

Meadowvale Stud Farm Piggery  
Monitoring Programme  
Annual Report  
2007-2008

Technical Report 2008–15

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## Executive summary

The Meadowvale Stud Farm piggery is located at Midhirst, in the Manganui River catchment. This report for the period July 2007-June 2008 describes the monitoring programme implemented by the Taranaki Regional Council to assess the Company's environmental performance during the period under review, and the results and environmental effects of the Company's activities.

The Company holds a total of three resource consents, which include a total of 25 conditions setting out the requirements that the Company must satisfy. The Company holds resource consent 0351-3 to allow the discharge of treated effluent to land and into the Rumkeg Creek, consent 5249-1 to allow the discharge of emissions into the air from the piggery site and consent 5416-1 to allow the discharge of treated effluent by spray irrigation onto land.

The Council's monitoring programme for the year under review included five inspections, two wastewater and receiving water physicochemical sampling surveys and one summer biomonitoring survey of the receiving waters.

During the year, the Company has demonstrated a high level of environmental performance and compliance with the resource consents. No unauthorised discharges relating to piggery effluent being discharged to a waterbody and no odour complaints emanating from piggery operations were received by the Council. The Company has greatly increased discharges to land in preference to discharging to water.

The summer biomonitoring survey indicated there is some evidence to suggest the discharge of effluent from the ponds to the Rumkeg Creek was having an influence on these communities, but this influence was not significant. During this period the consent holder had reduced wastewater discharges to surface water by partial irrigation to land.

Meadowvale Piggery Stud Farm addressed minor piggery maintenance issues but was unable to carry out any improvements during the monitoring period because of financial constraints. Escalating grain and fuel prices, and competition from imported pork produce, combined with low schedule market price have impacted on the Company.

Meadowvale are currently growing a few free range pigs for the local 'Farmers Market'. Although this is only a small part of the operation there is a growing demand for the free range product. Meadowvale are limited in the amount of free-range pigs they can grow due to the size of their property.

This report includes recommendations for the 2008-2009 year including a reduction in the inspectorial component of the monitoring programme.



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# **1. Introduction**

## **1.1 Compliance monitoring programme reports and the Resource Management Act 1991**

### **1.1.1 Introduction**

This report is the Annual Report for the period July 2007 to June 2008 by the Taranaki Regional Council and it is the third annual monitoring programme report associated with resource consents held by Meadowvale Stud Farm.

The consent holder operates a piggery situated at Midhirst, in the Manganui catchment, a subcatchment of the Waitara River. The piggery has operated from its current site since 1945 and has held consents since 1977. The piggery has a total of 1900-2000 pigs, which equates to 1475 (50kg) pig equivalents. Meadowvale currently employs up to five fulltime staff.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by Meadowvale Stud Farm relating to discharges to land, water and air.

One of the intents of the Resource Management Act (1991) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Taranaki Regional Council has generally integrated its environmental monitoring programmes and reports the results of the programmes jointly.

### **1.1.2 Structure of this report**

Section 1 of this report is a background section. It sets out general information about compliance monitoring under the Resource Management Act and the Council's obligations and general approach to monitoring sites through annual programmes, the resource consents held by Meadowvale Stud Farm in the Waitara catchment, the nature of the monitoring programme in place for the period under review, and a description of the activities and operations conducted at the Meadowvale Stud Farm.

Section 2 presents the results of monitoring during the period under review, including scientific and technical data.

Section 3 discusses the results, their interpretation, and their significance for the environment.

Section 4 presents recommendations to be implemented in the 2008-2009 monitoring year.

A glossary of common abbreviations and scientific terms and a bibliography are presented at the end of the report.

### **1.1.3 The Resource Management Act (1991) and monitoring**

The Resource Management Act primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

- (a) the neighbourhood or the wider community around a discharger, and may include cultural and socio-economic effects;
- (b) physical effects on the locality, including landscape, amenity and visual effects;
- (c) ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
- (d) natural and physical resources having special significance (e.g., recreational, cultural, or aesthetic);
- (e) risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Taranaki Regional Council is recognising the comprehensive meaning of 'effects' inasmuch as is appropriate for each discharge source. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the Resource Management Act to assess the effects of the exercise of consents.

In accordance with section 35 of the Resource Management Act 1991, the Council undertakes compliance monitoring for consents and rules in regional plans; and maintains an overview of performance of resource users against regional plans and consents. Compliance monitoring, including impact monitoring, also enables the Council to continuously assess its own performance in resource management as well as that of resource users particularly consent holders. It further enables the Council to continually re-evaluate its approach and that of consent holders to resource management, and, ultimately, through the refinement of methods, to move closer to achieving sustainable development of the region's resources.

#### 1.1.4 Evaluation of environmental performance

Besides discussing the various details of the performance and extent of compliance by the Meadowvale Stud Farm Piggery in the Waitara catchment during the period under review, this report also assigns an overall rating. The categories used by the Council, and their interpretation, are as follows:

- a **high** level of environmental performance and compliance indicates that essentially there were no adverse environmental effects to be concerned about, and no, or trivial (such as data supplied after a deadline) non-compliance with conditions.
- a **good** level of environmental performance and compliance indicates that adverse environmental effects of activities during the year were negligible or minor at most, items of concern were resolved positively, co-operatively, and quickly, the Council did not record any verified unauthorised incidents involving significant environmental impacts and was not obliged to issue any abatement notices, there were perhaps some items noted on inspection notices for attention but these items were not urgent nor critical, and follow-up inspections showed they have been dealt with.
- **improvement desirable** indicates that the Council may have been obliged to record a verified unauthorised incident involving significant environmental impacts against the company, and/or abatement notices may have been issued; there were adverse environmental effects arising from activities and intervention by Council staff was required, and there were matters that required urgent intervention, took some time to resolve, or remained unresolved at end of the period under review.
- **poor** performance is used when there were grounds for prosecution or infringement notice

## 1.2 Process description

Piggery wastewater from the various collection sumps passes through a separator screen which provides primary treatment by separation of solid components from the waste. These solids are composted, bagged and sold as garden fertiliser. The separator reduces solids, the biochemical oxygen demand (BOD<sub>5</sub>), and some nutrients contained in the liquid wastewater which is directed to the treatment pond system.



