

## Supplementary materials

Table S1. The modified SDA questions from Peal *et al.*, 2014

Components	Question
E1-1: Sector targets	Are there service targets for each part of the Septage Management (SM) service chain in the municipal/city development plan?
E1-2: Sector policy	Is there a local ordinance for SM in the city? If yes, is every stage of the service chain discussed in the ordinance?
E1-3: Institutional roles	Are the institutional roles and responsibilities for every stage of service delivery clearly defined and operationalized?
E1-4: Service consumer	Are there any published procedures used by the local government units (LGUs), water district, or service providers to assess the demand and willingness to pay target service recipients for SM services?
E1-5: Private sector	Does the policy, legislative and regulatory framework enable private sector investment in each stage of SM service chain?
E1-6: Regulation	Are there national/local regulatory mechanisms for SM?
E2-1: Fund flow coordination	Does the city have a process for coordinating SM investments in the subsector (domestic or donor, e.g., national grants, state budgets, donor loans and grants, etc.)?
E2-2: Investment plans	Is SM prioritized in the medium-term investment plan (as part of sanitation) and is it published and used?
E2-3: Human resource capacity	Is there the capacity to implement the SM plans and if not, is there a capacity building program for SM based on an assessment of human resource and technical assistance needs?
E3-1: Adequacy	Are the annual public financial commitments to SM commensurate with meeting needs/targets (within approx. 10 years)?
E3-2: Structure and budget	Do budget structures permit capital investments and recurrent costs for SM to be clearly identified?
D1-1: Capital funding	What is spent per capita on SM by the Municipality? Capex (3-year average)? Capex only, e.g., on household toilets, storage/transfer stations/septage management facility at wastewater treatment works
D2-1: Local participation	Are there clearly defined procedures for informing, consulting with and supporting local participation in planning, technology choice, costs and implementing sanitation, including SM?
D2-2: Budget allocation criteria	Have criteria (or a formula) been determined to ensure adequate funding is allocated to SM within the larger urban sanitation allocation? These criteria or formulae should be codified in policy/strategy/orders/acts.
D2-3: Reducing inequality	Are there specific plans and measures to ensure SM serves all users, including the urban poor? The procedures should be codified in policy/strategy/orders/acts.
D3-1: Quantity (access)	Is the annual rate of expansion of households gaining access to SM consistent with meeting needs/targets (within approx. 10 years)?
D3-2: Capacity of system	Is the capacity of each part of the SM service chain growing at the pace required to have a significant impact on public and environmental health?
D3-3: Quality of all infrastructure	What is the quality of SM infrastructure?
D3-4: Reporting	Are there procedures and processes applied on a regular basis to monitor SM access and the quality of services and is the information disseminated?
S1-1: Cost recovery	Are O&M costs known and fully met by either cost recovery through user fees and/or local revenue or transfers?
S1-2: Standards	Are there norms and standards for each part of the SM service chain that are systematically monitored under a regime of sanctions (penalties)?

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S2-1: Demand	Has government (national or local) developed any policies, procedures or programs to stimulate demand of SM services and behaviors by households?
S2-2: Planning	Do service providers have (business) plans for each part of the service chain for expanding SM services?
S2-3: Private sector development	Does the government have ongoing programs and measures to strengthen the domestic private sector for the provision of SM services in urban or peri-urban areas, in line with their plan?
S3-1: Quantity (outcome)	Percentage of total urban fecal waste generated by the city that is managed within each part of the sanitation service chain?
S3-2: Equity of use	To what extent does the SM system serve the city's low-income communities?

