

REVISED ECONOMIC AND FINANCIAL ANALYSIS

1. The Project supports the government goals to provide adequate sanitation to 100% of the population and eradicate open defecation through the development of sewerage systems in four cities in Indonesia.
2. The investments are expected to reduce the incident of diarrhea and gastroenteritis, dengue, typhoid, and skin diseases, which are among the major sanitation-related illness prevalent in the four project cities. The economic impacts of these diseases in terms of health care costs and productivity losses are significant.¹ Incidence of these diseases and pollution of surface and underground water are expected to increase with increasing population and urbanization without proper collection, treatment, and disposal of wastewater.
3. The provision of an off-site sewerage system is part of each city's sanitation strategy and wastewater master plan.

A. Economic Analysis

1. Basic Approach and Methodology

4. The basic approach and methodology for economic analysis of subprojects are similar with those applied during the appraisal, and are in accordance with the Guidelines for the Economic Analysis of Projects of the Asian Development Bank (ADB) and related ADB manuals.² The following adjusting factors, which affected by inflation from year 2012, were applied: (i) the economic internal rates of return (EIRR) and economic net present value (ENPV) were computed from the benefit-cost streams and comparing economic cost of capital (EOCC) of 12%, (ii) the beneficiary population considered in the evaluation included both the on-site and off-site users.
5. Economic benefits, which were quantified include (i) health care cost saving from reduced incidence of disease, (ii) productivity savings or avoided loss of finance, (iii) avoided costs of septic tank desludging and/or construction, and (iv) averted costs of accessing polluted water for drinking and other domestic uses. The unquantified benefits, which may improve the feasibility of subprojects include the following: (i) health costs and productivity savings from reduced incidence of diseases other than diarrhea, typhoid, dengue and skin diseases, (ii) value of sludge, which is a by-product of wastewater treatment process either as in-filling materials, soil conditioner or agricultural fertilizer, (iii) increased productivity and value of agricultural/fish catch due to reduced water pollution, (iv) increased value of lands that were previously made unusable or were rendered marginally productive because of pollution caused by poor sanitation, and (v) impact of improved wastewater management and reduced pollution on local tourism and economy.
6. Economic costs are derived from financial estimates of investments and operation and maintenance costs net of taxes, duties, and price contingencies.

¹ World Bank. 2008. *Economic Impacts of Sanitation in Indonesia*. Washington, DC.

² ADB. Year. *Guidelines for the Economic Analysis of Projects*. Manila.

7. Economic analysis was prepared for the base case. Sensitivity tests were carried out to determine the impact of changes in key variable (e.g. investments, operation and maintenance cost, and benefits) on subproject viability.

2. Costs and Benefits

8. Economic costs include investments for sewer networks, treatment plants, land, resettlements, consulting services, and project implementation support. They are derived from the financial estimates after adjustments following the described methodology. Economic benefits are estimated using the assumptions in the following paragraphs.

a. Jambi Sewerage System

9. The number of users is 11,000 connections for the off-site system (including the community-based systems) and 42,432 for the on-site systems (desludging/septage).

10. The following ENPV and EIRR were computed based on the total households projected in 2016:

Table 1: Economic Internal Rates of Return and Economic Net Present Value (All Scenarios), Jambi Subproject

	NPV discounted @12%	NPV	EIRR
1. Base Case		213,834.9	17.5%
2. 10% increase in investments		169,863.0	16.0%
3. 10% increase in incremental O&M costs		211,740.3	17.4%
4. 10% reduction in health cost savings		189,355.8	16.9%
5. 10% reduction in total benefits		146,385.0	15.8%
6. Combination of 2,3 and 4 (worst case)		100,318.6	14.4%
7. One-year delay in project benefits		214,834.9	17.5%

EIRR=economic internal rates of return, NPV=net present value

11. At current projections, the results suggest that the project is feasible as the EIRR values are higher than 12% in all scenario hypotheses.

b. Makassar Sewerage System

12. The number of users is 12,000 connections for the off-site system (including the community-based systems) and 36,312 for the on-site systems (desludging/septage).