**Figure 1** Piggery and disposal system

- |                             |   |
|-----------------------------|---|
| (1) initial anaerobic pond. | (4) staff gauge at Denbigh Road Bridge  |
| (2) middle anaerobic pond   | (5) offal disposal                      |
| (3) final aerobic pond      | (6) & (7) showing spray irrigated areas |

The treatment pond system consists of three ponds (Figure 1). These have been designed to operate as an initial anaerobic pond, followed by two aerobic ponds. However, the second pond appears to be operating as an anaerobic pond. Therefore in effect there are two anaerobic ponds and one aerobic pond. These ponds are adequately sized for the treatment of the piggery wastes provided that the system is regularly maintained.

From the treatment pond system, effluent is discharged to the Rumkeg Creek or spray irrigated to surrounding farmland which includes neighbouring properties. The Rumkeg Creek is a tributary of the Manganui River in the Waitara catchment and joins the Manganui River 750m downstream of the discharge.

Wastewater from the treatment system is to be discharged to the Rumkeg Creek only when flow conditions provide for at least 250 times effluent dilution. When low receiving water flow conditions preclude this discharge, treated wastewater is to be spray irrigated onto nearby farmland. As insufficient land is available for this purpose on the consent holder's property, agreements have been reached with neighbouring property owners to use their land also.

Wastewater which is spray irrigated to land is pumped from the second treatment pond.

## **1.3 Resource consent**

### **1.3.1 Water and Land discharge permit**

Section 15(1)(a) of the Resource Management Act stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations.

Sections 15(1)(b) and (d) of the Resource Management Act stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

Meadowvale Stud Farm holds consent **0351-3** to discharge treated piggery effluent from a ponds treatment system into the Rumkeg Creek, a tributary of the Manganui River in the Waitara catchment (during high flow conditions) and to discharge piggery effluent to land (see resource consent in Appendix I). This consent was issued by the Taranaki Regional Council on 5 September 2003 as a resource consent under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2015.

The discharge of treated wastewater of this nature may affect the water quality of a stream, particularly if there is insufficient dilution. Some effects may be obvious (e.g. appearance, turbidity) while biological effects may be more subtle.

The discharge of piggery effluent to land greatly improves soil fertility. However it has the potential to contaminate groundwater and surface water if managed inappropriately.

Fourteen special conditions are attached this consent.

#### **Discharge to water**

Special Conditions 1, 2 and 3 define the mixing zone and prohibit effects on the receiving waters.

Special Condition 4 requires the consent holder to operate and maintain the treatment and discharge system to ensure compliance.

Special Condition 5 requires the maintenance of a minimum dilution rate at all times in the receiving water.

Special Condition 6 requires the consent holder to monitor, maintain and supply records of the discharge.

Special Condition 7 requires riparian fencing and planting within 3 years.

#### **Discharge to land**

Special Conditions 8 and 9 limit effluent application rates to land in terms of nutrient loadings.

Special Condition 10 limits the areas and locations of land discharge.

Special Condition 11 prohibits discharge of contaminants to surface water.

Special Condition 12 limits surface ponding of the discharge.

Special Condition 13 requires the consent holder to monitor and maintain records of the land discharge.

Special Condition 14 requires that the discharge to land shall be maximised and used in preference to discharge to water.

### **1.3.2 Air discharge permit**

Section 15(1)(c) of the Resource Management Act stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations.

Meadowvale Stud Farm holds air discharge permit **5249-1** to discharge emissions into the air from a pig farming activity and associated activities, including solids composting, effluent treatment and irrigation and other waste management activities. This permit was issued by the Taranaki Regional Council on 2 September 1998 as a resource consent under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2009.

Piggery effluent has the potential to have significant odour especially when discharged to land. Nine special conditions are attached to this consent.

Special Condition 1 requires the consent holder to adopt the best practicable option to prevent or minimise any actual or likely adverse effects.

Special Conditions 2 and 3 require the consent holder to minimise offsite odour effects.

Special Condition 4 requires the anaerobic pond to be desludged.

Special Condition 5 controls alterations which may significantly change the nature or quantity of contaminants from the site.

Special Condition 6 requires the consent holder to minimise the emissions and impacts of air contaminants from the site.

Special Condition 7 requires the consent holder to operate the piggery and associated activities in accordance with information provided.

Special Condition 8 limits the discharges of suspended or deposited dust at or beyond the boundary of the site.

Special Condition 9 provides for review of any or all of the conditions of this consent.

## **1.4 Monitoring programme**

### **1.4.1 Introduction**

Section 35 of the Resource Management Act sets out an obligation for the Taranaki Regional Council to gather information, monitor, and conduct research on the exercise of resource consents, and the effects arising, within the Taranaki region.

The Taranaki Regional Council may therefore make and record measurements of physical and chemical parameters, take samples for analysis, carry out surveys and inspections, conduct investigations, and seek information from consent holders.

The monitoring programme for the Meadowvale Stud Farm Piggery site consisted of four primary components.

### **1.4.2 Programme liaison and management**

There is generally a significant investment of time and resources by the Taranaki Regional Council in ongoing liaison with resource consent holders over consent conditions and their interpretation and application, in discussion over monitoring requirements, preparation for any reviews, renewals, or new consents, advice on the Council's environmental management strategies and the content of regional plans, and consultation on associated matters.

