# Solid Waste Management Country Profile Papua New Guinea

### BACKGROUND

Papua New Guinea (PNG) is located in the southwest region of the Pacific Ocean and is the largest of the Small Island Developing States (SIDS) in the Pacific Region. It covers a land area of 462,840 km<sup>2</sup> with a relatively unique and dramatic geography, ranging from rugged mountainous peaks through lowland rainforests and wetlands to extensive coastal reefs. With its total population of 8,776,109<sup>1</sup>, PNG is also one of the most culturally diverse of all nations; it has hundreds of ethnic groups and over 800 different languages. The major industries are mining (liquefied natural gas, gold, crude oil, and copper), agriculture (palm oil and coffee), and forestry (wood), and GNI per capita is USD 2,750<sup>2</sup>. The nation has 22 province-level divisions, consisting of 20 provinces, the autonomous region of Bougainville, and the National Capital District (NCD). This report focuses on solid waste management (SWM) in NCD.

### INSTITUTIONAL ASPECTS

Related laws and strategies in PNG include the Environmental Act of 2000 and the Public Health Act of 1973, as well as the third PNG Medium Term Development Plan (MTDP III) 2018-2022, and the National Strategy for Responsible Sustainable Development for PNG (StaRS). These stipulate that all urban local level governments (ULLGs) should develop annual SWM plans. With assistance from JICA, PNG's Conservation and Environment Protection Agency (CEPA) is currently formulating the National Waste Management Policy and Strategy in line with Cleaner Pacific 2025 (the Regional Waste and Pollution Management Strategy 2025) developed by the Secretariat of the Pacific Regional Environment Programme (SPREP). In addition, in March 2020 CEPA stopped renewing business permits for plastic bag manufacturers and retail outlets that use plastic bags, including shops and supermarkets, throughout the country, and banned the import of plastic shopping bags. The Organic Law on Provincial and Local-Level

Governments of 1995 and the Local-Level Governments Administration Act of 1997 empower ULLGs to formulate waste management policies, legislation, and bylaws. The National Capital District Commission Act of 2001 provides for public welfare protection in relation to waste and environmental management. At present, only the National Capital District Commission (NCDC) and Kokopo-Vunamami ULLG (KVULLG) have developed their own SWM plans. Table 1 shows the roles of the respective authorities associated with SWM. Generally, Environmental Health Officers (EHOs) at the Provincial Health Authority, Provincial Government, District Development Authority, and ULLG levels are in charge of SWM in addition to other public health-related duties at a local level. They usually belong to (public) health-related divisions in their respective authorities, rather than to waste management-specific divisions.

Table	1.	The	role	of	authorities	associated	with	SWM
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Authority	Role		
Conservation and Environment Pro- tection Authority (CEPA)	Acts as overall lead agency responsible for SWM as a regulator stipulated in the Environ- ment Act of 2000		
National Depart- ment of Health (NDOH)	Supports Provincial Health Authorities in co- ordinating and supervising SWM for ULLGs to implement projects and activities pursuant to the Public Health Act in collaboration with CEPA		
Department of Na- tional Planning & Monitoring (DNPM)	Assimilates waste management policy into the government's MTDP III and assists CEPA and Provincial Governments in securing fund- ing through the annual appropriation budget or donors for implementation of projects and activities		
Department of Provincial and Local-level Gov- ernment Affairs (DPLLG)	Reviews and updates the Organic Law on Provincial and Local-Level Governments to harmonize it with proposed waste legislation and supports formulation of bylaws to im- prove SWM		
Provincial and Urban Local Level Governments	Manage municipal solid waste (MSW) through their own bylaws on MSW management as implementers in line with the Organic Law on Provincial and Local-Level Governments and their own Provincial/ULLG strategic develop- ment plans		



Provincial Health	Acts in each province under the umbrella of NDOH to implement and coordinate activi- ties associated with medical care and public	
Authority	health, including waste management regulat-	
	ed under the Public Health Act	

#### **TECHNICAL ASPECTS**

#### Waste Generation and Composition

According to an audit of waste generated and its composition, NCDC's Waste Management Division (WMD) and J-PRISM identified the amount of municipal solid waste (MSW) generated in Port Moresby as 334 tons per day, or 0.7 kg per capita per day. Generation rates per capita tend to be higher in urban areas such as Port Moresby, Lae, and other ULLGs, and considerably lower in rural and remote areas in PNG. The Asian Development Bank<sup>3</sup> reported that, assuming this average generation rate and the current population, generation for PNG as a whole is over 3,000 tons per day. Figure 1 shows the household waste composition in Port Moresby (NCDC/J-PRISM, 2014). The largest contributor is organic waste (40%), followed by paper (17%), and plastic (10%).





