

Ballance Agri-Nutrients (Kapuni) Ltd

Monitoring Programme

Annual Report

2022-2023

Technical Report 2023-50



Working with people | caring for Taranaki

Taranaki Regional Council
Private Bag 713
Stratford

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Executive summary

Ballance Agri-Nutrients (Kapuni) Ltd (the Company) operates an ammonia urea manufacturing plant located near Kapuni, in the Kapuni Stream catchment.

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, Ballance Agri-Nutrients Ltd demonstrated an overall high level of environmental and administrative performance.

The Company holds seven resource consents, which include a total of 74 conditions setting out the requirements that the Company must satisfy. The Company holds resource consents to allow it to take water from the Waingongoro River, the Kapuni Stream and from groundwater; to discharge to land, to the Kapuni Stream and an unnamed tributary of the Kapuni Stream; and to discharge emissions into the air.

The Company and the Council monitor the exercise of the resource consents. The monitoring programme includes site inspections, sampling of effluent, air emissions, discharge and receiving waters (both ground and surface) for physicochemical analysis, and biological surveys of streams. Particular attention is paid to the management of the irrigation disposal system, and its effects on groundwater quality.

The Council's monitoring programme included four inspections, physicochemical analysis of two stream samples, one stormwater/discharge sample, two effluent grab samples, two composite effluent samples, two groundwater samples and one air depositional gauging.

Abstraction volumes from Waingongoro River complied with the consent limit. A contribution of \$300,000 (\$30,000/year for 10 years) towards riparian planting and management in Waingongoro catchment has now been completed, there continue to be landowners receiving funding for riparian plants and planting.

The groundwater monitoring indicates the presence of elevated total nitrogen concentrations in shallow groundwater. This is in part a result of heavy applications of nitrogen (effluent) early in the life of the plant. Current effluent application is considerably lower than historic application rates. However, nitrate concentrations in the soil profile underneath the irrigation areas and in the tributaries flowing through or adjacent to the site remain elevated.

A narrow but concentrated plume of ammonia is present in the groundwater resulting from previous leaks in a finished effluent catch basin. This basin has since been repaired. A second more recent and more concentrated ammonia plume extends from the plant area. Both plumes have pump and treatment systems operating, with the contaminated groundwater pumped back through the plant and waste treatment system. Both plumes are closely monitored and neither plume extends beyond the boundary of the Company's site. However, during 2020 concentrations in one monitoring bore (but not other down gradient bores in close proximity) showed a large increase in total nitrogen. Concentrations in this bore have declined since the peak in 2020, and even further during this monitoring period. It is important that monitoring continues because levels remain elevated.

Monitoring of the Kapuni Stream through testing for nitrogen as well as biomonitoring involving macroinvertebrate and fish surveys has not detected any detrimental impact on the stream health caused by discharges from the Company's site.

Air monitoring of the site and the neighbourhood shows no significant impact on the surrounding environment in relation to the operation of the ammonia urea plant.

During the monitoring period, no unauthorised incidents were identified, or reported to the Council.

Overall, during the period under review, the Company demonstrated a high level of environmental performance and a high level of administrative performance with its resource consents.

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.

In terms of overall environmental and compliance performance by the consent holder over the last several years, this report shows that the consent holder's performance remains at a high level.

This report includes recommendations for the 2023-2024 year.

Table of contents

		Page
1	Introduction	1
1.1	Compliance monitoring programme reports and the Resource Management Act 1991	1
1.1.1	Introduction	1
1.1.2	Structure of this report	1
1.1.3	The Resource Management Act 1991 and monitoring	1
1.2	Process description	2
1.3	Resource consents	5
1.4	Monitoring programme	5
1.4.1	Introduction	5
1.4.2	Monitoring by the Company	6
1.4.2.1	Compliance	6
1.4.2.2	Irrigation system management	6
1.4.2.3	Groundwater	6
1.4.2.4	Biological monitoring	6
1.4.3	Monitoring by Taranaki Regional Council	6
1.4.3.1	Programme liaison and management	6
1.4.3.2	Review of the Company's monitoring data	6
1.4.3.3	Site inspections	6
1.4.4	Chemical sampling	7
2	Results	8
2.1	Water	8
2.1.1	Inspections	8
2.1.2	Results of abstraction and discharge monitoring	8
2.1.2.1	Waingongoro River abstraction	8
2.1.2.2	Kapuni Stream abstraction	9
2.1.2.3	Intake options report and monitoring programme	9
2.1.2.4	Annual meeting regarding the Waingongoro River intake and environmental performance	9
2.1.3	Discharge monitoring	10
2.1.3.1	Stormwater and raw water treatment discharges	10
2.1.4	Results of receiving environment biomonitoring	13
2.2	Land	14
2.2.1	Inspections	15

2.2.2	Discharge monitoring	16
2.2.2.1	Effluent volume	16
2.2.2.2	Nitrogen application rates	16
2.2.3	Soil and herbage monitoring	17
2.2.3.1	Spring 2022 soil and herbage survey	18
2.2.3.2	Autumn 2023 deep soil leaching profiles	18
2.2.4	Groundwater monitoring	18
2.2.4.1	Electromagnetic induction survey	19
2.2.4.2	Groundwater monitoring in relation to effluent irrigation	19
2.2.4.3	Groundwater monitoring in relation to the FECB ammonia plume	21
2.2.4.4	Groundwater monitoring in relation to the granulator plume	22
2.3	Air	23
2.3.1	Inspections	23
2.3.2	Results of air quality monitoring	23
2.3.2.1	Emissions testing	23
2.3.3	Results of receiving environment monitoring	24
2.3.3.1	Particulate deposition gauging	24
2.3.3.2	Ambient gas monitoring by Regional Council	26
2.3.3.3	Ambient ammonia monitoring by the Company	27
2.3.3.4	Other ambient monitoring	27
2.3.4	Technical review reports	28
2.4	Riparian management	28
2.5	Incidents, investigations, and interventions	28
3	Discussion	30
3.1	Discussion of site performance	30
3.2	Environmental effects of exercise of consents	30
3.3	Evaluation of performance	31
3.4	Recommendations from the 2021-2022 Annual Report	38
3.5	Alterations to monitoring programmes for 2023-2024	38
4	Recommendations	39
	Glossary of common terms and abbreviations	40
	Bibliography and references	42
	Appendix I Resource consents held by Ballance Agri-Nutrients (Kapuni) Ltd	
	Appendix II Categories used to evaluate environmental and administrative performance	

List of tables

Table 1	Discharges and emissions from the ammonia urea plant	4
Table 2	Resource consents for operation of ammonia urea plant	5
Table 3	Results of compliance monitoring and inter-laboratory comparison between Council and the Company 2022-2023	11
Table 4	Overview of the monitoring programme for the Kapuni Catchment	14
Table 5	Nitrogen application rates (kg/ha/y) for cut-and-carry areas and grazed areas for 2022-2023	16
Table 6	Site areas in relation to groundwater monitoring bores and nitrogen concentrations	19
Table 7	Dust scrubber emission testing results for the monitoring period 2022-2023	24
Table 8	Results of particulate deposition monitoring from 16 February 2023 to 10 March 2023	26
Table 9	Laboratory results and calculated time weighted averages (TWAs) for 2022-2023	28
Table 10	Summary of performance for Consent 0596-3	31
Table 11	Summary of performance for Consent 1213-3	32
Table 12	Summary of performance for Consent 4719-2	32
Table 13	Summary of performance for Consent 0598-3	33
Table 14	Summary of performance for Consent 1766-3	34
Table 15	Summary of performance for Consent 0597-3	34
Table 16	Summary of performance for Consent 4046-3	35
Table 17	Evaluation of environmental performance over time	36

List of figures

Figure 1	Map showing water intake structure adjacent to the Waingongoro River	8
Figure 2	Daily water abstraction by the Company for July 2022 – June 2023	9
Figure 3	Biomonitoring sites in the Kapuni Catchment	13
Figure 4	Irrigation areas ('cut-and-carry' areas in blue shading and grazed areas green shading)	15
Figure 5	Nitrogen applications rates on cut and carry spray irrigation areas	16
Figure 6	Nitrogen applications rates on grazed spray irrigation areas	17
Figure 7	Locations of groundwater monitoring bores	20
Figure 8	Total nitrogen concentration in groundwater associated with the FECB plume from West Bore	21
Figure 9	Total nitrogen concentration in groundwater associated with the FECB plume from East Bore	22
Figure 10	Total nitrogen concentration in groundwater associated with the granulator plume from Bore 25	23
Figure 11	Location of deposition gauge monitoring sites	25
Figure 12	Wind-rose for Hawera weather station during deployment of deposition gauges	25

List of photos

Photo 1	Ballance Agri-Nutrients ammonia urea plant (viewed looking towards the north-east)	3
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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 the resource consents held by Ballance Agri-Nutrients (Kapuni) Ltd (the Company). The Company operates an ammonia urea plant (the AUP) situated on Palmer Road, Kapuni, in the Kapuni catchment.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by the Company that relate to abstractions of water in the Waingongoro and Kapuni catchments, and discharges of water and effluent within the Kapuni catchment, and the air discharge permit held by the Company 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.

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 *Resource Management Act 1991* (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 Kapuni and Waingongoro 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' in as much 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.

1.2 Process description

The AUP was commissioned in November 1982. The plant utilises specification gas from the Taranaki Fields. This gas is supplied for both fuel and process.

The feed gas is treated in a de-sulphuriser and then mixed with superheated steam for reaction in the steam methane reformer. The synthesis gas mixture consists of hydrogen, carbon dioxide, and carbon monoxide. The reformer is heated by burning fuel gas. The waste gases from combustion are used to generate steam, before discharging to the atmosphere, to increase efficiency and reduce fuel consumption. The synthesis gas mixture is reacted with air (mainly dinitrogen gas) in a secondary reformer, a process that releases heat and requires no fuel. The heat is recovered for steam generation. A shift converter adjusts the synthesis gas mixture, before carbon dioxide is removed by absorption into an amine solution. This solution is regenerated by heating, which drives off the dissolved carbon dioxide. The carbon dioxide is sent to the urea plant for utilisation in the urea manufacturing process. Meanwhile, the synthesis gas is reacted to form ammonia. Non-utilisable by-product gases are burnt as fuel.

The ammonia and the carbon dioxide are combined in the urea formulation process. Off-gases are absorbed in scrubbers. The urea is formed into granules utilising air fluidised-bed granulation. Following this the product is screened and air-cooled.

The normal discharges and emissions from the AUP are listed in Table 1.



Photo 1 Ballance Agri-Nutrients ammonia urea plant (viewed looking towards the north-east)

Table 1 Discharges and emissions from the ammonia urea plant

Discharge	Resource consent	Source	Constituents	Rate
Discharges to land	0597-3	Discharge of plant production effluent and contaminated stormwater by way of spray irrigation to pasture	Primarily ammonia, urea and nitrate. Also contains cooling water blow down	Up to 1,470 m ³ /day
	7751-0 (Certificate of compliance)	Domestic sewage via soakage trenches	Treated sewage effluent	Up to 28 m ³ /day
Discharges to water	0598-3	Uncontaminated stormwater, and raw water treatment effluent, to the Kapuni Stream and an unnamed tributary of the Kapuni Stream	Major cations (particularly sodium) and accumulated particulate material	Up to 1,920 m ³ /day to the Kapuni Stream. Up to 4,080 m ³ /day to an unnamed tributary of the Kapuni Stream
	1766-3	Contingency discharge of treated plant effluent and contaminated stormwater	Primarily ammonia, urea and nitrate. Also contains cooling water blow down	Up to 1,000 m ³ /day to the Kapuni Stream when conditions do not allow spray irrigation
Emissions to air	4046-3	Reformers and de-sulphuriser heater	Carbon dioxide, nitrogen oxides, water vapour	Nitrogen oxides about 300 kg/hr
		Alkanolamine stripper	Carbon dioxide	16,000 kg/hr for short periods
		Cooling tower	Water vapour and droplets, traces of water treatment chemicals	
		Urea granulation process	Urea dust, ammonia	Less than 5 kg/hr
		Ammonia recovery process vent	Ammonia	Less than 3 kg/hr
		Ammonia finishing absorber	Ammonia	Less than 3 kg/hr
		Pressure relief valves	Ammonia	Infrequent (abnormal process event)

1.3 Resource consents

The Company holds seven 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 is included in Appendix I, as are copies of all permits held by the Company during the period under review.

