

Annex G) Traffic Survey Report

1. Introduction

1.1 Purpose

This proposed traffic study is to produce a baseline study in order to assess the existing traffic composition and traffic volume along the existing, pre-upgrade works between Danilovgrad and Podgorica. The locations selected will also form the ongoing traffic monitoring plan throughout the construction phase. The same locations, methodology and analysis will be used to enable the results to be compared over time.

Collected data will be used to identify critical flow time periods, to determine the various types of road users and to document traffic volume trends.

The locations selected will also be the same for a noise and vibration baseline survey.

1.2 Scope

The following locations have been selected:

Point 1 (42° 32.703'N 19° 6.197'E)	Km 114+696.140 (left side of the road)	Parking in front of Market Idea	This location was selected because it is the starting point of the road route, and it is located at the exit/entrance to the main roundabout. Moreover, it will be useful to monitor traffic in regards to the direction of vehicles since this location represents the crossroads between roads which lead towards Niksic, Danilovgrad city centre and the old road from Danilovgrad to Podgorica, suburban areas of Danilovgrad, and Podgorica. The old road from Danilovgrad to Podgorica is significant because it is still used by many people, especially during rush hour. Thus, it will be important to monitor whether this road will be more frequently used during construction, compared to the current conditions.
Point 2 (42° 31.861'N 19° 6.962'E)	Km 116+611.130 (right side of the road)	Restaurant Mustuluk	This location was selected because a significant connecting road is located right next to the restaurant, there is high frequency of traffic in this section, and it represents a good location for traffic survey since it provides good conditions for maintaining safety of the people who will be carrying out the survey.
Point 3 (42° 31.015'N 19° 7.401'E)	Km 118+287 (left side of the road)	Before roundabout near settlement Strahinici	This location was selected because there are two important connecting roads which lead toward 2 large settlements (Begovina and Strahinicl). Moreover, one of the roundabouts is going to be built at this location, so it is important to monitor traffic at this section. Additionally, one of the current bus stops is located here, so it will represent a good location for the traffic survey in regards to safety reasons as well.
Point 4 (42° 30.504'N 19° 8.071'E)	km 119+632 (right side of the road)	Near DDI Trade	This location was selected because one of the most frequently used bus stops is located just opposite from the shop (DDI Trade), and there is one connecting road right behind the shop. There are quite a few houses in this area, so it is also suitable for noise monitoring. Additionally, this location was selected for security reasons since the people who are going to be carrying out the survey can find a safe spot in front of the shop.
Point 5 (42° 29.975'N 19° 8.956'E)	Km 121+185 (right side of the road)	Restaurant Konoba Bagrem	This location is very significant because there are two connecting roads in this area, a roundabout is going to be built at this location and there are quite a few households and businesses around this location, so this location is significant for noise monitoring as well.
Point 6 (42° 29.276'N 19° 8.956'E)	Km 122+874 (right side of the road)	Near Monteco	This location represents one of the biggest intersections at the entire road alignment, and it leads towards two large settlements (Bandici and Spuz). It is important since traffic patterns and traffic load can easily be monitored at this point. Another reason why this locations was selected is the fact that there are some important bus stops at this location. Additionally, this

29.276'N)			location was selected due to safety reasons, since the people who are going to be carrying out the survey can easily find a good place to stand and be safe along the road.
Point 7 (42° 26.688'N 19° 12.194'E)	Km 129+041 (left side of the road)	Near access connection road	This location was selected because it is the end of the road section and it represents a connecting point with one of the larger settlements in this area (Beri). Additionally, it located close to the area in which it is planned to build a roundabout, so it will be useful to monitor the traffic load at this section. Finally, there is a bus stop at this section, which means that the safety requirements will fulfilled.

