăstirii have been risen in sec. IV-III BCE a fortified settlement, provided with wave, ditch and Palis (kept in the form of coal). Contemporary (the beginning of its existence) with fortified settlement on the Dealul Mănăstirii is the fortified settlement from Soltvino / Slatina - Chitattia / Cetate).

Raised over remains of housing from Bronze Age, the fortified settlement evolves over the course of four or five centuries in two stages.

The area was never part of the Roman Empire. Numerous finds of Roman monetary from Soltvino / Slatina can be connected with the salt trade. Coins of this period appear on the left bank of Tisa.

A settlement from centuries VI-VII C.E. has been researched in 1970 by R. Popa, R. Harhoiu and C. Kacsó in Certeze / Lazuri point, near the Tisa Town. Have been identified surface ceramic housing. The same team has

researched in this period the settlement from the point Mohelca, south of Crăciunești, (dating from centuries VII AD), where have been identified the remains of surface dwellings (Pl. XII).

The first documentary of the existing settlements in the area dating from centuries XIV.

Solotvino is certainly certified for the first time in 1412, but the salt mines have been attested before and were already property of the Crown.

Bila Tserkva (Biserica Albă) has been first attested in 1363.

Tisa has been first attested in 1374.

Port Sighet (certified since 1553.) have been located on the territory of the present district Camara from Sighetu Marmăției, where does the first lift military topographic map, from 1763 to 1787 a group of buildings on the bank of Tisa, designated as Saltz Kamer ("salt warehouse" ) that bordered on the south by Holz Stadel ("timber depot"). Salt Office has been described in 1783 as the castle. Except these structures, practically the entire area between the center of the Sighet and the Valea Cufundoasă (and to the Tisa town) have been designed for agriculture.

Sighetu Marmăției the most important center in the area was probably founded at the end of centuries XIII and beginning of centuries XIV.

Except the historical area of Sighetu Marmăției must be mentioned the late medieval discoveries from Teplița district, point Poligon, ring from centuries XVIII-XIX discovered at Cearda, the presence of medieval pottery at south of the fountain on the Solovan peak, the slope of the valleys and the emergence of coins centuries XVII-XVIII near this peak. Still no direct connection with a settlement historically attested are with the three galleries (centuries XVIII-XIX) unitary known as Grota from Făget.

Bridge planned to connect the Sighetu Marmăției with Biserica Albă starts, on the Romanian bank from DN18, immediately after the eastern houses of Camara District on the north side of DN18. At 200 m to the east of planned route is the Teplița Lake. Only starting point of the route is on the terrace (altitude  $\approx 278$  m); other part of the route on the Romanian bank is on the Tisa floodplain, 3-4 m below.

Currently the structures are built up, on the terrace, meadow area being used at most for agriculture. Also on the terrace have been found even all archaeological remains from the neighbouring. A little to the west of the entrance to the connection road to the bridge has been investigated on the Tisa second terrace a settlement from Bronze Age (Suciu de Sus) from Cireghi I (10). Nearby have appeared the stone chopper isolated from the Cămara - Cireghi I (7), microlite from an uncertain period and were reported tumuli (which have not been observed 10 years ago).

In Poligon point, in Teplița District (17) is a prehistoric station identified by the 1988 survey, whose results have not yet been published. Have been found numerous potteries, large pieces of folded fireplace and high numbers of pieces of tiles, although unprocessed. There were also appeared medio-modern pottery fragments and a piece of pipe. At some points away is Cireghi II (12) and Cămara II (13) where have been identified traces of a Bronze Age settlements and / or slave, but only through surface.

Although the terrace is observed consistent traces of habitation (especially from the Bronze Age), it is unlikely that the bridge route intersects a site. The fact that the Teplița Lake is only 200 m east of the connection road

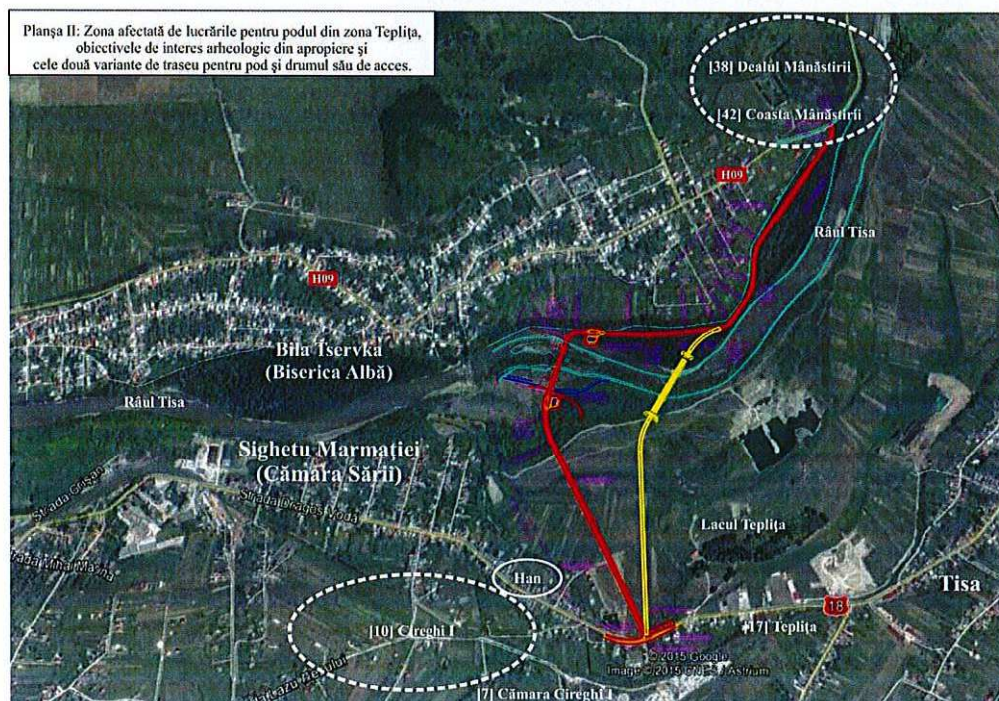
further reduce the likelihood of discovering archaeological remains. Teplița Lake is the result of industrial extraction of gravel excavations that affected a fairly extensive area.

Historical development of the meadow area crossed by the bridge route further reduce the probability that it contains archaeological remains in situ. Meadow area, located almost at the same level with Tisa waters and thus very vulnerable to flooding, was originally bounded to the terrace through a stream (now diverted to feed the Teplița Lake). 200 years ago more than half of the current floodplain taken the form of islands separated by Tisa side arms, now missing. Such a boom was passing on the area which is now passing on the earth road, the forest from the north of this road is a residue of meadows that once covered this semi-marshy area.

Obviously, such an area was not proper for living. Antique maps confirm that during the nearest habitation focused above on the terrace. Topographical elevation of 1763-1787 marks a "Wirths-Haus" (ie a house) just west of the route of the plan, on the terrace nose now occupied by the houses. The building of the inn continues to appear on all maps in centuries XVIII-XIX and at the beginning of the XIX centuries appear a new building half a kilometre to the east on the current location of the Teplița Lake. These two structures, however, are the only buildings in the area until 1900, the remaining land is occupied by marsh, grove and a small area of ploughed lands. Medieval and modern findings from Teplița - Poligon may have connection with the existence of the inn.

All these elements lead to the conclusion that it is highly unlikely that the area affected by the plan to be part of an archaeological site. On the other hand (due to concentration of discoveries terraces nearby) is very likely to occur in the archaeological material leaked from terraces, worn by Tisa waters or displaced during the human intervention. The likely existence of such materials requires a field evaluation.

