Contaminants Present in Organic Waste: Review of New Zealand Regulations and Guidelines

SUMMARY DOCUMENT

Prepared for Ministry for the Environment

DRAFT

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Draft Report for Ministry for the Environment

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1.0 Audience and the Purpose of the Report

1.1 Introduction

MfE commissioned Eunomia Research & Consulting, Whetū Consulting Group, and Massey University, to examine issues of contaminants in organic waste. The project aims to understand and address the challenges posed by contaminants in our organic waste material streams in order to mitigate risks to soil, human and animal health and expand end markets for processed organic waste. The project outputs will build on existing knowledge and standards and provide clear action recommendations for addressing the contaminants challenge.

1.2 Contextual Framework

This report sets out a high-level approach, wherein available New Zealand legislation, standards, guidelines and position statements are reviewed. In this initial piece of work, we aim to articulate, at a high level, what the current state of the legislative and regulatory environment is, and what the documentation reflects in the context of organic waste contamination.

NOTE: This is a summary of the full report.

2.0 Scope

The work covers the full suite of available documentation for organic wastes, including legislation and regulation, standards, guidelines and position statements applicable to the New Zealand framework. Various contaminant types and standards relevant to organic waste or soils are discussed in this document. It also includes the organisations that administrative powers are assigned to under each legislation and standard, furthermore, which specific stakeholders the document appears to be directed at. Some of the documentation encompass limitations which are also described in this work.

2.1 Documents Reviewed

Legislation and Regulation

- Natural and Built Environment Bill 2023
- Animal Products Act 1999

- Animal Products Amendment Act 2012
- Food Act 2014
- Environment Act 1986
- Conservation Act 1987
- Crown Pastoral Land Act 2022
- Hazardous Substances and New Organisms Act 1996
- Agricultural Compounds and Veterinary Medicines Act 1997
- Agricultural Compounds and Veterinary Medicines (Exemptions and Prohibited Substances) Regulations 2011
- Waste Minimisation Act 2008
- Responsibility for Reducing Waste Bill

Standards

- NZS4454 for Composts, soil conditioners and mulches
- Assure Quality – Organics Standard
- BioGro Certification Modules
- National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Protect Human Health

Guidelines

- Guidelines for beneficial use of organic materials on productive land
- WASTEMINZ- technical guidelines for disposal to land
- Compost New Zealand consent guide
- Technical Guide 08: The production and use of digestate as biofertilizer
- Organic Materials Guidelines – organic contaminants review
- Organic production protocols – green waste composting and vermiculture
- Working towards New Zealand risk-based soil guideline values for the management of cadmium accumulation on productive land
- It’s complicated: A guide to biodegradable & compostable plastic products and packaging

Position statements

- MfE: Compostable packaging position statement

- MfE: kerbside materials factsheet
- Position statement from New Zealand composters on compostable packaging
- Packaging Forum Position Statement on PFAS
- Organic Waste: A position statement from the Zero Waste Network
- Road Derived Sediments (RDS) and Vegetative Material Reuse Feasibility Study (2010)

3.0 Summary Table of Legislation, Regulation, Standards and Guidelines

Title	What it covers/who it applies to	Definition of contamination	Controls on contamination	Currency and status/powers
Legislation and Regulation				
Natural and Built Environment Bill 2023	Prescribes restrictions relating to land, coastal marine area, river and lake beds, water, and discharges. Establishes a national planning framework (NPF) to provide directions on integrated environmental management, resolve conflicts on environmental matters, and to set environmental limits and strategic directions.	A contaminant must be present in concentrations exceeding an environmental limit or be an unacceptable risk to human health/environment to be classed as contaminated land.	Polluter pays principle applies to those who cause or allow contamination, and the owner of land is responsible for management of contamination.	Mandatory, integrated national direction in the form of a National Planning Framework, a clearer and more directive statutory framework for area-based protections like significant biodiversity areas, and targets for improvement. Also, to be implemented, compulsory environmental limits.
Animal Products Act 1999	Governs the production, processing, and export of animal products. Sets out regulations related to the safety and quality of animal products. Also establishes standards for the management of risks associated with animal products.	Contamination is broadly defined to scenarios where animal products are deemed unsafe or unsuitable for human consumption or use due to the presence of foreign substances, pathogens, and chemicals.	Contamination prevention measures are to be implemented by the various stakeholders throughout the value chain. This include; good agricultural practices, good manufacturing practices, hazard analysis and critical control points, testing and monitoring, quality	Mandatory by law, grants regulatory authorities and government agencies specific powers to enforce compliance with its provisions.