### **1.4.3 Site inspections**

The Meadowvale Stud Farm Piggery site was visited five times during the monitoring period. With regard to consents for the discharge to water and land, the main points of interest were the piggery waste collection areas, the separator and composting system and the treatment ponds system with potential or actual discharges to receiving watercourses, including potential odour.

As far as practical, inspections in relation to air emissions were integrated with inspections undertaken for other purposes e.g. effluent discharges. The air monitoring programme had been costed on the basis of an integrated approach to resource monitoring.

### **1.4.4 Physicochemical sampling**

The Taranaki Regional Council undertook sampling of both the discharge from the site and the water quality of Rumkeg Creek upstream and downstream of the discharge point and mixing zone.

The treated effluent discharge was sampled on two occasions, and the samples analysed for carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>), chloride,

conductivity, suspended solids, dissolved reactive phosphorus (DRP), un-ionised ammonia, pH, turbidity and temperature.

Rumkeg Creek was sampled on the same two occasions, upstream and downstream of the treated discharge, and the samples analysed for filtered carbonaceous biochemical oxygen demand (FCBOD<sub>5</sub>), chloride, conductivity, suspended solids, dissolved reactive phosphorus (DRP), un-ionised ammonia, pH, turbidity and temperature.

The monitoring programme allows for the discharge and receiving water to be sampled on two occasions.

#### **1.4.5 Biomonitoring survey**

A biological survey was undertaken on 13 December 2007 at three established sites. The bio-monitoring sites surveyed, need to be associated with areas actually receiving the effluent. Because of the increased effluent volume discharged to land and the potential for wastes to enter both ground and surface water, the three sites monitored were upstream and downstream of the tributary that rises in the neighbouring upstream farm, entering the Rumkeg Creek approximately 75 metres upstream of pond one, and downstream of the pond discharge to assess any effect from the ponds.

Taranaki Fish and Game Council in the past had noted impacts on the biological quality of the Manganui River particularly in the vicinity of the Rumkeg Creek confluence. These impacts, and the appearance of 'undesirable heterotrophic growths' on the bed of the Rumkeg Creek from time to time, had indicated the inability of the receiving waters to adequately assimilate the discharge of treated piggery wastes under low flow conditions. As recently as August 2003 these growths had been recorded on the bed of the Rumkeg Creek.

## **2. Results**

### **2.1 Water**

#### **2.1.1 Inspections**

The first inspection for the monitoring period was carried out on 12 October 2007, following a long period of rain. There was a slight breeze and normal piggery odours were emanating from around the piggery. Irrigation to land had not been occurring but the final effluent pond was discharging at an estimated flow rate of 10 litres/second. The staff gauge on the Rumkeg Creek bridge was recorded at 0.5 metres which equates to a river flow of 2725 litres/second. Physicochemical water quality samples were collected from the treated effluent discharge, an upstream site and a downstream site along Rumkeg Creek. The ponds appeared to be operating effectively although there appeared to be a lot more floating solids on the second pond compared to the last inspection. The burial pits had covers on them.

An inspection was carried out 6 December 2007 during wet and windy weather conditions. Treated effluent was being discharged to Rumkeg Creek which was running in a fresh at the time of inspection. Floating solids had accumulated on the second pond surface. No noticeable visual environmental impacts were observed from the discharge when comparing the upstream and downstream monitoring sites. The solids separation area looked good. Slight noticeable piggery odours were emanating from around the site although these were not noticeable beyond the boundary. The burial pits were covered.

An inspection was carried out on 11 February 2008 during overcast and showery weather. Composting of piggery solids was being carried out and looked to be running well. There were normal odours emanating from the general area of the piggery. The pond levels were low at the time of inspection and no discharge to Rumkeg Creek was occurring. The consent holder was spray irrigating partially treated effluent from the middle pond onto the neighbouring property. The burial pits were well covered and there was no noticeable odour.

The inspection on 2 April 2008 was undertaken during fine and overcast weather. There was no wind and there were only normal piggery odours onsite. The solids separator had been emptied recently. The offal pits were covered. The ponds were discharging and water quality samples were taken. The discharge was estimated at 60 litres/minute. Partially treated effluent was being spray irrigated to land via the travelling irrigator at the time of inspection.

The final inspection of the monitoring period was carried out on 11 June 2008, during fine, calm weather conditions. Normal piggery odours were noted around the site but not beyond the boundary. The area in front of the solids separator was rather messy but the overflow was going into the pond system. The ponds were not discharging at the time of inspection. The offal pits were covered. The Manager produced a copy of the recorded times and river levels during discharges to Rumkeg Creek. The irrigator was used approximately 4 hours daily in 1 hour periods to prevent any runoff occurring. The pig numbers have been down a bit and sow numbers were at 170. At inspection the piggery was generally working well.

## 2.1.2 Results of discharge monitoring

### 2.1.2.1 Treated piggery wastewater

Prior to the 2007-2008 monitoring period the treatment ponds system had been sampled for various reasons. These results are summarised in Table 1. (Note that the treatment system has varied in design over the sampling periods).

**Table 1** Summary of treated wastewater analyses from the Meadowvale Stud Farm piggery for the period 1992 to June 2007

Parameter	Unit	Number of samples	Range	Median
Conductivity @ 20°C	mS/m	21	16.4-398	199
pH		16	7.7-8.6	8.0
Total carbonaceous BOD <sub>5</sub>	g/m <sup>3</sup>	22	12-360	120
Filtered carbonaceous BOD <sub>5</sub>	g/m <sup>3</sup>	8	6.2-46	10.5
Ammoniacal nitrogen	g/m <sup>3</sup> N	23	4.76-410	192
Dissolved reactive phosphorus	g/m <sup>3</sup> P	18	1.1-49.8	32.2
Turbidity	NTU	7	12-280	150
Suspended solids	g/m <sup>3</sup>	25	17-750	300

These results illustrate the variability in piggery effluent quality measured from this system over the period prior to the current consent monitoring programme. Some of this variability has been related to stormwater infiltration into the system and may also have coincided with changes in the configuration and degrees of treatment provided by the treatment system over the period surveyed.

