FINANCIAL ANALYSIS

A. Introduction

1. Financial analysis was conducted for the Darkhan Wastewater Management Project following Asian Development Bank (ADB) guidelines[1] including: (i) project financial viability analysis; (ii) assessment of affordability and willingness to pay; (iii) assessment of operational and financial strength of the operator, Darkhan Us Suvag (DUS), the city's utility company; and (iv) fiscal impact assessment on Darkhan-Uul *aimag* (province) government (DAG), the implementing agency and end-borrower of the loan, to ensure capacity for timely provision of counterpart funds, debt servicing, and operation and maintenance (O&M) costs.

B. Project Financial Analysis

2. Financial projection covers 25 years to compute the required annual revenues, to ensure the cumulative cash flow would meet cash operating costs, depreciation, and debt service. Cost streams to calculate the financial internal rate of return (FIRR) comprise capital investment and O&M costs. Capital costs include wastewater treatment plant (WWTP), pump stations, and sewer pipe rehabilitation costs. O&M costs include personnel salaries, cost of chemicals and agents, utilities, maintenance, administration, and overheads. Revenues come from wastewater treatment fees. Demand projections are based on growth of population connected to the sewer network, estimated at 45,000 in 2013, growing at an average of 1.04% annually. Daily per capita water use is estimated at 125–150 liters and industrial water consumption was assessed based on actual and projected use. Wastewater generation is assumed at 80% of water consumption. Income tax is assumed at 10%. The foreign exchange rate used in the analysis is MNT1,690 = $1.00. Inflation rates applied are: for foreign, –1.6% in 2013, 2.3% in 2014, 2.4% in 2015, and 1.4% in 2016 onward; and for local, 9.5% in 2013, 10.0% in 2014, and 8.0% in 2015 onward.

3. **Weighted average cost of capital.** If the FIRR exceeds the weighted average cost of capital (WACC), the project is deemed financially viable. The nominal interest rates applied are (i) loan from the Asian Development Fund at 2.0% per annum; (ii) loan from ADB's ordinary capital resources at 3.18% per annum;[2] and (iii) government contribution at 15% based on prevailing commercial bank rates, representing the opportunity cost of capital. Foreign currency inflation is at 1.4% for the ADB loans, and local inflation at 9.0% for the government contribution. Interest rates are computed on an after-tax basis, resulting in a WACC, in real terms, of 1.41%. The total investment is MNT34,957 million, of which MNT31,268 million will be financed by ADB and MNT3,689 million by the government.

Table 1: Weighted Average Cost of Capital

Item	Total Cost	ADF Loan	OCR Loan	Government
Amount (MNT million)	34,957	15,333	15,935	3,689
Weighting	100.0%	43.8%	45.6%	10.6%
Nominal cost		2.0%	3.18%	15.0%
Tax rate		10.0%	10.0%	0%
Tax-adjusted nominal cost		1.8%	2.9%	15.0%
Inflation rate		1.4%	1.4%	9.0%
Real cost	7.3%	0.4%	1.4%	5.5%
Real WACC	1.41%	0.17%	0.66%	0.58%

ADF = Asian Development Fund, OCR = ordinary capital resources, WACC = weighted average cost of capital.
Source: Asian Development Bank estimates.

[1] ADB. 1999. *Handbook for the Economic Analysis of Water Supply Projects*. Manila; ADB. 2005. *Financial Management and Analysis of Projects*. Manila; ADB. 2009. *Financial Due Diligence: A Methodology Note*. Manila.

[2] London interbank offered rate (LIBOR)-based, using the US dollar fixed-swap rate at 2.58% per annum plus the ADB spread at 0.50% and premium at 0.10%.

4. **Cost recovery.** DUS has been operating at a loss in 2009, 2010, 2012, and 2013. At the end of 2012 a net loss of MNT717 million (about $0.40 million) incurred, and at the end of 2013 the deficit was MNT374 million. DAG provides budget support, in part from national government transfers, and needs to provide MNT374 million to cover losses for 2013. However, assuming that timely and adequately increased tariffs will be implemented beginning 2015, it is projected that no further operational subsidies will be required from DAG.