13. The following ENPV and EIRR were computed based on the total households projected in 2016:

Table 2: Economic Internal Rates of Return and Economic Net Present Value (All Scenarios), Makassar Subproject

NPV discounted @12%	NPV	EIRR
1. Base Case	84,139.8	13.2%
2. 10% increase in investments	29,888.4	11.9%
3. 10% increase in incremental O&M costs	82,450.9	13.1%
4. 10% reduction in health cost savings	78,521.5	13.1%
5. 10% reduction in total benefits	20,421.4	11.7%
6. Combination of 1,2 and 5 (worst case)	-35,518.9	10.5%
7. One-year delay in project benefits	9,745.3	11.7%

EIRR=economic internal rates of return, NPV=net present value

14. The projections suggest that the project is feasible in the base case scenario. It remains feasible in the scenario when incremental operation and maintenance costs are increased by 10% as well as in the scenario when the health cost savings are reduced by 10%. However, the EIRR value becomes below 12% (11.9%) in the scenarios when the investment costs are increased by 10%; 11.7% when the total benefits are reduced by 10% ; and 10.5% in the combination of

c. Palembang Sewerage System

15. The number of users is 12,000 connections for the off-site system and 50,000 for the on-site systems (desludging/septage).

16. The following ENPV and EIRR were computed based on the total households projected in 2016:

Table 3: Economic Internal Rates of Return and Economic Net Present Value (All Scenarios), Palembang Subproject

NPV discounted @12%	NPV	EIRR
1. Base Case	49,408.0	13.1%
2. 10% increase in investments	-10,292.4	11.8%
3. 10% increase in incremental O&M costs	47,029.2	13.0%
4. 10% reduction in health cost savings	34,104.2	12.8%
5. 10% reduction in total benefits	-16,852.1	11.6%
6. Combination of 2,3 and 4 (worst case)	-78,931.3	10.4%
7. One-year delay in project benefits	-20,369.3	11.6%

EIRR=economic internal rates of return, NPV=net present value

d. Pekanbaru Sewerage System

17. The number of users is 11,000 connections for the off-site system (including the community-based system) and 42,987 for the on-site systems (desludging/septage).

18. The following ENPV and EIRR were computed based on the total households projected in 2016:

Table 4: Economic Internal Rates of Return and Economic Net Present Value (All Scenarios), Pekan Baru Subproject

	NPV discounted @12%	NPV	EIRR
1. Base Case		193,002.8	16.7%
2. 10% increase in investments		142,689.9	15.2%
3. 10% increase in incremental O&M costs		191,096.3	16.7%
4. 10% reduction in health cost savings		184,766.9	16.5%
5. 10% reduction in total benefits		122,055.2	15.0%
6. Combination of 2,3 and 4 (worst case)		69,835.9	13.6%
7. One-year delay in project benefits		117,764.2	14.6%

EIRR=economic internal rates of return, NPV=net present value

B. Financial Analysis

19. The financial analysis was prepared for the four subprojects in accordance with the Financial Management and Analysis of Projects of the Asian Development Bank (ADB).³ The analysis covers the investments for each subproject in the cities of Jambi, Makassar, Palembang and Pekan Baru.

20. The objectives of the financial analysis are to assess: (i) the viability of the proposed investment and amount of cost recovery, (ii) the affordability of the proposed wastewater tariff to target beneficiaries, and (iii) the sustainability of future operations of the wastewater treatment and collection systems.

1. Methodology and Assumptions

21. The key financial and technical assumptions used in the financial projections are as follows: (i) price level; constant cost at March 2015 prices, (ii) domestic cost escalation 5.1% at 2016, 4.9% at 2017, and 4.6% 2018 and onwards, (iii) the sewer user tariff with a 5% annual adjustment.

22. The district services delivery body (BLUD) is the preferred wastewater system operator for Jambi, Makassar and Pekan Baru. The Unit Pelaksana Teknis Daerah (UPTD) for wastewater management was established to handle the preparatory, implementation and operating activities pending the creation of BLUD. The SDO for Palembang will be PDAM Tirta Musi Palembang (Perusahaan Daerah Air Minum, water supply utility), a city owned enterprise operating the city water supply system.

23. The total development costs for the subprojects are based on the costs presented for the technical study with additional price contingencies to allow for the timing of implementation. The

³ ADB. 2005. *Financial Management and Analysis of Projects*. Manila.

wastewater systems aim to provide an effective wastewater treatment and collection service up to 2025. The plans involve the development of wastewater treatment plants including septage treatment units; construction of a wastewater collection system comprising trunk and main sewers, laterals, and interceptors, installation of service connections; construction of community-based sewerage systems, acquisition of land and involuntary resettlements, and land preparations.

24. The works are scheduled to start implementation by the second half of 2017 and targeted for completion in 2020 with the fill operation of the systems in 2025 (installment of all property connections). All acquisition of land and detailed engineering designs are targeted to be completed by 2016. Details of the costs for each city are presented in Table 5.