The analytical results for turbidity (NTU) shown in the above table differ slightly from those in previous reports because the previous turbidity meter (nephelometry, Hach 2100A meter) was replaced with a new (WTW Cyberscan) turbidity meter in 2005.

**Table 2** Summary of treated wastewater analyses from the Meadowvale Stud Farm piggery for the period July 2007 to June 2008

Parameter	Unit	12 October 2007	2 April 2008
Conductivity @ 20°C	mS/m	144	16.4
pH		-	-
Total carbonaceous BOD	g/m <sup>3</sup>	120	12
Ammoniacal nitrogen	g/m <sup>3</sup> N	147	4.76
Dissolved reactive phosphorus	g/m <sup>3</sup> P	30.8	1.1
Turbidity	NTU	145	12
Suspended solids	g/m <sup>3</sup>	200	17
Temperature	°C	-	14.4
Chloride	g/m <sup>3</sup>	49.1	15.9

Monitoring of wastewater during the 2007-2008 year indicated an improvement in effluent quality at the time of the second sampling. In terms of comparison with historical effluent quality the April 2008 sampling has very low concentrations for all parameters measured; the results were outside the range of all previous sampling at the site. The very low concentrations in the wastewater discharge in April 2008 were due to an increase in discharge from the pond in the days prior to sampling followed by high rainfall and increased stormwater entering the pond system; causing the discharge to be much more diluted.



Figure 2 Aerial photograph of monitoring sites

## 2.1.3 Results of receiving environment monitoring

### 2.1.3.1 Receiving waters physicochemical monitoring

Figure 2 shows the Meadowvale piggery site in relation to the receiving waters of Rumkeg Creek and Manganui River. Te Popo Stream also borders the Meadowvale property on the southern side. Environmental monitoring sites are also illustrated in relation to the piggery operation.

The sites monitored for physicochemical purposes are listed in Table 3.

**Table 3** Location of sampling sites in Rumkeg Creek, a tributary of the Manganui River

Site	Site code	Map reference	Location
Rumkeg Creek	RKC000197	Q20:186124	20 meters upstream of piggery discharge
Piggery effluent	PGP002001	Q20:189125	At discharge outlet from aerobic pond
Rumkeg Creek	RKC000198	Q20:188127	Denbigh Road Bridge

### 2.1.3.2 October 2007 survey

Results of the survey performed on 12 October 2007 are presented in Table 4.

**Table 4** Results from Meadowvale Stud Farm piggery and Rumkeg Creek, sampled on 12 October 2007

Site location		Rumkeg Creek u/s	Piggery final effluent	Rumkeg Creek d/s
Site code		RKC000197	PGP002001	RKC000198
Parameter	Unit			
Temperature	°C	11.1	-	11.1
Conductivity @ 20°C	mS/m	8.3	147	8.6
Chloride	g/m <sup>3</sup>	9.5	49.1	9.3
pH		7.2	-	7.2
Total carbonaceous BOD <sub>5</sub>	g/m <sup>3</sup>	-	120	-
Filtered carbonaceous BOD <sub>5</sub>	g/m <sup>3</sup>	0.9	-	1.1
Ammoniacal nitrogen	g/m <sup>3</sup> N	0.202	147	0.494
Unionised ammonia	g/m <sup>3</sup> NH <sub>3</sub>	0.00079	-	0.00193
Dissolved reactive phosphorus	g/m <sup>3</sup> P	0.056	30.8	0.121
Turbidity	NTU	4.4	145	4.7
Suspended solids	g/m <sup>3</sup>	5	200	4

These results indicate that the treated effluent discharge dilution ratio at the time of sampling was above the required minimum ratio of 1:250 as set out in special condition 6. Special conditions 2 & 3 (unionised ammonia, filtered carbonaceous BOD<sub>5</sub> and turbidity) limits were in compliance, 50 metres downstream from the treated effluent discharge point.

The final effluent BOD<sub>5</sub> and suspended solids showed slightly elevated results indicating that further desludging of the anaerobic ponds system and maintaining effective solids removal in the separation process will further improve these results. This survey was done before contractors desludged both (top and middle) anaerobic ponds.

### 2.1.3.3 April 2008 survey

Results of the survey performed on 2 April 2008 are presented in Table 5.

**Table 5** Results from Meadowvale Stud Farm piggery and Rumkeg Creek, sampled on 2 April 2008

Site location		Rumkeg Creek u/s	Piggery final effluent	Rumkeg Creek d/s
Site code		RKC000197	PGP002001	RKC000198
Parameter	Unit			
Temperature	°C	14.2	14.4	14.3
Conductivity @ 20°C	mS/m	11.2	16.4	11.7
Chloride	g/m <sup>3</sup>	13.8	15.9	14.3
pH		7.4	-	7.5
Total carbonaceous BOD <sub>5</sub>	g/m <sup>3</sup>	-	12	-
Filtered carbonaceous BOD <sub>5</sub>	g/m <sup>3</sup>	0.7	-	0.8
Ammoniacal nitrogen	g/m <sup>3</sup> N	0.065	4.76	0.568
Unionised ammonia	g/m <sup>3</sup> NH <sub>3</sub>	0.0005	-	0.00559
Dissolved reactive phosphorus	g/m <sup>3</sup> P	0.024	1.1	0.141
Turbidity	NTU	1.8	12	2.7
Suspended solids	g/m <sup>3</sup>	2	17	2

These results indicate a very high dilution of stormwater in the final aerobic pond showing insignificant environmental effects from the treated discharge, between the upstream and downstream monitoring sites on the Rumkeg Creek. Wastewater discharge records received from the consent holder show a discharge had occurred for up to three days prior to sampling. 151.5mm of rain was recorded at the TRC (Stratford) weather monitoring station and the Rumkeg Creek had been running in a fresh during this same period. Normally physicochemical wastewater discharge and stream samples are collected under normal stream flow conditions (i.e. not during a stream fresh) but low river flow conditions due to severe drought conditions had prevented the consent holder discharging prior to this period.