Considerations for their selection has included:

- Proximity to proposed roundabout construction, allowing an assessment on the amount of traffic joining or leaving the main highway
- Proximity to residences or small businesses (shops and restaurants) that are close to the road and will be significantly impacted by construction activity
- A reasonably safe spot to stand for the recorders (who will wear hi-vis vests)

The records will show:

- Location – *as specified in table above*
- Date – *Survey days will be for 4 days (including Sunday)*
- Hour – *Recording will run continuously for 12 hours on each of the selected days. New field recording sheet used for each 1 hour slot*
- Vehicle type - *as per the table below. On recording sheet use prison style strikes – llll then fifth across*
- Vehicle direction – *travelling north or south on M18. Taking or leaving highway at an intersection*

Vehicle Types:

- Horse /Horse and cart
- Bicycle
- Motorbike/scooter
- Car/small van
- Van/minibus
- HGV lorry
- Bus

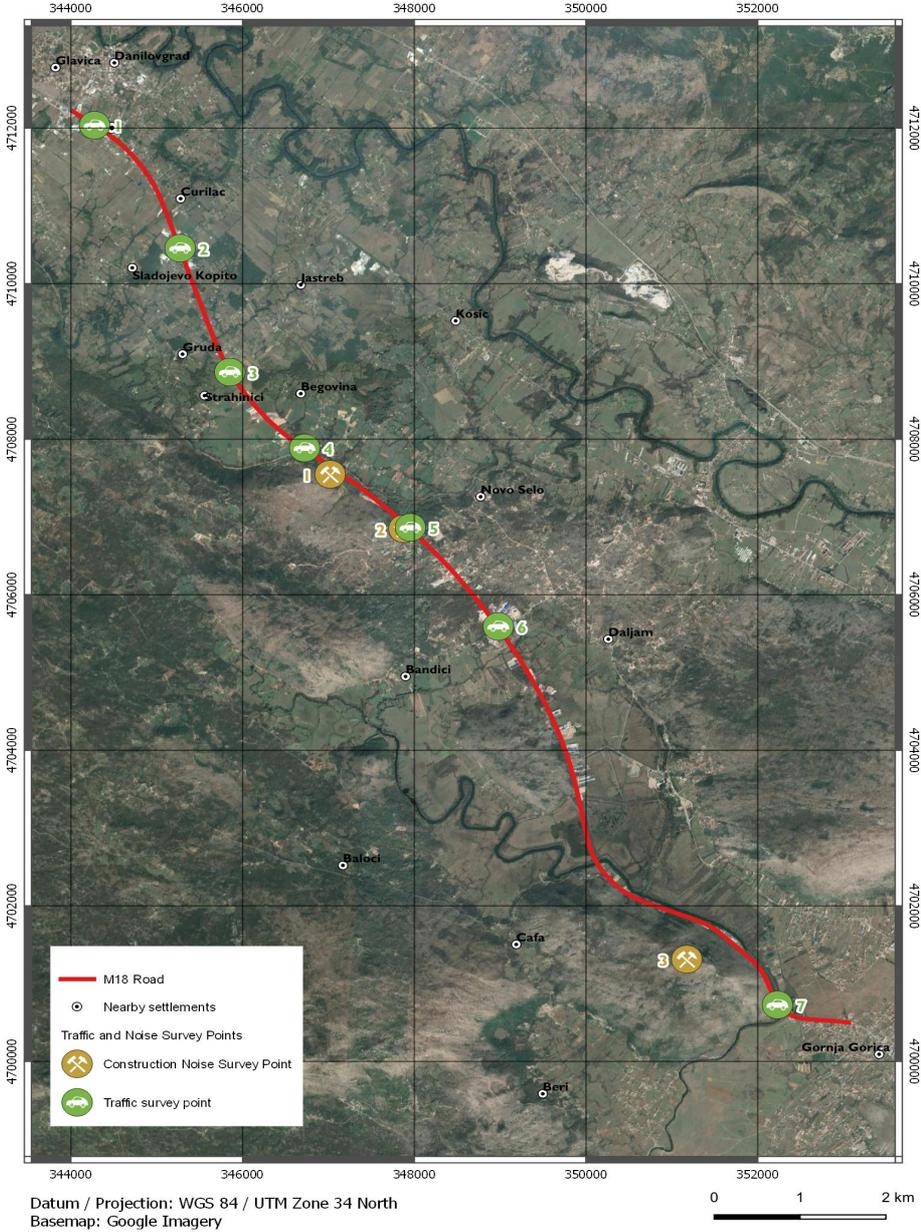
1.3 Method

Method will involve a manual count. Equipment for an automatic count is not available and would not detect the level of detail required for this type of local survey. Recorders will complete the recording sheet (attached)

