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Secretariat of the Pacific Regional Environment Programme

PacWastePlus
PACIFIC WASTE MANAGEMENT

This initiative is supported by **PacWastePlus**-a 72 month project funded by the European Union (**EU**) and implemented by the Secretariat of the Pacific Regional Environment Programme (**SPREP**) **to sustainably and cost effectively improve regional management of waste and pollution.**

Policy Guidance Report:
WASTE LICENSING AND ENVIRONMENTAL MONITORING POLICY PACIFIC ISLAND COUNTRIES AND TERRITORIES

April 2022

The intent of this publication is to develop draft policy and legislative drafting guidance informed by a literature review to help participating countries undertake their own respective legislative reform processes.

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Our vision: A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures.

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Glossary

Acronym	Description
AAD	Ambient Air Directive
AES	Aggregate Environmental Score
EA	Environmental Authority (Queensland)
EU	European Union
GEDSI	Gender Equity, Disability, and Social Inclusion
SPREP	Secretariat of the Pacific Regional Environment Programme
NEPM	National Environment Protection Measure
NSW EPA	New South Wales Environment Protection Authority
NT	Northern Territory
NSW	New South Wales
PICs	Pacific Island Countries
POEO Act	Protection of the Environment Operations Act
PWP	PacWastePlus Programme
UK	United Kingdom
UN	United Nations
USA	United States of America
WHO	World Health Organisation

About the Waste Licensing and Environmental Monitoring Policy for Pacific Island Countries and Territories Resources

PacWastePlus is working with participating countries to improve waste management via support activities that address data management, education, and awareness, strengthening of legislative frameworks, on-ground actions, and capacity building.

Presently very few Pacific Island countries (PICs) have a policy position, or operative clauses in existing legislation that facilitates the effective licensing and management of waste management activities, and to include and enforce environmental and waste monitoring requirements on businesses and waste service provides.

Participating countries would benefit from support and guidance on the policy requirements, and draft instructions, for the inclusion of waste licensing process, and environmental monitoring standards to be included in environmental / waste legislations.

This series of publications, packaged as a guidance toolkit, is to support country governments in the development of new legislation or the review of existing legislation that facilitates regulation of waste activities, data collection and reporting activities.

Waste Licensing and Environmental Monitoring Policy for Pacific Island Countries and Territories Resource Toolkit

Policy Guidance Report (this publication)

The intent of this publication is to develop draft policy and legislative drafting guidance, informed by a literature review, to help participating countries undertake their own respective legislative reform processes.

Template Policy

This template policy is to support country governments in the development of new legislation or the review of existing legislation that facilitates regulation of waste activities, data collection and reporting activities.

A Step-by-Step Guide to Implementation

A simple step-by-step guide to help inform policy makers of the high-level process needed to implement an effective waste licensing legislation supported by appropriate environmental monitoring requirements.

PacWastePlus Programme

The Pacific – European Union (EU) Waste Management Programme, PacWastePlus, is a 72-month programme funded by the EU and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to improve regional management of waste and pollution sustainably and cost-effectively.

About PacWastePlus
The impact of waste and pollution is taking its toll on the health of communities, degrading natural ecosystems, threatening food security, impeding resilience to climate change, and adversely impacting social and economic development of countries in the region. The PacWastePlus programme will generate improved economic, social, health, and environmental benefits by enhancing existing activities and building capacity and sustainability into waste management practices for all participating countries.

Countries participating in the PacWastePlus programme are: *Cook Islands, Democratic Republic of Timor-Leste, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu*.

KEY OBJECTIVES

Outcomes & Key Result Areas
The overall objective of PacWastePlus is "to generate improved economic, social, health and environmental benefits arising from stronger regional economic integration and the sustainable management of natural resources and the environment".

The specific objective is "to ensure the safe and sustainable management of waste with due regard for the conservation of biodiversity, health and wellbeing of Pacific Island communities and climate change mitigation and adaptation requirements".

Key Result Areas

- Improved data collection, information sharing, and education awareness
- Policy & Regulation - Policies and regulatory frameworks developed and implemented.
- Best Practices - Enhanced private sector engagement and infrastructure development implemented
- Human Capacity - Enhanced human capacity

Learn more about the PacWastePlus programme by visiting

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PacWastePlus
PACIFIC WASTE MANAGEMENT

https://pacwasteplus.org/

Executive Summary

Few Pacific Island Countries (PICs) have a policy position, or operative clauses in existing legislation that facilitates the effective licensing and management of waste management activities, and to include and enforce environmental and waste monitoring requirements on businesses and waste service provides. This report presents the findings of a literature review which will be translated into drafting guidance that will allow each individual PIC to undertake their own respective legislative reform processes.

Within PICs, there are several waste activities undertaken, either by government or private industry, including activities undertaken as secondary processes at other industrial facilities that might be regulated. These currently include landfills, dump sites, transfer stations, incinerators, aggregation sites, composting facilities. Existing policy and legislation are typically fragmented under a range of legislative mechanisms, including environment legislation, public health and infrastructure legislation. Some jurisdictions have dedicated solid waste management activities in regulation (e.g., Fiji, Samoa).

There are a number of conventions relating to the transportation of hazardous wastes across country borders, although not all of the PICs have signed up to all conventions and treaties. There are however limited requirements to monitor or track the transportation of waste internally within PICs. Likewise, there are a number of national and internationally required reporting obligations, however, data collection is typically not undertaken to provide data to meet these requirements.

There are several policy options for how a waste activity could be regulated. At a macro level, consideration of whether a PIC may license an activity or facility, or permit discharges or emissions, or a hybrid of both. Licensing is more common in Australian and European jurisdictions, but permits are common in the examples from the USA. Both would need to be backed up by a series of rules or criteria. These could include regulation based on the size of the facility, or annual throughput, which would limit the regulation potentially to larger facilities. Likewise, acceptance criteria for a license or permit could reflect the hazardous nature of the waste accepted or processed, reflecting a semi risk-based approach in that higher risk activities may attracted regulation. Alternatively, PICs could adopt a full risk-based approach where good operator performance is rewarded by lower fees or less onerous reporting requirements (and vice-versa).

The application of a license or permit could require license or permit holders to pay an annual fee. This may vary depending on the type of facility, risk, volume etc. The revenue from licensing could be utilised to offset the potential increased regulatory costs for assessment and compliance functions within the Government. Activity operators might also be required to provide financial assurance, a type of environmental bond, that would cover clean up and/or rehabilitation costs should an operator cease to exist whilst an environmental liability still exists.

License or permit conditions are likely to be similar in terms of environmental obligations. License holders or permittees would be expected to meet license conditions, which typically would comprise a balance between general operating conditions covering site activities and activity specific requirements. For example, annual regulatory returns would be common across all activities, however site-specific measures such as leachate monitoring might only be specific to landfills. For transporting, license or permit conditions should stipulate specific risk and hazard management measures (e.g., pollution incident control plans). Other common operating conditions for discharge quality, air quality, noise, soil, water etc., in a combined license, or in separate permits.

Transportation of hazardous wastes within PICs should be a licensed or permitted activity. This will ensure PIC Governments understand and can potentially track waste transporters with higher-risk waste. An extension option might be to track all waste movements, utilising a waste tracking system or chain of custody approach. For general waste (i.e., non-hazardous waste) this would be uncommon.

Data collected by licensees is typically required to be aggregated and submitted, either through specific data provision or as an annual return. For waste activities, this is likely to include water quality (surface water and/or groundwater, air quality/odour, noise/acoustics, soil etc., Typically annual return data would be presented in a technical report to the regulating entity, which a suitably or appropriately qualified person must sign off. The definition of this qualification is often found in legislation.

The regulating entity (e.g., a PIC Environment Department or Environment Protection Authority) would need to collate and assess data provided by licensees or permit holders. This data is useful to support annual reporting of waste arisings and submissions under the various international agreements and monitor the impact of activities. Where non-compliances with license or permit conditions are identified, further investigation or mandatory actions may be appropriate. The regulating entity would need legislative powers of enforcement to achieve this.

Data collection may also be necessary to inform progress reporting against national targets, such as waste strategies. Systems exist in other jurisdictions that legislate for certain types of data to be provided to the regulating entity. This could tie in with reporting requirements in a licensing framework or be standalone policy; however it is suited to being part of an environmental license.

Recommended policy options require consideration of a range of policy impacts across social, environmental, and economic spheres. There are clear environmental benefits of implementing either a licensing or permitting framework, such as reduction in pollution, the ability to regulate, and the ability to stipulate specific operating conditions raising the standard of existing and new activities. However, there is a risk that increasing the regulatory burden on operators may result in higher tipping fees, which may increase illegal dumping. Member countries will need to consider the context of their regulatory environment when identifying risk based measures to manage waste.

Willingness and ability to pay and be regulated may be significant issues. The introduction of a licensing or permitting framework will potentially increase a need for existing or new operators to have to pay a fee to operate. Member countries will need to consider the specific thresholds within their own jurisdiction as to the nature of fees. This may have a bearing on cost recovery though. Likewise, the willingness of operators to be regulated may prove a challenge. This includes complying with environmental monitoring or reporting requirements or limiting waste acceptance to specific waste types. Furthermore, environmental improvements to existing facilities could be introduced, which could cause some sites to close. Policy should not be introduced that impacts the accessibility of waste services.

Ability to pay extends to financial assurance. To be meaningful and provide for future clean up, assurances may only be sought for certain types of projects. Costs may be borne by country governments to setup new structures, train and pay new staff to undertake assessment, compliance and enforcement activities, as well as link up with other enforcement agencies (e.g., the police).

Recommending a singular regulatory framework across the PICs is challenging as ere are different legal frameworks in place which may make it easier to take up one option than others, and countries are in different stages of development for how they regulate waste activities.

Legislation for activity licensing should introduce:

- The identification of which facility types will be regulated
- Volume and type based limits on the waste accepted into a facility (e.g., a landfill which accepts >200 tonnes per annum might need a license; or a facility that processes any volume of hazardous waste may require a license etc.,)
- Provisions for the introduction of an annual fee based on volume/risk/type
- Minimum environmental standards for air quality, odour, noise, water, land discharges and mechanisms to report against these standards
- The development of complementary standards or guidelines that explain to operators what is expected of them in complying with license conditions (these could be developed across the region)
- Timeframes for assessment of new license or permit applications
- Vehicle or operator licensing for the transport of hazardous wastes
- The introduction of penalties or fines for infringements

Legislation relating to governance is more challenging to recommend, predominantly because of the different legal frameworks within the PIC countries. Each country needs to identify the most appropriate agency to establish a more comprehensive regulatory function.

This could be within existing agencies or in a new agency such as an EPA. This will require a comprehensive review of existing regulatory functions, and implementation will be varied. The key functions to introduce will be:

- The establishment of a compliance/regulatory function that has the head of power to undertake legally enforceable investigations and direct licensees or permit holders to undertake remediation or rehabilitation exercises.
- The establishment of a function to lawfully hold financial assurances.
- The establishment of a data and report holding repository and reporting against Country and International obligations
- The training and upskilling/recruitment of staff to undertake assessment, enforcement or compliance activities

Introduction

Project Background

The Secretariat of the Pacific Regional Environment Programme (SPREP) is an intergovernmental organisation charged with promoting cooperation among Pacific islands countries and territories to protect and improve their environment and ensure sustainable development.

SPREP is working with the European Union's Delegation to the Pacific, and 14 Pacific Island Countries [1]and Timor-Leste to undertake the PacWastePlus Programme (PWP) which seeks to improve and enhance waste management activities and the capacity of governments, industry, and communities to manage waste to reduce the impact on human health and the environment.

This project recognises that participating countries would benefit from support and guidance on the policy requirements, and draft instructions, for the inclusion of waste licensing process, and environmental monitoring standards to be included in environmental / waste legislation.

Policy Need

As noted by PacWastePlus, very few Pacific Island countries have a policy position, or operative clauses that guide government departments in how to effectively license and manage waste management activities, and to include and enforce environmental and waste monitoring requirements on businesses and waste service providers. The intent of this project is to develop draft policy and legislative drafting guidance informed by a literature review to help participating countries undertake their own respective legislative reform processes.

High-Level Policy Objectives

Acknowledging the need for Pacific Island countries to have access to guidance to effectively license and manage waste management activities, the following high-level policy objectives provide the broad framework to help guide and shape the recommended environmental and waste monitoring requirements.

- Waste Licensing and Permitting
  - Permitting and licencing requirements to regulate the nature, type, and volume of discharges from waste management activities to mitigate possible environmental impacts
  - Classification criteria and types of permits required for significant discharges or emissions (e.g., water, air, etc.,) significant waste disposal operations, and a hazardous material/waste handler, including but not limited to, minimum conditions and validity period
  - Fee, calculation formula for each type of permit and financial assurance where required
  - Standards to ensure waste management facilities are compliant with requirements and minimise environmental and health impacts on local communities
- Environmental and Waste Monitoring
  - Requirements for data collection, collation, analysis, management, and storage
  - Appropriate institutional structures and systems to support monitoring and reporting requirements

[1] Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

Further, a critical element woven throughout the policy objectives is the inclusion of Gender Equity, Disability, and Social Inclusion (GEDSI) issues. Acknowledging the range of barriers, gaps and exclusions present throughout the Pacific Island countries, including for example, inequalities between men and women and those affected by disabilities, the negative impacts of climate change disproportionately affecting the most vulnerable and the poor, and unequal access to land, water and education, the integration of GEDSI considerations into the policy guidance aims to reduce vulnerability, increase resilience and support the equitable distribution of benefits to Pacific Island countries and their peoples.

Finally, in developing the draft policy and regulatory framework it is important to take into consideration individual member country characteristics such as existing infrastructure, socio-economic factors, topography and location within the region, which may influence policy settings.

Existing State

This section summarises the existing policy and legislative environment, types of facilities, existing monitoring and enforcement/regulatory activities undertaken within the region.

Summary of waste management activities in the region

The Type and scale of waste management activities in the Pacific and Timor-Leste is presented in Table 1.

Table 1: Summary types of facilities across the region

Location	Facility Summary
Cook Islands	Waste management is a significant issue for Cook Islands. In relation to solid waste, efforts are undertaken to encourage the practice of refuse, reduce, reuse, and recycle. Solid waste management systems are vulnerable with landfill flooding due to extensive rainfall, carrying the risk of ground water contamination. Increased temperatures equate to increased levels of combustion at sites. Currently there are built waste management facilities only on Rarotonga and Aitutaki, which are near capacity. There is regular roadside collection of organic and sorted waste (plastics, glass, and aluminium cans) on these two islands. The recyclable materials are exported to New Zealand for processing, while some glass is crushed for local use for making concrete blocks and road aggregate. Collected cardboard is mulched and applied in agricultural sector. Portion of organics waste is managed by farmers association and is diverted in established compost centre. The rest of the islands practice open dumping, burning of household's waste and inappropriate disposal of hazardous waste. Other industrial facilities in the Cook Islands include timber processing such as sawmills which would manage residual timber waste (e.g., sawdust and shavings).
Democratic Republic of Timor-Leste	There is large variability in the management of waste in Timor-Leste. The Dili District Administration manages the Tibar Dump, which is the only controlled landfill in Timor-Leste. Landfill area spreads across 22 hectares (ha) and has few environmental protection measures. There are two incinerators used to treat medical waste. The Dili District Administration contracts private companies to assist with rubbish collection in Dili. Despite this, many households and businesses do not dispose of waste properly and are engaged in illegal dumping in rivers or drains and burning. In general, there is a poor segregation of waste at source. There are private recycling companies in Dili that bale and export cardboard, paper, and scrap metal. There are health concerns around population currently residing in the landfill area.
Federated States of Micronesia	Each state has a public landfill for disposal of all waste and the operation of these disposal facilities are either done by the Department of Public Works and Transport of the municipal governments. Chuk State has two landfills, where only one is currently operational. State of Pohnpei operates Dekehtik located on a mangrove swamp. There are environmental issues related to leachate run off into marine surroundings. The landfill has been upgraded with the assistance of Japan supported project in 2013. State of Kosrae operates a landfill in Tofol. There are several open dumpsites located within other municipalities. Yap State has the main public open dump site and many other dump sites established in rural communities. Waste collection service varies from state to state and can be irregular. Kosrae, Pohnpei and Yap have a Container Deposit System for the collection of PET bottles and aluminium cans. Kosrae has contracted a private operator to manage the recycling scheme. Recovered materials are sent to Taipei, China, and South Korea for recycling. Recovered and crushed glass has found its use in local paving projects. As a part PacWastePlus programme, Neauo Landfill in Chuk State will commence construction and development of organics processing facility.

Location	Facility Summary
Fiji	The amendment of Fiji's Public Health Act in 2018 enabled the expansion of garbage collection services, initially limited to municipal boundaries to all rural communities. Fiji owns one central landfill, located in Naboro. The landfill has been developed with assistance of the European Union in 2005 and is currently operated by private contractor. It spreads across approximately 38 ha and has a life of 70 years. There is also an incinerator located adjacent to Suva hospital, where left over ash is transported to Naboro landfill. As Suva's incinerator is reaching its end of life, the new proposed unit will be installed in Tamavua Hospital. Several recycling companies are established in the country, but challenges remain with providing incentives for local communities and collection services for recyclables. A partnership between Coca-Cola Amatil and Fiji Water collects plastic bottles and aluminium cans which are recycled at facilities in New Zealand. Green waste is either used as a landfill cover or composted at a household level. A small trial project was developed in 2008 with the help of Japan, to introduce home composting units. The major challenges in providing effective waste management in Fiji include high operation costs associated with garbage collection services, remote location of communities, increasing waste generation and location of approved disposal sites. Fiji also houses sawmills and wood treatment plants which would generate wastes that may contain hazardous materials.
Kiribati	There is large variability in the management of waste in Kiribati. The main island of Tarawa has three landfills, and there are two unregulated dumpsites located on Kiritimati Island. The landfills have subsequently been rehabilitated and upgraded under the Urban Development Program. The Betio landfill is reported to have a remaining capacity of 8,500 cubic meters, while at Bikenibeu and Nanikai, remaining capacity is 32,500 cubic meters and 17,800 cubic meters respectively. The responsibility for managing waste collection and disposal in landfills lies with the local government councils within their respective areas of authority. A Container Deposit recycling system exists on Tarawa, the 'Kaoki Maange Recycling' which has been in operation since 2004, collecting materials such as PET, aluminium, and lead acid batteries. Green waste used to be managed on a household level by composting in banana circles or compost heaps. However, the program has been abandoned due to lack of space in households. Currently a trail compost facility has been established and managed by Betio Town Council. There are minimal collection services provided in the outer islands, as a result, waste is buried, burned, or disposed at sea.
Nauru	Waste is collected daily from the 14 districts. There is large variability in the management of waste. However, with the purchase of machinery, the collection system is expected to improve. The common disposal method in Nauru involves an open dump in the south-west part of the island. The dump covers a large area but is described as a threat to underground water reserves. The current operation is spread over approximately 5 ha with approximately 1.5 ha currently in use for filling or stockpiling of materials as part of firefighting operations. Landfill is reaching the end of its life. Waste collection services using garbage trucks is currently being provided by the private sector. The frequency of waste collection differs for each district. Waste is not segregated at the point of collection, and there's no existing recycling infrastructure. Waste is sorted manually at the landfill with low rates of recovery. Notable concern around asbestos collection and disposal, where most household roofing is built with this type of material.
Niue	The Government of Niue offers waste collection to all 14 villages. Waste is segregated at source and collected by a contractor who transports the materials to the dumpsites. A recycling facility and transfer centre is under construction and expected to be completed in 2022. This will allow for the recovery and processing of household recyclables. Niue has three waste sites at Makato, Mutalau and Vaiea. Makato is the main site that caters for all domestic and commercial waste. Vaiea waste site is used mostly by villagers that live nearby, and Mutalau has not been used since 2005. There is an incinerator at Niue Foou Hospital, dealing with medical and quarantine waste. Ash is transported to Makato dumpsite. Illegal dumping of waste remains a major challenge on the island. Due to limited capacity, only aluminium cans are recycled through the Catholic Church Mission. These cans are crushed before being shipped to NZ for further processing. Hazardous wastes such as e-waste, lead-acid batteries, and waste oil are poorly managed and could potentially pollute the water lens. There is no proper disposal facility for liquid waste, consequently this is dumped directly to the ground on an overgrown patch of land. Some households continue to burn waste or illegally dump waste in disused sites or vacant land despite the waste collection services.

