

# Stanley Bros Trust (Piggery)

Monitoring Programme

Annual Report

2022-2023

Technical Report 2023-29



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Taranaki Regional Council  
Private Bag 713  
Stratford

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## Executive summary

The Stanley Bros Trust (the Company) operates a piggery located on the corner of 4833 South Road and 24 Arawhata Road, Opunake in the Arawhata catchment. The piggery is a breeder, grower, and finishing operation with the capacity of up to 5,381 pigs and piglets at any one time. The Company holds resource consents which allow the Company to discharge effluent to land via spray irrigation, and the discharging of effluent emissions to air from related practices.

This report for the period July 2022 to June 2023 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess the Company's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

**During the monitoring period, Stanley Bros Trust demonstrated a level of environmental and administrative performance that both required improvement.**

The Company holds two resource consents, which include a total of 21 conditions setting out the requirements that the Company must satisfy. The Company holds one consent to discharge piggery effluent to land and one consent to discharge emissions into the air at this site.

The Council's monitoring programme for the year under review included three inspections, four effluent monitoring surveys, and four rounds of surface water monitoring with samples from four sites collected for physicochemical analysis. Odour surveys were also undertaken during inspections. Data was supplied by the Company and reviewed by the Council.

The Company are currently carrying less pigs than their consented allowance and have no plans to increase stock numbers, citing instability within the pork industry. Therefore, the Company was unable to discharge effluent to the consented 100 ha of cut and carry pasture this monitoring period, with just 84.04 ha utilised for cut and carry operations, resulting in a non-compliance. A variation of consent may be sought by the Company in the upcoming monitoring period.

Piezometer installation has been delayed, with an abatement notice issued requiring the installation to occur by the 1<sup>st</sup> of May 2024.

The monitoring showed that a minor increase of nitrate-nitrogen, electrical conductivity, chloride, pH, free ammonia and nitrite N was recorded down the length of the Arawhata Stream. Data supplied by the Company was estimated that nitrogen loading in non-cut and carry areas exceeded the allowable limit slightly, therefore, causing a third consent non-compliance.

Over the years, the Company has invested heavily in new technologies, which allow greater control in irrigation management, more transparency in effluent application and improved productivity for cut and carry operations on site.

For reference, in the 2022-2023 year, consent holders were found to achieve a high level of environment performance and compliance for 878 (87%) of a total of 1007 consents monitored through the Taranaki tailored monitoring programmes, while for another 96 (10%) of the consents a good level of environmental performance and compliance was achieved. A further 27 (3%) of consents monitored required improvement in their performance, while the remaining one (<1%) achieved a rating of poor.

In terms of environmental performance and administrative performance by the consent holder, over the last several years there have been many non-compliant events, with abatements and infringements being issued on multiple occasions. The 2022-2023 monitoring period was an improvement on previous years with no abatement or infringements being issued but three non-compliant consent conditions. A new abatement requiring the installation of piezometers has been issued in the 2023-2024 year.

This report includes recommendations for the 2023-2024 year.

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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 for the period July 2022 to June 2023 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by Stanley Bros Trust Piggery (the Company). The Company operates a piggery situated on the corner of 24 Arawhata Road, and 4833 South Road (State Highway 45), Opunake, in the Arawhata catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by the Company that relate to discharge of water within the Arawhata catchment, and the air discharge permit to cover emissions to air from the site.

One of the intents of the *Resource Management Act 1991* (RMA) 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 Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of the Company's use of water, land and air, and is the 4<sup>th</sup> combined annual report by the Council for the Company.

### 1.1.2 Structure of this report

**Section 1** of this report is a background section. It sets out general information about:

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites through annual programmes;
- the resource consents held by the Company in the Arawhata catchment;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted in the Company's site/catchment.

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

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

**Section 4** presents recommendations to be implemented in the 2023-2024 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 RMA 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 an activity, and may include cultural and social-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 (for example recreational, cultural, or aesthetic); and
- e. risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Council is recognising the comprehensive meaning of 'effects' inasmuch as is appropriate for each activity. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with Section 35 of the RMA, the Council undertakes compliance monitoring for consents and rules in regional plans, and maintains an overview of the performance of resource users and consent holders. Compliance monitoring, including both activity and impact monitoring, enables the Council to continually re-evaluate its approach and that of consent holders to resource management and, ultimately, through the refinement of methods and considered responsible resource utilisation, 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 consent holders, this report also assigns a rating as to each Company's environmental and administrative performance during the period under review. The rating categories are high, good, improvement required and poor for both environmental and administrative performance. The interpretations for these ratings are found in Appendix II.

For reference, in the 2022-2023 year, consent holders were found to achieve a high level of environmental performance and compliance for 878 (87%) of a total of 1007 consents monitored through the Taranaki tailored monitoring programmes, while for another 96 (10%) of the consents a good level of environmental performance and compliance was achieved. A further 27 (3%) of consents monitored required improvement in their performance, while the remaining one (<1%) achieved a rating of poor.<sup>1</sup>

## 1.2 Process description

The Company own and operate a piggery located on the corner of 24 Arawhata Road and 4833 South Road (State Highway 45), Opunake. The piggery and surrounding land owned by the Company covers 133 ha. They are a breeder, grower and finishing operation capable of holding up to a maximum of 5,381 kg pig equivalents onsite at any one time. The discharge is made up of effluent and wash water from the piggery operation.

Up until early October 2018 the site operated as a piggery and dairy farm with 270 dairy cows. In October 2018 the dairy herd was sold and only a small amount of grazing stock remain on the farm.

The existing piggery is made up of seven purpose-built piggery sheds, which are ventilated with roof fans and side vents. The sheds are in good condition, with impervious wall cladding. The floor is impervious with concrete, wooden slats, and plastic flooring panels. The layout of the sheds is generally across the prevailing winds and there are side ventilation exhausts with automatic control. The configuration and locality of the sheds (along with the exhaust stacks) generally enhance dispersion of odours and dust from the sheds. The allowed stock density in sheds has been significantly reduced by revisions to animal welfare regulation changes, so extra planned sheds have not been built.

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<sup>1</sup> The Council has used these compliance grading criteria for more than 19 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

Pens are flushed daily with water and the effluent is pumped to a series of storage ponds before land application. Pond 1 has a storage capacity of 24,500 m<sup>3</sup> and pond 2 has a storage capacity of 19,320 m<sup>3</sup>. The ponds are stirred as effluent is applied to land through numerous methods which are described later in this report. Approximately 18 m<sup>3</sup> of effluent and wastewater is discharged onto land on a daily basis over approximately 84 ha. Since the closure of the dairy shed, effluent volume has reduced by 60%, increasing available storage to up to three months.

The Company undertook 'cut and carry' operations during this monitoring period, producing maize silage, grass silage, hay and haylage. The Company has also expressed interest in other 'cut and carry' operations for future years. Effluent will be applied after harvesting to maintain soil fertility for future crops.

Key determinants with effluent irrigation are potassium and nitrogen levels. The report produced by agKnowledge (in the consent application) estimated typical values for freshly voided manure characteristics based on 3.25 kg of manure per standard pig equivalent, and predicted nutrient loading rates based on these estimates with the inclusion of irrigation to 105 ha of land, and 30% of nitrogen gaseous losses. The report concluded that the nutrient input from the piggery and the 'cut and carry' operation is not excessive as harvested crops counter the high nutrient inputs from the piggery.

The existing piggery, ponds, and irrigation areas in relation to the property are shown in Figure 1 and Figure 2.



Figure 1 Location of Stanley Bros Trust Piggeries current buildings and effluent ponds



Figure 2 Stanley piggeries in relation to the Arawhata Stream and Unnamed Tributaries

### 1.3 Resource consents

The Company holds two resource consents, the details of which are summarised in the table below. Summaries of the conditions attached to each permit are set out in Section 3 of this report.



A summary of the various consent types issued by the Council are included in Appendix I, as are copies of all permits held by the Company during the period under review.