Title	What it covers/who it applies to	Definition of contamination	Controls on contamination	Currency and status/powers
	Applies to primary producers, processors, exporters, importers, retailers and distributors, government agencies and researchers.		assurance, traceability, regulatory oversight, biosecurity, sanitary design and training.	
Animal Products Amendment Act 2012	Amendment to the Animal Products Act 1999. Address evolving concerns, and improve regulations in food safety, animal welfare, export certification, labelling and packaging, incorporation of international standards, and enforcement and penalties. Applies to primary producers, processors, exporters, importers, retailers and distributors, government agencies and researchers	No definition is described in the amendment Act.	The following prevention measures are described; good manufacturing practices, hazard analysis and critical control points, testing and monitoring, traceability, allergen control, chemical residue monitoring, microbiological standards, sanitation protocols, temperature control, training, packaging and labelling.	Mandatory by law, grants regulatory authorities and government agencies specific powers to enforce compliance with its provisions.
Food Act 2014	This Act governs regulations and standards related to food safety, handling and preparation. It focuses on risk-based measures to ensure food safety at all stages of the food supply chain. This Act is applicable to food retailers, manufacturers, producers, importers and exporters, transporters, distributors, food service	Contamination is defined as the introduction of any harmful or undesirable substances (physical, chemical, or biological) into food that could make it unsafe for consumption.	Contamination is controlled through hygiene practices, cross-contamination prevention, cooking and heating, chilling and storage, food safety plans, cleaning and sanitizing, supplier and ingredient management, training, traceability, waste management, inspections and audits.	Primary legislation governing food safety, handling and preparation in New Zealand.

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	providers in healthcare sectors, and food businesses			
Biosecurity Regulations 2005	Measures aimed at preventing the introduction and spread of harmful organisms, both animal and plant, into the country. This Act applies to importers and exporters, shipping and transportation industries, agriculture and primary production, manufacturers and distributors, individuals, government agencies	In the context of this Act, contamination is referred to the introduction or presence of organisms, substances, or materials that have the potential to harm the environment, human health, and agriculture in New Zealand.	A comprehensive framework of controls are established to prevent and manage contamination. These controls include import and export regulations, quarantine measures, risk assessments, border inspection, biosecurity responses, education and awareness, surveillance and monitoring, enforcement, management plans, and partnerships.	Significant legislation granting the government and relevant authorities the power to manage and respond to biosecurity risks. Legal framework for preventing and managing the entry, establishment, and spread of pests, diseases and other harmful organisms.
Environment Act 1986	Covers environmental protection measures. Establishes a framework for managing and regulating activities that may affect the environment negatively. This Act applies to individuals, businesses, and organisations that engage in activities that could potentially have an environmental impact.	The introduction of substances, materials, or conditions into the environment that could harm or degrade environmental quality.	Some of the primary controls include resource consents, environmental impact assessments, waste disposal regulations, contaminated land management, enforcement, pollution prevention measures, monitoring and reporting.	This Act is still in force and have not been repealed or replaced
Conservation Act 1987	Legislation that focuses on the conservation and management of New Zealand's natural and	This Act does not explicitly provide a definition of contamination.	The controls in place on contamination in New Zealand are primarily governed by the	The Act is still in force in New Zealand

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	cultural heritage. The Act aims to ensure the sustainable use and protection of New Zealand's unique natural and cultural resources for the benefit of present and future generations. Applies to individuals, organisations and entities. These include government agencies, landowners, tourism and recreation operators, scientists and researchers, cultural and historical entities and local communities.		RMA1991 and other related legislation	
Crown Pastoral Land Act 2022	Covers the management, leasing and use of Crown-owned land used for pastoral farming. It aims to balance economic, environmental and cultural factors by regulating the tenure and sustainability of land use, while considering conservation and Māori rights. Applies to leaseholders and landowners, iwi, various government agencies	Contamination is not directly defined in this Act.	N/A	Legal statute that has authority and governs specific matters related to the management, leasing and use of Crown-owned land for pastoral farming.
Hazardous Substances and New	Regulates the management of hazardous substances and new organisms. Framework for protecting human health and the	Contamination refers to the presence or introduction of hazardous substances or new organisms into the environment	Controls include classification and approval, labelling and packaging, safety data sheets, notification and reporting,	The Act is still in effect and is the primary legislation governing the management of hazardous