5. **Tariffs.** Water and wastewater tariffs differentiate between domestic and non-domestic customers. In 2013, over 90% of connections in Darkhan were metered and DUS targets 100% by December 2014. At full operation of the project in 2017, all tariffs will be volumetric, in line with national policy. Current tariffs are categorized based on domestic and non-domestic type connections and uniformly applied across Darkhan *soum* (district). Since October 2010, water and wastewater tariffs have remained at the same levels. The proposed WWTP project will entail increases in O&M costs as a result of larger treatment volume and debt service obligations. To recover costs, tariffs need to be adjusted. An application to approve tariff increases was submitted to the various agencies including the Ministry of Finance and Water Services Regulatory Commission for final approval by the Competition and Consumer Rights Agency. The tariff adjustment is anticipated to be approved by the end of 2014, which is necessary to cover losses from previous years. To attain financial self-sufficiency for the project in the coming years, it is necessary to implement a 30% tariff increase in 2015 for domestic and non-domestic wastewater tariffs. To maintain a level of profitability in the succeeding years, tariff increases are designed to meet new sustainability targets. Table 2 presents the tariff schedule.

Table 2: Schedule of Anticipated Tariff Increases
(MNT per cubic meter)

Item	2011–2014	2015–2017	2018–2020	2021–2023	2024 onward
Wastewater					
Domestic	700	910	1,046	1,046	1,046
Non-domestic	1,179	1,532	1,762	1,762	1,762
Average effective	880	1,148	1,326	1,326	1,326
% Increase		30%	15%	0%	0%
Water					
Domestic	650	845	1,098	1,428	1,856
Non-domestic	1,200	1,560	2,028	2,636	3,427
Average effective	788	1,029	1,346	1,761	2,305
% Increase		30%	30%	30%	25%

Source: Asian Development Bank estimates based on DUS projections and requests to National Water Source Regulatory Committee.

6. **Financial internal rate of return and sensitivity analysis**. Based on the discounted cash flow analysis, the FIRR for the proposed WWTP project is 3.1% exceeding the WACC at 1.41%, with a financial net present value of MNT7,635 million over the period. Hence, the project is financially viable. Sensitivity tests are performed to determine the effects on project viability under adverse conditions. The project remains robust with a 10% increase in capital cost, a 10% increase in O&M cost, and a 10% decrease in revenue. The project remains feasible despite an assumed 1-year delay in implementation. Table 3 shows the FIRR and sensitivity analysis results.

Table 3: Financial Internal Rate of Return and Sensitivity Analysis Results

Item	Base Case	Cap Cost +10%	O&M Cost +10%	Revenue –10%	Delay by 1 year
FIRR (%)	3.1%	2.3%	2.3%	1.5%	1.9%
FNPV (MNT million)	7,635	4,584	4,124	310	2,202

FIRR = financial internal rate of return, FNPV = financial net present value, O&M = operation and maintenance.
Source: Asian Development Bank estimates.

C. Affordability and Willingness to Pay

7. The affordability analysis examined the levels of water and wastewater expenditures against total average household incomes. A field survey conducted in January 2014 and DUS statistics provided the average household size (four persons), household water consumption, and household incomes. Table 4 shows the summary affordability analysis for both average- and low-income households for the periods following the proposed adjustments of tariffs.

Table 4: Affordability Analysis

Item	Unit	2015	2018	2021	2024
Average Household					
Average household income	MNT	732,335	790,922	854,196	854,196
Average household sewerage bill	MNT/m	10,964	13,087	13,545	13,942
Income spent for sewerage		1.5%	1.7%	1.6%	1.6%
Average household water bill	MNT/m	8,956	14,147	21,162	30,613
Income spent for water	rate	1.2%	1.8%	2.5%	3.6%
Combined spending	**rate**	**2.7%**	**3.4%**	**4.1%**	**5.2%**
Low-Income Household					
Average household income	MNT	322,904	348,737	376,636	376,636
Average household sewerage bill	MNT/m	7,309	8,724	9,030	9,295
Income spent for sewerage	MNT/m	2.3%	2.5%	2.4%	2.5%
Average household water bill	MNT/m	5,970	9,431	14,108	20,408
Income spent for water		1.8%	2.7%	3.7%	5.4%
Combined spending	**rate**	**4.1%**	**5.2%**	**6.1%**	**7.9%**

Source: Asian Development Bank estimates.

