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Strategic assessment of solid waste management services and systems in Nepal

Assessment of SWM Services and Systems in Nepal

Policy Advisory Note

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Abbreviations

ADB	Asian Development Bank
AEPC	Alternative Energy Promotion Center
BOO	Built Own Operate
CBO	Community based organization
CPHEEO	Central Public Health Engineering and Environmental Organization
CWMF	Common Waste Management Facility
DBFOT	Design Build Finance Operate and Transfer
DBO	Design Build and Operate
DoE	Department of Environment
EIA	Environment impact assessment
EMCU	Environment monitoring and compliance unit
EPA	Environment Protection Act
EPR	Environment Protection Rules
ESMS	Environment standards and monitoring section
GPRBA	Global Partnership for Results-Based Approaches
IBN	Investment Board Nepal
IEC	Information education and communication
IEE	Initial environment examination
IGFT	Intergovernmental Fiscal Transfer
IPT	Integrated Property Tax
IUDP	Integrated urban development plan
KPI	Key Performance Indicator
LGO	Local Government Operations Act
MIS	Management Information System
MoEFCC	Ministry of Environment Forest and Climate Change, India
MoF	Ministry of Finance
MoFAGA	Ministry of Federal Affairs and General Administration
MoFE	Ministry of Forest and Environment
NNRFC	National Natural Resource and Fiscal Commission, Nepal
NPC	National Planning Commission, Nepal
NPR	Nepalese Rupee
NUDS	National Urban Development Strategy
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MuAN	Municipal Association of Nepal
NNRFC	National Natural Resources and Fiscal Commission, Nepal

NPC	National Planning Commission, Nepal
NPR	Nepalese Rupee
NUGIP	Nepal Urban Governance and Infrastructure Project
NUDS	Nepal Urban Development Strategy, 2017
NWMSU	National Waste Management Support Unit
PCC	Provincial Coordination Council
PPE	Personal Protective Equipment
PPP	Public-private partnership
PPPIA	Public Private Partnership and Investment Act, 2018
OHS	Occupational health and safety
RBF	Results-based financing
SWM	Solid waste management
TLO	Tole lane organization
TPD	Ton per day
UNEP	United National Environmental Program
WMP	Waste management plans

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~4,900 tonne

Solid waste generated by urban Nepal every day – that's 1.8 million tonne per annum

6

Of the 293 urban local bodies have constructed landfill sites; rest are dumping in open areas

600 tonne

Plastic waste dumped in landfills every day, posing an environmental hazard

188,203 cu.m.

Biogas the organic waste can potentially produce, besides 12,976 kWh electricity, per day

200 TPD

Biomethanation plants under construction – catering to just 7% of the ~2700 TPD organic waste generated

Acknowledgements

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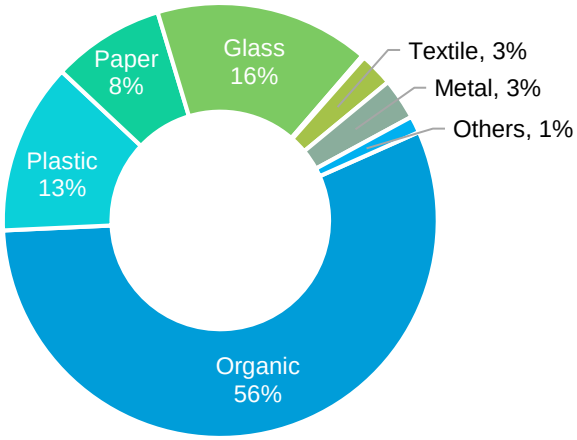
1 Background

The management of solid waste generated in the cities of Nepal—collection, transportation, treatment, and safe disposal—is a major challenge like countries with similar level of development. The country has 753 local level governments, of which 293 are urban (i.e. metropolitan/sub-metropolitan cities or municipalities) and the balance are rural municipalities. It is estimated that 16 million people reside in the urban areas,[1] with the south-eastern plains region (locally known as '*terai*' region) housing ~10.5 million and the north-western hills the balance. It is estimated that urban Nepal generates ~4,900 tons of solid waste daily and ~1.8 million tons per annum. Of this, 63% is generated in the *terai* region and 37% in the hills.

The estimated daily per capita waste generation of Nepal is approximately 0.30 kg. This is slightly lower than that of neighboring countries such as India (0.52 kg), Bhutan (0.52 kg), and Sri Lanka (0.34 kg) and similar to Bangladesh's (0.28 kg).[2] As much as ~56% of the total waste generated in urban Nepal is organic, 16% glass,[3] 13% plastic and 8% paper waste.[4]



Estimated waste characterization

Municipal solid waste management (SWM) in Nepal is largely limited to collection and transportation of waste. It is estimated that less than 50% of the generated waste is collected in urban areas. And the waste is disposed without any treatment. A study by the Asian Development Bank (ADB) in 2013 found that of the 58 municipalities surveyed, only six had landfill facilities. Others dumped their waste in open land and/or along the riverbank.[5] The study further said that even cities with landfills did not necessarily dispose their waste scientifically.

The waste is continued to be disposed either in water bodies or in open areas within cities, adversely impacting the general public health and environment by contaminating ground and surface water, clogging storm water drains and stagnating water for insect breeding and floods. The uncontrolled burning of waste significantly contributes to urban air pollution and the leachate from the waste dumps pollute the surrounding soil and water bodies. A study was carried out in East and South-East Asian countries of China, Indonesia, the Philippines, Vietnam, and Thailand in

[1] Economic Survey 2018-19, Ministry of Finance, Government of Nepal.

[2] Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden. 2018. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. Urban Development Series. Washington, DC: World Bank.

[3] Quantity of glass waste generated is high as this number is based on primary survey in Pokhara and Itahari only.

[4] Based on the primary survey results from Pokhara and Itahari (September, 2019), and projections based on the survey results from Asian Development Bank. (2013). Solid waste management in Nepal: Current status and policy recommendations. Mandaluyong City, Philippines: Asian Development Bank.

[5] Asian Development Bank. (2013). Solid waste management in Nepal: Current status and policy recommendations. Mandaluyong City, Philippines: Asian Development Bank.

2016. While the economic cost of uncollected household waste that is burned, dumped, or discharged into waterways was estimated to be US$375/tons,[6] for the same region, the World Bank estimated the integrated waste management costs for basic systems meeting good international hygienic standards to be US$50–US$100/tons. Considering these figures, it is estimated that urban Nepal is incurring an economic cost of US$ 335 million[7] annually whereas it can provide basic waste management systems at a cost between US$90–180 million[8] per annum. Thus, there will be a net economic benefit if SWM practices are raised to international hygienic standards. The federal government of Nepal thus needs to identify SWM as a priority area of intervention to reduce the environmental and health hazards occurring due to the current waste disposal practices. It is essential that current legal and regulatory, and monitoring frameworks are enhanced in keeping with the present day needs of the SWM sector. In order to improve the sector's performance, institutional structure at federal, provincial, and local levels should be appropriately strengthened. The areas of concern in service delivery at local level are to be addressed. Required policy, financial, and technical support from the federal and provincial level should be provided to the local level in order to develop the necessary SWM infrastructure.

The World Bank is preparing a long-term lending program, the Nepal Urban Governance and Infrastructure Project (NUGIP), targeting city-wide municipal infrastructure investments in 17 cities (8 cities in the western hilly and 9 in eastern *terai* region) of Nepal. Pokhara and Itahari are the largest cities in terms of population from the identified clusters of hilly and *terai* regions respectively and were selected for a detailed diagnostic study of their waste management systems. This policy advisory note has been prepared based on review of the available literature on SWM in Nepal, the consultations with various stakeholders at federal level,[9] and an assessment of the primary and secondary data of SWM systems of Pokhara and Itahari.[10]

The next chapter "Brief Assessment of the SWM Sector in Nepal," presents the broad issues concerning the legal and regulatory framework, institutional set-up, service delivery and financing in the SWM sector. Based on the identification of issues, the third chapter "Legal and Regulatory Reforms," provides the roadmap for reforming the legal and regulatory framework and highlights the necessary technical guidance required for improving the SWM sector. The fourth chapter, "Institutional Strengthening," focuses on strengthening the institutional set-up at all levels of the government in Nepal. The subsequent chapter, "Improving Service Delivery," focuses on

[6] Hauke Engel, Martin Stuchtey, and Helga Vanthournout (2016). Managing waste in emerging markets. Sustainability and resource productivity series. McKinsey & Company - US$375/tons is based on study in China, Indonesia, Philippines, Vietnam and Thailand.

[7] Annual cost is estimated based on daily 4,900 MT waste generation in urban Nepal of which 50% waste is collected and the rest remains uncollected and the per ton economic cost is $375 for uncollected waste.

[8] Annual cost estimated considering providing an appropriate waste management system for 4,900 MT waste generated daily which is collected, treated and disposed scientifically at a cost of $50-$100 per tons.

[9] The draft policy advisory note was sent to relevant development partners (and comments were received from Asian Development Bank, European Union and Department for International Development, UK) and stakeholders at Federal level government in Nepal (Investment Board Nepal, Ministry of Urban Development, Ministry of Forests and Environment, National Natural Resources and Fiscal Commission and Alternative Energy Promotion Centre) in lieu of in person consultation due to the travel and public gathering restrictions posed by COVID-19. The note was also sent to relevant stakeholders from Ministry of Federal Affairs and General Administration, Ministry of Finance and Ministry of Forests and Environment. However, comments were yet to be received till the time of finalization of the note.

[10] Detailed city level assessment studies were carried out in Pokhara and Itahari prior to this policy note. Findings from the city level assessment were utilized as guiding material for this policy note.

improving the SWM service delivery at local level and highlights the actions that are required to be implemented at federal and provincial level for prioritizing the SWM sector. The sixth chapter "Financing SWM Services," presents the sector financing mechanism to provide requisite financial support for creating requisite SWM infrastructure. The note is concluded with a "The Way Forward," which identifies the priority actions that are required to be undertaken by the respective levels of government in Nepal.

2 Brief Assessment of the SWM Sector in Nepal

2.1 Sector introduction

The assessment of solid waste management sector is carried out at two levels—federal and local—as these are the two active tiers of government with regards to this service. The roles of the federal agencies include formulating policies and enacting the relevant legislations, providing financing support, and developing investment frameworks including private sector engagement, and protecting the environment from harmful effects of various services and operations including SWM. The local level governments are responsible for providing SWM services for areas under their jurisdictions. As per the Constitution, SWM is a concurrent subject with both the federal and provincial level governments; but the provincial governments are passive as yet and have not been playing substantial roles in SWM.

The assessment at the federal level involves mapping the institutions engaged in the SWM sector and their roles and responsibilities. The legal and regulatory framework for SWM services is reviewed and the gaps are identified. Further, fiscal transfer mechanisms adopted by the federal government for providing financial support to local level governments and enabling framework for public-private partnerships (PPPs) in the SWM sector and environment monitoring mechanisms are assessed.

The assessment at the local level has been carried out for the entire SWM service provision in the two cities of Itahari and Pokhara. Primary surveys for waste quantification and characterization were carried out in these two cities. Field visits were conducted and local level stakeholders were consulted including government officials, community groups and private sector service providers in both the cities. The roles and responsibilities of different departments in the local level government have been evaluated for gaps identification. Based on the inferences derived from the detailed studies of these two pilot cities and federal level analysis, the SWM sector of Nepal has been assessed.

The subsequent sections introduce the institutions involved, and the legal and regulatory framework guiding the SWM in the country.

2.1.1 Institutional set-up

The Ministry of Federal Affairs and General Administration (MoFAGA) is currently the nodal federal ministry for overseeing the local level government operations in Nepal. The Ministry of Forest and Environment (MoFE) formulates policies, norms, sets standards, and monitors and prevents pollution in the country to protect the environment. The MoFE has specified the waste management activities that need an initial environmental examination or environmental impact assessment to be carried out.

The Ministry of Finance (MoF) manages the disbursement of the fiscal devolution to the local level governments and monitors its utilization. The Investment Board Nepal (IBN) supports all the levels

of government in executing projects through public-private partnership route.[11] The Alternative Energy Promotion Centre (AEPC), established under the Ministry of Energy, Water Resources and Irrigation (MoEWRI), is promoting generation of renewable or commercially viable alternative energy. AEPC assists local level governments in setting up bio-gas plants utilizing biodegradable organic waste at households, commercial, and at municipal levels.

2.1.2 Legal and regulatory framework

The Local Government Operation Act 2015 (LGO Act) defines the roles, responsibilities, and powers of local level governments. It elaborates on the rights of urban and rural local governments to issue local laws and regulations, develop criteria for conservation of the environment in protected areas, control environmental pollution and hazards, manage solid waste, develop and levy service charges, and so on.

Focusing on SWM, the Solid Waste Management Act, 2011 (SWM Act) and Solid Waste Management Rules, 2013 (SWM Rules) were enacted by the Government of Nepal with the major objective of maintaining a clean and healthy environment by minimizing the adverse effects of solid waste on public health and the environment.

Environmental pollution control, meanwhile, is enforced through the Environment Protection Act, 2019 (EPA) and the Environment Protection Rules, 1997 (EPR)[12] enacted by the MoFE. The fiscal devolution and revenue sharing between different tiers of government is governed by the Intergovernmental Fiscal Arrangement Act, 2017.[13] The investment in infrastructure development, including SWM (waste treatment and setting up of sanitary landfills), using PPPs, are governed by the Public-Private Partnership and Investment Act, 2018 (PPPIA).

2.2 Review of legal and regulatory framework

As stated earlier, SWM service in Nepal is governed by the SWM Act, SWM Rules, EPA, and EPR. An assessment of the SWM Act and Rules has been carried out and presented in Table 1. Annexes C and D provide a detailed chapter-wise assessment of the provisions of SWM Act and SWM Rules.

Table 1: Review of provisions of SWM Act and Rules

Provisions of the SWM Act and Rules	Key points to be considered for reform
Need for separate legislations for different types of waste	At present, the definition of solid waste in the Act covers domestic, industrial, bio-medical, electronic or other waste such as chemical, gaseous and liquid waste. Globally, domestic waste, and other hazardous waste such as industrial, bio-medical and electronic have separate legislations/regulations as their impact on public health and environment are different. Apart from municipal solid waste, Nepal should also formulate separate rules for management of different type of wastes such as hazardous industrial waste,

[11] (IBN, 2018).
[12] EPA is a newly drafted legislation and the EPR under this new EPA is under development. Until the new EPR is published, the EPR of 1997 shall be in effect.
[13] (MoF, Intergovernmental Fiscal Arrangement Act, 2017).

