ECONOMIC AND FINANCIAL ANALYSIS

A. General

1. Macroeconomic Context

1. Georgia is located in the Southern Caucasus, at the crossroads of Europe and Asia. It is an important transit corridor for many countries in Central and West Asia, especially Armenia and Azerbaijan. As a result of economic and institutional reforms and sound macroeconomic policies, Georgia's economy expanded by 9.6% annually, on average, during 2003–2007, and withstood the effects of the 2008 armed conflict with the Russian Federation and the global economic crisis.

2. The recession in Russia and slower growth among other trading partners has impacted Georgia through lower exports and reduced remittances, particularly from Russia and Greece. Industrial production contracted by 1.0% in 2015 and growth slowed from 4.6% in 2014 to 2.8% in 2015. As of December 2016, the lari had lost 30% of its value since December 2014. The tightening of monetary policy together with low oil prices helped contain inflation during 2015 to 4.9%. A strong recovery in the agriculture sector and some resilience in trade and financial services helped avert a further decline. On the demand side, growth was supported by a 32.2% rise in net exports in 2013. Investment contracted by 12.2% in 2013 because of reduced public spending on infrastructure stemming from the rationalization of public outlays and auditing of existing contracts. On the supply side, growth was led by agriculture, financial intermediation, domestic trade, and tourism. Services grew by 3.1% in 2013 because of growth in financial services, real estate, wholesale and retail trade, tourism, communications, and transport. Gross domestic product (GDP) growth is expected to improve to 2.5% in 2016 and 4.5% in 2017.[1]

3. Georgia signed an association agreement with the European Union (EU) in June 2014. The agreement includes a Deep and Comprehensive Free Trade Area (DCFTA) and it marks several years of cooperation between Tbilisi and the EU under the Eastern Partnership program. It describes the gradual improvements needed in several areas, including transport, and removes existing barriers on the trade of goods and services with the EU.

2. Sector Context

4. Since 2005, Georgia has revised regulations and legislation on many aspects of transport-related infrastructure and services to facilitate rapid development of the transport sector. Increased economic activity following these reforms has led to more intensive use of the transport network, particularly for international links, and the sector's contribution to GDP has been growing by about 10% annually. However, improvements in overall national mobility are not as visible as in international sections of the network. For example, secondary and local roads do not meet the demands or expectations of the economy. Lack of transport options is considered a contributor to the high national unemployment rate, which stood at 12.4% in 2014.[2]

5. The road network is about 22,000 kilometers (km) long. Roads are functionally classified as international, secondary, and local. The Roads Department manages international and

[1] International Monetary Fund. *World Economic Outlook Database.* http://www.imf.org/external/data.htm (accessed 6 July 2016).
[2] National Statistics Office of Georgia. 2015. *Statistical Yearbook of Georgia 2015.* Tbilisi.

secondary roads (6,835 km in total). Five international roads totaling 859 km are used mainly by transit traffic. Two of these roads, the E60 and E70 of the European network, form Georgia's East–West Highway, part of the Europe–Asia corridor through the Caucasus. Georgia is a signatory to a number of international transport agreements for the continued development of an integrated road transport network that not only facilitates cross-border transit traffic but also contributes to regional cooperation and integration. The E60 carries more than 60% of the international freight moved by roads. Despite the significant rehabilitation program for secondary roads, to date mainly through World Bank support, the annual expenditure on maintenance is too low to keep the entire network in good condition. Road construction and maintenance are financed from government revenue and donor funds.[3]

6. The improvement of secondary roads is one of the five key strategic targets of Georgia's transport sector. The present condition of the project road, which extends for 50 km from Dzirula to Chumateleti, is very poor, with much of the original surfacing either badly damaged or completely removed. Villages along the road are not accessible during winter and suffer from substantial out-migration and lack of employment opportunities. The proposed project will rehabilitate the road to two-lane all-weather standard, to the extent possible within the existing road formation to minimize land acquisition and resettlement, and also because the existing road is typically located on a narrow bench between a cliff face, a river, and a railway, meaning that substantial widening would be both difficult and expensive.

3. Without-Project Scenario

7. The without-project scenario involves continued use of the existing two-lane road. The existing road varies in terms of width (roughly between 5 and 7 meters [m]). The road has already deteriorated to an unmaintainable condition for most of its length. A bituminous pavement along the road exists only from the beginning of the project road (km 0.0) to the town of Kharagauli and in the town itself, as well as at the end of the project road within the village of Chumateleti. On these sections the without-project scenario involves routine maintenance of the existing road, including pothole patching, crack sealing, edge repairs, and other summer and winter routine maintenance. For the remaining, largely deteriorated, sections, only emergency maintenance including regraveling and winter maintenance will be carried out.