Table 5: Detailed Costs by City (\$million)

Item	Jambi	Makassar	Palembang	Pekan Baru
Investment Costs				
1 Land acquisition, resettlement and land preparation	2.7	2.9	2.1	2.8
2 Civil Works	52.85	68.75	73.8	60.3
3 Consulting Services	4.29	5.59	5.47	4.29
Recurrent Cost				
1 Project Management	0.57	0.58	0.58	0.58
2 Taxes and Duties	2.21	3.15	4.86	2.96
Total	62.6175	80.9675	86.8075	70.9275

Source: Asian Development Bank

2. Operation and Maintenance

25. The subprojects are new systems. The SDOs are likewise new entities. For Palembang anew department will be created under the PDAM to take charge of wastewater system operation. The technical engineers estimated the O&M expenses based on the capacity of the whole system. Included in the O&M costs are personnel costs, chemicals for disinfections and dewatering of sludge, septage receipt, sludge disposal, power cost, and provisions for repairs and escalated to current prices for inclusion in the financial statements. Constant annual O&M costs range from \$0.28 million for Jambi to \$0.491 million for Palembang.

3. Cost Recovery

26. The proposed wastewater fee structure is based on classifying consumers as (i) on-site wastewater management fees, (ii) residential sewer use fees, and (iii) commercial and industrial sewer use and effluent discharge fees. The fee classification is to improve revenues because commercial and industrial connections will be charged a higher rate than domestic or residential connections. For Palembang, the PDAM will collect the fee as a surcharge on the water bill. For the other three subprojects, monthly wastewater fees will be collected from households and commercial establishments connected to the system by the SDO through community leaders.

27. Implementation of the fee structure is expected in 2025 when operation commences. The sewer use tariff recommended per CDTA study with a 5% annual adjustment was adopted in the evaluation. The sewer use tariffs in the initial year of operation (2020) are shown below:

Table 6: Estimated Tariffs

Monthly Tariff	Domestic	Commercial	On-Site Users
\$	1.48	3.69	1.11
Rp	20,000	50,000	15,000

Sources: TA 8666-INO: MSMIP CDTA Report

28. The forecast of operations will connect sewer connections up to 2025. As shown below, after tapping of 1,000 pilot connections by the beginning of 2020, there will be equal annual growth in connections, terminating by 2025. This is the main difference in the PPTA study where accelerated growth was projected and design connections were attained in three-four years.

1. Jambi Subproject

29. Considering that the tariff established was based on the cost recovery of operating costs (excluding administrative costs), it is expected that the project will have a negative financial internal rate of return (FIRR) of -4.3%. The forecast of operations showed the following results:

Table 7: Projected Income Statement, Jambi Subproject

	2020	2021	2022	2023	2024	2025
Operating Revenues						
Sewer use Fees	0.48	0.63	0.75	0.78	0.81	0.85
Domestic - On-Site	0.02	0.12	0.19	0.19	0.2	0.21
Domestic - Off-Site	0.45	0.47	0.49	0.52	0.54	0.56
Commercial	0.01	0.04	0.07	0.07	0.07	0.08
Other Operating Revenues	0.02	0.09	0.07	0.08	0.08	0.09
Total Revenues	<u>0.50</u>	<u>0.72</u>	<u>0.82</u>	<u>0.86</u>	<u>0.89</u>	<u>0.94</u>
Operating Expenses						
Payroll	0.26	0.27	0.28	0.29	0.31	0.32
Power Cost	0.06	0.06	0.06	0.07	0.07	0.07
Chemicals	0.01	0.01	0.01	0.01	0.01	0.01
Maintenance	0.12	0.13	0.13	0.14	0.15	0.15
Other O&M	0.03	0.03	0.04	0.04	0.04	0.04
Tax	0.00	0.00	0.00	0.00	0.00	0.00
Bad debts	0.00	0.00	0.00	0.00	0.00	0.00
Total Operating Expenses	0.48	0.5	0.52	0.55	0.58	0.59
Net Income (loss) before depreciation	0.02	0.22	0.30	0.31	0.31	0.35
Depreciation	-2.29	-2.60	-2.60	-2.60	-2.60	-2.60
Net Operating Income (loss)	-2.27	-2.38	-2.30	-2.29	-2.29	-2.25
Less: Interest Expenses	0.00	0.00	0.00	0.00	0.00	0.00
Foreign Exchange Loss			0.00	0.00	0.00	0.00
Net Income (Loss)	-2.27	-2.38	-2.30	-2.29	-2.29	-2.25