Provisions of the SWM Act and Rules	Key points to be considered for reform
	bio-medical, electronic, chemical, construction and demolition, and plastic waste. The current SWM Act and Rules could be amended focusing on municipal SWM only.
Processing of waste need to be incorporated	The Act puts the onus of reducing and segregating the waste on the generators. Further, it mandates the local level governments to collect, transport and dispose the waste at a specified disposal site as identified by them. The Act further mandates local level construction and operation of waste management infrastructure including waste processing plants. However detailed provisions mandating treatment/processing of waste prior to disposal are required to be provided in the Act. This is a critical gap and needs to be addressed by making it mandatory for the local level to process and treat the waste and dispose only the inert materials.
Norms for citing land for waste management facilities	The Act empowers the local level government to identify land for setting up waste management infrastructure such as transfer stations and/or sanitary landfill facilities in an environmentally sustainable manner. However norms for environmentally suitable site for development of waste management facilities are required to be developed.
Engage provincial government(s) for development of common waste management facility	Local level governments in Nepal are responsible for management of waste generated in their jurisdictions. However, having a common waste management facility involving more than one local level government is beneficial to bring in economies of scale, which increases the commercial viability of waste management projects and also reduces the pressure on land. However, local level governments do not have the authority to operate outside their own jurisdictions. Hence involvement of a higher level of the government is required to facilitate coordination to develop regional/common waste management facility involving more than one local level government.
Sharing of waste-related data for informed policy decision at provincial and federal level	The SWM Act and Rules should mandate the local level governments to generate and share their operational data on SWM at regular intervals. It should further aim to build a robust database of SWM at the national level for decision making through the data which needs to be captured and periodically shared with the higher levels of government. The data to be shared by the local level governments include waste generation, waste composition, waste collection (quantity and coverage) and their current waste disposal practices. Such provisions are currently not available.
Levy and collection of SWM user charges	In Pokhara and Itahari, SWM charges are defined by the local level government but billing and collection of charges are vested with the private operators collecting and transporting waste from the cities. In both the cities coverage of billing the waste generators appeared to be an issue. Due to the involvement of private operators for billing and collection and absence of oversight of the local level governments, issues of revenue record keeping, revenue leakage were observed in both the cities. Although the methodology of tariff determination needs to remain with the local level government, the federal government needs to provide guidelines

Provisions of the SWM Act and Rules	Key points to be considered for reform
	for tariff assessment for targeted cost recovery, improve coverage and reduce revenue leakage.
Guidelines for social inclusion of informal sector	It has been observed in Pokhara and Itahari that about 15–20% of the recyclable waste is recovered by the informal sector.[14] Thus the informal sector plays an important part of city's waste management value chain by reducing the amount of waste reaching the dumpsite. The SWM Act/Rules should encourage the local level governments to recognize and integrate the informal sector in city's overall waste management. There is a need to formulate occupational health and safety guidelines at federal level which can be adopted by the local level governments to provide better working conditions to the waste collectors.
Waste management plan for local level	Local level governments need to be encouraged to prepare long-term waste management plans covering complete value chain of waste management for targeted service improvement. It is essential to assess the financial, technical (including option for shared facilities) and institutional resources that are required to improve service delivery performance in the long term. It is therefore necessary that the SWM Rules mandate the local level governments to prepare their long-term waste management plans and review them periodically say every two years.
Implementation of the Act and Rules	The SWM Act and Rules need to mandate the local level governments to prepare SWM by-laws in alignment with the federal level legal and regulatory framework. This is required for the better implementation of the SWM Act and Rules.
Technical support to local level governments	The SWM Act mandates establishment of a SWM Technical Cooperation Centre to provide technical assistance to the local level on issues related to SWM and the Centre was established. Post adoption of the Constitution of Nepal in 2015, the Centre was abolished. The Constitution envisions a significantly expanded role for local level governments as public service providers, including increased responsibility for delivering basic services and creating municipal infrastructure. Local level governments need substantial handholding and technical support for improving the SWM service delivery and hence it is necessary that a technical support unit is established at federal level.
Service level monitoring framework to be developed	City level assessment has revealed that there is no monitoring of performance of the service delivery. The federal level government needs to define the performance indicators to measure and monitor the improvements in the service delivery at local level governments including SWM. Also there is a requirement to establish a data management framework for the SWM in Nepal to implement the service level monitoring effectively.

[14] Informal sector comprises of Level-0 collectors who collect recyclables (papers, glass, plastic, metal etc.) from door-to-door and rag-pickers, Level-1 aggregators who buy and aggregate recyclables from Level-0 collectors and Level-2 are large scale aggregators who buy recyclables from Level-1 aggregators and sell it to recycling industries.

The SWM Act mandates the local level governments to undertake the waste management activities i.e. construction and operation of SWM facility, waste collection and disposal and operations of sanitary landfill as per the prevailing environmental standards for pollution control. As stated earlier, EPA is the governing legislation to control environmental pollution. So far the EPA and EPR necessitates to carry out an initial environmental examination (IEE) or environment impact assessment (EIA) based on annual quantity of waste disposed, population and size of the current waste management facility. The requisite environmental standards under the EPA[15] and EPR need to be formulated for SWM sector. The following table highlights the areas which are to be considered for strengthening the EPA and EPR.

Table 2: Review of provisions of Environment Protection Act and considerations for reform

Provisions/components of the EPA/EPR	Key Points to be considered for reforms and upgradation
Environment standard for operations of sanitary landfills	The local level governments are mandated to carry out waste management operations in accordance with the prevailing environmental standards. However at present there are no prescribed environmental standards for solid waste management sector which are required to be complied with. The MoFE needs to consider development of such environmental standards/guidelines under EPA. The standards for pollution prevention and control needs to cover all waste management operations i.e. collection and transportation, processing, and sanitary landfilling.
Pollution control norms governing waste disposal site selection	Schedules I and II of the EPR mandates the IEE and EIA preparation for waste management projects requiring filling of land with waste between 1,000-5,000 tons/year and more than 5,000 tons/year respectively. In order to curb unhygienic disposal of waste, criteria/assessment parameters need to be formulated for site selection and measurement of pollution levels.
Norms for buffer zone around waste management facilities need to be provided	The waste management facilities developed for processing and/or disposal of waste have far reaching adverse impact on air, water, and soil around them. It is necessary to identify a buffer area surrounding such facilities. Technical guidance for the core facilities and the buffer zones around it need to be developed.
Protection of environment conservation zones	Many of the cities are currently dumping waste in the riverbank or in the forests. EPR does not permit any industrial activity in environmentally sensitive zones. Similarly the EPR needs to be amended to prohibit the waste management activities in environmentally sensitive zones.
Monitoring of environmental pollution due to waste management	The Department of Environment (DoEnv) within the MoFE monitors the level of environmental pollution against the measures provided in the approved IEE/EIA report for the project. The Department prepares the annual plan for visits to such projects and compliance check are carried out during project execution, commissioning, and operations. However at present such compliance checks are limited to industrial projects. The DoEnv needs to include similar visits to solid waste management facilities.

[15] (MoFE, Environment Protection Act, 2019).

2.3 Assessment of institutional setup

The institutional set-up governing solid waste management sector in Nepal has seen changes post adoption of the new constitution in 2015. The issues pertaining to institutional setup at federal, provincial, and local level of government have been highlighted below.

Need to establish technical support unit under MoFAGA

The SWM Act mandated creation of SWM Council responsible for preparing a national policy for improving waste management and providing requisite institutional framework for interagency coordination. Further the Act mandated setting up of a Technical Cooperation Center to provide all the requisite technical support to local level governments such as technology selection, private sector participation and so on.

The Council and the Centre were abolished post adoption of new constitution in 2015. In the city level assessment it has been observed that the local governments require technical support and thus, there is a requirement to establish a unit at federal level for providing technical support to the local level governments for improving the SWM sector performance.

Need to identify proponents of regional waste management facilities

Sanitation falls under the concurrent list of the federal and provincial government as per the constitution of Nepal (2015)[16] giving equal powers to the provincial governments to have province specific legal and regulatory framework for sanitation including solid waste management. Currently provincial governments are not actively involved in the SWM. The provincial level governments can play critical role for development of common waste management facility involving more than one local level government.

Inadequate resources and technical capacities at the local level governments to carry out SWM activities Local level governments are responsible for efficient and effective solid waste management as mandated by the SWM Act and LGO Act makes the local level governments accountable for the services delivered. Thus the local level government needs to ensure that the team or division managing solid waste in the city is adequately staffed. The city level assessment of Pokhara and Itahari revealed that the teams at the local level governments need to be trained for efficient SWM service delivery planning, procurement processes, contract management, and PPPs.

2.4 Evaluation of SWM service delivery

The detailed assessment of complete waste management value chain was carried out in Pokhara and Itahari. In both the cities it is observed that the SWM service delivery is limited to collection, transportation and dumping of waste without any treatment. The following are the issues observed across the SWM value chain:

- ***Segregation at source:*** In Itahari, about 30% of the waste is being recovered at the household level. In Pokhara, the dry and wet waste recovery at source are 12% and 25% of the total waste generated. It is observed in both the cities that due to inadequate waste collection frequency, households segregate the wet waste and dry waste. Wet waste is utilized at source

[16] Item 18 of schedule-7, list of concurrent powers of Federation and State, Constitution of Nepal 2015.

for either composting or feeding the cattle and dry waste is stored to be disposed in the collection vehicles. Also, in areas with daily waste collection, waste segregation is seldom observed.

- ***Waste collection and transportation:*** Waste is collected from curbside and no door-to-door waste collection is practiced. Mostly the market areas in the core of the city are served with daily waste collection and rest of the areas have weekly or fortnightly waste collection which makes storage of waste difficult. Also timing of waste collection vehicle is not consistent leading to dumping of waste on sides of the road or disposal in nearby water channels. The available vehicle fleet in cities is not adequate if daily waste collection is required to be provided across the city. The vehicles used for waste collection do not have provision for collecting segregated wet and dry waste. The size of vehicles used currently are not suitable for door-to-door collection in narrow lanes and crowded areas. Of the total waste generated in the city only 40–50% is reaches the respective dumping sites. Each waste collection vehicle has been assigned a specific geographical area for waste collection and there is no specific route and collection schedule developed that needs to be followed. The uncertainty in vehicle timings lead to citizens to dumping waste in their neighborhood areas.
- ***Waste processing and disposal:*** The practice of processing/treatment of waste prior to disposal is absent. All the waste which is collected is disposed without any treatment. In case of Pokhara a sanitary landfill site was developed, is now being used as dumping yard. Itahari practices disposal of waste in forest. Dumping sites for both the cities are close to rivers. A waste treatment plant (bio-methanation/anaerobic digestion) is under construction for processing the biodegradable organic waste generated in Itahari. The project is developed on PPP mode and this treatment plant is also close to a river (~50 meters). In absence of site selection norms and monitoring of environmental compliance for waste management facilities, waste management facilities in close proximity to environmentally sensitive water bodies cannot be controlled.
- **Informal recycling sector**: City level assessment in Pokhara and Itahari revealed that on an average 15–20% of waste generated in cities is recovered by the informal sector reducing the quantity of waste reaching the dumpsite. The informal sector comprises mainly of individual rag-pickers (primary collectors) and recycling material aggregators who sell the recycling material to the recycling industry. The individuals in the informal sector work without any personal protective equipment and often get injured while extracting recyclables from mixed waste. Pokhara has prepared occupational health and safety (OHS) guidelines, however they are not followed during operations. There is a need to recognize the informal sector and formulate and implement good and safe OHS guidelines.

The city level assessment reveals that of all the waste that is generated in the city, about 35% is either recovered at the source which either is used for making compost or burnt. About 20% of waste remains uncollected which is either disposed in open areas (in case of Itahari) or is stored within the premise (in case of Pokhara) in the areas where waste collection frequency is not daily and. The remaining 45–50% of waste reaches the disposal facility daily.

There are seven private contractors engaged in collection and transportation of waste in Pokhara and single contractor in Itahari. The contracts through which private sector is engaged are poorly drafted wherein roles and responsibilities of the involved parties are not clear. The contractual obligations are seldom enforced and audited. The contracts drafted for waste collection operators are quite open-ended, ambiguous, and monitoring mechanisms, measurable performance

standards are missing. The short-term contracts discourage contractors from investing in infrastructure such as vehicles due to the apprehension of no-cost recovery and where there is long-term contract (like a 20 years contract in Itahari), the challenges are more due to absence of performance measurement and monitoring mechanism. The capital expenditure (procurement of vehicles and other assets) and O&M expenditure is borne by the contractors and is expected to be recovered through user fees.

There are no service level indicators developed in Nepal based on which service performance can be measured. Currently, complaints received from the waste generators are used as an indirect way of monitoring the performance. However complaints generally are for late or non-arrival of waste collection vehicles. In the majority of the cases, complaints are received over phone to the local level staff and record for all the complaints is not maintained which can be later utilized for assessing the service performance.

Various community groups exist in Nepal such as tole lane organizations, women groups, and mother groups; and these groups participate in waste management activities. Such community groups proactively organize localized waste management activities such as recyclable waste collection program and community awareness generation. Focused group discussion with such groups revealed that they are willing to support efforts of the local level in improving overall waste management. Local level governments are required engage such community groups in preparation of long-term waste management plan for the city and support in implementation of the long-term plan.

2.5 Review of financing mechanisms

The majority of the revenues of local level governments in Nepal come from the federal government transfers. In addition, the local governments receive a proportion of shared revenues (such as value-added tax, excise duty, and royalties from natural resources), which are revenue sources that are jointly assigned to federal and local governments but administered nationally. The fiscal transfers to the local level governments are through following grants:

1. Fiscal equalization grants which are unconditional and provided based on the expenditure needs of the local level government and its revenue generating capacity.

2. Conditional grants are tied grants allocated to the local level governments on recommendations of National Natural Resources and Fiscal Commission (NNRFC). The recommendations are given based on the parameters set in accordance with national standards, policies and programs, and prevailing costs of developing infrastructure. These grants are tied to certain predefined objectives and expenditures and sectors such as education, health and agriculture are covered under this.

3. Complementary grants are provided through a matching contribution/ratio of total project cost by the subnational governments to fund infrastructure projects considering parameters such as its feasibility, cost, outcomes, implementation capacity and priority of the project.

4. Special grants are provided to meet specific requirements of the local level governments for creation of basic infrastructure like education, health and drinking water.

In Pokhara and Itahari it was observed that the largest share of such transfers is spent in construction of urban roads, and solid waste is not prioritized. Hence, there is a requirement to

prioritize SWM at the federal level, which will further percolate to the local levels through regulatory reforms.

In addition, it was observed in Pokahra and Itahari that the dependency on federal government grants for the development of urban infrastructure. It is inferred from the review of various literatures that the transfer income received by the local level governments form 90–95% of the total revenues received. Hence, predictability of the funds transfers needs to be considered so that a comprehensive project plan can be prepared.

Both the city level assessments revealed that the own source revenue is not sufficient to meet the operational expenses. This needs to be improved. Currently waste management operations in both the cities are given to private operators on franchise model wherein the service is provided in specific area by a particular waste collection contractor and the same contractor is also responsible to collect the SWM charges from the waste generators of the same area. The coverage of billing of SWM fee in both the cities is about 25–30%. In order to realize the potential of revenue through levied SWM fee, it is essential that coverage of SWM fee is increased.

Moreover, the surveys undertaken during the city level assessment found that current SWM tariff is unaffordable for 37%[17] of the domestic waste generators. In order to improve their revenue from SWM, local level governments need to have tariff levels that consider the affordability of the waste generators falling in the low income category.

[17] Based on primary socioeconomic survey data carried out in Itahari (September 2019) as a part of city level assessment.

3 Legal and Regulatory Reforms

The SWM Act and SWM Rules are two legislations that govern the SWM service delivery and the EPA govern pollution control. The provisions of the SWM Act, Rules, and the EPA have been assessed and areas for legal and regulatory reform have been identified. This chapter focuses on the key legal and regulatory reform requirements, including:

1. Amending/extending the existing policies and regulatory framework in order to make them comprehensive and facilitate improvement of SWM sector
2. Developing of environmental standards, norms for quality monitoring at the waste management facilities and monitoring mechanism
3. Preparing technical guidelines and rules under the provisions of SWM act and Rules, EPA, EPR, and PPPIA
4. Practicing evidence-based policy formulation. Information of SWM service delivery from across the country needs to be assessed regularly and utilized for policy revision for sector improvement

These legal and regulatory reforms for improvement of the SWM sector in Nepal are described in the following subsections.