Even on the right bank of the Tisa, the largest portion of the route passes through low areas, meadow at the base of terraces, areas which even now are still covered by forest. Even here, the likelihood that the road route intersects an archaeological site is minimal.



**Figure 35. Location of the archaeological objectives**

Source: Preliminary archaeological study

Quite different is the situation for the last 100-200 m before the connection road to join H09 (existing road on the Ukrainian border). Exactly at the intersection point is the area known as Monastirite: Dealul Mănăstirii and Coasta Mănăstirii. The presence of dacian fortress and medieval monastery make the entire area (and not only terrace) to present archaeological interest. The ruins of the monastery is located in the intersection, north of present road.

#### 2.2.9.2 Evolution forecast

In the case of non-implementation of the plan "Bridge over Tisa in Teplița area in Sighetu Marmatiei" the evolution of the Cultural, architectural and archaeological heritage would be linear, there would be no significant changes compared to the current situation. Also, neither implementation of the plan will have a significant impact on the Cultural, architectural and archaeological heritage.

The realization and exploitation of the bridge over Tisa in Teplița area in Sighetu Marmatiei will not affect in in no way the cultural and ethnic conditions and the cultural heritage existing in the analyzed area.

According to planning certificate no 115 / 23.07.2015 issued by the Maramureș County Council, in the plan location does not exist archaeological vestiges or other objects of cultural interest that must be protected. If within the working site will be found archaeological vestiges, the works will be ceased and the law will be followed.

#### 2.2.10 Waste

##### 2.2.10.1. Types and quantities of waste of any nature resulting in the plan location

Waste produced during execution of the construction works can be:

- soil and excavated materials (waste code 17.05.04);
- stone and crushed stone waste (waste code 01.04.08);
- mixture of concrete, bricks (waste code 17.01.07);
- bituminous asphalt (other than those based on coal tar base (waste code 17.03.02);
- mixed waste from construction materials (waste code 17.09.00);
- wood waste (waste code 17.02.01);
- glass waste (waste code 17.02.02);
- plastic wastes (waste code 17.02.03);
- mixed metal scrap (waste code 17.04.07);
- household or similar waste (waste code 20.03.01);

**Table 5.** Waste produced in the site organization

Type of waste	Quantity	Waste generator	Collection/disposal means
Household	Daily about 0,8 t	The 90 people who will carry out activities inside the site and within the workstations	Bins inside the site organization. They will be transported periodically to an authorized landfill through an authorized company authorized with wich the constructor by the manufacturer will have a contract
Waste from building materials	About 12 m <sup>3</sup> per month, if there are rejected loads of	Rejected loads of concrete or asphalt mixtures	This waste will not be stored, but recovered by: - service roads paving;

	concrete or asphalt mixtures		- use as an interim coating material in the municipal landfills in the area
Construction waste	983 m <sup>3</sup>	Reinforcement of the road structure existing at the exit from DN 18	This waste will be separated into specialized installations; the aggregates will be reused for other works.
Earth and excavated material	28.500 m <sup>3</sup> topsoil 33.987 m <sup>3</sup> infertile material	Making the excavations for the connection road	The infertile material will be used for embankments and the topsoil for restoring the areas temporarily affected by construction.
Wood waste	Monthly about 0,4 m <sup>3</sup>	Current maintenance activities, packaging	Will be used as supporting elements in construction. Or will be used as firewood for the local population.
Sludge collected in sedimentation basins	Monthly about 1,28 m <sup>3</sup>	It is generated from oil sedimentation basins and separators	Will be collected regularly and transported to the landfill.
Paper and cardboard	Monthly approximately 25 kg	Activities of record keeping, supervision and site management	Will be collected and stored separately for recycling.
Hazardous wastes	Packaging of paints, adhesives, resins, solvents	Marking the road	The containers in which have been delivered to these substances will be returned to manufacturers / suppliers, according to the legislation in force through authorized centers

\* According to the waste list from Annex 2 din GD 856/2002 on waste management records and approving the list of wastes, including hazardous wastes

\*\*\* Regulation (EC) no. 2150/2002 of the European Parliament and of the Council of 25 November 2002 on waste statistics (with Romania's accession to EU, EU regulations apply directly in Romania)

#### 2.2.10.2. Management of the waste generated

According to the regulations in force, these wastes will be collected, transported and deposited at the storage ramp in order to neutralize them. The collection / disposal of this waste will be done as follows:

- the constructor will lead a contract with an authorised company for transport / elimination of the waste generated within the site organization;
- waste will be collected and stored selectively in special places within the site organization;
- recyclable waste will be collected separately and will be valorized through specialized centers;
- inert waste resulting from the works will be reused if possible;
- according to H. G. 349/2005 on waste storage, household waste and the equivalent thereof shall be collected within the site organization in collection points equipped with container type bins. Periodically they will be transported by a sanitation company safely to a landfill mutually agreed with the Maramures Environmental Protection Agency. It will keep a strict evidence on dates, quantities removed and identifiers of the means of transport used;

- an estimated production of about 27 kg / day (about 0,8 t / month) because the amount of waste produced is approximately 0.3 kg / person / day;
- metallic waste will be collected and temporarily stored inside the binding sites and will be valorized in specialized units;
- the topsoil excavated at the start of construction will be used for restoration of the areas temporarily affected by the construction works, there will be no excess;
- construction materials waste (rests of concrete, mortar and other technological losses resulted during transportation and handling of construction materials etc) could be valorised / eliminated as follow: local recovery as pavement of the service roads, intermediate coating in the area of domestic waste landfills or dumps loan deposit that have reached the exploitation rate;
- asphalt waste will be transported to the asphalt station and shall be introduced in production process of the asphalt;
- untapped crushed stone will be used for other repairs / construction works that require crushed stone;
- wood waste will be selected and removed depending on size;
- as equipment repairs will not be made within the site organization, but in specialized centers, in the plan area there will be no wasted oils, used tires, metallic waste;
- paper waste and the waste specific to office activity will be collected and stored separately for recovery;
- marking paints containers will be returned to manufacturers or distributors, according to the legislation in force;
- at the end of each working week, the working fronts will be cleaned and removed all elements that have become waste;
- hazardous waste will not be collected / stored in working fronts.

#### **2.2.10.3. Hazardous chemical substances and preparations used and / or produced**

During the construction period of the bridge over Tisa in Teplița area in Sighetu Marmăției can result the following category of hazardous waste:

- Fuel utilized for construction equipments and vans (waste code 13.07.01\*);
- paints, solvents used for road marking(waste code 08.01.99);

Handling, storage and utilization of the chemical hazardous substances will be carried out in compliance with legal provisions in force in order to ensure the safety of the manufacturer staff, local population and those who transit the analysed area.

#### **2.2.10.4. Management manner of the hazardous chemical substances and preparations and ensure of the conditions for the protection of environmental factors and the population health**

Refuelling of machinery and commercial vehicles will be made only in the site organization. In working fronts will not be stored fuel.

Asphalt mixture and concrete will be brought already made in order to reduce the emissions in air. The remnants of asphalt will be returned to the asphalt plant, that so will not be generated asphalt waste.

Machinery and vans used to transport the construction materials to the plan site shall be brought in perfect condition and will be inspected periodically. Their repairs and changes of oil and tire will be made only in specialized centers outside the plan location.

The paint used for road marking will be brought in sealed containers that will be returned to the manufacturer / suppliers, in compliance with the legal provisions in force.