Location	Facility Summary
Palau	Waste collection is provided to approximately 77% of the population in Palau, and each state is responsible for their own waste management services. Koror state provides weekly collection to 100% of its residents, with the collected materials managed at the M-Dock landfill - Currently transformed into Recycling centre. The new location in Aimeliik, which is about 280 meters wide and 280 meters long, includes the landfill itself, a circulation system and leachate pond where contaminated water is collected, and a facility where the water is treated. The landfill, funded by the Japanese Government, has the capacity to hold 384,898 cubed meters of waste, and will utilize the "Fukuoka method". Green waste is collected upon request. Koror State Government operates the Koror State Recycling Centre. This includes facilities such as: National Redemption Centre where recovered cans, glass and bottles are received and processed; Energy Recovery Facility where selected plastic types are converted to oil which is used as input to generate energy; Composting Facility which processes green waste to produce compost; Glass Blowing Facility where glass is crafted to other ornamental products such as vases, etc. Koror State Recycling Centre is receiving green waste, cardboard, and kitchen waste from hotel for producing compost. Food waste from most schools and other hotels go to piggery farms. Palau implemented a Container Deposit Legislation on aluminium and steel cans, plastic, and glass bottles in 2011. This program records an 87.3% recycling rate.
Papua New Guinea	The waste management collections are managed by the local councils such as Lae City Council and National District Capital Commission. The latter employs approximately 36 private contractors to provide waste collections within the Port Moresby area. There is an ongoing problem with provision of appropriate bins and containers for households and businesses. Containers are often exposed, which creates vermin issues. General lack of public awareness and education contributes to illegal dumping and burning of waste. There have been many illegal dumping grounds reported within the municipal areas. There are landfills located in both Port Moresby and Lae, where open burning of waste is a common practice. The Baruni landfill located on the outskirts of Port Moresby is regulated through an environmental permit issued by the PNG Conservation and Environment Protection Authority (CEPA), but with limited service infrastructure. Total Waste Management – a commercial operator has proceeded on development of Integrated waste management facility located in Roku, nearby Port Moresby area. There are also a number of liquid natural gas extraction and processing facilities in PNG. Several of these sites (e.g., the Exxon Mobil operated PNG LNG facility) are known to have their own on-site landfill and other waste management facilities, as well as discharge liquid effluent to the environment.
Republic of the Marshall Islands	The Majuro Atoll Waste Company (MAWC), owned by the national government and the Majuro Atoll Local Government, is responsible for solid waste collection, landfill management, and recycling in Majuro. MAWC provides weekly collection services to around 80% of households on Majuro. The remaining houses are responsible for transporting their wastes to Majuro's dumpsite. In outer islands rubbish collection services are poor, ad-hoc or completely absent. Many houses without collection services have instead created backyard pits. MAWC administers a Container Deposit system, collecting aluminium cans, PET bottles and glass bottles.
Samoa	There are two landfills in Samoa, each located on one of the two main islands. Tafaigata landfill covers 15.4 acres and Vaiaata Landfill 9.8 acres. Remaining capacity of both landfill is unknown. Waste collection services are provided to communities on the four inhabited islands of Upolu, Savaii, Manono and Apolima. Waste collection in urban areas is frequent – twice a week for general waste but not as frequent in rural areas. Despite these services, waste is still commonly illegally dumped or burnt. The government provides a quarterly bulky waste collection service. The private sector provides some recycling services, collecting items such as aluminium and scrap metal for export. There are some composting practices currently adapted, mainly at household level, where green waste is applied in gardens. Composting yard at Tafaigata Landfill is currently not fully operational due to lack of staff training.
Solomon Islands	Waste management is a challenge for the Solomon Islands, primarily due to the geographic dispersal of the population. There is an operational semi-aerobic landfill in Ranadi on a 4 hectare site. It has upgraded leachate pipes, connected to leachate ponds for collection. Waste collection services are currently limited to accessible areas within Honiara and in a few provincial centres. Urban area waste collection services less than 45% of household waste generated. The Honiara City Council is responsible for collection of household waste within Honiara City area, including the central market. In rural areas, rubbish collection services are poor, ad hoc or completely absent. As a result, all waste generated in rural areas is managed through burning, burying, and dumping - either on land or in nearby waterways. There are some existing recycling initiatives such scrap metal and aluminium recovery. Plastic recycling has a potential to expand due to collaboration with New Zealand on specific recycling and recovery projects. There's also a small active container deposit scheme focused on plastic bottles and beer cans.

Location	Facility Summary
Tonga Tuvalu	There is large variability in the management of waste in Tonga. The islands of Tongatapu and Vava'u receive rubbish collection services provided by the Tonga Waste Authority Limited. However, due to the lack of waste collection services provided to the other outer islands and rural areas, practices of backyard burying and burning is prevalent. The current waste collection service covers all nine islands in Tuvalu. The capital Funafuti has an advanced waste service – including organics collection and processing, a Waste Levy (with deposit) for the collection of recyclables and bulky waste, and a new recycling/transfer facility providing for the processing of household recyclables. Funafuti has a lined landfill, while outer islands utilise open dumps, managed by island councils (Kaupule). Oraganics and food waste is manage at a household level Despite current waste management efforts, there is still a prevalence of coastal litter in Tuvalu
Vanuatu	Waste management is a challenge for Vanuatu, primarily due to the geographic dispersal of the population. Currently, the existing system for waste collection is still limited to within municipalities and provincial centres. There is large variability in the volumes of waste in Vanuatu. Urban areas have access to waste collection services. In rural areas, rubbish collection services are poor, ad-hoc or completely absent. As a result, major portion of waste generated in rural areas is disposed of through burning, burying, and dumping - either on land or in nearby waterways. In provincial centres smaller pickup trucks are commonly used, however the collection has been identified as unreliable and inefficient.

Summary of Existing Policy and Regulation

Policy Related to Waste Activity Licensing

There are a number of legislative frameworks in use within Pacific Island Countries and the Study Area. These can be characterised at a high level as based on legal frameworks from the US compared to that of Australia (similar to that of the UK and EU). This translates into different policy approaches to how waste activities are regulated.

Other factors leading to variability also include the level of maturity, size of population, historical investment and settlement, and other factors. Existing policy related to regulation of waste related activities are presented in Table 2.

Table 2: Summary of existing waste policy and regulation

Location	Summary of Waste Policy and Regulations
Cook Islands	Key pieces of legislation that govern the management of solid waste in the Cook Islands are the Environment Act (2003), and the Public Health Act (2004). The National Environment Strategic Action Framework under the Environment Act also includes the management of waste. The National Sustainable Development Plan 2011–2015 identifies improved solid waste management facilities and waste minimization as key objectives to support the achievement of national development goals. The National Solid Waste Management Strategy 2013–2016 sets out an overall approach, policy objectives and targets for the improved management of solid waste in the Cook Islands. Public Health Act 2004 - Part 6 (Sections 35–41) relates to waste, the purpose of which under Section 35 is to ensure that waste is safely stored, collected, treated, removed, transported, disposed of, and otherwise dealt with. Other provisions of the legislation deal with building health standards, including for waste disposal and wastewater. Infrastructure Act 2019 - The Act outlines a structure of management for Cook Islands infrastructure, including establishing role of 'infrastructure manager' with various powers of entry and responsibilities. In Section 6, 'infrastructure' is defined to include: wastewater networks, solid and hazardous waste facilities, storm water drains and storm water networks. **Summary:** The Cook Islands does not appear to have a waste activity licensing or permitting system in place under the current regulatory framework.

Location	Summary of Waste Policy and Regulations
Democratic Republic of Timor-Leste	Law 3/2012 - Legislative Authorisation on Environmental Matters: • Art 39, 5: Urges the creation of mechanisms to ensure the use of solid waste for the production of alternative energy sources. • Art 40, 1: Establishes the responsibility of the State for the creation and maintenance of landfills so as to prevent the contamination of groundwater and negative impacts on public health. • Art 41, 1: Determines that the State will create the necessary means to ensure the appropriate treatment of domestic, commercial and industrial wastewater and of sewage effluents. Decree-Law 3/2016 - Statute of Municipal Administrations (municipal administrations and authorities to develop solid waste management systems) Art 11, 1, 'c' and 'j': Determines the authority of Municipal Administrations and Municipal Authorities to invest in the construction, conservation and maintenance of wastewater management systems and solid waste management systems in populated areas. Decree-Law 26/2012 - the Basic Law on the Environment, defines wastes and hazardous wastes and establishes governmental responsibilities for solid waste collection, transport, storage, processing, reduction, re-use, and recycling. • Art 39(5): Urges the creation of mechanisms to ensure the use of solid waste to produce alternative energy sources. • Art 40(1): Establishes the responsibility of the State for the creation and maintenance of landfills to prevent the contamination of groundwater and negative impacts on public health. • Art 41(1): Determines that the State will create the necessary means to ensure the appropriate treatment of domestic, commercial, and industrial wastewater and of sewage effluents. Joint Ministerial Diploma 43/2017 (solid waste treatment systems) - The Joint Ministerial Diploma 43/2017, sanctioned by the Ministry of Public Works, Transport and Communications and the Ministry of State Administration (under Article 10) requires Municipal Administrations and Authorities to develop, construct and manage municipal solid waste treatment systems, appropriately coordinating with competent departments of the Central Administration. **Summary:** The Democratic Republic of Timor-Leste regulates and governs its environmental licensing and pollution control under the Decree-Law No. 5/2011. It creates the environmental licensing system to perform any public or private project which may negatively affect the environment. The Environmental Licensing System is based on the potential environmental impact assessment of any project taking into consideration its dimension, technical characteristics, and location.
Federated States of Micronesia	Littering Act 1991, CSL 191-33, Act 1-48 (An Act to Provide for the Control of Littering in Chuuk, to Establish a Process for the Designation of Appropriate Sanitary Public Dump Sites and Maintenance of Such Sites, to Set Forth Penalties for Violations of this Act, to Repeal TDL No. 23- 12, and for Other Purposes) [note in-country contact referred to Title 22, Chapter 3 (Littering)] • s4 requires the EPA to designate a sanitary dump site after an Environment Impact Statement, to be maintained by the Department of Public Works. Code Title 4: The Executive, Ch 1: Executive Organisation (commenced 1990) Amended by CSL 2-94-10 Act 2-31 and CSL 7-03-05 Act 7-09 (commenced 2003) • This 2003 amendment substantially reorganised the Executive Branch. The Department of Health Services includes divisions of Public Health and Sanitation; the Department of Transportation and Public Works includes a division of Land. The Division of Public Works is responsible for maintenance of public roads, government facilities, and for the review of approval of drawings, or plans for proposed government facilities; the Department of Administrative Services includes a Division of Planning and Statistics under s 7(e) to formulate development plans, review and make recommendations on projects and programs of the state government; the Department of Public Safety includes a Division of Police Operations. Code Title 18: Conservation and Resources, Division 4: Environmental Protection, Chapter 15: Environmental Quality Protection Act

Location	Summary of Waste Policy and Regulations
	• s1512(a) relates to discharge of waste. Under sub-s (1), when the Agency finds that (A) discharge of waste is taking place, or is threatening to take place, in violation of the Act or regulations; or (B) the waste collection, treatment or disposal facilities of a pollution discharger are approaching capacity; the Agency must require the discharger to submit a detailed time schedule of specific action to prevent a violation for approval by the Agency. Under sub-s (2), when the Agency finds that a discharge of waste is taking place, or is threatening to take place, in violation of the requirements, the Agency must issue a cease-and-desist order. • s1512(b) relates to pollutants, requiring a person who (A) discharges pollutants to air, water or land in violation of this chapter or a permit; or (B) intentionally or negligently causes a pollutant to be discharged to air, water or land; to clean up the pollutant or abate its effects on the order of the Agency. Solid Waste Management Strategy (Pohnpei State) 2020-2029[2] (with action plan 2020-2024) provides a strategy approach for managing waste within the Pohnpei State. The Strategy and Action Plan seek to improve the existing CDL system, to improve the management of the existing landfill, and improve waste collection systems for local residents. Solid Waste Management Strategy (Chuuk) 2019–2028 Overview of context and background; strategy; and action plan. Action plan components include proper management of landfill sites; introduction of container deposit system; and enhancement of human capacities. Annex 1 details current waste flow in Chuuk State. Solid Waste Management Strategy (Kosrae) 2018–2027 Overview of context and background; strategy on; and action plan. Action plan components include improvement of waste collection system; improvement of container deposit system; proper management of public landfill site; and proper treatment of waste oil. Annex 1 details current waste flow in Kosrae. Solid Waste Management Strategy (Yap) 2018–2027 Overview of context and background; strategy; and action plan. Action plan components include expansion of waste collection services to areas outside of Colonia; privatisation of waste collection service provided in Colonia; enhancement of container deposit system; proper management of public disposal site; green waste recycling; and proper management of inappropriate waste disposal such as waste oil and tires. Annex 1 details current waste flow in Yap. Strategic Development Plan 2004-2023 Volume III outlines Infrastructure development. **Summary:** The Federated States of Micronesia has existing policies and strategies to provide the framework for solid waste management. There are also State laws and regulations that play a primary role in governing waste management. It would appear that many states have some form of waste licencing in place, however detail on the specific legislative approach and policy cannot be found in all of them.
Fiji	Environment Management Act 2005 (as at 1 January 2020): • Environment Management (Waste Disposal and Recycling) Regulations 2007 (as at 1 August 2018) Provides definition of different waste categories and requirements for permits. Department of Environment (including Waste Management and Control Unit) Administers the Environment Management Act 2005. Environment Management Act establishes the Waste Management and Control Unit which has responsibility for waste management and pollution control in Fiji, namely solid waste, liquid waste, air pollution, hazardous and chemical waste. **Summary:** Under Environment Management Act 2005 and "Waste Regulations", Fiji regulates and governs waste disposal permits, which are required for every commercial or industrial facility that disposes or discharges wastes or pollutants from any of its premises.

[2] Pohnpei State, 2019. Solid Waste Management Strategy 2020-2029 (Action Plan: 2020-2024) (https://www.sprep.org/sites/default/files/documents/publications/Pohnpei_SolidWasteMgmt_Strategy.pdf)

Location	Summary of Waste Policy and Regulations
Kiribati	Environment Act 1999 (as at 1999), Environment (Amendment) Act 2007 • N.B. The 2007 amendment significantly alters the 1999 Act but there is no consolidation so both must be read together. Objects of the Act include: to provide for and establish integrated systems of development control, environmental impact assessment (EIA) and pollution control; to prevent, control and monitor pollution; to reduce risks to human health and prevent the degradation of the environment including by regulating discharge of pollutants, regulating the transport, collection, treatment, storage and disposal of wastes and promoting recycling, re-use, reduction, composting and recovery of materials in an economically viable manner; to comply with and give effect to regional and international conventions and obligations relating to the environment; and to control, manage and regulate hazardous substances Public Utilities Ordinance 1977 (as at 1977), Public Utilities (Amendment) Act 1983) • This Ordinance sets up the Public Utilities Board which has powers and functions to operate and maintain a sewerage system. Kiribati Development Plan 2016-19 The summary of KPA 4: 'Environment' states that 'Significant efforts on solid waste management have been made with donor partner support, upgrading three landfill areas, launching private waste collection, and processing e-waste and bulky waste for export'. Waste management is identified as one of the five key environmental policy areas identified by the Government. **Summary:** Kiribati Environment Act (1999) and Environment Regulations (2001) require all waste disposal sites to hold a valid Environmental License. Under its conditions, types of waste and their proper landfill disposal procedures are specified.
Nauru	Economic Infrastructure Strategy and Investment Plan, 2011 • Includes analysis of infrastructure related to sanitation and waste management, and priorities for this sector. Also includes a solid waste management infrastructure stocktake. National Sustainable Development Strategy 2005-2025, 2005, National Sustainable Development Strategy 2005-2025, 2009 (revised) - Priority regarding infrastructure sector is increased use of waste management. Water and Sanitation Master Plan 2015–2035, 2015 Technical report including analysis of existing water and sewerage system and planning of system with 20-year program. **Summary:** Nauru does not appear to have a waste activity licensing or permitting system in place under the current regulatory framework.
Niue	Environment Act 2015 • General environmental protection legislation including provision for development consents for certain activities affecting environment, including those related to waste disposal, activities affecting freshwater supplies and air quality or the atmosphere. Carrying out these activities without a development consent is an offence • Reg 2017-01a Environment (Development Consent & EIA) Regulations 2017 - Schedule 2 sets out a number of waste-relevant activities that require development consent. This includes landfills, recycling or collection stations, drainage or disposal systems, wastewater and sanitation schemes, and human waste disposal systems. Infrastructure Plan Section N – Solid Waste 2016 Asset Management Plan, Infrastructure Plan Section F – Water and Wastewater 2016 Asset Management Plan. **Summary:** Niue does not appear to have a waste activity licensing or permitting system in place under the current regulatory framework.
Palau	Solid Waste Management Regulations 2013 (Chapter 2401-31) - Regulations for the management, including storage and disposal, of solid wastes. A permit is required for a person to establish, modify or operate any solid waste disposal facility. Marine & Fresh Water Quality Regulations 2013 (Chapter 2401-11) - Provides it is the policy of the Republic of Palau that there shall be no direct or indirect discharge of sewage or other waste into any planned or intended ground or surface source of drinking water. All sewage and waste shall receive the degree of treatment necessary to protect the beneficial uses of waters of the Republic of Palau before discharge.

Location	Summary of Waste Policy and Regulations
	Wastewater Treatment and Disposal Regulations 2019 - Provision for issue of Registration certificates by the Board for wastewater treatment and sewerage plants. National Code Title 17: Crimes (as at 2014), Penal Code of the Republic of Palau, RPPL No. 9-21 2013 s 2509 - creates the offence of 'Criminal Littering' i.e., if a person knowingly places, throws, or drops litter on any public or private property or in any public or private waters, except: in a place designated by the Republic of Palau for the disposal of garbage and refuse; or into a litter receptacle. 'Litter' means rubbish, refuse, waste material, garbage, trash, offal, or debris of whatever kind or description, and whether or not it is of value, and includes improperly discarded paper, metal, plastic, glass, or solid waste. Palau Climate Change Policy 2015 At p. 17 — in order to establish the enabling framework to build resilience to climate change and disasters within Palau's utilities while reducing the carbon footprint from utilities, Palau seeks to assess the viability of introducing waste-to-energy technologies and waste reduction/recycling measures. **Summary:** Under the Title 24 of Palau's National Code, established Environmental Quality Protection Board administers and manages a permit system. This includes the operation, construction, expansion, or alteration of any installation which results in or may result in the discharge of any pollutant in the air, land, or water. Solid Waste Management Regulations 2013 (Chapter 2401-31) includes regulations for management, including storage and disposal of solid wastes. A permit is required for a person to establish, modify, or operate any solid waste disposal facility.
Papua New Guinea	The waste management in two main cities, Port Moresby (POM) and Lae, is managed by local government authorities: Lae City Council (LCC) and National District Capital Commission (NCDC) through their Waste Divisions. Waste management systems in both cities do exist. NCDC has a Waste Management Plan 2016-2025[3] for the City of Port Moresby which focuses on the existing solid waste management system, waste discharge and collection, treatment, waste minimisation and final disposal, and public awareness. The National Government of Papua New Guinea (PNG) has no solid waste management (SWM) strategy or regulation or law to manage waste in the country. The waste management authorities in both cities use the Public Health Act 1973, the Environment Act 2000 and their own by-laws. Division 2 of the Public Health (Sanitation and General) Regulation 1973 provides for refuse (or household) management, referring to solid municipal waste management. The Environment Act was passed to manage industrial waste. This implies that there is no specific act in SWM. Both authorities enforce these laws with minimal compliance and no performance monitoring. The Environment Act (2000) is the primary legislation for environmental protection, implemented nationwide by the Department of Environment and Conservation (DEC). It also empowers the provincial and local governments to develop provincial environmental policies and bylaws on environmental issues, including SWM. A key mandate of the act is the formulation of policies, including a national SWM strategy and associated regulations. The DOH implements the Public Health Act (1973) and Public Health (Sanitation and General) Regulation. The regulation includes provisions related to health, sanitation, cleaning, scavenging, and waste disposal; and fines for illegal dumping practices. The Organic Law on Provincial and Local Level Governments (1995) empowers provincial and local governments to formulate SWM policies, legislations, and bylaws. **Summary:** Papua New Guinea does not appear to have a waste activity licensing or permitting system in place under the current regulatory framework.
Republic of the Marshall Islands	The Environmental Protection Act 1984 and associated solid waste management (SWM) regulations approved in 1989, provides the legal and policy framework for the management of solid waste in the Marshall Islands. The Environmental Protection Agency (EPA) is responsible for setting and monitoring minimum standards for the design, construction, installation, operation, and management of solid waste storage, collection, and disposal facilities in the country. **Summary:** The Republic of the Marshall Islands does not appear to have a waste activity licensing or permitting system in place under the current regulatory framework.

