Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

New Zealand Rural Waste Minimisation

Phase 1 Risk Assessment

Summary Report

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True North Consulting Ltd

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New Zealand Rural Waste Minimisation Risk Assessment and Waste Prioritisation

Summary Report

November 2015

True North Consulting Ltd.

1 Introduction

What is the background to this project?

In the last few years, investigations undertaken in Canterbury, Waikato and Bay of Plenty indicate that rural waste minimisation could be greatly improved as current waste management practices such as burning and burying may be causing harm to the environment.

The main barriers to better waste management are suspected to be farmer behaviour favouring traditional on-farm disposal methods and a lack of waste minimisation options for farmers.

The Rural Waste Minimisation Project will help us to better understand the risks associated with current rural waste management practices, find viable waste minimisation options and activate positive behavioural change in New Zealand.

Why did we undertake this risk assessment?

The risk assessment was undertaken to determine the impacts on and risks to New Zealand's natural resources (land, water and air), economy, and social and cultural well-beings from current rural waste burning, burying and stockpiling practices.

The intention of this phase of work is to help guide and prioritise activity in the subsequent parts of the project which are:

- To identify new waste minimisation options for rural waste management and assess the technical and economic feasibility of these.
- To develop implementation plans with service providers for feasible waste minimisation options.

What is the aim of this report?

This report establishes the baseline data and aims to identify the risks associated with current disposal practices for rural waste, specifically focusing on the types and quantities of waste generated and relevant disposal behaviours. It provides a better understanding of key issues and priorities for dealing with rural waste.

Environment Canterbury contracted SLR Consulting (NZ) Limited (SLR) to conduct the risk assessment and to create a prioritised list of rural wastes. True North Consulting Ltd has prepared this Summary Report for Environment Canterbury.

2 Methodology

How did we assess the impacts and risks to New Zealand?

The research assessed each rural waste type, associated farming practices, disposal methods and issues arising from these. Using this information, SLR assessed the risk posed by current practices and prioritised the wastes for further consideration.

The risk assessment methodology considered the limitations of the available rural waste survey data and the common on-farm disposal activities of burn, burial and bulk storage.

The methodology included:

- Development of Source/Pathway/Receptor models to understand the source of wastes (e.g. burning of plastics); the pathways through which these wastes could enter the wider environment (e.g. inhalation of

airborne contaminants); and the receptors likely to be affected (e.g. farmers or grazing animals) by the waste types.

- Each waste stream was assessed to determine the risk it poses to the environment, social and cultural well-beings and the economy. The process that was developed for assessing these risks comprised:
  - A calculation of 'likelihood x consequence' on the worst case risks identified through the Source/Pathway/Receptor models to arrive at a risk rating score for each waste stream.
  - Risk justification tables for each waste group that provide the data and justifications for the risk rating score given.
- The following areas were identified and assessed within the framework in order to understand how each variable influences the overall risk:
  - Quantities of waste produced;
  - Toxicity of wastes;
  - Behaviour of wastes along transformation and transmission pathways;
  - Location of disposal points; and
  - Typical farming practices.
- For each waste stream, the risks from burning, burial and bulk storage were assessed and scored. These scores were aggregated and weighted to produce risk ratings for each waste.
- These scores were used to prioritise the wastes according to the risk each poses.

The following rural wastes were not included within the risk assessment:

- *Fertiliser* – a review of the original survey notes indicated that the fertiliser was recorded as a waste when it may have been being stored prior to use.
- *Animal carcasses and organic wastes* – although significant in volume the potential risks are not commensurate to the tonnages. The on-farm practices of using contractors/companies to pick up dead animals (carcasses go to dog food processing plants, etc.) mean on-farm risks will be lower.
- *Domestic household wastes*.

3 Results

What are the risks of current disposal practices?

The key risks identified were:

- Bioaccumulation (build up) of contaminants in the ecosystem;
- Leaching of soil contamination into groundwater and nearby waterways;
- Quantities of wastes produced, particularly chemical wastes in dairy and horticultural activities;
- Release of toxic gases from burning of wastes.

Burning of Rural Wastes

The practice of burning wastes poses the greatest social and environmental risk. The burning of waste generally produces a significant odour through the volatilisation of contaminants and it also produces particulate matter such as contaminated ash. The burning of plastics, packaging, hazardous substances,

treated timber, and building material (e.g. asbestos) are most likely to have an adverse environmental impact and will result in significant volatilisation of contaminants. Waste types such as untreated timber and organic material can result in the significant production of ash. However, the long term social and environmental impacts are likely to be comparatively minor.

The pathway by which these contaminants enter the environment is predominantly via direct and uncontrolled release to the atmosphere. Once airborne these contaminants may travel large distances depending on weather conditions (e.g. wind direction, particle density) where they may be deposited as particulate matter across pastures, waterways, residential dwellings or be directly inhaled by farm workers, and the wider community. Consequently, the pathway by which contaminants enter the environment also influences the extent of contaminant impact.

Key risks associated with the burning of rural wastes include:

- Volatilisation of a range of contaminants which can lead to significant health effects.
- Health impacts affecting local residents, farm workers and/or local community and subsequent lost farm productivity due to time off work.
- Impact on local businesses and tourism from odour and smoke production.
- Particulate matter deposited to sites of ecological and cultural significance.
- Lost economic value due to complete degradation of products, or lost recycling opportunities.
- Impact on local communities (e.g. decreased amenity values, health effects) from direct exposure to air borne contaminants.