#### 2.1.4 Biological receiving water monitoring

The Council's standard 'kick-sampling' technique was used at three established sites to collect streambed macroinvertebrates from the Rumkeg Creek in order to assess whether the Meadowvale Piggery has had any adverse effects on the macroinvertebrate communities of these streams. Samples were processed to provide number of taxa (richness), MCI and SQMCI<sub>5</sub> scores for each site.

**Table 6** Biomonitoring sites in Rumkeg Creek and the Manganui River, surveyed in relation to Meadowvale Piggery

Site No	Site code	Map reference	Location
1	RKC000196	Q20:186 124	400 metres upstream of Denbigh Road bridge
2	RKC000198	Q20:188-126	Denbigh Road bridge
M1	MGN000195	Q20:190-130	Upstream of confluence with Rumkeg Creek

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The SQMCI<sub>5</sub> takes into account taxa abundances as well as sensitivity to pollution. It may indicate subtle changes in communities, and therefore be the more

relevant index if non-organic impacts are occurring. Significant differences in either the MCI or the SQMCIs between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

The macroinvertebrate survey conducted on 13 December 2007 indicated that the discharge from the Meadowvale Piggery, being both the discharge from the oxidation ponds, and also through irrigation onto land, in the month preceding this survey had no detrimental effects on the macroinvertebrate communities of the Rumkeg Creek. Further, no undesirable heterotrophic growths were observed on the streambed at the time of the survey. This is consistent with the compliance of the discharge with special conditions of resource consent 0351-3, where, allowing for a mixing zone of 50 metres below the discharge point, the discharge shall not give rise to any significant adverse effects on aquatic life, habitats or ecology in the Rumkeg Creek.

The macroinvertebrate communities of the Rumkeg Creek contained high proportions of 'sensitive' taxa at all sites and the communities were generally dominated by 'sensitive' taxa. Taxonomic richness (number of taxa) was similar between all three sites, and any differences in MCI between sites U and 1 were attributable to subtle changes in community composition, such as rare (i.e., less than five individuals) taxa that were present at one site but not the other. The reduction in the MCI score from site 1 to site 2 is not considered a statistically significant change but may still be attributable to the discharge from the piggery. This is supported by the significant drop in SQMCIs score and also the appearance of some taxa that are tolerant, and occasionally associated with, waters that are organically enriched. However, the effects were subtle enough, that any effect of the discharges from the effluent ponds on the macroinvertebrate communities of the Rumkeg Creek can not be considered significant.

There is no evidence to suggest that the discharge of effluent from Meadowvale Piggery to land was having an adverse effect on the macroinvertebrate communities of the Rumkeg Creek in the weeks preceding this survey. There is some evidence to suggest that the discharge of effluent from the effluent ponds to the Rumkeg Creek was having an influence on these communities, but this influence was not significant.

### **2.1.5 Gauging water flow**

To determine flow rates in the Rumkeg Creek a rating curve is maintained by Council. This enables the consent holder to assess treated wastewater discharge compliance with the minimum dilution ratio of 1:250 (one part effluent to two hundred and fifty parts receiving water flow).

The staff gauge installed on the Denbigh Road bridge provides the consent holder with the stream level (or height) and a rating chart produced by Council showing water flow rates at any given stream rate. This rating was reviewed during the 2006-2007 year.

### **2.1.6 Liaison with consent holder**

During the 2007-2008 monitoring period, the Taranaki Regional Council liaised with the consent holder regarding several operational issues, additional to those required in the monitoring programme. These included matters such as annual draft reports, compliance fees, pond maintenance, biomonitoring, piggery operations, Overseer nutrient programme, etc.

## **2.1.7 Treated effluent discharge records**

### **Discharge to water**

Special Condition 6 of consent **0351-3** requires a minimum dilution rate of 1 part effluent to 250 parts receiving water at the point of discharge and is to be maintained at all times during discharge events.

Special condition 7 of consent **0351-3** requires the consent holder shall monitor and maintain discharge records, including date, time, rate, staff gauge reading and duration of discharge. These records are to be supplied to the Council quarterly or as requested.

During the 2007-2008 monitoring period the Council received from Meadowvale Piggery, records showing 73 daily discharges to the Rumkeg Creek. These records indicated that the consent holder maintained a minimum dilution rate of 1 part effluent to 250 parts receiving water at the point of discharge on most occasions. 77 daily discharges were recorded during the previous 2006-2007 monitoring period.

### **Discharge to land**

Special condition 14 of Consent **0351-3** requires that the consent holder shall monitor and maintain records of discharge, including date, application area, rate and duration of discharge. These records are to be supplied to the Council quarterly or as requested.

Special condition 15 of consent **0352-3** requires the consent holder to maximise discharge to land in preference to discharge to water.

During the 2007-2008 monitoring period no records were received by Council in relation to discharge to land although the consent holder had recorded pump irrigating hours.

The consent holder is trialling the Overseer nutrient budget program, initially developed for dairy farmers, to assist in managing application of dairy effluent to land. Recognising that the nutrient composition of pig manure is different to cow manure, the NZPIB is undertaking work to identify pig manure values so these can be incorporated into the Overseer program to assist nutrient management for pig farmers.

Greater emphasis in monitoring the effluent application rates to land is required to ensure that the effluent application rate does not exceed the recommended 200 kg nitrogen/ha/year, during the 2007-2008 monitoring period.

The Council strongly encourages pork producers to use systems that discharge pig manure to land rather than water. The nitrogen content of piggery manure is usually the major determinant of land area required.