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Organisms Act 1996	environment from the risks posed by these substances and organisms. It applies to importers, manufacturers, users and handlers, producers, distributors and retailers, applicants for approvals, government agencies, environmental and community groups.	in a manner that causes adverse effects or poses risks to human health, the environment, or property.	storage and handling regulations, environmental release controls, contaminated site management, enforcement and penalties.	substances and new organisms in New Zealand.
Agricultural Compounds and Veterinary Medicines Act 1997	Regulation of agricultural compounds to ensure the safety, efficacy, and proper labelling of these products. This Act applies to manufacturers, distributors, retailers, farmers, growers, veterinarians, importers and exporters. In essence, the Act covers anyone who is engaged in activities related to the use of agricultural compounds and veterinary medicines in New Zealand.	Contamination is defined as the presence of a substance in an agricultural compound or veterinary medicine that is not an intended ingredient and could potentially harm humans, animals or the environment.	Controls on contamination include manufacturing standards, product registration labelling requirements, quality assurance and testing, import and export controls, reporting of adverse events, penalties and enforcement.	Legislation currently in effect, not repealed.
Agricultural Compounds and Veterinary Medicines (Exemptions	A set of regulations that complement the Agricultural Compounds and Veterinary Medicines Act 1997. These regulations provide additional details and specific provisions	The presence of a substance in an agricultural compound or veterinary medicine that is not an intended ingredient and could	Prohibiting harmful substances. Restricting the use of risky substances and only allowing use where risk is considered manageable.	Currently applicable in New Zealand

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and Prohibited Substances) Regulations 2011	related to certain exemptions and prohibited substances within the context of the Act. Applies to manufacturers, distributors, retailers, farmers, growers, veterinarians, importers and exporters. veterinary medicines in New Zealand.	potentially harm humans, animals or the environment.	Promoting safe use by suggesting the use of safer alternatives.	
Waste Minimisation Act 2008	The Act focuses on waste minimization, product stewardship, and encouraging resource efficiency across various industries and sectors to promote waste reduction and sustainable waste management.	Contamination refers to the introduction of harmful substances or pollutants into the environment.	No detailed regulations specifically focused on managing individual contaminants or hazardous substances are pertained within the Act. Product stewardship includes the responsible management of waste and contaminants generated throughout the lifecycle of products. By discouraging the disposal of waste to landfills, through the implementation of the waste levy, it indirectly prevents the release of contaminants from landfills and encourages alternative waste management methods. The Waste Minimisation Act integrates with the HSNO Act to manage hazardous waste and substances more effectively and safely	Still in effect, however a waste legislation reform are being developed to replace the current Waste Minimisation Act 2008 and the Litter Act 1979.

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Standards				
NZS4454:2005 for Composts, soil conditioners and mulches	New Zealand standard that provides guidelines for composts, soil conditioners, and mulches. Manufacturers, suppliers, and users of composts, soil conditioners and mulches in New Zealand.	In the context of NZS44:53:2005, contamination is defined as the presence of materials, substances, or organisms in composts, soil conditioners, and mulches that may adversely affect human health, plant growth, or the environment.	Control measures include limits on the presence of physical, organic and chemical contaminants, and pathogens. Accurate labelling and documentation are required. Quality control and testing.	Published standard recognised by the New Zealand Standards Approval Board (SAB). The standard does not hold legal power but can be referenced to establish quality and safety criteria.
Assure Quality – Organics Standard	The aim of this standard is to protect consumers against deception and fraud in the marketplace and against unsubstantiated product claims. To protect producers of organic produce against misrepresentation of other agricultural produce as being organic. To ensure that all stages of production, preparation, storage, transport and marketing are subject to inspection and comply with this standard. This standard applies to organic farmers, food processors and manufacturers, distributors and retailers, consumers,	The definition for contamination in this standard relates to background contamination. Also known as unavoidable residual environmental contamination (UREC). Background levels of naturally occurring or synthetic chemicals that are present in the soil, or present inorganically produced products, that are below established tolerances.	All equipment from conventional farming systems is properly cleaned and free from residues before being used on your organically managed areas. Not store prohibited crop inputs within the organic production site. Potentially contaminated areas on a property, such as dip sites, should be excluded from certified areas. The use of polychloride (PVC) based products is prohibited.	The standard does not hold legal power but can be referenced to establish quality and organic status.