Table 2 Resource consents for operation of ammonia urea plant

Resource consent	Purpose	Granted	Next review date	Expiry date
0596-3.1	Abstract water from Waingongoro River	15 January 2021	June 2029	1 June 2035
1213-3.1	Abstract water from Kapuni Stream during emergencies	15 January 2021	June 2029	1 June 2035
0597-3	Discharge plant production effluent and contaminated stormwater by way of irrigation onto land	31 August 2012	June 2029	1 June 2035
0598-3	Discharge uncontaminated stormwater and raw water treatment plant wastewater to Kapuni Stream or tributary of Kapuni Stream during high flows	31 August 2012	June 2029	1 June 2035
1766-3	Discharge treated effluent and stormwater to Kapuni Stream when conditions do not allow irrigation onto land	31 August 2012	June 2029	1 June 2035
4719-2	Take groundwater for site remediation purposes	31 August 2012	June 2029	1 June 2035
4046-3	Discharge of emissions to air from the manufacturing of ammonia and urea	10 February 2012	June 2027	1 June 2035
Certificate of compliance				
7751-0 (formerly consent 3967-1)	Discharge treated domestic wastewater to groundwater via soakage trenches	6 December 2010	N/A	N/A

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.

Monitoring at the AUP is carried out by both the Company and the Council. The components of monitoring carried out by each entity are described in further detail below.

1.4.2 Monitoring by the Company

1.4.2.1 Compliance

Compliance with resource consent conditions on abstraction and discharge rates and on discharge and receiving water compositions is determined on a regular basis. The company engages K2 Environmental Ltd to conduct testing of emissions from the dust scrubber on a biannual basis.

1.4.2.2 Irrigation system management

The irrigation system is managed through monitoring of inputs from effluent, and outputs through grass removal and drainage to groundwater. Soil and herbage analyses are performed.

1.4.2.3 Groundwater

A series of monitoring bores within and around the irrigation areas is used to monitor the effects of the irrigation system on groundwater quality. A total of 42 monitoring bores have been installed at the AUP since 1981. An electromagnetic induction survey has been conducted annually since 2002 to map the migration of contaminated plumes beneath the site.

1.4.2.4 Biological monitoring

Since 1981, biological monitoring of the Kapuni Stream and its tributaries has been carried out regularly by a consultant for the Company as part of a combined monitoring programme for the AUP and the Todd Energy (formerly Vector) gas treatment plant on an adjacent site. Monitoring is carried out quarterly to detect any changes, over time, in the abundance, diversity and health of benthic macroinvertebrate communities, and biannually for fish and freshwater crayfish. During the monitoring period, Stark Environmental Ltd was engaged to perform the quarterly sampling and to report on the resultant monitoring conducted. The reports are forwarded to the Council for review.

1.4.3 Monitoring by Taranaki Regional Council

1.4.3.1 Programme liaison and management

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

- ongoing liaison with resource consent holder 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.

1.4.3.2 Review of the Company's monitoring data

Monitoring data gathered by the Company are reviewed monthly to determine compliance with resource consent conditions and to assess trends in water usage, discharge composition and groundwater quality.

1.4.3.3 Site inspections

An officer of the Council visits the AUP site quarterly. Inspections are made of streams at the site, the stormwater system, the effluent treatment system, irrigation areas and the site in general. Monitoring results, irrigation records and activities which may influence plant effluent quality are discussed. The site neighbourhood is surveyed for environmental effects and odour.

1.4.4 Chemical sampling

The results of monitoring reported by the Company are checked on two occasions within each year of the monitoring period by splitting samples of effluent, stormwater and receiving waters (the Kapuni Stream) upstream and downstream of the discharge point and mixing zone concurrently for comparative laboratory analysis. The groundwater monitoring procedure is checked annually.

An annual ambient air quality survey is conducted at several locations around the site. The survey monitors concentrations of carbon monoxide, nitrogen dioxide, and particulate matter.

2 Results

2.1 Water

2.1.1 Inspections

The Company's site was inspected on four occasions during the monitoring year under review. On all occasions site management was found to be good and no significant issues were noted. Overall the effluent management system and irrigation areas were found to be working well, however during the September inspection it was noted that care needed to be taken when irrigating after rainfall as this increases the likelihood of ponding.

2.1.2 Results of abstraction and discharge monitoring

2.1.2.1 Waingongoro River abstraction

Process and operation water for the site is pumped from the Waingongoro River, which is located 7.2 km east from the Company site (Figure 1). Water is pumped at a rate of approximately 140 m³/h (3,360 m³/d or 39 L/s). The consented daily volume limit, of 3,456 m³ at a maximum rate of 100 L/s, was increased by 15% to 4,000 m³, without an instantaneous limit, under replacement consent 0596-3 in August 2012.



Figure 1 Map showing water intake structure adjacent to the Waingongoro River

Under the Resource Management (Measurement and Reporting of Water Takes) Regulations 2010, the Company was required to take continuous measurements and keep daily records of volume taken from 10 November 2012, and thereafter supply by 31 July each year the record for the preceding 1 July to 30 June period. Suitable flow meters were already in place, and appropriate records kept, at the time the regulations came into force.

The daily abstraction record for 2022-2023 is presented in Figure 2.

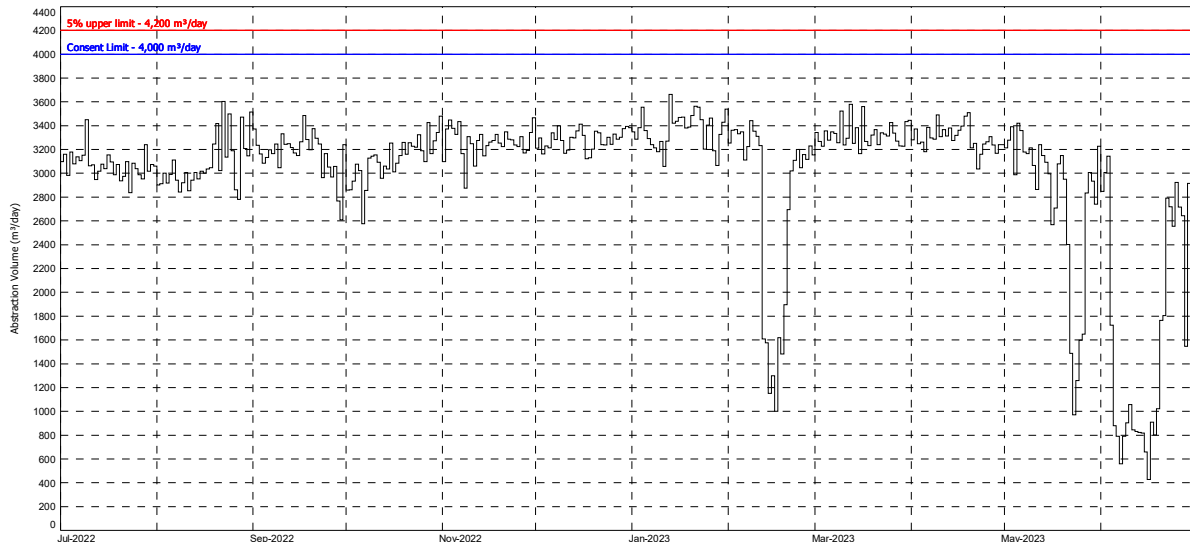


Figure 2 Daily water abstraction by the Company for July 2022 – June 2023

The record shows that the consent limit of 4,000 m³/d on maximum abstraction volume was complied with throughout the 2022-2023 review period. The minimum daily recorded volume was 428 m³/d on 17th June 2023 and the maximum recorded daily volume was 3,664 m³/d on 14 January 2023, or just less than 92% of the limit.

Verification of the accuracy of the measurement system was carried out by an authorised independent agent on 5 September 2019. The equipment was found to meet the required accuracy levels (+/- 5%).

2.1.2.2 Kapuni Stream abstraction

Water permit 1213-3.1, to abstract water from the Kapuni Stream at times when the normal water supply has failed, was not exercised for the monitoring year under review.

2.1.2.3 Intake options report and monitoring programme

Special conditions on consent 0596-3.1 require the Company to produce a report on options to minimise entrainment of juvenile fish through the water intake, and to develop a monitoring programme in consultation with Iwi. Work has been completed regarding this programme and the monitoring results indicate that levels of fish mortality as a result of entrainment are not likely to have any meaningful effect on fish populations. Further details of the monitoring carried out is included in the 2017-2018 monitoring report published by the Council (see bibliography).

2.1.2.4 Annual meeting regarding the Waingongoro River intake and environmental performance

Condition 12 on consent 0596-3.1 requires liaison with interested parties on exercise of the consent:

12. *At least once every year, the consent holder shall convene a meeting with representatives of the Taranaki Regional Council, Fish and Game, Department of Conservation, Ngati Ruanui and Ngauruhine. The meeting shall be for the purpose of discussing and generally informing the parties about the consent holder's monitoring data and the monitoring programme relating to the operation, monitoring and environmental effects of the consented activities.*

A meeting for the Company to consult with and inform interested parties about the options and monitoring of its water intake on the Waingongoro River was last held at its offices at the Kapuni site during June 2023.

2.1.3 Discharge monitoring

2.1.3.1 Stormwater and raw water treatment discharges

Stormwater is discharged to the Kapuni Stream from a holding pond. At times of extreme high rainfall, the stormwater is also discharged to an unnamed tributary of the Kapuni Stream which runs through the plant site. Resource consent 0598-3 allows for to 1,920 m³/d of uncontaminated stormwater to be discharged to the Kapuni Stream and up to 4,080 m³/d to the unnamed tributary with a combined discharge of 6,000 m³/d.

Normally these discharges are in batches with a frequency ranging from daily to weekly, dependent on rainfall. During and after exceptionally heavy rainfall, the discharge may occur for continuous periods of up to 24 hours.

In 2022-2023, the maximum daily volume of stormwater discharged from the site was 3,871 m³/d. In total there was 65,566 m³ of stormwater discharged over 75 days during the monitoring period. The volume of material discharged is in compliance with the resource consent.

A standard stormwater discharge procedure has been developed by the Company for plant operators and has been approved by the Council. The procedure involves chemical analysis and visual inspection of the collected stormwater before each discharge. The flow of the Kapuni Stream is measured by a Flo-Dar radar/ultrasonic flow measurement device installed beside the Vector gas treatment plant, which is validated against readings from the Council's hydrometric station downstream at Normanby Road. The stream pH and temperature are measured to allow the estimation of unionised ammonia concentrations. A suitably trained Company staff member must authorise each discharge.

About one hour after commencement of each discharge of the basin contents, chemical analysis of the Kapuni Stream at Skeet Road, 600 m below the discharge point, is carried out to monitor effects on water quality.

Monitoring of the discharge was undertaken by the Company, and on two occasions during the monitoring year by the Council. The results of testing of the samples taken by the Company and the Council are compared as a quality control measure. The results of the compliance monitoring and inter-laboratory comparison between the Council and the Company are shown in Table 3.

The resource consent requires that the stormwater discharge shall maintain a pH range of 6.5-9.0 and a maximum zinc concentration below 0.5 g/m³. Monitoring by the Company in 2022-2023 showed a pH range of 7.4-8.8 when discharging to the Kapuni Stream. Zinc in the stormwater discharge was tested twice by the Council in conjunction with the inter-laboratory comparisons (0.07 g/m³ on 8/3/23 and 0.1 g/m³ on 30/06/23) and both results were below the maximum limit.

The resource consent also has maximum limits on unionised (free) ammonia (0.025 g/m³) and sodium (40 g/m³) concentrations in the receiving waters. Concentrations were below these limits.

The monitoring results above demonstrate compliance with the conditions of resource consent 0598-3 during the review period.

The comparisons of laboratory results generally showed good agreement, and compliance with consent conditions. There were some differences in urea, which also occurred in the previous monitoring period, which could possibly be attributed to samples not being completely frozen on arrival at Hills, or potentially a difference in analysis method.