3.1 Recommendations on policy amendments

This section focuses on the reform areas for strengthening the existing SWM Act and Rules. The key reform areas are elaborated in the following subsections.

3.1.1 Separate policies for different types of waste

The SWM Act encompasses all kind of wastes generated by households, industrial units, and health institutions. There is a need for drafting separate regulations for each category of waste—that is, hazardous (hazardous industrial, bio-medical and electronic waste) and non-hazardous waste—considering their differential impacts on environmental and public health. Box 1 below provides examples from India and the Philippines where there are separate regulations governing different types of waste.

It is recommended that the federal government should consider a solid waste management policy exclusively for municipal waste and formulate separate policies for hazardous and electronic waste, plastic, and construction and demolition waste.

Box 1: Examples of countries with separate regulations for various waste streams

Countries such as India and the Philippines, which have similar waste profile as Nepal, have separate legislation for regulating and monitoring the environmental pollution due to unmanaged waste. India has separate guidelines for municipal solid waste, bio-medical waste, plastic waste, construction and demolition waste, e-waste, and industrial waste. In the Philippines, the Republic Act No 9003 known as the Ecological Waste Management Act covers household waste, commercial waste, non-hazardous institutional and industrial waste, street sweepings, construction debris, agriculture waste, and other non-hazardous/non-toxic solid waste. This does not include bio-medical and hazardous industrial waste.

Sources: (GoP, 2000) and (MoEFCC, 2016).

3.1.2 Focus on complete waste management value chain

Provisions of the current SWM Act focus on segregation at source, collection, transportation, and disposal of waste. They also promote recycling and re-use. As per the Act, the local government are responsible for construction and operations of waste management infrastructure including waste processing plants. However, the Act is required to mandate the local governments for treatment of collected waste and minimize the quantity of waste reaching the sanitary landfill facility. The use of appropriate processing technology is essential to ensure increased waste recovery and decreased waste arrival at the landfill. The SWM Act needs to be amended by mandating local level government to process and treat the waste and to dispose only inert materials in the sanitary landfill.

3.1.3 Practice evidence-based policy formulation

The availability of comprehensive data on the sector is essential for formulation of new regulations and revision of any existing ones. At present, the federal government does not have comprehensive information on the sector such as estimates of waste generated, disposal practices adopted by local governments, and status of waste management facilities. It is recommended that the federal government should develop web-based MIS (refer to section 4.1) to aggregate information on solid waste management operations of local governments and environmental quality at the waste management facilities. The MIS reports should then be used for formulation of policies and designing implementation support programs to improve SWM service delivery. Also, the data on environmental quality is to be used for formulating environmental standards for assessment parameters and develop environmental quality monitoring mechanisms.

3.1.4 Objective allocation of roles and responsibilities

The SWM Act needs to lay down the responsibilities of the federal, provincial, and local governments. The federal government needs to draft/amend policies and regulations as required, develop national level strategy (elaborated in section 5.1), develop technical guidance, measure and monitor the performance of SWM services, and measure compliance with environmental standards in the cities. The provincial government needs to identify and implement common

waste management facilities with necessary support from the federal and local level governments.

3.1.5 Inclusion of informal sector

As highlighted in Table 1 in Chapter 2, currently the SWM Act and Rules do not identify the informal sector's role in waste recycling (by rag-pickers and waste recyclers) in the cities of Nepal. The SWM Act and Rules need to promote formalizing these waste recycling activities. The federal level government needs to provide the necessary technical guidance to local level governments on ways and means by which the informal sector can be engaged in local waste management and monitoring their activities.

The individual waste recyclers and the rag-pickers often work in unhygienic and unsafe conditions. In Pokhara, it was observed that about 100 individuals are involved in waste segregation at the dumping ground and they do not use any safety gears while working. To ensure safe and hygienic working conditions, federal level government needs to formulate occupational health and safety (OHS) guidelines which can be adopted by the local level governments. In case of outsourced services, these guidelines should form part of the compliance requirements in the contracts with the private sector contractors.

3.2 Develop technical guidance to improve service delivery

The federal government needs to develop technical guidance to support the local level governments in delivering SWM services efficiently. Based on the assessment of Pokhara and Itahari, it is understood that the local level governments also require technical assistance in engaging the private sector for SWM infrastructure creation and improving the service delivery.

3.2.1 SWM technical guidance and by-laws

A technical manual for solid waste management needs to be prepared and provided to the local government level to guide infrastructure creation and service delivery improvement. As seen in Itahari, although the private operator has been appointed, because of delays in technology selection, there was a delay in initiating the construction of waste processing unit. The manual could include the following:

- Methodology for preparation SWM plan for the city, implementation of plan, monitoring of the implementation framework. This is further elaborated in section 5.3.
- Methods to successfully implement waste segregation and minimization at source.
- Technical options (type, classification, and hierarchy) and specifications (size/dimension, materials) for storing waste for various locations such as households, tourist locations, markets, neighborhood etc.
- Methods to maximize waste collection and route design (door-to-door or point collection system, route optimization, etc.) for waste transportation and so on. It may also include guidance on designs for transfer stations and vehicles specifications (hand carts, larger vehicles for hilly or plain terrain), ensuring segregated waste collection and transportation. Although construction and demolition waste should be collected and managed separately, the guidelines also need to cover the same as it is also the responsibility of the local level governments.

- Possible organizational structure and staffing requirement for solid waste management unit at the local level based on population and quantity of waste generated.
- Guidance on technology selection for processing and treatment of waste such as composting, waste to energy, bio-methanation, refused derived fuel, and so on. The criteria for technology selection and technical specifications for implementation and O&M also need to be included in the manual.
- Technical designs of sanitary landfills and methods of environmental impact minimization. This should also include designs of leachate collection system, leachate treatment, and other infrastructure requirements for landfill construction.

The Act/Rules need to mandate the local level governments to formulate their SWM by-laws to meet the objectives as defined in the federal policies, regulations, and national strategy. The federal government needs to draft model SWM by-laws for the local level governments to contextualize and adopt based on based on the local conditions. Box 2 provides recommendations on the coverage of such SWM by-laws.

Box 2: Recommendations for coverage of local SWM by-laws for Nepal

The local by-laws should be comprehensive, covering all components of the waste management value chain. They should cover obligation of waste generators, i.e. littering, segregation and composting; obligations of local governing bodies with respect to waste management; community engagement; management of waste-related data; management of waste other than domestic waste generators' (construction and demolition, bio-medical, industrial etc.); user charges (tariff determination, means of levy and collection of charges, penal provisions for non-payment of user charges/fees, modality of revision of user charges/fees); grievance redressal system; environmental impact monitoring mechanism; and penal provisions for contravention of local by-laws.

3.2.2 Encourage private sector participation in SWM

At present, the private sector/community groups can be involved in waste management by way of license.[18] The policy needs to encourage private sector participation across the SWM value chain through PPP, following appropriate procurement laws.

The PPPIA (2019) has identified waste processing and management plant as infrastructure sector eligible for private investments through PPP. However, other SWM operations such as waste collection, transportation, and development and operations of sanitary landfill site, can also be undertaken on a PPP basis. Currently there is no guidance available to local level governments on the procurement process to be followed to engage the private player for these activities.

The federal government needs to prepare a technical guidance/PPP toolkit for local level government for engaging the private sector in various operations across the SWM value chain. The PPP toolkit could be developed under PPPIA covering SWM as a sector. This toolkit needs to

[18] The SWM Rules allow engagement of organization agency wishing to manage the waste by way of applying for a license. Local level government may issue such licenses without creating any competition.

include guidance on project execution modalities for waste management projects (i.e. PPP or otherwise), guidance on assessing technical and financial feasibility, project scoping and structuring, and model bidding documents (project information memorandum, request for qualification, and request for proposal and draft contract/concession agreement). Open competitive bidding needs to be mandated for the implementation of any waste management project. The modalities of engaging private sector in service delivery improvement are further elaborated in section 6.3.

3.2.3 Establish grievance redressal system

As per the LGO Act, mayors of respective local level governments are responsible for managing grievances related to public service delivery. The federal government should provide guidance on establishing and operationalizing digital grievance redressal system and feedback mechanism at local levels covering all service including SWM.

3.3 Develop monitoring framework for environmental compliance

The objective of SWM sector improvement is not only improvement in service delivery but also reducing the negative impact on the environment. However, currently there are no environmental standards developed specific to waste management infrastructure and operations. Also there is no monitoring of environmental pollution caused by uncontrolled and untreated dumping of waste. The following subsections provide the technical guidance requirements that are required to strengthen legal and regulatory framework pertaining to environmental quality to be maintained by waste management facilities.

3.3.1 Formulation of environmental standards

The SWM Act and Rules mention development and operations of the SWM facilities in conformity with the prevailing environmental standard. However, such environmental standards with respect to solid waste management facilities need to be developed in Nepal. This requires the EPR to recognize solid waste as a polluting sector if the waste is not managed properly. EPR needs to provide environmental quality standards to be maintained by the waste management facilities such as air quality, water quality and noise levels at the processing units, and post-treatment leachate quality.

Further the environmental standards under the EPR also needs to define buffer zones around the core waste management activities. Separate environmental quality standards are to be formulated for the buffer zone to address the issues of air, water, noise, and soil pollution to safeguard the communities living in the vicinity of the SWM facilities.

3.3.2 Environmental monitoring and compliance

The federal regulation needs to be extended to include mechanism to monitor pollution levels caused by unmanaged waste in cities. Currently there is no system at the local, provincial or at federal level to monitor the environment impact of unscientific dumping of solid waste generated at local level.

The DoEnv under the MoFE is responsible for ensuring the compliance of environmental quality standards of Industrial projects with the approved EIA. The project promoters are penalized if the project does not adhere to the provisions of the approved EIA. Similarly, environmental quality assessment parameters and standards need to be set for waste management facilities such as quality of leachate discharged from SWM facilities into inland waterbodies, emission from incinerators, and manure from bio-methanation plant and so on. The EPA and EPR need to be amended accordingly to reflect the standards and requisite monitoring mechanism.

3.4 Way forward for legal and regulatory reforms

To summarize, there are some amendments required in the SWM Acts and Rules as discussed in the previous sections. These are to be extended to include implementation and monitoring framework of the provisions of the Act and Rules. Technical guidance and a national level strategy are to be developed pursuant to the SWM Act and Rules. MoFAGA, being the nodal agency for all local level government operations, could be responsible for these suggested amendments and drafting of the technical guidance and strategy.

MoFE needs to develop various environmental quality assessment parameters and quality standards pertaining to SWM infrastructure and services. MoFE needs to formulate monitoring mechanism to measure and monitor the pollution levels and compliance with the environmental standards of the waste management facilities.

IBN needs to recognize the various SWM operations and infrastructure which can be implemented on PPP mode and support MoFAGA to develop PPP toolkit to support the SWM projects development and implementation at the local level through PPP route.

4 Institutional Strengthening

Weak institutional capacity at local level, lack of technical guidance, and absence of any environment monitoring and compliance from the federal level has not allowed systematic improvement of SWM as a local public delivery function. This chapter identifies the areas where institutions at the federal and local levels need to be strengthened in order to perform their designated roles and responsibilities.

The structure and process changes are required at the three levels of government—federal, provincial, and local. The recommendations include (1) improve technical capabilities at federal level by establishing a technical support unit under MoFAGA, (2) extend the roles and responsibilities of MoFE to carry out environmental monitoring of SWM operations, (3) enhance coordination among the federal agencies, (4) engage provincial government for implementation of common waste management facilities, (5) realign responsibilities of the environmental section at local level to efficiently deliver SWM services, and (6) capacity building of the local level governments. The following sections elaborate on the recommendations.

4.1 Federal level institutional strengthening

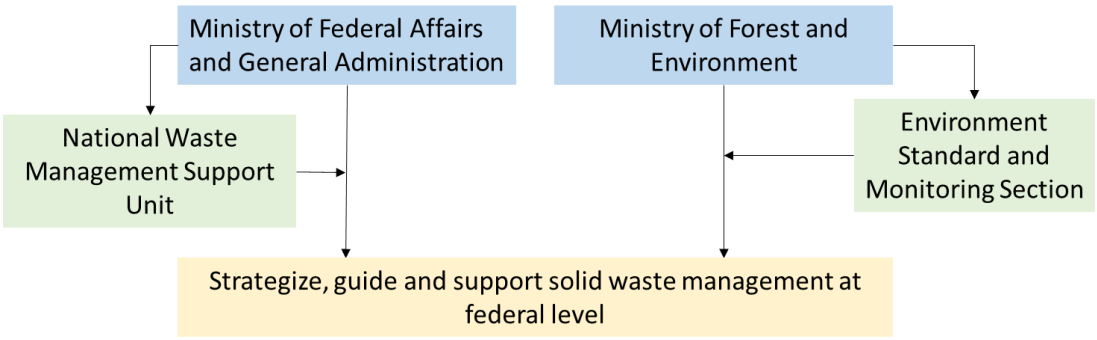
A two-prong approach for supporting the local level governments is required for improving the service delivery in long term—provide necessary technical and policy support and monitor environmental pollution against established standards.

It is recommended to establish 'National Waste Management Support Unit' under MoFAGA to provide all the necessary technical and policy support and monitor the service delivery improvement.

Further for formulation of requisite environmental pollution control parameters and standards and its monitoring mechanisms, it is recommended that the responsibilities of 'Environment Standard and Monitoring Section' under MoFE needs to be extended.

These two federal level units need to provide necessary technical support to the respective ministries for informed decision making and also provide technical support to the local level governments to carry out their SWM operations efficiently. Figure 1 presents this proposed arrangement.

Figure 1: Indicative institutional set-up



4.1.1 National waste management support unit to be established under MoFAGA

The MoFAGA is the nodal ministry for operations of the local level governments, including SWM. There is a need at a federal level to provide technical support to local level governments for developing an effective SWM system. The National Waste Management Support Unit (NWMSU) could be the technical arm of MoFAGA overseeing the SWM sector.

Globally, there are examples of countries which have set-up specialized units at the national level to provide technical assistance to the local governments for efficient SWM service delivery. Box 3 provides examples from Sri Lanka which has established similar unit to provide technical assistance to local authorities.

Box 3: Case study on national level assistance to the local authorities for SWM, Sri Lanka

The National Solid Waste Management Support Center was established under the Ministry of Public Affairs, Home Affairs, Provincial Councils and Local Government in Sri Lanka. The center provides technical support to the municipalities to structure and implement projects. Support is also provided to strengthen their capacities to access technical and financial assistance from various ministries. They promote 3Rs (reduce, recycle, and recover) for waste management, composting at source, waste segregation, etc.

The center has launched awareness programs on various themes such as composting, school sanitation, recycling of liquid waste and garbage removal from flood affected areas. The center prepares strategies as per the instruction of the specialists committee on waste management.

Source: (MoPA, 2019).

The functional responsibility areas of the proposed National Waste Management Support Unit include:

- **National SWM strategy:** The unit based on the data received from all the local level, needs to prepare an outcome based national solid waste management strategy. The Strategy needs to focus on improving the SWM service delivery and reduce the environmental pollution. The

strategy should also clearly state the short-, medium-, and long-term outcomes that are required to be achieved at a national, state, and local levels. This is further elaborated in section 5.1.