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	certification institutions and governmental authorities.			
BioGro Certification Modules	BioGro is one of the leading certifiers for organic products in New Zealand. BioGro approval refers to the certification granted by BioGro to agricultural producers, processors, and manufacturers who meet their strict organic standards and guidelines. This standard applies to organic farmers, food processors and manufacturers, distributors and retailers, consumers, certification institutions and governmental authorities.	A contaminant is materials prohibited under the BioGro standards that are present in a certified product. Contaminated – has come into contact with or contains materials prohibited under the BioGro standards. Even if no measurable contamination is present, a product may still be deemed to be contaminated if there is evidence that contamination may have occurred.	All equipment from conventional farming systems is properly cleaned and free from residues before being used on your organically managed areas. Not store prohibited crop inputs within the organic production site. Potentially contaminated areas on a property, such as dip sites, should be excluded from certified areas.	The standard does not hold legal power but can be referenced to establish quality and organic status.
National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health	The NES was developed due to New Zealand having a history of soil contamination. The contamination is primarily associated with past practices involving storage and use of hazardous substances, and disposal of hazardous wastes. The NES complements other environmental laws and regulations in New Zealand, ensuring that the management of contaminated soil aligns with	The Hazardous Activities and Industries List (HAIL) lists a variety of activities that can potentially result in soil contamination on a piece of property. Common contaminants include heavy metals such as arsenic or lead, persistent pesticides such as DDT, petroleum hydrocarbons and asbestos.	Controls imposed by the NES are classified under one of four primary categories: Permitted activity - no resource consent required Controlled activity - resource consent required Restricted discretionary activity - resource consent required Discretionary activity status - resource consent required	The NES encompasses three pillars: National set of planning controls Mandated method for regulating applicable standards Standardised procedure for site investigations and reporting

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	broader environmental protection objectives. The NES applies to landowners, land developers, local government authorities, environmental consultants especially specialising in contaminated land management, regulatory organisations, general public and future occupants of land.			
Guidelines				
Guidelines for beneficial use of organic materials on productive land	The guidelines encompasses two volumes. **Volume 1 Guide**, which provides guidance on how to safely use organic materials and derived organic products and discusses management issues and the recommended grading and management framework; and **Volume 2 Technical Manual**, which provides detailed supporting information about how the limit values were decided, the current regulatory framework, how to implement some of the recommendations in the Guide and selected technical information from Volume 2 of the 2003 New Zealand Biosolids	Any substance (including heavy metals, organic compounds and micro-organisms) that, either by itself or in combination with other substances, when discharged onto or into land or water, changes or is likely to change the physical, chemical or biological condition of that land or water.	Contaminant levels in organic materials and derived products are determined by the inherent contaminant levels in the raw materials processed. Source controls are important in managing and limiting the amounts of these contaminants. For livestock and poultry manure, practices include feed and bedding management as well as control over veterinary medicines. Each industry has issued good advice on these issues. For biosolids they include enforcement of trade waste bylaws.	This Good Practice Guide for the Beneficial Use of Organic Materials on Productive Land (the Guide) covers the application of good quality organic materials, it is not compulsory.

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	Guidelines for historical reference. The Guide contains information and recommendations to assist producers, applicators and consent authorities gain the benefits of applying good quality organic material to land to increase soil fertility and productivity.			
WASTEMINZ-technical guidelines for disposal to land	Technical guidelines for disposal to land, are an amalgamation of requirements and recommendations that regulate how different types of refuse should be managed and disposed of appropriately on land but more specifically in relation to landfill management. This guideline applies to government officials involved in environmental protection, waste management and public health, professionals involved in waste management, environmental consultants, researchers and academics, landfill engineers, community and environmental proponents.	Any substance (including gases, odorous compounds, liquids, solids, and microorganisms) or energy (excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy, or heat: a) when discharged into water, changes or is likely to change, the physical, chemical, or biological condition of water; or b) when discharged onto or into land or into air, changes or is likely to change, the physical, chemical, or biological condition of the land or air onto or into which it is discharged.	Contamination is managed and minimised throughout the disposal to land process	The document has been designed to provide technical guidance on the siting, design, construction, operation, and monitoring for disposal to land.

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Compost New Zealand consent guide	A guide to support with the composting consent process. Provide an overview of primary features of commercial composting regarding consenting. Implementation of relevant and effective resource consent conditions. A list of additional information sources are provided. An overview of the regulatory environment regarding composting is provided. Benefits of composting are discussed. This document applies to compost facility operators, entrepreneurs or companies considering establishing composting facilities, environmental consultants, local and regional governmental authorities, community groups and environmental advocates, academics and scientists.	No formal definition on contamination is described in this document, however mention is made to contamination in relation to the NZS 4454.	The Standard also specifies acceptable levels of physical, chemical and microbiological contamination, and effective control of feedstock will assist the compost operator with avoiding unacceptable contamination of the end product. This is achieved through management plans.	Not a legally binding document but a guide that is frequently used.
Technical Guide 08: The production and use of digestate as biofertilizer	This Technical Guide 8 (TG8) provides specific guidance on the production of high-quality, safe and healthy digestate for use as a fertiliser substitute. It provides a fundamental basis for the AD	No formal definition is offered for contamination. However, feedstock contamination is divided into the following categories heavy metals, persistent organic pollutants,	Robust selection and quality control of feedstock that is accepted for AD. Feedstock pre-treatment to ensure pathogen free digestate	Not a legally binding statutory document but widely used as a guide in New Zealand.