Table 1 Summary of resource consents held by Stanley Bros piggery

Consent number	Purpose	Granted	Review	Expires
<i>Air discharge permit</i>				
<b>5251-2.2</b>	To discharge emissions into the air from pig farming operations and associated effluent treatment and waste management activities	2019	2024	2030
<i>Discharges to land permit</i>				
<b>10671-1</b>	To discharge piggery effluent onto land by spray irrigation	2019	2024	2030

## 1.4 Monitoring programme

### 1.4.1 Introduction

Section 35 of the RMA sets obligations upon the Council to gather information, monitor and conduct research on the exercise of resource consents within the Taranaki region. The Council is also required to assess the effects arising from the exercising of these consents and report upon them.

The 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 Company site consisted of three primary components.

#### 1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Council in:

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- discussion over monitoring requirements;
- preparation for any consent reviews, renewals or new consent applications;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

#### 1.4.3 Site inspections

The Company's site was visited on three occasions during the monitoring period. With regard to consents for the discharge of piggery effluent to land, the main points of interest were plant processes with potential or actual discharges to land, including contaminated storm-water and process wastewaters.

Sources of data being collected by the Company were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

As far as practical, inspections related to air emissions were integrated with inspections undertaken for other purposes for example inspection of the oxidation ponds. The air monitoring component focused on processes with associated actual and potential emission sources and characteristics, including potential odour.

#### 1.4.4 Chemical sampling

The Council undertook sampling of the effluent collection and irrigation pond. In addition, surface water samples were collected from the Arawhata Stream and associated unnamed tributary on four occasions. The analytes tested for in the effluent pond and surface water samples include the following:

- Effluent pond analytes: Temperature, pH, electrical conductivity (EC), chloride, nitrate + nitrite nitrogen, total nitrogen, total kjeldahl nitrogen (TKN), total sodium, total phosphorus, total potassium, sodium absorption ratio (SAR), total calcium and total magnesium.
- Arawhata Stream analytes: Temperature, pH, electrical conductivity (EC), chloride, nitrate + nitrite nitrogen, chloride, total potassium, dissolved reactive phosphorus (DRP), free ammonia, total ammoniacal nitrogen and total biochemical oxygen demand (TBOD5).

The Council also undertook odour surveys to assess ambient air quality in the neighbourhood during inspections.



## 2 Results

### 2.1 Inspections

Inspections were completed at the Stanley Bros Ltd piggery on the 2<sup>nd</sup> August 2022, 27<sup>th</sup> February 2023 and the 15<sup>th</sup> May 2023. Inspections undertaken assessed the functionality of onsite features with the potential to have negative effects on the environment. Effluent collection points, bunding and swale drains, effluent ponds, effluent spreading, site maintenance, odour assessments, were all checked and undertaken during regular compliance monitoring inspections. Any new developments at the site or any issues have been discussed with staff onsite. The three site inspections completed during the 2022-2023 monitoring period all resulted in compliance with the discharge to land and discharge to air resource consents at the time of the inspections.

### 2.2 Results of discharge monitoring

#### 2.2.1 Effluent monitoring

Piggery effluent is pumped to the irrigation pond (Figure 1). The pond holds the effluent when conditions are not correct for irrigation to land to occur. A secondary pond is also available for additional storage if required.

The Council sampled the irrigation pond (PGP001003) on four occasions this monitoring period. The analysis of the one round is provided in the following Table 2.

Table 2 Irrigation pond effluent sample 2022-2023 results

PGP001003	Collected	07 October 2022	19 December 2022	06 March 2023	15 May 2023
Parameter	Time (NZST)	12:00	12:50	10:40	13:40
Temperature	°C	12.6	-	18.9	17.8
pH	pH Units	7.3	7.1	7.1	6.8
Electrical Conductivity (EC)	mS/m	315	414	604	763
Chloride	g/m <sup>3</sup>	109	17.7	240	400
Nitrate-N + Nitrite-N	g/m <sup>3</sup>	<0.10	0.11	<0.10	<0.10
Total Nitrogen	g/m <sup>3</sup>	490	700	980	1240
Total Kjeldahl Nitrogen (TKN)	g/m <sup>3</sup>	490	700	980	1240
Total Sodium	g/m <sup>3</sup>	63	82	124	230
Total Phosphorus	g/m <sup>3</sup>	158	320	179	290
Total Potassium	g/m <sup>3</sup>	210	250	380	800
Sodium Absorption Ratio (Total)		1.2	1.0	2.2	2.8
Total Calcium	g/m <sup>3</sup>	131	380	129	310
Total Magnesium	g/m <sup>3</sup>	48	88	64	111

## 2.2.2 Surface water monitoring

In lieu of groundwater monitoring, four surface water monitoring locations have been established on the Stream and associated unnamed tributary.

The four sites are provided in the following Figure 3:

- ARW000070 is located slightly offsite, to the northwest of the Company site. The stream is full of macrophyte vegetation with minimal to no shading. This is monitored to assess pre-irrigation area surface water quality (control site).
- ARW000954 is located on the eastern side of the Company site, up gradient of site irrigation areas. This stream is an unnamed tributary of the Arawhata Stream. It is assessed to provide pre-irrigation area surface water conditions (control site).
- ARW000984 is located in the central area of the site, within the irrigation areas, just after the confluence with the main stem of the Arawhata Stream. The aim of this site is to assess for any effect associated with the irrigation areas on the surface water body.
- ARW000999 is located at the mouth of the Arawhata Stream, on the coast. This location seeks to assess the combined effect of the irrigation areas on the unnamed tributary and the main stem of the Arawhata Stream, prior to discharging into the Tasman Sea.



Figure 3 Surface water sampling locations

Four rounds of surface water monitoring was undertaken by the Council this monitoring period (Table 3, Table 4, Table 5 and Table 6).

Table 3 Surface water monitoring Arawhata Stream 2022-2023 results (07 October 2022)

	Site	ARW000070	ARW000954	ARW000984	ARW000999
	Collected	07 Oct 2022	07 Oct 2022	07 Oct 2022	07 Oct 2022
Parameter	Time (NZST)	12:45	12:15	12:30	11:20
Sample Temperature	°C	16.4	13.8	14.2	13.5
Electrical Conductivity (EC)	mS/m	27.3	26.2	29.4	30.3
pH	pH Units	7.3	7.4	7.5	8.1
Chloride	g/m <sup>3</sup>	29	28	31	33
Total Potassium	g/m <sup>3</sup>	4.9	8.0	7.6	7.5
Dissolved Reactive Phosphorus	g/m <sup>3</sup>	<0.004	0.042	0.033	0.033
Free Ammonia	g/m <sup>3</sup>	0.00009	0.00024	0.00031	0.0008
Nitrate-N	g/m <sup>3</sup>	1.08	1.16	1.92	2.1
Nitrate-N + Nitrite-N	g/m <sup>3</sup>	1.08	1.18	1.93	2.1
Nitrite-N	g/m <sup>3</sup>	0.002	0.015	0.016	0.022
Total Ammoniacal-N	g/m <sup>3</sup>	0.012	0.029	0.034	0.020
Total Biochemical Oxygen Demand (TBOD <sub>5</sub> )	g O <sub>2</sub> /m <sup>3</sup>	0.4	0.8	0.5	0.6

Table 4 Surface water monitoring Arawhata Stream 2022-2023 results (19 December 2022)

	Site	ARW000070	ARW000954	ARW000984	ARW000999
	Collected	19 Dec 2022	19 Dec 2022	19 Dec 2022	19 Dec 2022
Parameter	Time (NZST)	12:20	12:45	12:30	12:00
Sample Temperature	°C	-	-	-	-
Electrical Conductivity (EC)	mS/m	25.4	27.0	28.9	30.1
pH	pH Units	7.4	7.6	7.5	7.9
Chloride	g/m <sup>3</sup>	27	28	30	31
Total Potassium	g/m <sup>3</sup>	5.0	12.4	10.2	10.5
Dissolved Reactive Phosphorus	g/m <sup>3</sup>	<0.004	0.074	0.045	0.052
Free Ammonia	g/m <sup>3</sup>	0.00028	0.00032	0.00034	0.0005
Nitrate-N	g/m <sup>3</sup>	0.29	0.89	1.55	1.59
Nitrate-N + Nitrite-N	g/m <sup>3</sup>	0.29	0.90	1.55	1.60
Nitrite-N	g/m <sup>3</sup>	0.003	0.005	0.005	0.011
Total Ammoniacal-N	g/m <sup>3</sup>	0.024	0.017	0.022	0.014
Total Biochemical Oxygen Demand (TBOD <sub>5</sub> )	g O <sub>2</sub> /m <sup>3</sup>	<0.4	0.5	1.4	0.6