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Table S2. Score descriptions for the SDA Scorecard

Components	Score Descriptions
E1-1: Sector targets	<p>0 No service targets / SM is not mentioned in the municipal/city development plans.</p> <p>0.5 Stages of the service chain are mentioned in the municipal/city development plans, but there are no elaborate targets for each stage of the service chain.</p> <p>1 There are defined targets and goals for each stage of the service chain.</p>
E1-2: Sector policy	<p>0 There are no local ordinances regarding SM.</p> <p>0.5 There are local ordinances that mention the stages of the service chain but are vague and unclear.</p> <p>0.5 There is a national policy for SM, but local ordinances for SM are absent.</p> <p>0.5 A local ordinance has been drafted and will be implemented this year.</p> <p>1 There are local ordinances for SM.</p>
E1-3: Institutional roles	<p>0 No document for assigning institutional roles for SM service delivery</p> <p>0.5 There are some written guidelines for institutional roles but are not yet operationalized or are unclear and incomplete.</p> <p>0.5 Institutional roles have been drafted and will be operationalized this year.</p> <p>1 There are clearly defined institutional roles in a written document for SM.</p> <p>1 Following provisions of Local Water District Law</p>
E1-4: Service consumer	<p>0 There are no standard procedures for assessing demand and willingness to pay for service consumers (in the LGU, water district, or private service provider).</p> <p>0.5 Assessments have been done to some smaller subunits of LGUs.</p> <p>0.5 Irregular assessments have been done by the water district or private service provider.</p> <p>0.5 Followed Philippine protocols for Environmental Impact Assessment</p> <p>1 There is a standard method to assess the demand and willingness to pay for service consumers (in the LGU, water district, or private service provider).</p>
E1-5: Private sector	<p>0 There are no documents or rules that enable private sector investment to SM.</p> <p>0.5 There are some written guidelines for private sector investment in SM.</p> <p>1 A document defines the process of how private sector can invest in SM projects.</p> <p>1 Some private organizations/companies were involved in the development of the septage management system.</p> <p>1 Septage management system is managed by a concessionaire.</p>
E1-6: Regulation	<p>0 There are no national/local regulatory mechanisms for SM.</p> <p>0.5 There are regulatory mechanisms but are not effectively implemented./ Only national mechanisms are present</p> <p>1 There are national/local regulatory mechanisms for SM and these are well implemented and not conflicting.</p>
E2-1: Fund flow coordination	<p>0 There are no written process for coordinating SM investments (in the LGU, water district, or private service provider).</p> <p>0.5 There is a designated office in the LGU for coordinating SM investment but there are no written guidelines.</p> <p>1 There are official guidelines for coordinating SM investments.</p> <p>1 Fund flow is managed by the water district or private service provider.</p>
E2-2: Investment plans	<p>0 SM is not part of the top 10 priorities.</p> <p>0.5 SM is part of the top 10.</p> <p>1 SM is part of the top 5.</p> <p>1 SM is the main focus of water district or private service provider; it realizes investment plans for septage management.</p>

E2-3: Human resource capacity	<p>0 There are no capacity-building programs for the implementation of SM plans in the past 10 years (in the LGU, water district, or private service provider).</p> <p>0.5 There are some irregular and externally funded capacity-building programs at the beginning/establishment phase.</p> <p>1 There are regular training and capacity building seminars/programs; the service provider even provides training to some LGUs.</p>
E3-1: Adequacy	<p>0 There are no public financial commitments to SM in the past 10 years.</p> <p>0.5 Indicators show that the financial commitments are not commensurate with meeting needs or targets for SM.</p> <p>1 There are annual public financial commitments to SM in the past 10 years, and because of these commitments, SM targets are being met.</p> <p>1 SM targets set by recent projects funded through government loans are met.</p>
E3-2: Structure and budget	<p>0 Budget structures do not permit capital investments for SM (not mentioned in sanitation budget).</p> <p>0.5 The current budget structure permits capital investments for SM with some limitations.</p> <p>0.5 A recent program has been created to guide LGUs in septage management investments.</p> <p>1 Budget structures encourage capital investments for SM.</p> <p>1 The LGU has its own way of managing SM investments even before a national guideline has been created.</p> <p>1 This aspect is managed solely by the service provider (with its own procedures, rules, and monitoring).</p> <p>1 The service provider is required to submit financial reports to a government agency at a regular basis.</p>
D1-1: Capital funding	<p>- Capital Expenditure (CapEx) for SM (% of annual budget, 3-year average)</p> <p>- In case there is no CapEx data available, put the same score as D3-1</p>
D2-1: Local participation	<p>0 There are no published guidelines or procedures (in the LGU, water district, or private service provider).</p> <p>0.5 There is a national procedural manual for informing, consulting with and supporting local participation in planning, technology choice, and costs of development projects but none specific to SM.</p> <p>1 There is a published document for the procedures to be taken for stakeholder participation in SM service decision-making.</p>
D2-2: Budget allocation criteria	<p>0 There are no published formulas or criteria (in the LGU, water district, or private service provider).</p> <p>0.5 A proportion of funds for sanitation is allocated to SM, but it is not codified in specific policies, orders, or acts.</p> <p>1 There are published criteria/formulas for adequate fund allocation for SM.</p> <p>1 SM is one of the focuses of the service provider.</p>
D2-3: Reducing inequality	<p>0 No published indicators/procedures to measure equity of SM service (in the LGU, water district, or private service provider)</p> <p>0 Do not prioritize urban poor</p> <p>0.5 Inconsistent indicators are used to measure equity of SM service.</p> <p>0.5 The water district only serves the HHs availing their water supply service.</p> <p>1 There is a published list of indicators for SM service equity.</p> <p>1 The SM service provider has a strategy/framework for ensuring service equity.</p> <p>1 The municipal office provides toilet and septic tanks to the poor.</p>
D3-1: Quantity (access)	<p>0 There are no published reports on the evaluation of SM coverage (in the LGU, water district, or private service provider).</p>