The works does not require the use of explosives.

### 3. THE ENVIRONMENTAL CHARACTERISTICS OF AREA POSSIBLE TO BE SIGNIFICANTLY AFFECTED

The environmental characteristics of the area possible to be significantly affected have been described in detail in Chapter 2. The impact on the environment will be felt locally at the level of the location of the bridge over Tisa in Teplița area in Sighetu Marmăției. The negative impact is temporary and reversible, with the exception of permanent land occupation (residual impact). Table 6 summarizes the issues that could have impact on the environmental factors and the type of effect expected.

**Table 6.** The relationship between the PUZ provisions and the environmental characteristics of the area possible to be significantly affected

PUZ provisions with possible impact on the environment	The environmental factor that may be affected	Forecasted effect
Change the current land use	flora / fauna	negative
	natural protected area	negative
	soil	negative
	socio-economic environment	positive
Execution of the bridge over Tisa an the connection road	flora / fauna	negative
	natural protected area	negative
	soil and subsoil	negative
	human health	negativ
	surface waters	negative
	socio-economic environment	positiv

The negative effects are generally temporary (occurring during execution of the construction works).

Below are presented the sources of pollution and the prognosis of the evolution of each environmental factor likely to be affected by the construction and exploitation of the bridge over Tisa in Teplița area of Sighetu Marmăției.

#### 3.1. Water

##### ❖ Pollution source

##### During execution of the construction works

Construction and operation of the bridge over Tisa in Teplița area does not represent direct source of water pollution. The construction works will not be conducted in Tisa minor riverbed. During entire period of the construction works will be maintained the water flow regime, water depth and the physico-chemical characteristics of the water.

Water pollution can occurs only indirect and accidental. The potential sources of water pollutants during the construction of the bridge over Tisa could be classified in:

- point sources (stationary);
- diffuse sources of pollution.

The only point sources of water pollution during achievement of the construction works of the bridge over Tisa in Teplîța area on Sighetu Marmăției are represented by the household wastewater generated within the site organization and working fronts. The amount of wastewater discharged into the site organization depends on the number of workers present, the amount of available hot water, working conditions.

**Diffuse sources** of water pollution are:

- **construction works:** earthworks, traffic associated with the works, equipment operation;
- **activities within the site organization:** bulk storage of construction materials (especially powder materials and those of small dimensions) that can be washed out by rain or driven by the wind;
- **equipment washing:** water resulting from washing is alkaline ( $\text{pH} > 8.5$ ) and may be contaminated with grease or oil;
- equipment maintenance (repairs, change of spare parts).

Achievement of the construction works of the bridge over Tisa in Teplîța area could have indirect impact on the surface water quality (as the accidental penetration of the raw materials in river course), but will not affect in any form the groundwater from the plan location.

#### ❖ Evolution forecast

The waste water will be treated within the treatment plant in site organization, that so at the discharge in the natural emissary (Tisa river) will comply with the provisions of the NTPA001/2002. It is strictly forbidden discharge of those waters before to be treated.

Construction materials and the waste will be stored in special arranged areas within the site organization. Around the deposits will be executed marginal ditches in order to collect leakage of construction materials. Rainwater that washes platform of the site organization will be collected and conducted to a sedimentation tank.

Fuels and hazardous substances will be stored in special areas in order to avoid the pollution of adjacent platforms. Fuel supply of the construction equipments will be carried out only within the site organization.

The site organization will be located outside the natural protected areas (at about 174 m), faraway from Tisa riverbed and the area occupied by site organization will be limited to the minimum required and upon completion of the construction works, the areas temporary affected by the construction works will be restored to its initial destination (will be returned to agricultural circuit). During entire construction works period, the constructor will take all the measures necessary to mitigate the negative impact on the environment.

Construction equipments and the vans utilized for transport the construction materials will be repaired and washed only in authorized centres, located faraway from Tisa riverbed and out of natural protected areas.

Impact on water is temporary and reversible. Upon the completion of the construction works will disappear even the potential sources of pollution of surface water.

#### **During operation of the bridge**

During operation of the bridge over Tisa in Teplîța area in Sighetu Marmăției will not be registered significant pollution sources of surface water. The rainwater that washes the road platform will be collected and treated through sedimentation basins and oil separators, that so at the discharge in the natural emissary will comply with the provisions of NTPA001/2002.

### **3.2. Air**

#### **❖ Pollution sources**

During the construction of the bridge over Tisa in Teplița area of Sighetu Marmăției, the air can be polluted as a result of the activities carried out within the site organization, within the working fronts and on the main access roads to the plan site.

Air pollution will occur especially during the excavation / covering works, excavations and fillings as a result of land handling and traffic for the transport of land and ballast.

The level of pollution caused by these operations depends on the technology used and the efficiency of the equipment used.

Air pollution will be manifested in each working front and on main access roads, the pollution sources could be characterized as:

- ground sources with effective emission heights of up to 4 m above ground level;
- open sources (involves earth handling);
- mobile sources, represented by the construction equipment and the means of transport used to achievement of the plan.

#### **❖ Evolution forecast**

**During execution of the construction works of the bridge over Tisa in Teplița area in Sighetu Marmăției**

The air in the studied area is good from point of view qualitative and is under the maximum limits provided in law 104/2011 regarding the air quality. At selection of the construction solutions for achievement of the bridge over Tisa was taken into account to not change the air quality in the analyzed area.

Air pollution during construction of the bridge over Tisa in Teplița area on Sighetu Marmăției can occur especially in periods in which will be executed the excavation and fillings works and in period of achievement of road clothing. Also, function of the equipment and of the vans used for transport the raw materials and the waste can lead to the air pollution.

For forecasting air pollution have been estimated concentrations of air pollutants emissions in working fronts, in site organization and on the main service roads.

Impact on atmosphere is maximum during achievement of embankments works.

In this period, air in working fronts can be polluted mainly with sedimentable particles, and the smaller amount of carbon monoxide, lead, nitrogen oxide, carbon dioxide and hydrocarbons. Achievement of embankments is point sources of air pollution and is manifested especially at ground level (effective height of emission is about 4 m).

Emissions of particulate matter vary from day to day because they depend on several factors including: specific of works, weather conditions, average fuel consumption and the surface of the site within the construction works are carried out.

During the execution of excavation / filling, stripping / covering works, particulate emissions are direct proportion to the content of small particles and inverse proportion to soil moisture and speed and weight of construction equipment. To limit emissions of particulate sediment, the working fronts will be sprayed regularly. This activity should be limited, however, because a high amount of water could turn the road into a slippery area and could cause an accident.

For short periods and only in the working fronts, the maximum allowable limits for sedimentable particles can be overcome as emissions from construction machinery may be added emissions from transport equipment.

According to recommendations of US - EPA / AP - 42, particles with a diameter  $d > 100 \mu\text{m}$  are deposited in reduced time, the deposition area does not exceed 10 m from the road. The particles with sizes ranging from  $30 \mu\text{m}$  and  $100 \mu\text{m}$  are deposited until 100 m from the road axis and the dimensions smaller than  $30 \mu\text{m}$ , especially breathable particles with dimensions smaller than  $15 \mu\text{m}$  (including PM10) and fine particles diameter of less than  $2.5 \mu\text{m}$  are deposited at distances greater than 100 m.

Considering the data provided by the US-EPA, it is estimated that at distances greater than 100 m of working fronts, the concentration of PM in air will be 2-5 times lower than that on the station / manufacturing bases, and particle sizes will be smaller than  $30 \mu\text{m}$  (particulate matter).