[3] NCDC, 2015. Waste Management Plan 2016-2025 for a Sustainable Port Moresby (https://ncdc.gov.pg/admin/uploads/file/SWMP%20Final-Press.pdf)

Location	Summary of Waste Policy and Regulations
Samoa	The Samoa National Waste Management Act 2010 provides guidelines for the collection, management, disposal, and recycling of solid waste. The Act provides for registration and licensing of waste operators, permits for dumping and incinerating wastes, sets environmental standards for the management of waste, and provides for community involvement in waste management. Under the National Waste Management Act 2010, all landfill sites and waste dumps in Samoa must be licensed by the Ministry, which may impose any conditions in relation to the operation of the site or dump under the licence. A person who operates a landfill site, a waste dump or any waste facility of operation which is also required to be licensed. **Summary:** Samoa has a waste activity licensing or permitting system in place under the current regulatory framework.
Solomon Islands	Under the Environmental Health Act 1980, the Ministry of Health and Medical Services (MHMS), Environmental Health Division has the responsibility for providing expert advice on the development and implementation of environmental health policies covering waste management. The Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM), under the Environment Act 1998, is responsible for the protection and conservation of the environment. The Act empowers the ministry to assist in the development of legislation and policies for solid waste management (SWM). Section 3 (c) of the Act authorizes the ministry to reduce risks to human health and prevent the degradation of the environment by all practical means including: (i) preventing, monitoring, and controlling pollution; (ii) regulating the discharge of pollutants to the air, water, or land; (iii) regulating the transport, collection, treatment, storage, and disposal of wastes; and (iv) promoting recycling, reusing and recovering materials in an economically viable manner. **Summary:** Solomon Islands does not appear to have a waste activity licensing or permitting system in place under the current regulatory framework.
Tonga	The Waste Management Act (2005) provides a comprehensive legislative base for the effective development and management of the sector. It provides for the establishment of a solid waste management (SWM) authority, in this case Waste Authority Limited (WAL), mandating its functions, powers, and responsibilities. These are wide ranging, including the provision of MSW collection, transfer, and disposal services; promotion of waste reduction and recycling programs; development of rules and codes of practice; monitoring of public health and environmental impacts; public awareness raising; SWM community responsibilities; imposition and collection of SWM fees; and prosecutions for violations. Other salient legislation includes (i) the Public Health Act (1992), providing regulations pertaining to waste containers, waste collection, SWM and hazardous waste disposal, street cleaning, and the prohibition of waste import and export; and ensuring that recyclers are issued licenses; and (ii) the Public Enterprises Act (2002) and Companies Act (1995) which relates to public enterprise establishment and operation. **Summary:** Tonga has a waste activity licensing or permitting system in place under the current regulatory framework.
Tuvalu	The Waste Operations and Services (WOS) Act 2009 and Environmental Protection Act 2008 provide the legal framework for the management of solid waste in Tuvalu. The Waste Management Unit was redesignated to Solid Waste Authority of Tuvalu (SWAT) in 2010 under the Ministry of Home Affairs (MoHA). SWAT has been given the responsibility for (i) developing national solid waste management (SWM) strategies; (ii) acting as sector regulator, including management of compliance and performance of all waste management operations in Tuvalu; (iii) supporting waste management operators in a communicative and cooperative manner by providing necessary technical expertise; (vi) reporting to the government on the national waste management program; and (v) promoting community education and awareness on solid wastes. MoHA provides policy direction and budgetary support to SWAT. Under the Environmental Protection Act 2008, the Department of Environment (DoE), under the Ministry of Natural Resources Energy and Environment, is responsible for ensuring the proper regulation, monitoring, and control of solid wastes to minimize its impact on environmental quality. The DoE is mandated to regulate waste collection and disposal systems and set operational standards by applying guidelines for waste management operations within Tuvalu. **Summary:** Tuvalu has a waste activity licensing or permitting system in place under the current regulatory framework.

Location	Summary of Waste Policy and Regulations
Vanuatu	The Waste Management Act (WMA) 2014 establishes specific responsibilities for identifying waste, collecting waste, disposing of waste, planning, and reporting on waste management and managing hazardous waste. It also includes provisions on litter and waste disposal. These responsibilities are shared between the Department of Environmental Protection and Conservation, municipal and provincial councils, the Ministry of Health and Biosecurity Vanuatu. Under the Environment and Conservation Act 2002, the Department of Environmental Protection and Conservation (DEPC) is designated as the lead national agency for solid waste management (SWM). A National Waste Management Strategy Action Plan was adopted in April 2011 in line with the Pacific Regional Solid Waste Management Strategy 2010–2015. The Pollution (Control) Act 2013 also cites SWM. Under the Decentralization and Local Government Regions Act 1994 (some amendments in 2013) municipal councils have responsibility for the management of solid waste within council areas. **Summary:** Vanuatu has a waste activity licensing or permitting system in place under the current regulatory framework. The WMA requires licences for private waste contractors to operate and regulates their activities, including through powers to revoke licences for non-compliance. To date there have not been any prosecutions in relation to licence non-compliance and it has been a gradual process to encourage licence renewals.

Policy Related to Waste Transport

Table 3 presents details on existing policy and regulatory measures on waste transportation in the region.

Table 3: Summary of existing policy related to the transport of waste across region

Location	Summary of Waste Transport Policy and Regulations
Cook Islands	Public Health Act 2004 - Section 37 establishes responsibilities of building occupiers to ensure proper and safe disposal of waste. Section 38 prohibits burning of plastic waste and tyres. Section 39 outlines required methods of emptying and disposal of septic tank waste. Part 6 (ss 35–41) relates to waste, the purpose of which under s 35 is to ensure that waste is safely stored, collected, treated, removed, transported, disposed of, and otherwise dealt with. Section 40 prohibits dumping of waste. Section 41 allows for the making of further regulations regarding waste management. Schedule 1 outlines 'offensive trades', including operating a waste disposal site, removal of waste from septic tanks and waste collection, treatment or disposal. Part 8 regulates offensive trades. Offensive trades are prohibited without permits by Section 51, while Section 52 establishes offensive trade permits and their requirements. Environment (Atiu and Takutea) Regulation 2008 • r.29 - Recyclable materials - The Island Council, in consultation with the Island Environment Authority, shall be responsible for the environmentally sound collection, storage, and export of all cans, bottles, batteries and other recyclable materials., • r.30 (2) - A permit issued pursuant to subclause (1) may be granted on such terms and conditions as the Island Environment Authority may determine as necessary for the environmentally sound storage, transport, collection or disposal of such hazardous waste. • 31. Designation of a public waste disposal and treatment site - (1) The Island Council in consultation with the Island Environment Authority and Landowners shall be responsible for the designation of any site for the purpose of public waste disposal and for the storage of recyclable materials. **Summary:** Cook Islands does not appear to have a waste transport activity licensing or permitting system in place under the current regulatory framework.
Democratic Republic of Timor-Leste	Decree- Law 3/2012 - Legislative Authorisation on Environmental Matters: • Art 2, vv: Establishes the necessity of creating a solid waste management system comprising the collection, transportation, storage, reduction, reutilisation and recycling of solid waste, especially through the creation of landfills built so as to avoid the contamination of groundwater. • Art 2, xx: Prohibits the importation of dangerous waste and subjects the importation of dangerous chemicals to previous consent by the State. • Art 39, 2: Establishes the responsibility of public entities for the collection, transportation, storage, processing, reduction, reutilisation and recycling of solid domestic and commercial waste.

Location	Summary of Waste Transport Policy and Regulations
	• Art 39, 3: Establishes the responsibility of the producer of solid hospital waste, industrial waste and waste from construction activities for its collection, transportation, storage, processing, reduction, reutilisation and recycling. • Art 42, 1: Prohibits the importation of dangerous waste. • Art 42, 2: Subjects the identification, control, production, transportation, storage, exportation and use of dangerous waste to special legislation. Decree-Law 3/2016 - Statute of Municipal Administrations (municipal administrations and authorities to develop solid waste management systems) • Art 11, 1, 'c' and 'j': Determines the authority of Municipal Administrations and Municipal Authorities to invest in the construction, conservation and maintenance of wastewater management systems and solid waste management systems in populated areas. Decree-Law 2/2017 – Urban Solid Waste Management System: • Art 5: Determines the authority of Municipal Administrations and Authorities to establish urban solid waste management systems and allows them to delegate or to set up concessions for the management of urban solid waste. • Art 6: Defines urban solid waste as wastes originating from housing, the service sector, commercial or industrial establishments, and healthcare units, as long as the daily output does not exceed 1100 litres. Includes bulky waste; organics; waste produced in public places; animal waste; construction waste; dangerous waste; and healthcare waste. • Art 7: Defines as recoverable waste all waste capable of being selected and whose transformation leads to a useful end, such as packaging, paper and cardboard, glass, used tyres, scraps, batteries, electrical and electronic equipment, and used cooking oils. • Art 14: Establishes the obligation of Municipalities to guarantee urban waste management for waste which does not exceed 1100 litres per day per producer. Establishes the obligation of Municipalities to ensure the adequate collection and transportation of waste. • Art 16: Establishes the obligation of users not to abandon waste in public areas, to take care of the equipment provided for waste collection, and to pay a service fee • Art 23: Establishes rules for waste collection, such as: waste should only be deposited in approved locations and containers; the use of selective waste/waste sorting equipment is mandatory whenever it is available; used cooking oils must be disposed in closed plastic bottles • Art 25: The waste collection entity should establish the location and install urban waste collective equipment, whether undifferentiated or selective. The waste collection entity must ensure the existence of urban waste collective equipment at a distance of less than 150 metres from the buildings in urban areas and of 250 metres in predominantly rural areas. • Art 29: In urban areas, waste collection should happen at least once a week or according to another collection plan by the waste collection entity. In rural areas, waste collection can be spaced according to the collection plan approved by the waste collection entity. • Art 31: Selective collection of electrical and electronic waste shall occur by a request to the waste collection entity. Collection will happen at a time, date and location agreed between the waste collection entity and the interested party after the payment of a fee determined by the waste collection entity. The waste collection entity must respond to a request in a maximum of 5 working days. • Art 32: The collection of bulky domestic waste is done by a request to the waste collection entity. Collection will happen at a time, date and location agreed between the waste collection entity and the interested party after the payment of a fee determined by the waste collection entity. The waste collection entity must respond to a request in a maximum of 5 working days. • Art 34: Whenever the waste collection authority deems it necessary or the non-domestic user believes it is more convenient, the urban waste management service may be the object of a contract between the waste collection authority and the non-domestic user. • Art 39: Users to which the urban waste management service is provided are subject to a fee for the provision of this service. Users are classified as domestic or non-domestic for the purpose of determining the fee for the service. • Art 42: The fee is indexed to the consumption of electricity by users and follows the general rule that who consumes more electricity produces more waste. • Art 56: The fees for the solid waste management system are only due once the system is effectively available.

Location	Summary of Waste Transport Policy and Regulations
	Decree-Law 26/2012 - • Art 39(3): Establishes the responsibility of the producer of industrial waste, industrial waste, and waste from construction activities for its collection, transportation, storage, processing, reduction, reutilisation, and recycling • Art 42(2): Subjects the identification, control, production, transportation, storage, exportation and use of hazardous waste to special legislation. **Summary:** The Democratic Republic of Timor-Leste does not appear to have a waste transport activity licensing or permitting system in place under the current regulatory framework.
Federated States of Micronesia	Code Title 12: Crimes and Punishment, Ch 10: Miscellaneous Offenses (as at 2001) • s5054(1) provides that any person permitting a junk vehicle to remain on public property thirty days after a junk vehicle warning shall be guilty of littering. Solid Waste Management Action Plan (Pohnpei) 2014– 2018 - Strategic priorities include institutional arrangements; policy, legislation and enforcement; data collection; waste minimisation; waste collection; waste disposal; e-wastes, waste oil, batteries and tires; medical waste management and capacity building, education and awareness. Solid Waste Management Strategy (Kosrae) 2018–2027 Overview of context and background; strategy on; and action plan. Action plan components include improvement of waste collection system; improvement of container deposit system; proper management of public landfill site; and proper treatment of waste oil. Annex 1 details current waste flow in Kosrae. Solid Waste Management Strategy (Yap) 2018–2027 Overview of context and background; strategy; and action plan. Action plan components include expansion of waste collection services to areas outside of Colonia; privatisation of waste collection service provided in Colonia; enhancement of container deposit system; proper management of public disposal site; green waste recycling; and proper management of inappropriate waste disposal such as waste oil and tires. Annex 1 details current waste flow in Yap. **Summary:** The Federated States of Micronesia does not appear to have a waste transport activity licensing or permitting system in place under the current regulatory framework.
Fiji	Customs (Prohibited Imports and Exports) Regulations 1986 (as at 8 June 2019) Specifies conditions for import of certain goods including biodegradable plastic bags and radioactive substances. Litter Act 2008 (as at 1 August 2018) - 'Litter' defined in s 2 to mean 'any matter or thing whether solid or partly solid, the possession of which None identified. None identified. Stocktake of Existing and Pipeline Waste Legislation: FIJI 8 has been abandoned by any person having control of the same in any street or land or public place …'. It includes building, household, shop, garden and trade refuse or waste; human, animal, fish and vegetable refuse or waste; containers and packaging of any description. 'Dangerous litter' is defined in s 2 to mean 'litter that is dangerous, or liable to become dangerous', including litter which, if deposited in a public place, is likely to endanger any person or to cause physical injury, disease or infection of any kind to any person coming into contact with it; any bottle, glass, sharp metal or trap, any substance of a toxic or poisonous nature, any oil, diesel, fuel grease spill or similar discharge and any derelict abandoned vehicle.' Penalties and offences for littering are outlined in Part IV of the Act. Public Health Act 1935 (as at 1 August 2018) - Establishes an authority called the 'Central Board of Health' which can make regulations. Section 52 authorises the Board, with the Minister's approval, to make regulations for '(a) the storage, collection and disposal of nightsoil and garbage or other offensive matter; (b) preventing the accumulation of dust filth, ashes and refuse on premises and public places. National Solid Waste Management Strategy & Action Plan 2008–2010 Sets out how Fiji should address waste. Covers waste minimisation, not limited to resource conservation, waste segregation at source, waste disposal, recycle, reuse and composting. Precursor to Waste Management Regulation under the Environment Management Act 2005. Climate Change and Health Strategic Action Plan 2016–2020. Outlines various strategies to control communicable diseases through adaptive actions. One strategy is the safe disposal of communal solid waste and waste waters in identified vulnerable areas. **Summary:** Under Environment Management Regulations 2007, Part 5, Fiji regulates waste transport, where a facility that is or operates a waste transport business must hold a waste transport permit issued by the WPC Administrator.

Location	Summary of Waste Transport Policy and Regulations
Kiribati	Local Government Act 1984 - Provides that the Minister may establish local councils. These councils have responsibility for various functions under the legislation, including collection of solid waste. Kiribati Integrated Environment Policy (2013) Goal is: To strengthen national capacity to ensure a safe and healthy environment for the people of Kiribati through effective and sound management of chemical and waste. Kiribati adopts the 'Waste Hierarchy' approach in its management of waste, starting with avoidance and minimisation first then looking at the opportunities for reuse, recycling and recovering before finally considering safe disposal. **Summary:** Kiribati does not appear to have a waste transport activity licensing or permitting system in place under the current regulatory framework.
Nauru	The Derelict Sites Management Act 2017 'An Act to make provision for the identification, control, removal, disposal and management of derelict properties, buildings and vehicles in the Republic and for related purposes. Sanitary Inspectors' Ordinance 1921 (as at 1921) Ordinance Revision Ordinance 1967 Section 5 requires a sanitary inspector to direct an owner or occupier to clean an unclean or unsanitary area and report it to the Administrator for further instructions if it is not cleaned. Includes discussion of wastewater and sewage. Waste identified as risk to water quality. Policy objective 3.1 includes activity to establish regulations for disposal of septic tank and cesspit wastes. Agricultural Quarantine Act 1999 Various, including Plant and Animal Quarantine Regulations 2004 - This Act regulates the treatment and disposal of garbage on ships and aircraft arriving in Nauru. It defines 'garbage' to mean animal and human waste, organic refuse, galley scraps or other similar refuse'. **Summary:** Nauru does not have a waste transport activity licensing or permitting system in place under the current regulatory framework.
Niue	Environment Act 2015 • Section 15 deals with disposing of waste or other matter, and removal and disposal of asbestos. Method of disposal must be authorised by Act or Regulations or have development consent. • Section 49 authorises environment officers to seize and remove certain wastes, including vehicles, vessels, trailers, satellite dishes, solar panels, gas cylinders, whiteware or e-ware. Water Act 2012 (as at 2012) N.B. Environment Act 2015 (amends Water Act s 54): • Section 38(1) prohibits the disposal of any matter underground by means of a water bore, or in such a way as may pollute any groundwater. 38(2) requires activities listed in Schedule 2(e.g., waste collection and disposal sites and facilities, sewerage treatment and disposal operations) to apply for a water pollution control licence. Penalties are specified for contraventions. **Summary:** Niue does not appear to have a waste transport activity licensing or permitting system in place under the current regulatory framework.
Palau	Solid Waste Management Regulations 2013 (Chapter 2401-31) - Regulations for the management, including storage and disposal, of solid wastes. 'Solid waste' means garbage, refuse, and other discarded solid materials including solid waste materials resulting from industrial and commercial operations, and from community activities, but does not include solid or dissolved material in domestic sewage, or other substances in water sources, such as silt, dissolved or suspended solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants. This definition is intended to include liquid waste materials such as waste oil, as well as pesticides, paints, solvents, and hazardous waste. Environmental Health Regulations 2004 Article 12 - establishes minimum standards governing the operation and maintenance of solid waste storage, collection and disposal systems. Toilet Facilities and Wastewater Disposal Regulations 1996 - Regulations for sewerage and wastewater disposal. National Solid Waste Management Strategy: The Roadmap towards a Clean and Safe Palau 2017 to 2026 - The Strategy considers solid wastes generated households, institutions and commercial settings on the main island. The Strategy does not cover liquid and gaseous waste. Aims include to synergise efforts in waste management among different line agencies and the wider community; improve environment, health and socio-economic conditions of the people of Palau by managing wastes properly through 3R+ return programs and provision of safe and environmentally sound collection, storage, treatment and disposal systems; and sustain the initiatives on waste management through the commitments of the government and the stakeholders adopting this Strategy.

Location	Summary of Waste Transport Policy and Regulations
	Summary: Palau does not have a waste transport activity licensing or permitting system in place under the current regulatory framework.
Papua New Guinea	The Customs Act 1951 regulates the imports of goods into PNG. Regulations under this legislation prohibit the import of plastic shopping bags defined as: 'being any of the substances defined as all High Density Polyethylene (HDPE) plastic bags with or without handles used or provided at the point of sales, used as carrying or transporting of retail or wholesale goods including: (a) HDPE carry bags; and (b) Vegetable or tear-off bags; and (c) Food bags (used at Kai Bars)'. A total of 36 private contractors operate the MSW collection system of Port Moresby, under arrangements with the Waste Management Division of the National Capital District Commission (NCDC). The geographic area served by the system is large, but there are no transfer stations. NCDC is responsible for medical waste collection and disposal in Port Moresby. Elsewhere in PNG, The National Department of Health (NDoH) is responsible for medical waste management. There are 19 public hospitals in PNG that operate a color-coded bag system for the collection, storage, and transfer of medical wastes: green (general waste), pink (radioactive waste), and red (hazardous chemical waste). **Summary:** Papua New Guinea has a waste transport licensing system in place under the current regulatory framework. The National Department of Health (NDoH) require all businesses in Port of Moresby to have a license to trade, including waste service providers. PNG Ports Corporation Ltd (PNGPCL) investigates all waste service providers to be trained and inducted into PoM and would like to implement a waste tracking system to ensure waste collected from ships is being disposed of in an environmentally acceptable manner. Ships visiting Port Moresby are able to access waste services through licensed service providers. There is little transparency, however, regarding how shipboard waste is managed other than access by those to the Baruni Dump which incurs fees to NCDC.
Republic of the Marshall Islands	The Pesticides and Organic Pollutants (POPS) Regulations 2004 establish a system of control over the importation, distribution, sale, and use of pesticides and to ban or restrict the use of twelve POPS targeted by the Stockholm Convention. The Majuro Atoll Waste Company (MAWC), which is owned by the national government, and the Majuro Atoll Local Government, is responsible for solid waste collection, landfill management, and recycling. MAWC provides weekly collection services to around 2,500 households, and 82 commercial customers located in the area between the airport and Rita. The company does not provide service in the area between the airport and Laura, where approximately 500 households are responsible for transporting their wastes to Majuro's dumpsite. In Majuro, the EPA ordered the main hospital to transfer the incinerator off the hospital compound due to foul emissions. The new location, which is close to the international airport, is also problematic, experiencing equipment breakdowns and producing a bad smell. In addition, transporting medical waste is problematic because there is no appropriately designed collection truck, and workers do not have adequate protective gear. A privately contracted company runs the collection and incineration of medical waste. **Summary:** Republic of the Marshall Islands does not appear to have a waste transport licensing or permitting system in place under the current regulatory framework.
Samoa	Under the National Waste Management Act 2010, regulations are made to impose requirements in relation to certain wastes having adverse impacts on the environment or human health by regulating the importation, exportation, manufacture, use, storage or transportation of certain objects, substances or things which may become wastes, and imposing conditions in relation to them. Despite the provisions of the Business Licences Act 1998, an approved authority and its contractors may engage in activities associated with the storage, disposal and transport of toxic wastes, if such activities comply with the requirements of this Act, and any law relating to hazardous wastes and substances. The Shipping Act 1998 also has provisions on the transportation of hazardous wastes and the Marine Pollution and Prevention Act 2008 has provisions on the illegal dumping of waste from ships and port facilities. Both allow for a form of permitting with respect to both transportation of hazardous waste and discharges to the marine environment. Under the Land, Surveys and Environment Act 1989, Section 146 allows regulations for the purposes of providing for the regulating or prohibiting the import of environmental pollutants. **Summary:** Samoa appears to have a waste transport licensing or permitting system in place under the current regulatory framework.