- **Research and policy advocacy:** The unit needs to carry out research on SWM service provisions, that is, good practices on collection and transportation of waste, processing, and disposal. The best practices that could be contextualized for Nepal. This will facilitate the local level governments to select suitable practices. Research could be extended to connecting the local level governments with technology providers for processing of municipal waste. Further, this unit should also work closely with the relevant ministries, provinces, and Municipal Association of Nepal (MuAN) for policy advocacy and matters that are required to be implemented for improving SWM in Nepal.
- **SWM PPP toolkit:** The unit, with support from IBN, needs to develop a SWM PPP toolkit for supporting the local level governments in engaging private sector for improving the service delivery. Such toolkit should provide guidance to the local level governments in project development, feasibility assessment, scoping and structuring, selection of contracting options and procurement processes that are required to be followed by the local level governments. Further the toolkit needs to also provide model bidding documents for engaging the private sector in waste management.
- **Technical guidance manual on SWM:** The unit needs to prepare a technical guidance manual on solid waste management. This manual need to cover step-wise guidance for preparation of long term waste management plans (WMP) at the local level; technical guidelines for segregation, collection and transportation of waste; technology options for waste processing and treatment; and technical design standards for sanitary landfills.

  The manual may also include sound operations management practices (operations plan, complaints management, data generation and reporting, available information technology tools for service monitoring). India, which shares similar geographical and cultural conditions with Nepal, has developed a technical manual for SWM (see Box 4).

Box 4: Case study: Manual on municipal SWM, India

India generates close to 1.5 lakh metric tons of municipal waste daily. To guide the local governments on technical matters related to SWM, the Central Public Health and Environmental Engineering Organization (CPHEEO) prepared a technical manual on planning, designing, implementation, and monitoring of SWM systems. The manual defines the planning process to be adopted by the local governments for preparing, revising, and implementing SWM plans. It also explains adoption of appropriate institutional structure at the local level for waste management considering the population size of the city, technical aspects related to segregation, collection and transportation, processing and treatment, and sanitary landfills. Additionally, the manual guides the local governments in selection of appropriate waste processing technology and monitoring of SWM service.

Source: (CPHEEO, 2016).

- **SWM Tariff setting guidelines:** The unit needs to develop a step-by-step tariff setting guidelines for SWM. These guidelines need to be developed to assist local level governments in the financially sustainable provision of solid waste services.
- **SWM Management Information System (MIS):** As the nodal Ministry responsible for local level operations, MoFAGA should develop national level strategy to improve the SWM sector of Nepal. This requires a strong vision and goal-oriented actions for all the entities engaged in SWM at the federal and local levels, and informed decision-making. To facilitate efficient implementation of the strategy, there is a need to monitor the performance of the SWM service delivery at local level. At present no SWM operational data are available at national level.[19] Hence, it is prudent to develop a robust web-based MIS that will act as a baseline SWM data repository for Nepal.

  The local levels need to enter necessary data on the online MIS at regular intervals, based on which MIS reports are to be generated and monitored at the federal level. The NWMSU should utilize this information and provide advisories to the MoFAGA to plan for improvements of the SWM sector.
- **Capacity-building:** For efficient service delivery, the local level governments need to be staffed adequately with required skillsets. Developing their capacity for implementation of an integrated SWM is essential. The NWMSU should provide training and capacity building support to local level officials to carry out their functions effectively and ensure implementation of the federal strategies and policies for improvement of SWM in urban areas.
- **National communication and outreach strategy**: This federal unit should support the development a communication strategy to enhance awareness on SWM, including adopting segregation of dry and wet waste, use of dustbins for disposal of waste, reducing the use of plastic, and so forth at federal, provincial, and local level. Also, this unit should design and develop common information education and communication (IEC) campaigns for the local level to customize and utilize after revising it as per the local context, to improve awareness of the citizens towards SWM.

4.1.2 Environmental monitoring and compliance unit to be established under MoFE

As stated in section 2.1 MoFE is responsible for conserving and protecting environmental quality by reducing pollution. Under the MoFE, there are six functional divisions: (i) Planning, Monitoring and Coordination, (ii) Climate Change Management, (iii) Forest and Watershed, (iv) Participatory Forestry, (v) Environment and Biodiversity, and (vi) Administration. Environment Standards and Monitoring Section (ESMS) under the Environment and Biodiversity division of MoFE is responsible for development of norms and standards for monitoring the environment pollution. However this section is currently focused on industrial pollution.

The role of ESMS needs to be extended to formulate environmental quality standards and technical norms for SWM infrastructure and operations. Functional areas of the ESMS under the MoFE could be enhanced to include the following:

[19] The Central Bureau of Statistics (CBS) is currently carrying out a waste management baseline survey in all the 293 urban local governments. The report based on this survey is not yet prepared (June 2020).

- Formulate environmental quality norms and standards of site selection for waste management infrastructure
- Formulate guidelines for buffer/green zone around waste management facilities
- Define permissible limits for discharges/outputs from waste management facilities, for example quality of compost, emission from incinerators or other thermal waste processing technologies, and discharged leachate

Apart from the above mentioned six divisions, under the MoFE, there are five departments[20] managing specific tasks. Department of Environment (DoEnv) is one of them and is responsible for monitoring the environmental pollution against the provision of the approved IEE and EIA reports of the infrastructure projects. As stated earlier, this unit is currently focusing on monitoring mainly the industrial projects.

While ESMS is recommended to develop environmental quality standards and norms for SWM, DoEnv needs to be given additional charge of monitoring compliance of environmental standards at the waste management facilities. The MoFE needs to prepare a working mechanism among these two units with close cooperation from the NWMSU for efficiency of environmental monitoring mechanism.

Further the MoFE needs to further designate DoEnv to certify the site selection (i.e. certifying that the site selection adheres to the norms developed by the ESMS) for the development of waste management facility.

4.1.3 Establish cooperation with AEPC

Currently, the AEPC operates under the Ministry of Energy, Water Resources and Irrigation (MoEWRI),[21] with a mandate to promote energy generation from renewable sources. It also provides financial subsidy to renewable energy projects.[22] The AEPC operates independently and makes standalone proposals in consultation with the local level governments for development of waste processing facilities. Once approved by the local level governments, the AEPC provides the necessary technical support and financial subsidy to the local level governments to appoint private contractors for project execution. At the federal level, AEPC can be consulted while developing the policies, regulations, and technical manuals. The provincial governments should also seek support from AEPC while planning and developing common waste management facilities engaging more than one local level government. The AEPC independently can also approach the provincial governments to identify clusters where waste processing facilities can be developed to bring economies of scale, enhance viability of projects, and reduce the pressure on land.

[20] These departments under the MoFE are (1) Forest and soil conservation, (2) Plant resources, (3) Forest research and training, (4) National parks and wildlife conservation, and (5) Environment.
[21] (MoEWRI, 2020).
[22] The Renewable Energy Subsidy Policy, 2019 of Nepal identifies municipal scale bio-gas plants as an eligible sector to receive subsidy. Further the government of Nepal has received proceeds from the International Bank for Restriction and Development towards scaling-up renewable energy program and has identified AEPC as a nodal agency which in turn is supporting developing of municipal scale bio-gas plants in Nepal.

4.2 Engage provincial governments

Under the new constitution, Nepal has introduced a three-tiered government at federal, provincial, and local level. Local level governments are empowered to take up projects as well as draft their own rules and regulations. However, any infrastructure project outside the jurisdiction of the local level requires involvement from a higher level of the government, such as provincial government. The provincial government needs to be involved in the SWM planning and implementation activities within the province. The Philippines has successfully included all tiers of government and local communities in the solid waste management activities through a national level policy (see Box 5).

Box 5: Case study of national level SWM policy of the Philippines with focus on institutions

Republic Act No. 9003, published by Republic of the Philippines (in 2000), is "an Act providing for an ecological solid waste management program, creating the necessary institutional mechanisms and incentives, providing penalties and appropriating funds therefore." The Act prescribes establishment of National Solid Waste Management Commission at national level, and further mandates each province to establish Provincial SWM Board and similarly each local government unit to establish SWM Board at local level. The Act mandates preparation of local waste management plans and Provincial SWM Board is required to prepare provincial waste management plan from the submitted waste management plan by the respective local level SWM Board. Under them city and municipal SWM board. The Act mandates preparation of local waste management plans and Provincial SWM Board is required to prepare provincial waste management plan from the submitted waste management plan by the respective local level SWM Board. The functions and responsibility of the Provincial SWM Board include identifying areas within its jurisdiction having common solid waste management problems and allowing clustering at local levels for common waste management facility. Further the Provincial Board is required to provide necessary logistical and operational support to local municipalities and monitor implementation of Provincial SWM plan and revise it every two years.

Item no. 18 of Schedule 7 of the Constitution of Nepal (2015) identifies 'tourism, water, and sanitation' as a concurrent subject between the federal and provincial governments. Hence, involvement of provincial governments can facilitate in bringing neighboring local levels together and formulate a common waste management facility. The provincial government can play a role in identifying various clusters of local level and initiating a dialogue with the local levels to formulate common waste management facilities. A cluster approach will improve the technical and economic viability of such infrastructure and reduce the burden of identification of land to develop waste management facility for each local level.

4.3 Strengthen institutional capacity at local level

The institutional capacity of the local level governments for effective solid waste management is weak, resulting in absence of long-term planning or budgeting practices, poor project development and execution, and absence of service monitoring and efficient contract

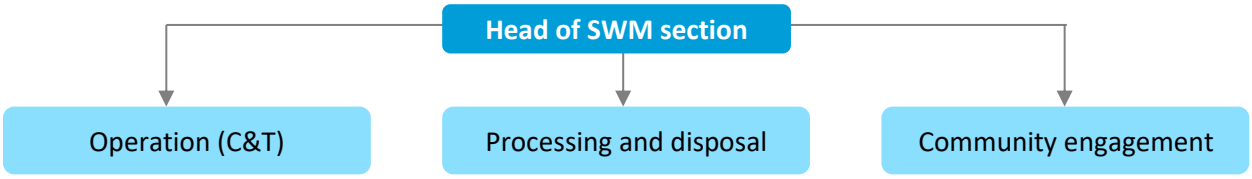
management. Local level capacities are required to be enhanced for an effective waste management service delivery. Institutional capacity improvement means (a) appropriate organizational structure, (b) capability of the human resource, (c) availability of equipment/apparatus for efficient functioning, (d) access to information, and (e) community engagement.

4.3.1 Adequate and appropriate staffing

Currently at the local level waste management related activities are managed by the Environment Section under 'Environment and Disaster Management Division'. It was observed that these sections are generally under-staffed, and the existing staff have limited technical capabilities and there are gaps in distribution of roles and responsibilities to manage SWM function effectively. As seen in Pokhara, there is a single supervisor in Sanitation Branch managing seven contractors responsible for collection and transportation of waste from the city. In Itahari, there are only three environmental engineers in the entire 'Environment and Disaster Management Division' and there is only one environment engineer in the Environment Section managing SWM and other environmental issues. Hence, adequacy of staff to deliver SWM services efficiently is clearly an issue.

Due to inadequate staffing, demarcation of roles and responsibilities are not maintained. This issue needs to be addressed at two levels. Firstly, recruitment of resources with required technical know-how and secondly, adopt a value chain approach in the organizational structure. It is recommended to re-align the responsibilities of these existing sections into operations encompassing collection and transportation, processing and disposal, and community engagement (presented in Figure 2).

Figure 2: Indicative set-up for SWM section at local level



The local level governments based on the technical guidance available from the National Solid Waste Management Support Unit, devise a staffing pattern for city's waste management unit. While recruiting the staff to be deployed under this unit an assessment of the requisite technical and management capabilities of staff for effective discharge of the role and responsibility to be ensured.

4.3.2 Training and capacity building

The staff managing SWM operations need to be adequately trained. Based on the field understanding, technology selection, land identification, appointment of private operators, contract management are some of the key areas which need to be focused for training and capacity building. The capacity building needs to follow the approach provided below:

- **Conduct a training needs assessment.** The local levels need training on vehicle selection, technology selection for processing and treatment of waste, preparation of bidding

documents for appointment of contractors, contract management etc. However, the need for capacity building will have to be assessed for each local level government and accordingly the training curriculum is to be developed

- **Provide trainings based on the identified needs.** Training modalities and frequency are to be decided based on the requirements. The NWMSU shall be responsible to identify and coordinate with the local levels for such training purposes.
- **Establish a process for institutional learning and knowledge management.** Knowledge repository at the NWMSU and periodic dissemination of knowledge is important to ensure that the continuity is maintained.

4.3.3 Improve community engagement

The waste generators need to be made aware of the requirements to make the improvements in SWM service delivery sustainable. The proposed community development branch (refer Figure 2) could be made responsible for this. Various forms of community groups are active in Nepal i.e. tole lane organizations (TLOs), women's group, youth clubs and cooperatives in SWM. Such community groups play an active role in supporting waste management by taking up special drives of segregation and recycling. Thus, the local level governments should prepare a comprehensive list of such groups and carry out IEC activities for deeper engagement of these community groups in SWM processes. The community groups/TLOs can be involved in the planning and management of solid waste in the following ways:

- **Awareness generation** about storing waste, segregation of waste, zero littering in the neighborhood, no open dumping, etc. The SWM unit of the local level government, along with TLOs, can organize awareness generation programs for the residents. SWM unit needs to prepare an annual schedule for awareness generation programs. Also, IEC materials can be distributed through TLOs.
- **Conduct sale of recyclables** at the community level. The household can store the recyclables and cumulatively sell to the scrap dealers. This will generate revenue for TLOs and a large quantity of the waste will be segregated and moved to the next level in the SWM value chain.
- **Participate in the planning process**. TLOs can act as a communication bridge between the local level government and the waste generators. The requirements of the residents can be conveyed to the local level governments through the TLOs.

4.3.4 Inclusion of the informal sector in SWM

Significant amount of informal recycling runs parallel to waste management activities and close to 15% of waste is recovered by informal sector. The rag-pickers collecting such recyclable waste work without any personal protective equipment (PPE). Due to the informal nature of work, there is no imposition of health and safety measures for the waste recyclers in Nepal. They work without any safety gear.

Brazil recognized 'collection of waste' as a formal job, which not only gave them formal job but an opportunity to earn deserving remuneration which has a positive impact on their social dignity (please refer to Box 6).

Federal government need to develop guidelines and provided to the local level for mainstreaming the informal sector by providing better working conditions through adoption of occupation health

and safety measures, providing access to healthcare facilities, educational and social benefits. Further, since the informal recycling practices in cities play a major role in reducing the amount of waste reaching the dump site. In order to strengthen and promote recycling activity, the local level governments should consider the following actions by introducing such provisions in their local level SWM by-laws:

- Identify the informal system of recyclers from rag-pickers to small-scale aggregators to large-scale recyclers as a part of city's waste management system.
- Develop occupational and health safety guidelines to be followed by the informal sector while collecting and managing recyclables.
- Institutionalize them by providing identity cards and protective gears to reduce adverse impact on health.
- Devise ways in which access to healthcare facilities and educational and social benefits are provided to the individuals working in the informal waste management system.