Emissions regime of sedimentable particles is dependent on the level of activity and specific operations and may vary from one day to another and from one phase to another of the process, depending on weather conditions and the specific of works.

To open emission sources, undirected cannot be associated emission levels and cannot be assessed in relation to emission regulations.

Work will be performed in stages, the machines will act in working fronts, so as not to affect the entire surface of the plan site simultaneously and do not affect significantly the air quality.

#### **Estimation of air pollutants emissions generated by construction equipment and the vans used for transport of raw materials**

Quantities of pollutants released into the atmosphere by construction equipment mainly depend on:

- technology level and engine power;
- fuel consumption per unit of power;
- equipment age and capacity;
- fitting with pollution control devices (catalysts);
- traffic intensity and types of vehicles;
- pollutant dispersion weather conditions.

Pollutant emission level drops with increased engine performance, and the engines used nowadays have increasingly lower consumption per power unit and are fitted with catalysts to retain emissions, that so the emissions generated in working fronts will frame in the admissible limits, according with legislation in force.

To estimate the emissions of air pollutants generated by machines operating in a working area, it was used diesel oil consumption (for specific emissions of pollutants: NO<sub>x</sub>, CO, SO<sub>2</sub>, particulates), and specific activity was at the base for estimating emissions of suspended particulate matter and sediments.

Emissions of air pollutants generated from equipment and means of transport occurs mainly in the works site and at the distance of up to 10-15 m in the left and in the right way. According to the data generated by atmospheric pollutant dispersion model Caline 4 in conjunction with the data from literature, at 20 meters outside the area, concentrations of pollutants will be reduced by 50% and over 50 m, the reduction is 75%.

The impact of these pollution sources on air is temporary and reversible, sources disappear upon completion of works, and the environment returns to the original condition, without affecting the air quality.

Emissions from construction machinery have been calculated considering the estimated amount of diesel fuel consumed (diesel fuel specific consumption of 60 l / h) and in accordance with emission factors provided in the Order 462/1993. Emissions estimates were compared with the limits set out in the order 462/1993 and are much lower than the maximum allowable concentrations according to the respective order, so that will not affect the air quality in the work site.

**Table 7.** Emissions from construction equipment and comparison with the CMA provided in order 462/1993

SO <sub>x</sub>	CO	NO <sub>x</sub>	particle	hydrocarbons
138,5 g/h compared to 5.000 g/h	218,8 g/h compared to the unspecified limit	675,8 g/h compared to 5.000 g/h	98,0 g/h compared to 500 g/h	46,0 g/h compared to 3.000 g/h

**The impact on air quality will occur only for short term** and only within working fronts. This will be generated primarily by the execution of excavations for foundations, exhaust emissions from construction machinery and the vans used to transport construction materials.

This form of impact is temporary (manifest only during construction works) and is reversible (at the completion of the construction works, the environment will return to its initial state) without significant impact on air quality.

**There will be no medium or long term impact on air or residual impact.**

#### **Forecasting of air impact during operation period of the bridge over Tisa in Teplița area on Sighetu Marmatiei**

During the operation period of the bridge over Tisa in Teplița area on Sighetu Marmatiei, air pollution will be generated only by road traffic, but the pollution level will not be significant due the traffic conditions.

During the bridge operation period, the air from location of the bridge over Tisa can be polluted due to:

- discharge into the atmosphere of engine fuels combustion products (fuel vapours, smoke, car exhaust gas);
- producing of different kinds of powders from the road and tire wear, of the brake and clutch devices.

In case of gasoline engines, pollutants resulting from fuel mixture combustion are: CO<sub>2</sub>, CO, nitrogen oxides (NO<sub>x</sub>), burnt and un-burnt hydrocarbons (HC) and SO<sub>2</sub>. The proportions depend on the air/fuel ratio. In case of vehicles with diesel engines, emissions are less by about 10 times for CO, 3-4 times for HC, 2-3 for NO<sub>x</sub>.

Depending on the fuel type, the exhaust gases contain: Pb particles in gasoline (with additives) and smoke particles in diesel fuel.

As the bridge will take over a part of the transit traffic inside Sighetu Marmatiei Municipality, the impact on the air will be significantly positive and will manifest in the long term.

The air pollutant emission values are directly proportional to the traffic intensity, running speed, traffic flow and technical condition of running vehicles.

The content of the exhaust gases, according to the literature, is shown in Table 8.

**Table 8.** Content of exhaust gas

Pollutant	Slow run		Optimum regime		Acceleration		Deceleration	
	b	m	b	m	b	m	b	m
Carbon monoxide	7.0	-	2.5	0.1	1.8	-	3.0	-
Hydrocarbons	0.5	0.004	0.2	0.02	0.1	0.01	1.0	0.03
Nitrogen oxide (ppm)	30	60	1100	850	650	150	20	30
Aldehyde (ppm)	10	20	20	10	10	10	300	30

Currently, in Sighetu Marmăției border crossing point are registered 197 vehicles daily, according to the traffic studies. Estimates of traffic intensity in the analyzed area are presented in table 9.

**Table 9.** Traffic forecast on the plan location in the maximum traffic hypothesis

Category	Year 2015	Year 2018	Year 2025	Year 2035	Anul 2045
	Without plan	With plan			
Cars	151	272	362	492	835
Buses	1	1	1	1	1
Vans	5	5	7	9	19
Minibuses	37	54	72	96	135
AC 2 axis	0	1	2	3	4
AC 3,4 axis	0	0	0	0	0
AC >=5 axis	0	17	21	29	53
AC trailer	0	3	4	5	7

In order to estimate the level of emissions generated by the road traffic, the TREMOVE simulation model for transport and pollutant emissions developed for the European Commission by the Leuven Transport and Mobility Institute was initially used in the traffic study. This is an integrated model for the strategic analysis of the costs and effects of policies applicable to transport. This model is based on the analysis of transport demand, traffic flows, and traffic speed.

In the traffic study, the CORINAIR procedure was considered to estimate the NO<sub>x</sub>, CO<sub>2</sub>, SO<sub>2</sub>, VOC, PM emissions and fuel consumption. This procedure primarily assesses the emission factors for each category of pollutants and also the total vehicle-km path for each vehicle type.

Calculation formulas for each pollutant are shown below.

#### Emission factors for NO<sub>x</sub>

##### Cars:

$FE_{NO_x} = (0,525 - 0,01 \cdot V + 0,0000936 \cdot \text{POWER}(V, 2)) / 1$ , where: V = speed.

##### Auto-truck:

$FE_{NO_x} = (1 / (((-0,000001 \cdot (\text{POWER}(V, 2)) + 0,00067 \cdot V + 0,026687))))$ , where: V = speed.

For the estimation of SO<sub>2</sub> and CO<sub>2</sub> emissions, it is first necessary to estimate the **specific fuel consumption CC** in g / km.

**Cars:**

$CC = (191 + 1,17 \cdot V) / (1 + 0,129 \cdot V - 0,000723 \cdot \text{POWER}(V, 2))$ , where: V = speed.

**Auto-trucks:**

For auto-trucks different speeds formulas apply, according to CORINAIR, as follows:

$CC = 276,5968 + 721,6679 \cdot \text{EXP}(-1 \cdot 0,036759 \cdot V) + 20235,47 \cdot \text{EXP}(-1 \cdot 0,804496 \cdot V)$ , where: V = speed.