Location	Summary of Waste Transport Policy and Regulations
Solomon Islands	The Environment Act 1998 regulates the transport, collection, treatment, storage and disposal of wastes and to comply with and give effect to regional and international conventions and obligations relating to the environment. Under the Petroleum Act 1987, Section 5 prohibits escape or discharge of petroleum from any vessel or vehicle into inland or tidal water, and Section 6 requires strong transport of petroleum only in packages from which it cannot escape. The Honiara City Council (HCC) Environmental Health Division is responsible for collecting household waste within Honiara City and transporting it to the Ranadi dump site. HCC is also responsible for collecting waste from the central market. However, less than half of Honiara City's population is provided with waste collection services. The large informal settlements, which fall outside of the HCC municipal boundary, also do not receive waste collection services. However, some people living in settlements near the boundary with Honiara City transport rubbish to small roll-on-roll-off bins that HCC places in several outlying areas. HCC and three private contractors also collect commercial wastes in and around Honiara and transport it to the Ranadi dump site. HCC uses the proceeds of its commercial collection service to subsidize the household collection service. **Summary:** Solomon Islands does not appear to have a waste transport licensing or permitting system in place under the current regulatory framework.
Tonga	The Public Health Act (1992) regulates waste collection and waste containers, as well as disposal of solid and hazardous waste. It prohibits import of toxic and hazardous waste, ensuring that recyclers are issued licences. The provisions of the Act extend to ships. MSW generated by commercial institutional generators is usually transported to the landfill by private MSW service companies, WAL and the commercial/institutional operators own vehicles. The Ministry of Health (MOH) is responsible for the collection, storage, transfer, treatment, and disposal of medical waste generated on Tongatapu, the main island of the Kingdom of Tonga. Medical waste is transported in a special collection vehicle, which collects medical waste from the island's seven clinics and other facilities and transfers it to the main hospital in Nuku'alofa. The waste is then sterilized in an autoclave, using standard operating procedures. Following sterilization, the treated waste is then transported to the Tapuhia landfill facility for disposal. This treated medical waste is buried in specially excavated holes in the waste mass and then covered. **Summary:** Tonga appears to have a waste transport licensing or permitting system in place under the current regulatory framework.
Tuvalu	The Waste Management (Levy Deposit) Regulation 2019, under s 10(1) of the Waste Management Act 2017, establishes a system of levies charged and refunds provided to encourage the recycling of certain imported goods. The Waste Management (Prohibition on the Importation of Single-Use Plastic) Regulation 2019, under s 11(1)(A) of the Waste Management Act 2017, prohibits the importation of certain single-use plastics. The Ozone Layer Protection Act 2008 prohibits the importation of plastic foam manufactured with substances controlled by the Montreal Ozone Protocol. Under the Pesticides Act 2008, Section 7(2) requires an import permit for import of any pesticide, and Section 10 provides for an import permit system. Under the Environmental Protection Act 2008, the Department of Environment (DoE), under the Ministry of Natural Resources Energy and Environment, is mandated to regulate waste collection and disposal systems, and set operational standards by applying guidelines for waste management operations within Tuvalu. Under the Falekaupule (Local Government) Act 1997, Funafuti Kaupule has the primary responsibility for providing solid waste collection services to households and businesses; and for keeping roads, paths, and other public places free of rubbish. The Garbage Disposal Bylaw prohibits the disposal of solid wastes in an area other than the designated dumping site. Household and commercial wastes collected by the Funafuti Kaupule and SWAT, with the exception of green waste, are transported to Funafuti's one official dumpsite for disposal. **Summary:** Tuvalu does not appear to have a waste transport licensing or permitting system in place under the current regulatory framework.

Location	Summary of Waste Transport Policy and Regulations
Vanuatu	The Ozone Layer Protection Act 2010 prohibits the importation of plastic foam manufactured with substances controlled by the Montreal Ozone Protocol. Under the Decentralization and Local Government Regions Act 1994 (some amendments in 2013) municipal councils have responsibility for the management of solid waste within council areas. Port Vila Municipal Council (PVMC) operates a solid waste collection service and manages the Bouffa dumpsite. Shefa Province is nominally responsible for solid waste management in the peri-urban area outside Port Vila Municipality (PVM); but it does not have solid waste collection or disposal systems and at present has limited capacity to provide them. Under existing SWM legislation for solid waste much of the monitoring and enforcement is left to the same municipal agency that implements waste collection and disposal activities. **Summary:** Vanuatu does not appear to have a waste transport licensing or permitting system in place under the current regulatory framework.

A summary of existing waste activity and transport licensing or permitting system for each country are presented in Table 4.

Table 4: Summary table of existing waste activity licensing and transport licensing

Country	Existing waste activity licensing	Existing waste transport licensing
Cook Islands	No	No
Democratic Republic of Timor-Leste	Yes	No
Federated States of Micronesia	Yes	No
Fiji	Yes	Yes
Kiribati	Yes	No
Nauru	No	No
Niue	No	No
Palau	Yes	No
Papua New Guinea	No	Yes
Republic of the Marshall Island	No	No
Samoa	Yes	Yes
Solomon Islands	No	No
Tonga	Yes	Yes
Tuvalu	Yes	No
Vanuatu	Yes	No

Waste Related International Conventions

Nations within the region are signatories or party to several international conventions that relate to protecting human health and the environment.
These are presented in Table 5. **Error! Reference source not found.**.

Convention	Summary
Basel Convention	Protect human health and the environment against adverse effects caused by the generation, management and transboundary movement of hazardous wastes, including the prevention of hazardous wastes being transported from OECD countries to developing country parties
Stockholm Convention	Seeks to protect human health and the environment from persistent organic pollutants (POPs) including DDT, polychlorinated biphenyls, and some per- and polyfluoroalkyl substances (e.g., PFAS).
Rotterdam Convention	Promotes shared responsibility and corporative efforts amongst parties in the international trade of certain hazardous chemicals (e.g., PBBs, PCBs and PCT) to protect human health and the environment.
Minamata Convention	Protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds.
Waigani Convention	Prohibits the importation of hazardous and radioactive wastes into Pacific Island developing countries and facilities environmentally sound management of these wastes
Noumea Convention	The Convention is a comprehensive umbrella agreement for the protection, management and development of the marine and coastal environment of the South Pacific Region
Apia Convention	Parties commit action for the conservation, utilisation and development of the natural resources of the South Pacific region for the benefit of future and present generations.

It is noted that not all nations within the Study Area are parties of all relevant conventions. These are presented in Table 5.

Table 5: Countries party to relevant conventions

Country	Basel	Stockholm	Rotterdam	Minamata	Waigani	Apia	Noumea
Cook Islands	X	X	X	-	X	X	X
Democratic Republic of Timor-Leste	X	X	X	-	X	-	-
Federated States of Micronesia	X	X	-	-	X	-	X
Fiji	-	X	-	-	X	X	X
Kiribati	X	X	-	X	X	-	-
Nauru	X	X	-	-	-	-	X
Niue	-	X	-	-	X	-	-
Palau	X	X	-	X	-	-	-
Papua New Guinea	X	X	-	-	X	-	X
Republic of the Marshall Island	X	X	X	X	-	-	X
Samoa	X	X	X	X	X	X	X
Solomon Islands	-	X	-	-	X	-	X
Tonga	X	X	X	-	X	-	-
Tuvalu	-	X	-	X	X	-	-
Vanuatu	-	X	-	X	X	-	-

Summary of Existing Monitoring and Governance Framework

Monitoring Data Requirements

Data is required to meet the obligations under some of the international conventions as presented in Table 6.

Several of the conventions require specific data around activity undertaken within country which are required to be submitted to the secretariat of each.

Several countries also have a need to record progress in reducing the volume of waste generated and increasing recovery over disposal to landfill.

Policy Options – Facility and Transporter Licensing

We have selected a range of jurisdictions that have established licensing frameworks in place that also have relevance to the South Pacific region. This includes Australia jurisdictions that have tropical island and indigenous communities that sit within existing frameworks (e.g., Queensland, Northern Territory) plus New South Wales which has a comprehensive and established waste (and other environmental activities) licensing framework. Noting that the US permitting approach is utilised in the North Pacific region, we have drawn on current approaches in Hawaii, which are driven largely by the US EPA when it comes to hazardous waste management.

This research also considers existing permitting approaches in the study area drawing on specific examples from countries where relevant, as well as including other island states such as St Helena. This report also draws on experiences from the EU regime which is considered the most advanced in the world, specifically looking at England or the UKs regulatory framework

Waste Facility Licensing

Licensing by Activity Type

Key issues identified in this section:

- There are a range of waste related activities undertaken in Pacific Island Countries, including landfills and dumps, waste aggregation facilities, incinerators, transfer stations and composting.
- Other industrial or agricultural operations also are likely to undertake waste activities
- Licensing or permitting by activity type is common in PICs, where it exists, and in Australia, Hawaii and Europe, although broader licenses that capture all sites exist in other island communities.
- Policy may introduce a blanket “other waste processing” to allow flexibility for new and emerging technologies or as a catchall to allow regulation of all waste processing.
- Policy may also introduce mobile licenses for waste activities.

There are several typical waste facilities currently in operation within the Pacific Island communities included within this study. This includes standalone waste facilities, as well as other facility types (e.g., resource extraction and processing facilities) that generate wastes that may require licensing for their management.

The types of activity identified currently include:

- Landfills – engineered landfills (e.g., lined or double lined) to non-engineered landfills to dump sites
- Incinerators – with or without abatement, typically associated with hospital/healthcare wastes
- Metal recycling aggregation facilities (e.g., sorting/segregation for export)
- Container deposit facilities (e.g., drop sites/aggregation sites)
- Transfer stations
- Aggregation sites (e.g., waste storage for export)
- Composting / organics processing sites

There are several other activities undertaken across some countries that have an element of activity or emission that requires licensing or permitting under a similar framework to waste sites. These include (but are not limited to):

- Petroleum extraction facilities (e.g., LNG extraction and processing)
- Mining activity (solid waste, waste tyres, wastewater discharges)
- Agricultural activities (generating organic waste, food wastes, biosecurity waste, wastewater)
- Forestry and sawmilling (generating sawdust and shavings, woody wastes)
- Food manufacturing (e.g., bottling plants, food processing etc.,)
- Tourism and hospitality facilities (commercial wastes, but also potentially wastewater)

Licensing by facility type is common across jurisdictions with established regulatory frameworks, such as those in Australia (Queensland[4], New South Wales,[5] and the Northern Territory[6]) which gain a head of power through enabling legislation (typically environment or environmental protection acts). It is noted however that these licensing frameworks are typically much broader than just waste and waste related activities, extending to all industrial processes, include elements of those listed above.

Capturing similar environments as some Pacific Island members, Queensland's approach is uniformly applied to all areas of Queensland, and therefore, covers facilities that meet the threshold test for scale in remote and island communities in Queensland would fall under the licensing framework. Facilities are regulated based on activity (e.g., operating a landfill) but the licensing thresholds includes consideration of scale (e.g., tonnage disposed of) and waste type.

Permitting in other jurisdictions, typical in the USA is undertaken for waste facilities managed by City or County (or both) Environmental Services Departments, with permits applied for under a relevant government department. For example, in Hawaii, facility operators must apply for a permit to the Department of Health for a General Integrated Solid Waste Permit Application for the operation of a landfill.

[4] Queensland Government, Environmentally Relevant Activities (from https://www.business.qld.gov.au/running-business/environment/licences-permits/applying/activities)
[5] New South Wales Environment Protection Agency, Licensing (https://www.epa.nsw.gov.au/licensing-and-regulation/licensing)
[6] Northern Territory Environment Protection Agency, Licensing and Approvals (https://ntepa.nt.gov.au/your-business/licensing-and-approvals)

The head of power here sits under the Department of Health Administrative Rules[7] . In Hawaii the types of facilities regulated by type include Construction & Demolition waste landfills, composting/co-composting facilities, incineration and energy from waste facilities, medical/foreign waste treatment, municipal solid waste landfills, recycling and auto-salvage facilities, remediation facilities, special waste landfills, transfer stations, and waste treatment.

A different approach has been implemented in one of the remote islands in Atlantic Ocean. Waste licensing in St Helena Island is regulated by Governor in Council who established standards for collections, treatment, and disposal of waste[8]. Due to the scale and population of the island, there are no specific regulations focused on types of waste facilities, besides a general set of permits and licences authorising the operation of any facility for recycling, treatment, or disposal of wastes, including landfill and incineration operations. These permits are granted by Chief Environmental Officer.

The Fiji *Environment Management Act* 2005 sets out the strategy and framework for waste management for Fiji. Facilities and operators that discharge waste, pollutants or hazardous materials are required to lodge an application for a Waste Disposal Permit issued by the Department of Environment The power to issue this particular permit is given to Waste Management and Pollution Control Administrator,[9]however, if the waste is disposed through a town or council collection, the requirement of holding a permit is waived.

Table 6: Comparison of facility licensing/permits in other jurisdictions

Facility Type	NSW (Australia)	Queensland (Australia)	Northern Territory (Australia)	Hawaii (USA)	St Helena	England (UK, EU as proxy)
Landfill (C&D)	Yes	Yes	Yes	Yes	Yes	Yes
Landfill (MSW)	Yes	Yes	Yes	Yes	Yes	Yes
Landfill (special)	Yes	Yes	Yes	Yes	Yes	Yes
Organic material processing / Composting / Co-composting	Yes	Yes	Yes	Yes	Yes	Yes
Recycling / Auto Salvage / Mechanical Waste reprocessing	Yes	Yes	Yes	Yes	Yes	Yes
Metal recycling	Yes	Yes	Yes	-	Yes	Yes
Remediation	-	Not specified but covered by others	-	Yes	-	-
Transfer Stations	Yes	Yes	Yes	Yes	Yes	Yes
Waste treatment	Yes	Yes	Yes	Yes	Yes	Yes
Energy from Waste (incineration / energy recovery)	Yes	Yes	Not listed but assumed	Yes	Yes	Yes
"Other" waste processing sites	-	Yes	-	-	Yes	Yes
Mobile Waste Processing	Yes	Yes	-	-	-	Yes
Waste transport (hazardous waste)	Yes	Yes	Yes	-	Yes	Yes
Waste transport (general waste)	-	-	-	-	Yes	-

[7] State of Hawaii, General Integrated Solid Waste Management Permit Application (https://eha-cloud.doh.hawaii.gov/epermit/app/#/formversion/d31c9345-0a2d-43f7-b58f-298e07d97426)

[8] Saint Helena Government, Environmental Protection Ordinance, 2016 (https://www.sainthelena.gov.sh/wp-content/uploads/2021/10/Environmental-Protection-Ord-Updated-111021.pdf)

[9] Fiji Government, Environment Management (Waste Disposal And Recycling) Regulations 2007 (https://doefiji.files.wordpress.com/2013/10/amended-waste-disposal-recycling.pdf)

Considerations in defining the type of activity include how activities undertaken at facilities that are not primarily waste related sites (e.g., wastes generated and managed at the Liquid Natural Gas Plant in Port Moresby, Papua New Guinea; or at quarantine facilities within ports in any of the countries in this study) might be captured within regulation. Activity based licensing allows for just those activities that need to be regulated to be included within a permit or a license, or for existing permits to be expanded to capture waste related activities.

Some jurisdictions (e.g., Queensland) have a blanket "other waste processing" activity. This is designed to capture new and emerging technologies, or those activities that do not fit the existing framework. This activity-based license allows flexibility to the regulator, without needing to define every waste facility type at the onset, so may allow future flexibility.

Mobile licenses may also be relevant when considering activity-based licenses. Generally, activities are limited to a particular facility, however commonly equipment is used for screening, crushing, and grinding that is mobile. Emerging technologies such as energy from waste are also often containerised which may allow for greater mobility. Mobile activities may be highly beneficial to island communities dealing with problem streams on a campaign basis (e.g., dealing with disaster wastes), and should be considered when defining a regulatory framework.

Licensing or permitting by activity type may require additional guidance of regulation to be developed to provide clarity. For example, in the UK where activities are permitted under the EU Waste Framework Directive, there are multiple pathways for regulation. This includes coverage under regulatory position statements, where the regulator states activities that do not currently require a permit, exemptions, where you must be registered but do not need a permit, a set of standard rules in a permit (i.e., fixed operating conditions) or a bespoke permit specific to an activity. Licensing requirements for certain activities are expected to need model operating conditions and specific environmental controls.

Activity based licensing may also be used in extreme cases to prevent certain types of activities being undertaken in a particular country, or even in certain areas. For example, a country could stipulate that energy from waste activities are not permissible and exclude specifically in the licensing framework.

Policy options for licensing or permitting via activity type are:

- Identifying permissible waste and waste related activities (e.g., landfill, incineration, energy recovery, organics, waste transfer, recycling/recovery activities, transport etc.,)
- Identifying non-permissible waste and waste related activities
- Licensing of waste transport activities
- Licensing of mobile plant

Licensing by Waste Type

Key issues identified in this section:

- Licensing by waste type accepted into a facility is common, particularly for activities that manage, process, treat or dispose of hazardous wastes.
- Typically facilities are licensed based on accepting a certain type of waste (e.g., a landfill may be allowed only to accept Hazardous Waste), or a range of waste types.
- Activities could be licensed based on an alternative definition, for example, accepting or processing medical waste, or asbestos waste, as opposed to meeting the definition of hazardous waste.

Waste management activities could be licensed by waste type. Globally hazardous waste is characterised under the Basel Convention[10] which in the study area flows through into the Waigani Convention. Many jurisdictions (e.g., Queensland, New South Wales, the UK, the EU, Hawaii) include hazardous waste in waste licensing definitions. This is often seen as an opportunity to follow a risk-based regulation approach, with activities managing hazardous wastes seen as higher risks, and therefore requiring higher levels of regulation or administration costs.

Annex I of the Waigani Convention defines categories of wastes that are hazardous wastes, as well as the list of UN Class, Codes and Hazardous Characteristics in Annex II. Under the Convention, each member country is required to define any additional wastes considered hazardous. By elimination, wastes not defined as hazardous are typically considered general or non-hazardous wastes which provides a second waste type that could be used to define regulation.

Facility regulation by waste type is commonly used particularly for regulation of landfill, where specific waste types may be accepted and landfill type defined (e.g., Hazardous Waste Landfills in the UK) or where particular waste may be excluded in a license of permit (e.g., the prevention of Hazardous Wastes from disposal in non-hazardous waste landfills). Commonly this allows a variable permitting regime to be applied to ensure a known quality of waste is deposited. The acceptance of certain types of waste would then be applied through waste acceptance criteria incorporated into licenses or permits for each facility type.

Waste acceptance criteria exist based broadly on type (i.e., this landfill can only accept a certain type of waste) or for more granular wastes, testing frameworks exist (e.g., Waste Acceptance Criteria testing under the EU Waste Framework Directive, or characterisation required under Queensland's Regulated Waste Framework). This allows waste generators or their agents to characterise their waste prior to agreeing to the treatment or disposal. Under a license or permit, a facility operator would be obligated to check the quality of the waste that they are accepting into the site whether it meets their license or permit conditions.

Other definitions of waste could be utilised to implement a licensing framework based on waste type other than just whether the waste is hazardous or not. For example, activities could be regulated in relation to management of specific wastes (e.g., waste metal recycling as in Hawaii, or medical waste processing). A license or permit could be issued specifically for that activity. A common example in Australia is the licensing of activities relating to organic waste processing with clear definition of what constitutes organic waste.

Licensing by Throughput or Load

Key issues identified in this section:

- Load based limits are commonly applied in licenses for waste activities.
- These typically limit either the annual throughput through site hosting the activity (e.g., a transfer station may only process 25,000 tonnes per annum) or limit the amount of waste stockpiled on site at any one time (e.g., the same transfer station may only hold 1,000 tonnes of waste on the premise at any one time). Some jurisdictions reviewed apply both.
- Load based licensing may also apply a lower threshold beyond which regulation is not required (e.g., a license only applies if processing more than 20 tonnes of waste per annum). This approach would need to be supported by strong "general environmental duty" provisions to prevent environmental harm occurring even if a smaller facility is not licensed or permitted.

Research indicates that waste facilities throughout the world often include an element of scale in relation to determining both approval and licensing conditions. In Queensland, scale is used a part of the Environmental Licensing framework.

[10] Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal

This includes a minimum threshold for requiring a license (e.g., an organic waste processing license only applies for activities processing more than 200 tonnes per annum). Other licenses include incremental steps based around volume, which determines the licensing fee for that activity.

As an example, general (non-hazardous) waste landfills in Queensland have a threshold ranging from less than 2,000 tonnes disposed per annum to more than 200,000 tonnes per annum, with multiple steps in between.

In New South Wales similar volume-based thresholds exist for waste facilities. For example, composting facilities under Schedule 1 *Scheduled Activities* in the *Protection of the Environment Operations Act* 1997[11] has thresholds for both putrescible (e.g., food waste) and non-putrescible organic wastes if received from off site. Crushing, grinding or separating activities only is a scheduled activity if it can process 150 tonnes of material per day or 30,000 tonnes per annum.

In this way, NSW licensing is different to Queensland where it offers both a daily rate limit as well as an annual limit. Activities such as waste transfer similarly have annual limits but also limits at any one time. Similar thresholds existing for energy recovery, although where this applies to waste a license is required for recovering more than 200 tonnes per annum of general waste, but only 200 kg of hazardous and other (non-general) wastes. Measuring flow and calculating load may require additional technical capability and technology.

Volumetric licensing requirements do not exist in the Northern Territory however licenses are required for disposal of waste by burial where the waste disposal (i.e., landfill) requirements serve more than 1,000 people. This approach may be well suited to establishing a regime in locations with small communities. It is noted that licenses are also required in the Northern Territory for any sites commercially collecting, transporting, recycling, or disposing of listed wastes (i.e., hazardous wastes) however this is not based on volume.