## **2.2 Air**

### **2.2.1 Inspections**

As far as was practicable, inspections in relation to air emissions were integrated with inspections undertaken for other purposes e.g., effluent discharges. The air monitoring programme had been costed on the basis of an integrated approach to resource monitoring.

### **2.2.2 Results of air monitoring**

Odours emitted from normal piggery operations are influenced mainly by weather conditions (i.e. wind direction), operating of the oxidation treatment ponds, solids storage & disposal, irrigating to land and general piggery hygiene operations.

The offensiveness of odour is reliant on individual perception, Council methods of measurement, and management practices of the pork producer. The Environmental Management System (EMS) deals with piggery operational practices ensuring the effect of odour is taken into account when the pork producer is undertaking activities relating to areas of the piggery.

All inspections carried out during the monitoring period found only slight odours were occurring around the separator and pond areas.

### **2.3 Register of incidents**

The Taranaki Regional Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The register ('unauthorised incident register') includes events where the Company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

Incidents may be alleged to be associated with a particular site. If there is an issue of legal liability, the Council must be able to prove by investigation that the identified Company is indeed the source of the incident. (or that the allegation cannot be proven).

In the 2007-2008 year no unauthorised incidents were recorded by the Council in relation to the Meadowvale Stud Farm Piggery.

### 3. Discussion of plant performance

During the year, the Company has demonstrated that a high level of environmental performance and compliance issues relating with the resource consents was achieved.

Meadowvale Piggery Stud Farm has not completed programmed improvements and only minor upgrades have been carried out during the monitoring period. This was due to another year of financial constraint caused by increased fuel and feed prices and competition from imported pork produce. Grain prices have increased from \$300 to \$500 a tonne due to drought and biofuel demands.

A power saving initiative has been made by installing a submersible pump controlled by a level switch which pumps separated liquids as required and does not operate continuously as before. This has eliminated some odour around the step screen as less liquid waste is being drained off the bins.

During the monitoring period desludging of the anaerobic ponds was not required. This task was carried out the previous year and should be programmed for the 2009-2010 period. The middle pond still requires removing of an island, floating on the pond surface, to help prevent the pond from overloading and short-circuiting. Overloaded ponds reduce the effectiveness in breaking down organic matter. A well maintained pond treatment system, comprising of an anaerobic and aerobic pond in series, can achieve up to 95% BOD removal, and up to 70% nitrogen reduction. The BOD<sub>5</sub> concentration recorded from the final piggery effluent at the time of the survey performed toward the end of the 2007-2008 monitoring period was slightly lower, compared with previous results.

No piggery odour complaints were received by the Council during the 2007-2008 monitoring period nor were there any complaints received by the consent holder. Staff ensured spray irrigation occurred during favourable wind conditions; the disposal of pig carcasses was to a well managed, covered offal pit and in general, staff and management maintained a reasonably tidy workplace.

Continual piggery operational improvements to manage odour discharges to air are required to prevent potential odour problems. The RMA (1991) requires that *'there should be no offensive or objectionable odour beyond the boundary of the farm'*. Compliance with managing discharges to air is mentioned in the EnviroPork work book and it would be prudent for the Consent holder to discuss these guidelines with the New Zealand Pork Industry Board (NZPIB).

The absence of 'sewage fungus' growth on the Rumkeg Creek streambed was again the direct result of limiting the discharge of effluent until conditions which provided adequate dilution occurred or discharge to land was carried out.

Records received by the Council show slightly reduced discharges to Rumkeg Creek and increased discharges to land. Discharge to land was maximised as the Company was unable to discharge treated effluent during periods of low flow during a moderate summer drought. The nitrogen content of piggery manure discharged to land is usually the major determinant of the land area required. For this reason it is important to keep accurate spray irrigation records to prevent exceeding an application rate of 200kg N/hectare/year.

Some maintenance needed to be carried out strengthening the effluent pond walls. Erosion, cattle and mechanical damage had occurred, thinning the pond walls in

some areas. Ponds should be maintained at lower levels until the pond walls have been repaired.

Meadowvale has up to 1800 pig units onsite at any one time. The number of sows has been decreased from 200 to 170 breeding sows, they also have 40 gilts (young breeders), 12 boars, 400 piglets on sows (up to 4 weeks old in farrowing crates), 500 weaners (up to eleven weeks old) and 800 growers up to 21-22 weeks old before going to the market.

The feeding program has been up-graded resulting in pigs going to market ten days earlier with an average weight gain of 2 kilograms.

The diet includes fish meal and a higher percentage milk powder for the young piglets/weaners and 1,800 litres of either whey, cream or brewers yeast (ex brewery) for the growers and sows.

Mixed feed includes 75% barley (some wheat), 5% dried blood (Walkers Hawera), 18% meat and bone meal (Taranaki by Products), and 2% vitamins and minerals. This new feeding regime was started late November 2006 and to date, no noticeable environmental effects (mainly odour) have been recorded.

### **3.1 Environmental effects of exercise of water and land discharge permit**

#### **3.1.1 Exercise of water discharge consent**

The physicochemical monitoring indicated that the discharge of treated piggery effluent into Rumkeg Creek had resulted in no adverse downstream environmental effects. The absence of 'sewage fungus' growth on the Rumkeg Creek streambed was a direct result of discharging effluent only under high flow conditions, allowing sufficient dilution and otherwise irrigating to land. The consent holder complied with the required dilution ratio of 1:250 on all but one occasion.

Piggery effluent is about ten times more concentrated than dairy effluent and consequently has greater polluting potential. Piggery waste assimilation may remove much of the available oxygen in the receiving water and add excess amounts of nutrients (nitrogen and phosphorus), leading to the formation of nuisance biological growths on streambeds.