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	facility certification of their digestate as Biofertilizer. Waste management professionals Biogas and Biofertilizer industry engineers and plant operators, farmers and agricultural professionals, environmental consultants and experts, regulatory authorities, scientists and academics, policy makers and planners, agricultural advisors.	physical contaminants, biological contamination.	and to avoid cross-contamination. Process control further avoids cross-contamination of final product with rejected and un-treated product. Strict document and data keeping procedures to enable trace backs if contamination occurs. Pasteurisation to significantly decrease presence of pathogens. Farm cross-contamination is avoided by using dedicated trucks for each farm and specific days of service.	
Organic Materials Guidelines – organic contaminants review	This report supported the amendments made to the *2003 Guidelines for the safe application of Biosolids to Land in New Zealand* through offering a robust review of the contaminant section of the Guidelines. The validity of suggested threshold values and the relevance of chemical targets were reviewed. The review established a framework of reasons at which organic	There is an emphasis on a group of contaminants referred to as emerging organic contaminants (EOCs). The US Geological Survey has defined an EOC as "any synthetic or naturally occurring chemical or any microorganism that is not commonly monitored in the environment but has the potential to enter the environment and cause known or suspected adverse ecological and (or) human health effects.	Contamination is managed through: Products containing EOCs of concern are regulated in importation and manufacturing Improved efficacy of wastewater and sludge treatment processes Regulating limits on yearly loading rates of biosolids applied to land	The Ministry for the Environment New Zealand Water and Wastewater Association (2003) Guidelines for the Safe Application of Biosolids to Land in New Zealand are designed to safeguard the life-supporting capacity of soils, promote the responsible use of biosolids, protect public health and the environment and minimise risk to the New Zealand economy.

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	contaminant concentrations in biosolids should be regulated. This report applies to regional councils, territorial authorities, biosolids producers (like wastewater treatment plants), land managers, and anyone involved in the application of biosolids to land.		Applying and regulating limits on contaminants posing a risk in biosolids	
Organic production protocols – green waste composting and vermiculture	The document describes the protocols that needs to be followed throughout the value chain, including the receiving of certified feedstock, quality control and testing during both processes, final product testing, packaging requirements of the final product, as well as storage and transportation. Apply to individuals, farms, or organizations involved in organic agriculture, gardening, or horticulture.	No formal definition is described in this document.	The finished product are tested by an ISO 17025 accredited laboratory for; nutrients, heavy metals, multi-residue, acidic herbicide test including clopyralid (clopyralid only required if grass clippings is an input source) and carbon/nitrogen ratio.	Internal document compiled by Revital Fertilisers, September 2017 describing the procedures involved in vermiculture and greenwaste processing.
Working towards New Zealand risk-based soil guideline values for the management	This project was conducted to assist the Cadmium Management Group to identify how it will develop a set of New Zealand-derived, risk-based soil guideline values (SGV) to manage cadmium accumulation in soils	Contaminants may be referred to as either threshold or non-threshold contaminants with regard to their effects on human health. Threshold contaminants are those considered to manifest toxic effects only if exposure	Appendix B describes the methodology to protect groundwater. In New Zealand and the United States generic guideline values for the protection of groundwater quality have been developed,	MPI released the strategy document *Cadmium and New Zealand Agriculture and Horticulture: A Strategy for Long Term Risk Management in February 2011 (MAF 2011).*

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of cadmium accumulation on productive land	on production land. The project was funded by the Ministry for Primary Industries and conducted by Landcare Research between December 2011 and May 2012.	exceeds a threshold dose level, and primarily include non-carcinogens. Non-threshold contaminants are carcinogens and are considered to have effects at all levels of exposure. Cadmium is considered a threshold contaminant.	where desired groundwater quality is typically drinking water standard.	The strategy has the objective: To ensure that cadmium in rural production poses minimal risks to health, trade, land use flexibility and the environment over the next 100 years.
It's complicated: A guide to biodegradable & compostable plastic products and packaging	WasteMINZ produced guidelines to provide best practise advise to waste industry, producers, consumers and advertisers regarding biodegradable compostable plastic products and packaging. Main objectives of this guide include: Clarifies some of the terminology used for plastic products (plant or fossil fuel based) that are advertised as compostable, biodegradable or degradable Explains the substantiation (proof) needed to make these claims. Provides information about where to dispose of them.	No definition for contamination is included in this guide.	No significant methodology on control of contamination offered.	Test guides and methods provide a framework or roadmap of steps, criteria, procedures or a general approach but do not provide a pass or fail for degradability or biodegradability.