Under Hawaii Administrative Rules Title 11 Chapter 58.1 *Solid Waste Management Control*[12] controls on tonnages for waste sites appear to be limited to defining exemptions. That being, sites undertaking waste management activities are exempt from needing a permit if they fall below the threshold. For example, a landfill site which is used by a single owner and receives less than 150 tonnes per year of soil, rock, concrete or other non-decomposable or uncontaminated inert materials generated on site is considered exempt. Relevant to this study is that in Hawaii incineration facilities having a total rated capacity of less than one tonne per hour are exempt from requiring a permit. Composting facilities less than 3,000 tonnes per annum are exempted however there are quality controls on the output that accompany this exemption.

Tonnage thresholds also exist in Hawaii that link to permit fees called “filling fees” which apply to a range of waste facilities which are scaled based on tonnage but set at very low levels (i.e., landfill greater than or less than 20 tonnes per day)

Risk Based Licensing

Key issues identified in this section:

- Risk based licenses can consider the waste type, the hazardous properties, or the throughput, but also can be incentivised for good performers to pay a lower annual fee (or conversely) depending on their annual monitoring and reporting.
- Risks may also be dictated through activity type, with higher risk activities (e.g., hazardous waste processing) paying a higher fee and having more conditions than lower risk activities (e.g., concrete crushing).

[11] NSW Government. *Protection of the Environment Operations Act 1997* (https://legislation.nsw.gov.au/view/whole/html/inforce/current/act-1997-156#sch.1)

[12] Hawaii Department of Health. Hawaii Administrative Rules Title 11 Department of Health, Chapter 58.1 Solid Waste Management Control (https://health.hawaii.gov/shwb/files/2013/06/11-5811.pdf)

Sections 3.1.1 to 3.1.3 have discussed a range of options for threshold-based licensing. These are derived from a perception of risk (for example, a higher amount of waste accepted to a site poses a greater risk). Some jurisdictions reviewed have gone further, introducing a risk-based licensing or permitting framework. The use of risk-based licensing may be utilised where there is a high degree of variability in the risk of waste activities undertaken in a jurisdiction. Risks are clearly higher for facilities that undertake processing, treatment, or disposal of higher risk wastes such as hazardous or biosecurity waste, compared to sites that are considered low risk such as construction and demolition processing facilities where the materials handled are largely inert.

This is consistent with how risks are considered in Queensland. Environmentally relevant activities are varied depending on risk. Both capturing the nature of the activity (e.g., energy recovery is higher risk than composting) and the nature of the waste (hazardous properties), and scale. Guidelines exist on the siting of some waste facility types (e.g., landfill, organic waste processing facilities) which aim to manage location risk, as does an environmental assessment process during development approval processes.

The risk-based approach can also be applied through a licensing approach to environmental outcomes. New South Wales introduced a risk-based licensing approach in 2015[13]. This process requires a risk assessment to be undertaken to consider how the activity may pose a risk to air, water, land or human health etc., and compares to the potential impact on the environment and neighbours. When a license is then approved, it is allocated an overall risk level which then dictates the level of regulatory and compliance oversight. There is also an element that allows license holders to provide evidence of reducing their environmental risks resulting in a reduction of their burden, whilst poorer performing licensees will pay license fees that are higher as an incentive to drive improved performance.

In the Northern Territory, risks are reflected in the difference between needing environment protection approvals (for lower risk activities) compared to activities that require an environment protection license. For waste activities, higher risk activities are aligned with listed wastes (i.e., hazardous wastes).

Licensing Fees and Cost Recovery

Key issues identified in this section:

- Some jurisdictions apply license or permit fees. This revenue can be used to recover some or all of the cost of processing license or permit applications, or administration of the license or permit.
- Often fees are based on the perceived level of risk associated with the activity, and therefore, higher risk or more complex activities may charge a higher proportionate fee than simple or lower risk activities.
- The basis for fees is often a unit or points system, with legislation setting the cost per unit. This allows amendments to subordinate legislation that contains the fee units to be changed relatively easily.
- Fees are typically paid annually.

An element of established licensing or permitting regimes are fees that operators are required to pay to maintain a license. This may be a consideration for a new regulatory policy approach in Pacific Islands. The use of a fee allows a regulatory agency to recover some of the costs associated with undertaking compliance activities, reviewing reports, and in general, administering the legislation which enables licensing or permitting. Fees are applied to the operator of the activity which requires licensing.

In Queensland under the Environmental Protection Act each license has an annual fee determined by its "aggregate environmental score" (AES)[14]. Given that environmental authorities may have multiple different activities authorised at one site, the highest AES score (i.e., the score for the highest perceived risk activity) is taken and multiplied by a common factor (set each year) to give an overall license fee. Fees therefore range from zero (although these are not for waste facilities) to over AUD $200,000.

[13] NSW EPA, Risk-based licensing (Environmental risk levels) (https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences/risk-based-licensing)
[14] Queensland Government, Summary of fees for environmentally relevant activities (ERAs) (https://environment.des.qld.gov.au/__data/assets/pdf_file/0025/88702/era-is-summary-annual-fees.pdf)

There are opportunities for operators to claim a reduced fee via a discount. Although the Department of Environment and Science is the regulator and is funded through central agency review, cost recovery from license fees is counted as income allowing additional funding for regulatory agencies.

In New South Wales there is a similar approach to license fees. All licenses attract annual fees, but some licenses have an element that is annual load based. The administrative fee is calculated according to the nature, size and/or capacity of the activity undertaken. Where licenses are granted under the risk-based framework described previously, they are subject to the environmental management category. Administrative fee units are presented in the *Protection of the Environment Operations (General) Regulation 2009*[15].

The Northern Territory[16] deploys a similar approach but presents in a simpler format noting that the fee payable for an environmental license only applies to landfill licenses, and for facilities that manage a listed waste (i.e., a hazardous waste). Fees are calculated using Revenue Units and are paid in advance for each year the license is held. As the NT also limits licenses using a per person scoring, it also charges a population service fee applied to persons serviced over 1,000 persons.

Fees for the three Australian jurisdictions are paid annually, with additional fees required to amend the conditions of a license. Typically, licenses are managed by online systems, although there is not a uniform system across all three jurisdictions. The amount charged link back to published units, which are typically legislated for in relevant legislation in each jurisdiction. This allows for the unit fee to be set across a range of activities (not just waste related) and also to allow for increased fees to allow for inflation, typically with increments built into legislation.

In St. Helena under the Environment Protection Ordinance there are provisions for fees to be paid. There is limited detail but this appears to relate to fees and charges in respect to ensuring the objectives of environmental management plans are met, or in relation to the control of management of pollution and hazardous substances. Fees are at the discretion of the Chief Environmental Officer.

In Fiji, under the Environment Management Act 2005 and Waste Regulations 2007, every commercial or industrial facility that disposes or discharges waste of pollutants is required to obtain a permit. A fee of $75 is payable to Waste and Pollution Control ("WPC") Administrator on submission of this form and should accompany it. The fee for the permit, if issued, will depend on the nature of the permit issued.[17]

Financial Assurances

Key issues identified in this section:

- In some jurisdictions, applicants are required to pay financial assurance at the point of approval. These are sometimes referred to as environmental bonds.
- This assurance is a bond held by the regulating agency to cover the potential environmental liability of the activity should there be a pollution incident or should the operator not be able to fulfil closure and rehabilitation obligations.
- In other jurisdictions, regulations demand that operators demonstrate they have sufficient funds to cover closure and long-term maintenance, management and record keeping.

[15] New South Wales Government, Protection of the Environment Operations (General) Regulation 2009 (https://legislation.nsw.gov.au/view/html/inforce/current/sl-2009-0211)

[16] Northern Territory Environment Protection Agency, Fees associated with environment protection approvals and environment protection licenses (https://ntepa.nt.gov.au/__data/assets/pdf_file/0009/285732/licence-fees-payable.pdf)

[17] Fiji Government, Environment Management (Waste Disposal and Recycling) Regulations 2007 (https://doefiji.files.wordpress.com/2013/10/amended-waste-disposal-recycling.pdf)

It is common for financial assurance or an environmental bond to be included when a license or permit is issued for the first time. This is a financial commitment made by the license applicant to cover future potential costs of remediation or rehabilitation of environmental harm caused by the operation of an activity. In Queensland, financial assurance[18] is used to ensure the holder of a license complies with conditions and to cover rehabilitation costs and is legislated under the *Environmental Protection Act 1994*. Originally financial assurance was designed for mineral extraction projects to cover the potential liability on the state of having to clean up former mining sites should the operator go out of business or have insufficient resources to cover the often extensive cost of rehabilitation.

A similar approach exists in New South Wales, allowing the Environment Protection Authority to require a financial assurance to guarantee funding for potential environmental liabilities so that burden does not fall back on the community. This policy is currently under review with consultation undertaken on how a new policy can give certainty and transparency adopting a risk categorisation approach[19].

Similar make good arrangements exist in the Northern Territory under the *Waste Management and Pollution Control Act 1998* allowing for costs to be recovered if there is a failure to comply with an environment protection approval or license.

In the USA, regulation of sites that permit activities for Hazardous Waste Treatment, Storage and Disposal are required to demonstrate that they will have the financial resources to properly close the facility when its operational use is over, or provide the appropriate emergency response in the case of an accidental release[20]. Facility operators are required to prepare a closure cost estimate which include long-term maintenance, monitoring and record keeping during a require post-closure care period. For example, a landfill may continue to generate leachate many years after it has been closed. Cost estimates are updated annually whether by new estimate using a quantity surveyor, or increased for inflation. This extends to state regulated facilities where the mechanism for calculating financial assurance is similar[21].

There are no known financial assurance (or bonds) applied in St Helena. In Fiji, the *Environment Management Regulations* 2007, introduced environmental waste bonds in order to cover the probable cost of rehabilitation of land or the environment necessitated by the discharge of waste or pollutants or other regulated activity by a facility, and may be made a condition of a permit for that activity. Environmental bond is a core requirement of waste disposal permit, which applies to significant private sector facility operators or dischargers. It remains valid in line with the granted permit.[22]

License or Permit Validity Period

Key issues identified in this section:

- Licenses are typically continued in perpetuity until they are suspended, revoked or surrendered.
- Some jurisdictions require the regulating agency to renew each license at specified intervals (e.g., 5-years)

[18] Queensland Government, Financial assurance, provisioning and rehabilitation for environmental authorities (https://www.business.qld.gov.au/running-business/environment/licences-permits/rehabilitation)
[19] New South Wales Government, Financial Assurances (https://yoursay.epa.nsw.gov.au/assurances)
[20] US EPA, Financial Assurance Requirements for Hazardous Waste Treatment, Storage and Disposal Facilities (https://www.epa.gov/hwpermitting/financial-assurance-requirements-hazardous-waste-treatment-storage-and-disposal)
[21] US EPA, CRL-2002-40-vo21-section 258-74 Allowable Mechanisms
[22] Fiji Government, Environment Management (Waste Disposal and Recycling) Regulations 2007 (https://doefiji.files.wordpress.com/2013/10/amended-waste-disposal-recycling.pdf)

Licenses for waste activities typically continue in perpetuality. In NSW once a license comes into force, the license remains in force until it is suspended, revoked, or surrendered, however the NSW Environment Protection Agency is required to review each license at intervals not exceeding 5-years after the issue of the license. There are obligations on the NSW EPA to ensure they undertake this review within the specific period in the POEO Act.

This approach is similar in Queensland, although there do not appear to be provisions for review of Environmental Authorities, although specific time periods are not presented. In Queensland operators do have the option to temporarily suspend and Environmental Authority (e.g., if not operating), as well as similar cancellation and surrender activities to New South Wales. In Queensland however, the license is harder for the regulator to open up, and typically requires amendments requested by the license holder to enforce other changes, although there are mechanisms in the legislation that do allow the regulator to impose new conditions under certain scenarios.

License fee periods for trackable wastes in NSW is 12-months from the issue of the license, with a requirement to renew annually. In other Australian jurisdictions are typically issued for 1-year. This generally corresponds with annual return periods which relate to required submission dates for data required for compliance purposes.

In the Northern Territory licenses are time limited, and a license holder must reapply prior to the expiry of the license. This gives the regulator the opportunity to review and amend conditions periodically.

In Hawaii, whilst Permits appear to be paid annually, they do not seem to have a fixed duration. It is assumed that they continue in perpetuality provided the permit is still required and that the permit holder is compliant with the terms of each permit.

In Fiji, waste permits are issued for a period specified under the *Environment Management Regulations* 2007. These can vary between a single disposal or discharge of waste and pollutant, multiple disposals or discharges of specified types of waste, or for disposal or discharge of all wastes and pollutants during the life of the permit under conditions specified in the permit.[23]

Waste Facility License Conditions

Minimum Standards for Environmental Permits or Licenses

Key issues identified in this section:

- Licenses or permits typically have minimum standards that allow up to a certain level of environmental harm against environmental values.
- For waste activities, these typically apply to air quality, noise, water and land emissions.
- Depending on the type of activity and discharge, special conditions may also be applied for waste activities to protect environmental values from significant harm.

Where environmental licenses or permits are issued, they often include minimum standards for environmental permits or licenses. These are included as obligations within the permit and limit emissions to air, noise, land, and water.

[23] Fiji Government, Environment Management (Waste Disposal and Recycling) Regulations 2007 (https://doefiji.files.wordpress.com/2013/10/amended-waste-disposal-recycling.pdf)

In Australia these are included within activity specific guidelines (e.g., Landfill guidelines - New South Wales[24], Landfill Siting, design, operation and rehabilitation Guideline - Queensland[25], *Guidelines for the Siting, Design and Management of Solid Waste Disposal Sites in the Northern Territory* - Northern Territory) which can sometimes be supported by activity and license specific model operating conditions (Queensland). For other types of landfill, guidelines are less formal (e.g., *Organics Processing Facilities* - New South Wales[26]) or are web-based guidance. These guidelines have information relating to management of activity affected environmental impacts including air quality and odour, noise, stormwater management, leachate, and groundwater impact (and others). These form the basis for minimum standards.

In Queensland there is a tendency to also provide model operating conditions for site activities, which are used to populate the license. Whilst model operating conditions do not necessarily reflect the actual license conditions once an application is granted (i.e., the regulator may change model operating conditions to be site specific), they do provide clarity over the minimum standards for air quality, noise, water discharges etc. Standards for environmental protection are described more in the following sections. Model operating conditions exist for organic material processing by composting, sewage treatment and waste disposal,[27] however the Queensland Government also issue common conditions for environmentally relevant activities.[28] This includes a suite of optional conditions that may be applied including conditions for fuel storage, laboratory testing, monitoring requirements for air, noise, water, waste, and land. This includes release limits although these are not specified in the generic model conditions so will be deployed in specific licenses.

In Hawaii specific standards are available for the management of hazardous wastes through Chapters 260-279 of Hawaii Administrative Rules – Title 11 Department of Health Subtitle 1 – General Departmental Provisions. Specific guidelines exist for owners and operators of hazardous waste treatment, storage, and disposal facilities[29].

In Hawaii specific provisions exist for certain types of waste. For example, hazardous waste burned in boilers and industrial furnaces has a suite of standards to control organic, particular, metals, hydrogen chloride and chlorine gas emissions[30] which are specific. Operators can apply for exemptions from the application of these controls.

In England Environmental Permits apply for the majority of waste sites. Provisions exist for the use of "standard rules permit" if the operation meets a certain description and rules[31]. These exist for transferring waste, biological treatment, metal recovery, material recovery facilities, recovery or use of waste on land, treatment of construction and demolition wastes and for some oil and gas/mining exploration purposes. In the example of metal recycling, the guidance for standard permits includes a range of emissions and pollution controls obligations that are outcomes based, in that they state that emissions from the site shall be free from odour, noise, etc., shall not cause pollution[32]. Pollution is defined in legislation.

[24] NSW EPA, Environmental Guidelines, Solid Waste Landfills, Second Edition 2016 (https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/waste/solid-waste-landfill-guidelines-160259.pdf)
[25] Queensland Government, Guideline – Landfill siting, design, operation and rehabilitation 2021 (https://environment.des.qld.gov.au/__data/assets/pdf_file/0026/88433/pr-gl-landfill-siting.pdf)
[26] NSW EPA, Guidelines – Organics Processing Facilities (https://www.epa.nsw.gov.au/your-environment/waste/waste-facilities/organics-processing-facilities)
[27] Queensland Government, Environmental Authority Conditions (https://environment.des.qld.gov.au/management/activities/prescribed/environmental-authority-conditions)
[28] Queensland Government, Common conditions – Prescribed environmentally relevant activities (https://environment.des.qld.gov.au/__data/assets/pdf_file/0030/89841/pr-co-common-conditions-prescribed-eras.pdf)
[29] Hawaii Administrate Rules, Subtitle 1, Chapter 264 Hazardous Waste Management Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (https://regulations.justia.com/states/hawaii/title-11/subtitle-1/chapter-264/) .
[30] Hawaii Administrative Rules Section 11-266-105 *Standards to Control Particulate Matter* (https://regulations.justia.com/states/hawaii/title-11/subtitle-1/chapter-266/subchapter-h/section-11-266-105/)
[31] United Kingdom Government, Standard rules: environmental permitting (https://www.gov.uk/guidance/waste-environmental-permits)
[32] United Kingdom Government, SR2011 No 2, Version 7 Metal recycling site – existing permits (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/796317/Standard_rules_SR2011_No_2_Metal_recycling_site___existing_permits.pdf)

This outcomes-based approach is consistent with the application of general environmental duty, as defined in the Queensland Environmental Protection Act 1994, and has recently been introduced into Victorian legislation. General environmental duty means a person must not carry out any activity that causes or is likely to cause environmental harm unless measures to prevent or minimise the harm have been taken[33]. This approach means that activities within Queensland must not be carried out where they cause or are likely to cause environmental harm. The regulator can undertake enforcement activities where environmental harm is caused. This type of approach may be beneficial in countries where waste activities are too small to meet a volume-based threshold but still have the potential to cause harm.

Air Quality Standards

Key issues identified in this section:

- Air quality impacts from waste activities can be highly variable, but can be organised into particulate emissions and/or gases
- Air quality standards are typically set at a national (or Federal) level and implemented through enabling legislation that flows through into minimum standards or specific conditions in-licenses or permits.
- For more complex sites, risk assessments are typically required to demonstrate operation of the activity meets the expected standards of the legislation.

Air quality associated with industrial processes and waste management varies. In many of the countries in this study, waste burning is a common source of emissions impacting air quality. The common ambient (e.g., outdoor) air pollutants of primary concern associated with waste or other industrial facilities are likely to be:

- Particles (defined as particles with an aerodynamic diameter of <10 µm (called PM_{10}) and a subgroup of finder particles (referred to as $PM_{2.5}$, i.e., particle diameter <2.5 µm)
- Gases (including ozone, nitrogen dioxide and sulfur dioxide - carbon dioxide and methane are becoming of greater interest for their greenhouse gas potential but do not directly pose a health risk).

In Australia, the USA and Europe, Air Quality Standards are set at a federal government level. In Australia, the National Air Quality Standards set ambient air quality standards under the National Environment Protection Measure (NEPM) 1998 for Ambient Air Quality[34].

This translates into State Air Quality standards that are applied through relevant licensing frameworks, such as Queensland's *Environmental Protection (Air) Policy*[35] which establishes long-term objectives for sulfur dioxide, nitrogen dioxide, ozone, carbon monoxide, particles, lead and a range of airborne toxics. Decisions relating to approval of environmental license applications must consider this policy, and proposals for new activities may require atmospheric dispersion modelling to determine and demonstrate potential impact of air emissions. The policy in Queensland sets a management hierarchy for air emissions similar to the waste hierarchy and identifies environmental values for protection. Against these values, air quality objectives are published that operators of site activities are required to adhere to. These environmental values are transferrable to Pacific Islands:

> *The qualities of the air environment that are conductive to protecting the health and biodiversity of ecosystems;*
>
> *The qualities of the air environment that are conductive to human health and wellbeing; and*
>
> *The qualities of the air environment that are conductive to protecting the aesthetics of the environment, including the appearance of buildings, structures and other property; and*
>
> *The qualities of the air environment that are conductive to protecting agricultural use of the environment.*

[33] Queensland Government, Meeting environmental obligations and duties (https://environment.des.qld.gov.au/management/compliance-enforcement/obligations-duties)
[34] Australian government, 2016. National air quality standards (https://soe.environment.gov.au/theme/ambient-air-quality/topic/2016/national-air-quality-standards)
[35] Queensland Government, Environmental Protection (Air) Policy (https://www.legislation.qld.gov.au/view/whole/pdf/asmade/sl-2019-0153)

NSW has a similar approach to standard setting, driven by the NEPM. These are converted into license conditions at the point of issue of an environment protection license. A detailed assessment of emissions from the activity on the premises, including location, source and mitigation measures is typically required in the pre-application assessment, with conditions applied in the license for operators to demonstrate they meet these conditions. The Northern Territory offers a similar, if less detailed and sophisticated approach, but ultimately industrial facilities are required to monitor against the objectives of the NEPM and this is presented in site specific licenses.