Table 5 Surface water monitoring Arawhata Stream 2022-2023 results (06 March 2023)

	Site	ARW000070	ARW000954	ARW000984	ARW000999
	Collected	6 March 2023	6 March 2023	6 March 2023	6 March 2023
Parameter	Time (NZST)	11:30	10:50	11:05	11:15
Sample Temperature	°C	17.0	16.5	16.3	18.1
Electrical Conductivity (EC)	mS/m	27.9	29.0	30.9	32.2
pH	pH Units	6.9	7.4	7.3	8.1
Chloride	g/m <sup>3</sup>	32	32	34	35
Total Potassium	g/m <sup>3</sup>	5.0	12.0	10.3	9.8
Dissolved Reactive Phosphorus	g/m <sup>3</sup>	<0.004	0.25	0.149	0.135
Free Ammonia	g/m <sup>3</sup>	<0.00004	<0.00009	0.00010	0.0008
Nitrate-N	g/m <sup>3</sup>	0.194	0.71	1.19	1.15
Nitrate-N + Nitrite-N	g/m <sup>3</sup>	0.195	0.71	1.20	1.15
Nitrite-N	g/m <sup>3</sup>	0.002	0.003	0.004	0.003
Total Ammoniacal-N	g/m <sup>3</sup>	<0.010	<0.010	0.012	0.014
Total Biochemical Oxygen Demand (TBOD <sub>5</sub> )	g O <sub>2</sub> /m <sup>3</sup>	1.0	0.5	0.6	0.8

Table 6 Surface water monitoring Arawhata Stream 2022-2023 results (15 May 2023)

	Site	ARW000070	ARW000954	ARW000984	ARW000999
	Collected	15 May 2023	15 May 2023	15 May 2023	15 May 2023
Parameter	Time (NZST)	13:00	13:30	13:20	12:45
Sample Temperature	°C	15.9	20.0	15.6	15.7
Electrical Conductivity (EC)	mS/m	26.5	27.0	29.2	29.9
pH	pH Units	7.0	7.2	7.2	7.5
Chloride	g/m <sup>3</sup>	30	30	33	33
Total Potassium	g/m <sup>3</sup>	5.4	9.8	8.7	8.7
Dissolved Reactive Phosphorus	g/m <sup>3</sup>	0.009	0.053	0.039	0.037
Free Ammonia	g/m <sup>3</sup>	<0.00005	0.00008	<0.00007	0.00016
Nitrate-N	g/m <sup>3</sup>	1.01	2.3	3.0	2.9
Nitrate-N + Nitrite-N	g/m <sup>3</sup>	1.01	2.3	3.0	2.9
Nitrite-N	g/m <sup>3</sup>	<0.002	0.004	0.006	0.005
Total Ammoniacal-N	g/m <sup>3</sup>	<0.010	0.012	<0.010	0.011
Total Biochemical Oxygen Demand (TBOD <sub>5</sub> )	g O <sub>2</sub> /m <sup>3</sup>	0.4	0.6	0.6	0.7

The 2022-2023 monitoring rounds indicated the following:

- Surface water EC ranged 25.4-32.2 mS/m. Electrical conductivity increased slightly down the length of the main stem, with the highest values occurring at the mouth of the stream (ARW000999).
- Free ammonia was recorded at trace concentrations, ranging from <0.00004 - 0.0008 g/m<sup>3</sup>. A very slight increase was observed down the length of the catchment.
- Nitrate nitrogen was recorded in all samples at low concentrations, ranging 0.194-3.0 g/m<sup>3</sup>. This analyte increased in concentration down the length of the catchment. With the highest values occurring in the middle of the farm below the stream confluence (ARW000984) and at the mouth of the stream (ARW000999).
- Nitrite nitrogen was recorded at low concentrations, ranging <0.002-0.022 g/m<sup>3</sup>. This analyte observed a slight increase in concentration down the length of the catchment. Again the highest values occurring in the middle of the farm below the stream confluence (ARW000984) and at the mouth of the stream (ARW000999).
- pH and chloride were observed to have a slight increase in concentration down the length of the catchment.
- Total potassium shows fluctuation of results down the Arawhata catchment. Namely, site ARW000954 is used as a control site but displays results higher than the rest of the catchment in each survey undertaken in the current monitoring period. This may indicate an effluent irrigation influence at this site and therefore it can no longer be considered a true control site. A recommendation for future monitoring would be to move this control site upstream onto the neighboring property to completely eliminate any effects from effluent irrigation. This would determine total potassium values upstream of the effluent irrigation area and determine if the irrigation activities are having an effect at this location. Further monitoring will take place in the 2023-2024 monitoring year, from which further inferences can be determined and long term trends can begin to be assessed.

These results are supported by the data from the surface water monitoring from previous monitoring periods. Namely 2020-2021 and 2021-2022.

## 2.3 Provision of consent holder data

Consent required information was provided to the Council by means of an annual report (Appendix III). This was produced by the Company's third party consultant agKnowledge<sup>2</sup>.

### 2.3.1 Pig inventory 2022-2023

Special condition 1 of consent 10671-1.1 states the effluent discharged shall be from a piggery of no more than 5,381, 50 kg pig equivalents. Table 7 indicates that the Company were well below the consented allowance, with 4,565 SPU equivalents. The total number of pigs in 2022-2023 has decreased from that of 2021-2022 by 2,573 kg and 51 SPU equivalents.

Table 7 Stanley Bros piggery inventory 2022-2023

Type of pigs	No. of pigs	Average weight (kg)	Total weight (kg)	50 kg equivalent pigs (SPU)
Sows	336	162	54,432	1,089
Boars	4	162	648	13
Gilts	91	150	11,850	273
Light pork	1,354	70	93,100	1,862

<sup>2</sup> Report of 2022/23 effluent irrigation management plan for Stanley Bros Trust. agKnowledge

Type of pigs	No. of pigs	Average weight (kg)	Total weight (kg)	50 kg equivalent pigs (SPU)
Store pigs	655	44	28,820	576
Weaners	1,503	25	37,575	752
<b>Total</b>	<b>3,943</b>		<b>228,225</b>	<b>4,565</b>

### 2.3.2 Record keeping

The consent holder is required to keep accurate records of effluent application to land, including as a minimum:

- a. Volume of effluent applied;
- b. Rate and time of application;
- c. Area (ha) that the effluent was applied to
- d. Method of irrigation; and
- e. Type of crop that is grown on that land.

#### 2.3.2.1 Rate and time of effluent application

Table 8 below provides the rate and time of the applications to land in the 2022-2023 monitoring period.

**Table 8 Irrigations per month and effluent volumes applied 2022-2023**

Month	Irrigation per month (days)	Effluent volumes applied (mm)
July 2022	25	129
August	23	103
September	11	44
October	20	59
November	28	95
December	10	46
January 2023	13	62
February	11	24
March	9	24
April	0	0
May	27	47
June	14	55

#### 2.3.2.2 Area (ha) that effluent is applied and total volume applied

The farm is divided into five blocks, these total 105.1 ha. The annual effluent volumes applied to these blocks is provided in the following Table 9. The total volume of effluent applied in the 2022-2023 monitoring year was 16,254 m<sup>3</sup>.

Special condition 9 of consent 10671-1.1 states: The consent holder shall ensure that the effluent is discharged to at least 100 hectares of land that is not grazed and that is planted in crops that are removed from the property i.e. a 'cut and carry' operation. It may also be applied and additional areas that are grazed.

It is noted that the Company discharged to only 84.04 ha of cut and carry land during the monitoring year, and the rest to grazed land.

Table 9 Annual effluent volumes by irrigation block in mm and m<sup>3</sup> loading of N per ha 2022-2023

Block	Effective area (ha)	Effluent volume applied (mm)	m <sup>3</sup> of effluent
Main Road	7.7	42	323.4
Arawhata/Centre	26.5	149	3948.5
Cliff tops	9.9	95	940.5
Sand dunes	23.8	292	6949.6
Maize	37.2	110	4092
Total	105.1	-	16,254

### 2.3.2.3 Method of irrigation

The effluent from the piggery is pumped to storage pond prior to land application. The Company communicated that two different delivery systems were used during the 2022-2023 monitoring year:

1. Dribble bar – main method of effluent application, depths applied (~3 mm)
2. 'Weta' travelling rain gun – used to apply effluent to the Sand Dune block at 8-10 mm depths during 7 months of the year.