The community engagement division of the SWM branch could be made responsible for this record keeping

Box 6: Formalizing waste-pickers to enhance waste recycling in Brazil

In response to the national movement of waste pickers, the Brazil government was the first to formalize the job of collection of recyclables (2002) and called the occupation "catador de material reciclável" (recyclable material picker). For this recognition, a nation-wide database was developed recording the waste-pickers involved in the activity. Such formalization benefitted recording of nation-wide recycling activities, employment information, earnings and socioeconomic characteristics of the waste pickers.

Mobilization of informal sector in Costa Rica

Recycling and reduction of waste were two main pillars of Costa Rica's national waste management strategy to become carbon neutral. Under this initiative coordination units were established at the municipalities to interact with the waste-pickers, especially women groups, micro-enterprises and cooperatives were created locally. The system included setting up sorting and recycling centers managed by female small enterprises under the supervision of the municipalities.

Sources: (Filho) and (Gunsilius, et al., 2011).

5 Improving Service Delivery

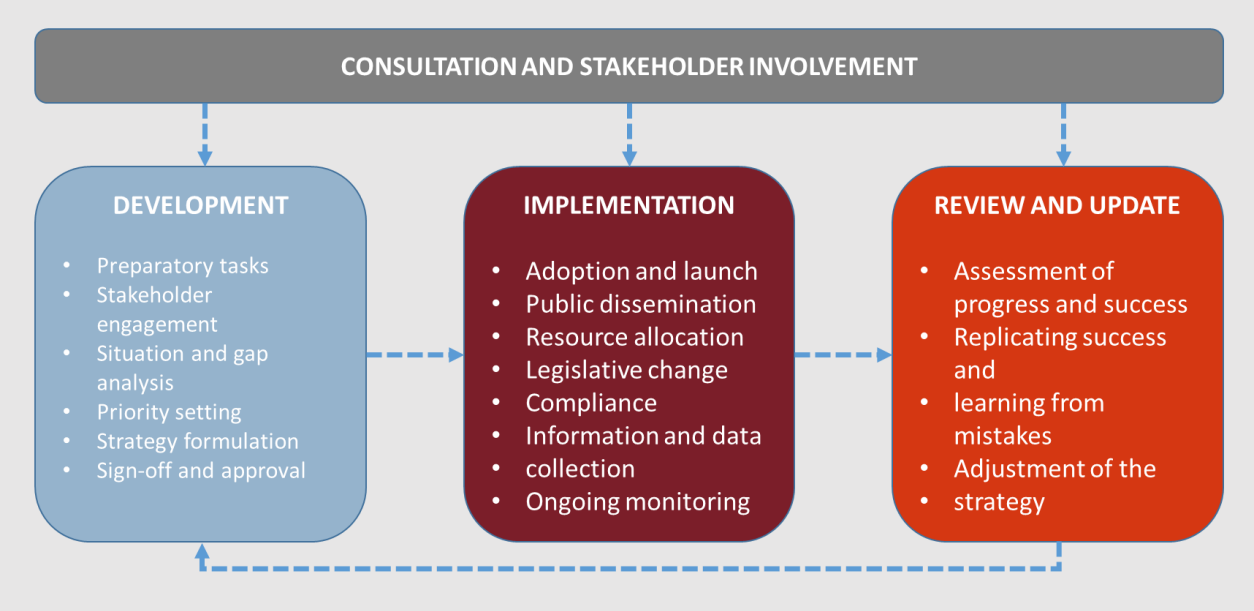
5.1 Prepare National Waste Management Strategy

The Government of Nepal has endorsed the "National Environment Policy 2019" to control pollution, manage waste, and promote greenery so as to ensure citizens' rights to live in an equitable and healthy environment. The policy aims to lessen and prevent all types of environmental pollution and manage waste emanating from all sectors including households, industry, and services.

Improving the performance of solid waste management sector in Nepal needs a multifaceted approach covering reforms in the legal and regulatory framework, provision of the requisite institutional framework engaging all levels of governments, supporting the local level governments for progressive improvements in service delivery, and ensuring availability of sector financing mechanism for capital investments and cost recovery.

Given that tourism is a driving economic sector in Nepal, improvements in solid waste management sector need to be visible. Thus, a National Solid Waste Management Strategy is recommended to be developed covering all these areas of reforms to be implemented in a step-by-step approach. The following figure presents the key actions to be undertaken for the development, implementation, and review of the strategy.

Figure 3: Process of developing national SWM strategy



Source: Adopted from "Guidelines for National Waste Management Strategies—moving from challenges to opportunities," developed by United National Environmental Program (UNEP) and United Nations Institute for Training and Research (UNitar).

The national strategy should adopt 'waste hierarchy' principle (European Union, 2008) ensure maximum recycling and recovery and minimum disposal of waste. The strategy should identify goals structured around the waste management hierarchy and specific measurable targets to be achieved against each goal. An immediate (1 year), short (3 year), medium (5 year) and long term (10 year) measurable targets, against current baseline, should be identified for each goal. The NWMSU needs to monitor the target achieved against each goal identified in the strategy and the strategy needs to be reviewed every two years. The relevant stakeholders from the federal level ministries and agencies, and local level needs to be consulted for preparation of the national strategy.

5.2 Prepare provincial plan for common waste management facilities

As stated in section 3.1.4, provincial governments need to play a key role in identification and development of common waste management facilities. However role of provincial government in development of such common facilities have not been identified in the current legal and regulatory framework. The key responsibilities for the provincial governments are to work with local level governments and encourage them to join common SWM facilities to bring in economies of scale, identify the cumulative finance requirement for development of the identified common SWM infrastructure and lead the implementation of such common facilities. Modalities of coordination within the province are provided in section 6.2.2. The provincial government needs to prepare a waste management plan utilizing the data from SWM MIS. These plans will identify the common facilities to be developed within the respective province. Such plans to be prepared in close cooperation with the participating local level governments.

5.3 Develop local level waste management plans

The local level governments is recommended to prepare an Integrated Urban Development Plan (IUDP) in line with National Urban Development Strategy 2017 (NUDS, 2017) with a planning horizon of 15 years.[23] IUDP encompasses land use, physical development, transportation and mobility, socioeconomic, institutional and multi sectoral investment plans. This plan will broadly identify the projects to be undertaken for the improvement of SWM services and can be elaborated under the waste management plan. The SWM unit in the local level government will be responsible for the preparation of such a plan, which is to be approved by the local government council.

Priorities of local waste management plan should adhere to goals identified under National Waste Management Strategy In alignment with the national priorities for waste management and city level priorities as identified under IUDP, the local level governments should to prepare their waste management plans (WMP). The plan should clearly establish the priority of interventions on immediate-term (1 year) short-term (3 year), medium-term (5 year), and long-term (10 year) basis in line with the priorities and goals identified under the National Waste Management Strategy developed by the federal government. The plan should further identify resource requirement and funding for capital infrastructure and its operation and maintenance.

[23] Roland White and Takaaki Masaki, 2019, Managing the federal transition to support sustainable urbanization in Nepal, the World Bank, Washington D.C.

Participatory approach to be adopted for the preparation of plan Stakeholders need to be engaged at each stage of the preparation, implementation, and review of the WMP. The priorities are to be finalized after a due consultations with all stakeholders at the local level, that is, community groups (NGOs, CBO, and TLOs), industrial associations, private contractors, project affected persons around waste management facilities, recycling association (if any), and citizens. The local plan should be prepared considering a planning horizon of at least 10 years. Indicative inclusions of the local WMP are provided in Box 7.

Box 7: Coverage of local waste management plans

The local level waste management plan should focus on integrated waste management planning covering complete value chain of waste management. The local WMP should provide, profile of the local government, current waste management systems and institutional mechanism for waste management, and quantification and composition of waste. The WMP should further provide immediate, short-, medium-, and long-term goals identified for service improvement based on thorough stakeholder consultations. The draft WMP should provide future waste projections, proposed waste management system and infrastructure retirements and institutional structure, plan financing mechanism, arrangements for informal sector integration, land identification and earmarking in the local land-use plans, planning for effective community participation, probable resettlement and rehabilitation issues and its mitigation plan, implementation schedule and monitoring framework against identified priorities, and approval from the local council.

5.4 Coordination processes among three tiers of government

The waste management plans, once sanctioned by the local level councils, are to be submitted to NWMSU for review and approval. Once the plan is approved, projects need to be prepared submitted seeking for financial assistance for implementation of the identified priorities. The local level government needs to inform the provincial government while submitting such the plans and projects to NWMSU. The federal level unit needs to assess the plan and provide their recommendations to MoFAGA for further action. The provincial governments, though Provincial Coordination Council, should identify the local level governments agreeing to participate in the common waste management facility and prepare a provincial waste management plans for the same. The project proposals from provinces need to be submitted to the NWMSU for review and approval.

5.5 Adopt project life cycle approach

Improvement in service delivery depends on multiple factors, including: (1) project development-appropriate project identification and prioritization, (2) project implementation, (3) operation and maintenance, and (4) monitoring and evaluation.

5.5.1 Project development phase

The local level WMP would clearly identify and state the prioritized projects to be taken up for implementation. The projects identification needs to be evidence based. Baseline data is to be assessed and projects are to be identified. Post identification of the requirements, based on the technical guidance of NWMSU, projects are to be formulated. For example, for a particular waste mix and quantity composting as a waste processing technology may to be chosen.

Project development phase needs to ensure:

- **Land availability for the project**. At present, there are no norms for identification of suitable land for development of SWM infrastructure, i.e. transfer stations, waste processing facility or waste disposal facility. However, till such norms are developed, while identifying lands, local level governments must ensure that there is minimum impact on the environment and public health. Land identification must avoid proximity to bio-diversity protection and disaster-prone areas.
- **The project location is adhering to the master plan**. As per the Land Use Act 2019, the local level governments are required to prepare land use/city master plans clearly showing the location of industrial corridor, special economic zones, national projects, heritage sites, religious and cultural sites, academic institutions, security areas, bio-diversity protection zones, disaster prone zones, roads, health institutions, irrigation canals, and other areas as designated by the government. The planning of SWM infrastructure by any local government should begin with identification of suitable land duly allowing adequate buffer area. Local master plan should identify and reserve such land for development of SWM facilities and accordingly plan the surrounding areas in order to avoid opposition at the project implementation phase. A due consultative process needs to be followed while identifying and reserving such land parcels by seeking consent of the concerned stakeholders from the vicinity and relevant authorities.
- **Establish financial feasibility and availability of finances.** From the assessment of Pokhara and Itahari, it was understood that the local level governments are highly dependent on grants (more than 60% of the total revenue) and own source revenue can barely recover the operational expenditure. Hence, sources of finance for the projects are to be identified.

Based on the technical and financial feasibilities the project is to be structured and the implementation modality is to be decided upon with support from the NWMSU and the IBN.

5.5.2 Project implementation phase

Establishing technical and financial feasibilities is followed by implementation of the prioritized projects. The key considerations are:

- Requisite clearances are to be obtained. Statutory clearances such as EIA from MoFE or other relevant organization as applicable.
- Land is prepared for the project implementation. Site clearances are the pre-requisite for the implementation. This includes ensuring access to the site (by road) and provision of basic infrastructure at the location (e.g. drinking water and shade for the laborers).
- Appointment of contractor through competitive bidding process. Based on the current assessment, it was understood that the local level governments require technical assistance to draft the contracts and to carry out a fair and transparent bidding process. NWMSU shall

prepare model contracts and bidding documents which the local level governments can adopt based on the requirements.

5.5.3 Operation and maintenance phase

The local level governments need to ensure complete value chain activities including segregation collection and transportation, processing and disposal of waste are carried out in accordance with the prescribed environmental standards. The key operational improvements that are required for the improvement of overall service delivery are:

- **Complete waste segregation**. The SWM Act prescribes that segregation of waste be done by the waste generators, i.e. at the source. The local level governments are yet to implement this. There are success stories of waste segregation in Nepal e.g. in Dhankuta Municipality (see Box 8 for details). The local level governments need to prepare an implementation plan to ensure complete waste segregation. Awareness of people is the key. Adequate IEC materials are to be designed and programs conducted in association with TLOs and community groups for effective implementation of 'segregation of waste at source'. Segregated waste needs to be conveyed in a segregated manner across the activity chain until it is disposed of in the landfill.

Box 8: Dhankuta Municipality sets an example in waste management

Dhankuta Municipality, with a population of 50,000, generates ~12 metric ton of waste daily. It has encouraged waste generators to segregate waste in biodegradable and non-biodegradable fractions. The biodegradable fraction (50% of waste generated) is utilized by waste generators at the source as animal fodder and agriculture manure by the rural wards; in the core city area, it is used as manure for kitchen and rooftop farming. All the non-biodegradable waste is brought to the landfill and is further segregated into various categories of recyclables, i.e. plastic, metal, glass, etc. The landfill site has been converted into a beautiful city park which is frequented by many federal and provincial ministers, other local government officials, etc. Dhankuta Municipality was declared the second best and the best cleanest city in Nepal in 2016 and 2017, respectively, and received cash prize.

Source: (World Bank, 2020).

- **Efficient waste collection and transportation.** A door-to-door waste collection plan needs to be prepared with daily frequency. Considering the mountainous landscape of western Nepal, the waste collection frequency could vary. The collection frequency should consider the maximum number of days wet waste can be stored. Waste collection routes and schedules are to be prepared and communicated to the waste generators so that maximum waste can be collected from the city. Waste collection vehicles should be closed to avoid odor and spillage of waste. Waste collection vehicles are to be carefully chosen to ensure that vehicles can move on roads with varying widths. The local level governments need funds to procure the vehicles with required specifications.

  If the urban local level governments outsource waste collection and transportation activities, then contracts of the private operators need to be drafted carefully to address the issues in

contracting as seen in Itahari and Pokhara (highlighted in Chapter 2). The scope of the local level governments and contractors should be spelt out clearly and risks need to be rationally distributed between the two parties. Performance indicators are to be included in the contracts. The contracts should provide the measurement methodologies of these performance indicators. The local level governments need to set up a monitoring mechanism to ensure strict compliance with the agreed service levels. Local level governments, in order to develop fair and transparent contracts with measurable performance indicators/standards to be achieved by the private sector, could seek support from the NWMSU as specified in section 4.1.1 of this note. This support could be provided through drafting federal level contracting manual which the cities may follow.

- **Process and treat the waste.** The collected waste is to be brought to the processing and treatment units for recovery. Though there has been some initiative to construct bio-methanation plants, processing and treatment of waste in local level governments is largely absent (see Box 9). Unsegregated waste is a deterrent to the processing of waste. These projects are to be chosen carefully. Rigorous stakeholders' consultations need to be carried out to ensure there is complete buy-in from the people residing nearby. The processing technologies need to be selected to minimize public health hazards.

Box 9: Snapshot of initiatives by AEPC

More than 2,600 tons per day (TPD) of organic waste (~0.1 million tons of organic waste per year) is generated in the cities of Nepal. With support from AEPC, six cities in Nepal are in the process of constructing bio-methanation plants with a cumulative capacity of 200 TPD. Four cities—Dharan, Kailali, Dang, and Jhapa—are in the construction phase, while plans for construction have been approved in Birendranagar, Itahari and Damak. However, 200 TPD is very low considering the quantum of organic waste generated across all urban centers in Nepal

Source: Discussion with AEPC in December, 2019.

- **Post waste processing, only inert material should be disposed in sanitary landfill.** Currently, urban Nepal has very limited number of sanitary/engineered landfill facilities for disposal of collected solid waste. Box 10 showcases the experience of Birgunj and Nepalgunj. Waste disposal does not necessarily happen in a sanitary manner. The local level governments need to maximize waste recovery so that only inert reaches the landfill sites.