It should be noted that many Australian jurisdictions are now looking to EU guidance around best available techniques and air quality standards for waste specific facility monitoring, particularly for energy from waste.

In Hawaii the Clean Air Branch of the Department of Health administers a State-wide air pollution control program. This consists of a permitting program which regulates facilities, an air quality and source monitoring program, and an investigatory and enforcement program. The head of power for this comes from the Federal Clean Air Act and Amendment, a range of Federal Regulations, Hawaii State Law (Air Pollution Control) and Administrative Rules[36]. Air quality standards are set at a Federal Level with the Clean Air Branch managing a permit system, monitoring and undertaking enforcement activities where violations occur. Data is required to be submitted to the Clean Air Branch for listed pollutants and also for greenhouse gases using a specific methodology for global warming potential.

This approach is similar in Fiji, where specific standards are imposed on industrial facilities that emit exhaust gases, smoke, steam, or dust from any of its premises. They are required to hold an air pollution permit in respect of the emission. Facilities which fall under these categories are obliged to comply with air quality standards set out in Part A and B of schedule 5 of Environment Management Regulations 2007 and apply throughout the country[37]. There are also existing monitoring standards for facilities that discharge emissions into the atmosphere. The requirement is based on protocols specified by the Department of Environment, the facility's Code of Environmental Practice, or *Environment Management Regulations* 2007.

In England much of the requirements under an environmental permit stem from the overarching EU Industrial Emissions Directive[38]. An air emissions risk assessment is required to calculate the impact of the activity's emissions and the standards that a site operator must meet. Under the EU directives, the UK Environment Agency has a series of Ambient Air Directive (AAD) Limit Values which monitoring data are compared with. This includes monitoring frequency and standards, and in some cases, the number of permissible exceedances that are allowed.

Sustainable Development Goals[39] on health (SDG3), energy (SDG7), sustainable cities (SDG11) and climate change (SDG13) all provide opportunities for member countries to address air pollution and related health impacts. The World Health Organisation has recently released new guidelines for Air Quality based on significant research.[40] These global Air Quality Goals are directed at overall ambient air quality standards. Consideration of how facility licensing or permitting could influence the ability of each member country to achieve these goals may be relevant to the country legislation.

[36] Hawaii Department of Health, Clean Air Branch (https://health.hawaii.gov/cab/#Air)

[37] Fiji Government, Environment Management (Waste Disposal And Recycling) Regulations 2007 (https://doefiji.files.wordpress.com/2013/10/amended-waste-disposal-recycling.pdf)

[38] European Union, Industrial Emissions Directive (https://ec.europa.eu/environment/industry/stationary/ied/legislation.htm)

[39] United Nations, Sustainable Development Goals (https://sdgs.un.org/goals)

[40] World Health Organisation, 2021. WHO Global air quality guidelines: Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. https://apps.who.int/iris/handle/10665/345329 (https://apps.who.int/iris/handle/10665/345329)

Water/Liquid Discharge Standards

Key issues identified in this section:

- Discharges to water vary considerably depending on the waste activity. Some activities will have barely any discharge to water other than stormwater, however other activities will require discharge approval for potentially harmful substances.
- This may apply to groundwater, surface water, or both.
- Standards are likely to be linked to national or international drinking water standards
- Site-specific risk assessments may be required, and the need to construct wastewater treatment facilities to ensure water discharged meets relevant standards.

Waste facilities vary significantly in terms of potential discharge, and the nature of a potential discharge. Water for discharge can be split between clean water (e.g., run off from a site that has not come into contact with waste or other hazardous materials) and dirty water (e.g., waste that has come into contact with waste such as landfill leachate, stockpile runoff etc.,). Environmental licenses or permits typically would seek to control both as discharges from a site, as well as the interaction or separation on site. Certain industrial processes including sewage treatment facilities also are permitted to release pollution provided it meets discharge criteria. In some emergency situations, licenses or permits allow for the discharge of poor-quality water to mitigate health and safety risks on sites.

In Queensland discharges of dirty water from sites are limited under the Environmental Protection Act 1994 and its subordinate legislation Environmental Protection (Water and Wetland Biodiversity) Policy[41] 2019. These link to environmental values (for water) and define water quality objectives. These objectives are science based and progressively being rolled out, but link to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality.[42] As a potential proxy for application in some of the member states, environmental values and water quality objectives have been set by the Queensland Government for the Cape York Eastern Basins[43] region, including both surface fresh waters and coastal waters.

These translate into environmental licenses in Queensland through the application of specific conditions around discharge limits. These permit an acceptable level of pollution at a level where environmental harm is permissible. Some licenses in Queensland permit volume-based discharges, particularly in ephemeral creek systems, where release of stored pollutants is required during infrequent high-flow events.

Under some conditions, where developments intercept clean water they are required under license conditions to store water to prevent rapid discharge from the site, causing a risk of flooding downstream. This may require the construction of stormwater management measures on sites. Landfills are typically of needing detention basis for clean water to manage the offsite flow. This is particularly prevalent in areas prone to intense rainfall, with conditions included in licenses to ensure structures are constructed appropriately and rates of discharge can be adhered to. License applications would typically be supported by Stormwater Management Plans.

Discharges to groundwater are relevant to some waste facilities, particularly landfills where the absence of a lining system may allow the migration of contaminants from the landfill into the subsurface. In Australia, the derived water quality objectives are applied to groundwater, however groundwater is often used for drinking water and may require additional protection.

[41] Queensland Government, Environmental Protection (Water and Wetland Biodiversity) Policy 2019
[42] Commonwealth of Australia, Australian and New Zealand Guidelines for Fresh and Marine Water Quality (https://www.waterquality.gov.au/anz-guidelines)
[43] Queensland Government, Cape York Eastern Basis (https://environment.des.qld.gov.au/management/water/policy/cape-york-eastern-basins)

In Australian jurisdictions drinking water quality would usually be compared to the Australian Drinking Water Guidelines.[44] These standards may be applicable to communities utilising groundwater for drinking water however countries are likely to already have their own standards (e.g., through the Water Authority of Fiji[45]), linked to the WHO Guidelines for Drinking Water Quality.[46] Policy relating to water quality standards would need to be designed to protect these environmental values, and may be site specific.

The NSW Government has established water quality objectives across all major fresh and estuarine surface water catchments across New South Wales. Similar to Queensland, these identify the relevant environmental values associated with each catchment and allow assessment of the impact of a new activity against these objectives and environmental values. The NSW Environment Protection Authority regulates discharges from activities using conditions on the environmental license[47]. This can include:

- Restricting the amount of various pollutants that can be discharged
- Requiring discharges to water to be monitored and reported
- Requiring that pollution control equipment operates properly and efficiently

The NT EPA has a role in preventing pollution of waterways under the Waste Management and Pollution Control Act 1998. This includes developing standards for water quality under the National Water Quality Management Strategy[48] driven by the Commonwealth Government (similarly to Queensland and New South Wales), and adopting national guidelines. Discharges to water are based on the Australian and New Zealand Water Quality Guidelines which flow through into limits in Environmental Licenses under the *Waste Management and Pollution Control Act* 1998.

Similar to the Clean Air Branch, Hawaii also has a Clean Water Branch[49] within the Department of Health. The Clean Water Branch permits the release of industrial waste waters and stormwaters from industrial sites. Standard permit conditions[50] exist which align with the *Clean Water Act* 1997 which is also known as the *Federal Water Pollution Control Act*. Permit conditions are set to prevent pollution of waters including basic or minimum standards for water quality.

Fiji has similar approach, where liquid waste permits are introduced. Subject for this regulation is every commercial or industrial facility that discharges liquid waste from any of its existing premises. Additional requirements are considered and regulated by the Central Board of Health under Part VIII of the Public Health Regulations (Cap. 111 sub. leg.).[51]

Wastewater discharges within the study area may be from industrial and commercial sources, such as waste management sites or mines, sewerage and non-sewer systems, wastewater sourced from the tourism industry, animal wastewater, marine shipping or urban stormwater sources. Activities that include wastewater treatment utilising an engineered solution (e.g., a wastewater treatment plant) or an alternative treatment system (e.g., wetland treatment systems) typically have an element of design and therefore expected effluent specifications. These can form the basis for application of license or permit conditions.

[44] NHMRC, 2018. Australian Drinking Water Guidelines 6, 2011 (version 3.5 August 2018) (https://www.nhmrc.gov.au/about-us/publications/australian-drinking-water-guidelines)
[45] Water Authority of Fiji, 2021 (https://waterauthority.com.fj/awareness-safety/water-safety/)
[46] World Health Organisation, 2017. Guidelines for Drinking-water quality, 4th edition (https://www.who.int/publications/i/item/9789241549950)
[47] NSW Environment Protection Agency. Licensing to regulate water pollution (https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences/licensing-under-poeo-act-1997/licensing-to-regulate-water-pollution)
[48] Commonwealth of Australia, National Water Quality Management System (https://www.waterquality.gov.au/about)
[49] State of Hawaii, Department of Health, Clean Water Branch (https://health.hawaii.gov/cwb/)
[50] State of Hawaii, Department of Health, NDPES Permit Conditions (Version 15) (https://health.hawaii.gov/cwb/files/2013/05/stdcond15.pdf)
[51] Fiji Government, Environment Management (Waste Disposal And Recycling) Regulations 2007 (https://doefiji.files.wordpress.com/2013/10/amended-waste-disposal-recycling.pdf)

Some of the nations included in this study have done extensive research on liquid waste discharge[52] and have clear action plans in place for delivery of water quality improvements. These include elements of governance such as developing standards for discharge which could be utilised in site licensing (i.e., the license could stipulate meeting such a standard).

Waste Transporter Licensing Options

Key issues identified in this section:

- Hazardous waste is required to be tracked in the majority of jurisdictions.
- Transporters are often required to be licensed or have a permit to transport hazardous waste.
- This may include specific conditions in licenses for the types of waste, the nature of incident planning, or requirements to track and have chain of custody documentation formally.
- Restrictions are also required to regulate the import and export of hazardous waste in Pacific Island Countries.

Ensuring that waste transport does not cause unnecessary or unacceptable risks to human health or the environment is an important licensing consideration. It does however deviate from the majority of site-based licensing considerations and requires licensing of the activity of "waste transport." Many of the considerations discussed around site-based activity licensing are relevant (e.g., type of waste, quantity of waste etc.,) and often jurisdictions consider an element of risk based licensing.

In Australia, there is a Commonwealth obligation under the National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 1998[53] which controls the movement of most hazardous wastes in Australia. This requires states and territories to track cross boundary transportation of waste, aligned with the principals of the Basel Convention.

In Queensland, only waste containing hazardous wastes require must be transported by a licensed transporter. There is a specific activity license to transport hazardous wastes[54] with these wastes defined in the states Environmental Protection Act. At present tracking is undertaken via a mix of paper-based consignment notes and an electronic tracking system. Waste generators must seek provide chain of custody documentation to a waste transporter which keeps information on the nature, source and destination of the waste. The waste transporter then transfers this to the waste management facility. General waste (for example household municipal solid waste) does not require tracking. Specific guidelines exist for some waste types (e.g., asbestos, clinical wastes, Perfluorooctanoic Acid (PFOA), Perfluorooctyl Sulfonate (PFOS) and Other Perfluorinated Chemicals (PFCs) (commonly known as PFAS) and polychlorinated biphenyls (PCBs) as well as opportunities to seek exemptions.

In Queensland the license itself includes numerous conditions relating to the type of transport, limits on how wastes may be transported, water and runoff measures from vehicles, hazardous waste handling and spill and leak provisions. This requires a transport of hazardous wastes to maintain appropriate spill-protection measures and notify the regulator of the details of any spill. Vehicle must be registered with the regulator, and drivers must have access to various pieces of documentation. Operators must also have mechanisms in place to record complaints. The license is similar to that issued under both the New South Wales and Northern Territory systems. The National Heavy Vehicle Regulator in Australia is currently developing a Waste and Recycling Industry Code of Practice for Load Management[55] however this has been in development for several years and not finalised.

[52] Ministry of the Environment, Government of Fiji, 2015. Fiji national liquid waste management strategy and action plan) https://www.sprep.org/att/publication/000556_IWP_PTR48.pdf)

[53] Commonwealth Government, 1998. National Environment Protection (Movement of Controlled Wastes between States and Territories) Measure 1998 (https://www.legislation.gov.au/Details/F2012C00858)

[54] Queensland Government, Management of regulated wastes (https://environment.des.qld.gov.au/management/waste/business/tracking)

[55] National Heavy Vehicle Regulator, 2021. Industry Codes of Practice under development (https://www.nhvr.gov.au/safety-accreditation-compliance/industry-codes-of-practice/registers)

In the USA similar requirements are legislated at a national level for the regulation of hazardous waste transporters under Subtitle C of the *Resource Conservation and Recovery Act*.[56] Specific obligations exist with standards applied under Part 263 of the Code of Federal Regulations which apply specifically to persons transporting hazardous waste in the USA if the transportation is required of a waste under Part 262 of the Code. These regulations applied to both interstate and intrastate transportation and generally require chain of custody (or manifest) documentation for a transporter to receive hazardous waste from a generator. This applies to exports as well. As with Australian jurisdictions, it is apparent that both electronic and printed documentation is permissible. There are modifications to the regulations depending on the volume of waste transported. Also common across both the USA and Australia is requirements for notification and action on spills or leaks.

In Hawaii the health department provides guidance on the obligations and identification of hazardous wastes regulated under the Federal legislation through the Solid and Hazardous Waste branch and through the Hawaii Administrative Rules Title 11 Chapter 58.1. Through this, operators of waste facilities, particularly landfills, are required to ensure they seek to identify where hazardous wastes may be disposed of to solid waste landfills.

The UK approach requires waste tracking across all waste types, of an estimated transaction rate of 23 million waste transactions per year, and over 100,000 waste carriers and brokers[57]. This includes hazardous wastes, but also includes transactions of municipal solid waste or general waste for materials that do not contain hazardous properties. Work in the UK is currently underway to develop a comprehensive data management system for waste arisings. Waste carriers in the UK must be registered with the environmental regulator (specific to each country) for transport of construction and demolition waste produced by your own business, or any waste produced by others. A Waste Transfer Note must be completed and passed on for every load, and these must be kept for a minimum period of 2-years. For transporting hazardous waste consignment notes, a transporter must complete and pass on a consignment note, and transporters must be registered with the regulator.[58]

In Fiji, any facility that is or operates a waste transport business is required to obtain a transport permit. These permits are issued by Waste and Pollution Control Administrator. The general requirements are focused on waste types transported and safety measures for type of transport.

Waste Facility Monitoring

Data and Information Requirements

Key issues identified in this section:

- Regulated activities are typically required to undertake a form of environmental monitoring to demonstrate compliance with their license or permit conditions.
- The license or permit typically will dictate the location, frequency and duration of monitoring, data reporting or submission requirements.
- The regulating entity will need to consider their own data management requirements, standards to be complied with, and laboratory limits of reporting and accuracy.

For activity or facility monitoring data is required to demonstrate compliance with license or permit conditions. The PacWaste Plus Project is in the process of developing a waste data strategy[59] which targets data collection and monitoring of macro-level indicators of waste performance. When licensing or permitting a site, it is crucial to understand the data and information requirements specific to that activity. This is a critical component of applying environmental risk management to the regulation of activities involving different types of waste.

[56] United States Environmental Protection Agency, Resource Conservation and Recovery Act (RCRA) (https://www.epa.gov/rcra)
[57] DEFRA, SBRI GovTech Catalyst – Smart Waste Tracking supplementary information pack
[58] Netregs, Hazardous / special waste (Northern Island and Scotland) (https://www.netregs.org.uk/environmental-topics/waste/hazardous-special-waste/)
[59] SPREP, PacWaste Plus Project Data Strategy (in Draft)

Australian jurisdictions target monitoring of air quality, noise, waters (surface and groundwater if appropriate) waste, and land. In applying for a license, information on the potential impact and mitigation/management measures are typically applied. A level of baseline monitoring may be required to support the application, which enables the environmental value to be monitored. Typical considerations may include:

- Location of monitoring locations (e.g., up-gradient, ambient, compliance locations etc.,)
- Frequency and duration of monitoring (how long must monitoring be undertaken for, how often)
- How data will be managed (e.g., what format should data be collected in, uniformity of reporting)
- How data will be analysed (e.g., what does the regulator need, what does site need, how is compliance required to be measured, what type of visualisations or data presentations will be required)
- What standards will the data be compared to? What are the quality requirements of this (e.g., limits of reporting for laboratory data).

These requirements are typically included within the license conditions for each environmental value within Australian license conditions. The regulator typically only undertakes specific monitoring of individual facilities or locations where there a compliance or enforcement investigation (e.g., they have received a complaint) and there is a need to validate. Broader monitoring programs do exist for state or national reporting programs (e.g., catchment management or monitoring studies). Ambient air quality monitoring (for example) is undertaken at a state or local government level.

In Hawaii facilities subject to various federal requirements are required to submit data. For example, under the Air Emissions Reporting Requirement, facilities subject to the federal requirements are also required to submit data under the Hawaii State and Local Emissions Inventory systems for emissions inventory reporting[60]. This goes to calculating annual fees and applies to landfill facilities. Standard conditions in water permits[61] in Hawaii presents specific sampling points within their permits, similar to Australian jurisdictions, with specific requirements around the nature of sampling, accurate representation, monitoring details similar to in other jurisdictions and following appropriate sampling methodologies. The cost burden of undertaking reporting sits with the permit holder.

Responsibilities for Data Collection

Key issues identified in this section:

- Data collection activities are typically undertaken by the license or permit holder. Obligations on the qualifications of the data collector are sometimes put in place to give certainty of quality.
- Conditions may dictate that non-compliances with the license or permit are reported proactively, including details on subsequent risk assessment or management measures applied.
- Data is typically submitted to the regulating entity annually through an annual return. This is typically a requirement of a license or permit.

In Australian jurisdictions, Hawaii and the UK the onus is placed on the licensee to collect site-specific data in support of a demonstration of their ongoing compliance with license or permit conditions. Typically, this data is provided within an annual return, that a licensee must submit by a certain date.

In Queensland, annual returns are typically only required for resource industry, however an annual monitoring report is typically required in license conditions for all activities. This report must be prepared by a Suitably Qualified Person (as defined in legislation) and include a summary of the previous 12 months required monitoring, an evaluation and explanation of the data from monitoring programs and comparison to baseline data collected, and an outline of any actions taken to minimise environmental harm. Data is collected by the site operator, who also has an obligation to report non-compliances against the requirements on a timely basis.

[60] State of Hawaii, Department of Health Clean Air Branch, Air Emissions Reporting Requirements (AERR) and state and local emissions inventory systems (SLEIS) (https://health.hawaii.gov/cab/air-emissions-reporting-requirements-aerr-and-state-local-emissions-inventory-system-sleis/)
[61] State of Hawaii, Department of Health, Standard NPDES Permit Conditions (Version 16) (https://health.hawaii.gov/cwb/files/2021/08/stdcond16.pdf)

Waste facilities in Queensland are obligated to collect data pertaining to waste arisings, predominantly to support the landfill disposal levy. This means all sites have to submit data to the regulator around how much waste is transported to a landfill site, including volumes exempted or used for non-landfill purposes. This extends to resource recovery facilities, as it contributes to the overall states recovery and recycling rate reporting. Data is collected by councils and site operators and submitted monthly, quarterly, or annually depending on the size of the site. Site operators are also required to conduct volumetric surveys and submit this data to demonstrate the volume of fill disposed of to landfill for reconciliation of reported data.

Licensees in NSW are required to submit an annual return to the NSW EPA annually. This includes a statement of compliance with the license conditions and a report of monitoring of pollutant loading. This data must be collected by the licensee and is input via an online tool. The annual return must be signed by an authorised person (i.e., the licence holder) which certifies that each year's calculations have been completed and recorded in accordance with protocols. Failure to comply may lead to penalties for false declarations. The EPA then undertakes a compliance audit of load calculation and returns.

A similar approach exists in the Northern Territory around providing annual returns. The holder of a license is required to comply under the *Waste Management and Pollution Control Act* 1998. Guidance on reporting on environmental monitoring[62] from the Northern Territory EPA identifies that the EPA can request an environmental monitoring report be submitted in accordance with license conditions, a specific notice to carry out a formal environmental audit program, or due to compliance or enforcement activities. A request for a monitoring report can also be made under the NT Water Act and a range of other obligations. This places the onus on the site operator to undertake and report the outcomes of monitoring.

In Hawaii the obligations for monitoring also reside with the permit holder under each branch of the Department of Health's requirements.

The Environmental Management Act 2005 in Fiji sets parameters for permits for discharge of waste and pollutants. Under its subordinate legislation, the Environmental Management (Waste Disposal and Recycling) Regulations 2007 specific data requirements are presented for solid and liquid waste disposal permits, livestock permits, and air pollution permits. It is assumed that the site operator is required to undertake the collection of monitoring data.

Types of Legislative Instruments

In Australian and US jurisdictions reviewed, the head of power for legislation tends to sit within either Environmental legislation or specific waste management legislation, or a combination of both. This ensures as a minimum, there are protections from environmental harm, but typically these flow through to a range of subordinate legislation including waste licensing frameworks which in turn drive guidance and additional requirements.