### 2.3.2.4 Type of crops grown

Two crops were grown under the cut and carry system in 2022-2023. Maize Silage paddocks (37.2 ha) which were cultivated in October and harvested in March, yielding around 21.3 tonnes DM/ha.

An annual Ryegrass was planted as a crop cover over the cooler and wetter months. This is harvested in late September/early October, yielding 3.8 tonnes DM/ha.

Over the rest of the farm excluding the Sand Dune Block, the pasture was mown to produce 713 bales as haylage and 789 bales as hay.

Table 10 Dry matter yields of cut and carry operations 2022-2023. Sourced agKnowledge report 22/23

Harvested Feed	Feed Amount	Average DM Yield	DM removed (tonnes)
Maize silage	37.2 ha	21.3 tonnes/ha	792
Grass silage	30.3 ha	3.8 tonnes/ha	116
Hay (15's)	789 bales	300 kg/bale <sup>1</sup>	237
Haylage (15's)	713 bales	300 kg/bale <sup>2</sup>	214

### 2.3.3 Total nitrogen and potassium in the effluent

Effluent sample results collected by the consent holder and the Council have been combined in the agKnowledge effluent management report 2022-2023 to determine mean nitrogen and potassium concentrations, as shown in Table 11. High concentrations of phosphorus, calcium and magnesium were recorded in April 2021 in a previous monitoring period when the pond level was at its lowest, which has resulted in a skewed mean for these parameters.

Table 11 Mean nutrient composition of piggery effluent (n=14) plus 95% confidence interval

Nutrients in piggery effluent	Mean (g/m <sup>3</sup> )	95% CI (g/m <sup>3</sup> )
Nitrogen	756	140
Phosphorus	190	64
Potassium	317	96
Calcium	486	741
Magnesium	81	45
Sodium	97	28

### 2.3.4 Nutrient management

Consent 10671-1.1, special conditions 10 and 11 require the following:

10. The Total Nitrogen applied to any hectare of land shall not exceed:
  - a. 400 kg in any 12-month period for 'cut and carry areas'; or
  - b. 200 kg in any 12-month period for any other land (including grazed pasture).
11. The total Potassium applied to any hectare of land shall not exceed:
  - a. 300 kg in any 12-month period for 'cut and carry areas'; or
  - b. 100 kg in any 12-month period for any other land (including grazed pasture).

#### 2.3.4.1 Nitrogen loading

Estimated nitrogen loading across all areas is provided in Table 12. All cut and carry areas were estimated to be well below consent loading limit for nitrogen. For the non-cut and carry areas the N loading was estimated to be slightly above the consent limit, with an estimated loading of 220 kg N/ha.

Table 12 Estimated nitrogen (N) loading by irrigation block 2022-2023

Block	Effective area (ha)	m <sup>3</sup> of effluent	Loading of N kg/ha
<u>Main Road</u>	7.7	323.4	31.8
<u>Arawhata/Centre</u>	26.5	3948.5	112.6
<u>Cliff tops</u>	9.9	940.5	71.8
Sand dunes	23.8	6949.6	220.8
<u>Maize</u>	37.2	4092	83.2
Total	105.1	16,254	-

Underlined blocks indicate cut and carry areas. Please note 2.74 ha of the sand dunes is actioned under cut and carry.

#### 2.3.4.2 Potassium loading

Estimated potassium loading has been calculated and provided in the following Table 13. The results demonstrated that the Company were compliant with the potassium loading limits across all irrigation blocks for cut and carry and other land.



Table 13 Estimated potassium (K) loading by irrigation block 2022-2023

<b>Block</b>	<b>Effective area (ha)</b>	<b>m<sup>3</sup> of effluent</b>	<b>Loading of potassium kg/ha</b>
<u>Main Road</u>	7.7	323.4	13.32
<u>Arawhata/Centre</u>	26.5	3948.5	47.23
<u>Cliff tops</u>	9.9	940.5	30.09
Sand dunes	23.8	6949.6	92.56
<u>Maize</u>	37.2	4092	34.87
Total	105.1	16,254	-

Underlined blocks indicate cut and carry areas. Please note 2.74 ha of the sand dunes is actioned under cut and carry.

### 2.3.5 Cut and carry operation

The Company provided the Council with analysis of composite feed samples<sup>3</sup> of each crop, so that the nutrient uptake and removal off-farm could be calculated.

Table 14 Nitrogen and potassium concentrations and total N and K removed in the cut and carry system

<b>Harvested Feed</b>	<b>N (% in DM)</b>	<b>K (% in DM)</b>	<b>N uptake (kg)</b>	<b>K uptake (kg)</b>
Maize silage	1.18	1.15	9,346	9,108
Grass silage	1.70	2.80	1,972	3,248
Hay (15's)	1.60	1.60	3,792	3,792
Haylage (15's)	1.80	2.50	3,852	5,350
Total			18,962	21,498

In total the Company removed 18,962 kg nitrogen (N) and 21,498 kg potassium (K) from cut and carry areas this monitoring period.

## 2.4 Incidents, investigations, and interventions

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the Company. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual causes of non-compliance or failure to maintain good practices. A pro-active approach, that in the first instance avoids issues occurring, is favoured.

For all significant compliance issues, as well as complaints from the public, the Council maintains a database record. The record includes events where the individual/organisation concerned has itself notified the Council. Details of any investigation and corrective action taken are recorded for non-compliant events.

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

Table 15 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to the Company activities during the 2022-2023 period. This table presents details

<sup>3</sup> Report of 2022/23 effluent irrigation management plan for Stanley Bros Trust. agKnowledge

of all events that required further investigation or intervention regardless of whether these were found to be compliant or not.

Table 15 Incidents, investigations, and interventions summary table

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
Ongoing	During the 2022-2023 monitoring period it was found the Company had not installed groundwater monitoring bores as per special condition 14 of consent 10671-1.1	N	Y	Two abatement notices were issued in the 2020-2021 monitoring period, requiring the Company to install the bores by 31 August 2020. Since this date, further discussion has been held with the Council in regards to removing the bore condition from the consent. This has been deemed not possible and a new abatement notice has been issued after discussion between the Council and consent holder. This requires piezometer installation by May 2024.
19/07/2023	During a review of the company's effluent irrigation management plan for 2022-2023, it was discovered that special condition 9 of consent 10671-1.1 was not complied with. Consent holder shall ensure effluent is discharged to at least 100 hectares of 'cut and carry' land.	N	N	Outcome pending. This is a minor non-compliance and over the last four monitoring periods has been an ongoing minor non-compliance. To be reviewed with council via a consent change as pig numbers are significantly reduced, therefore, irrigation area to cut and carry land may potentially be reduced.
19/07/2023	During review of the company's effluent irrigation management plan 2022-2023, it was discovered that special condition 10 b of consent 10671-1.1 was not complied with. Consent holder shall not exceed total nitrogen of 200 kg in any 12 month period for any other land (non-cut and carry).	N	N	This a minor non-compliance as the limit was breached by an estimated 20 kg N/ha in the non-cut and carry section of the farm. The Company have been notified and instructed to remedy the issue.

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
19/07/2023	During review of the company's effluent irrigation management plan 2022-2023, it was discovered condition 13 of consent 10671-1.1 was not complied with. Consent shall be exercised in accordance with an effluent management plan.	N	N	The effluent irrigation management plan must supply more information to satisfy this consent condition. Requires details of the management of the cut and carry operation evapotranspiration and available water holding capacity of the soil(s) over the irrigated area; how irrigation will be scheduled to maximise the benefits of evapotranspiration and minimise subsurface drainage; the designated application areas and buffer zones for streams and the property boundary.

## 3 Discussion

### 3.1 Discussion of site performance

The 2022-2023 year marked the end of the fourth monitoring period for the Company.