1.4 Traffic Record Sheet

TRAFFIC RECORD SHEET - Podgorica-Danilovgrad Project						
Location Point	Date	Hour slot	Recorder	Weather	Comment	
	Horse / Horse and cart	Bicycle	Motorbike / scooter	Car/small van	Van/minibus	HGV lorry
						Bus
						TOTAL
M18 Travelling South						
Taking Intersection West						
Taking Intersection East						
M18 Travelling North						
Taking Intersection West						
Taking Intersection East						
Intersection West going South						
Intersection West going North						
Intersection East going South						
Intersection East going North						
TOTAL						

2. Data Collection Photos



Source (Earth Active, 2019)

Figure 2.5.4a: Traffic survey point 1 – facing NW



Figure 2.5.4b: Traffic survey point 1 – facing SE

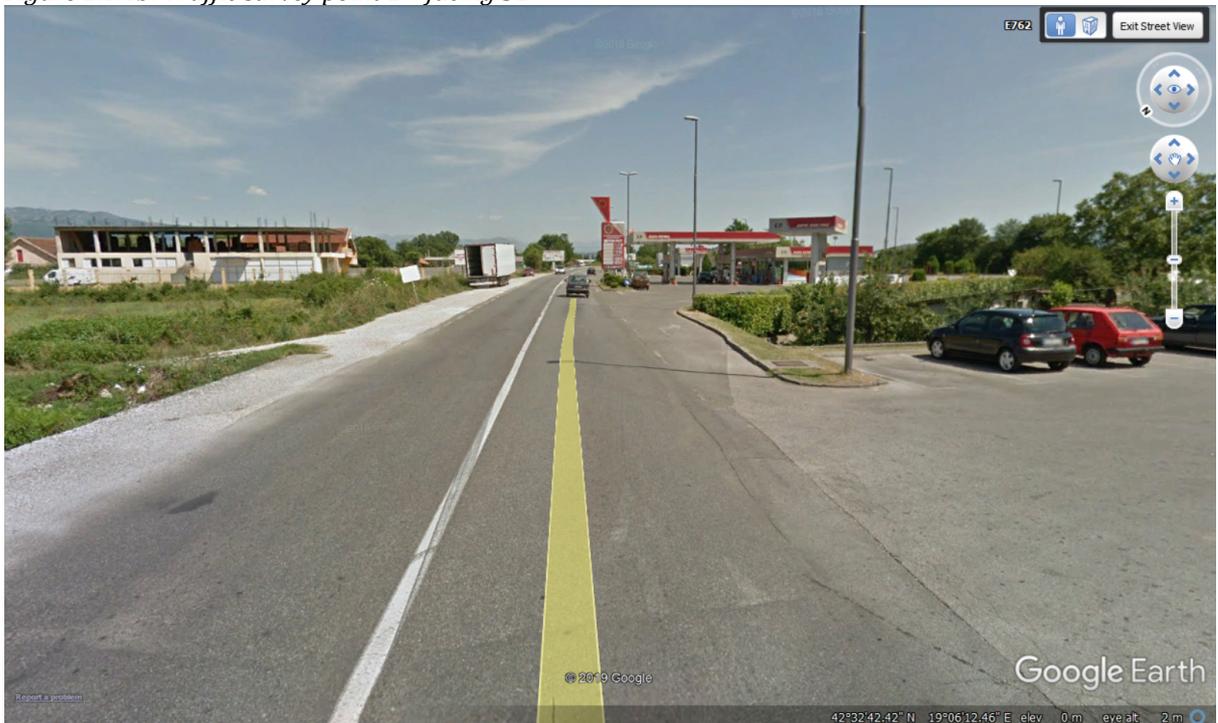