Table 3 Results of compliance monitoring and inter-laboratory comparison between Council and the Company 2022-2023

	Spray Irrigated Effluent IND002006								D-Min and Stormwater IND002007	Kapuni u/s of AUP KPN000293		Kapuni d/s of AUP KPN000300		
	8 March 23				30 June 23				30 June 23					
	Grab		Composite		Grab		Composite		TRC	AUP	TRC	AUP	TRC	AUP
	TRC	AUP	TRC	AUP	TRC	AUP	TRC	AUP						
Temperature °C	28.1	-	-	-	22.3	-	-	-	10.8	-	9.8	9.7	9.8	9.8
Conductivity @ 25°C mS/m	178.2	-	194.3	-	152.7	-	301	-	30.8	36.2	11.2	10.9	11.9	12.1
pH	7.9	-	8.1	-	7.0	-	8.1	-	7.4	7.57	7.4	7.6	7.4	7.7
Suspended solids g/m³	14	-	-	-	15	-	-	-	19	-	-	-	-	-
Turbidity NTU	-	-	-	-	-	-	-	-	14.1	-	-	-	-	-
Turbidity FNU	-	-	-	-	-	-	-	-	-	-	1.66	-	1.82	-
Ammonia (free) g/m³ NH₃	-	-	-		-	-	-	-	0.041	-	<0.001	<0.001	<0.001	0.0033
Ammonia (total) g/m³-N	-	-	9.1	9.96	-	-	15.0	14.9	8.8	9.59	0.033	0.05	0.181	0.3
Nitrate g/m³-N	-	30	32.0	29.0	-	12.0	15.6	15.5	8.6	-	1.36	-	1.51	-
Nitrite g/m³-N	-	7.9	8.2	7.18	-	2.7	1.19	1.25	0.75	0.81	0.005	<0.01	0.016	0.02
Nitrite and Nitrate g/m³-N	35.0	37.9	40	36	14.8	14.7	16.8	16.75	9.4	-	1.37		1.52	-
Total Nitrogen g/m³	44	-	49	-	22	-	33	-	23	-	-	-	-	-
Urea g/m³-N	-	2.26	0.49	<0.74	-	3.24	0.75	2.47	4.7	4.12	-	-	-	-
Potassium g/m³	-	210	161	164	-	-	91	87	3.1	-	3.9	-	3.9	-
Sodium g/m³	-	164	240	240	-	168	550	494.8	22	22.08	8.7	8.69	8.9	8.93
Calcium g/m³	-	47	40	39	-	38	47	46	-	-	-	-	-	-
Magnesium g/m³	-	16.0	13.9	12.9	-	13.4	16.9	16.8	-	-	-	-	-	-
Chloride g/m³	-	-	230	-	-	-	230	-	-	-	-	-	-	-
Phosphorus, (dissolved reactive) g/m³	-	-	1.64	-	-	-	1.21	-	<0.004	-	0.017	-	0.014	-
Copper (acid soluble) g/m³	0.011	-	-	-	0.011	-	-	-	<0.010	-	-	-	-	-

	Spray Irrigated Effluent IND002006								D-Min and Stormwater IND002007	Kapuni u/s of AUP KPN000293		Kapuni d/s of AUP KPN000300		
	8 March 23				30 June 23				30 June 23					
	Grab		Composite		Grab		Composite		TRC	AUP	TRC	AUP	TRC	AUP
	TRC	AUP	TRC	AUP	TRC	AUP	TRC	AUP						
Chromium (acid soluble) g/m³	<0.010	-	-	-	<0.010	-	-	-	<0.010	-	-	-	-	-
Mercury (total) mg/m³	0.00016	-	-	-	0.00027	-	-	-	<0.00008	-	-	-	-	-
Nickel (acid soluble) g/m³	<0.010	-	-	-	<0.010	-	-	-	<0.010	-	-	-	-	-
Zinc (acid soluble) g/m³	0.42	-	-	-	0.32	-	-	-	0.1	0.07	-	-	-	-
Hydrocarbons (total C7-C36) g/m³	-	-	-	-	-	-	-	-	<4	-	-	-	-	-

2.1.4 Results of receiving environment biomonitoring

Biomonitoring of the Kapuni Stream and its tributaries was carried out by the Company as required by the conditions of the resource consents. All six biological surveys were undertaken by the Council, with Stark Environmental Ltd carrying out the data interpretation and reporting on behalf of the Company.

The programme involved assessment of changes in the abundance and diversity of the macroinvertebrates and fish communities. Seven sites in the Kapuni catchment, five on the main stream and two in gullies that run through the irrigation area were monitored quarterly for benthic macroinvertebrates and biannually for fish by electric fishing (Figure 3). A further four sites on the main stream are sampled once a year in spring in conjunction with the other monitoring for both macroinvertebrates and fish. Monitoring results and their interpretation are forwarded to the Council quarterly and are reviewed.

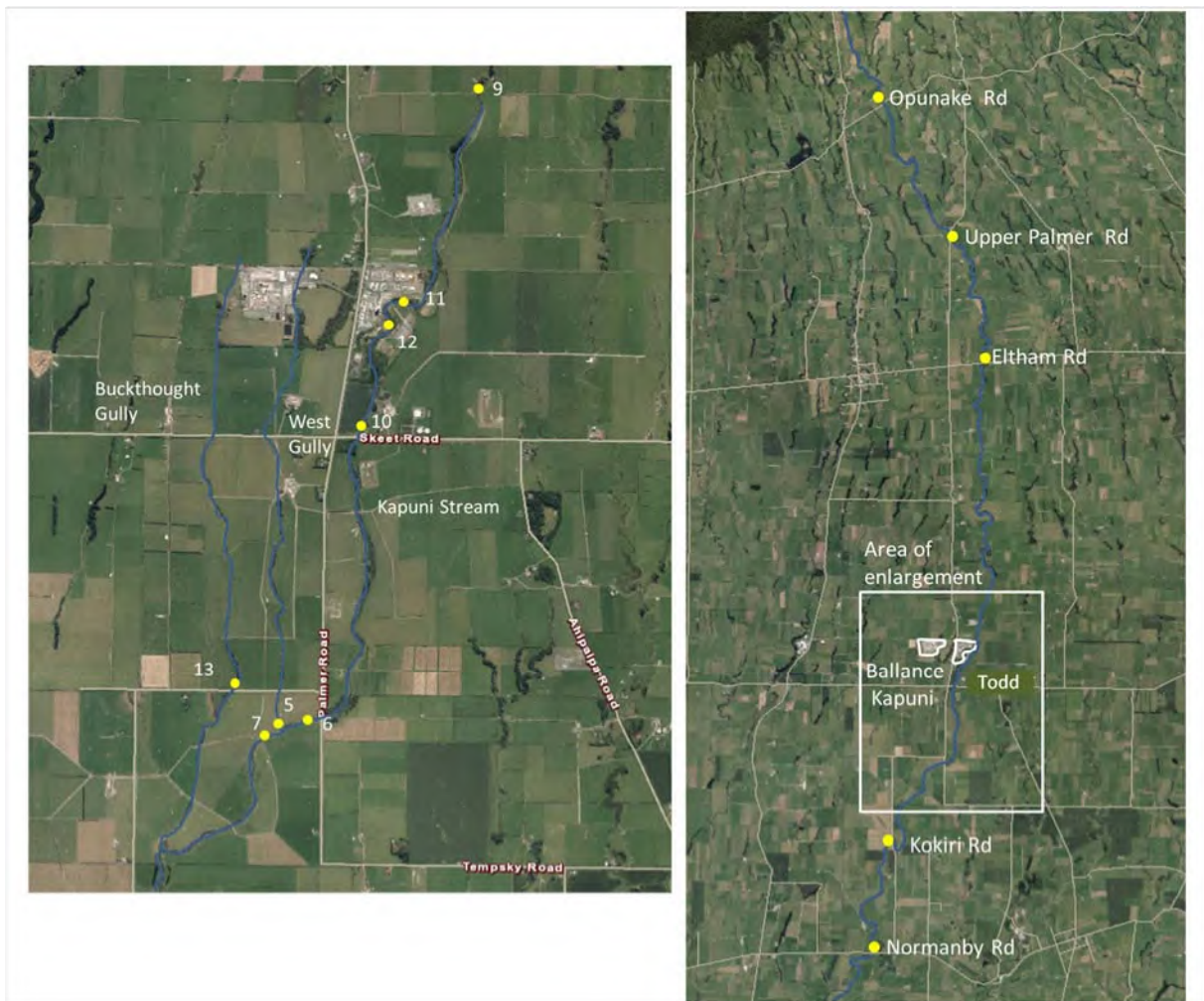


Figure 3 Biomonitoring sites in the Kapuni Catchment

Four macroinvertebrate surveys and two fish surveys were scheduled for the Kapuni Catchment for the 2022-2023 monitoring period as detailed in Table 4.

Table 4 Overview of the monitoring programme for the Kapuni Catchment

Survey dates	Taxa	Number of sites	
		Kapuni Stream	Tributaries
4-Aug-22	Macroinvertebrate	7	2
25-Oct-22	Fish	11	0
25-Oct-22	Macroinvertebrate	11	2
9-Feb-23	Macroinvertebrate	7	2
15-May-23	Fish	7	0
15-May-23	Macroinvertebrate	7	2

A separate report prepared by a Council freshwater biologist summarises the findings of the individual reports as well as ensuring that the reports are accurate is attached as Appendix II. The general conclusions were that the macroinvertebrate communities in the Kapuni Stream were in good to excellent health and were not significantly affected by the Company's operations. Furthermore, there were no significant adverse impacts caused by activities associated with the Company on fish communities in the Kapuni Stream.

2.2 Land

Wastewater generated from the site, in the form of process effluent and contaminated stormwater, is disposed of, after treatment, by spray irrigation onto land adjacent to the plant (Figure 4) under consent 0597-3. The irrigation system comprises 12.8 ha operated as a 'cut-and-carry' area (Areas 1-6, blue shading), from which the grass is removed and supplied to a local farm. Until June 2004, an additional area of up to 30.3 ha on a neighbouring farm to the west was operated as a 'grazed' area. A new grazed area was established on another neighbouring farm, to the south (Luscombes, Area 11, green shading) in December 2004, which was increased in stages to 15.2 ha by January 2008. Use of the Buckthought grazed area recommenced in February 2009, 18.7 ha being irrigated (Area 7 and Area 8 adjacent to the cut-and-carry area), but ceased again in February 2011. The Luscombe grazed area was increased by 11.2 ha (Area 12) to 26.4 ha in October 2013. Effluent is applied by travelling irrigators.

Due to the nature of activities at the Company's site, wastewater generated from it contains nitrogen, therefore, there is potential for nitrate contamination of groundwater beneath the irrigated areas as a result of discharging the wastewater. A formal plan for the management of the waste disposal system was compiled in 1990 from procedures developed during eight years of operational experience and from advice provided by the Department of Scientific and Industrial Research, Grasslands Division (DSIR), now AgResearch Limited, Grasslands Division (AgResearch). The success of the system relies on the minimisation of nitrogen output and on good soil and pasture management of the irrigation areas.

The rate of nitrogen removal by pasture uptake and through microbial transformations is governed by many factors, including the infiltration capacity of the soil, soil temperature, mineral content of the waste (particularly the cation balance), hydraulic loading (rainfall is the major factor), application method, grass removal method, and livestock management.

Plant effluent is monitored for nitrogen species, and for cations, which affect soil stability. Alkali metal ions (sodium and potassium) will deflocculate the soil when present at elevated concentrations. The concentrations of these ions are reduced through the discharge of their main source, ion exchanger regenerate, to the Kapuni Stream with stormwater under consent 0598-3.

Soil and herbage testing of the irrigation areas has been undertaken bi-annually, in spring and autumn, to determine the requirements for soil stability and grass health. Applications of gypsum and Epsom salts (soil

conditioners) are delivered routinely according to the results of the analyses. Other nutrients, such as superphosphate, are applied as required. At times of intense or prolonged rainfall, the effluent may be discharged to the Kapuni Stream under consent 1766-3, provided there is sufficient flow in the stream, to avoid irrigation under saturated conditions.

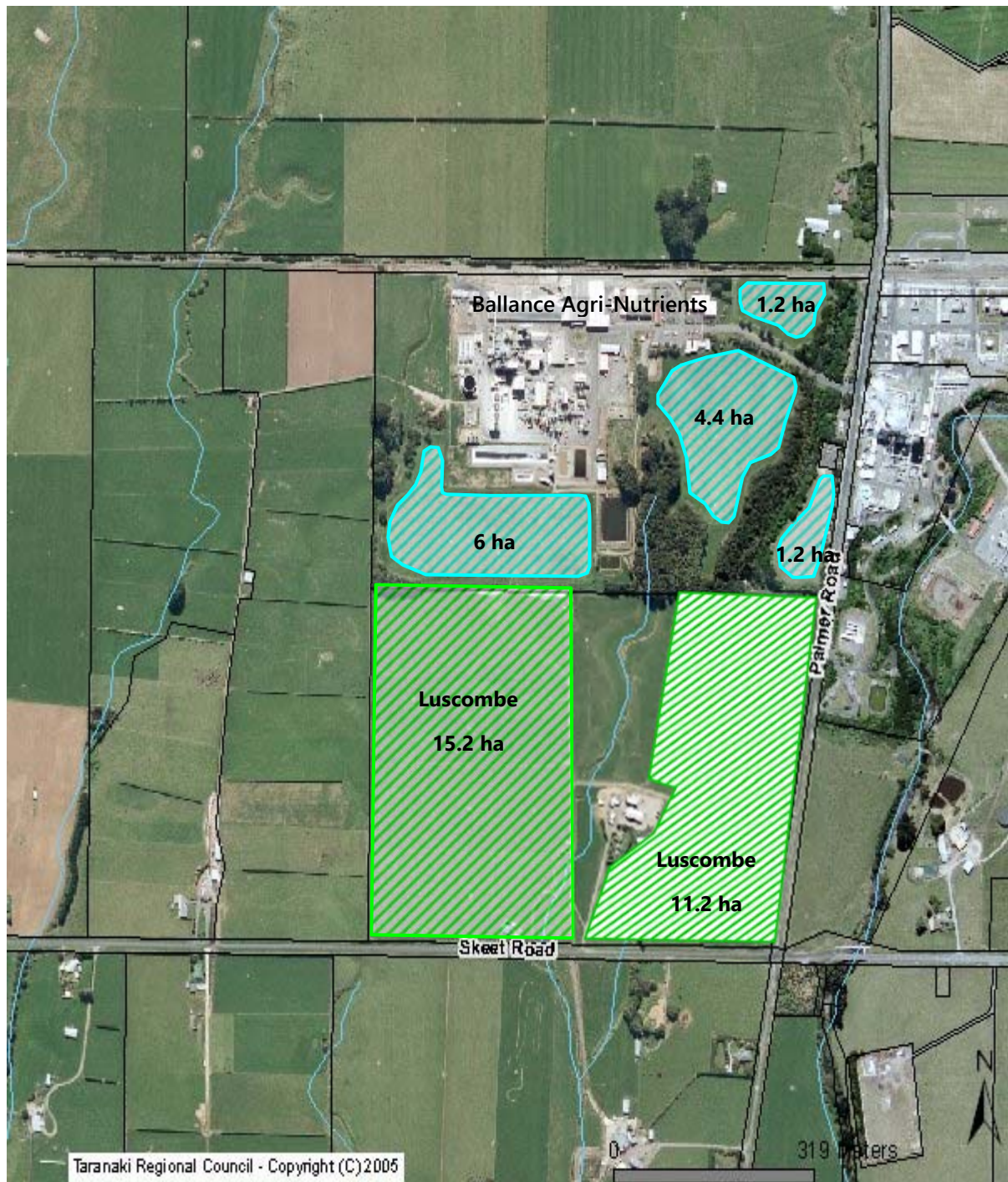


Figure 4 Irrigation areas ('cut-and-carry' areas in blue shading and grazed areas green shading)

2.2.1 Inspections

Throughout the year under review site management was found to be good and the effluent management system and irrigation areas were found to be working well, though care needs to be taken when irrigating to land during or after rain.