4. With-Project Scenario

8. The with-project scenario involves 50 km of reconstructed all-weather standard road on the existing road following the standard wherever possible but departing from standard to avoid costly construction solutions and extensive resettlement at some locations. Absolute minimum values at these specific locations are a design speed of 20 km per hour, a curvature radius of 20 m, and pavement width of 6 m. Appropriate routine and periodic maintenance will be carried out after rehabilitation, to ensure that the road remains in service as close to its as-completed condition.

5. Options Analysis

9. The project road is located in a river valley in the country's central mountainous region, in a narrow corridor shared for most of its length by the main east–west railway. Given the relatively low traffic volumes, alternatives where the road would be relocated onto new alignments were not realistic in terms of economic or environmental feasibility. Therefore, the project road will remain on or close to the present alignment. There was, however, a choice of

[3] Asian Development Bank. 2014. *Georgia Transport Sector Assessment, Strategy, and Road Map.* Manila.

concrete pavement versus asphalt and this was reviewed by the Roads Department which selected asphalt pavement since it is more suitable for the secondary roads in terms of constructability and maintainability. In addition, two alternative approaches related to the alignment were considered in the feasibility study:

(i) following strictly the Georgian geometric design standard for this category road, or
(ii) departing from standards when the strict application of the standards would result in an excessively costly technical solution.

10. The Roads Department agreed to depart from the standard at 40 locations using minimum design values.[4]

B. Traffic Studies

11. The project road was divided into homogenous subsections in terms of traffic volume between significant settlements and junctions. Manual classified traffic counts were conducted and the results were converted into annual average daily traffic (Table 1). In addition, an origin–destination survey was carried out at km 10 especially to find out the proportion of the traffic travelling to the E60 via the western section of the project road to avoid travelling on the eastern sections which are in very poor condition. Table shows that the existing traffic is clearly concentrated on the section of the road between the access road to E60 at km 2 and Kharagauli town (km 10–13).

Table 1: Observed Baseline Traffic 2014
(number)

Section	Annual Average Daily Traffic	Car	Bus	Light Truck	Goods (2-axle)	Goods (3-axle)	Articulated	Motorcycle	Non-motorized
Km 0–2	50	40	3	2	1	1	1	1	1
Km 2–10	1,034	815	142	46	9	1	2	5	14
Km 10–13	1,857	1,448	176	139	31	9	3	30	21
Km 13–30	121	84	15	13	1	3	1	2	2
Km 30–50	184	134	16	19	1	1	1	4	6

Source: Asian Development Bank estimates based on traffic counts provided by the Roads Department and Kocks Consult.

12. The GDP growth forecasts for 2015–2020, which average 5.5%, were sourced from the World Bank[5] and International Monetary Fund.[6] Real GDP growth for 2021–2036 has conservatively been assumed to average 5% per annum during 2021–2026, 4% per annum during 2027–2031, and 3% per annum during 2032–2036.

13. Passenger vehicle traffic is considered to grow slightly faster than GDP while goods vehicle traffic, being driven directly by the economy, is commonly in line with GDP growth.

[4] This is the least-cost alternative which was acceptable to the government. A lower cost alternative was available, but required considerable sections of the road to be developed to standards below what could be accepted from road safety or maintenance considerations. The selected option is the most appropriate from cost and functional considerations, as addressed in the feasibility study.

[5] The World Bank. *Global Economic Prospects*. http://www.worldbank.org/en/publication/global-economic-prospects Accessed on 25 January 2017.

[6] International Monetary Fund. *World Economic Outlook Database.* http://www.imf.org/external/pubs/ft/weo/2016/02/weodata/index.aspx. Accessed on 25 January 2017.

Therefore, an elasticity value of 1.2 for passenger vehicles is used to translate GDP growth figures into traffic growth rates.

14. Generated traffic has been assessed as two components: (i) traffic resulting from improved accessibility for households and organizations served by the existing road; and (ii) traffic associated with new development stimulated by the rehabilitated road. Traffic demand is being suppressed by the high travel costs of using the road because of poor road condition. A willingness-to-pay survey was conducted along the project road where 160 households with a total of 498 persons were interviewed. Based on the survey, the trip rate of the people living along the road will increase from 0.31 to 0.53 trips per person per day (68%). Since the census data was relatively old at the time of the survey, and because the condition of the western section of the road is slightly better than the eastern section, the increased trip rate was reduced to 50%, producing an additional 60 vehicles per day for sections between km 13 and km 50 only. Based on the visitor forecast for Borjomi–Kharagauli National Park and the estimation of other business development in the region due to road rehabilitation, four passenger cars per day and 1.0% of total traffic were adopted for traffic generation.