  The discussions with the officials from Pokhara and Itahari revealed that acquiring land to construct SWM infrastructure is a challenge for the urban local level governments. Unavailability of government land, issues of land procurement, and absence of land identification norms are the deterrents to identification of land and construction of SWM infrastructure. The local level governments need to seek provincial and federal government support for the implementation of sanitary landfill sites.

Box 10: Sanitary landfill facility in Birgunj and Nepalgunj

The Asian Development Bank recently supported development of a sanitary landfill facility for scientific disposal of solid waste at Birgunj Metropolitan City and Nepalgunj Sub-Metropolitan City. The facility at Birgunj is still in the development phase, while the sanitary landfill facility in Nepalgunj sub-metropolitan city is operational. Approximately 32 metric tons of waste is collected from the city and is taken to the disposal site. Compost is made from biodegradable organic waste and sold in the market. In addition to this, recyclables such as glass, plastic, and tires are separated and sold to recyclers to generate additional income. Nepalgunj sub-metropolitan city has mandated waste generators to segregate waste into organic and non-organic to efficiently process waste at the composting plant in the disposal facility. Nepalgunj so far has been a success story of efficient waste management in Nepal.

Source: (Republica, 2020).

- **Adherence to environmental standards while improving SWM service delivery.** As stated earlier the MoFE needs to develop the environmental standards that are required to be followed by the local levels while implementing and operating solid waste management facilities. Project operations need to ensure adherence to such standards and a periodic compliance report to such compliance to be provided to the respective monitoring unit.

6 Financing SWM Service

Financing SWM sector improvement needs adequate resources to cover the cost of capital asset creation and the service operations. In Nepal, most financial resources available to provincial and local level governments are provided in the form of intergovernmental fiscal transfers (IGFT)[24] which form almost the entire income (95%)[25] of the local level governments. Hence capital investments for SWM infrastructure creation through own sources of the local level, though desirable, are not possible with the current revenue mix.

6.1 Cost recovery

Chapter 5 of the SWM Act allows local level governments to fix and realize service charges towards management of waste from the waste generators (domestic as well as non-domestic) within its jurisdiction. The Act further states that the income from SWM service charge should be utilized for waste management, environmental protection, and development of landfill sites. It is implicit that local governments should aim to recover operation and maintenance costs and capital costs from SWM service charges.

Since it is not possible to recover the capital costs at current levels of service provided by the local level governments, it is recommended that 100% O&M cost is recovered through service charges within next five years. The local level governments, in order set the appropriate SWM tariffs to recover the O&M cost, are first required to establish appropriate accounting practices for accurately assessing the O&M cost across the waste management value chain.

6.1.1 Improvements in operational cost accounting for SWM service

The local level governments need to adopt good accounting practices to establish the cost of service delivery for determination of tariffs. During the city level assessment in Pokhara and Itahari it is found that the current accounting practices does not allow assessment of O&M cost as per the waste management activity i.e. collection and transportation, processing, and disposal, and sweeping of streets. Accurate cost assessment of the SWM service is required for financial planning, investment decisions, and operational performance improvement. This is required to record the direct and indirect cost components along the waste management value chain. The cost of asset depreciation and interest costs for any borrowed capital should also be separately stated. In the first five years, the local level governments need to aim to recover operational costs excluding depreciation and interest costs.

Various methods of assessing SWM service charge exist in the local level governments of Nepal. There are flat rates per floor of domestic dwelling (Itahari), as percentage of integrated property

[24] Local governments receive fiscal transfer grants in the form of fiscal equalization, conditional, complementary and special grants and revenue share from sources (such as value-added tax, excise duty and royalty from natural resources) that are jointly assigned to central and local governments but administered nationally.

[25] Roland White and Takaaki Masaki, 2019, Managing the federal transition to support sustainable urbanization in Nepal, the World Bank, Washington D.C.

tax (Triyuga, Mechinagar, and Rajbiraj), surcharge on business or integrated property tax and flat rate based on location of the waste generator (Pokhara).[26]

The local level governments need to formulate guidelines for setting SWM tariffs and process for its annual revision. The tariffs will also be linked to service levels, affordability, and target of achieving full O&M cost recovery in five years. The local level governments are thus required to assess the current service levels and extent of cost recovery post establishing good accounting practices. An annual audit of accounts will make the process more credible.

The National Waste Management Support Unit needs to develop a tariff setting guidance manual to support the local level governments in assessing the service costs and setting tariffs. The NWMSU also needs to develop key performance indicators (KPI) for service assessment and planning for operational improvement. The KPIs such as total, establishment, and O&M cost per ton of waste collected can be used for benchmarking performance of the local level governments having similar demographic profile and waste management operations. The waste management plans prepared by the local level governments should include a five-year plan for improving service levels and improving operational efficiency and O&M cost recovery.

6.1.2 Improved cost recovery through enhanced SWM charge collection

The local level government needs to ensure 100% coverage for levying the SWM charges. The local level government need to levy and collect the charges from the waste-generators directly. The system of levying, collection, and monitoring SWM service charges needs to be simple and yet robust. Given the inadequate staff in the SWM section, SWM service charges need to be collected along with the billing and collection system for the integrated property tax (IPT).

Box 11: Average SWM user fees paid and billing methods

As per the "What a Waste 2.0" report prepared by the World Bank in 2016, the average annual user fee paid by a household is $37 in South Asia, and $47, $52, and $168 for lower-middle, upper-middle and high income countries respectively. Fees charged based on volume of waste generated are common in high-income countries, where waste management systems are evolved. Such joint billing with property and other utility taxes is common in middle- as well as high-income countries, which requires significant level of coordination, and is possible in matured waste management systems. Such joint billing leads in higher cost recovery amounts.

6.2 Capital investments through grants

As stated earlier, the economic losses due to unmanaged waste are 3–4 times the cost of providing basic integrated waste management systems meeting good international hygienic standards. Given that local governments do not have the financial capacity to undertake capital works and the positive externalities associated with good SWM practices, it is suggested that the

[26] In Pokhara the applicable monthly SWM charge is based on location of the waste generator (core market area, residential area, or mixed area), type of construction (mud/concrete), and its proximity to a main road, black topped road, or earthen road.

federal government needs to provide capital grants to the local level governments for SWM infrastructure creation.

6.2.1 Reforms linked capital grants

Currently, capital investments at the local level in Nepal are driven by inter-governmental fiscal transfers. The provincial as well as local level governments are currently eligible to receive fiscal equalization, conditional, special, and complementary grants. Of which, except for fiscal equalization grants, all three are tied in nature. Based on the National SWM Strategy, a reform-linked capital grant is recommended to be provided to the local governments and to the provincial government in the case of shared or regional SWM infrastructure.

Further, it is recommended that while fixing the allocation of funds for tied grants by the NNRFC, an appropriate amount to be reserved for funding SWM projects at the provincial and local level. Tied grants in the form of either special, conditional, or complementary grants from such reserved divisible pool should be made available to the respective provincial or local government implementing the SWM infrastructure project. The provincial and local level governments developing SWM infrastructure can access these funds by preparing their respective waste management plans, prioritizing their investment, and committing to achieve cost recovery reforms i.e. 100% O&M cost recovery in next five years.

6.2.2 Grants to provincial and local level governments

Chapter 15 of the Local Government Operations Act mandates provision of Provincial Coordination Council (PCC) to maintain coordination between the province and local level governments. The PCC needs to be designated as a provincial coordination agency of waste management plans at local and provincial level. The PCC, in consultation with the local level governments in the province, need to identify the cluster of local level governments participating for common waste management facility (CWMF). In addition, the PCC need to also coordinate with local level governments for preparation and monitoring of WMPs and prepare of provincial waste management plan.

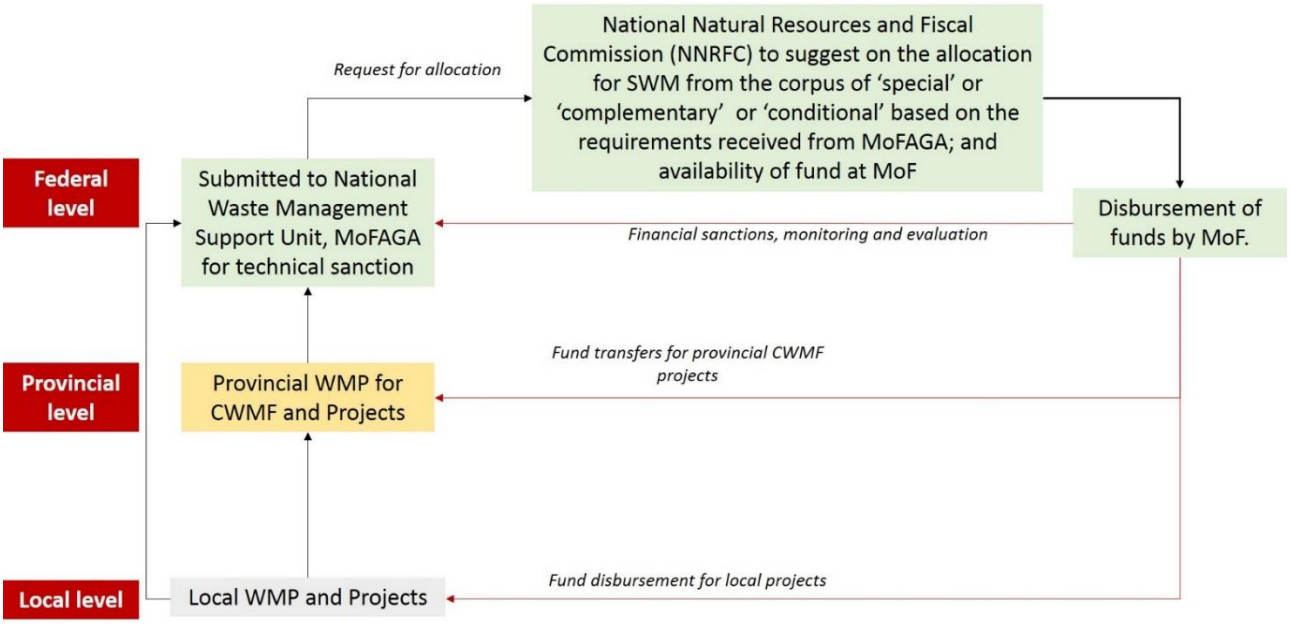
For CWMF, the provincial government can directly access federal grants after preparation of provincial waste management plan. The process of SWM fund flow involving the required institutions is presented in Figure 4.

6.3 Promote private sector participation

The availability of capital grants for improving the solid waste management sector may not translate into improvement in the service delivery due to lack of institutional and administrative capacities to prepare a pipeline of projects and inefficiency in executing identified projects. The local level governments in Nepal are facing a paradox: there is a massive requirement for investment in core infrastructure including SWM but are unable to utilize the substantial available allocations for capital expenditure effectively and close to a third of the funds remains unspent.[27]

[27] Roland White and Takaaki Masaki, 2019, Managing the federal transition to support sustainable urbanization in Nepal, the World Bank, Washington D.C.

Figure 4: Indicative fund disbursement mechanism for SWM projects



The local level governments will need to be supported by the private sector for improving the SWM service delivery. The PPPI Act identified 'solid-waste processing and management plant' as an eligible infrastructure sector, wherein projects can be identified to be implemented on PPP basis through private financing. However, until now, the sector has seen private sector participation limited to short-term collection and transportation service contracts. The private sector has the potential to improve operational efficiency and cost-effectiveness in collection, transportation, treatment, and disposal of waste generated. The service level accountability of the private sector can be enforced through contractual commitments. However, the local level governments need substantial technical and handholding support for engaging private sector in solid waste management.

6.3.1 Modalities for PPP in SWM

Currently, the private sector is engaged largely in the collection, transportation and dumping of waste. As discussed in Chapter 2, the key issues of the existing contracts are (1) ambiguity in scope of work, (2) absence of fair and transparent competitive bidding process, and (3) lack of monitoring mechanism of the contract performance. There is a lack of contract management capabilities in the staff managing the SWM function at local level.

Models for engaging the private sector for delivering waste management service can be through a service contract, a franchise agreement, or a concession contract with the respective local level. Each of these models has its own applicability which needs to be assessed by the local level government for engaging private sector.

- ***Service contracts***: Local government awards a fixed-term contract to a private operator for solid waste collection service, street sweeping service, collection of recyclables, transfer station operation, disposal site operation, or fleet maintenance. A competitive procurement

process is followed for such contract award and the private operator is paid for service delivery by the local level government under the terms of contract.

- ***Concession contracts:*** The local government awards a concession to a private operator to set up a facility that utilizes government-owned resources. The concession is in the form of a long-term contractual agreement, whereby the private operator builds and operates a facility which is a part of the system i.e. waste processing facility or the entire waste management system. In some cases, the private operator may maintain ownership indefinitely; in others, the private firm may transfer ownership of the facility to the government after a specified period in the concession.
- ***Lease:*** The Local government owns assets and invests in assets and leases their use to a private operator. The private operator is responsible for maintenance and repair. In some cases the private operator is also required to collect revenues from users. The profits are shared with the local governments who is also responsible for making new investments in upgrading the system.
- ***Franchise:*** The local government awards a finite term contract for a zonal monopoly (a franchise) to a private operator for the delivery of solid waste collection services. The franchise awarding is made after a competitive qualification process. The private operator recovers its costs and profit through direct charges to the waste generators in the specified zone that are served. The local government provides control over the tariff charged to the waste generators.

Long term service contracts or concession are further differentiated from each other depending on combination of risk (i.e. design, finance, build, own, operate, and transfer) sharing in the contract between the local government and the private operator. There are various models considering the risk sharing mechanism exist in engaging private sector in solid waste management. Modalities of such contract structures include:

- Design, build and operate (DBO). The private contractor is responsible for the design, construction, and operation of the SWM facility. Such contracting models are used when the public authority has the financial resources to develop the facility, however, lacks design, construction, and operation capabilities. Such models can be used for development of sanitary landfill facilities, waste processing facilities etc.
- Design, build, finance, operate and transfer (DBFOT). The private partner is responsible for the design, construction, financing and operating of the SWM facility and transfer the facility to the public authority post the contract period. Such contracting models are very complex and are used when the public authority lacks financial resources, design, and construction and operation capabilities. Such contract structures are utilized for development of waste processing and disposal facility, development of integrated waste management systems.
- Build, operate, and own (BOO). The private partner builds a facility based on a defined design and owns and operates it. Sometimes such contract also has the additional component of transferring the asset back to the authority at the end of contract. Such contracts are provided where the design is provided by the public authority and requires the private sector to construct and operate. Also the ownership of the asset remains with the operator. Such models can be used for development of transfer stations, sanitary landfill facilities etc.

Engaging the private sector for waste management activities through long term contracts and its management is a complex and institutional capacities of the local level governments in Nepal

needs to be developed. The federal level government need to provide support in the form of handholding and capacity building.