Overarching legislation driving hazardous waste management and the need for tracking and site licensing stems from the Basel Convention or other hazardous materials. These typically flow through into documents linked to legislation that set limits on emissions or movements of waste, but may be in subordinate legislation or guidance documents which are easier to modify as the regulatory situation changes.

[62] Northern Territory Environment Protection Agency, Guideline for Reporting on Environmental Monitoring (https://ntepa.nt.gov.au/__data/assets/pdf_file/0006/284856/guideline_reporting_env_monitoring.pdf)

Institutional Structures and Systems

Key issues identified in this section:

- Governance systems are required within the regulating entity depending on the type of license or regulatory framework applied.
- There is a need for a regulatory function to exist. It is common for this to be executed through an Environment Protection Agency or similar, however there are also environment departments that fulfil the same function without a clear differentiation of responsibility.
- The regulatory function needs the legal power to review, investigation, prosecute and revoke licenses of operators where environmental harm is suspected or proven.
- The regulatory function also needs the technical skills and staffing to review applications, administer licenses or permits, review data and annual returns, as well as the compliance and enforcement function.
- This extends to data management systems.

Government agencies will require a range of governance systems depending on the type of licensing or regulatory framework applied.

Most notable is the need to have a regulatory function within each country. This organisation could be defined as a separate Environmental Protection Agency (such as in the USA, NSW, Victoria, Northern Territory, Western Australia) or imbedded within a broader environmental agency (e.g., Queensland Department of Environment and Science). Regardless of where the regulator sits, this function requires authorising legislation that allows it to investigate, request operators of activities undertake specific tasks such as additional monitoring or investigation and have legal powers to stop work or prosecute where environmental harm has been identified. To facilitate this member country governments would need to undertake a comprehensive review of where similar legislative powers may sit already, or where they may sit in the future, and how they might be allocated under a new framework.

EPA functions do exist within member countries (e.g., Marshall Islands) which are extended by the establishment of specific companies such as the Majuro Atoll Waste Company who are responsible for waste disposal on Majuro Atoll, improvement in waste collections, establishment of a comprehensive recycling system and strength organisation and financial systems. These functions are also included in country regulations by health ministries (e.g., Solomon Islands) which include the regulation of transport, collection, storage, and disposal of wastes, and this is enabled through the existing Strategies.[63]

From a monitoring point of view, the regulatory function within an institution needs to have sufficient resources to effectively operate. This may include undertaking reviews of license or permit applications when received, but also attending pre-lodgement type meetings with prospective licensees who require support to understand the licensing or permitting framework. This will be particularly pertinent following implementation of a new legislative framework.

The regulatory function will also require resources to undertake compliance activities. This includes reviewing monitoring data submitted in compliance with regulatory requirements and undertaking investigations and enforcement activities in line with legislation that an operator may not be in compliance with. Where a compliance structure requires these activities, a technical understanding of the issues and science associated with the activity and potential pollution may be required.

[63] Solomon Islands Government, 2017. Solomon Islands National Waste Management and Pollution Control Strategy 2017-2026

A license or permit fee is typically used in Australia, the US and Europe on an annual basis for an activity. This allows cost recovery, depending on the scale, that permits and environmental regulator funding to operate. Typically license fees are insufficient to cover the full cost of regulator operations, however this would need to be modelled.

There is also a requirement for institutional structures to consider their need to store data. Where waste levies exist, it is common for a waste data management system to exist (e.g., Queensland through QWDS[64]) but often annual return data (e.g., monitoring information) for specific activities is provided via different forums such as the New South Wales eConnect system[65]. The eConnect system is a comprehensive license management system that includes applications for licenses, as well as the opportunity for an operator to manage their license or submit annual returns.

Implementation Options

Several member countries have already established legislation and enacted entities who are charged with licensing of waste facilities. Others are starting from an earlier base. Additionally, the scale of existing or potential future facilities within member countries is variable. Many of the existing frameworks in other jurisdictions referenced in this research paper relate to mature, well-established systems, that have evolved over a long period of time. For example, Queensland undertook significant reforms to their licensing framework over the period 2014 to 2019 with regulation updated in late 2018.

Considerations for implementation in member countries may need to include:

- Initial consultation(s) with stakeholders including industry to understand and refine knowledge of policy gaps and develop objectives for the policy.
- Research into a refined policy framework to achieve the goals of the policy reform.
- The time required to draft policy papers, legislation, and subordinate legislation
- Time required to undertake consultation with key stakeholders (e.g., industry, local government, environmental groups, other government departments etc.,)
- The time required to raise awareness and educate existing operators and government officials of impending changes, including training of enforcement agents which may include police, customs and port officers, lawyers and members of the judicial system
- The timeframe from when new legislation goes live to when prosecutions may be enabled (i.e., a soft launch could be considered with compliance needs but no enforcement for a set period of time).
- The time needed to develop supporting information (e.g., guidelines, standards) or to develop rules for exemptions.
- A transition period, or if legislation is applied retrospectively, a time period within which existing facilities may reasonably be expected to improve facilities to meet new standards and license or permit conditions.

[64] Queensland Government, Queensland Waste Data System (https://www.qld.gov.au/environment/pollution/management/waste/recovery/data-reports/qwds)
[65] NSW Government, eConnect EPA (https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/econnect-epa)

Policy Options – Data Collection and Reporting Framework

Data and Information Requirements

Key issues identified in this section:

- Pacific Island Countries are signatory to several conventions that seek to protect human health and the environment from a range of hazardous materials and chemicals.
- Countries are required to submit data at varying intervals where they are signatory to a convention.

There are several data collection and information requirements to support regional reporting necessary for member countries to meet obligations under multilateral environmental agreements.

Basel Convention

The Basel Convention seeks to protect human health and the environment against adverse effects caused by the generation, management, and transboundary movement of hazardous wastes, including the prevention of hazardous wastes being transported from OECD countries to developing country parties. This includes a range of hazardous wastes including plastic, e-waste, chemical, radioactive, municipal solid, asbestos and incinerator ash wastes, as well as used tyres.

Parties of the Basel Convention are required to notify of any new hazardous wastes and nominate one or more competent authorities to manage implementation of the convention. Under the Convention, member countries are required to collect data and submit an annual national report.[66] This data consists of a questionnaire submission with a comprehensive data manual[67] to support.

Stockholm Convention

The Stockholm Convention seeks to protect human health and the environment from persistent organic pollutants (POPs) including DDT, polychlorinated biphenyls, and some per- and polyfluoroalkyl substances (e.g., PFAS). Member countries have an obligation to report specific exemptions for import or export of listed substances, and to develop and maintain a plan. Article 15 of the Convention requires periodic reporting on national implementation measures, which are submitted every 4-years. This reporting is a questionnaire based online tool, which requires information on types of industrial chemicals disposed of[68] amongst other data needs.

Rotterdam Convention

This convention promotes shared responsibility and corporative efforts amongst parties in the international trade of certain hazardous chemicals (e.g., PBBs, PCBs and PCT) to protect human health and the environment. Parties must designate a national authority to act on the countries behalf and report on banning activities for these chemicals. There are no specific reporting requirements.

[66] UN Environment Program, Basel Convention. National Reporting (http://www.basel.int/Portals/4/Basel%20Convention/docs/natreporting/manual/manual-e.pdf)
[67] UN Environment Program, Basel Convention. National Reporting Manual (http://www.basel.int/Portals/4/Basel%20Convention/docs/natreporting/manual/manual-e.pdf)
[68] UN Environment Program, Stockholm Convention. Guidance (on reporting) (http://chm.pops.int/Countries/Reporting/Guidance/tabid/3670/Default.aspx)

Minamata Convention

The Minamata Convention aims to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. A national focal point for each member country is required for information exchange and notifications. Member countries are obligated to report on measures taken for implementation which is reported in short form every 2-years and long form every 4-years. The next long report is due 31 December 2021. This is undertaken through an online reporting tool. Data is required on a range of sections including knowledge of the use of mercury within the member country, sources of emissions and storage.

Waigani Convention

The Waigani Convention prohibits the importation of hazardous and radioactive wastes into Pacific Island developing countries and facilitates environmentally sound management of these wastes. Member countries must designate one competent authority and focal point, and notify of transboundary movements, as well as identify and report any illegal hazardous waste import activities within the jurisdiction. A range of information is required to be transmitted between countries, as well as with the Secretariat of the Convention, including export notification, written consent or disapproval for import applications, movement documentation, accident notification and information on the sound management of wastes.

State of Environment Reporting

Pacific Island nations undertake state of the environment reporting as a tool for environmental planning and management, as well as for collecting data for allowing changes to be tracked over time. This includes impacts of social and economic development pressures, consequences of those changes on human and environmental well-being and future sustainable development options. Data is required to be collected for the state of the environment reports which are released periodically (approximately every 4-5 years).

Waste Strategy Progress Reporting

Typically, where countries have a medium to long term strategic plan for how the plan to reduce waste to landfill and improve recycling and resource recovery, or improve other waste outcomes (e.g., increase avoidance, improve facility outcomes etc.,) there is a need to collect data to measure progress. At a headline level this may include recycling and recovery rates, and tonnages produced per capita, but may extend in granularity to details around waste types, facility exemptions, exported and imported waste etc. The draft PacWastePlus Project Data Strategy seeks to align data quality objectives with data collection and analysis predominantly for this purpose.

Responsibilities for Data Collection

Key issues identified in this section:

- Data collection responsibilities for international treaties and other federally required data collection exercises sits with the country government.
- Typically data is gathered from hazardous waste tracking submissions.
- At a country level, specific data quality objectives are required where waste data is to be collected for annual progress reporting needs.

The conventions and reporting referenced above require each country to appoint a lead agency or individual as a point of contact. It is assumed that this entity would also coordinate data collection and submission of data and reports to align with each timescale.

In Australia, this reporting sits with the Commonwealth Government who coordinate the submission and aggregation of data collected by the states. It is the state governments that undertake the data collection process through their own data collection practices, such as annual reporting to support license conditions. As licensing is typically linked to the characteristics of the waste (i.e., hazardous or non-hazardous), these datasets are readily available. There are nuances between what a state collects and its relevance to national reporting, and national reporting datasets often have timeframes misaligned depending on when a states reporting period is and how the data are provided. Likewise, datasets often remain piecemeal however there are activities underway to improve this.

The USA is not currently a party to the Basel Convention however is a signatory, and collects the data required should they be required to report as a party in the future. Data to support submissions against any international reporting obligations is captured under national hazardous waste tracking requirements.

In Fiji it is assumed reporting against international conventions as well as national level strategy reporting is the responsibility of the Ministry of Waterways and Environment, and specifically the Department of Environment, who oversee the implementation of the *Environment Management Act* 2005.[69]

Data quality objectives for broader data collection exercises are set at the international level through the development of questionnaires with specific questions. At a country level, where data collection is required for reporting under conventions or for progress reporting, member countries may need to set specific quality objectives for data providers, dictating a flow through of quality controls to allow an appropriate level of accuracy. This may vary on need. Typically, some form of manual or guideline may be required, and potentially training for data providers.

Types of Legislative Instruments

Key issues identified in this section:

- Data sourced from licenses or permits where throughput is limited provide a useful source of data; this data provision is typically included in legislative provisions, however unlicensed facilities do not report data.
- Waste tracking requirements might typically be included in legislation which specifies the type and quality of data to be collected, which could be aligned with reporting requirements.
- Other data collection frameworks exist where mandatory reporting of all wastes, including general or non-hazardous wastes is required in legislation.

Data sourced from environmental returns under licenses or permits can be useful. Particularly, where a licensee has an obligation to report on total throughput under a waste quantity limit. This would be an obligation founded in the enabling environmental legislation (e.g., the Queensland Environmental Protection Act 1994 etc.,) and enable overall waste volumes to be estimated from licensed or permitted activities. This does leave a gap for unlicensed facilities data collection which would not fall under the legislation.

The Queensland *Waste Reduction and Recycling Act* 2011 and its subordinate legislation requires waste facility operators to provide specific data. Prior to 2019, this requirement was just around data provision to go into an annual report, however with a landfill disposal levy commencing in July 2019, these requirements are closely tied into the data needs for the operation of the levy[70].

[69] Republic of Fiji, Ministry of Waterways and Environment, Strategic Plan 2020-2024 (https://www.mowe.gov.fj/wp-content/uploads/2020/03/2020_2024_Strategic-Plan_MoWE.pdf)
[70] Queensland Government, 2021. Are you a waste disposal site? (https://www.qld.gov.au/environment/pollution/management/waste/recovery/disposal-levy/operators/information)

Other legislative requirements associated with Waste Tracking requirements, for at least hazardous waste obligate operators and transporters to report quantities of certain types of wastes transported. This may give an opportunity to collect these data as part of broader reporting. Under international conventions, there are obligations through permitting of imports and exports of waste types which require data collection and reporting in a particular format.

For broader data collection on problem wastes, there are some extended producer responsibility schemes in operation that drive data collection with a legislative basis. The Australian Packaging Covenant Organisation (APCO)[71] is an extended producer responsibility organisation across Australia charged with making packaging more sustainable. APCO is created out of the *Australian Packaging Covenant* under the *National Environmental Protection (Used Packaging Materials) Measure* 2011. Under this scheme, participants who meet a certain threshold for business size are required to provide data on packaging use and align with the national targets. As a co-regulatory scheme, participants generally sign up to APCO who coordinate, however businesses can also report to individual states and territories. This can be problematic for capturing all data as some governments (e.g., Queensland) do not have a mechanism or guidance to receive data. After initial poor performance, APCO has recently started to gather better quality data and drive towards national packaging targets.

Other product stewardship schemes in Australia are administered at the Commonwealth level and have recently been updated. This includes a new general *Recycling and Waste Reduction Act* 2020 as well as the more established *Product Stewardship (Televisions and Computers) Regulations* 2011 and *Product Stewardship (Oil) Act* 2000. The new act replaced other product stewardship legislation and is focussed on both setting limits on the export of waste (and banning unsorted recycled materials from being exported).

In the UK, waste data for waste generation and management figures are provided for the whole of the UK[72]. This system was originally devised to meet the requirements of the European Commission Waste Framework Directive (2008/98/EC) and European Commission Waste Statistics Regulation (2150/2002/EC). Data is collected from councils, from commercial and construction and demolition waste sources, as well as treatment and packaging wastes. These data are presented in a freely accessible spreadsheet available via the Department of Environment, Food and Rural Affairs website[73].

Institutional Structures and Systems

Key issues identified in this section:

- There is likely to be crossover between institutional structures and systems created for facility licensing and for waste data reporting, notably the establishment of a regulating entity.
- These may be supported by data submission requirements in licenses or permits.
- Consideration of how data may be published or freely available is required.

[71] Australian Packaging Covenant Organisation, About APCO (https://apco.org.au/about-apco)
[72] UK Department of Environment, Food and Rural Affairs, Waste and recycling statistics (https://www.gov.uk/government/collections/waste-and-recycling-statistics)
[73] UK Department of Environment, Food and Rural Affairs, ENV23 – UK statistics on waste (https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management)

Existing structures and systems discussed around facility licensing are likely to be relevant here, although reporting at a country or state level may draw upon that data. Existing environmental departments or EPA functions are likely to coordinate the collection and coordination of this data, however in many jurisdictions data management and analysis is devolved to statutory authorities (e.g., Sustainability Victoria[74], Green Industries South Australia[75]). Similar entities exist in member countries responsible for waste management, however their responsibilities may not extend to broader data collection and reporting (i.e., they may be obligated to deliver waste management services only).

Management systems may be beneficial if there are large quantities of data now (or in the future) to manage which support national reporting. The creation of an EPA or other entity may require enabling legislation if it is to have enforcement responsibility (e.g., it may need to be able to undertake legal investigation and prosecution). This will also require additional funding or reallocation of existing resources.

Data submission requirements are typically an obligation under site-based licenses, including legislative requirements such as Section 66(a) of the New South Wales *Protection of the Environment Operations Act* 1997. Across Australian jurisdictions, it is this data collection for licenses that is combined with import/export permit applications to provide data for national level reporting under various international agreements.

The data submitted in Queensland under the waste facility reporting (and now levy reporting) is collected in the Queensland Waste Data System.[76] This is supported by a range of monthly to annually data returns, and operational guidance to ensure data is input correctly. This data framework as it stands now may be seen as more complex and costly to operate than required in member countries at this stage, however the legislative approach to sourcing data for state or national reporting may be relevant. The challenge may be identifying a threshold for facility type or size for reporting, similar to those considerations in the licensing framework.

A similar reporting framework exists in Hawaii with an annual report generated, however these data come from permitted solid waste management facilities only and reporting notes that recycling data is incomplete.[77] This is a common problem in Queensland as well, with many recycling facilities not required to report under the levy as the waste does not go to landfill, however these data are critical to reporting recovery and recycling rates.

In the UK data is collected by the Department of Environment, Food and Rural Affairs and published via a web page. The outputs are spreadsheet based. Data is sourced from a range of providers, with local government data (i.e., domestic/municipal solid waste) utilising a tool called “WasteDataFlow” provided by the Waste Recycling Action Plan (WRAP), a charity specialising in waste management. Construction and demolition waste data historically was reported through mandatory site waste management plans, however, may now be collected by review of waste tracking data.

[74] Sustainability Victoria, 2021. (https://www.sustainability.vic.gov.au/)
[75] Government of South Australia, 2021. Green Industries SA (https://www.greenindustries.sa.gov.au/)
[76] Queensland Government, 2021. Queensland Waste Data System (https://www.qld.gov.au/environment/pollution/management/waste/recovery/data-reports/qwds)
[77] State of Hawaii, Hawaii Office of Solid Waste Management, 2021. Annual report to the thirty-first legislature (https://health.hawaii.gov/opppd/files/2020/12/342B-15-2021-OSWM-Legislative-Report.pdf)

Policy Impact analysis

Facility or Activity Licensing

Whilst it would be expected that formal policy impact analysis would be undertaken in member countries when deciding and implementing a new, or modifying an existing regulatory framework, there are a number of economic, social and environmental considerations that should be taken into account, as summarised in the following sub sections.

The options identified for analysis are:

- **Option 1** – Maintain the status quo
- **Option 2** – Adopt a licensing framework based on activity type, waste type and/or throughput or a combination of each. This option refers to implementing a licensing framework similar to environmental licenses utilised in Australia and Europe. Under this option, sites have one singular license covering multiple functions. The Fijian approach with operators required to obtain solid waste and liquid waste permits aligns more closely with this option.
- **Option 3** – Adopt a permitting framework based on emissions. This option refers to implementing a permit-based framework similar to that utilised in the USA where multiple permits are required for the emissions relevant to the activity being regulated.

Option 1 – Maintaining the status quo

Under this option member countries would not change their existing regulatory frameworks. Existing frameworks would continue, and those countries without licensing or permitting frameworks would not change. This option presents no immediate impact to existing stakeholders. There would be no change to approval requirements, existing permit fees or the level of administration required. Environmental and social risks would be maintained. No formal impact assessment is undertaken on this option.

Option 2 – Implement an environmental licensing framework

Option 2 proposes that member countries implement a new or adapt existing frameworks to allow for a holistic environmental licensing framework to be developed. The implementation of such an approach would generally result in potentially direct or indirect impacts to existing facility operators, local government (e.g., councils), waste generators and the community, and may include changes to:

- The type of activity or facility required to be regulated
- Fees paid by facility operators
- The number of activities and approvals administered by member country governments in assessment and regulatory roles
- Associated revenue generated by member country governments through collection of licensing fees
- The cost to waste generators from need to classify and characterise waste, or increased fees for waste disposal.

Depending on how this option is implemented, some activities that are not currently captured, or where no activities are regulated, may result a license.

Costs to each member country from implementation of Option 2 are most likely to be incurred through:

- Developing new legislation (or amending existing) and undertaking consultation with local government, industry, and other stakeholders
- Implementing new governance structures (e.g., setting up an EPA function or a regulatory / compliance function within an existing agency, staffing, undertaking investigations, data management etc.,)
- The upskilling or new training of staff to understand new framework.
- The provision of support to waste industry or other applicants associated with licensing applications and post issue support.
- Transitional time for existing permitted industries to a new framework, or time to allow for a new framework to be established and fully operational.
- Additional regulatory inspections associated with enforcement activities under a new framework.
- Potential legal costs associated with implementation.

Waste Activity Operators

Member countries may choose to regulate private industry solely, or, as in other jurisdictions, apply regulations to government run facilities that undertake the same activity. Potential impact to existing activity undertakers, including existing license or permit holders may include:

- The requirement to provide an annual fee to support a license which may be based on risk, quantity, waste type or activity type will increase operational costs.
- Conditions associated with licenses may require facility upgrades over a certain period of time (e.g., a requirement could include existing landfills need to be lined within 5-years, or to upgrade monitoring networks) – these may require capital upgrades
- The closure of unregulated or poorly constructed sites may result in clean-up or remediation costs
- The need to apply for new licenses at sites resulting in delays or prohibited operations
- Changes to the nature of waste or volume accepted at a site
- Changes or the introduction of the need to undertake routine monitoring to align with license conditions, including potential costs for sampling, laboratory analysis, monitoring equipment, reporting and data management.
- Potential costs associated with managing requirements from regulators to investigate and clean-up pollution incidents or non-compliances.
- Costs associated with raising financial assurances or bonds including interest where loans are required.
- Increases in illegal dumping by private industry to avoid higher disposal or other management fees
- A clear regulatory framework provides certainty to investors.