The Company was required to provide the Council with an Effluent Irrigation Management Plan (EIMP), as well as the concentrations of nitrogen and potassium within the irrigation effluent. The Company commissioned agKnowledge to undertake the works and their assistance has been retained throughout the monitoring period.

The plan fulfilled the consent requirements by providing information on the following:

- Management of the cut and carry operation;
- Evapotranspiration and available water holding capacity of the soil over the irrigated area. This is gathered using the soil sensor probe information.
- How irrigation will be scheduled to maximise the benefits of the evapotranspiration and minimise subsurface drainage
- How effluent is to be applied as uniformly as practicable over the irrigated area, and the uniformity of application demonstrated;
- The designated application area and buffer zones for streams and the property boundary.
- The determination of the total nitrogen and potassium in the effluent.

From an administrative performance perspective, performance has been satisfactory during the period under review. However, there has been ongoing non-compliances throughout the monitoring period as outlined in section 2.4.

Consent 10671-1.1 condition 14 requiring the installation of a minimum of three piezometers by the 31<sup>st</sup> January 2020 remains non-compliant. An updated abatement notice has been issued and the Company have a new deadline to install the piezometers by May 2024. Installation will be timed to work around the cropping season.

In addition, a non-compliance was recorded during the review of the Company records. The Company were unable to irrigate to 100 ha of cut and carry pasture in the monitoring period as required by consent 10671-1.1. Irrigation occurred to only 84.04 ha of cut and carry land. However, it is noted that reduced pig numbers (816 SPU below maximum consented limit) generates less effluent for irrigation to land.

The Company has been informed that if they wish to change the consented maximum irrigation area for cut and carry operations, then a variation of the current consented limit may be possible if the supporting rationale provides confidence that the variation effect will be no more than minor.

Lastly, another non-compliance was recorded during the review of the Company records. The Company exceeded the total nitrogen applied to non-cut and carry areas, namely in the sand dune block. An estimated loading of 220.75 kg N/ha exceeded the allowable limit of 200 kg N/ha.

Over the years, the Company has invested heavily in new technologies, which allow greater control in irrigation management, more transparency in effluent application and improved productivity for cut and carry operations on site.

### 3.2 Environmental effects of exercise of consents

No known environmental effects have occurred at Stanley Bros Trust piggery during the 2022-2023 monitoring period. Inspections, surface water monitoring and effluent monitoring all displayed the company is compliant in terms of adverse environmental effects. This is a vast improvement from previous monitoring

periods, in which several abatement and infringement notices were issued for poor environmental performance.

The soil sensors which are currently being trialled by the Company are telemetered to the GPS within the tractor, as well as to a hand held phone. The aim is to provide the Company with up-to-date soil water balance, and available capacity of the soil in real-time. This information can then be used to inform decisions around when and where irrigation application can occur, reducing the risk of excess discharge through ponding, leaching or runoff. It is noted that the Company have engaged expert advice to utilise these technologies. Groundwater monitoring bores are still required to monitor the actual effect of the irrigation activity on groundwater.

Liaison with Company and review of records indicated more N and K was removed than discharged to land. This is calculated via composite maize and grass silage feed samples analysed by Hill Laboratories for N and K. This is compared to piggery effluent applied to maize and grass silage areas per hectare at an application depth of 21.5 mm. The Company records estimated that 18,962 kg nitrogen (N) and 21,498 kg potassium (K) were removed from cut and carry areas during the monitoring period.

Riparian planting and fencing has been completed across the site. It is understood from discussions that the Company is undertaking maintenance only (replacing perished plants) at the present time.

The four Arawhata Stream monitoring rounds recorded minor increases in nitrate-nitrogen, electrical conductivity, chloride, pH, free ammonia and nitrite N down the length of the catchment. These concentrations of surface water chemical parameters are only slightly elevated down the Arawhata Stream length and pose no major environmental impacts.

Further monitoring will assess the practicality of new technologies used by the Piggery over time.

### 3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 16-18.

Table 16 Summary of performance for consent 5251-2.2

<b>Purpose: To discharge emissions into the air from pig farming operation and associated practices including effluent treatment and other waste management activities</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Maximum allowable number of pig equivalents	Liaison with Company and review of Company records indicated that the piggery is carrying less than consented (5,381 SPU equivalents) Actual 4,565 SPU equivalents	Yes
2. Adoption of best practical option to avoid or minimise adverse effects	Liaison with Company and inspections	Yes
3. Consultation and approval prior to alterations to plant and process	Liaison with Company	N/A
4. Minimisation of impact and emissions through use of equipment and suitable methods	Monitoring Inspections	Yes
5. Operation of piggery in accordance with original application	Monitoring inspections	Yes

<b>Purpose: To discharge emissions into the air from pig farming operation and associated practices including effluent treatment and other waste management activities</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
6. Objectionable odour at site boundary not permitted	Monitoring inspections	Yes
7. Optional review provision	Consent expires June 2030- next review June 2024	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 17 Summary of performance for consent 10671-1.1

<b>Purpose: To discharge piggery effluent onto land by spray irrigation</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Effluent discharge no more than allowable number of pig equivalents	Liaison with Company and review of Company records indicated that the piggery is carry less than consented (5,381 SPU equivalents) Actual 4,565 SPU equivalents	Yes
2. Minimisation of nutrient leaching to groundwater	Liaison with Company and review of records	Yes
3. No overflow of effluent from disposal system	Liaison with Company and inspection	Yes
4. Sufficient storage available in effluent storage ponds	Liaison with Company and Inspection	Yes
5. No effluent surface ponding exceeding 30 minutes	Monitoring Inspection	Yes
6. Sodium adsorption ratio of wastewater shall not exceed 15	Sampling and review of chemical parameters	Yes
7. Effluent applied in consented areas and away from dwellings/rivers	Monitoring Inspection	Yes
8. No spray drift beyond property boundary	Monitoring Inspection	Yes
9. The consent holder shall ensure that the effluent is discharged to at least 100 ha of land that is not grazed and that is planted in crops that are removed from the property	Liaison with Company and Inspection. Discharged to only 84.04 ha of cut and carry land.	No
10. Total nitrogen applied on land will not exceed 400 kg in 12 month cut and carry areas, or 200 kg in 12 month pasture areas	Liaison with Company and review of records with estimate of loading from duplicate sample from effluent pond. Non-compliant for non-cut and carry area. Limit of 200 kg exceeded. Compliant for cut and carry areas.	No

<b>Purpose: To discharge piggery effluent onto land by spray irrigation</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
11. Total potassium applied on land will not exceed 300 kg in 12 month cut and carry areas, or 100 kg in 12 month pasture areas	Liaison with Company and review of records with estimate of loading from duplicate sample of effluent pond	Yes
12. Accurate records of applied effluent volume, rate, area, method, and type of crop grown	Liaison with Company	Yes
13. Consent exercised in accordance with Effluent Irrigation Management Plan	Liaison with Company and Inspection. More detail is required in the current EIMP.	No
14. Installation of three piezometers by 31 January 2020 for groundwater quality monitoring	Liaison with Company and Inspection	No
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		<b>Improvement required</b> <b>Improvement required</b>

N/A = not applicable

Table 18 Evaluation of environmental performance over time

<b>Year</b>	<b>Consent no</b>	<b>High</b>	<b>Good</b>	<b>Improvement req</b>	<b>Poor</b>
2019-2020	5251	1	-	-	-
	10671	-	-	1	-
2020-2021	5251	-	-	1	-
	10671	-	-	1	-
2021-2022	5251	1	-	-	-
	10671	-	-	1	-
2022-2023	5251	1	-	-	-
	10671	-	-	1	-
<b>Total</b>		<b>3</b>		<b>5</b>	

During the year, the Company demonstrated a level of environmental performance that required improvement as consent 10671-1.1 received a rating of improvement required due to condition 14 remaining non-compliant. Conditions 9,10b and 13 were also non-compliant. The Company demonstrated a level of improvement required for administrative performance. This was due to the management of effluent application resulting in two additional non-compliance as stated above. Appendix II defines categories used to evaluate environmental and administrative performance.