15. Diverted traffic was considered based on the results of the origin–destination survey. The diversions were divided further into (i) traffic movements within the project road, (ii) traffic diversion from the Zestafoni road (which connects the project road from km 10 to the E60 at the town of Zestafoni), (iii) traffic diversion from Dzirula road (which connects the project road from km 2 to the E60 at the village of Dzirula), and (iv) traffic diversion from the E60 because of reduced travel time of some trips and diversion from the E60 during the reconstruction period and when the E60 is closed by landslides and/or adverse weather conditions. The total amount of diverted traffic varies from 26 to 278 vehicles per day depending on the road section. Table 2 shows the forecast demand on the project road aggregating normal, generated, and diverted traffic.

Table 2: Forecast Annual Average Daily Traffic
(number)

Section	2016	2021	2026	2031	2036
Km 0–2	56	484	737	928	1,107
Km 2–10	1,034	2,034	3,105	3,910	4,656
Km 10–13	1,857	3,242	4,955	6,232	7,415
Km 13–30	121	403	665	834	991
Km 30–50	184	516	851	1,067	1,267

Source: Asian Development Bank estimates based on traffic counts provided by the Roads Department and Kocks Consult.

C. Economic Costs

16. The economic costs of the project comprise (i) capital investment, which includes civil works, land acquisition and resettlement, as well as consulting services for construction supervision and social safeguard management; and (ii) road maintenance.

17. Financial costs of tradable goods were converted to economic costs in line with Asian Development Bank guidelines.[7] The economic analysis included land acquisition and resettlement costs, civil works, consulting services, and physical contingencies, but excluded taxes, price contingencies, and financial charges during reconstruction and rehabilitation. A standard conversion factor of 1.0088 and a shadow wage rate factor for labor of 1.00 and for

[7] ADB. 1997. *Guidelines for the Economic Analysis of Projects.* Manila.

unskilled labor of 0.79 were used to convert from financial to economic costs. The shadow wage rate was calculated in accordance with Appendix 12 of the Guidelines for the Economic Analysis of Projects.[8] The economic analysis was conducted based on the domestic price numeraire. Costs have been adjusted to reflect the cost escalation that has occurred since the feasibility study was completed (2015). Table 3 gives a breakdown of the investment costs used in the economic analysis.

Table 3: Summary of Economic and Financial Project Costs
($ million, 2015 prices)

Cost Item	Economic Cost	Financial Cost
Civil works (construction costs)	58.76	70.00
Physical contingencies (10%)	6.51	7.75
Price contingencies (15%)	0	6.55
Consulting services	4.49	5.30
Land acquisition and resettlement	1.05	1.20
Total	**70.81**	**90.80**

Source: Asian Development Bank estimates.

18. Maintenance costs have been estimated at $1,000/km for winter maintenance and general summer routine maintenance, and $300/km for the maintenance of structures. The cost of periodic asphalt overlays has been estimated at $30,000/km. These levels of expenditure are sufficient to sustain the improved condition of the completed project period. A residual value equivalent to 20% of the civil works investment costs (estimated by applying the straight-line depreciation method to individual project items based on assumed lifespans) has been included in the economic analysis.

D. Economic Benefits

19. The incremental economic benefits from the project are (i) vehicle operating cost (VOC) savings, and (ii) time cost savings. Benefits were calculated based on the traffic forecasts presented in Table 2 and costs presented in Table 3.

20. Savings in VOCs accrue from better traffic conditions and a higher level of service on the improved road. Unit rates for VOC per km by international roughness index value have been derived from the application of the Highway Development and Management (HDM-4) model. International roughness index values for the upgraded road are forecast to start from 2.0 at completion, and at the end of the analysis period to be 6.3 on average. VOCs were estimated for each vehicle class at the end of 2014, using data on the price of new vehicles, tires, fuel, lubricating oil, crew wages, and annual overhead and maintenance costs.