Country Governments (or delegated authorities)

Member countries will need to incorporate a form of governance arrangement to administer and regulate under Option 2. The potential impacts to country governments may include:

- For government managed/operated waste sites a potential increase in cost and regulatory burden to manage own facilities.
- Increased revenue from licensing costs
- Increased administration burden from managing and maintaining licenses
- Increased need to electronic systems to manage licenses, data and other information relating to an activity in a manner that maintains data security but can be used for enforcement (legal) activities as required.
- Increased staffing requirements to administer licenses
- Increased staffing requirements to undertake compliance and enforcement activities
- If following a risk-based approach, the assessment and regulatory function will need access to technical specialists to quantify/qualify risk considerations
- There is likely to be a need to develop supporting guidance documentation around a licensing framework which may include:
  - Rules around exemptions, thresholds, and application of the implemented framework
  - Processes to characterise different waste types
  - Clarity around the definition of waste (if needed), particularly as recycling becomes more prevalent
  - Interactions with other regulatory frameworks
  - Guidance on standards for waste facilities (e.g., minimum standards for landfills)
- Where financial assurance or bonds are applied, a clear and transparent process for banking said assurances and mechanism for return at surrender of license.
- The ability to update or reform regulatory frameworks based on new science (e.g., for issues such as emerging contaminants) or new activities (e.g., a growth in biogas technology in the region).
- Potential for increased illegal dumping to the environment if private facilities have to increase gate fees to reconcile increased regulatory burden. This could lead to increased financial burden on councils or governments to undertake clean up, investigation or surveillance programs, or increase the need for illegal dumping education programs.
- Consideration of legacy clean-up costs for old landfill sites including closure, rehabilitation and surrender of license or return to the community.

Community

- Increased community confidence in an appropriate level of environmental protection in managing environmental risks from waste activities
- Requirement for currently unregulated (in some cases) activities to be appropriately managed
- New costs associated with regulation are passed down to residents through higher gate fees or rates
- New costs associated with requirements to provide specific waste containers for households
- The increased regulation of sites and potential closure of higher risk sites may mean households without access to collections have to travel further to lawfully dispose of their wastes. This could result in:
  - A loss of amenity value for residents (i.e., loss of access to a waste facility)
  - An increase in illegal dumping
- Regulation or banning of (for example) incineration of wastes may improve health outcomes

The following table summarises the costs and benefits of implementing a licensed based approach.

Table 7: Cost and benefit summary (Option 2)

Option 2: Adopt a new licensing framework for waste activities		
Stakeholder	**Benefits**	**Costs**
Government	• Increased revenue to fund regulatory and compliance activities from fees • Provision of environmental bonds to manage risk of clean-up activities cost deferring to state • Flexibility to react to new science or technologies by amending legislation. • Clear and transparent framework allows for investment. • Increased certainty of protection of human health and the environment. • Control over emissions from polluting activities. • Reduction or removal of non-regulated sites.	• Introduction of new legislation, and regulatory framework and overarching governance requires funding to deliver including new staff and data management technology. • Existing staff require training to apply new framework. • In-country government needs to be willing to support new framework. • Access to technical expertise needed. • New processes, information, guidelines and subordinate legislation required to implement. Likely adaptive over time. • Increase in regulation may require more enforcement activities and cleanup costs due to increase in illegal dumping etc.,
Industry	• Opportunity for good operators with engineered facilities to continue operating and increase market share. • Clearer regulation and standards for new and emerging technologies may lead to new investment. • Fairer playing field so all facilities meet a minimum standard. • Increased confidence in Country Governments ability to maintain environmental law and management. • Regulation of some unregulated activities.	• Costs and fees associated with licensing • Costs associated with site improvements (if retrospective), new monitoring and reporting obligations. • Costs associated with financial assurances and interest on loans. • Increased administrative burden for site operators. • Education and training required to support roll out of new framework for site operators. • May lead to illegal activity (waste crime) with illegal dumping or mischaracterisation of wastes to meet purpose.
Community	• Increased confidence that environmental protection is being provided. • Closure of nuisance sites. • Cessation of activities harmful to health (e.g., incineration without abatement)	• Potential increase in illegal dumping to avoid higher dumping costs • Flow through of costs to rate payers to cover increased cost of regulation, licensing etc.,

Option 3 – Introduction of a Permitting System

This option is commonly used in the US jurisdictions such as Hawaii. Under this approach, where an entity wishes to run a waste activity, they must apply for a permit. In the example of Hawaii, this requires a request for permit to multiple areas within the Department of Health to obtain permits for, for example, solid waste management, air quality emissions, water emissions.

A significant number of the potential impacts associated with this approach are the same as for Option 2 and need to be considered in a country specific context. Costs to each member country from implementation of Option 3 are most likely to be incurred through:

- Developing new legislation (or amending existing) and undertaking consultation with local government, industry, and other stakeholders.
- Implementing new governance structures (e.g., setting up individual technical agencies (e.g., air, water, waste as a minimum) within the regulator, setting up an EPA function to manage multiple permits, individual technical teams to administer each different permit).
- The upskilling or new training of staff to understand new framework.
- The provision of support to waste industry or other applicants associated with permit applications and post issue support from each agency.
- Transitional time for existing industries to a new framework, to apply for permits, or time to allow for a new framework to be established and fully operational.
- Additional regulatory inspections associated with enforcement activities under a new framework across multiple disciplines.
- Potential legal costs associated with implementation.

Waste Activity Operators

Potential impact to existing activity undertakers, including existing license or permit holders may include:

- The requirement to provide multiple fees for permits across each emissions discipline.
- Conditions associated with permits may require facility upgrades over a certain period of time (e.g., a requirement could include a need to upgrade air quality abatement which may not be possible for several years).
- The closure of unregulated or poorly constructed sites may result in clean up or remediation costs.
- The need to apply for new permits at sites resulting in delays or prohibited operations; permits may be staggered, or some may be issued ahead.
- Changes to the nature of waste or volume accepted at a site results in confusion or incorrect material being deposited.
- Changes or the introduction of the need to undertake routine monitoring to align with license conditions, including potential costs for sampling, laboratory analysis, monitoring equipment, reporting and data management.
- Potential costs associated with managing requirements from regulators to investigate and clean-up pollution incidents or non-compliances.
- Costs associated with raising financial assurances or bonds including interest where loans are required.
- Increases in illegal dumping by private industry to avoid higher disposal or other management fees.
- A clear regulatory framework provides certainty to investors.

Country Governments (or delegated authorities)

Member countries will need to incorporate a form of governance arrangement to administer and regulate under Option 3. The potential impacts to country governments may include:

- For government managed/operated waste sites a potential increase in cost and regulatory burden to manage own facilities.
- Increased revenue from permit costs however often permit costs are less that other licensing approaches.
- Increased administration burden from managing and maintaining multiple permits.
- Increased need to provide electronic systems to manage permits, data and other information relating to an activity in a manner that maintains data security but can be used for enforcement (legal) activities as required.
- Increased staffing requirements to administer permits.
- Increased staffing requirements to undertake compliance and enforcement activities.
- Each assessment and regulatory function will need access to technical specialists to quantify/qualify risk considerations.
- There is likely to be a need to develop supporting guidance documentation around a permit framework which may include:
  - Standardised permit rules (e.g., common water quality discharge parameters).
  - Rules around exemptions, thresholds, and application of the implemented framework.
  - Processes to characterise different waste types.
  - Clarity around the definition of waste (if needed), particularly as recycling becomes more prevalent.
  - Interactions with other regulatory frameworks.
  - Guidance on standards for waste facilities (e.g., minimum standards for landfills).
- Where financial assurance or bonds are applied, a clear and transparent process for banking said assurances and mechanism for return at surrender of license.
- The ability to update or reform standard permit requirements based on new science (e.g., for issues such as emerging contaminants) or new activities (e.g., a growth in biogas technology in the region).
- Potential for increased illegal dumping to the environment if private facilities have to increase gate fees to reconcile increased regulatory burden.
- Consideration of legacy clean-up costs for old landfill sites including closure, rehabilitation and surrender of license or return to the community.

Community

- Increased community confidence in an appropriate level of environmental protection in managing environmental risks from waste activities.
- Requirement for currently unregulated (in some cases) activities to be appropriately managed.
- New costs associated with regulation are passed down to residents through higher gate fees or rates.
- The increased regulation of sites and potential closure of higher risk sites may mean households without access to collections have to travel further to lawfully dispose of their wastes. This could result in:
  - A loss of amenity value for residents (i.e., loss of access to a waste facility).
  - An increase in illegal dumping.
- Regulation or banning of (for example) incineration of wastes may improve health outcomes.

The following table summarises the costs and benefits of implementing a licensed based approach.

Table 8: Cost and benefit summary (Option 3)

Option 3: Adopt a permitting approach for waste activities		
Stakeholder	**Benefits**	**Costs**
Government	• Increased revenue to fund regulatory and compliance activities from permit fees • Flexibility to react to new science or technologies by amending legislation. • Clear and transparent framework allows for investment. • Increased certainty of protection of human health and the environment. • Control over emissions from polluting activities specific to site. • Reduction or removal of non-regulated sites.	• Introduction of new legislation, and regulatory framework and overarching governance requires funding to deliver including new staff and data management technology. • Existing staff require training to apply new framework across multiple disciplines • In-country government needs to be willing to support new framework. • Access to technical expertise needed. • New processes, standard permitting guidance, water quality discharges etc. • Increase in regulation may require more enforcement activities and cleanup costs due to increase in illegal dumping etc.,
Industry	• Opportunity for good operators with engineered facilities to continue operating and increase market share. • Clearer regulation and standards for new and emerging technologies may lead to new investment. • Fairer playing field so all facilities meet a minimum standard. • Increased confidence in Country Governments ability to maintain environmental law and management. • Regulation of some unregulated activities.	• Costs and fees associated with licensing • Costs associated with site improvements (if retrospective), new monitoring and reporting obligations. • Costs associated with financial assurances and interest on loans. • Increased administrative burden for site operators. • Education and training required to support roll out of new framework for site operators. • May lead to illegal activity (waste crime) with illegal dumping or mischaracterisation of wastes to meet purpose.
Community	• Increased confidence that environmental protection is being provided. • Closure of nuisance sites. • Cessation of activities harmful to health (e.g., incineration without abatement)	• Potential increase in illegal dumping to avoid higher dumping costs • Flow through of costs to rate payers to cover increased cost of regulation, licensing etc.,

Additional Considerations around Licensing and Permitting

Specific Details around how Licensing could be Detailed

There are a range of approaches to how a licensing framework may be constructed, including solely on activity type, waste type, volumes or adopting a risk-based approach. Each member country will need to consider an appropriate approach. It is likely that a hybrid approach of activity, waste type and volume would be most appropriate for the majority of Pacific Islands, and whilst activities and waste types may be reasonable uniform, details around volumes will vary significantly.

Financial Assurance or Bonds

Financial assurance is commonly used across the world to ensure there are sufficient funds available to close, decommission and rehabilitate sites should the site operator not be able to meet this obligation, or to cover the cost of cleanup of accidental spills and leaks, or both. These may form part of a license, however, could also be managed outside of a licensing or permitting framework. Methods will need to be developed to ensure an accurate forecasting of cost can be made, and updated, and mechanisms put in place to ensure the banking of the bond is clear and transparent aligned with country standards. There may be challenges for existing industry to meet the demands of financial assurance requirements, particularly for established projects.

Supporting Documents

Introducing a new, or updating and existing, environmental licensing framework is likely to have significant need for post-legislation document development. Legislation by its very nature is not sufficiently detailed to cover every permutation, and operators and regulators will need to shape operational guidance and update subordinate legislation to align with the overall objectives of legislation. This will require staffing as well as sufficient in-house technical support, or the ability to purchase that expertise from contractors. On this basis, legislation should be introduced to stakeholders as evolving.

Extension to Existing Licensing or Permitting Frameworks

Where a country intends to modify an existing arrangement, consideration of the changes compared to the existing situation should be considered in a regulatory impact statement. Timeframes may vary when compared to starting from scratch, and there may be a need to engage more with industry stakeholders as amendments may affect their own business operability. The focus of the implementation of a new framework should be around improvement and evolution of existing, rather than looking to fully shut down operating industry.

Application to Waste Transporters

Licensing frameworks in most jurisdictions require the tracking and management of the transportation of hazardous wastes. This is typically applied in a waste licensing context, with either the entity undertaking the transporting requiring a license or permit, or each individual vehicle. Additional obligations exist for spill protection measures, and typically operators of vehicles are required to have additional training. For more general waste transport, it is uncommon for waste transporters to require licensing, however in some jurisdictions all waste transactions (i.e., transfer of waste from source site to a transporter) area required to be recorded, not just for hazardous wastes.

Application of Licensing Framework to Public Facilities

Licensing or permitting frameworks are well suited to a range of private sector industries including those outside the traditional waste sites such as timber mills, mines and petroleum projects, and agriculture. In some jurisdictions these frameworks also apply to public sector owned assets. Consideration should be given in each country as to the costs and benefits of applying only to the private sector. Whilst there may be a need only to regulate the private sector, introduction of a multi-level licensing framework where the same landfill site is regulated differently between public and private operators leads to an uneven playing field and may create perverse outcomes around landfill standards, competition, and pricing.

Application of a Licensing Framework more Broadly

Whilst the nature of this research paper and facility licensing policy options has focussed broadly on waste related activities, consideration must be given to how broadly an industrial facility licensing approach should go, and interactions. Sites such as timber mills, the resources industry often have the same licensing requirements and as such, should be included in policy framework development.

Data Collection and National Reporting

Legislative and policy options to support national data collection and reporting obligations can be supported by the implementation of a licensing or permitting framework that requires licensees to provide data. Specific waste reporting obligations could be legislated, such as under the Queensland *Waste Reduction and Recycling Act* 2011 or as driven by European Commission requirements in the UK, or subordinate legislation that requires local governments and/or waste facility operators provide specific data on waste throughput or deposited at their sites.

At a national level, country governments may want to introduce legislation to drive the reporting of waste data that allows a comprehensive return of information to allow for reporting under international conventions and to implement country waste and recycling progress reporting. The policy options at the highest level would be to do nothing or to implement a form of policy. It would be envisaged that legislative requirements could be introduced separately or aligned with a licensing or permitting framework.

- **Option 1** – Do nothing
- **Option 2** – Introduce standalone data collection legislation
- **Option 3** – Introduce integrated data collection requirements into legislation linked to licensing/permitting

The potential costs and benefits for Option 2 and 3 are largely similar at a regional scale, and further analysis is likely to be necessary at a country scale, but may include:

- The cost of introducing, legislating, and developing operational standards for reporting of data requirements.
- The integration of legislation with other requirements.
- The willingness of operators to provide data including that which might be considered commercial in confidence.
- Training and awareness raising for data preparation and submission, including, for example, timeframes, submission tools, quality assurance testing.
- The ability of operators to collect data (e.g., presence of weighbridges or other means of measuring quantity of waste including deeming) and cost of installing such systems.
- The cost associated with creating a system (whether excel or IT system based) to capture, validate, quality check and analyse data provided.
- The cost associated with meeting relevant reporting obligations (i.e., staff to do the tasks above).
- The cost and addition research required to incorporate reporting elements for other product stewardship schemes (e.g., container deposit schemes).
- The creation of roles or potential governance structures to support waste data calculations.

If considering developing standalone legislation to drive data collection purposes, member countries may find it more challenging than co-development with a licensing framework. It may be more difficult to introduce a change without licensing a specific facility and there may be a greater resistance or reluctance to provide accurate data. Legislation may need to consider fines or other penalties in relation to non or false provision of data (as there would be in a licensing framework) however in other jurisdictions this has often been difficult to prosecute against, with an educational approach preferred with non-compliant operators.

Conclusions and Recommended Policy Options

Facility Licensing and Governance Framework

Recommended Policy Option

Recommending a singular regulatory framework across the PICs is challenging. There are different legal frameworks in place which may make it easier to take up one option than others, and countries are in different stages of development for how they regulate waste activities.

This means establishing a license or permitting framework relies on the legal framework in which the country operates. A licensing approach is recommended to provide a more cohesive and less administratively burdened approach as licenses are managed through a central point.

Legislation for activity licensing should introduce:

- The identification of which facility types will be regulated
- Volume and type-based limits on the waste accepted into a facility (e.g., a landfill which accepts >200 tonnes per annum might need a license; or a facility that processes any volume of hazardous waste may require a license etc.,)
- Provisions for introduction of an annual fee based on volume/risk/type
- Minimum environmental standards for air quality, odour, noise, water, land discharges and mechanisms to report against these standards
- The development of complementary standards or guidelines that explain to operators what is expected of them in complying with license conditions (these could be developed across the region)
- Timeframes for assessment of new license or permit applications
- Vehicle or operator licensing for the transport of hazardous wastes
- The introduction of penalties or fines for infringements

Recommended Implementation Plan

For PICs without an established licensing or permitting framework, changes should be methodical and allow sufficient points of engagement (see below). Implementation should include:

- Initial consultation(s) with stakeholders including industry to understand and refine knowledge of policy gaps and develop objectives for the policy.
- Research into a refined policy framework to achieve policy reform goals for the individual country.
- The time required to draft policy papers, legislation, and subordinate legislation
- Time required to undertake consultation with key stakeholders (e.g., industry, local government, environmental groups, other government departments etc.,)
- The time required to raise awareness and educate existing operators and government officials of impending changes, including training of enforcement agents which may include police, customs and port officers, lawyers and members of the judicial system
- The timeframe from when new legislation goes live to when prosecutions may be enabled (i.e., a soft launch could be considered with compliance needs but no enforcement for a set period of time).
- The time needed to develop supporting information (e.g., guidelines, standards) or to develop rules for exemptions.
- A transition period, or if legislation is applied retrospectively, a time period within which existing facilities may reasonably be expected to improve facilities to meet new standards and license or permit conditions.

Stakeholder Engagement

Stakeholder engagement planning should be undertaken as an early task item for member countries. Stakeholder engagement specific to implementing a new, or making amendments to existing licensing or permitting frameworks should include:

- Inter and intra government agency consultation – to fully understand policy impact as it relates to the whole of government, including but not limited to legal frameworks, legislation held within other acts, obligations on other agencies to provide data/support
- Local Government (if present) – understand impact of policy on their operations (e.g., council/local government run facilities), costs and activities undertaken
- Waste industry – understand willingness to pay/be regulated, test charges, reporting and monitoring requirements, ability to implement improvements to existing facilities or build new ones; concerns regarding compliance; training needs for industry staff
- General industry – consultation around potential increases in waste management costs or for sites which undertake waste activities; coordination with other regulations
- General public – none unless specifically identified during implementation planning.

Data Collection and Governance Framework

Recommended Policy Option

Legislation relating to governance is more challenging to recommend, predominantly because of the different legal frameworks within the PIC countries. Each country needs to identify the most appropriate agency to establish a more comprehensive regulatory function in.

This could be within existing agencies, or in a new agency such as an EPA. This will require comprehensive review or existing regulatory functions and implementation will be varied. The key functions to introduce will be:

- The establishment of a compliance/regulatory function that has the head of power to undertake legally enforceable investigations, and direct licensees or permit holders to undertake remediation or rehabilitation exercises.
- The establishment of a function to lawfully hold financial assurances.
- The establishment of a data and report holding repository and reporting against Country and International obligations
- The training and upskilling/recruitment of staff to undertake assessment, enforcement, or compliance activities

Recommended Implementation Plan

Implementation for a data, reporting and governance structure may include:

- Detailed review of existing governance structures, legislative framework and agency responsibilities in overseeing waste regulation functions in each member country.
- Consultation within country government to understand appetite for change of function and necessary legislative amendments required.
- Research and design of proposed structures, reporting and data housing functions.
- Research and design of compliance and enforcement powers
- Undertaking of stakeholder engagement around interactions with the function, design of management system interfaces, fees and charges etc.,
- The development of draft policy papers, legislation and subordinate legislation giving a head of power to the regulatory function.
- The appointment of a head of regulatory function and supporting staffing (as required)
- Awareness raising and education of existing staff or those staff recruited or transitioning into new roles within the regulatory function.
- Awareness raising and education of key stakeholders who will interact with the new regulatory function in how to complete forms, applications and data submissions.
- The establishment and commissioning of the new regulatory function.
- The development of supporting documents, management systems and decision support tools.

Stakeholder Engagement

Stakeholder engagement planning should be undertaken as an early task item for member countries. Stakeholder engagement specific to implementing new data submission, governance and reporting requirements is anticipated to require engagement as follows:

- Inter and intra government agency consultation – significant engagement will be required within the member country government as introduction of new governance arrangements will need coordination, especially where some functions are already delivered through other agencies (e.g., Department of Health or Department of Environment). Reporting and data provision requirements may also require government agencies to provide information. Provisions will also be required for upskilling existing staff or recruiting new, plus forming leadership arrangements.
- Local Government (if present) – understand impact of reporting requirements on their operations.
- Waste industry – understand reporting requirements, ability to report, cost to businesses of reporting, may have concerns regarding new administrative burden in annual reporting etc.,
- General industry – understand reporting requirements, ability to report, cost to businesses of reporting, may have concerns regarding new administrative burden in annual reporting etc.,
- General public – none unless specifically identified during implementation planning.

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