Figure 2.5.4c: Traffic survey point 2 – facing NW



Figure 2.5.4d: Traffic survey point 2 – facing SE



Figure 2.5.4e: Traffic survey point 3- facing NW



Figure 2.5.4f: Traffic survey point 3 – facing SE



Figure 2.5.4g: Traffic survey point 4 – facing NW



Figure 2.5.4h: Traffic survey point 4 – facing SE



Figure 2.5.4i: Traffic survey point 5 – facing NW



Figure 2.5.4j: Traffic survey point 5 – facing SE



Figure 2.5.4k: Traffic survey point 6 – facing NW



Figure 2.5.4l: Traffic survey point 6 – facing SE



Figure 2.5.4m: Traffic survey point 7 – facing NW



Figure 2.5.4n: Traffic survey point 7 – facing SE



Figure 2.5.4o: Construction noise survey point 1 – no street view

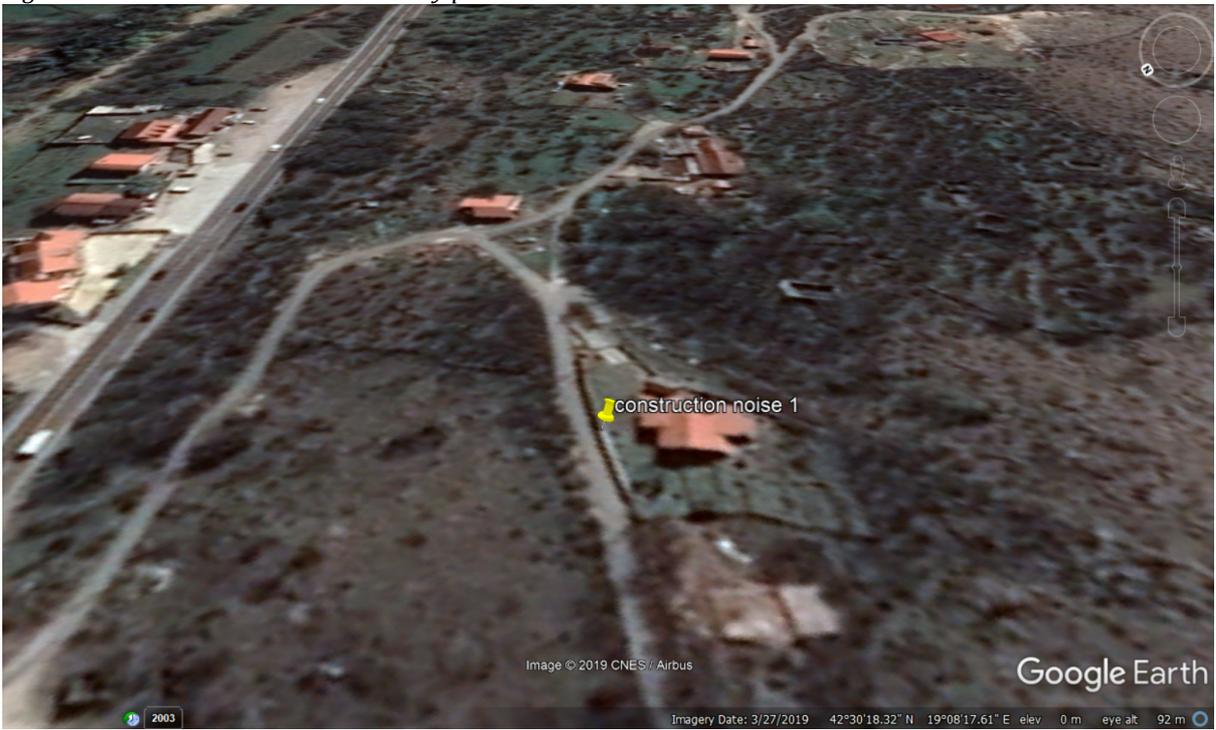
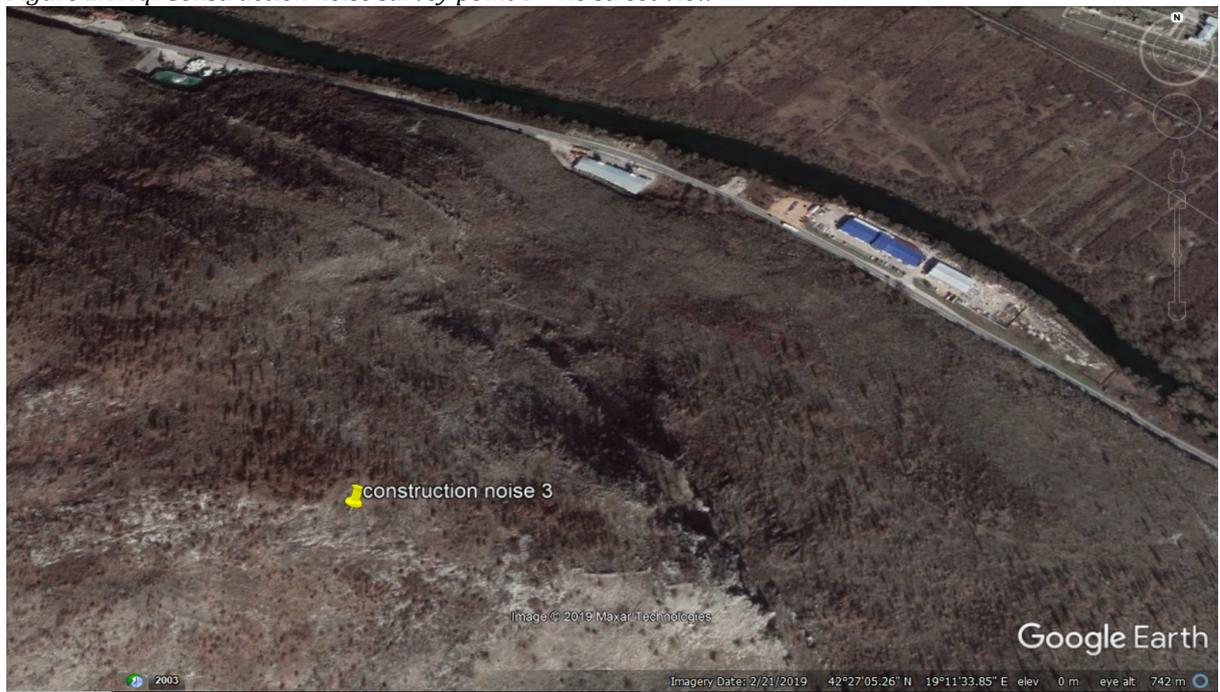