Source: NCD Waste Management Plan 2016-2025

#### **Waste Collection**

There are three types of municipal waste collection and transportation patterns in NCD: 1) NCDC contracts out the waste collection service to private companies, 2) some large waste generators contract with private collection companies, and 3) some large waste generators use their own trucks to transport their waste. There are six types of NCDC contract for MSW collection, including (i) domestic and schools, (ii) commercial, (iii) markets, (iv) settlements and villages, (v) sanitary waste, and (vi) medical waste. The collection areas for domestic and commercial waste collection (including schools) in NCD are separated into three zones, and collection is outsourced to large private contractors. In addition, small and medium enterprises called "minor contractors" are also offered public service contracts to develop their waste management capacity and provide opportunities for job creation. WMD regularly monitors the operations of waste collection contractors through various means such as routine dispatch of supervisors to collection areas, inspection of reports relating to complaints of non-collection, and review of contractors' own regular reports and records. WMD has also conducted a number of time-and-motion surveys and identified problem areas such as poor crew behavior and cooperation, poor design of collection routes, improper uniforms and safety gear, and inappropriate discharging of waste by residents. In 2018, the total amount of waste generated in the city of Port Moresby was estimated at 320 tons per day, of which 213 tons, or 67%, was collected. One of the biggest challenges is expansion of collection services into the illegal settlements where half Port Moresby's total population is living, but where residents do not pay waste collection fees. At present, all the MSW collected is transported to the Baruni landfill (BLF). At BLF, data and information on each incoming truck, including the truck number, type of waste transported, collection zone, arrival time, and loading condition, are recorded by disposal site attendants who are mostly local residents hired by NCDC. The waste collection fees and tipping fees (including goods and services tax) in NCDC are shown in the table below.

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1) Wast	Fee (PGK)		
2019	Residential charge	175.80	
2019	Commercial charge	281.25	
2) Tippi	Fee (PGK)		
a)	Chemical & hazardous waste	Per load	236.30
b)	Explosive & toxic non-hazardous waste	Per load	236.30
c)	Solvent or fluid waste	Per load	167.60
d)	Solid waste	Per load	81.65



#### Waste Final Disposal

There is only one disposal site in PNG that is managed on a day-to-day basis as a sanitary landfill using cover soil, a leachate treatment system, and measures to mitigate methane generation, and that is BLF in Port Moresby. Except for BLF, all the disposal sites in other ULLGs are "open dump sites" with no day-to-day management, including monitoring of incoming vehicles. BLF is operated by a private contractor commissioned by NCDC after a tender process. NCDC's WMD drew up a development plan for BLF that shows a roadmap including expansion of the disposal site and provision of recycling and incineration plants on site. The disposal site's operation manual was also developed by WMD, and the site's operation by a private contractor is monitored and inspected by an engineer from WMD. BLF was rehabilitated in 2016 (see photo above) as a semi-aerobic landfill system using the so-called Fukuoka Method, equipped with leachate pipes and a pond, as well as gas ventilation pipes, which contributes to reduction of both environmental and public health risks, such as water contamination and GHG emissions. Since 2017, the site has been managed appropriately, accepting more than 300 tons of daily incoming waste from the whole of Port Moresby. The key challenge now is the increasing amount of waste coming into the site, which requires urgent expansion of the disposal area, and efforts to minimize waste through promoting composting and constructing intermediate treatment facilities in line with NCD Waste Management Plan 2016-2025. The safeguarding of waste pickers working at the site should be also considered. A weighbridge was installed in August 2019 and started operation in October 2020.



Baruni landfill after improvement work (2016)

### Recycling

There are three main recycling contractors that collect aluminum cans and scrap metals in Port Moresby. Informal collectors such as waste pickers help with collection and sell what they collect to the contractors. Surveys of waste pickers at BLF were conducted by NCDC both in 2014 and 2017. The survey findings were as follows:

- There are about 300 individuals working as waste pickers at BLF, and one-third of them are children.
- At any given time, there are about 60-70 waste pickers working in the disposal area.
- Waste pickers and communities living inside and outside of the landfill are keen to collaborate with NCDC to support waste management at BLF, especially to contribute resource circulation.

The 3R <sup>4</sup>/HEART Initiative is conducted by WMD in schools and communities in Port Moresby to promote proper waste management and recycling. In addition, WMD implemented a pilot project for market-waste composting activities in Gerehu during J-PRISM I in 2015. Installation of facilities for intermediate treatment of MSW, including market-waste composting and incinerator facilities, is included in NCD Waste Management Plan 2016-2025. A feasibility study will be conducted before installation of equipment and facilities. One recycling trial, conducted as a JICA project, was a feasibility survey for waste treatment and carbonization using Eco-Tan-Kun (a carbonization plant; see photo) at BLF in collaboration with WMD. Eco-Tan-Kun was set up for demonstration in 2018 and produced charcoal and vinegar from organic waste such as coconut husks, cardboard, and betel skin. WMD is considering further promotion of this type of recycling option.