2.2.2 Discharge monitoring

2.2.2.1 Effluent volume

Special Condition 2 of consent 0597-3 limits the volume discharged to 1,470 m³/d. The Company measures and records daily the effluent volume sprayed on each irrigation plot and forwards this data to the Council. By summing the daily plot volumes, compliance with the consent limit can be determined. The data demonstrates that the daily volume limit was complied with throughout the 2022-2023 review period with a peak daily volume of 809 m³ recorded on the 9 September 2022.

2.2.2.2 Nitrogen application rates

Special Condition 11 of consent 0597-3 limits the application rate of total nitrogen onto the irrigation areas. The total nitrogen loadings for cut and carry and grazed pastures for each operational area are provided in 5. This shows compliance with the consent condition of 1,000 kgN/ha/y for cut and carry areas and 300 kgN/ha/y for grazed areas during the 2022-2023 monitoring period.

Table 5 Nitrogen application rates (kg/ha/y) for cut-and-carry areas and grazed areas for 2022-2023

	Cut and Carry kgN/ha/y						Grazed kgN/ha/y	
Area	1	2	3	4	5	6	11	12
Total	495	471	400	472	420	405	177	131

The Company also has an internal target for cut and carry areas of 600 kgN/ha to promote good pasture health which was also achieved. Long term compliance with the nitrogen loadings have always been observed though there have been periods where the internal goal has not been achieved (Figure 5).

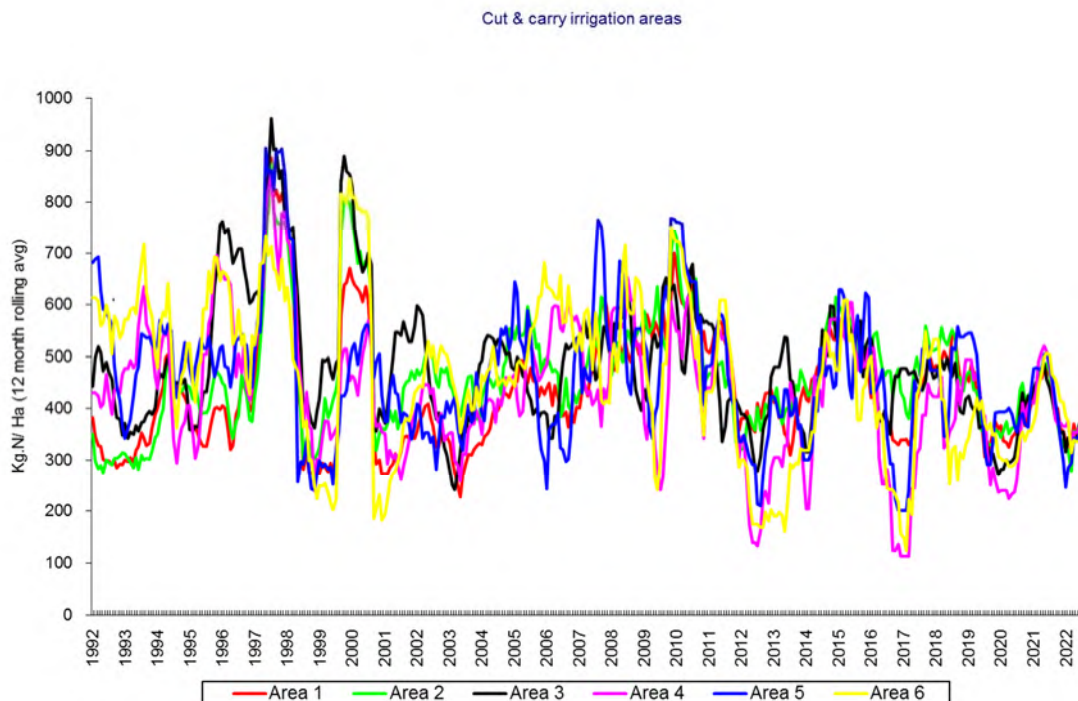


Figure 5 Nitrogen applications rates on cut and carry spray irrigation areas

Long term compliance with the nitrogen loadings have always been observed for grazed areas (Figure 6). It should be noted that the areas referred to as Area 7 and Area 8 have not been used since the 2010-2011 monitoring year, Area 9 since 2001-2002 monitoring year and Area 10 since the 2007-2008 monitoring year.

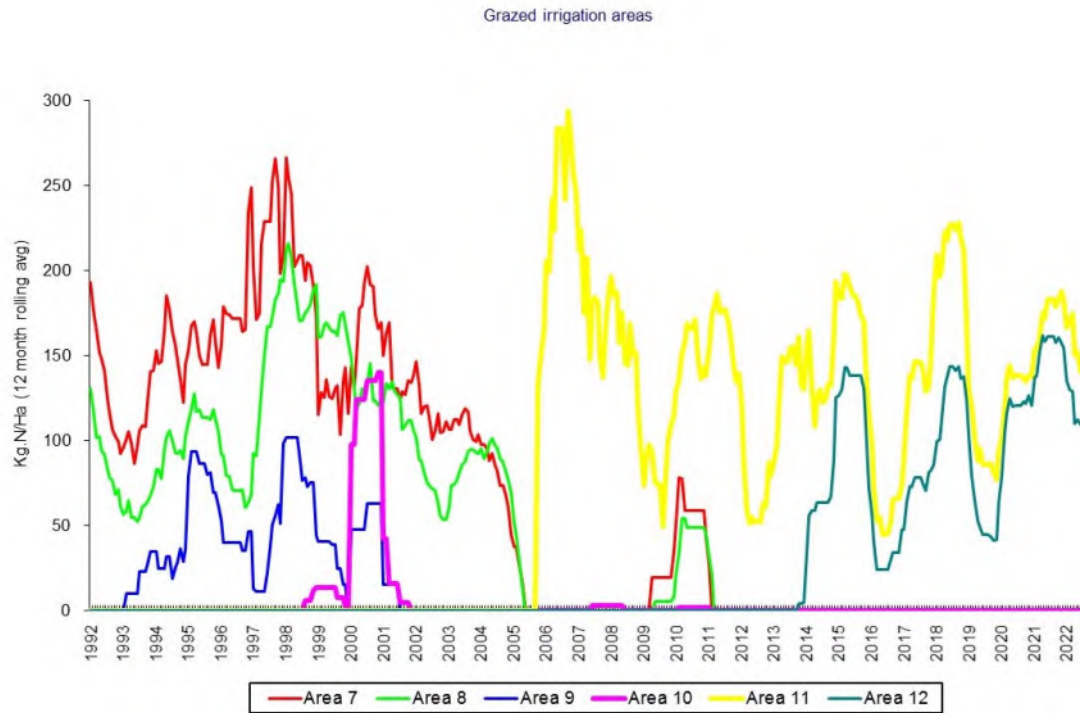


Figure 6 Nitrogen applications rates on grazed spray irrigation areas

2.2.3 Soil and herbage monitoring

The Company employs AgResearch to carry out monitoring of plants and soils of the irrigation areas. This was the 33rd year that the monitoring was undertaken.

The primary objective of the programme is to provide a management plan for the effluent disposal areas. In the case of the cut-and-carry area this is aimed at maintaining conditions which maximise the uptake of nitrogen, potassium and sodium from the effluent while preventing accumulation of leachable nitrate in the soil.

This includes managing the balance of cations in the surface soil to prevent deflocculation of soil colloids and the consequent loss of its ability to infiltrate water (hydraulic conductivity).

The grazed area is managed with similar objectives. However, the total amount of nitrogen applied is limited by the capacity of the system to absorb and redistribute nitrogen rather than its removal.

A secondary objective is the monitoring of the effluent disposal areas to assess the performance and to allow modifications of the management plan.

The monitoring has two components:

1. Spring sampling which is centred on nutritional status of the areas and balance of cations in the surface soil; and
2. Autumn sampling which details the movement of nitrate through the soil profile to the saturated zone.

AgResearch undertook sampling at the Company site with the results summarised below (AgResearch 2022 and 2023).

2.2.3.1 Spring 2022 soil and herbage survey

Surface soil and plant samples were taken on 3 November 2022 from the cut and carry area and grazed areas from Luscombe farm. Sodium absorption ratios (SAR) and potassium absorption ratios (KAR) have reduced compared to sampling completed in spring 2021 and are generally at levels below 2.0, which is positive for avoiding soil deflocculation and surface sealing for the purpose of irrigation application. In addition, the sum of SAR and KAR is generally around the upper safe threshold of 3.0, indicating that the dressings of calcium and magnesium salts in the cut areas are effective. All this is against a background trend of a slow increase in the loading of all cations over recent years.

There was no indication of any consistent plant tissue macro- or micro-nutrient issues. Titanium levels indicated potential soil contamination of samples from the grazed areas, possibly accounting for higher cobalt iron levels.

The pasture swards in the cut areas could be improved to increase growth and N uptake, by avoiding very low and very high canopy covers, which will reduce bare soil and weed ingress. This may also be assisted by the addition of capital phosphate fertiliser, as soil Olsen P values are now low relative to optimum.

2.2.3.2 Autumn 2023 deep soil leaching profiles

The 18 April 2023 deep soil sampling survey report found that annual nitrogen application to the sampled cut areas had increased by 31% (for the March to February year), but at 447 kg N/ha is still below the recommended level of 600 kg N/ha. Winter N application was the same as that recorded the previous year, and thus the proportion applied in winter had declined to 43% from 54% (2021-2022). In the grazed areas, the annual N load was similar to the previous year and below the recommended level of 200 kg N/ha. There was little N applied to these areas during the winter months. It should be noted that the greater the mass applied in the wetter months, the greater the potential for leaching beyond the plant uptake zone.

The profile nitrate-N mass to 3 m of the cut areas was 21% higher than the previous year (209 vs 173 kg N/ha), but still below the long-term average (331 kg N/ha). While the increase on last year is likely influenced by both greater effluent application and higher annual rainfall, it is worth noting that the nitrate-N mass measured during 2021-2022 was the lowest recorded in the last 20 years. The contribution of ammonium to the profile mineral N represented <3% of the total between 0-3.0 m.

The profile nitrate-N mass to 3 m in the grazed areas was relatively high (518 kg N/ha compared to the long-term average of 306 kg N/ha) and highly variable for both effluent and non-effluent areas, reflecting the influence of urine patches and a wet year.

2.2.4 Groundwater monitoring

There are 42 groundwater monitoring bores established at the Company's site. The monitoring bores at the plant are monitored by the Company for different purposes. The original sites were established to monitor the effects on groundwater of the application of effluent onto land under Consent 0597-3.

More recently, sites have been introduced for general site assessment and in response to specific problems. These include the monitoring of a contaminant plume resulting from leaks in the finished effluent catch basin (FECB) and from contamination detected around the urea process area. The areas that each monitoring bore corresponds with are summarised in Table 6, and their locations are given in Figure 7.