### 3.4 Recommendations from the 2021-2022 Annual Report

In the 2021-2022 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at the Company site will remain unchanged from that undertaken in the 2020-2021 monitoring period. Three rounds of surface water monitoring will be completed.
2. THAT the Council review a proposal submitted by the Company. The result of the review will determine whether or not the original consent requirement; to install piezometers in three locations, be upheld.
3. The Company shall submit for a variation of consent 10671-1.1. To reduce the number of pigs allowed by the consent, to what is currently held on site. In doing so the Company will also submit, with supporting rationale, for a reduction in the cut and carry irrigation area requirement
4. THAT should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Recommendation 1 was undertaken, however, four surface water monitoring runs were completed. Monitoring will continue at this level going forward.

Recommendation 2 was undertaken and it was determined that the piezometers will be installed as planned.

Recommendation 3 has not been submitted to council. Company operating significantly below SPU equivalents maximum value. Council may give notice of its intention to review this consent condition in the following monitoring year.

Recommendation 4 Monitoring will remain the same for the 2023-2024 period.

### 3.5 Alterations to monitoring programmes for 2023-2024

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account:

- the extent of information already made available through monitoring or other means to date;
- its relevance under the RMA;
- the Council's obligations to monitor consented activities and their effects under the RMA;
- the record of administrative and environmental performances of the consent holder; and
- reporting to the regional community.

The Council also takes into account 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 exercising resource consents.

The monitoring programme will remain unchanged from that undertaken in the 2022-2023 monitoring period. Four rounds of surface water monitoring will be completed, along with three inspections and four effluent monitoring surveys.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site(s) in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2023-2024.



## 4 Recommendations

1. THAT in the first instance, monitoring of consented activities at the Company site will remain unchanged from that undertaken in the 2022-2023 monitoring period. Four rounds of surface water monitoring will be completed, along with, three inspections and four effluent monitoring surveys.
2. THAT the Company shall submit for a variation of consent 10671-1.1 to reduce the number of pigs allowed by the consent, to what is currently held on site. In doing so the Company will also submit, with supporting rationale, for a reduction in the cut and carry irrigation area requirement.
3. THAT the Council shall give notice to review the conditions of consent 10671-1.1 in June 2024 in relation to the above recommendation, if the Company does not submit a variation of consent.
4. THAT control site ARW000954 is moved further upstream to determine if irrigation is having an effect at this site. Total potassium levels at this site are consistently the highest in the catchment. Moving this monitoring site upstream to the neighbouring farm may indicate if irrigation is having an effect on potassium levels at this location.
5. THAT should there be issues with environmental or administrative performance in 2023-2024, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

## Glossary of common terms and abbreviations

The following abbreviations and terms may be used within this report:

Al*	Aluminium.
As*	Arsenic.
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.
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in $\mu\text{S}/\text{cm}$ .
Cu*	Copper.
Cumec	A volumetric measure of flow- 1 cubic metre per second ( $1 \text{ m}^3\text{s}^{-1}$ ).
DO	Dissolved oxygen.
DM	Dry matter.
DRP	Dissolved reactive phosphorus.
E.coli	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
F	Fluoride.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
FNU	Formazin nephelometric units, a measure of the turbidity of water
Fresh	Elevated flow in a stream, such as after heavy rainfall.
$\text{g}/\text{m}^2/\text{day}$	grams/metre <sup>2</sup> /day.
$\text{g}/\text{m}^3$	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.

Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
Incident register	The incident register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
L/s	Litres per second.
m <sup>2</sup>	Square Metres.
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.
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.
MPN	Most Probable Number. A method used to estimate the concentration of viable microorganisms in a sample.
µS/cm	Microsiemens per centimetre.
NH <sub>4</sub>	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH <sub>3</sub>	Unionised ammonia, 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.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
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.
PM <sub>10</sub> , PM <sub>2.5</sub> , PM <sub>1.0</sub>	Relatively fine airborne particles (less than 10 or 2.5 or 1.0 micrometre diameter, respectively).
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	<i>Resource Management Act 1991</i> and including all subsequent amendments.
SS	Suspended solids.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU or FNU.
Zn*	Zinc.

\*an abbreviation for a metal or other analyte may be followed by the letters 'As', to denote the amount of metal recoverable in acidic conditions. This is taken as indicating the total amount of metal that might be solubilised under extreme environmental conditions. The abbreviation may alternatively be followed by the letter 'D', denoting the amount of the metal present in dissolved form rather than in particulate or solid form.

For further information on analytical methods, contact an Environmental Quality Manager.

## Bibliography and references

agKnowledge. 2021 Effluent Irrigation Management Plan for Stanley Bros Trust.

agKnowledge. 2021. Proposed update to Effluent and Irrigation Management System for Stanley Bros Trust

agKnowledge. 2022. Report on 2021-22 Effluent Irrigation Management Plan for Stanley Bros Trust

Ministry for the Environment. 2018. Best Practice Guidelines for Compliance, Monitoring and Enforcement under the Resource Management Act 1991. Wellington: Ministry for the Environment.

Taranaki Regional Council (2021): *Stanley Bros Trust (Piggery) Monitoring Programme Annual Report 2020-2021*. Technical Report 2021-89.



# Appendix I

## Resource consents held by Stanley Bros Trust Piggery

(For a copy of the signed resource consent  
please contact the TRC Consents department)

### Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Permits authorising the abstraction of water are issued by the Council under Section 87(d) of the RMA.

### Water discharge permits

Section 15(1)(a) of the RMA 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. Permits authorising discharges to water are issued by the Council under Section 87(e) of the RMA.

### Air discharge permits

Section 15(1)(c) of the RMA 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. Permits authorising discharges to air are issued by the Council under Section 87(e) of the RMA.

### Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA 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. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

### Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Land use permits are issued by the Council under Section 87(a) of the RMA.

### Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Coastal permits are issued by the Council under Section 87(c) of the RMA.



**Discharge Permit**  
**Pursuant to the Resource Management Act 1991**  
**a resource consent is hereby granted by the**  
**Taranaki Regional Council**

Name of Consent Holder:	Stanley Bros Trust (Trustees: Ronald Thomas Stanley & Noel Henry Stanley) 4789A South Road RD 31 Opunake 4681	
Decision Date (Change):	6 August 2019	
Commencement Date (Change):	6 August 2019	(Granted Date: 12 September 2012)

**Conditions of Consent**

Consent Granted:	To discharge emissions into the air from a pig farming operation and associated practices including effluent treatment and other waste management activities	
Expiry Date:	1 June 2030	
Review Date(s):	June 2024	
Site Location:	24 Arawhata Road, Opunake	
Grid Reference (NZTM)	1670475E-5637131N	

*For General, Standard and Special conditions  
pertaining to this consent please see reverse side of this document*

**General condition**

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

**Special conditions**

1. The maximum number of pigs on the property, at any one time, shall not exceed 5,000 pigs (or 5,381, 50 kg pig equivalents).
2. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants into the air from the site.
3. Prior to undertaking any alterations to the pig farming and effluent disposal processes, operations, equipment or layout, as specified in the original application and any subsequent application to change the conditions of this consent, which may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991 and its amendments.
4. The consent holder shall minimise the emissions and impacts of air contaminants discharged into air from the site by:
  - a) the selection of the most appropriate process equipment;
  - b) process control equipment and emission control equipment;
  - c) the methods of control;
  - d) the proper and effective operation, supervision, maintenance and control of all equipment and processes; and
  - e) the proper care of all pigs on the site.
5. The consent holder shall, at all times, operate the piggery and associated activities in accordance with the information provided in support of the original application and any subsequent application to change the conditions to this consent, except as otherwise required or directed by the conditions set out in this resource consent.
6. The discharges authorised by this consent shall not give rise to an odour at or beyond the boundary of the site that is offensive or objectionable.