**Emission factors for SO<sub>2</sub>**

For **cars**, the emission factors for SO<sub>2</sub> shall be calculated using the formula:

$$FE_{SO_2} = 2 \cdot 0,00004 \cdot CC$$

For **auto-trucks**, the emission factors for SO<sub>2</sub> shall be calculated using the formula:

$$FE_{SO_2} = 2 \cdot 0,00004 \cdot CC$$

**Emission factors for CO<sub>2</sub>**

CO<sub>2</sub> emissions are estimated on the basis of traffic performance by vehicle type and CC - specific fuel consumption.

For **cars**, FE\_CO<sub>2</sub> is estimated with the formula:

$$FE_{CO_2} = 44,011 \cdot (CC / (12,011 + 1,008 \cdot 1,8 + 0))$$

For **auto-trucks**, FE\_CO<sub>2</sub> is estimated with the same formula, where CC is the specific fuel consumption for auto-trucks.

**Emission factors for VOC**

VOC emissions are only estimated for passenger cars, as VOCs are emitted only by bensine-fueled vehicles.

The emission factors for VOC are estimated using the below formulas:

$$FE_{VOC} = (1,35 - 0,00677 \cdot V) / (1 + 0,178 \cdot V - 0,00127 \cdot \text{POWER}(V, 2))$$
, where: V = speed.

**Emission factors for PM**

Emissions of fine particles have been estimated for auto-trucks. Fine particulate emissions are only generated by diesel-fueled vehicles.

Firstly, Emission Factors (FE) for PM - fine particles were estimated as follows:

**Auto-trucks:**

$$FE_{PM} = 0,458629 + 1,753999 \cdot \text{EXP}(-1 \cdot 0,047259 \cdot V) + 4,55682 \cdot \text{EXP}(-1 \cdot 0,32909 \cdot V)$$
, where: V = speed.

Following the application of these formulas, the results presented in Table 10 below are obtained. Fuel consumption is denoted by FC. Have been calculated at the level of the entire analyzed area the emissions of:

- carbon dioxide CO<sub>2</sub>;
- NM VOC emissions;
- NO<sub>x</sub> emissions;
- fine particles PM;
- emission of sulphur dioxide SO<sub>2</sub>;

**Table 10.** Air pollutants emissions, tons / year / km

	NO <sub>x</sub>	FC	CO <sub>2</sub>	SO <sub>2</sub>	VOC	PM
<b>2018</b>						
Without plan	9101.503	359367.072	1143988.904	28.749	41.475	350.234
With plan	9100.334	359332.901	1143880.128	28.747	41.475	350.188
<b>Emissions mitigation</b>	<b>1.169</b>	<b>34.170</b>	<b>108.776</b>	<b>0.003</b>	<b>-0.001</b>	<b>0.046</b>
<b>2025</b>						
Without plan	11827.387	472532.103	1504232.094	37.803	54.496	463.119
With plan	11825.063	472464.496	1504016.877	37.797	54.497	463.028
<b>Emissions mitigation</b>	<b>2.325</b>	<b>67.607</b>	<b>215.217</b>	<b>0.005</b>	<b>-0.001</b>	<b>0.091</b>
<b>2035</b>						
Without plan	16101.818	650400.214	2070447.424	52.032	74.425	650.746
With plan	16099.816	650340.798	2070258.282	52.027	74.426	650.667
<b>Emissions mitigation</b>	<b>2.001</b>	<b>59.416</b>	<b>189.142</b>	<b>0.005</b>	<b>-0.001</b>	<b>0.079</b>
<b>2045</b>						
Without plan	23445.731	964481.865	3070277.268	77.159	111.491	1005.220
With plan	23441.521	964329.791	3069793.164	77.146	111.479	1005.012
<b>Emissions mitigation</b>	<b>4.209</b>	<b>152.074</b>	<b>484.104</b>	<b>0.012</b>	<b>0.012</b>	<b>0.208</b>

Emissions were expressed in g/veh × m of pollutant per vehicle category.

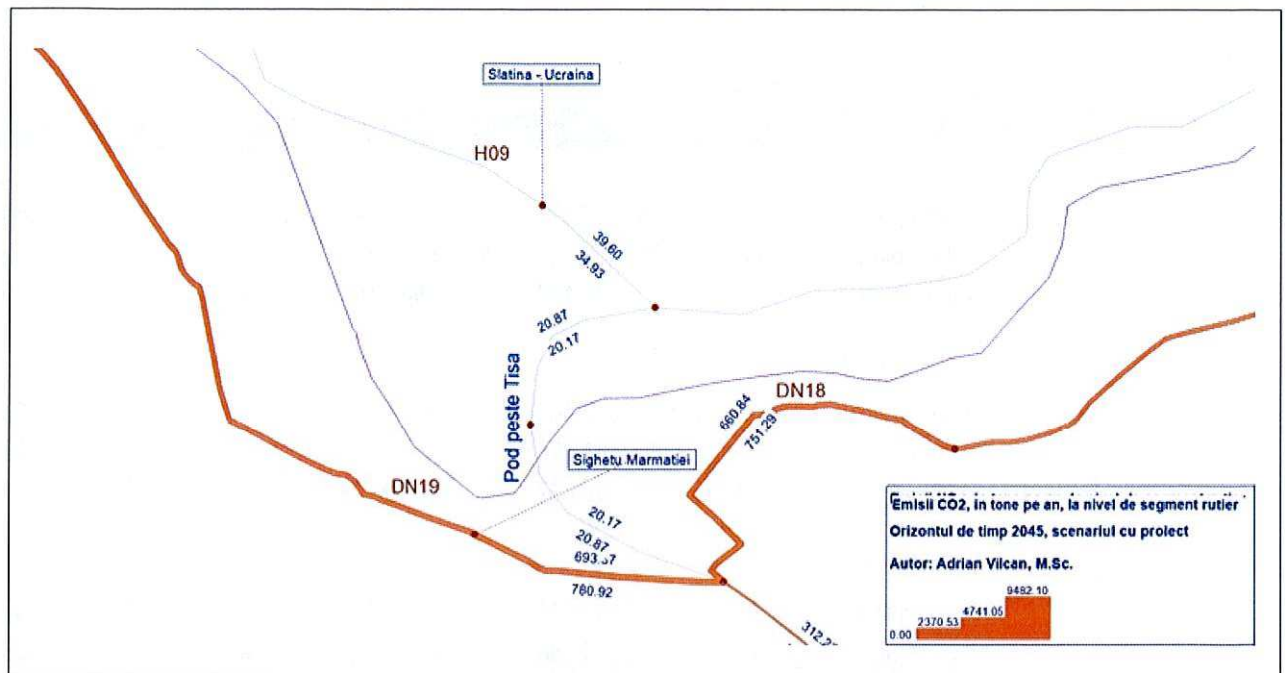
The results have been compared with the limits provided by Law 104/2011, the level of emissions generated by the road traffic fall within the maximum allowable limits.

It can be noticed that after the plan's realization, the CO<sub>2</sub> emissions of the entire analyzed area are reduced by 215.22 tons per year in 2025, reaching up to 484 tons per year in 2045.