	0.5 Slow rate of expansion of SM services coverage (not meeting targets) 1 On track expansion rate of SM service coverage
D3-2: Capacity of system	0 No evaluation documents created for measuring the impact of SM projects (in the LGU, water district, or private service provider) 0.5 The current capacity of the SM projects is half/below half of the target set. 0.5 There have been little improvements in the capacity/utilization of the SM system. 1 The completed and current SM projects have significant impact on improving public and environmental health.
D3-3: Quality of all infrastructure	Containment: percentage of households with sanitary toilet facility Emptying and Transport: 0 Does not own/rent vacuum tanks for desludging 1 Owns/rents vacuum tanks for desludging Treatment: percent total utilization of treatment plants Disposal and Reuse: 0 No disposal/reuse facility 0.5 Disposes sludge into a landfill / starting to study reuse 1 Facilitates reuse of sludge
D3-4: Reporting	0 There are no published manuals for monitoring SM access and service quality (in the LGU, water district, or private service provider). 0.5 There are people assigned for the task, but there are no standardized methods for evaluation of SM access and service quality. 1 There is a manual of procedures for evaluating SM access and service quality / indicators are clearly defined. 1 The service provider is required to submit performance reports.
S1-1: Cost recovery	0 O/M costs are not measured or monitored in detail (in the LGU, water district, or private service provider). 0.5 There is currently a significant financial gap between the cost of establishing the service and the revenue being gained. 1 O/M costs are known and monitored; mechanisms were created to recover these costs, and these mechanisms are effective.
S1-2: Standards	0 There are no created standards for each stage of the SM service chain, so the efficiency is not monitored, and sanctions are not set. 0.5 Efficiency of the service is monitored through inconsistent indicators that do not result in penalties if not met. 1 There are published standards/indicators for each stage of the SM service chain, and these standards are monitored regularly; if the standards are not met, penalties could be given.
S2-1: Demand	0 There are no programs for information dissemination for SM. 0.5 There are some campaigns and programs, but these are irregular and are funded by external organizations. 1 There are regular programs and campaigns.
S2-2: Planning	0 There are different service providers for each stage of the service chain, and they are not coordinated well. 0.5 The business provider supports the plans and programs of the LGU for the service chain. 1 Service providers have specific plans for each stage of the SM service chain, and these plans are currently being realized.
S2-3: Private sector development	0 There are no programs to strengthen the domestic private sector for the provision of SM services in urban or peri-urban areas. 0.5 There some internationally funded irregular programs.