21. Savings in travel time costs will result from higher permissible vehicle speeds, increased levels of service, and easier overtaking conditions. Average speeds are calculated by the traffic model by applying speed flow formulae that link average speeds to road type and volumes on roads. Values of working time were calculated based on existing data on salaries and wages. According to data from the National Statistics Office, in 2013 the average salary in Georgia was GEL770 per month. This average salary was, however, rounded up to GEL1,000 for passenger car drivers and GEL800 for other drivers and all passengers to reflect the higher salary level of the car owners and users. After the inclusion of the 20% employer's social payment, the actual average salaries are $677.95 per month or $3.85 per hour for passenger car drivers and $542.78 per month or $3.08 per hour for other drivers and all passengers. The value of

[8] Lagman-Martin, Anneli. 2004. Shadow Exchange Rates for Project Economic Analysis: Toward Improving Practice at the Asian Development Bank. *ERD Technical Note Series No. 11.* Manila. Asian Development Bank.

nonworking time was taken as 30% of the value of working time. The value of time was assumed to increase in line with changes in forecast real GDP per capita.

22. Average vehicle occupancy was derived from the origin–destination survey, which found 2.31 persons per car or light vehicle and 7.46 persons per small bus. As the VOC unit rates include a crew cost component, the time savings calculation did not include any savings in terms of goods vehicle crew, as this would represent double counting. About 57% of all occupants, including crew, of cars, 88% of passengers on minibuses, and 67% of passengers on medium and large buses were assumed to be traveling for work.

23. The disruption to traffic during construction has not been taken into account in the economic analysis because of low existing traffic volumes and the fact that (i) the poor existing condition of the road already suppresses traffic demand, and (ii) the average travelling speed will not decrease during construction significantly since it is already very low.

E. Results of Economic Analysis

24. The economic assessment has been carried out using the standard appraisal methodology that compares the incremental benefits derived from reductions in VOCs and travel times resulting from the construction of the road against the initial investment costs and required operation and maintenance costs over the 23-year appraisal period, including a 3-year period for project construction.[9] The results of the economic analysis are shown in Table 4, expressed as the key economic indicators of benefit–cost ratio, economic internal rate of return (EIRR), and net present value at 12% discount rate. The cost and benefit streams over time for the project are also included in the table. The results indicate that the project is economically viable. The EIRR for the total project is 12.6% and the net present value is $2.33 million.

Table 4: Benefit and Cost Streams
(2015 domestic prices, $ million, undiscounted)

Year	Capital Costs	Incremental Change of Maintenance Costs	VOT savings	VOC savings
2017	6.44	(0.03)	0.00	0.00
2018	25.76	(0.03)	0.63	1.14
2019	32.20	(0.05)	0.68	1.25
2020	0	(0.03)	2.57	3.33
2021	0	(0.03)	2.74	3.57
2022	0	(0.03)	2.93	3.83
2023	0	(0.03)	3.13	4.11
2024	0	(0.03)	3.34	4.39
2025	0	(0.03)	3.54	4.64
2026	0	(0.07)	3.75	4.90
2027	0	(0.03)	3.96	5.15
2028	0	(0.03)	4.13	5.38
2029	0	(0.03)	4.32	5.64
2030	0	(0.03)	4.59	6.00
2031	0	0.10	4.90	6.40
2032	0	(0.03)	5.24	6.84
2033	0	0.10	5.61	7.29
2034	0	(0.03)	5.98	7.76
2035	0	0.10	6.35	8.19
2036	0	(0.07)	6.74	8.65
2037	0	0.10	7.15	9.09
2038	0	(0.03)	7.59	9.52

[9] Total impacts of the diverted traffic including the traffic movements from/to the adjacent roads, as explained in para. 17, were modeled with HDM-4.

Year	Capital Costs	Incremental Change of Maintenance Costs	VOT savings	VOC savings
2039	(12.88)	0.10	8.05	9.87
Total	**51.51**	**(0.16)**	**97.90**	**126.92**
			EIRR	**12.6%**
			NPV	**2.33**
			BCR	**1.05**

( ) = negative, BCR = benefit–cost ratio, EIRR = economic internal rate of return, NPV = net present value, VOC = vehicle operating cost, VOT = value of time.
Source: Asian Development Bank estimates.

25. Table 4 demonstrates that benefits will commence even during the construction period. This is based on the assumption that the road will be opened incrementally. This is because both ends of the project road are connected to the East–West Highway, which provides a good opportunity for both contractors to begin from the East–West Highway in terms of logistics. Utilizing this advantage would provide better access from the villages which are locating closest to the highway from early in the implementation period.