Table 6 Site areas in relation to groundwater monitoring bores and nitrogen concentrations

Site	Monitoring bore	Approximate long term range (since 2000) of Total N Concentrations (g/m ³)
Control site	22	3 - 9
Irrigation areas	3, 4, 5, 7, 10-1, 10-2, 10-3, 10-4, 10-5, W, W1, W2	<1 - 85
Skeet Road	1, 2, 8, 12-1, 12-2, 12-3	<1 - 72
FECB plume	East and West bores, 4, 13 to 21, 30	9 - 8075
Plant site	23 to 29, 31 to 40	8 - 15,100

2.2.4.1 Electromagnetic induction survey

In June 2002, the groundwater monitoring programme was altered to include an electromagnetic induction (EM31) survey to be conducted annually which would help in identifying any contaminated groundwater and the extent of the contamination by measuring the electrical properties of the soil. The EM31 is a near-surface electromagnetic survey system with a peak response in the 1 to 1.5 m depth range and a maximum depth range of 5 to 6 m in the vertical dipole mode. It is a high sensitivity system, capable of measuring and recording very small changes, of milliSiemens per metre (mS/m); in soil electrical conductivity (i.e. inverse of resistivity). It is often used to detect and delineate subtle changes in the subsurface conditions caused by contamination, underground waterways, fault lines, change in soil type, subsidence, etc. The survey highlights the movement of any conductive substances entering the ground from the main plant operations and effluent irrigation system at the Company's site.

An EM31 survey was undertaken on 30 and 31 of March 2023. The EM31 surveys cover the large paddocks on the south (Site A) and east side (Site B) of the main production plant. (Southern Geophysical 2023).

The data from 2023 identified a general trend of lower conductivity measurements throughout sites A and B, particularly at the fringes of the survey areas. These changes could be associated with lower volumes of conductive material entering the ground, such as fertilisers or, more likely are associated with season changes affecting groundwater levels and ground saturation.

The locations which change in conductivity between the yearly surveys differ in positions, showing no consistent trends beyond that of typical seasonal changes. The conductivity changes appear to be within the normal variability of the site, with factors such as groundwater conditions, grass growth, and wastewater application all affecting conductivity. Overall, the survey shows no significant change from the previous year's ground conductivity survey.

2.2.4.2 Groundwater monitoring in relation to effluent irrigation

The 'irrigation' monitoring sites are sampled regularly, at frequencies ranging from monthly to annually, depending on groundwater composition. Groundwater levels were measured and the samples analysed for conductivity, pH, ammonia, nitrate, nitrite, urea, sodium and chloride. These monitoring bores provide the most information as they generate data on the depth of the effects of the irrigated effluent.

Three bores (Bores W, 10 and 12) are multi-piezometric (that is, a cluster of standpipes screened to allow the monitoring and collection of groundwater samples at various depths). Monitoring results have indicated that groundwater is affected by effluent irrigation at a depth of 8-10 m (Bore W), but not at a depth of 11-13 m (Bore 10-4) or deeper (Bore 10-5) where total nitrogen levels have always remained low.

Seasonal and multi-year variations in nitrogen concentrations occur in wells which are not affected by effluent irrigation. Therefore, peaks may not be irrigation related, but due to variations in rainfall recharge,

which affect the concentration of the nitrogen plume derived from the production area. Attention needs to be paid to the timing and magnitude of effluent nitrogen loadings to avoid additional losses to groundwater which may be unsustainable.



Figure 7 Locations of groundwater monitoring bores

2.2.4.3 Groundwater monitoring in relation to the FECB ammonia plume

Groundwater is sampled at 14 monitoring bores established down slope of the FECB and on the spray irrigation area. These monitoring bores have been installed to determine the rate of movement and dispersion of ammonia that has leaked from the FECB over the past 37 years. Three of the down gradient monitoring bores (West Bore, East Bore and Bore 30) have had abstraction and treatment of groundwater under consent 4719-2.

Monitoring of the down gradient bores shows the plume has migrated. At West Bore (WFECB), which is located immediately downslope of the FECB, nitrogen levels have been relatively stable after the last effluent basin liner was installed during 1996-1997. Nitrogen levels have fluctuated between 44 and 198 g/m³ since 1999, with a spike in 2013, when a value of 444 g/m³ was measured. However, a rapid increase identified in the 2019-2020 monitoring year when 2,038 g/m³ was detected in May 2020. This increase continued in 2020, culminating in the highest result observed in August 2020 of 8,075 g/m³ (Figure 8). This suggested either another leak or inadequate abstraction of the groundwater at the bore. The elevated result saw a relatively rapid decline in the follow monitoring years and the latest results recorded a further decline to 2337 g/m³ in August 2022 and a similar concentration of 2434 g/m³ in August 2023. The concentrations have declined and potentially stabilised compared with the previous results, although the results are still considerable higher (some 12 times higher) compared with pre-2020 results. Further monitoring will assess whether the decline continues to previous levels.

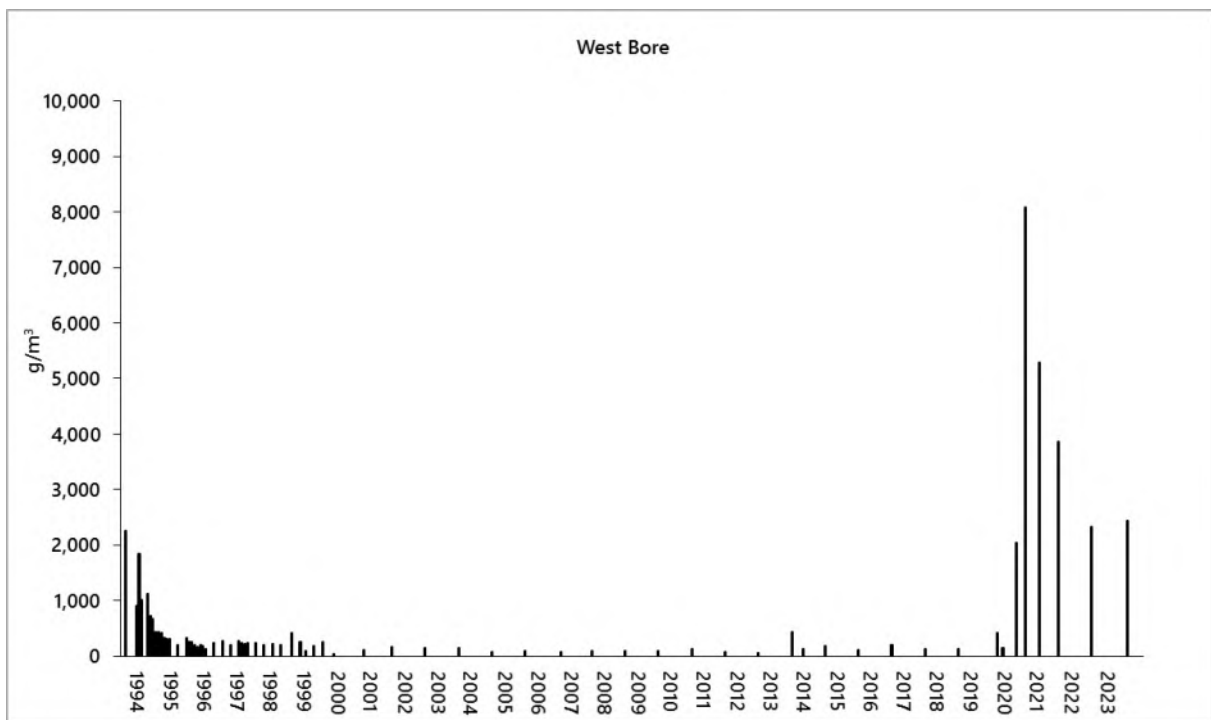


Figure 8 Total nitrogen concentration in groundwater associated with the FECB plume from West Bore

At East Bore (EFECB), which is located immediately downslope of the FECB and slightly to the east of West Bore, nitrogen levels have been relatively stable after the last liner was installed (Figure 9). For the current monitoring year concentrations have declined since 2021 and ranged from 46 to 131 g/m³. These results are returning to similar concentrations of those prior to 2019. This further indicates that the plume migration could have been largely localised but further monitoring will assess whether the decline continues to previous levels.

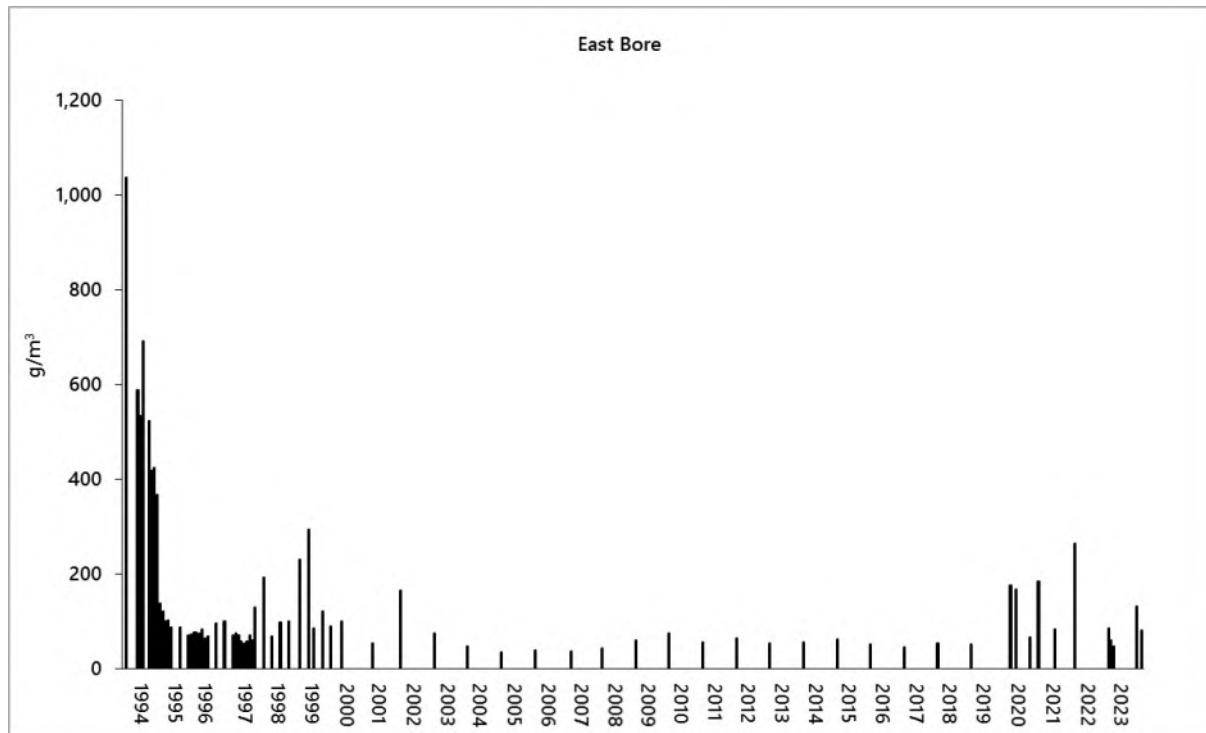


Figure 9 Total nitrogen concentration in groundwater associated with the FECB plume from East Bore

Bore 30 is the other down gradient pumping bore. Nitrogen levels at this bore are potentially affected by both the ammonia plume and by irrigation of wastewater. Overall, total nitrogen concentrations have remained relatively stable since 1999 when the last FECB leak occurred.

The total nitrogen concentrations in other bores located down gradient of the FECB (Bores 13 and 15) have declined slightly since 2020. However, although concentrations in Bore 14 are relatively stable, there has been a marginal increase during 2023. It is unclear whether this was due to plume movement or just effluent irrigation.

Pumping from East Bore, West Bore and Bore 30 should continue along with monitoring of the other bores. If further plume movement is observed, further action may need to be taken to contain the plume onsite, such as increased pumping of groundwater.

2.2.4.4 Groundwater monitoring in relation to the granulator plume

The Company has extended its groundwater monitoring programme to other areas of the plant. High total nitrogen concentrations, predominantly in the form of ammonia, had been detected in the vicinity of the granulator area of the plant. In response to these elevated nitrogen concentrations, the Company has undertaken remedial pumping at Bore 25 (Figure 10) and Bore 32 since late 1994 under consents 4719-1 and 4719-2. Pumping from, and monitoring of, these bores has continued through to the monitoring period under review.

Total nitrogen concentration in the pumped groundwater varies according to rate of pumping, increasing when abstraction ceases. Since 2000, total nitrogen concentration in the bores within the plant site has ranged from approximately 8 to over 15,000 g/m³, mainly in the form of ammonia. During the period under review nitrogen levels were similar to the previous monitoring period. However, there was a higher monthly maximum of 4,103 g/m³ recorded during March 2023 for Bore 25 and 4,357 g/m³ during December 2022 for Bore 32.