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	1 There are ongoing programs for enhancing the capacity of domestic private sector in delivering SM services.
S3-1: Quantity (outcome)	From fecal waste flow diagram
S3-2: Equity of use	Percentage of low-income communities covered by the SM services

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Table S3. Data for Muntinlupa City's Fecal Waste Flow Diagram

Category	Number of HHs	Percentage
1. Connected to a central sewerage system	4,076	4.35
2. Use septic tank:		
- Desludged by Maynilad Water Services <i>Inc.</i>	591	0.63
- Still to be desludged	79,576	84.35
3. Use closed pit	908	0.97
4. Use other depository (cesspools, seepage pits)	7,160	7.65
5. Use open pit	278	0.30
6. Use pail system	1,082	1.16
7. Practice open defecation	554	0.59
Total	93,634	

Source: June 2015 Muntinlupa City Health Office sanitation monitoring data and Philippine Statistics Authority 2010 Census Report

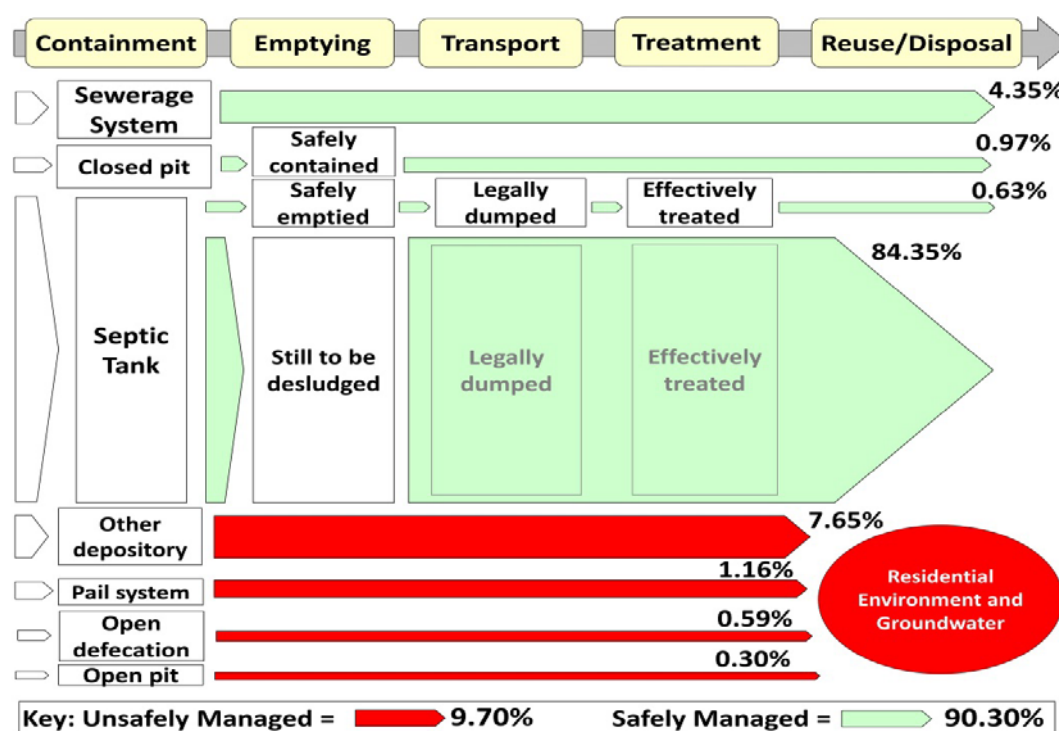


Figure S1. The fecal waste flow diagram of Muntinlupa

Table S4. Data for Pasig City's Fecal Waste Flow Diagram

Category	Number of HHs	Percentage
1. Use septic tank:		
- Desludged by Manila Water Company <i>Inc.</i>	99214	64.02
- Desludged by private desludging company	27,983	18.06
2. Use Antipolo type toilet (closed pit)	739	0.48
3. Use open pit	62	0.04
3. Dispose straight to drainage canals/ivers	26,613	17.17
4. Practice open defecation	359	0.23
Total	154,970	