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Position Statements				
MfE: Compostable packaging position statement	The Ministry for the Environment (MfE) published a position statement in March 2022 describing the Ministry's position on where compostable products could play a role in a circular economy in Aotearoa New Zealand. The position outlined in this document provides information to support Government policy initiatives, including consultation on improving household kerbside recycling collections, the phase-out of single-use and hard-to-recycle plastics, and regulated product stewardship schemes for priority products.	Contamination in the context of this document refers to biodegradables as a contamination source. Consumers often incorrectly believe that compostable products can break down when littered; however, when littered or lost to waterways or the sea, compostable products are contaminants. They are not designed to degrade in these environments. Confusion about compostable products leads to contamination of recycling streams	The Ministry considers that a cautious approach to compostable products is needed. Other jurisdictions are managing the challenges of compostable products and taking similarly cautious approaches. MfE recognises their duty of care to our whenua (land) and our soil.	This document is a position statement, and it does not provide guidance and should not be interpreted as such.
MfE: kerbside materials factsheet	The Ministry has set out to make it easier for people to recycle and divert food scraps from landfills. A consensus exist where people are unsure about can and can't be recycled with items going in incorrect bins.	Not a lot of mention is made regarding organic waste contamination or contamination standards. Brief reference is made that only certain materials could be accepted such as food scraps and FOGO collections.	No materials that could potentially contaminate the soil are accepted, however, this is very broad and lack specifics. Councils will have some discretion over a few materials, such as compostable bin liners. Compliance monitoring is still aligned with the WMA 2008.	The new waste strategy is the driving force behind this factsheet and have legislative power.

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			The way MfE work is guided by their compliance, monitoring and enforcement strategy. Their auditing programme will expand to include the new requirements and auditors may contact local authorities to check on progress. Where non-compliance with the new obligations is found, they may take enforcement action.	
Position statement from New Zealand composters on compostable packaging	Position Statement from New Zealand Composters on Compostable Packaging was issued in February 2019 due to concerns regarding contamination in composting practices. Minimising and eliminating contamination is a crucial area of concern for composters. It is currently challenging for both the public and industry to differentiate between some compostable and non-compostable plastic products, due to their similarity in appearance (such as cups made from PLA and cups made from PET). Removing contamination is both expensive and time-consuming.	Current household collections of food and garden waste are often contaminated with non-compostable items. Therefore, contamination in the context of this paper is defined as non-compostable materials ending up in the compost production chain.	Composting facilities are not willing to accept compostable packaging in household food waste or green waste collections. New Zealand councils have unanimously agreed that until the technology improves to enable non-compostable plastics to be easily identified and removed, current and future council provided kerbside food and green waste collections will not accept compostable packaging.	This document is not legally binding.

Title	What it covers/who it applies to	Definition of contamination	Controls on contamination	Currency and status/powers
Packaging Forum Position Statement on PFAS	The Packaging Forum (PF) initiated a technical advisory group to determine the PF position on PFAS in food-contact packaging and determine, if possible, a pathway forward. The PF in New Zealand is primarily driven by a combination of factors, including scientific research, consumer preferences, and international regulations. These factors influence decisions related to packaging materials, sustainability practices, and waste management strategies within the country.	No definition provided on contamination.	Industry has the capacity to implement a solution. The PF would support the development of national standards and screening protocols and the PF would look to work with stakeholders and regulators to support this development.	Not a legally binding document.
Organic Waste: A position statement from the Zero Waste Network	*Organic Waste: A position statement from the Zero Waste Network* was issued in March 2021 to explain their position on organic waste and the steps needed to deal with the entirety of the value chain. The Zero Waste Network's opinion is that regulatory instruments should be utilised in response to the issue of organic waste, and specifically organics in landfills, and food waste.	Organics are being described as a source of contamination in various waste streams.	Diverting and separately collecting organics is a vital step in improving collection, recovery and recycling of non-organic materials because organics are one of the most significant sources of contamination of different waste streams.	Not a legally binding document.

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Road Derived Sediments (RDS) and Vegetative Material Reuse Feasibility Study (2010)	This document reports the results of a feasibility study investigating the potential to use RDS and vegetative material from the Auckland Motorway network as a feedstock for compost and producing a useful resource. The study also investigates the possible regulatory implications of this option and the feasibility of the AMA operating and managing the composting process from collection to use as compost.	Contamination means the mulch must be effectively composted before use to kill the weed seeds/branches.	Composting standard contamination limits and compares them to typical RDS contaminant levels. Although the proposed standards are related to existing contamination in soils and required "clean up" or management standards they provide a comparison for understanding the potential limitations of applying RDS-containing materials to land.	Not a legally binding document but a feasibility study.