8. The average household will spend 1.5%–1.7% of total household income on wastewater services and 2.7%–5.2% on water and wastewater combined from 2015 to 2024. An internationally accepted rule for wastewater tariff affordability is around or below 2%–3% of household average income. Accepted affordability levels for a combined water and wastewater tariff are 6%–8% of household income. Hence, the proposed tariffs are deemed affordable for average households.

9. Low-income households with 44% of average income will spend 2.3%–2.5% of the average income on wastewater and 4.1%–7.9% on combined water and wastewater. Hence, the proposed tariffs are deemed affordable for low-income households.

10. Based on survey results, the mean willingness to pay (WTP) for a wastewater service fee of apartment dwellers in Darkhan is MNT1,076 per cubic meter (m^3) ($0.64/$m^3$). If the WTP amount were an estimate of actual tariff requirements for cost recovery, the proposed tariffs in Table 2 match consumer expectations for the benefits of improved service.

D. Operational and Financial Strength of Darkhan Us Suvag

11. **Past financial performance.** The past financial management of the operator of project facilities (DUS) was assessed to determine its performance in terms of services delivery, profitability, and financial strength from 2009 to 2012. DUS uses the accounting system required by the government, which is based on the accrual method, following international accounting standards. DUS systems are almost completely computerized.

12. **Profit and loss.** Wastewater service revenues grew at a compounded annual average growth rate of 4.1%, and water supply revenues grew at 11.5% during the period of 2010 to 2012. In 2012, the O&M cost for water supply increased without the benefit of a tariff increase, and DAG provided a subsidy to cover the shortfall. The 2012 increase in other revenue reflected the infusion as mainly interest income. However, the subsidy was insufficient to cover the debt

burden, which increased by 352% from MNT183 million in 2011 to MNT827 million in 2012—resulting in a net loss of MNT717 million. In 2013, the O&M cost for water and wastewater increased by 15%. The 32% increase in revenue failed to cover the deficit and the DAG subsidy provided was less than in 2012. DUS applied for a tariff increase in 2013 but approval remains pending.

13. **Balance sheets.** DUS fixed assets reflected the magnitude of system expansion of 270% from 2010 to 2011. The improvements were funded by capital infusion from several short-term commercial loans amounting to MNT1,540 million with interest rates from 1.0% to 1.8% per month, payable in 3–12 months. The current ratio (current assets to current liabilities) averages 2.0. Current assets comprise 73% receivables, 3% cash, and 24% inventories and other current assets. Current liabilities comprise 47% short-term loans, 31% payables, and 22% other current payables.

14. **Financial projections.** Detailed financial projections are prepared to assess the impact of the proposed WWTP project on DUS overall operations. Pro-forma statements are utilized to reflect financial profitability, funds availability, and financial position. The projections are in nominal terms, covering a 25-year period, and follow ADB guidelines.

15. The main financial viability parameters include (i) operating ratio, which should be less than or equal to unity when the project becomes fully operational; (ii) debt service coverage ratio, at minimum 1.5 average during the loan period; and (iii) tariff affordability, generally acceptable at maximum 6%–8% for water and wastewater. Cost recovery is analyzed at different levels: the projections determine the tariff levels needed to cover O&M costs and debt servicing from the project and if feasible, depreciation and reinvestment margins.

16. Generally, the indicators show a satisfactory forecast for operations starting in 2015, with annual net profits resulting from appropriate tariffs based on cost recovery. The tariff increases during the period are limited to ensure affordability for low-income households, and are deemed sufficient, if implemented as planned. Cash will have accumulated to MNT7,003 million by 2024 and all expenditures will be fully covered. The return on net fixed assets at 8% average is in line with the industry average, which is 8% for most utilities. The proposed tariffs are structured to fully recover O&M cost plus debt servicing and depreciation, while ensuring affordability. The operating ratio for combined O&M for water and wastewater reflects satisfactory compliance of the conditions. Minimum debt coverage is attained during the loan period, averaging 1.6, higher than the acceptable industry level of 1.5. Debt–to–equity and debt–to–assets ratios are within acceptable levels, averaging 23% and 26% respectively from 2015 to 2040. The current ratio is 1.6 and reflects DUS being in a satisfactory financial position.

