

# Winery Wastewater and Grape Marc Monitoring Report 2012-2013

The purpose of this report is to inform Council of the Compliance Group's ongoing monitoring of the discharge of winery wastewater and grape marc to land for the period 1 July 2012 – 31 May 2013.

This report also provides a summary of the findings from a pilot study undertaken in April 2013 to assess the chemical composition of fresh and aged grape marc to determine potential environmental impacts of discharging this waste by-product on the soil and water environments.

Council has been monitoring winery waste annually since 1999 with reports being produced since 2005.

The 2013 New Zealand Winegrower's Vineyard Register & Annual Report indicates that Marlborough has 73% proportion of the grapes grown in New Zealand; with 23,232 producing hectares and 252,000 tonnes produced in 2013.

Liquid waste from the winemaking process predominantly consists of water used for cleaning floors, equipment, fermentation tanks and barrels. Liquid waste is typically seasonal in nature, with the highest volume generated at vintage time.

Grape marc is the solid end product once grapes have been pressed for juice. It contains seeds, stems, skins and pulp. There is limited information of the chemical composition of grape marc. An estimated 38,000 tonnes of grape marc was produced by Marlborough wineries in 2013.

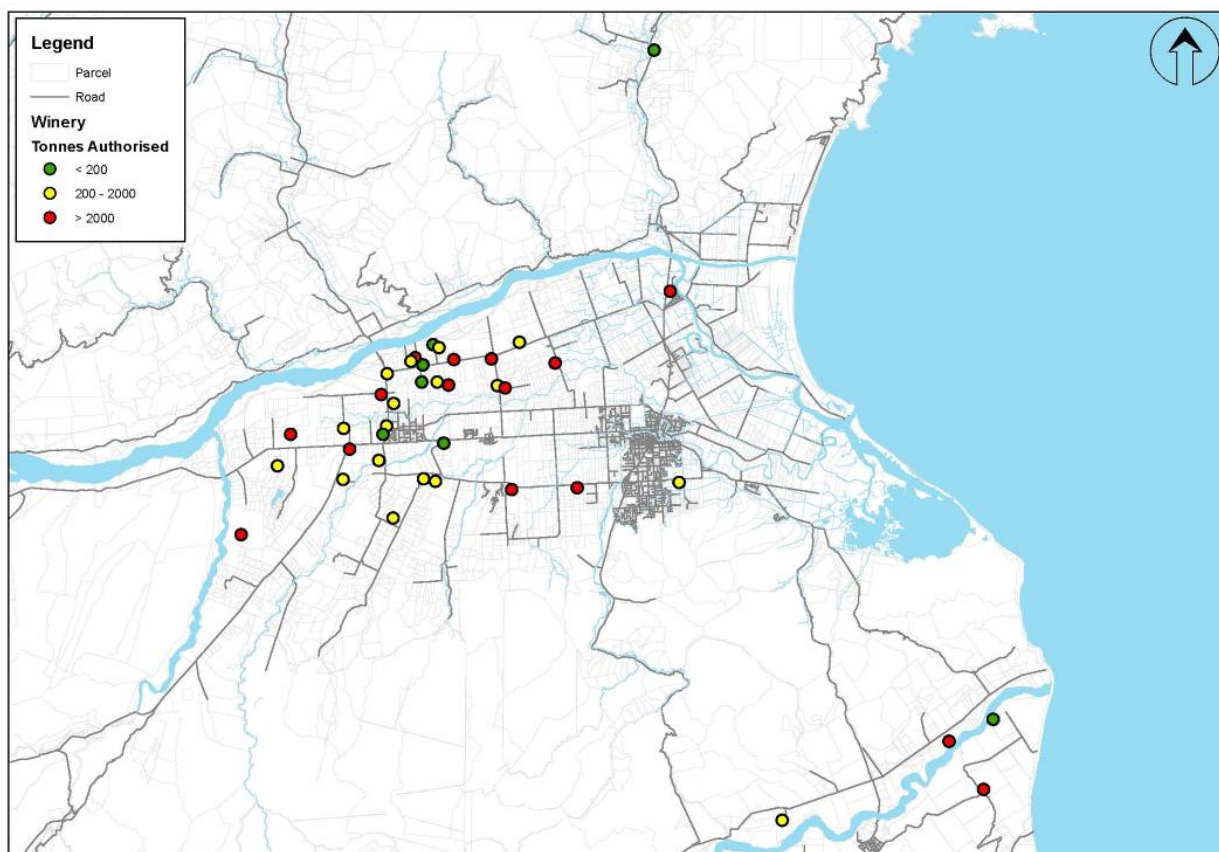


Figure 1: Map of wineries in Marlborough. Different colour dots represent the small (green), medium (yellow) and large (red) wineries.