Source: ADB estimate

2. Makassar Subproject

30. Considering that the tariff established was based on the cost recovery of operating costs (excluding administrative costs), it is expected that the project will have a negative financial internal rate of return (FIRR) of -4.8%. The forecast of operations showed the following results:

Table 8: Projected Income Statement, Makassar Subproject

	2020	2021	2022	2023	2024	2029
Operating Revenues						
Sewer use Fees	0.45	0.54	0.64	0.73	0.83	1.14
Domestic - On-Site	0.01	0.04	0.07	0.10	0.13	0.20
Domestic - Off-Site	0.43	0.45	0.47	0.49	0.51	0.64
Commercial	0.01	0.05	0.10	0.14	0.19	0.30
Other Operating Revenues	0.13	0.26	0.26	0.07	0.08	0.11
Total Revenues	<u>0.58</u>	<u>0.80</u>	<u>0.90</u>	<u>0.80</u>	<u>0.91</u>	<u>1.25</u>
Operating Expenses						
Payroll	0.28	0.29	0.31	0.32	0.33	0.41
Power Cost	0.11	0.11	0.12	0.12	0.13	0.16
Chemicals	0.01	0.01	0.01	0.01	0.01	0.02
Maintenance	0.10	0.11	0.11	0.12	0.12	0.15
Other O&M	0.05	0.05	0.05	0.05	0.06	0.07
Tax	0.00	0.00	0.00	0.00	0.00	0.00
Bad debts	0.00	0.00	0.00	0.00	0.00	0.00
Total Operating Expenses	<u>0.55</u>	<u>0.57</u>	<u>0.6</u>	<u>0.62</u>	<u>0.65</u>	<u>0.81</u>
Net Income (loss) before depreciation	0.03	0.23	0.30	0.18	0.26	0.44
Depreciation	-2.36	-3.10	-3.34	-3.34	-3.34	-3.34
Net Operating Income (loss)	-2.33	-2.87	-3.04	-3.16	-3.08	-2.90
Less: Interest Expenses	0.00	0.00	0.00	0.00	0.00	0.00
Foreign Exchange Loss			0.00	0.00	0.00	0.00
Net Income (Loss)	-2.33	-2.87	-3.04	-3.16	-3.08	-2.90

Source: ADB estimate

3. Palembang Subproject

31. Considering that the tariff established was based on the cost recovery of operating costs (excluding administrative costs), it is expected that the project will have a negative financial internal rate of return (FIRR) of -5.6%. The forecast of operations showed the following results:

Table 8: Projected Income Statement, Palembang Subproject

	2020	2021	2022	2023	2024	2029
Operating Revenues						
Sewer use Fees	0.45	0.53	0.6	0.69	0.78	1.03
Domestic - On-Site	0.03	0.06	0.1	0.16	0.21	0.30
Domestic - Off-Site	0.42	0.45	0.47	0.49	0.51	0.64
Commercial	0.00	0.02	0.03	0.04	0.06	0.09
Other Operating Revenues	0.01	0.02	0.02	0.07	0.07	0.10
Total Revenues	<u>0.46</u>	<u>0.55</u>	<u>0.62</u>	<u>0.76</u>	<u>0.85</u>	<u>1.13</u>
Operating Expenses						
Payroll	0.27	0.28	0.29	0.31	0.33	0.4
Power Cost	0.14	0.15	0.15	0.16	0.17	0.21
Chemicals	0.01	0.01	0.01	0.01	0.01	0.02
Maintenance	0.10	0.11	0.11	0.12	0.12	0.15
Other O&M	0.05	0.05	0.05	0.05	0.06	0.07
Tax	0.00	0.00	0.00	0.00	0.00	0.00
Bad debts	0.00	0.00	0.00	0.00	0.00	0.00
Total Operating Expenses	<u>0.57</u>	<u>0.6</u>	<u>0.61</u>	<u>0.65</u>	<u>0.69</u>	<u>0.85</u>
Net Income (loss) before depreciation	-0.11	-0.05	0.01	0.11	0.16	0.28
Depreciation	-3.38	-4.76	-5.16	-5.16	-5.16	-5.16
Net Operating Income (loss)	-3.49	-4.81	-5.15	-5.05	-5.00	-4.88
Less: Interest Expenses	0.00	0.00	0.00	0.00	0.00	0.00
Foreign Exchange Loss			0.00	0.00	0.00	0.00
Net Income (Loss)	-3.49	-4.81	-5.15	-5.05	-5.00	-4.88