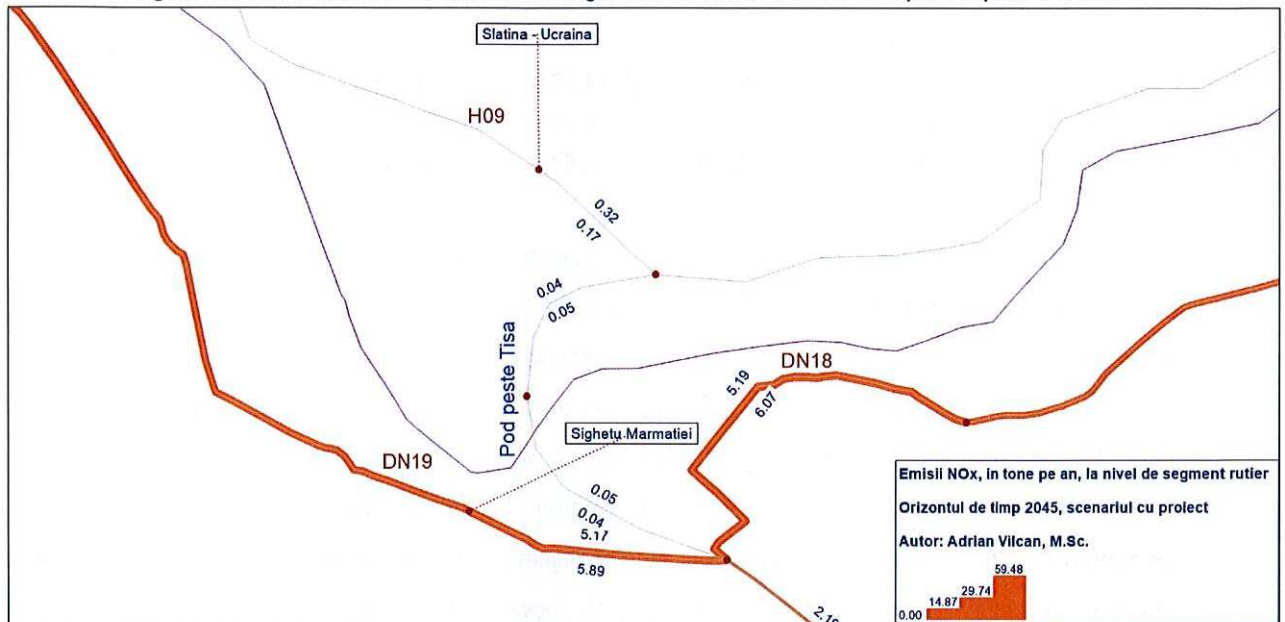
For the calculation of emissions of polluting substances generated during the construction works and during the operation of the bridge over Tisa in Teplița area of Sighetu Marmăției, have been utilized the emission factors from the EMEP / EEA emission inventory guidebook 2016, developed by the European Environment Agency.

Below are presented the emissions generated by the bridge over Tisa.

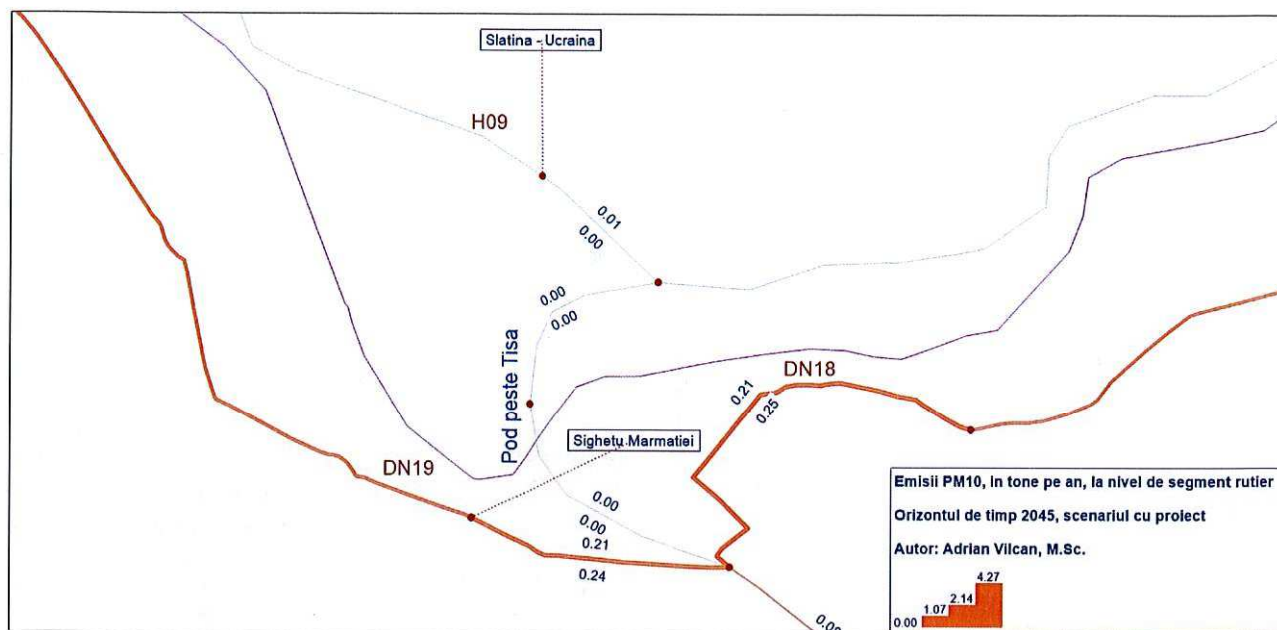
**Environmental report**  
 "Bridge over Tisa in Teplița area in Sighetu Marmatiei



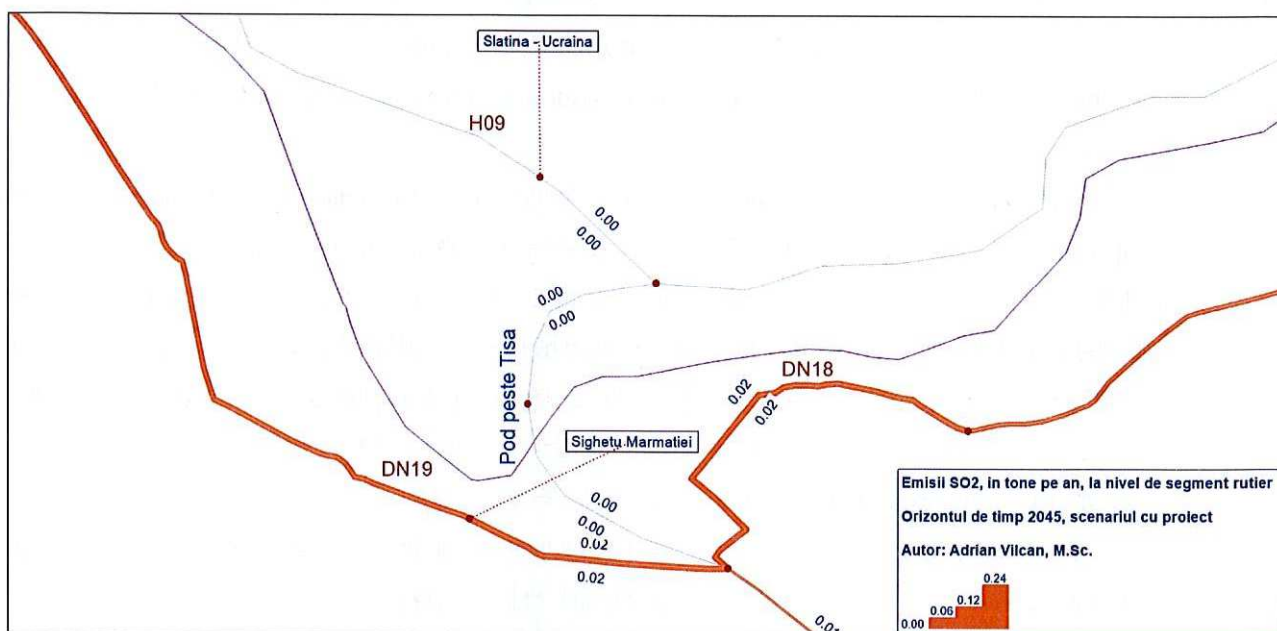
**Figure 36.** Emissions of CO<sub>2</sub> at the road segment level in 2045 in case of plan implementation