## Where monitoring was undertaken

There are 39 wineries in the Wairau/Awatare rural zones (Figure 1). Thirty-four wineries are located in the Wairau Plains, one is located north of Blenheim and four are located in the Awatare area. For the 2012/2013

monitoring period 35 wineries were inspected. The 4 wineries that were not inspected process under 100 tonnes. Two wineries do not discharge to land.

Ten wineries were monitored for composting, stockpiling and/or spreading grape marc directly to land under Wairau/Atawere Resource Management Plan (WARMP) standards. The remaining 18 rural wineries and all 9 industrial zone wineries have their grape marc transported offsite for stock feed and/or stockpiling by farmers.

The nine wineries in the Riverlands and Cloudy Bay industrial zones that discharge directly to trade waste were not monitored for the 2013 vintage. Complaints were received about odour from one industrial site which installed a new wastewater system. No other issues were observed for these wineries so they are not discussed further in this report.

### How monitoring was undertaken

For those wineries that discharge wastewater to land, 19 (49%) are monitored by permitted activities under the WARMP rules, 13 (33%) are monitored by resource consent conditions, and 5 (13%) are monitored under a Certificate of Compliance.

Resource consents conditions for discharge of winery wastewater to land are imposed based on the individual wastewater systems and local environments; therefore, conditions vary for each winery. However, most wineries have similar conditions that deal with: wastewater volume; nitrogen loading to the land; wastewater and soil sampling; discharge rate; odour; buffer zones; annual reporting to identify adverse environmental effects; and record keeping.

The WARMP permitted standards for discharge of winery wastewater include: annual wastewater sampling (biological oxygen demand, faecal coliforms, pH); odour; nitrogen loading to the land; discharge rate; buffer zones to boundaries and water bodies; and no discharges into surface water bodies.

A traffic light system was used for the second year to determine the compliance with consent conditions or plan rule permitted activity standards. The feedback from wineries is that this is a positive, useful and welcome approach to monitoring. Conditions or rules assessed as:

- **green** are compliant and no action is required;
- **amber** are assigned for relatively minor breaches requiring some corrective action; and
- **red** are non-compliant and remedial actions may be required.

### Monitoring results

Thirty seven wineries submitted information (e.g., annual reports, wastewater and/or soil sample results) and data (e.g., wastewater volumes, discharge dates, disposal area sizes) to assess compliance. For those that provided information, follow up with many wineries was needed to clarify the information and/or data provided.

Two (5%) wineries (down from 14 (36%) last year) were fully compliant with all conditions or rules and were therefore, assessed as **green**.

Eight (21%) wineries (down from 21 (54%) last year) were assessed as **amber** because one condition or rule was not met (e.g., wastewater results for faecal coliform, pH or biological oxygen demand were not within allowable limits; discharge rates exceeded 10 mm/day). Two wineries (5%) had multiple conditions or rules which were assessed as **amber**. Although wineries provided records for the volumes of wastewater discharged, most did not keep clear and accurate daily records for the volumes and areas that wastewater was discharged to. As such, discharge rates were estimations and they were therefore assessed as **amber**.

Historically the main issue observed during inspections has involved ponding in the disposal fields of wineries. Ponding can occur because irrigation rates are too high; wastewater is applied to soils that have reached field capacity (i.e., irrigating during high rainfall events); the disposal area is too small for the volume of wastewater discharged; mechanical failure and/or poor management of the wastewater system and disposal fields. Over-irrigation can lead to leaching of excess water to groundwater, and with it salts (e.g., sodium [Na+] and potassium [K+]), organic carbons (e.g., sugar and ethanol) and nutrients (e.g., nitrogen and phosphorous) not used by soil microorganisms or held by the soil matrix. Of particular importance is the

potential for Na<sup>+</sup> and K<sup>+</sup> to accumulate in the soil profile, which may result in altered soil structure or poor plant growth.

For this monitoring period there were only several instances of minor localised ponding with no ongoing environmental issues. Short term corrective actions were undertaken to address ponding including: ceasing discharge for the rest of vintage to allow a rest period for the soil; and/or using an alternative disposal area for discharge. The actions taken should have helped to avert the potential for wastewater entering underground aquifers, overloading of soil and altering of soil structure. More long term actions may include soil remediation (soil ripping and planting of different pasture species to improve uptake of wastewater); alterations to the wastewater and irrigation systems for more optimal volumes discharged; or retiring disposal areas and moving to land that is more appropriate for discharge.

Eleven wineries (28%) (last year four wineries 10%) had a number of conditions assessed as **red** because consented annual and daily discharge volumes and discharge rates were breached; only one of two soil samples was taken; or wastewater sample results were not provided. All other conditions were met and assessed as amber or green. These breaches are not considered significant enough to warrant enforcement actions. Instead, for the 2012/2013 monitoring season, some wineries that had previously been assessed as amber in 2012 had not taken on board the comments and recommendation and were therefore assessed as red for 2013.