Source: ADB estimate

4. Pekan Baru Subproject

32. Considering that the tariff established was based on the cost recovery of operating costs (excluding administrative costs), it is expected that the project will have a negative financial internal rate of return (FIRR) of -4.8%. The forecast of operations showed the following results:

Table 9: Projected Income Statement, Pekan Baru Subproject

	2020	2021	2022	2023	2024	2025	2029
Operating Revenues							
Sewer use Fees	0.58	0.66	0.75	0.7	0.97	1.00	1.19
Domestic - On-Site	0.01	0.06	0.11	0.17	0.24	0.24	0.29
Domestic - Off-Site	0.56	0.58	0.61	0.49	0.67	0.7	0.83
Commercial	0.01	0.02	0.03	0.04	0.06	0.06	0.07
Other Operating Revenues	0.02	0.02	0.02	0.10	0.10	0.10	0.12
Total Revenues	<u>0.60</u>	<u>0.68</u>	<u>0.77</u>	<u>0.80</u>	<u>1.07</u>	<u>1.10</u>	<u>1.30</u>
Operating Expenses							
Payroll	0.27	0.28	0.29	0.31	0.32	0.34	0.40
Power Cost	0.04	0.04	0.04	0.04	0.05	0.05	0.06
Chemicals	0.01	0.01	0.01	0.01	0.01	0.02	0.02
Maintenance	0.12	0.13	0.13	0.14	0.15	0.15	0.18
Other O&M	0.03	0.03	0.04	0.04	0.04	0.05	0.05
Tax	0.00	0.00	0.00	0.00	0.00	0.00	0.70
Bad debts	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Operating Expenses	<u>0.47</u>	<u>0.49</u>	<u>0.51</u>	<u>0.54</u>	<u>0.57</u>	<u>0.61</u>	<u>0.70</u>
Net Income (loss) before depreciation	0.13	0.19	0.26	0.26	0.50	0.49	0.60
Depreciation	-2.67	-2.96	-3.06	-3.06	-3.06	-3.06	3.06
Net Operating Income (loss)	-2.54	-2.77	-2.80	-2.80	-2.56	-2.57	-2.45
Less: Interest Expenses	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Foreign Exchange Loss			0.00	0.00	0.00	0.00	0.00
Net Income (Loss)	-2.54	-2.77	-2.80	-2.80	-2.56	-2.57	-2.45

C. Project Financial Sustainability and Implementation Risks

33. City revenues and expenditures were projected using historical trends and best estimates of local units. The surplus projected in the short term is assumed to be available for some of the investments required for improved urban sanitation services. Surplus income can be used by the Palembang government to finance the public service organization, which the city government will be required to provide to the SDO responsible for sanitation (including O&M and periodic major capital expenditures).

34. The SDOs in Jambi, Makassar, and Pekan Baru are revenue-generating agencies, but the amount of revenue they receive and their expenditures are not linked. The agencies' annual proposed budgets are not dependent on the revenue they will generate, but are based on the city government's allocation and/or priority to the various city agencies.

35. Funding of the capital investment and annual O&M for environmental sanitation comes from the city government annual budget. Based on the annual budget ceiling, environmental agencies prepare their annual program and the budget required, which is then consolidated into the city budget.

D. Financial Projection for Service Delivery Organizations

36. The financial sustainability of the subprojects depends on the financial performance of the SDOs as operating entities. The SDOs' financial performance is projected to determine their overall financial condition until the full system operation in 2025.

37. Selected financial ratios and performance indicators are used to analyze the results of the operations and project viability. In addition, risks are associated with the financial aspects of the project which should be carefully considered and addressed to ensure sustainability of the project and the SDO as an entity: (i) uncertainty in the implementation of service fee increases, (ii) uncertainty on the provision of an SDO, as required for O&M, (iii) insufficient subsidies, and (iv) inefficiency of the collection system.

38. The projected income statement shows that the proposed monthly wastewater fees can adequately cover O&M costs. However, net operating losses will be incurred until for the first 2 years prior to complete house connection implementation within the since the wastewater tariffs not being sufficient to cover the full depreciation cost of the sewerage system, a noncash cost.

39. The attainment of financial adequacy for the SDOs will require that service fee are periodically raised to keep pace with inflation. The financial sustainability of the SDOs largely depends therefore on government's positive action on SDO service fee increase applications. If service fees are not periodically increased to keep pace with inflation, the government must ensure the provision of a public service organization type of funding support to the SDOs. Hence, these factors should be properly addressed to mitigate the enumerated risks.