4.0 Comparison of Contaminant Limits

The table below provides a comparison of the contaminants and contaminant limits for the various New Zealand standards and guidelines. All measures are in mg/kg of dry weight for the product/soil.

Contaminant	NZS4454: 2005	BioGro	AsureQuality	NES Standard[1] (soil concentrations)	2017 Guidelines – Organics on Productive Land	Technical Guide 08[2]	MPI Technical Paper No: 2012/06
Chemical (mg/kg dry weight)							
Cadmium (Cd)	3	2 (soil) 1 (compost excl. HW)[3] 0.7 (compost incl. HW)	3	0.8 (rural soil) 3 (residential soil) 230 (HDR soil)[4] 400 (recreation soil) 1,300 (industrial soil)	10	10	1 (soil limit) 1 (minimal risk) 12 (serious risk) 6 (minimal risk, microbial) 86 (serious risk, microbial)
Chromium (Cr)	600	150 (total) 1 (VI)	400	>10,000 (III) VI: 290 (rural soil) 460 (residential soil)	1500	1500	-

[1] Assumed a soil pH of 5; > pH increase concentrations
[2] The TG8 took product contaminant concentration limits from "The Guidelines"
[3] HW is household waste
[4] HDR is high density residential

Contaminant	NZS4454: 2005	BioGro	AsureQuality	NES Standard[1] (soil concentrations)	2017 Guidelines – Organics on Productive Land	Technical Guide 08[2]	MPI Technical Paper No: 2012/06
				1,500 (HDR soil) 2,700 (recreation soil) 6,300 (industrial soil)			
Arsenic (As)	20	20	20	17 (rural soil) 20 (residential soil) 45 (HDR soil) 80 (recreation soil) 70 (industrial soil)	30	30	-
Boron (B)	-	-	-	>10,000	-	-	-
Lead (Pb)	250	100 (soil) 250 (excl. HW) 45 (incl. HW)	200	160 (rural) 210 (residential) 500 (HDR) 880 (recreation) 3,300 (industrial)	300	300	-
Nickel (Ni)	60	35 (soil) 60 (excl. HW) 25 (incl. HW)	60	-	135	135	-
Mercury (Hg)	2	1	1	200 (rural)	7.5	7.5	-

Contaminant	NZS4454: 2005	BioGro	AsureQuality	NES Standard[1] (soil concentrations)	2017 Guidelines – Organics on Productive Land	Technical Guide 08[2]	MPI Technical Paper No: 2012/06
		0.4 (incl. HW)		310 (residential) 1000 (HDR) 1,800 (recreation) 4,200 (industrial)			
Zinc (Zn)	600	300 200 (incl. HW)	575	-	1500	1500	-
Copper (Cu)	300	60 70 (incl. HW)	270	>10,000	1250	1250	-
Organic (mg/kg dry weight)							
DDT/DDD/DDE	0.5	0.2	5.0 (meat) 1.25 (milk fat) 0.5 (eggs)	45 (rural) 70 (residential) 240 (HDR) 400 (recreation) 1,000 (industrial)	-	-	-
Lindane (Hexachlorocyclohexane)	0.02	2.0	2.0	-	-	-	-
Aldrin	0.02	-	-	-	-	-	-
Dieldrin	0.05	-	-	1.1 (rural) 2.6 (residential) 45 (HDR)	-	-	-

Contaminant	NZS4454: 2005	BioGro	AsureQuality	NES Standard[1] (soil concentrations)	2017 Guidelines – Organics on Productive Land	Technical Guide 08[2]	MPI Technical Paper No: 2012/06
				70 (recreation) 60 (industrial)			
Chlordane	0.05	-	-	-	-	-	-
PCP	-	-	-	55 (rural) 55 (residential) 110 (HDR) 150 (recreation) 360 (industrial)	-	-	-
BaP	-	-	-	6 (rural) 10 (residential) 24 (HDR) 40 (recreation) 35 (industrial)	-	-	-
Heptachlor and Heptachlor epoxide	0.02	-	-	-	-	-	-
Hexachlorobenzene (HCB)	0.02	-	-	-	-	-	-
Dioxin							
Total PCBs	0.5	-	-	-	-	-	-