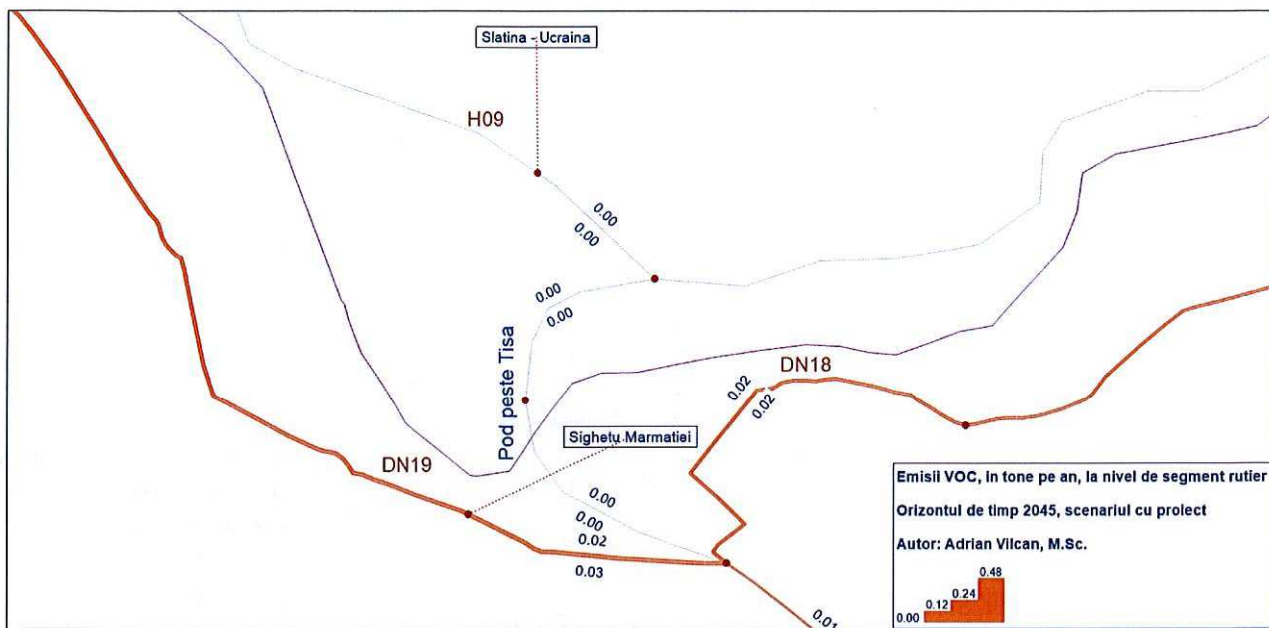
**Figure 37.** Emissions of NO<sub>x</sub> at the road segment level in 2045 in case of plan implementation



**Figure 38.** Emissions of PM10 at the road segment level in 2045 in case of plan implementation



**Figure 39.** Emissions of SO<sub>2</sub> at the road segment level in 2045 in case of plan implementation



**Figure 40.** Emissions of VOC at the road segment level in 2045 in case of plan implementation

As can be seen from Figures 36-40 from above, building the bridge will not lead to a significant increase in emissions of pollutants in the analyzed area. A higher level of air pollutants will be recorded in the vicinity of DN 18, but this is mainly due to traffic on DN 18.

The results obtained for the estimation of the emissions generated during the construction works period and during the operation of the bridge over Tisa in Teplița area of Sighetu Marmăției were compared with the limits stipulated in the STAS 12574/1987 setting the maximum admissible concentrations of some substances in atmospheric air in protected areas, with the limits imposed by Law no. 104/2011 on ambient air quality and Order no. 462/1993 on the approval of technical conditions for the protection of atmospheres and methodological norms for the determination of atmospheric pollutant emissions from stationary sources. Estimated values are below the maximum allowable limits (according to data in Table 10 and Figures 36-40).

Thus, neither during the exploitation period of the bridge over Tisa in Tepluța area in Sighetu Marmatei, the health of the inhabitants in the vicinity of the bridge site will not be affected.

The results have been compared with the limits provided by Law 104/2011, the level of emissions generated by the road traffic fall within the maximum allowable limits.

During operation of the bridge over Tisa, other sources of air pollution can be considered: noise, vibrations and radiations, use of anti-skid material. Level of noise, vibration and radiation will not affect local populations and ecosystems.

The anti - skid material impact is directly dependent on material type, quantity used, weather conditions.

Type of material: non-slip materials (sand, clay), chemicals (salt, calcium chloride), salt brine or 10-30% mixture of salt and sand (the percentage may increase on roads with good tightness). The mixtures will be homogeneous and will be spread evenly over the surface of the carriageway in dosages ranging from 100-300 g / m<sup>2</sup>.

The salt can be used only if the road surface temperature is less than  $-7^{\circ}\text{C}$  because at lower temperatures is dangerous and is not to be used.

The amount of salt used varies between 10 and 60 g / m<sup>2</sup>, depending on road conditions and weather conditions.

Skid material handling (supply, loading and spreading equipment such materials) may generate specific emissions.

According to data from US EPA, particulate mass flow discharged to the atmosphere during material handling chains may reach the following values:

- unloading skid-material in deposit: maximum 360 g/discharged batch and 20 kg/year;
- loading anti-skid material in equipment: 180 g/equipment and 18 kg/year;
- spreading anti-skid material: maximum 4.5 kg/km/day on days with frost/ice on the road.

The impact of this activity is seasonal (occurs only in winter), and the magnitude of impact is very low. Can be registered emissions of sedimentable particles or chlorine emissions, but this will not affect the quality of air or the flora and fauna species that live in the plan location or in its boundaries.

### **3.3. Soil**

#### **❖ Pollution source**

The investment does not represent direct pollution source for the soil, but may occur accidental pollution of the soil due the:

- sedimentation of the dust resulted from the transport and unloading of construction materials;
- sedimentation of air pollutants generated by transport means, by the operation of the construction equipments;
- uncontrolled or accidental spills of hydrocarbons (oils, lubricants, fuels, paints) in working fronts or during transport;
- leaks on ground: mortar, grout and suspension of the places where concrete is poured in the paper;
- improper storage of waste and construction materials.
- improper discharge of wastewater produced in the site organization;
- storage of the bulk construction materials without covering system (that so these materials can be washed away by rain or be driven by wind and deposited near the site);
- washing the construction machines outside the specially designed platforms and disharghe of those water directly on the ground or in the emissary;

At the execution of the construction works will be utilized equipments with proper characteristics, the pollution risk with fuels is as lower as possible. The proposed works will not affect the soil and subsoil.

The area permanent occupied by the achievement of the bridge over Tisa in Teplița area in Sighetu Marmăției represent a very small percentage of the analysed area, the areas temporary affected by the construction works will be restored upon the completion of the construction works, will not be pollutant substances, that so the impact on soil and subsoil will not be significant.

That so, upon completion of the construction works, the only residual impact on soil is represented by the permanent occupation of some land areas.

❖ **Evolution forecast**

Construction of the bridge over Tisa in Teplița area in Sighetu Marmăției can impact the soil by permanent or temporary occupation of some lands areas, achievement of uncovering / covering, excavations / fillings operations, operation of the construction equipment in working fronts, establishment of construction materials and waste deposits within the site organization.