6.3.2 Support to local level for PPP

Engaging private sector through PPP modalities is a complex process and the local level governments in Nepal requires substantial support and handholding from IBN through NWMSU. Support areas that are required to be provided include the following:

- **Project development:** Basis the waste management plan prepared by the local levels and identification of priority interventions that are required to be implemented for improving SWM, local levels will need support for project development i.e. scoping of infrastructure components, financing modalities, implementation mode, contracting process, and project structuring in case of PPP.
- **Preparation of procurement documents:** Post finalization of the project development modalities, local levels need support in defining the procurement process and preparation of requisite procurement documents i.e. request for qualification, request for proposal, draft contract/concession agreements, etc.
- **Handholding on contract management**: Procurement process for PPP projects are complex and local levels will need handholding support for bid process management and also need support on managing such complex contracts once the contracts are awarded to the private player.
- **Dispute resolution**: The institutional capacities of the local level are weak and has very limited of engaging private sector through complex contractual arrangements. For engaging the private sector in continued service delivery, centralized dispute mechanism needs to be established at federal and provincial level to support resolution of disputes with the private sector.
- **Training and capacity building:** IBN in partnership with the NWMSU will required to undertake training and capacity building activities for building capacities at the local level, i.e., development of contract documents for engaging a private sector player in collection and transportation, and integrate waste management, processing and disposal. Training program on PPP contract structures, bid process management, contract management, and dispute resolution are essential.

7 The Way Forward

The improvements in SWM sector in Nepal require comprehensive reforms in institutional, legal, and regulatory and finance management to improve the SWM service delivery at the local level. As discussed in the previous chapters, the institutional and regulatory reforms shall support the local level government to carry out service delivery efficiently. The key reform actions by these two ministries on immediate basis are summarized in Table 3.

Table 3: Institution wise key reform actions

Institution	Key reform action	Key stakeholders to be consulted
MoFAGA	Initiate amendment of SWM Act and Rules	MoFE, MoF, AEPC, MuAN and provincial governments, sector specialists.
	Establish National Waste Management Support Unit	MoFE, IBN, AEPC
	Develop National Waste Management Strategy	MoFE, MoF, IBN, AEPC, MuAN and provincial governments, sector specialists.
	Draft SWM technical guidance manual	MoFE, MoF, AEPC, MuAN and provincial governments, sector specialists.
MoFE	Develop sector monitoring and data sharing mechanism	MuAN, NWMSU, MoFAGA
	Extending the roles of DoEnv and ESMS	MoFAGA, NWMSU
	Develop technical norms, standards for environmental quality assessment	MuAN, NWMSU, MoFAGA, AEPC
Provincial level governments	Develop provincial waste management plan for common waste management facilities	Local level governments within province
Local level governments	Prepare local SWM by-laws	NGOs, CBOs, community groups, industry associations, private waste management operators
	Establish SWM unit	-
	Prepare local waste management plan for project development and service delivery improvement	NGOs, CBOs, community groups, industry associations, private waste management operators, project impacted communities
	Prepare a cost recovery plan to meet the operational expenditure	NGOs, CBOs, community groups, industry associations,
	Establish a grievance redressal mechanism	-

Along with the key reforms that are required to be undertaken by the MoFAGA and MoFE, Table 4 summarizes interventions that need to be undertaken at various entities at in the respective tiers of the government. The immediate measures (within 1 year) and the medium-term (2–3 years) interventions have also been presented.

Table 4: Phasing of interventions by respective tier of government

Tiers of government	Key reform areas			
	Regulatory reforms	**Institutional strengthening**	**Service delivery improvements**	**Financing**
Federal level	**Immediate term**			
	• Amendment SWM Act (MoFAGA) • Policies for waste streams other than municipal waste (MoFE) • Amend EPR (MoFE) • Develop site selection norms to develop SWM infrastructure (MoFE)	• Establish NWMSU (MoFAGA) • Recognize ESMS as environmental monitoring and compliance unit under DoE, MoFE	• Prepare a National SWM Strategy (MoFAGA) • Develop SWM technical guidance manual (NWMSU)	• Develop reformed linked capital grant support program for SWM (MoF, MoFAGA, NPC, NNRFC) • Finalize mechanisms for project approval and fund disbursement (MoF, MoFAGA, NPC, NNRFC) • Develop monitoring mechanism to track utilization (MoF, NPC)
	Medium term			
	• Develop model SWM by-laws (MoFAGA)	• Set-up online data sharing MIS (NWMSU)	• IBN to assist the NWMSU to develop SWM PPP toolkit • Develop capacity-building program for PPP and contract management (IBN, NWMSU)	• Track utilization and measure outcomes achieved (MoF, NWMSU)
Provincial level	**Immediate term**			
		• Prepare mechanism of coordinating waste management plan preparation	• Prepare waste management plan • Identify land for CWMF	• Submit WMP and CWMF project to NWMSU for approval and seek grants

Tiers of government	Key reform areas			
	Regulatory reforms	**Institutional strengthening**	**Service delivery improvements**	**Financing**
		through Provincial Coordination Council (PCC).		
	Medium term			
		• Identify implementation agency for common waste management facility (CWMF)	• Review and update waste management plan • Initiate project preparation for CWMF.	• Initiate CWMF project implementation • Monitor project progress vis-à-vis fund utilization
Local level	**Immediate term**			
	• Formulate local level SWM bye-law pursuant to federal legislation	• SWM unit under the disaster management and environment section needs to be staffed adequately with required skillsets • Involve TLOs, communities, NGOs in planning and management processes	• Prepare waste management plan, including service delivery improvement and infrastructure planning • Project prioritization and identification of financing sources • Identify land for developing SWM infrastructure	• Establish O&M cost accounting system basis the guidance received from NWMSU • Formulate tariff based on SWM bye-law • Assess revenue impact for joint billing with IPT.
	Medium term			
	• Formulate monitoring mechanisms of implementation of by-laws	• Institutionalize informal sector	• Procurement of equipment, and O&M • Procurement of land and project implementation	• Improve coverage of levying charges • Rationalize tariff, and timely billing and collection of charges • Adopt consultative budgeting process for SWM

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Annexes

Annex A: List of participants in federal level consultations

Agency	Officials consulted
Ministry of Federal Affairs and General Administration (MoFAGA)	• Mr. Jaya Narayan Acharya, Joint Secretary, MoFAGA • Mr. Rishi Acharya, Under Secretary, MoFAGA
National Natural Resources and Fiscal Commission (NNRFC)	• Ms. Anita Paudel, Under Secretary
Ministry of Urban Development (MoUD)	• Ms. Shestha Maskey, Joint Secretary, MoUD
Department of Environment (DoE), Ministry of Forests and Environment (MoFE)	• Ms. Abha Shestha Karna, Director General • Mr. Indu Bikram Joshi, Deputy Director General
Environmental Impact Study Division (Ministry of Forests and Environment)	• Ms. Jwala Shrestha, Under Secretary and Chief, Environmental Impact Study Section
Investment Board Nepal (IBN)	• Mr. AbhayaSigdel, Consultant • Mr. Tapendra Chand, Consultant
Alternative Energy Promotion Centre (AEPC)	• Mr. Madhusudan Adhikari, Executive Director • Mr. Sushim Man Amatya, Senior Programme Officer
National Planning Commission (NPC)	• Mr. Biju Kumar Shreshtha, Joint Secretary • Mr. Narayan Khatiwada, Programme Director (Energy, Water Resource and Irrigation)

Annex B: Brief review of the existing rules and regulations impacting SWM Sector

Law/act/guideline/rule	Agency involved	Coverage
Intergovernmental Fiscal Arrangement Act 2074 (2017 AD)	Ministry of Finance	• Provides the sharing the revenue between the federal, provincial and the local level of the government. • Also describes the powers vested with the federal government to levy tax, non-tax royalty. • Describes how the revenues will be collected at the federal level and will be vested in various federal level funds, state level funds and local level funds and its transfer mechanisms as devised by the NNRFC and frequency of transfers. • Defines the distribution of royalties received from the natural resources.
Solid Waste Management Act, 2068 (2011 AD)	Ministry of Federal Affairs and General Administration	• Provides guidance on solid waste generation, collection and discharge • Explains responsibilities of local governments in minimizing waste generation, segregation of waste, and safe disposal of harmful waste • Prescribes for transfer stations (as required), sanitary landfill sites, involvement of private parties and communities in waste management through formal licensing • Provisioned for constitution of SWM council for monitoring and management, their roles and responsibilities, decision-making powers, etc. • It is also suggested to develop SWM technical cooperation center. The center has been dissolved recently • The Act is also provisioned for penalties and charges for noncompliance and usage of services, respectively
Solid Waste Management Rules, 2070 (2013 AD)	Ministry of Federal Affairs and General Administration	• This rule is pursuant to SWM Act, 2068 • The rules further provide directions, course of action, responsibilities of the urban local level (ULG) and other involved agencies in segregation, management, transportation and discharge of solid waste • The rules also elaborate further on licensing processes • The rules introduce monitoring of segregation, processing and discharge by a central committee to be headed by MoFAGA. The

Law/act/guideline/rule	Agency involved	Coverage
		committee has representations from other relevant ministries as well. However, no monitoring framework has been provided in the rules
Environment Protection Act (EPA), 2019	Currently under MoFE	• Was enacted for protection (maintenance, promotion and proper utilization) of environment and national heritage • Mandates preparation of environment assessment (EA), IEE and EIA for infrastructure projects • Provisioned for prevention and control of environmental pollution, establishment of laboratory and institutionalize sample checks for environmental quality compliance • Establishment of councils, deployment of environmental inspectors, and operationalization of environmental funds are some of the key provisions
Environmental Protection Rules, 2054	Currently under the purview of Ministry of Forests and Environment	• This elaborates on Rule 4 of EPA, 2053, and provides scope for IEE and EIA approvals, validity of such reports, etc. Necessary details have been provided in the Rule as amendment to the EPA
Local Government Operations Act, 2074 (2015 AD)	Ministry of Federal Affairs and General Administration	• For institutionalization of legislative, executive and judiciary practices at local governments • It classifies municipalities and requirements for operation of municipalities • Provisioned for municipality's function, duties and rights, such as municipal police, cooperative institutions, local service management, local development plans and projects, health and education, local market management, environment protection and bio-diversity, local records management, disaster management, etc.
PPP Policy (2015 AD)	Ministry of Finance	• Formulated in compliance with Private Sector Investment in the Construction and Operation of the Infrastructure Act (2006) with a vision "to ensure public access to infrastructure and services through their qualitative and sustainable development" • Aims to bring in private capital in infrastructure investments, efficient and innovative technology, effective managerial skillsets, ensure efficient service delivery, and

Law/act/guideline/rule	Agency involved	Coverage
		sustainable O&M of large infrastructure projects. • Provides guidelines for do's and don'ts for the parties involved, stages of development, and key consideration for each stage of project development
PPPI Act (2019)	Investment Board Nepal	• The Act identifies waste processing and management plants under 'infrastructure structure', which can be developed and construct under PPP mode

Annex C: Chapter-wise review of the SWM Act, 2011, and comparable legislation in the region

Chapter reference	Provision	Example from other countries	Remarks on provisions of the Act
1: Preliminary	• Defines the terms used in the Act • Defines the organizations/entities involved, various operations and components of SWM, SWM infrastructure	• Only municipal solid waste is governed by the SWM Rules, 2016, developed under the Environment Protection Act, 1986. The rules also address the domestic waste generated by commercial and other establishments. However, India has separate rules for industrial waste, hazardous chemical waste, e-waste, biomedical waste, lead acid batteries, radioactive waste, plastic waste, construction and demotion waste, etc. • Similarly, Republic Act9003 (RA 9003) of the Philippines, includes only household, commercial, non-hazardous institutional and industrial waste, street sweeping,	• The definition of solid waste in the Act includes all types of waste i.e. hazardous (solid, liquid, chemical, bio-medical etc.) and domestic waste. Biomedical waste, hazardous waste, etc., are defined separately. Municipal solid waste is not defined, which primarily is the responsibility of local governments • Considering the impact of different categories of waste on health and environment, it is necessary to segregate management of harmful waste (industrial and biomedical)

Chapter reference	Provision	Example from other countries	Remarks on provisions of the Act
		construction debris, agricultural and other waste, and does not include hazardous and biomedical waste	through separate legislations
2. Provisions on solid waste generation, collection, discharge	• Covers the responsibilities of local governments in managing solid waste. The responsibility of waste generators is to reduce generation of waste at source and ensure segregation of waste in wet and dry fractions. • Prescribes for a common collection point, segregated waste transportation • Encourages reduction, reuse and recycling of waste	**SWM Rules, 2016—India** • The rules focus only on the responsibilities of stakeholders at various levels. Urban local bodies (ULB[28]) are mandated to prepare their own bylaws using the framework prescribed in the rules • Standards for land selection, buffer zones, environmental standards, etc., are the responsibilities of Ministry of Environment Forest and Climate Change (MoEFCC) • ULBs are obligated to prepare a solid waste master plan and introduce bylaws to implement the plan. The MoEFCC has prepared model bylaws that can be adopted and revised by the cities as per local needs	• There is no mention of preparation of local-level plans for SWM. Without a plan to collect and transfer waste, efficiency cannot be achieved, and project identification remains a challenge • The Act does not mandate local governments to roll outdoor-to-door waste collection • It does not mandate the local government to design occupational health and safety (OHS) guidelines for personnel involved in these activities
3. Transfer station and landfill site	• Prescribes transfer stations after primary collection centers in an environmentally suitable manner • Describes the responsibilities of local governments in obtaining land with federal assistance,	• It provides guidance on all the activities such as collection, storage, transportation, material recovery, processing and disposal of waste • The Act also suggests training rag pickers and waste collectors	• It does not mention undertaking feasibility studies for constructing transfer stations, and the environmental standards that

[28] Urban local bodies is terminology in India used similar to define urban local governments in Nepal.

Chapter reference	Provision	Example from other countries	Remarks on provisions of the Act
	identifying land, constructing, operating and maintaining landfill sites	and identifies it as the responsibility of ULB RA 9003—Philippines • Clearly defines the three-level institutional mechanism for implementing the provisions of the Act • Outlines provisions on segregation, collection, and transportation of waste, development of transfer stations, recycling program, composting program, guidelines for development of controlled dumps, sanitary landfill facility siting and operations criteria, etc.	need to be adhered to • Availability of land for landfill site is identified as a probable issue for which the federal government may provide assistance. Land management and land records, as per the Constitution of Nepal, is a provincial subject. But the Act does not recognize the role of state governments • Landfill is loosely defined and it does not prescribe local level governments to only dispose the inert in the landfill
Z4. Involvement of private sector and communities in SWM	• Provisions for private operators and investors to obtain license to operate at the local level • Prescribes tendering to appoint the private party for SWM • Permits are to be given to private operators to provide services at landfill	PPP toolkits for all sectors have been prepared private sector engagement by the cities. The ministry has also developed guidelines for contract management, technology selection, etc.	• Licensing and tendering processes mentioned do not provide clarity on the arrangements between these two methods. Also, it is not clear whether only licensed operators can be a part of the tendering process • It does not provide any technical advisory on tendering, contracting, etc.