Contaminant	NZS4454: 2005	BioGro	AsureQuality	NES Standard[1] (soil concentrations)	2017 Guidelines – Organics on Productive Land	Technical Guide 08[2]	MPI Technical Paper No: 2012/06
Dioxin-like PCBs (ug/kg dry weight)	-	-	-	0.09 (rural) 0.12 (residential) 0.33 (HDR) 0.52 (recreation) 1.2 (industrial)	-	-	-
TCDD (ug/kg dry weight)	-	-	-	0.12 (rural) 0.15 (residential) 0.35 (HDR) 0.6 (recreation) 1.4 (industrial)	-	-	-
Emerging Organic Contaminants (EOCs) (mg/kg dry weight)							
Nonyl phenol and ethoxylates (NP/NPE)	-	-	-	-	50	50	-
Phthalate (DEHP)	-	-	-	-	100	100	-
Linear alkydbenzene sulphonates (LAS)	-	-	-	-	2600	2600	-
Musks – Tonalide	-	-	-	-	15	15	-
Musks – Galaxolid	-	-	-	-	50	50	-
Pathogens (count)							

Contaminant	NZS4454: 2005	BioGro	AsureQuality	NES Standard[1] (soil concentrations)	2017 Guidelines – Organics on Productive Land	Technical Guide 08[2]	MPI Technical Paper No: 2012/06
E. coli or Faecal coliforms	<100 MPN/g	-	-	-	<100 MPN/g	<100 MPN/g	--
Campylobacter	-	-	-	-	<1/25 g	<1/25 g	-
Salmonella	-	-	-	-	<2 MPN/g	<100 MPN/g	-
Human adenovirus	-	-	-	-	<1 PFU/0.25g	<1 PFU/0.25g	-
Helminth ova	-	-	-	-	< 1/4g	< 1/4g	-

A review of the above data indicates that there is no uniform agreement across all of the standards and guidelines. Cadmium is the only contaminant that is covered by all of the limits. Here the product limits range from 0.7 mg/kg for the Biogro Standard (compost including household waste) 10 mg/kg in the Guidelines for Organics on Productive Land and the Technical Guide 08 (The contaminants considered, and the limits, are the same for the Technical Guide 08 and the Guidelines for Organics on Productive Land which is consistent with the Technical Guide -08 deliberately aligning itself with the Guidelines for Organics on Productive Land).

The three compost standards (NZS 4454, Biogro, and AssureQuality) are broadly similar and cover similar contaminants with, in general, NZS 4454 covering a wider range of contaminants and Biogro having slightly lower limits. The contaminant levels for these standards are consistently lower than the contaminant levels in the Technical Guide 08 and the Guidelines for Organics on Productive Land. It is also worth noting that the various guidelines cover a range of pathogens and emerging contaminants where, of the compost standards, NZS4454 only covers one pathogen, and the others do not cover pathogens or emerging contaminants. None of the standards or guidelines cover PFAS, PFOS or microplastics.

5.0 Conclusions

There are a range of standards and guidelines which provide some coverage of the issue of contamination in the organic waste stream. These standards and guidelines have served to manage contamination in organic waste streams; however, they have been developed independently of each other over time and, while there is some broad alignment, they do not form a comprehensive approach.

Some inconsistencies are notable, such as there is no standard definition of contamination, the range of contaminants covered, and the nominated contaminant thresholds vary – often considerably – between the standards and guidelines. In terms of the controls that have been developed in New Zealand, the focus has been on product and application controls.

There has recently been some development in terms of input controls specifically in relation to organics with kerbside standardisation with guidance on food organics and FOGO collections specifically excluding specific materials.[5] Other non-organic specific input controls include restrictions on single use plastic packaging.

There are some notable gaps. For example, there are no standards or controls for AD digestate (although one is under development by the Bioenergy Association), no specific standards for vermicast/vermicomposting[6], and also no standards for use of manures or biochars.

Very little reference is made to the Treaty of Waitangi/ te tiriti o waitangi and mātauranga Māori, as well as what is acceptable when considering cultural, as well as environmental, human, and animal health.

Finally, there is no consistent framework for updating and integrating emerging new contaminants or processes. This is evident with contaminants such as microplastics and PFAS. It is currently the responsibility of the various industry organisations administrating the standards and guidelines to identify issues, determine thresholds, and formulate a response. Ideally, an agreed process should be incorporated to regularly review the issues, standards and guidelines with accessibility where reference could be made to a commonly held list.

[5] the Standard Materials for Kerbside Collections Notice 2023 (Notice No. 1) - 2023-go4222 - New Zealand Gazette exclsudes paper and cardboard; compostable packaging; tea bags; sawdust from treated timber; animal waste; and ash.

[6] Vermicast is covered to an extent in NZS4454 but it essentially requires a pasteurisation phase, which does not align with industry practice.