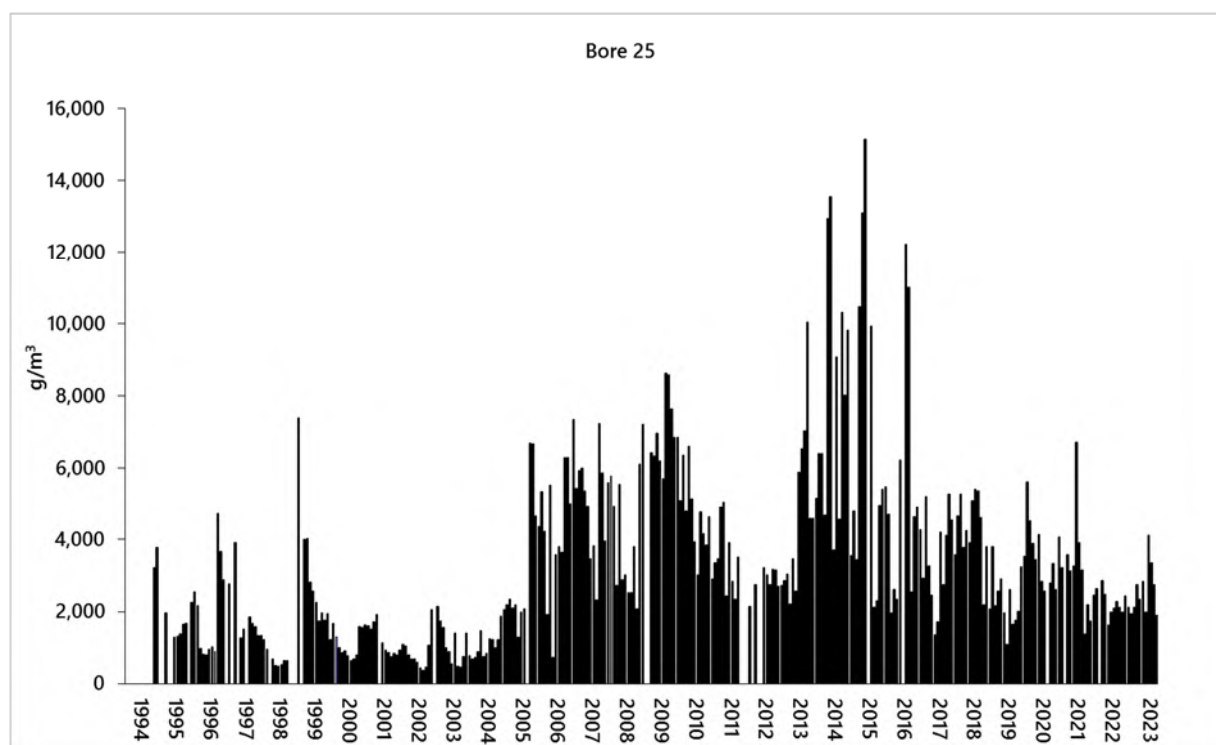


Figure 10 Total nitrogen concentration in groundwater associated with the granulator plume from Bore 25

2.3 Air

2.3.1 Inspections

There were no odours detected off-site during inspections.

During each scheduled inspection the dust scrubber, the plant perimeter, the cooling towers, formaldehyde storage area, and the bulk storage area were checked for emissions to air including odour and particulate deposition. There were no significant effects observed beyond the boundary of the plant as a result of discharges to air during the inspections.

Instrumental monitoring of ambient gas and dust deposition was undertaken at the site on one occasion during the 2022-2023 monitoring period and is reported in Section 2.3.2.

2.3.2 Results of air quality monitoring

2.3.2.1 Emissions testing

To assess compliance with special conditions on consent 4046-3, the Company undertook monitoring of air emissions from the site. The discharge of air emissions from the dust scrubber was monitored on one occasion during the monitoring period by K2 Environmental Ltd (K2 Environmental Ltd 2023).

Routine sampling of the dust scrubber was undertaken on 18 July 2023. The results of the stack emission assessment are presented in Table 7. The tests were the average of three samples, each collected from 20 points across the vent.

Table 7 Dust scrubber emission testing results for the monitoring period 2022-2023

Date	18 July 2023	Consent limit
Ammonia (kg/hr)	190	295
Urea (kg/hr)	5.7	12
Urea (mg/m ³)	18.7	125

Special Condition 3 on Resource Consent 4046-3 limits the ammonia emission from the dust scrubber fan and the blow down tank vent as a combined mass discharge of 295 kg/hr.

The concentration limit for urea emissions from the dust scrubber fan (or any other source) is 125 mg/m³, and the mass discharge rate limit is 12 kg/hr, as set by Special Condition 6.

The level of ammonia discharged from the dust scrubber was recorded as being below the consent limit on the single monitoring occasion, as was the urea mass discharge rate.

2.3.3 Results of receiving environment monitoring

2.3.3.1 Particulate deposition gauging

The particulate deposition gauges were deployed on 16 February 2023 at five locations around the site (Figure 11) and were recovered 22 days later on 10 March 2023. The wind direction and speed characteristics for the duration of the deployment are shown in Figure 12.

The content of the gauges was analysed for coarse particulate matter, conductivity, pH, urea and ammonia and the results are presented in Figure 11. There are no human health-related standards or guideline values for these compounds in ambient air. These are considered to have a nuisance effect only. There is no condition in consent 4046-3 which limits the particulate deposition rate beyond the boundary of the site. The Regional Air Quality Plan recommends a guideline value for nuisance effects from particulate deposition of 130 mg/m²/d over a minimum 20 day period. Consideration is given to the location of the industry and the nuisance the community is likely to suffer, when assessing results against this value.

The maximum deposition rate recorded during the deployment was 1200 mg/m²/day (Table 7) and was reported from monitoring site AIR003401 on the north western boundary. This is significantly higher than the guideline value of 130 mg/m²/day. Occasionally, objects such as leaves, sticks or invertebrates can be deposited in the gauges and affect the final weight of the filter. The laboratory report did not note any large objects, describing the contents as "*dark brown dust deposit*". This result is the highest rate recorded from this location since monitoring began in 1997, and the only time a result has exceeded the guideline. The previous highest result was 110 mg/m²/day in April 2015 and November 2017.

The particulate deposition rate at monitoring location AIR003404 also exceeded the guideline, returning a result of 140 mg/m²/day (Table 7). Results from this location have exceeded the guideline on seven previous occasions since 1997. The monitoring site is located 400 m from the urea plant and adjacent to Palmer Road. Immediately to the east is a large industrial area which includes the Todd Energy Kapuni natural gas production plant. Particulate found in the deposition gauges is most likely to be from these sources rather than AUP. The presence of green plant deposit described in the laboratory report, indicates contamination by vegetation matter.

The remaining sites reported deposition rates of between 10 and 30 mg/m²/day which are less than the guideline value.



Figure 11 Location of deposition gauge monitoring sites

Wind Direction at Hawera AWS
 Wind Speed (knots) at Hawera AWS
 From 16-Feb-2023 09:00:00 to 10-Mar-2023 21:00:00

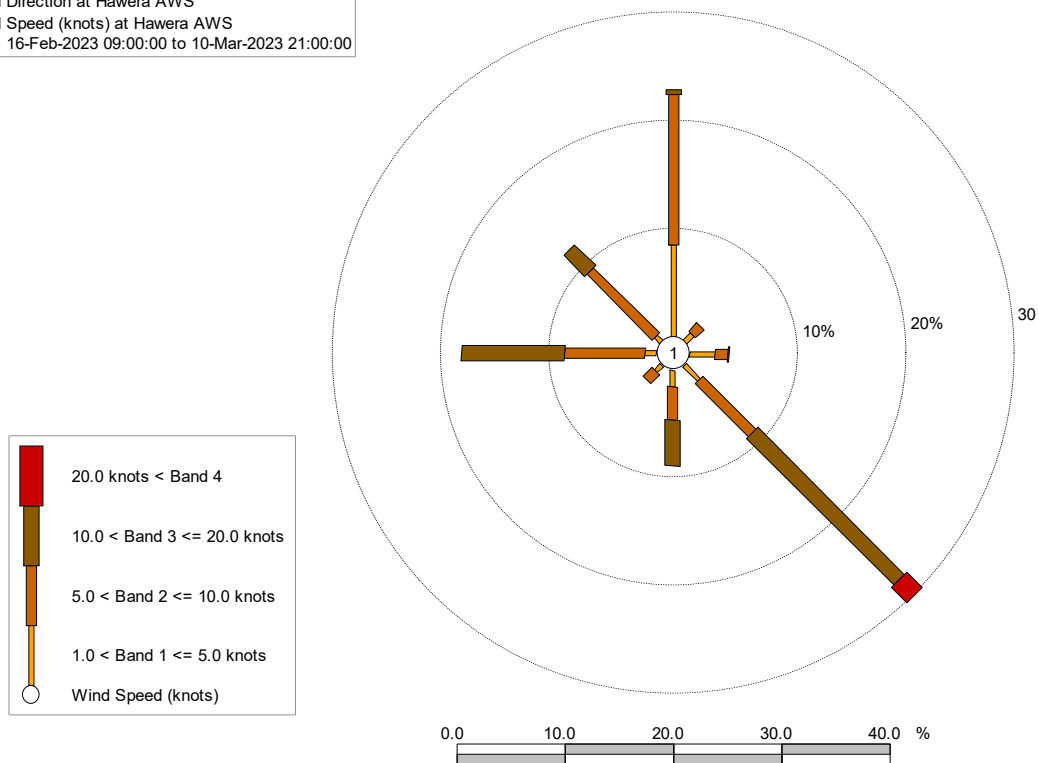


Figure 12 Wind-rose for Hawera weather station during deployment of deposition gauges

Table 8 Results of particulate deposition monitoring from 16 February 2023 to 10 March 2023

Parameter	Site				
	AIR003401	AIR003402	AIR003403	AIR003404	AIR003405
	North west of the plant on the northern boundary	West of the plant (north of irrigation area)	On site north of roadway	On the eastern boundary	Close to the eastern boundary south of the plant
pH	7.0	6.5	7.3	6.9	7.0
Conductivity mS/m/d	0.56	0.24	0.44	0.27	0.43
Ammonia mgN/m ² /d	14.8	2.4	4.9	2.6	3.8
Urea mgN/m ² /d	6.2	0.1	0.24	0.1	0.15
Particulate mg/m ² /d	1200	10	30	140	20

The filter contents were further analysed for ammonia and urea which are present in stack emissions, and for pH and conductivity. The deposition rates of ammonia and urea in monitoring site AIR003401 were 14.8 and 6.2 mg/m²/day respectively, significantly higher than the other sites. This explains the elevated rate of particulate deposition in this gauge. These compounds may cause a nuisance effect at sensitive receptors such as residential dwellings at high deposition rates. Given the separation distances involved nuisance effects are not likely, and deposition of these products is likely to be mildly beneficial to pasture growth on the surrounding properties. Conductivity has no effect on air quality, and the reported pH levels are neutral and not likely to cause adverse effects.

2.3.3.2 Ambient gas monitoring by Regional Council

Instrumental monitoring of ambient air quality was not undertaken by the Council this monitoring year due to equipment malfunctions. In previous years a multi-gas monitor was deployed in the vicinity of the plant to record concentrations of ammonia, carbon monoxide (CO) and other combustible gases. Instead, qualitative assessments of the likely off-site concentrations and potential effects of these HAPs are presented below.

Carbon monoxide and combustible gases

Exposure to high CO concentrations can cause nausea, dizziness, and disorientation, and at very high concentrations can cause coma, collapse and loss of consciousness. The National Environmental Standards for Air Quality (NES: AQ, MfE, 2004) includes an Ambient Air Quality Standard (AAQS) for exposure to CO of 10 mg/m³ averaged over an 8-hr period.

During the previous monitoring year the maximum instantaneous concentration of CO measured at the monitoring locations was 1.2 ppm (1.4 mg/m³), significantly lower than the AAQS limit of 10 mg/m³ (8-hour average)

Lower Explosive Limit (LEL) is the concentration of flammable gas, vapour, or mist in ambient air, below which an explosive gas atmosphere will not be formed. In past years methane has been used as a proxy for LEL and is measured using the MultiRae. Last year the instrument recorded methane at 0% of the LEL which is lower than the guideline value of 5%. This low result is to be expected given that methane will likely readily disperse over the distance between the source and the instrument.

There have not been any significant changes to activities on-site or scale of production and on this basis it is unlikely that the concentration of CO and percentage LEL at the monitoring site during this monitoring year would be significantly different than last year.

2.3.3.3 Ambient ammonia monitoring by the Company

In accordance with condition 5 of consent 4046-3 the Company are required to monitor ambient ammonia concentrations at two static locations beyond the boundary of the site. The purpose of the monitoring is to ensure compliance with condition 5 which specifies that the maximum ground-level concentration of ammonia shall not exceed 4.27 ppm (volume/volume).

In September 2012, two static monitoring stations for measurement of atmospheric ammonia concentration were established on the western (Buckthoughts) and southern (Luscombes) boundaries of the cut-and-carry irrigation area. This was done in consultation with the owners of the adjacent properties who had requested such monitoring at pre-hearing meetings on the consent application to determine any long-term trends. The start of the weekly three-hour sampling window was changed from 7.00 am to 1.00 pm, with the approval of Council, to fit better with the Company laboratory workload. Ammonia concentration was measured using a Draeger CMS instrument. Usually, one measurement is taken, over a period of about 10 minutes, but when results above the detection limit of 0.20 ppm are recorded multiple measurements may be taken to ensure compliance with the consent limit (one hour average).

The majority of results at Buckthoughts were below the detection limit of 0.20 ppm. There were eight instances where a figure was recorded, ranging from 0.21-1.14 ppm. Likewise at Luscombes the majority of results were below the detection limit. There were four instances where a concentration was detected ranging from 0.21-0.32 ppm.