Chapter reference	Provision	Example from other countries	Remarks on provisions of the Act
			• Local governments are to monitor the operations of private parties maintaining the landfill, but does not provide further details on the performance, environmental standards and implementation framework
5. Service charges	• Local governments may levy services charges on waste generators • Local governments to formulate a pro-poor charging regime • Income from service charges and contractors to be spent only on SWM services	• This is identified as an activity of the local body	• The basis of charging like nature and quantity of waste is not easily implementable • Ring-fencing income and expenditure of SWM services requires clear identification of tasks of urban local governments and private operators, and also accounting reforms to implement • It prescribes discontinuing services if waste generators do not pay; however, it does not provide guidance on the implementation when door-to-door service is not available
6. Pollution control	• Local governments are responsible for pollution control and monitoring, and		• There are no environmental monitoring and pollution control

Chapter reference	Provision	Example from other countries	Remarks on provisions of the Act
	complying with the standards set out in the Act • Prescribes preparing a financial, environment management, social and physical development plan for landfills		standards that apply to SWM activities, as mentioned in the Act • No implementation guidance, i.e., frequency and method of monitoring, is given to the local level • Institutional structure to carry out such monitoring is not provisioned for
7. SWM council	• A national level council is to be constituted with representation from various relevant ministries and units, and cities, to take policy decision	The Central Monitoring Committee in case of India and the National SWM Commission in case of the Philippines	• The Ministry of Power, the Ministry of Finance were not made part of the council • Policy decisions need to be evidence based, but information flow is not outlined in the implementation mechanism
8. SWM Technical Cooperation Center	• Establishment of a center to provide technical support to urban local governments • Key responsibility is to formulate standards for various SWM activities and prepare nation-wide strategies • Providing support in capacity building is another important	The Central Public Health and Environmental Engineering Organization formed under the Ministry of Housing and Urban Affairs, is responsible for all technical support and guidance, advisory, strategy formulation for SWM The Central Pollution Control Board, formed under MOEFCC, is responsible for tracking, monitoring and ensuring	• Such units with focused responsibilities can fast-track processes. Also presence of such units is important as local governments are newly formed and lack technical competence • The center, being the nodal technical support

Chapter reference	Provision	Example from other countries	Remarks on provisions of the Act
	activity envisaged for the center	compliance with the environmental standards In case of the Philippines, the National Ecology Center provides technical support on SWM	organization, can collate data from local levels, which is not envisaged in the obligatory duties. Tracking the implementation status of projects at the local level is important. This also warrants for involvement of the provincial government in tracing provincial-level progress
9. Offenses and punishments	• Various offences such as discharging waste in non-designated place and littering are punishable under the Act • Punishments in terms of fine and penalties are mentioned • Also, creating hindrances to service provision will be considered under state offence, for which legal cases can be filed	• Local government may draft these provisions under the bylaws, including its implementation mechanism • RA 9003 of the Philippines also identifies fines and penalties for non-compliance to the provisions of the Act (defines the minimum and maximum amount for non-compliance to specific clauses of the Act)	• It does not mention the mechanism for imposing penalties on defaulters or offenders • No guidance is available on the amount of penalties
10. Miscellaneous	• Standards and directives to implement the Act to be issued from time to time • Record of community-based organizations involved in the SWM needs to be maintained by local governments • Further directives given for the		• Community-based organizations play an important role in the SWM of cities, but the Act does not envisage involving them rigorously in the planning and execution process

Chapter reference	Provision	Example from other countries	Remarks on provisions of the Act
	biomedical waste and chemical poisons		

Annex D: Chapter-wise review of SWM Rules, 2013, and comparable legislations in the region

Chapter no	Provision	Examples from other countries	Remarks on provisions of the rules
1. Short title and commencement			Clear objective to be achieved through implementation of the Act and rules, should be defined
2. Definitions		Sanitary landfill is the key component of the SWM value chain and needs to be defined adequately in the Act/rules for local level to gather the understanding Indian SWM Rules, 2016, define it as *final and safe disposal of residual solid waste and inert wastes on land in a facility designed with protective measures against pollution of ground water, surface water and fugitive air dust, wind-blown litter, bad odor, fire hazard, animal menace, bird menace, pests or rodents, greenhouse gas emissions, persistent organic pollutants slope instability and erosion.* The RA 9003 of the Philippines defines sanitary landfill as *waste disposal site designed, constructed, operated and maintained in a manner that exerts engineering control over significant potential environmental impacts arising from the development and operation of the facility*	Key terms like sanitary landfill need to be defined for better understanding at local level
3. Segregation and management of solid waste	Warrants waste generators to segregate and manage harmful or chemical waste on their own	Globally, the term hazardous waste means the domestic hazardous waste as there are separate legislations for municipal waste and other waste, i.e.,	This provision mandates waste generators to segregate and manage harmful waste on their own. However, in the

Chapter no	Provision	Examples from other countries	Remarks on provisions of the rules
		industrial hazardous and biomedical waste. Though legislations in other countries warrant waste generators to segregate domestic hazardous waste, responsibility of collecting and managing such waste lies with the local body	absence of strong monitoring mechanisms at the local level, there are chances that such waste may get mixed with the general solid waste without any treatment
4. Discharge of solid waste	Warrants local level to consider the ease of transportation, processing and final disposal of waste while fixing the time, place and manner in which the waste generators can discharge waste. It also describes that local level may determine separate time, place and manner for transportation of waste up to processing site	Time, location and collection of the waste directly from waste generators are explained in detail in the local legislations, i.e., the local sanitation bylaws	Section 8 of the Act prescribes providing for waste collection at each and every *tole* or *settlement* to make the waste collection effective. However, to ensure the least public health impact, the local level may do away with the collection center and arrange for daily door-to-door waste collection Also, the time, location and method of waste collection may be clearly defined in the local level bylaws
5. Discharge and management of harmful and chemical waste	• Forbids waste generators from mixing harmful, chemical, organic and other waste. However, harmful waste can be discharged post processing and converting into general waste • Permission to be taken from local governments for generation and management of harmful waste • Local level can manage	Hazardous waste generated at the local level is collected separately and managed at the hazardous waste processing and management facility	Provision for segregation of hazardous chemical waste from general waste is good. Which negates the negative impacts of such waste. However, monitoring the compliance, w.r.t processed hazardous waste to be mixed with the general waste on daily basis, by the local government may be looked at considering the available institutional capacity at the local level

Chapter no	Provision	Examples from other countries	Remarks on provisions of the rules
	processed harmful waste through charging a service fee		
6. **Discharge and management of health institution related waste**	• Health institutions should segregate and manage waste on their own • Local level to give permission for processing of waste by health institutions	Legislation for management of waste generated by the healthcare institutions are different from general municipal waste. Also, there are completely segregated waste collection systems for bio-medical waste. In India, the Biomedical Waste Management Rules, 1998, which were amended in 2016, warrant all healthcare facilities to dispose provide their waste only through biomedical waste management facility operators	City-level assessment revealed that general waste from healthcare institutions gets mixed with general municipal waste at the disposal site. A biomedical waste legislation is needed mandating healthcare facilities to send their waste to authorized healthcare waste management operators only
7. **Transportation of solid waste**	• Warrants the local level to waste is covered during transportation, and there is no waste or leachate spillage and odor during loading and unloading	Similar provisions exist in other countries. However, the RA 9003 of the Philippines further defines to assess the size of the road which ensures that waste collection to reach the point of collection	No remarks
8. **Operation of sanitary landfill**	• Warrants the local level to ensure no adverse impact on environment, physical, social or biological impact on the nearby population due to sanitary landfill development	Legislation in other countries clearly define the criteria for selection of land to be used for development of sanitary landfill facility. Schedule I of the SWM Rules, 2016, (India) clearly defines the criteria for site selection (specifications for sanitary landfill). Section 40 of the RA 9003 of the Philippines stipulates minimum criteria for sanitary landfills	Majority of urban centers in Nepal dispose waste alongside water bodies, i.e., rivers, and other environmentally sensitive areas. Also, very few urban centers have identified and developed sanitary landfills. Providing the local level with clear site selection criteria will support in negating the adverse public

Chapter no	Provision	Examples from other countries	Remarks on provisions of the rules
			health and environmental impact
9. **Post-closure management of sanitary landfill**	• Warrants the local level to reduce the impact of leachate, gas, odor from sanitary landfill and adopt measures to utilize landfill gas	In order to avoid the negative impacts of landfilled waste, clear technical guidance is provided by the technical guidance. e.g. Section C, Schedule I, of the SWM Rules, 2016, (India) clearly defines the specifications of the topsoil layer, drainage layer, vegetative layer that need to be developed once the landfill operations are closed	Though the rules provide that the local level needs to negate the impact of landfilled waste, technical guidance related to closure of the dumpsites/landfill sites needs to be provided to local level. This may be provided as a part of the SWM Rules to be adopted by the local level
10. **Application for license for SWM**	• Warrants any entity interested in undertaking SWM, to apply for a license to the local level with all requisite details	Legislations reviewed do not have such provisions, though the RA 9003 allows local bodies to recommend measures to be implemented through private sector participation—particularly in the generation and development of essential technologies in SWM i.e. processing of waste. Incentives are also provided to the private sector for development of waste processing technologies	This provision is good considering that any entity having local knowledge and capacity may support SWM operations and increase the coverage of service where the local level institutional capacities needs strengthening. However, it may not be necessary that such entities have requisite experience in managing the SWM operations and in particularly operating complex waste processing technologies
11. **License may be issued**	• Allows the local level to issue license post thorough verification of the application	Comparable legislation in other countries do not have such provisions. Rather they promote engaging the private sector through adopting a competitive tendering process	Local levels need to introduce a transparent tendering and bidding process for the selection of experienced operators for SWM
12. **License may be revoked**	• Empowers the local level to revoke the license if any condition	Multiple countries have developed model contract documents for selection of operators for SWM in cities. Such contracts are	License system may be changed by the tendering process. Contract documents should have

Chapter no	Provision	Examples from other countries	Remarks on provisions of the rules
	mentioned while issuing the license is not fulfilled	developed collection and transportation, processing and disposal and integrated SWM in urban areas. Such contracts bring balanced risk allocation, performance standards and associated non-compliance penalties. Local governments engage the private sector through a competitive bidding process after customizing the model bidding documents	performance standards, termination clauses, penalties, risk allocation, etc.
13. Renewal of license	• Empowers the local level to renew the license, wherein the applicant needs to initiate the process at least 6 months prior to expiry of original license	As above	As above
14. Engaging NGOs in waste management	• Empowers the local level to engage NGOs in generating awareness regarding SWM and warrants the local level to prepare a comprehensive list of NGOs	The RA 9003 of the Philippines warrants NGOs and private institutions to strengthen the integration of environmental concerns in school curricula at all levels, with particular emphasis on the theory and practice of waste management principles like waste minimization, resource conservation and recovery, segregation at source, reduction, recycling, re-use and composting, in order to promote environmental awareness and action among the citizenry	Provisions of engaging NGOs in creating awareness about waste management is good. However, NGOs and community organizations also need to be engaged in a consultative process for preparing local-level plans, for improving the waste management
15. Compliance with standards	• Warrants entities engaged in SWM to carry out the activities as prescribed by the local level. Also	Pollution control norms for SWM are clearly defined. For example, in the Indian SWM Rules, standards for monitoring water and air quality, treated leachate	This provision empowers the local level to develop its own standards applicable to each component of the value chain of waste

Chapter no	Provision	Examples from other countries	Remarks on provisions of the rules
	sets out the process of revoking the license in case the standards are not complied with	quality, standards for composting (quality of output compost), emission standards for waste to energy facilities, etc., are clearly defined. These are required to be met by the local level during waste processing and landfill operations	management. However, in the absence of technical guidance and institutional capacity at the local level, such standards are often not developed at the local level. There is a need to develop model technical standards that may be customized and included as a part of the local bylaws to be adopted by the local level through a consultative process
16. Determination of service charges	• Warrants the local level to determine the user charge to be collected from waste generators based on efforts on waste reduction at source, shape, size and type of waste, environmental impact and estimated expense to be incurred for SWM	Similar provisions exist across other countries	Determination of user charge based on the type of waste, environmental impact, weight and volume of waste generated may be difficult as the quantity of waste generated may vary across the season. Due to such provisions, Itahari has 126 categories of user charges for different categories of waste generators. It would be prudent to rationalize waste generator categories and follow a flat rate system (considering willingness and ability to pay by waste generators and location of local governments, i.e. different rate for mountainous region compared to terai). Also, it should be spelt out whether user charges should recover only the O&M costs or capital costs also

Chapter no	Provision	Examples from other countries	Remarks on provisions of the rules
17. **Discounting service charges**	• Empowers the local level to provide up to 50% discount to the underprivileged group considering their financial condition and publish list of such group every year	No such provisions on other legislations reviewed	Mechanism for identification of the underprivileged group needs to be clearly presented in the Act/rules
18. **Committee for landfill affected area**	• Warrants the local level to form a committee of people from the landfill affected area	No such provisions on other legislations reviewed	Majority of the urban centers in Nepal do not have a landfill and continue to dump waste in open areas. Issues faced by the community residing in nearby areas too should be addressed. Working procedure, records of meetings and other information to be made available in the public domain for review
19. **Responsibilities, duties and powers of SWM Council**	• Empowers the council to make policy decisions on SWM and improve coordination between agencies involved in SWM	Institutional mechanism for implementation and monitoring of the provisions of legislations engage all levels of the government. For example, India has a Central Monitoring Committee (comprising representatives from all relevant ministries, local governments, private sector and industry) at the federal level under the Ministry of Environment Forest and Climate Change, an advisory board at state and local levels as the implementing authority. In parallel to this the Pollution control boards (federal,	The Act and rules clearly identify the institutions at local and federal levels. However, for economy of scale, regional cooperation is essential such that more local level units join to develop a common waste processing and disposal facility. Engaging provincial governments in developing such regional facilities is essential

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		state and local level) will monitor the implementation of the rules. The Philippines also has the National SWM Commission supported by the Ecology Center (technical support), Provincial SWM Board and City & Municipal SWM Board	
20. Responsibilities, duties and powers of Center	• In furtherance to the powers conferred to the SWM Technical C-operation Center as per the Act, it conferred duties for recommend a waste processing technology to local level, promote PPP, prepare directives related to SWM to advise local level, provide technical assistance, resolve disputes, follow-up on SWM condition at local level and follow-up on measures implemented for improvement of SWM at local level	An ecology center has been established under the National SWM Commission to provide the requisite technical support for implementing the provisions of the Act. The Ministry of Urban Development in India is entrusted with similar task	A federal-level unit is required to provide technical support to local levels in training, capacity building, PPPs, development of model contract documents, developing requisite technical standards in close coordination with the Ministry of Environment, collection and maintaining data on solid waste in the country, which may be used for taking policy decisions A mechanism is required to monitor the pollution due to un managed solid waste. The Department of Environment, MoFE, may be entrusted with the responsibility of pollution monitoring and control and adherence to the environmental pollution due to unmanaged waste along with industrial and other pollution.
21. Functions, duties and powers of board	• Warrants the Board of SWM Technical Co-operation Center	Federal units need to develop a federal-level strategy for improving SWM in the country and	The board may consider preparation of national SWM strategy, its implementation steps

Chapter no	Provision	Examples from other countries	Remarks on provisions of the rules
	to approve the annual report prepared by the Center, provide directions to Center on import of waste processing technology, etc.	monitoring its implementation, e.g., National SWM Commission	and measureable outputs to be achieved each year
22. Remuneration, facility and terms of service for the executive director	• Defines the remuneration to be paid to the executive director of the SWM Technical Co-operation Center	Not commented upon	Not commented upon
23. Internal audit	• Warrants the SWM Technical Co-operation Center to maintain a record of the income and expenses for audit	Not commented upon	Not commented upon
24. Direction may be given	• Provision where in the Government of Nepal may give directions related to SWM to local level		As a federal government, Government may give directions. However, an institutional mechanism that will be used to give directions and monitor its compliance need to be clearly defined
25. Sector Monitoring Committee	• Provides for setting up a committee for monitoring the SWM sector (complete value chain from segregation to disposal)		Role of the SWM Technical Co-operation Center, the board, and such committees need to be clearly segregated and defined