The 2013 vintage had an increase in the volume of grapes crushed for all wineries yet there was no adverse environmental effects observed at the time of the site inspections. A number of wineries have consequently increased their disposal areas and five wineries have applied for new resource consents to increase their processing capacity.

#### **Overview of results from sampling of grape marc, leachate and soils that received grape marc**

Un-composted grape marc of two different ages was collected for chemical analysis. Fresh grape marc of various wine cultivars was collected directly under wine presses while aged grape marc was collected from uncovered stock piles that were estimated to be at least a year old in farm paddocks.

Leachate was sampled from one fresh grape marc pile and an uncovered aged grape marc pile.

Soil samples were collected from directly under four un-composted grape marc piles (<1 year old) and also control sites deemed not to have been subject to grape marc stockpiling.

Overall results indicate that nitrogen, potassium and phosphorus levels were higher in both the fresh and aged grape marc. Calcium, sulphur, and magnesium were lower in fresh grape marc while sodium was low in fresh and aged grape marc. pH was lowest (most acidic) in fresh grape marc. Of the parameters tested in leachate BOD was significantly higher (63000 g/m<sup>3</sup>) in fresh grape marc compared to aged grape marc (63 g/m<sup>3</sup>).

Overall results from the pilot study indicate that grape marc and its leachate have the potential to cause the following adverse environmental effects if undertaken in a certain location or in an uncontrolled manner:

- Altered soil structure through the accumulation of potassium (K<sup>+</sup>)
- Soil contamination through the accumulation of contaminants (BOD and total suspended solids)
- Surface and/or ground water contamination from nutrients (nitrogen and phosphorus) and organic nutrients (BOD) through leaching, runoff and/or direct discharge
- Reduced amenity values due to odour or visual effects from inappropriately managed discharges
- The mauri of ecosystems, wahi tapu sites and other sites of cultural significance can be adversely affected by inappropriate discharges of effluent and sludge onto or into land.

Mitigation measures should be in place with respect to the discharge of grape marc to land, which could include setbacks from water bodies, requirements for stockpiles to be sited on impermeable surfaces and to be covered to prevent leachate runoff and limit the effects of odour, and provisions around stockpiles for the collection of leachate.

With appropriate controls for the discharge of grape marc to land in place, and if this activity is managed well, grape marc could be used as a soil conditioner, a fertiliser or growth medium.

## **Relationship with industry**

The Compliance Group is taking a proactive and constructive partnership approach to monitoring the discharge of winery wastewater and grape marc with education and relationship building being key objectives. Consequently, good co-operation is received from the industry. The emphasis is on continuous improvement to ensure environmental impacts are minimised or averted and compliance costs to both the Council and wine companies are minimised.

Industry has responded positively to the traffic light rating system as it allows wineries the opportunity to remediate inadvertent breaches and improve operations and management of the wastewater systems. It is anticipated that the increased contact with wineries will lead to greater understanding of the requirements for the discharge of wastewater to land, which should result in more wineries being fully compliant. More importantly, environmental impacts will be identified and remediation actions can be implemented early.

Based on the information provided for Council's compliance reports for the 2012/2013 season, the Compliance Group considers that wineries still need to be more familiar with the permitted activities standards and resource consent conditions for discharging wastewater to land. Some wineries do not appear to have taken on board the recommendations and comments from the previous 2011/2012 monitoring period. In addition, better record keeping is still required by many of the wineries as daily volumes applied for the annual reporting period are poorly documented. As such, daily discharge volumes are often an estimate or cannot be determined, particularly during the non-vintage period.

Meetings and discussions have been held with many wineries and consultants to discuss areas of non-compliance and expectations for the 2014 vintage. These wineries have responded positively to the requirement to undertake corrective actions identified and have demonstrated a willingness to undertake improvements to their operations and/or recording systems.

## **Future activities**

The 2013/2014 season will continue to focus on education about the criteria required for consent conditions and plan rule standards. This is to ensure accurate data is captured, particularly daily discharge volumes for the non-vintage and vintage periods. The Compliance Group's expectation for the 2013/2014 report is that wineries are to provide the required information for consent conditions and plan rule standards. Where this information is not provided, wineries will be assessed as red and enforcement action(s) may be undertaken where wineries have failed to provide information for 3 consecutive years.

For the 2014 vintage there will be a greater focus on checking the sites where grape marc is composted or stored prior to feeding stock to ensure that any adverse environmental effects are minimised.

Information gained from this pilot study will be used for the review of plan standards for the discharge of agricultural waste to land.

Further research should be undertaken to substantiate these results and also to explore the potential benefits of grape marc.

Record No. 1448078