## Consent 5251-2.2

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2018 and/or June 2024 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 6 August 2019

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**



**Discharge Permit**  
**Pursuant to the Resource Management Act 1991**  
**a resource consent is hereby granted by the**  
**Taranaki Regional Council**

Name of Consent Holder: Stanley Bros Trust  
(Trustees: Ronald Thomas Stanley & Noel Henry Stanley)  
Main Road  
R D 31  
OPUNAKE 4681

Decision Date: 12 September 2012

Commencement Date: 12 September 2012

**Conditions of Consent**

Consent Granted: To discharge emissions into the air from a pig farming operation and associated practices including effluent treatment and other waste management activities at or about (NZTM) 1670546E-5637141N

Expiry Date: 1 June 2030

Review Date(s): June 2018, June 2024

Site Location: Arawhata Road, Opunake

Legal Description: Lot 1 DP 16380 Blk XV Opunake SD  
(Discharge source & site)

*For General, Standard and Special conditions  
pertaining to this consent please see reverse side of this document*

**General condition**

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

**Special conditions**

1. The maximum number of pigs on the property, at any one time, shall not exceed 4,000 P value (as defined in Appendix IV of the *Regional Air Quality Plan for Taranaki 2011*.)
2. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants into the air from the site.
3. Prior to undertaking any alterations to the pig farming and effluent disposal processes, operations, equipment or layout, as specified in application 5738 and supporting documentation, which may significantly change the nature or quantity of contaminants emitted from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals under the Resource Management Act 1991 and its amendments.
4. The consent holder shall minimise the emissions and impacts of air contaminants discharged into air from the site by:
  - a) the selection of the most appropriate process equipment;
  - b) process control equipment and emission control equipment;
  - c) the methods of control;
  - d) the proper and effective operation, supervision, maintenance and control of all equipment and processes; and
  - e) the proper care of all pigs on the site.
5. The consent holder shall, at all times, operate the piggery and associated activities in accordance with the information provided in support of application 5738, except as otherwise required or directed by the conditions set out in this resource consent.
6. The discharges authorised by this consent shall not give rise to an odour at or beyond the boundary of the site that is offensive or objectionable.

## Consent 5251-2

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2018 and/or June 2024 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 12 September 2012

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**





**Discharge Permit**  
**Pursuant to the Resource Management Act 1991**  
**a resource consent is hereby granted by the**  
**Taranaki Regional Council**

Name of Consent Holder: Stanley Bros Trust  
(Trustees: Ronald Thomas Stanley & Noel Henry Stanley)  
4789A South Road  
RD 31  
Opunake 4681

Decision Date 6 August 2019

Commencement Date 6 August 2019

**Conditions of Consent**

Consent Granted: To discharge piggery effluent onto land by spray irrigation

Expiry Date: 1 June 2030

Review Date(s): June 2021, June 2024, June 2027

Site Location: 24 Arawhata Road, Opunake

Grid Reference (NZTM) 1670475E-5637131N

Catchment: Arawhata

*For General, Standard and Special conditions  
pertaining to this consent please see reverse side of this document*

**General condition**

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

**Special conditions**

1. The effluent discharged shall be from a piggery of no more than 5,381, 50 kg pig equivalents.
2. Notwithstanding the conditions of this consent, it shall be exercised in a manner that minimises the leaching of nutrients to groundwater.
3. There shall be no overflow of effluent from any part of the effluent disposal system.
4. The consent holder shall ensure that at all times, while complying with the other requirements of this consent, there is sufficient storage available in the effluent storage ponds for any reasonably likely inflow, so that there is no unauthorised discharge to land or water.
5. Discharges to land shall not result in effluent ponding on the surface that remains for more than 30 minutes.
6. The sodium adsorption ratio of the wastewater shall not exceed 15.
7. No effluent shall be applied to land less than:
  - a. 25 metres from the water's edge in any watercourse
  - b. 50 metres from any bore, well or spring actively used for water supply purposes; or
  - c. 150 metres from any dwelling house unless the written approval of the occupier has been obtained to allow discharge at a closer distance.
8. There shall be no spray drift, as a result of the irrigation of treated wastewater, at or beyond the property boundary.
9. The consent holder shall ensure that the effluent is discharged to at least 100 hectares of land that is not grazed and that is planted in crops that are removed from the property i.e. a 'cut and carry' operation. It may also be applied and additional areas that are grazed.
10. The Total Nitrogen applied to any hectare of land shall not exceed:
  - (a) 400 kilograms in any 12-month period for 'cut and carry areas'; or
  - (b) 200 kilograms in any 12-month period for any other land (including grazed pasture).

## Consent 10671-1.1

11. The total Potassium applied to any hectare of land shall not exceed:
  - (a) 300 kilograms in any 12-month period for 'cut and carry areas'; or
  - (b) 100 kilograms in any 12-month period for any other land (including grazed pasture).
  
12. The consent holder shall keep accurate records of effluent application to land, including as a minimum, the:
  - a. volume of effluent applied;
  - b. rate and time of application;
  - c. area (ha) that the effluent was applied to;
  - d. method of irrigation; and
  - e. type of crop that is grown on that land.

This information shall be provided to the Taranaki Regional Council annually during the month of July and at other times when requested.

13. From 1 November 2019, this consent shall be exercised in accordance with an Effluent Irrigation Management Plan ('EIMP') that has been approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The EIMP shall detail how effluent irrigation is managed to minimise nutrient leaching to groundwater. The EIMP shall include as a minimum, details of:
  - (a) management of the cut and carry operation
  - (b) evapotranspiration and available water holding capacity of the soil(s) over the irrigated area;
  - (c) how irrigation will be scheduled to maximise the benefits of evapotranspiration and minimise subsurface drainage;
  - (d) how effluent is to be applied as uniformly as practicable over the irrigated area, and the uniformity of application demonstrated;
  - (e) the designated application areas and buffer zones for streams and the property boundary; and
  - (f) the determination of total Nitrogen and Potassium in effluent.
  
14. Before 31 January 2020 the consent holder shall after consultation with the Chief Executive, Taranaki Regional Council, install a minimum of three piezometers. The piezometers shall be at locations, and to depths, that enable monitoring to determine any change in groundwater quality resulting from the exercise of this consent. The piezometers shall be installed in accordance with NZS 4411:2001 and all associated costs shall be met by the consent holder.

Consent 10671-1.1

15. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2021 and at 3-yearly intervals thereafter, for the purpose of:
- (a) ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time; and
  - (b) addressing any significant increases in the concentration of nutrients in the groundwater.

Signed at Stratford on 6 August 2019

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**

## Appendix II

Categories used to evaluate environmental and administrative performance

## Categories used to evaluate environmental and administrative performance

Environmental performance is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. Administrative performance is concerned with the Company's approach to demonstrating consent compliance in site operations and management including the timely provision of information to Council (such as contingency plans and water take data) in accordance with consent conditions.

Events that were beyond the control of the consent holder and unforeseeable (that is a defence under the provisions of the RMA can be established) may be excluded with regard to the performance rating applied. For example loss of data due to a flood destroying deployed field equipment.

The categories used by the Council for this monitoring period, and their interpretation, are as follows:

### Environmental Performance

**High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.

**Good:** Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively, and quickly. The Council was not obliged to issue any abatement notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

For example:

- High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
- Strong odour beyond boundary but no residential properties or other recipient nearby.

**Improvement required:** Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

**Poor:** Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self-reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

### Administrative performance

**High:** The administrative requirements of the resource consents were met, or any failure to do this had trivial consequences and were addressed promptly and co-operatively.

**Good:** Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively

adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

**Improvement required:** Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an abatement notice to attain compliance.

**Poor:** Material failings to meet the administrative requirements of the resource consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.





## Appendix III

Company provided annual report



# Annual Effluent Irrigation Management Plan 2022-23

For  
**Stanley Bros Trust**  
July 2023

## **Brief**

Stanley Bros Trust have asked agKnowledge Ltd to update their Effluent Irrigation Management Plan (EIMP) for the Taranaki Regional Council (TRC). This EIMP is required to meet the discharge consent conditions (Consent 10671-1.1) for the July 1, 2022 to June 30, 2023 period.

## **Discharge Consent Conditions**

The specific discharge consent conditions required by the TRC relating to effluent applications to land on this property are as follows:

*Clause 12. The consent holder shall keep accurate records of effluent application to land, including as a minimum, the:*

- a. volume of effluent applied;*
- b. rate and time of application;*
- c. area (ha) that the effluent was applied to;*
- d. method of irrigation; and*
- e. type of crop that is grown on that land.*

*In addition, information was also requested on:*

- f. the determination of total Nitrogen and Potassium in effluent,*
- g. to provide effluent monitoring data to determine the loading of nitrogen and potassium across the irrigation areas?*
- h. pig numbers for the year.*

Each of these points will be addressed but not in the order presented above.