Source: 2014 DILG Pasig City sanitation monitoring data and household survey

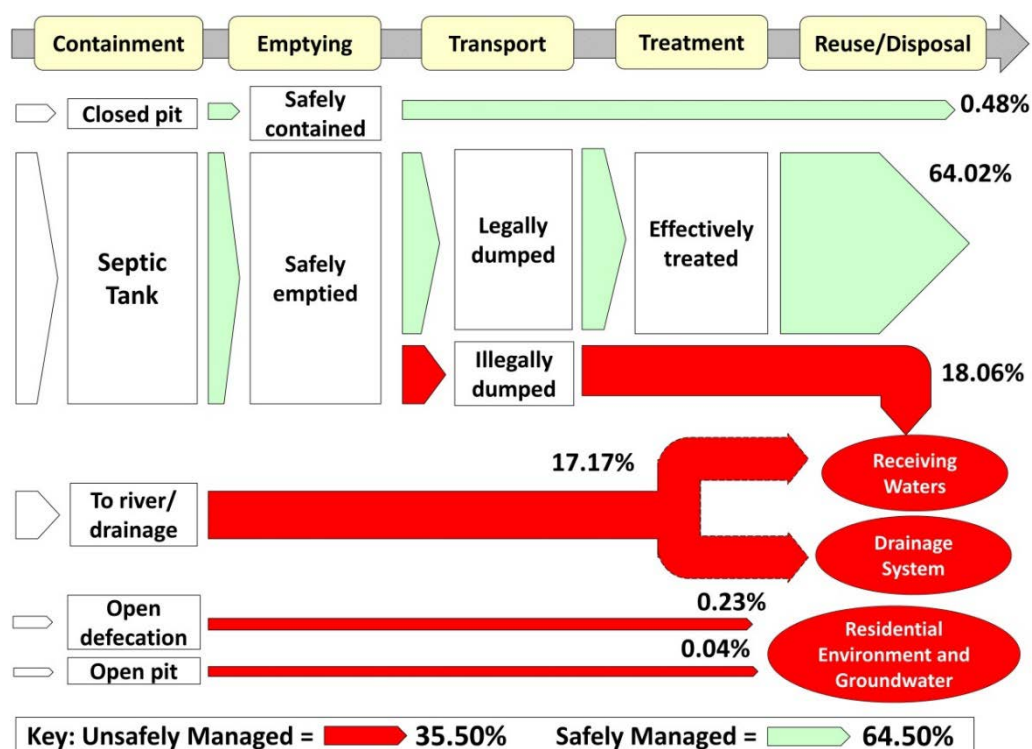


Figure S2. The fecal waste flow diagram of Pasig



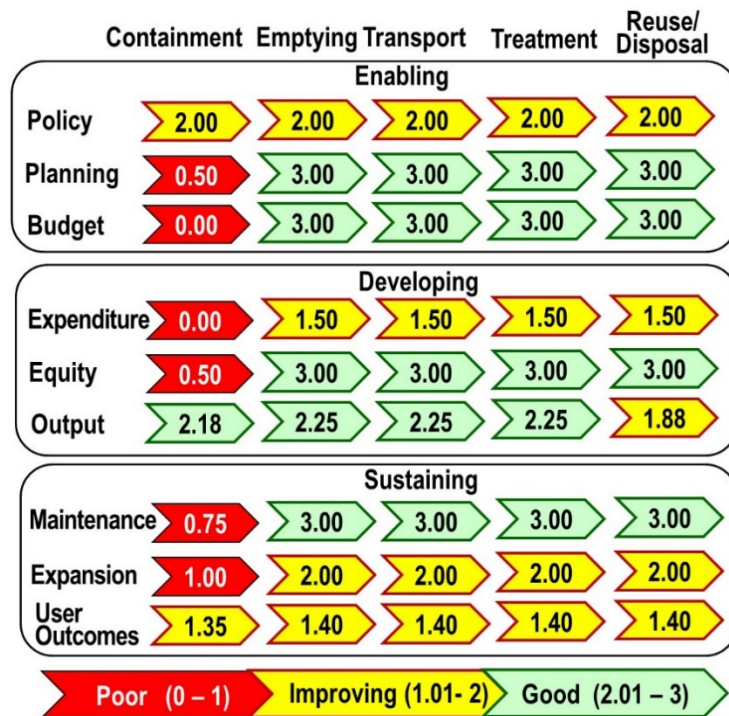