The main impact that may occur on soil is permanent / temporary occupation of some productive areas. To reduce this form of impact will be utilized only the areas absolutely necessary for the achievement of the plan, and the areas affected temporary by the construction works will be restored in shorter time and will be monitored their restoration.

The proposed area to be affected permanent / temporary by the construction works will be strictly delimited in the terrain and will be respected during achievement of the construction works. After delimitation of the spaces, first will be removed the topsoil layer (up to approximately 30 cm depth), then infertile material, to a depth recommended in the technical plan (variable depending on the structures made). The topsoil will be stored separately by the infertile material and will be used to restore the areas temporary affected by the construction works.

Use for restoration of the areas affected temporary by the construction works of the topsoil excavated initially will contribute to the reduction of amount of waste generated by works and to restoration of the specific composition of the biocenosis because will not exist the risk of occurrence of alien species (potently invasive).

Activities conducted in the site organization can contribute to the soil and subsoil pollution because the handling of important amounts of substances like fuels, paints, solvents, aggregates (crushed stone, sand, lime, s.o). Of these, the greatest potential of soil pollution have the fuels: supply and storage of fuel, but even fuel supply of equipments, because these operations are carried out more often, and the quantities used are much higher.

Soil pollution can occur due to appearance of technical failures of construction equipments that acts in working fronts and on vans that transport construction materials. These defections can lead to leakage of fuels or oils or may increase the exhaust gas emissions that can contribute the soil pollution.

Another form of impact on soil is the construction activities carried out in the working fronts: activities of uncovering / covering, excavations / fillings. These activities have **direct impact on soil**. Will be registered temporary / permanent loss of soil, depending of the destination of each area. The direct impact will occur only for short term (in case of the areas **temporary affected** by the works: site organization, mining roads) and for **long term** (in case of the areas permanent occupied by the works).

Carrying out the excavation / fillings, uncovering / covering activities will have indirect impact on soil due to gravimetric sedimentation of sedimentable particles generated by the handling the earth and construction materials.

Soil surfaces where 300-1000 g dust/m<sup>2</sup>/year is deposited, can be affected by pH change and structural changes are likely, but because the uncovering / covering activities will have short period of implementation, will not be registered a significant impact on soil quality.

Handling the earth will have no significant impact on air, but because on the surfaces of the particles can accumulate considerable amounts of polluting substances (mainly heavy metals), due to deposition of sedimentable particles can affect quality of soils.

The residual impact will occur by permanent occupation of some land areas, but because these areas represent a very small percentage of analyzed area, **the residual impact will not be significant.**

### **3.4. Subsoil**

#### **During execution of the construction works**

Execution of the construction works of the bridge over Tisa in Teplita area on Sighetu Marmăției will lead to several changes in quality and structure of soil and subsoil. These will occur mainly by temporary / permanent occupation of some areas. Carrying out the site organization will lead to temporary occupation of some lands, this activity will have no impact on geological environment, but only on soil. There will be no substance to percolate into the soil. Construction of the bridge over Tisa will cause permanent occupation of land, but because the areas occupied represents a very small percentage of the area analyzed, the impact will not be significant.

The plan is not a direct source of pollution for geological environment, but it can cause accidental pollution with oil products as a result of accidents or of technical failures of vans utilized for transporting construction materials.

#### **During operation period of the bridge over Tisa in Teplița area on Sighetu Marmăției**

Operation of the bridge over Tisa in Teplița area on Sighetu Marmăției will not significantly contribute to the subsoil pollution, due to the activities specific (road traffic).

In this period, the subsoil can be affected due appearance of technical failures at vehicles involved in traffic. These can occur only accidental, but because in the plan have been proposed oil separators and sedimentation basins, pollutant will be retained and will not affect the environment.

Where the amount of pollutant will be significant, will be utilized absorbent material and further will be contracted a company specialized in pollution cleaning. Also, during execution of the construction works and during operation period of the bridge over Tisa, will comply with the measures proposed in the accidental pollution prevention and remediation plan.

### **3.5. Biodiversity**

#### **3.5.1. Flora**

Generally, the construction of a communication rue / bridge can generate the following forms of impact on biodiversity:

- reduce the biological productivity by:
  - pollution of the plan location due the construction activities or occurrence of accidental loose of pollutants;
  - removal of biotic components from the working fronts as result of achievement of the following activities: stripping, excavations and due the permanent / temporary occupation of some land areas;
- fragmentation of the natural habitats as a result of the presence of new structures (roads, bridges);
- removal of wildlife specimens due the presence of working equipments and workers in the working fronts and within the site organization.
- increase of mortality rate in case of fauna species that use the site for feeding due to injury of fauna specimens by machinery and vehicles moving in working fronts, in site organization and the main service roads existing in the analyzed area;

- affecting aquatic species living in the river as a result of deviation (total or partial) of the river course;
- water pollution (increase turbidity, of the level of some substance in water).

These forms of impacts vary depending on plan characteristics and the specific conditions of the plan site (weather conditions, presence / absence of susceptible species, etc.). Also, a very important factor for assessment of the impact of construction works on fauna is the period necessary to carry out the construction works.

The construction works for achievement of the bridge over Tisa in Teplița area on Sighetu Marmăției will last 24 months. Plan achievement does not require execution of the construction works within the Tisa minor riverbed and it is not necessary diversion of the river course.

The construction works will be done in stages, so there will not be affected the whole plan location, and the fauna species could move in similar habitats, in areas in which are not carried out construction works.

The impact of construction of bridge over Tisa in Teplița area on Sighetu Marmăției will occur only in each working front, without affecting the entire location area.

**The impact will be in admissible limits, temporary and reversible. The environment will return to its original state upon completion of the construction works, except for areas permanently occupied by the new infrastructure), that so the residual impact on biodiversity will not be significant.**

**The direct impact** or construction of the bridge over Tisa in Teplița on Sighetu Marmăției is the permanent or temporary impairment of land surfaces and is manifested especially in the construction of the connection road. In case of bridge construction, the occupied area is much smaller. The total area occupied by the plan on the ground level on the territory of Romania is 84,030 m<sup>2</sup>, out of which 76,260 m<sup>2</sup> in the overlapped territories of ROSCI0251 Tisa Superioară and ROSPA0143 Tisa Superioară.

The area permanently occupied for carrying out the works represents a very small percentage of the total area of the two natural protected areas, namely 0.1214% of ROSCI0251 Tisa Superioară and 0.2664% of ROSPA0143 Tisa Superioară. The temporarily occupied area (to site organization) is 20,000 m<sup>2</sup> and will be located entirely outside the natural protected areas

Because in the plan location have not been identified protected flora species, and the fauna specimens identified in the plan location can move in similar habitats in the vicinity of the plan location, the impact will not be significant.

The percentage permanently occupied by the plan represents a very small percentage of the analyzed area, so that the impact will not be significant. Will not be significantly reduced the feeding area of the identified species. Also, by permanent occupation of some land areas will not be reduced the breeding area of identified species, because the plan location is not breeding areal, and the breeding area from the vicinity of the plan will not be affected in any form by the plan achievement.

The direct impact will occur only in plan location, will not be major affected the habitats for whose protection has been designated the ROSCI0251 Tisa Superioară because there is a remnant grove in an advanced state of degradation on the site. In areas with spontaneous vegetation, the directly affected area is 84,028 m<sup>2</sup>, which will be compensated by the planting of the willows and the extension of the deposit in the adjacent areas.