## **Pig numbers for the year**

*TRC Special Condition 1 (Consent 5251-2.2) states that the number of pigs on the property, at any one time, shall not exceed 5,000 pigs (or 5,381, 50 kg pig equivalents).*

The total number of pigs, by class and average liveweight (LWT) is shown below (Table 1). The 50 kg LWT Standard Pig Unit (SPU) has been derived from the total LWT carried.

**Table 1:** Pig inventory for 2022/23.

Pig Class	Pig Numbers	Average LWT (kg)	Total LWT (kg)	SPU equivalents
Sows	336	162	54,432	1,089
Gilts	19	150	13,650	273
Boars	4	162	648	13
Light Pork	1,330	70	93,100	1,862
Store Pigs	655	44	28,820	576
Weaners	1,503	25	37,575	752
<b>Total</b>			<b>228,225</b>	<b>4,565</b>

The number of SPUs carried by the Stanley Bros Piggery is 15% below the consented number.

## **Effluent Applications**

### *a) Volume of effluent applied*

The total volume of effluent applied from the Piggery during 2022/23 was 688 mm. Details of application depths, timing of applications and receiving blocks are set out below.

### *b) Rate and time of application*

**Table 2:** Irrigations per month and effluent volumes applied.

Month	Irrigations per month (days)	Effluent volumes applied (mm)
July 2021	25 <sup>1</sup>	129
August	23 <sup>1</sup>	103
September	11	44
October	20	59
November	28 <sup>1</sup>	95
December	10	46
January 2022	13	62
February	11	24
March	9	24
April	0	0
May	27	47
June	14	55

<sup>1</sup> Multiple irrigation delivery systems operating.

*c) Area (ha) that effluent is applied to*

For effluent application purposes, the farm is divided into five blocks, totalling ~105 ha. The total annual volume of effluent (688 mm) applied to these blocks is shown in Table 3. The average annual application depth for 2022/23 was 21.5 mm.

**Table 3:** Block areas and annual effluent volumes applied.

Farm Block	Effective Area (ha)	Total Effluent Volume Applied (mm)
Main Road	7.7	42
Arawhata/Centre	26.5	149
Cliff Tops	9.9	95
Sand Dunes	23.8	292
Maize	37.2	110

*d) Method of irrigation*

The effluent flushed from the Piggery is pumped to a storage pond prior to land application. Two different delivery systems were used during 2022/23:

- 1) Dribble bar - main method of effluent application, depths applied (~3mm).
- 2) ‘Weta’ travelling rain gun – used to apply effluent to the Sand Dunes Block at 8-10 mm depths during 7 months of the year.

*e) Total Nitrogen and Potassium in effluent*

Historical data of chemical analysis of the mean nitrogen and potassium concentrations in the piggery effluent have been used as the basis for calculating the nutrient loadings are presented in Table 4.

**Table 4:** Mean nutrient composition of piggery effluent (n=14)<sup>1</sup> plus 95% Confidence Interval (C.I.).

Nutrients in Piggery Effluent	Mean (g/m3)	95% C.I. (g/m3)
Nitrogen	756	140
Phosphorus	190	64 <sup>1</sup>
Potassium	317	96
Calcium	486	741 <sup>1</sup>
Magnesium	81	45 <sup>1</sup>
Sodium	97	28

<sup>1</sup> Samples collected by Stanley Bros and TRC.

<sup>2</sup> One sampling (April 2021) had outlier values for P, Ca & Mg; e.g., Ca values normally ranged between 89-131, but were 4,000 at the April sampling.

*f) Type of crops grown*

Two crops, maize silage and permanent pasture, were grown under the Cut and Carry system in 2022/23.

The maize silage paddocks (37.2 ha) were cultivated and planted in October, then harvested in March, yielding around 21.3 tonnes DM/ha. An annual ryegrass was then planted as a cover crop, over the cooler/wetter months, and harvested as grass silage in late September/early October yielding ~3.8 tonnes DM/ha.

On the rest of the farm, except for the Sand Dunes Block, pasture was mown, with the earlier crops removed as haylage (713 bales) and the later crops removed as hay (789 bales).

*g) Management of cut and carry operation*

The feed grown on-farm and then sold off-farm, for 2022/23, was as follows (Table 5).

**Table 5:** Dry matter yields of Cut and Carry crops.

Harvested Feed	Feed Amount	Average DM Yield	DM removed (tonnes)
Maize silage	37.2 ha	21.3 tonnes/ha	792
Grass silage	30.3 ha	3.8 tonnes/ha	116
Hay (15's)	789 bales	300 kg/bale <sup>1</sup>	237
Haylage (15's)	713 bales	300 kg/bale <sup>2</sup>	214

<sup>1</sup> & <sup>2</sup> Feed Supplement data from Beef+LambNZ Factsheet (2017)

Composite maize silage feed samples of each block were collected and analysed by Hill Laboratories so that nutrient uptake and removal off-farm could be calculated (Table 6).

**Table 6:** Nitrogen & potassium concentrations and total N and K removed in the Cut and Carry system.

Harvested Feed	N (% in DM) <sup>1</sup>	K (% in DM) <sup>1</sup>	N uptake (kg)	K uptake (kg)
Maize silage	1.18	1.15	9,346	9,108
Grass silage	1.70	2.80	1,972	3,248
Hay (15's)	1.60	1.60	3,792	3,792
Haylage (15's)	1.80	2.50	3,852	5,350

In total, 18,962 and 21,498 kg's of N and K respectively were removed off-farm in the harvested feed.

## **Nutrient Management**

The resource consent also includes special conditions for nutrient management viz:

*Special condition 10. The Total Nitrogen applied to any hectare of land shall not exceed: (a) 400 kilograms in any 12-month period for 'cut and carry areas'; or (b) 200 kilograms in any 12-month period for any other land (including grazed pasture).*

*Special Condition 11. The total Potassium applied to any hectare of land shall not exceed: (a) 300 kilograms in any 12-month period for 'cut and carry areas'; or (b) 100 kilograms in any 12-month period for any other land (including grazed pasture).*

### Maize Silage and Grass Silage

Piggery effluent was applied to the maize silage areas at an average application depth of 21.5 mm supplying 180 kg N/ha and 76 kg K/ha; fertiliser N (100 kg N/ha) was also applied at the sowing of the maize (Table 8). No potassium fertiliser was applied.

### Permanent Pasture

The total nutrients for the Hay and Haylage Cut and Carry crops were applied solely as piggery effluent and calculated to be 216 kg N/ha and 91 kg K/ha (Table 7).

### Nutrient balance

Table 7 summarises the nutrient inputs and outputs for the Cut and Carry operations.

**Table 7:** Summary of nutrient inputs and outputs (kg/ha).

Cut & Carry Crops	Area (ha)	Inputs		Outputs	
		N	K	N	K
Maize silage	37.2	280	76	304	332
Annual ryegrass	30.3	71	30	65	107
Hay & haylage	44.1	216	91	103	123

The N and K inputs applied were below the consented maximum limits for the Cut and Carry operation.

### Soil tests

Soil samples have been collected (0-15cm depth) and analysed for available mineral N and Quick Test K. Results from 2018 to 2023 are presented in Table 8 and show there has been no accumulation of N but a small increase in K in these soils, given normal variability.



**Table 8:** Average nitrogen & potassium concentrations in soils since 2018.

Soil analysis (0-15 cm)	2018 (n=4)	2020 (n=5)	2021 (n=5)	2022 (n=4)	2023 (n=4)
Available nitrogen (kg/ha)	206	192	194	192	206
Potassium (MAF QT units)	8	7	8	12	13

## Livestock

A number of dry stock animals are carried on the farm to control pastures both inside and outside the Cut and Carry areas. Note that the Sand Dunes block receives effluent but is solely grazed by livestock. Other areas near the Main Road and houses are grazed by a small number of sheep and horses. Table 9 summarises the number of animals and their duration on the property during 2022/23.

**Table 9:** Livestock carried on-farm during 2022-23.

Stock Class	Number carried	Average LWT (kg)	Total LWT (kg)	Time on Farm (months)
R1 heifers	162	185	29,970	12
Winter grazers	208	425	88,400	2
<b>Total</b>			<b>118,370</b>	

Bob Longhurst & Dr Doug Edmeades

13 July, 2023