#### **3.1.2 Exercise to land discharge consent**

Wastewater discharge to land is generally preferred over discharging to flowing surface waters. However, land discharge can have adverse effects on surfacewater, groundwater and grazing stock if not appropriately managed.

The application of nutrients (in particular, nitrogen, phosphorus, and potassium) in excess of plant uptake can result in leaching of nutrients to groundwater. In addition, irrigating too close to a waterbody or in excess of soil hydraulic conductivity can result in runoff to waterbodies.

It is important that the consent holder keeps records of all land discharges to minimise any environmental effects and to be able to monitor the application as part of best management practices to eliminate any irrigation run off to neighbouring

waterbodies (Te Popo Stream and Rumkeg Creek) thus preventing any unauthorised discharges to a waterbody.

## 3.2 Environmental effects of exercise of air discharge permit

### 3.2.1 Exercise of air consent

Operations at the piggery have resulted in some objectionable odour off site from time to time. Odour has been the result of general operations and adverse weather conditions. As the piggery is located on a small site within a residential area in Midhirst there is no real buffer zone.

The RMA (1991) requires that there should be no offensive or objectionable odour beyond the boundary of the farm.

The pork industry ('EnviroPork') guide to managing environmental effects, deals with management practices ensuring the effect of odour is taken into account when undertaking activities relating to farm operations.

No complaints concerning piggery odour emissions were received by the Council during the 2007-2008 monitoring period.

## 3.3 Evaluation of performance

A tabular summary of the Company's compliance record for the year under review is set out in Table 7 and Table 8.

**Table 7** Summary of performance for consent 0351-3 discharge of treated piggery effluent to Rumkeg Creek and land

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Operation and discharge in accordance with application	Inspection of data and discharge point monitoring	Yes
2. Maximum concentrations in receiving water after mixing	Physicochemical sampling	Yes
3. Maximum increase in turbidity after mixing	Physicochemical sampling	Yes
4. Constituents not permitted in receiving water after mixing	Monitoring inspections of receiving waters	Yes
5. Operation and maintenance of treatment and discharge system	Monitoring Inspections	Yes
6. Minimum dilution rate in receiving waters	Discharge records and monitoring	Yes - on all but one occasion
7. Records of discharge	Discharge records received by Council	Yes
8. Riparian fencing and planting	Monitoring inspections and liaison with consent holder	N/A
9. Maximum effluent application rate to land	Liaison with consent holder	Yes

Condition requirement	Means of monitoring during period under review	Compliance achieved?
10. Mitigating measures for high effluent application rate to land	Not yet assessed by Council	N/A
11. Proximity of discharge to dwelling or water body	Inspections	Yes
12. Contamination of surface water not permitted from land irrigation	Monitoring inspections	Yes
13. Extended surface ponding not permitted	Monitoring inspections	Yes
14. Records of discharge to land	Records	Yes
15. Maximisation of discharge to land over water	Records and monitoring inspections	Yes
16. Optional review provision	Not scheduled for consideration in year under review. Next optional review June 2010	N/A

**Table 8** Summary of performance for consent 5249-1 discharge of emissions into the air and waste management activities

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of action to minimise adverse environmental effects	Monitoring inspections	Yes
2. Action to minimise offsite odour effects	Monitoring inspections	Yes
3. Objectionable odour at site boundary not permitted	Monitoring inspections	Yes
4. Desludging of anaerobic pond and related notification prior to action	Monitoring inspections	Yes
5. Consultation and approval prior to alterations to plant or process	Liaison with consent holder	Yes
6. Minimise impacts and emissions through use of equipment	Monitoring inspections and liaison with consent holder	Yes
7. Operation in accordance with application	Monitoring inspections	Yes
8. Objectionable dust levels at site boundary not permitted	Monitoring inspections	Yes
9. Optional review provision	Last review date was June 2003. Consent expires June 2009	N/A

N/A = not applicable

During the year, Meadowvale Stud Farm Piggery has demonstrated a high level of environmental performance and compliance with the resource consents.

### 3.4 Recommendations from the 2006-2007 Annual Report

In the 2006-2007 Annual Report, it was recommended:

1. THAT monitoring of air emissions from the Meadowvale Stud Farm piggery in the 2007-2008 year continue at the same level as in the 2006-2007 period.
2. THAT monitoring of wastewater discharges from the Meadowvale Stud Farm piggery in the 2007-2008 year continues, and increase from two to three physicochemical surveys if receiving water conditions require such an increase.
3. THAT the piggery inspections in the 2007-2008 period be reduced from six inspections as in the 2006-2007 period to four inspections and these inspections be carried out tri-monthly.
4. THAT the consent holder continues to clean the anaerobic ponds and final (aerobic) pond of accumulated solids every two years or as required thereby providing the necessary retention time in the system for adequate wastes treatment.
5. THAT the consent holder be advised that maximisation of land discharge (required by Special Condition 15 of consent **0351**) be complied with, and that close attention be given to maintenance of sufficient dilution of any discharge of treated wastes in the receiving waters to prevent the development of any 'undesirable biological growths' on the bed of Rumkeg Creek.
6. THAT the consent holder provides the Council with details of the location of areas to be irrigated with piggery wastes and provide records as required by Special Condition 14 of Consent **0351**.

Recommendation 1 was carried out, Recommendation 2 was carried out but an increase in sampling was not required. Recommendation 3 was partly carried out, five inspections were undertaken. Recommendation 4 was not required but the ponds are scheduled to be cleaned out in the 2008-2009 monitoring period. Recommendations 5 and 6 were implemented in 2007-2008.

### 3.5 Alterations to monitoring programmes for 2008-2009

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki emitting to the atmosphere/discharging to the environment.

In consideration of the Meadowvale Piggery's environmental performance in regard to treated piggery wastewater discharge and its effects, it is recommended that piggery inspections carried out by Council be reduced from six to four monitoring inspections per year.