The ammonia concentration based on a one hour average was below the consent limit of 4.27 ppm for both site boundaries.

2.3.3.4 Other ambient monitoring

Nitrogen oxide emissions

Since 2014 Taranaki Regional Council (TRC) has conducted a region-wide programme to monitor ambient concentrations of nitrogen oxides (NO_x) at a range of locations in Taranaki, including at the Ballance AUP site. Nitrogen oxides represent a mixture nitrogen-based gases including nitric oxide and nitrogen dioxide (NO₂), which is produced at the plant during the manufacturing of fertiliser. Adverse health impacts of NO₂ may occur as a result of short (1-hour and 24-hour) and long-term (annual) exposure durations. Short-term exposure to high concentrations can result in the inflammation of airways which may exacerbate asthma and other pre-existing respiratory problems. Long-term exposure to NO₂ may adversely impact lung development in children and may lead to the development of asthma. The risk of developing certain forms of cancer and premature death also increase with long-term exposure to NO₂.

Passive sampling devices were deployed at two monitoring locations from 12 January 2023 to 2 February 2023 to measure ambient NO_x. The samplers absorb NO_x over the duration of the deployment and are sent for laboratory analysis.

Condition 7 of the consent requires the emissions to be controlled so that off-site concentrations of NO₂ do not exceed the Ambient Air Quality Standard (AAQS) for NO₂ which is 200 µg/m³ expressed as a 1-hour mean. Additionally, the Ambient Air Quality Guideline (AAQG) for NO₂ is 100 µg/m³ expressed as a 24-hour mean. In order to compare the laboratory data against the AAQS and AAQG they have been converted to time weighted averages (TWA) and the results are presented in Table 9.

Table 9 Laboratory results and calculated time weighted averages (TWAs) for 2022-2023

Monitoring Site	NOx (µg/m ³)	NOx 1/hr (µg/m ³) Theoretical max.	NOx 24/hr (µg/ m ³) Theoretical max.
AIR003401	0.9	3.1	1.7
AIR003404	5.8	20.1	10.7
Assessment criteria		200 (AAQS)	100 (AAQG)

The results show that the ambient ground level concentration of NOx is well below the limit set out by consent 4046-3.

2.3.4 Technical review reports

Special condition 10 of consent 4046-3 requires the Company to submit to Council a report every three years which addresses the following matters:

- a review of any technological advances in the reduction or mitigation of discharges to air from the site, and the costs and benefits of these advances; and
- an evaluation and review of ammonia pressure safety valve [PSV] systems, operating parameters, and vent heights to ensure that the probability of PSV discharges have been reduced as far as practicable, and to determine whether flaring or other control rather than vent height is practicable as a means to reduce ground level concentration of ammonia; and
- details of any complaints received [external to the operation of the plant] to include date, time operating conditions, weather conditions and measures taken in response; and
- monitoring records required by condition 5.

The last report was received was in June 2021 and was for the period June 2018 to May 2021. The next report is due in 2024.

2.4 Riparian management

Condition 13 on water permit 0596-3, issued in August 2012 to take from Waingongoro River, states:

The consent holder shall make ten annual payments of \$30,000 (GST exclusive) to the Taranaki Regional Council as a financial contribution for the purpose of providing riparian planting and management in the Waingongoro River catchment. The first payment shall be made within 60 days of the commencement of this consent, and subsequent payments shall be made by 1 September each year.

The first annual payment of \$30,000 was made in September 2012. The Company had already, since 1999, been donating voluntarily to Taranaki Tree Trust \$30,000 per year for the specific purpose of riparian planting and management both upstream and downstream of the intake location. A total of \$300,000 has been received by the Council in 10 payments since the commencement date of the consent and therefore no further payments are required to satisfy condition 13 of this consent.

At the start of July 2022 there was an available balance of \$65,849.38. During 2022-2023, twenty five landowners received funding from the Company, for the amount \$41,354.99 for riparian plants and planting. A total of 15,972 plants were planted. There was a closing balance of \$24,494.39.

2.5 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).

In the 2022-2023 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans.

3 Discussion

3.1 Discussion of site performance

On-site maintenance and management at the AUP was well operated. On-going liaison between staff and the Council has been indicative of the Company's commitment to development of environmental performance.

The consent to take water from the Kapuni Stream was not exercised during the current monitoring year.

For discharges to the Kapuni Stream, the procedures of the environmental management plan were followed. Control, monitoring and reporting of discharges was good throughout the period. Results from inter-laboratory comparisons generally correlated well.

For discharges to land, the irrigation system for treatment and disposal of plant effluent was well managed. Effluent monitoring, surface and groundwater monitoring, and soil and herbage analyses showed compliance with consent conditions.

For emissions to air, in general, plant processes were operated and controlled so that the emissions authorised by consent were maintained at a practicable minimum.

Overall, the plant has been operating in an environmentally sound manner.

3.2 Environmental effects of exercise of consents

Spray irrigation of effluent to land, the contingency discharge of effluent and the discharge of stormwater and water treatment effluent to the Kapuni Stream are the activities that have greatest potential to adversely affect the aquatic receiving environment.

The results of biomonitoring in the Kapuni catchment indicate that there is no significant adverse impact in the stream or its tributaries as a result of plant operations. In relation to discharges to land, the high levels of nitrate in shallow groundwater are partly due to the heavy effluent application that occurred early in the life of the plant. Current application rates are considerably lower. However, nitrate and sodium concentrations in the soil profile underneath the irrigation areas continue to remain elevated. The ground conductivity data for this monitoring year identified a general trend of lower conductivity for site locations in the immediate vicinity of the plant. This was likely associated with seasonal changes affecting groundwater levels and ground saturation.

Two concentrated ammonia plumes due to historical leaks from the effluent storage basin and from the urea plant are managed with pump recovery and treatment systems. The contaminated groundwater is pumped back through the plant and waste treatment systems. Both plumes currently do not extend beyond the Company's site and are monitored. They pose no short term threat to freshwater ecosystems but monitoring and active management are needed for the foreseeable future to ensure that there is no harm to freshwater ecosystems. One groundwater bore (West Bore) that was situated close to the FECB plume showed a large increase in total nitrogen during 2020, potentially indicating plume movement. The concentrations in this bore have since declined, with an even further decline during 2022-2023, but levels remain very elevated. It is important that monitoring of the bores continue and it is suggested that the company undertake an independent review of the groundwater data and revise the conceptual model of the plume and potentially the pumping rates of the treatment system.

During the monitoring period, the results of monitoring from site inspections, and the measurement of dust deposition and of ambient gas levels, indicated no significant adverse effect on the neighbourhood as a result of activities at the ammonia urea plant.

Over the reporting period, no air discharge incidents were reported to the Council. Average one-hour ammonia levels recorded by the Company remained low and compliant.

The results from the deposition gaugings indicate only minor amounts of deposition have been recorded close to the main plant, with no effect on the surrounding environment. Monitoring of gas concentration was not undertaken by Council this monitoring year due to equipment malfunctions. Previous monitoring indicated that there is little of concern in the ambient atmosphere around the plant.

3.3 Evaluation of performance

A tabular summary of the Company's compliance record for the year under review is set out in Table 10 to Table 16.

Table 10 Summary of performance for Consent 0596-3

Purpose: To take water from the Waingongoro River for operation of an ammonia/urea plant		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Limit on maximum abstraction rate	Metering by consent holder and review of records by Council	Yes
2. Installation and operation of monitoring equipment	Site inspection and receipt of abstraction records	Yes
3. Certification of monitoring equipment	Receipt of certificate. Installation details of existing meters/dataloggers received 20 April 2012. Verification performed 9 September 2019	Yes
4. Actions upon breakdown of monitoring equipment	Receipt of notification, and inspection. Check water take records	N/A
5. Access to monitoring equipment	Site inspection	Yes
6. Format of monitoring records	Examination of records	Yes
7. Best practicable option and efficient use	Site inspections and liaison with consent holder	Yes
8. Restrictions on intake modification	Site inspection. Report on consultant's inspection of 5 March 2013	Yes
9. Report on altering intake to minimise entrainment of juvenile fish by 31 January 2013	Receipt of report. Scoping report received 31 January 2013; final costs/benefits report received 28 March 2014	Yes
10. Development of a monitoring programme and annual review	Receipt of monitoring programme.	Yes
11. Consultation on monitoring programme to include iwi	Liaison with consent holder. Monitoring programme under development at end of review period	Yes
12. Annual meeting about monitoring programme	Meeting occurs as required.	Yes
13. Financial contribution to riparian planting and management	Receipt of contribution – No further payments due	Yes
14. Review of consent in respect of intake structure	N/A	N/A

Purpose: To take water from the Waingongoro River for operation of an ammonia/urea plant		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
15. Optional review provision	Next option for review June 2029	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 11 Summary of performance for Consent 1213-3

Purpose: To take and use water from the Kapuni Stream (at times when the normal water supply has failed) for operation of an ammonia/urea plant		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Limit on maximum abstraction rate	Metering by consent holder. Consent not exercised.	N/A
2. Take only when main supply fails	Liaison with consent holder	N/A
3. Keep and provide record of take	Inspection and receipt of record	N/A
4. Best practicable option	Liaison with consent holder	N/A
5. Notify Council and report on exercise of consent	Receipt of notification/reports	N/A
6. Optional review provision	Next option for review June 2029	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A
Overall assessment of administrative performance in respect of this consent		N/A

N/A = not applicable

Table 12 Summary of performance for Consent 4719-2

Purpose: To take and use groundwater for industrial site remediation and process use purposes		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Limit on maximum abstraction rate	Metering by consent holder	Yes
2. Keep and provide record of take	Receipt of record	Yes
3. Best practicable option	Liaison with consent holder	No Elevated N levels continue in the groundwater, further investigation required

Purpose: To take and use groundwater for industrial site remediation and process use purposes		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
4. Optional review provision	Next option for review June 2029	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 13 Summary of performance for Consent 0598-3

Purpose: To discharge stormwater from non-process areas; and raw water treatment plant wastewater, from an ammonia/urea plant to the Kapuni Stream and into an unnamed tributary of the Kapuni Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Limit on discharge volume	Metering by consent holder	Yes
2. Best practicable option	Inspection and liaison with consent holder	Yes
3. Discharge concentration limits	Inspection and chemical sampling	Yes
4. Receiving water concentration limits	Inspection and chemical sampling	Yes
5. Control on effect of discharge in receiving water	Inspection, chemical sampling and bio-monitoring	Yes
6. Company shall monitor the stream	Review of Company records	Yes
7. Company shall minimise discharge of phosphate	Inspections and monitoring results	Yes
8. Discharge to be in accordance with an Effluent Disposal Management Plan	Inspections and liaison with consent holder	Yes
9. Provision of Management Plan for certification	Receipt of Management Plan. Reviewed Plan received 18 Dec 2012. Updated Plan received 4 May 2015	Yes
10. Review of Management Plan by DOC and Fish & Game NZ	Plan forwarded 21 May 2013	N/A
11. Company to provide water treatment programme to Council for review when changes to process or chemicals proposed	Notifications from Company when changes to chemicals proposed	Yes
12. Optional review provision	Next option for review June 2029	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 14 Summary of performance for Consent 1766-3

Purpose: To discharge treated plant production effluent and contaminated stormwater from an ammonia/urea plant into the Kapuni Stream when wet ground conditions do not allow spray irrigation onto and into land		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Constraint on when discharge occurs	Liaison with Company and monitoring results. Consent not exercised	N/A
2. Limit on discharge rate	Metering by Company	N/A
3. Best practicable option	Inspection and liaison with Company	N/A
4. Discharge concentration limits	Inspection and chemical sampling	N/A
5. Receiving water concentration limits	Inspection and chemical sampling	N/A
6. Control on effect of discharge in receiving water	Inspection and bio-monitoring results	N/A
7. Discharge to be in accordance with an Effluent Disposal Management Plan	Inspections and liaison with consent holder	N/A
8. Provision of Management Plan for certification	Receipt of Management Plan. Plan received 18 Dec 2012. Updated Plan received 4 May 2015	Yes
9. Review of Management Plan by DOC and Fish & Game NZ	Plan forwarded 21 May 2013	N/A
10. Optional review provision	Next option for review June 2029	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A
Overall assessment of administrative performance in respect of this consent		N/A

N/A = not applicable

Table 15 Summary of performance for Consent 0597-3

Purpose: To discharge treated plant production effluent and contaminated stormwater from an ammonia/urea plant by spray irrigation onto and into land		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Disposal within defined area	Inspection	Yes
2. Limit on discharge rate	Metering by consent holder	Yes
3. Best practicable option	Inspection and liaison with consent holder	Yes
4. Maximisation of discharge to land, and minimisation of discharge to stream	Inspection and metering by consent holder	Yes