Carbonization plant for organic waste (2019)



### FINANCIAL ASPECTS

Of NCDC's total expenditure for waste management in 2018 (amounting to PGK 16,501,474), PGK 10,987,976 (67%) was spent on waste collection, and PGK 2,970,177 (18%) was spent on landfill management (operation and rehabilitation). The budget for waste management is financed from NCDC's general fund, and waste collection and tipping fees are charged pursuant to the NCD Garbage and Sanitation Regulations. The waste collection fees are charged based on a monthly fee determined by the size of the container and the frequency of the collection, and the Revenue Division issues the invoice and collects the fees quarterly. The tipping fees were introduced based on the polluter pays principle; they are calculated according to the number of times waste is taken to BLF and the type of waste. The waste generator pays the fee in advance at the accounts section of NCDC and receives an access ticket to BLF. It is reported that the waste collection and tipping fees collected in 2019 were PGK 4,333,735 and PGK 1,333,735, respectively, which equated to about 34% of the total amount of expenditure for waste management in 2018. The proportion was significantly lower than that in 2012, which was about 65%. Further efforts to secure financial resources are necessary. Moreover, the total amount of waste collection fees billed by the eight districts of NCD in 2019 was PGK 21,548,503, but only about 20% of that amount was actually collected. This shows an urgent need to review the setting of waste collection fees and improve the fee collection system. Similarly, the collection of tipping fees has also not been managed well, so it is necessary to review these fees and their associated collection system too. These issues are expected to be improved by a data management system utilizing the weighbridge.

### LOCAL LEVEL GOVERNMENT

Generally, the Environmental Health Officers (EHOs) in the Public Health Authorities, Provincial Governments, District Development Authorities, and ULLGs shown in Table 1 above are in charge of SWM in addition to other public health-related duties at a local level in PNG. They usually belong to (public) health-related divisions in their respective authorities, rather than waste management-specific divisions. ULLGs are responsible for providing waste collection services and disposal on the ground. However, technical and financial vulnerabilities mean that they are facing challenges, especially in collection services and disposal site operation. For example, collection coverage is very limited due to financial constraints, which causes "hotspots" of littering and illegal dumping. Disposal sites managed by ULLGs are all open dump sites and the only options for dealing with incoming waste are dumping, burning, or manually pushing it down into valleys. In addition, the access roads to and/or within the disposal sites are usually in poor condition. In Kokopo, two dump keepers are deployed at the disposal site by the local authority (KVULLG). Their roles are to keep records of incoming waste, to push the deposited waste down into the valley, and to burn waste to reduce its volume. Once a year, a hired bulldozer pushes waste further down into the valley. However, this valley is connected to a river. Investigation is therefore required into whether the site is within the same catchment area as PNG Water, as this area is Kokopo's primary source of drinking water. The tipping zones in the valley are unlined and uncovered, so leachate from the waste stream is likely to enter the groundwater and river. Moreover, much of the soil in the region is volcanic and porous, further facilitating infiltration of the groundwater. During 2019 and 2020, KVULLG was proposing to design, construct, and commission an engineered landfill, but it proved too difficult to find alternative land for this new landfill. KVULLG therefore decided to rehabilitate the existing site as a proper disposal site, rather than decommissioning it. KVULLG is now developing a rehabilitation plan, having invited officers from NCDC's WMD to help develop the design of the disposal site through city-to-city cooperation.



Hotspot in coastal area of Lae (2019)



### CONCLUSIONS AND RECOMMENDATIONS

Though there are still some challenges, waste collection service and landfill operation are well-managed by NCDC's WMD. In line with NCD Waste Management Plan 2016–2025, efforts are being made to extend collection service into the expanding illegal settlements, to improve tipping fees through installation of the weighbridge, and to monitor the contractors. One of the biggest challenges in Port Moresby, the capital of PNG, is minimizing waste generated. Due to a rapidly growing population and urbanization, the amount of waste generated is increasing, while residents are not separating out reusable resources and recycling options are extremely limited. Awareness-raising and educational programs should be encouraged for communities and schools to address methods of minimizing waste, and the marine plastic pollution issue. In addition, a recycling system needs to be developed, including promotion of relevant policy measures and applicable technology. Then, as CEPA, NDOH, and PHA are promoting city-to-city cooperation, NCDC is also expected to play an important role in improving waste management throughout the whole of PNG by transferring its SWM-related technical skills and know-how to other ULLGs.

- <sup>\*1</sup> World Bank, 2019: (https://data.worldbank.org/indicator/SP.POP.TOTL?locations=PG)
- \*2 World Bank, 2019: (https://data.worldbank.org/country/Papua-New-Guinea)

<sup>\*4</sup> Reduce, Reuse, Recycle

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<sup>\*3</sup> https://www.adb.org/publications/solid-waste-management-pacific-papuanew-guinea-country-snapshot