Burial of Rural Wastes

A number of waste types such as plastics, packaging, sharps, building waste (e.g. asbestos) and hazardous substances are commonly disposed of in unlined farm pits.

Leaching of contaminants from the pit into surrounding soils and groundwater is the main pathway by which the buried waste affects the wider environment. Therefore the type of waste directly influences the amount and toxicity of the leachate produced. Buried paints, solvents, aerosols, hazardous substances (e.g. agricultural sprays), residual contaminants from plastics and packaging and decomposing organics (e.g. animal carcasses) are the waste types most likely to result in the production of hazardous leachate.

Other notable direct and indirect pathways for contaminant exposure include the direct and uncontrolled release of contaminants to the atmosphere, skin contact with residual waste, inhalation and ingestion of contaminants and surface water flow transporting contaminants from the buried waste to the surrounding environment.

Key risks associated with the burial of rural wastes include:

- Degradation of residual wastes leading to leaching of contaminants to soil reducing the quality of sites of ecological and cultural significance.
- Accumulation of contaminants in soil structure leading to vegetation bioaccumulation.
- Wastes leaching into soil and surface waterways.
- Health impacts from direct dermal contact with residual wastes.
- Buried waste potentially affecting residential property values.
- Inadequate burial of packaging leading to decreased community amenity (e.g. packaging blown to adjacent areas).

Bulk Storage of Rural Wastes

Storage of waste on-farm generally involves stockpiling of waste for later recycling (e.g. scrap metal); storing of waste prior to collection and disposal or recycling via product stewardship schemes (e.g. silage wrap, drums); storing of items for potential reuse (e.g. paints, solvents, agricultural sprays); and general disposal of waste on-farms (e.g. building waste). While all methods pose a potential impact to the environment, storing of items such as paints and solvents presents one of the most significant sources of environmental risk.

Bulk storage also poses a risk by grouping non compatible products together, often over long periods of time and potentially in unsecure/damaged containers. Due to the persistent nature of waste materials such as paints, solvents, and agrichemical sprays, there is a real risk of chemical reaction and chemicals leaching out into the surrounding environment.

For example, if these chemicals then enter surface water runoff there is a potential for widespread impacts to receptors including crops and pastures (e.g. uptake of contaminants via root system), farmer workers (e.g. direct skin contact with contaminated leachate) and sensitive ecological sites (e.g. contaminated leachate entering ground and surface water resulting in fish kills and bioaccumulation).

By comparison, waste types such as metal, concrete and untreated timber are relatively inert and have a lower environmental risk to the environment. However, if stored for long periods of time the waste items may degrade producing contaminants such as iron oxide (e.g. metal corrosion) or concrete dust which have the potential to enter the environment through various pathways.

Key risks associated with the bulk storage of rural wastes include:

- Leaching of wastes breaking down to surrounding environment and sites of cultural significance.
- Lost economic value due to degradation of product from poor storage.
- Health effects from inhalation of degraded packaging or skin contact with residual wastes.
- Fire hazard risk.

Prioritised Wastes List

In general terms, the priority waste types are hazardous chemical wastes (e.g. paints, solvents, agrichemicals) and plastics. Table 1 below lists the prioritised wastes in the following order:

Table 1 Prioritised Wastes

Rank	Rural Waste	Rank	Rural Waste	Rank	Rural Waste
1	Paints, solvents	**15**	Fertiliser bags	**29**	Used wood chip animal bedding
2	Oil containers	**16**	Animal health plastic	**30**	Metal (roofing, metal, wire)
3	Used oil	**17**	Seed bags	**31**	Used machinery/ vehicles
4	Aerosols	**18**	Plastic (pallet wrap)	**32**	Used Tyres
5	Vehicle batteries	**19**	Containers	**33**	Cardboard
6	Waste oil filter	**20**	Drums	**34**	Alcathene pipe offcuts
7	Agricultural sprays	**21**	Glass	**35**	Miscellaneous plastic packaging
8	Drench/dip	**22**	Greenhouse plastic sheeting	**36**	Paper (filter socks)
9	Sharps	**23**	Plastic bags	**37**	Old fence posts
10	Netting	**24**	Household batteries	**38**	Building waste, concrete
11	Animal feed bags	**25**	CCA treated timber	**39**	Twine
12	Baleage wrap	**26**	PVC	**40**	Pallets - wooden untreated
13	Mulch film and crop cover	**27**	Untreated timber offcuts	**41**	Trickle tape irrigation tape
14	Silage wrap	**28**	Plastic		

The list ranks 41 wastes with the highest weighted risk based on the risk score:

- The top 9 rural wastes score highly on the environmental and social (health) risk assessments. However, the respective tonnages for these 9 rural wastes are comparatively less than other wastes.
- The next riskiest wastes are a series of plastics which score relatively high in all risk assessments.
- The wastes which were ranked lower risks are a mixture of plastics, building wastes, metals and wood wastes. These materials placed lower on environmental, social and cultural risk assessments, although some of the materials have reasonable recycling values and tonnages that possibly hint at commercial collection strategies.

What happens now?

The prioritised wastes and the priority waste groups will inform the next phase of the project, which aims to identify new waste minimisation options for rural waste management and assess the technical and economic feasibility of these. Environment Canterbury has contracted Jacobs and Tonkin & Taylor Ltd to undertake this work.

4 Acknowledgements

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