Figure S3. Service delivery scorecard for Muntinlupa City

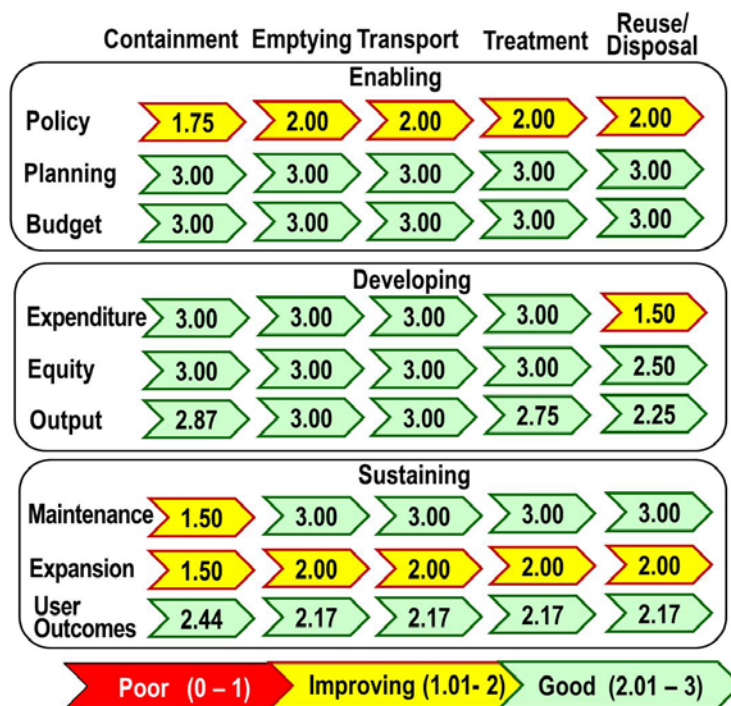


Figure S4. Service delivery scorecard for Pasig City

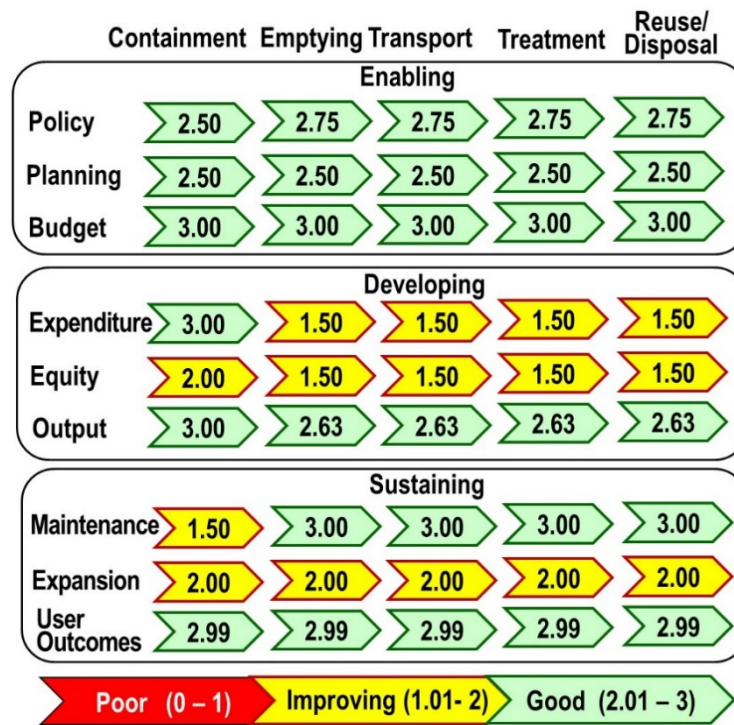


Figure S5. Service delivery scorecard for San Fernando City