26. Sensitivity tests and calculations of switching values were carried out to determine the effect of variations in key input parameters on the economic indicators (Table 5). The project is only slightly viable at a base case mainly because of low initial traffic volumes. The sensitivity analysis shows further that the EIRR will fall to 12% or below if construction costs increase or road user savings are not achieved fully. On the other hand, the EIRR remains above 10% at all cases which is acceptable for projects where additional unvalued benefits can be demonstrated, as stated in the Guidelines for the Economic Analysis of Projects (footnote 6). A willingness-to-pay survey was conducted to assess the suppressed demand due to the poor condition of the road.

Table 5: Sensitivity Analysis
(2015 domestic prices)

Scenario	Benefit–Cost Ratio	NPV ($ million)	EIRR (%)	Switching Value (%)
Base case	1.05	2.33	12.6	
Construction cost + 10%	0.95	2.50	11.4	5
Maintenance costs + 20%	1.01	1.22	12.3	3
Vehicle operating cost savings – 10%	0.99	(0.54)	11.9	(9)
Travel time cost savings – 10%	1.00	0.16	12.0	(10)
Traffic lower – 20%	0.84	(7.75)	10.0	(10)

( ) = negative, EIRR = economic internal rate of return, NPV = net present value.
Source: Asian Development Bank estimates.

27. Potential benefits for tourism and other businesses of the region were assessed to demonstrate the additional unquantified benefits which would be realized after the rehabilitation of the road. The project road serves Kharagauli region which is a well-known tourism area with a wide range of attractions. The improvement of the road will attract more visitors and tourists to the area, generating indirect economic benefits for the businesses along the road, including tourism related services, and agriculture, transportation and construction, and real estate services.

F. Results of Financial Analysis

28. The financial management function of the project will be handled by the Roads Department through the Eurasian Transport Corridor Investment Center (ETCIC). The ETCIC will be responsible for the flow of funds, accounting, budgeting, financial reporting, and auditing. It has been involved in implementation of several International Financing Institution (IFI)-

financed transport projects, including by the World Bank and Asian Development Bank, since 2009. The financial management arrangements of the ETCIC have been found to be satisfactory. They have been reviewed periodically by the World Bank as a part of its ongoing project implementation support, as well as during the financial management assessment, conducted in October 2016.

29. Overall, the ETCIC and Roads Department have satisfactory planning and budgeting capacity in place. The ETCIC is capable of preparing budgets, as has been demonstrated on several IFI-financed projects during recent years. The ETCIC also has overall adequate financial management staffing capacity. The financial management staff comprises a financial manager, a financial specialist, an accountant, a small-value contracts manager, and a disbursement specialist who is mostly involved with an ongoing Asian Development Bank project. The ETCIC utilizes Oris accounting software, which is used by most of the IFI-financed projects in Georgia and is adequate for accounting and reporting purposes.

30. Routine and periodic maintenance in Georgia depends entirely on the government budget and has been underfunded by international norms. Expenditures on routine maintenance, including winter maintenance, were about $17 million per year during 2007–2014 for both international and secondary roads, which represents less than $2,500 per km per year. Although the total road sector expenditures share of GDP tripled during 2004–2013, most of this spending was allocated to capacity expansion of the East–West Highway corridor, which is another major focus of the government. Public expenditure for capital investment (construction and rehabilitation) in the road subsector increased by 13% per year between 2007 and 2014 but budget allocations for road maintenance (routine and winter maintenance) remained erratic and increased by only by 6% per year during the same period. The government is, however, committed to ensure a streamlined and planned approach to maintenance. The Roads Department uses a road asset management system with appropriate road condition measurements to monitor network condition and prepare effective road maintenance plans within the budget available. All road maintenance works are contracted out to private companies after competitive bidding processes. Maintenance contracts are based on a bill of quantities and the contractor's unit prices which are procured year by year in packages. The government is in the process of adopting output and performance-based contracting with several pilot projects ongoing through World Bank financing.

31. The project is not revenue generating and the sustainability of the maintenance funding is a key to ensure that the project will be sustainable for its intended service life. The incremental maintenance costs associated with the project road are estimated to be negative (–$0.16 million, undiscounted) for years 2017–2039. Based on the government's commitment to maintain a similar or increased level of budget for road maintenance works as in the previous years, and given the project road's significant role as an alternative route for the E60, it is reasonable to expect that funds will be available to meet the maintenance costs of the project.

32. In consultation with the government and other IFIs, the proposed project will assist the Ministry of Regional Development and Infrastructure (MRDI) and Roads Department implement the financial management assessment recommendations. The overall financial management risk for this project before and after mitigation measures is assessed *moderate*.