E. Fiscal Impact Assessment of the Project on Darkhan-Uul *aimag* government

17. **Historic revenue and expenditure.** The performance of DAG as end-borrower was analyzed to determine its financial capacity to provide counterpart funds during implementation, and O&M and debt service during operation. Revenue and expenditure data from 2009 to 2013 were analyzed and financial projections until 2030 were prepared to assess financial performance including capital structure, internal funds generation to support current operations, debt service capacity, and ability to finance O&M of the project after completion. Central government transfers comprised 88% of total revenues, and non-tax revenue comprised 12%. Of the revenues, 78% were allocated for the operations budget. Fiscal expenditures include employee salaries (32%); goods and services (31%); programs and events (17%); fixed asset

utilization (18%); and transfers to *soums*, social welfare, rent, and other expenses (2%). The average growth rate during the period was 33% for revenue, and 32% for expenditures.

18. **Results of fiscal impact assessment**. Financial projections are based on DAG historic revenue and expenditure growth patterns of 20%–25% annually from 2009 to 2013. Table 5 summarizes the effects of project cash requirements on DAG operations.

Table 5: Project Fund Requirements as Percentage of Revenue
(MNT million)

Item	2015	2016	2017	2018	2019	2020	2025	2030
Total revenues	16,009	20,811	27,055	35,171	45,723	61,726	192,892	565,114
Total expenditures	15,123	18,148	22,140	27,675	35,147	48,503	178,240	548,014
Project counterpart	360	1,306	1,079	780	164	0	0	0
% Total expenditures	2.4	7.2	4.9	2.8	0.5	0	0	0
% Total revenues	2.3	6.3	4.0	2.2	0.4	0	0	0
Project O&M cost	0	0	0	0	0	301	2,334	5,852
% Total revenues	0	0	0	0	0	0.5	1.2	1.0
Project debt service	0	0	0	0	0	2,021	2,021	2,021
% Total revenues	0	0	0	0	0	3.3	1.0	0.4
Total funds required	360	1,306	1,079	780	164	2,322	4,355	7,873
% Total revenues	2.3	6.3	4.0	2.2	0.4	3.8	2.3	1.4

O&M = operation and maintenance.
Source: Asian Development Bank estimates.

19. As a percentage of annual revenues during the loan grace period from 2015 to 2019, the annual DAG counterpart funds are estimated at 0.5%–7.2% of total annual fiscal expenditures, and slightly lower at 0.4%–6.3% of total annual fiscal revenue. After project construction, the wastewater O&M cost is projected to be 0.5%–1.2% of total fiscal revenue. Project debt service is forecast to be 0.4%–3.3% of total revenue, averaging 0.8% over the debt payment period. Combining all project fund requirements, the percentage to total annual fiscal revenue is 0.4%–6.3%.[3] These findings indicate that the fiscal risk is moderate, as fiscal revenue is expected to continue to grow in line with national rates, and economic growth is estimated at 20% annually, with support by the central government.

F. Conclusions

20. The project is financially viable and sustainable. DAG is committed to provide the subsidies to cover past losses, and will provide additional subsidies to cover O&M costs and debt service if required. Based on the fiscal impact analysis, DAG has the financial capacity to provide these subsidies. The anticipated tariff increases will further ensure the project's financial sustainability. However, the financial action plan needs to be implemented, by DAG, including (i) implementing tariff increases as suggested, (ii) assuring sufficient budget allocation to provide timely counterpart funding, and (iii) ensuring affordability assessments and social mitigation measures, including carrying out public awareness campaigns, a consultation and participation plan, and subsidies programs for the poor and vulnerable prior to increasing tariffs for water and wastewater services.

[3] Based on generally accepted criteria employed by the World Bank, the counterpart contributions are considered affordable to the municipality if the required annual amount does not exceed 15%–20% of the projected annual construction budget. As this is difficult to assess with available municipal construction budget data, the annual contribution is compared with the overall annual municipal expenditure and as a share of special infrastructure projects funded by the government. In the case of debt service, the acceptable standard is that debt service payments associated with the project should not exceed an average 2.5% of municipal revenues.