Figure 2.5.4p Construction noise survey point 2 – no street view



Figure 2.5.4q: Construction noise survey point 3 – no street view



3. Results

During the survey most vehicles were driving 10 - 20km above the speed limit, wherever there are no police patrols present.

In average, during 12 hours monitoring period there is one vehicle passing M-18 every 4.5 seconds. This number slightly increases during mid-July to mid-August period when is the peak tourist season in Montenegro.

According to traffic flow theory, with the average traffic flow of 53.5 vehicles/min and traffic density of 1,791.8 vehicles/km, M18 Danilovgrad – Podgorica road section overreaches the maximum mass flow rate (or flux) and exceeds its optimum density.

This practically means that traffic flow will become unstable and even a minor incident can result in persistent stop-and-go driving conditions on this section of the road.

Adding additional two lanes to this entire road section will improve current situation.

4. Conclusions

To obtain more accurate information it would be recommended to conduct traffic counts over the longer periods of time. The most economical way would be to do it using specialized cameras, capable of capturing traffic flow, installed at specific points along this road (maximum at 3-4 points on this road). This would provide 24/7 coverage and significantly larger amount of data – that would enable interested parties to obtain clearer picture of traffic parameters including distinction on domestic vs. foreign/transiting vehicles.

5. Constraints

Some of the common constraints traffic monitors experienced in the field during conducting traffic counts were:

1. Extreme heat

During days for monitoring team faced extremely sunny and hot weather where daily temperatures were ranging between 34-37° (which is 7-10° C above historical average). On some locations it was difficult to find appropriate shelters from sun so monitors had to improvise and frequently change positions in order to follow shade.

2. Social interactions with local people

Long presence of the monitors at the same location was triggering curiosity by neighborhood, especially on the first day. People from the shops, bars, nearby houses and bus stops approached monitors and were in the mood to have social interactions. This is to large degree cultural phenomena and "usual syndrome of the first day" that was expected and for which monitors were well prepared in advance.

Monitoring team was avoiding getting into lengthy conversations with people, provided short polite answers to questions, explaining purpose of their monitoring.