It is also recommended that provision be made for physicochemical impact monitoring to continue from twice per year to three times per year, under normal stream flow conditions (i.e. not during stream freshes). This extra sampling run will

only to be undertaken if the downstream receiving waters are showing signs of adverse environmental effects (i.e. presence of 'sewage fungus' in the Rumkeg Creek or high waste loadings from the treatment system).

### **3.6 Exercise of optional review of consents**

Consent **0351-3** held by Meadowvale Stud Farm Piggery provides for review in 2010.

Consent **5416-1** held by Meadowvale Stud Farm Piggery does not provide for an optional review in 2008 and expires June 2009.

Consent **5249-1** held by Meadowvale Stud Farm Piggery does not provide for an optional review in 2008 and expires June 2009.

## 4. Recommendations

1. THAT monitoring of air emissions from the Meadowvale Stud Farm piggery in the 2008-2009 year continue at the same level as in the 2007-2008 period.
2. THAT monitoring of wastewater discharges from the Meadowvale Stud Farm piggery in the 2008-2009 year is altered from two to three physicochemical surveys if receiving water conditions require such an increase.
3. THAT the piggery inspections in the 2008-2009 period be reduced from six inspections as in the 2007-2008 period to four inspections and these inspections to be carried out tri-monthly.
4. THAT the consent holder continues to clean the anaerobic ponds and final (aerobic) pond of accumulated solids every two years or as required thereby providing the necessary retention time in the system for adequate waste treatment.
5. THAT the consent holder be advised that maximisation of land discharge (required by Special Condition 15 of consent 0351) be complied with, and that close attention be given to maintenance of sufficient dilution of any discharge of treated wastes in the receiving waters to prevent the development of any 'undesirable biological growths' on the bed of Rumkeg Creek.
6. THAT the consent holder provides the Council with details of the location of areas to be irrigated with piggery wastes and provide records as required by Special Condition 14 of Consent 0351.

## Glossary of common terms and abbreviations

The following abbreviations and terms are used within this report:

biomonitoring	assessing the health of the environment using aquatic organisms
BOD	biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate
BODF	biochemical oxygen demand of a filtered sample
bund	a wall around a tank to contain its contents in the case of a leak
CBOD	carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate
condy	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m
DO	dissolved oxygen
DRP	dissolved reactive phosphorus
fresh	elevated flow in a stream, such as after heavy rainfall
g/m <sup>3</sup>	grammes per cubic metre, and equivalent to milligrammes per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures
l/s	litres per second
MCI	macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats
mS/m	millisiemens per metre
mixing zone	the zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NH <sub>4</sub>	ammoniacal nitrogen, normally expressed in terms of the mass of nitrogen (N)
NH <sub>3</sub>	unionised ammonia nitrogen, normally expressed in terms of the mass of nitrogen (N)
NO <sub>3</sub>	nitrate, normally expressed in terms of the mass of nitrogen (N)
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water
pH	a numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.

physicochemical	measurement of both physical properties(e.g. temperature, clarity, density) and chemical determinants ( e.g. metals and nutrients) to characterise the state of an environment
resource consent	refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15)
RMA	Resource Management Act 1991 and subsequent amendments
sewage fungus	Growths of bacteria and/or fungi responding to increased concentrations of organic material in the water.
SS	suspended solids,
temp	temperature, measured in °C
turb	turbidity, expressed in NTU
UIR	Unauthorised Incident Register entry- an event recorded by the Council on the basis that it had potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan

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## **Appendix I**

### **Resource consents held by Meadowvale Stud Farm Piggery**



**Appendix II**  
**Biomonitoring report**



## **Appendix III**

### **Flow rating for Rumkeg Creek**



## Rumkeg Creek above Confluence

### River Height vs Flow Values

Prepared for Meadowvale Stud Farm Limited

(reviewed March 2007)

A staff gauge has been installed on the Rumkeg Creek Denbigh Road Bridge for monitoring of the river level (or height).

Table 1 shows river levels at this bridge and the corresponding flow for each level. All flows are expressed in litres per second.

River Level	Flow (litres/second)	River Level	Flow (litres/second)
0.1	20	0.5	2,726
0.11	24	0.51	2,959
0.12	29	0.52	3,205
0.13	34	0.53	3,465
0.14	39	0.54	3,739
0.15	46	0.55	4,036
0.16	54	0.56	4,350
0.17	62	0.57	4,681
0.18	72	0.58	5,028
0.19	82	0.59	5,393
0.2	95	0.6	5,789
0.21	110	0.61	6,207
0.22	126	0.62	6,647
0.23	144	0.63	7,109
0.24	164	0.64	7,592
0.25	189	0.65	8,098
0.26	216	0.66	8,625
0.27	246	0.67	9,174
0.28	279	0.68	9,744
0.29	315	0.69	10,337
0.3	359	0.7	10,991
0.31	406	0.71	11,674
0.32	459	0.72	12,386
0.33	516	0.73	13,127
0.34	577	0.74	13,897
0.35	648	0.75	14,695
0.36	725	0.76	15,523
0.37	808	0.77	16,380
0.38	897	0.78	17,266
0.39	993	0.79	18,181
0.4	1,101	0.8	19,180
0.41	1,217	0.81	20,219
0.42	1,341	0.82	21,296
0.43	1,474	0.83	22,413
0.44	1,615	0.84	23,568
0.45	1,772	0.85	24,763
0.46	1,939	0.86	25,996
0.47	2,118	0.87	27,269
0.48	2,307	0.88	28,581
0.49	2,507	0.89	29,932



River Level	Flow (litres/second)
0.9	31,365
0.91	32,845
0.92	34,372
0.93	35,946
0.94	37,567
0.95	39,235
0.96	40,950
0.97	42,712
0.98	44,520
0.99	46,376
1	48,591