Purpose: To discharge treated plant production effluent and contaminated stormwater from an ammonia/urea plant by spray irrigation onto and into land		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. Discharge to be in accordance with an Effluent Disposal Management Plan	Inspections and liaison with consent holder	Yes
6. Provision of Management Plan for certification	Receipt of Plan. Plan received 18 Dec 2012	Yes
7. Review of Management Plan by DOC and Fish & Game NZ	Plan forwarded 21 May 2013	N/A
8. No odour beyond boundary of the site	Site inspections and complaints register	Yes
9. No spray drift beyond boundary of the site	Site inspections and complaints register	Yes
10. Defines the edge of the spray zone	Site inspections	Yes
11. Limit on the application of total nitrogen	Site inspections and liaison with consent holder, sampling results	Yes
12. Consent holder shall provide details of water treatment programme and any proposed changes to the Council for review	Liaison with the consent holder, and information supplied to the Council by the Company	Yes
13. Consent holder shall provide details of chemical cleaning programmes and any proposed changes to the Council for review	Liaison with the consent holder, and information supplied to the Council by the Company	Yes
14. Optional review provision	Next option for review June 2029	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 16 Summary of performance for Consent 4046-3

Purpose: To discharge emissions into the air from the manufacture of ammonia and urea and associated activities at an ammonia-urea manufacturing complex		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Best practicable option	Site inspections and liaison with consent holder	Yes
2. Prior to changing plant processes or operations that may change nature of discharge the Company shall consult with the TRC	Liaison with consent holder	Yes

Purpose: To discharge emissions into the air from the manufacture of ammonia and urea and associated activities at an ammonia-urea manufacturing complex		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
3. Limits the mass emission of ammonia from the dust scrubber and blow down tank vent	Liaison with the consent holder and monitoring of discharges by K2 Environmental for the Company	Yes
4. Limits the concentration of ammonia beyond the site boundary	Liaison with consent holder and monitoring at boundary by the Company and Council	Yes
5. Consent holder to establish monitoring sites for ammonia	Due by 12 February 2013. Sites established in September 2012	Yes
6. Limits the concentration and mass of urea emissions	Liaison with consent holder and monitoring of discharges by K2 Environmental for the Company	Yes
7. Limits the concentration of carbon monoxide and nitrogen dioxide beyond the plant boundary	Liaison with consent holder. Monitoring by Council.	Yes
8. Limits the concentration of other contaminants beyond the plant boundary	Liaison with consent holder and inspection	Yes
9. Discharge not to give rise to offensive or objectionable odour beyond the plant boundary	Inspections and Company records.	Yes
10. Written report required every three years detailing emissions and measure undertaken to reduce them	Received 10 June 2015	Yes
11. Consent holder to convene meeting three-yearly	Meetings held	Yes
12. Shall maintain and operate a site contingency plan and review it annually	Site inspections and correspondence from the Company	Yes
13. Optional review provision	Next option for review June 2027	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 17 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement required	Poor	Not exercised
2010-11	0596-2, 1213-2, 4719-1, 0598-2, 0597-2, 3967-1	6	-	-	-	-
	1766-2	-	-	-	-	1
	4046-2	-	-	1	-	-
2011-12	0596-2, 1213-2, 4719-1, 0598-2, 0597-2, 4046-3	6	-	-	-	-

Year	Consent no	High	Good	Improvement required	Poor	Not exercised
	1766-2	-	1	-	-	-
	4046-2	-	-	1	-	-
2012-13	0596-2, 0596-3, 4719-1, 4719-2, 0598-2, 0598-3, 1766-3, 0597-2, 0597-3	9	-	-	-	-
	1213-2, 1213-3, 1766-2	-	-	-	-	3
	4046-3	-	-	1	-	-
2014-15	0596-3, 1213-3, 4719-2, 0598-3, 1766-3, 0597-3, 4046-3	7	-	-	-	-
2015-16	0596-3, 1213-3, 4719-2, 0598-3, 0597-3, 4046-3	6	-	-	-	-
	1766-3	-	-	-	-	1
2016-17	0596-3, 1213-3, 4719-2, 0598-3, 0597-3, 4046-3	6	-	-	-	-
	1766-3	-	-	-	-	1
2017-18	0596-3, 1213-3, 4719-2, 0598-3, 0597-3, 4046-3	6	-	-	-	-
	1766-3	-	-	-	-	1
2018-19	0596-3, 1213-3, 4719-2, 0598-3, 0597-3, 4046-3	6	-	-	-	-
	1766-3	-	-	-	-	1
2019-20	0596-3, 4719-2, 0598-3, 0597-3, 4046-3	5	-	-	-	-
	1213-3, 1766-3	-	-	-	-	2
2020-21	0596-3, 1213-3, 4719-2, 0598-3, 0597-3, 4046-3	6	-	-	-	-
	1766-3	-	-	-	-	1
2021-22	0596-3, 1213-3, 4719-2, 0598-3, 0597-3, 4046-3	6	-	-	-	-
	1766-3	-	-	-	-	1
2022-23	0596-3, 4719-2, 0598-3, 0597-3, 4046-3	4	1	-	-	-
	1213-3, 1766-3	-	-	-	-	2
Totals		74	2	3	-	13

During the 2022-2023 period under review, the Company demonstrated a high level of environmental and administrative performance and compliance with the resource consents as defined in Appendix IV.

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's AUP in the 2022-2023 year continue at the same level as in 2021-2022.
2. THAT should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT monitoring of the effects of abstraction from the Waingongoro River be discussed in consultation with interested parties, as provided in condition 10 and 11 on consent 0596-3.
4. THAT consents 0596-3, 1213-3, 4719-2, 0598-3, 1766-3, 0597-3 and 4046-3 not be reviewed in June 2023.

Recommendations one, three and four were implemented, while it was not considered necessary to undertake additional monitoring or investigation as per recommendation two.

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.

It is proposed that for 2023-2024, the monitoring remain the same as undertaken in 2022-2023. It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the sites 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 2022-2023.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at the Company's AUP in the 2023-2024 year continue at the same level as in 2022-2023.
2. 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.
3. THAT the Company update their conceptual groundwater model of the site to ensure their groundwater remediation approach is still the best practicable option to prevent or minimise any actual or likely adverse effect on the environment.

Glossary of common terms and abbreviations

Approach velocity	The speed at which water moves towards an intake structure, expressed in m/s.
AUP	Ammonia urea plant.
Biomonitoring	Assessing the health of the environment using aquatic organisms.
Bund	A wall around a tank to contain its contents in the case of a leak.
Condy	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.
DRP	Dissolved reactive phosphorus.
EPT	Ephemeroptera, Plecoptera and Trichoptera; species of mayflies, stoneflies and caddisflies sensitive to organic pollution.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/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.
Hg	Mercury.
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.
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.
$\mu\text{S}/\text{cm}$	MicroSiemens per centimetre.
NH_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Un-ionised ammonia, normally expressed in terms of the mass of ammonia (NH_3).
Ni	Nickel.
NIWA	National Institute of Water and Atmospheric Research
NO_3	Nitrate, normally expressed in terms of the mass of nitrogen (N).

NO _x	Any mixture of nitrous oxide (N ₂ O), nitric oxide (NO) and nitrogen dioxide (NO ₂) gases
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).
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 the 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.
RMP	Riparian management plan.
SS	Suspended solids.
Sweep velocity	The speed at which water moves past an intake structure, expressed in m/s.
Temp	Temperature, measured in °C (degrees Celsius).
TRC	Taranaki Regional Council.
Turb	Turbidity, expressed in NTU.
UI	Unauthorised Incident.
UIR	Unauthorised 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.
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.

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Appendix I

Resource consents held by Ballance Agri-Nutrients (Kapuni) Ltd

(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.

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

Name of
Consent Holder: Ballance Agri-Nutrients (Kapuni) Limited
PO Box 439
Hawera 4640

Decision Date
(Change): 15 January 2021

Commencement Date
(Change): 15 January 2021 (Granted Date: 31 August 2012)

Conditions of Consent

Consent Granted: To take water from the Waingongoro River for operation of an ammonia/urea plant, and a hydrogen plant

Expiry Date: 1 June 2035

Review Date(s): June 2023, June 2029

Site Location: 309 Palmer Road, Hawera

Grid Reference (NZTM) 1707780E-5628870N

Catchment: Waingongoro

*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 volume of water taken shall not exceed 4,000 cubic metres per day.
2. Before exercising this consent the consent holder shall install, and thereafter maintain a water meter and a datalogger at a location that measures all water taken. The water meter and datalogger shall be tamper-proof and shall measure and record the rate (in litres per second) and volume of water (in cubic metres per day) taken to an accuracy of ± 5 percent. Records of the date, the time and the rate and volume of water taken at intervals not exceeding 15 minutes, shall be made available to the Chief Executive, Taranaki Regional Council at all reasonable times.

Note: Water meters and dataloggers must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters and dataloggers have a limited lifespan.

3. The consent holder shall provide the Chief Executive, Taranaki Regional Council with a document from a suitably qualified person certifying that water measuring and recording equipment required by the conditions of this consent ('the equipment'):
 - (a) has been installed and/or maintained in accordance with the manufacturer's specifications; and/or
 - (b) has been tested and shown to be operating to an accuracy of ± 5 percent.

The documentation shall be provided:

- (i) within 30 days of the installation of a water meter or datalogger;
 - (ii) at other times when reasonable notice is given and the Chief Executive, Taranaki Regional Council has reasonable evidence that the equipment may not be functioning as required by this consent; and
 - (iii) no less frequently than once every five years.
4. If any measuring or recording equipment breaks down, or for any reason is not operational, the consent holder shall advise the Chief Executive, Taranaki Regional Council immediately. Any repairs or maintenance to this equipment must be undertaken by a suitably qualified person.
5. The water meter and datalogger shall be accessible to Taranaki Regional Council officers at all reasonable times for inspection and/or data retrieval.
6. The records of water taken shall:
 - (a) be in a format that, in the opinion of the Chief Executive, Taranaki Regional Council, is suitable for auditing; and
 - (b) specifically record the water taken as 'zero' when no water is taken.

7. At all times the consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the abstraction of water, including, but not limited to, the efficient and conservative use of water.
8. The consent holder shall ensure that no modification is made to the intake that:
 - (a) increases the aperture size of any intake screen; or
 - (b) increases velocity of water toward any screen (approach velocity) or across any screen (sweep velocity); or
 - (c) in any other way that could increase the likelihood of juvenile fish entering the intake or being trapped against the screen.
9. By 31 January 2013 the consent holder shall provide the Chief Executive, Taranaki Regional Council with a report, including recommendations, on an investigation of the costs and benefits of altering the intake to meet design guidelines for minimising the entrainment of juvenile fish.
10. The consent holder shall ensure that a monitoring programme is developed and undertaken that determines compliance with the conditions of this consent and identifies, as far as practicable, the environmental effects resulting from its exercise. The monitoring programme shall be reviewed annually.
11. In developing the monitoring programme referred to in condition 10 the consent holder shall carry out reasonable consultation with Ngati Ruanui and Ngaruahine that includes submitting the monitoring programme to both Iwi for comment and allowing one month for a response. The consent holder shall ensure any comments received are provided to the Chief Executive, Taranaki Regional Council.
12. At least once every year, the consent holder shall convene a meeting with representatives of the Taranaki Regional Council, Fish and Game, Department of Conservation, Ngati Ruanui and Ngaruahine. The meeting shall be for the purpose of discussing and generally informing the parties about the consent holder's monitoring data and the monitoring programme relating to the operation, monitoring and environmental effects of the consented activity.
13. The consent holder shall make ten annual payments of \$30,000 (GST exclusive) to the Taranaki Regional Council as a financial contribution for the purpose of providing riparian planting and management in the Waingongoro River catchment. The first payment shall be made within 60 days of the commencement of this consent, and subsequent payments shall be made by 1 September each year.
14. 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 special condition 8 (re changes to the intake) of this resource consent during the month of June 2013, for the purpose of requiring the modification of the intake to reduce the risk of fish entrainment.

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 2017 and/or June 2023 and/or June 2029 for the purposes 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/or
 - (b) to require any data collected in accordance with the conditions of this consent to be transmitted directly to the Council's computer system, in a format suitable for providing a 'real time' record over the internet.

Signed at Stratford on 15 January 2021

For and on behalf of
Taranaki Regional Council



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: Ballance Agri-Nutrients (Kapuni) Limited
 P O Box 439
 HAWERA 4640

Decision Date: 31 August 2012

Commencement
Date: 31 August 2012

Conditions of Consent

Consent Granted: To discharge treated plant production effluent and
 contaminated stormwater from an ammonia/urea plant by
 spray irrigation onto and into land at or about (NZTM)
 1699807E-5629386N, 1700174E-5629156N,
 1700195E-5629448N, 1700572E-5629619N,
 1700685E-5629761N, 1700700E-5629443N

Expiry Date: 1 June 2035

Review Date(s): June 2017, June 2023, June 2029

Site Location: 309 Palmer Road, Kapuni

Legal Description: Pt Lot 1 DP 13121 (Discharge source & site) Lots 1 & 2 DP
 15057 Sec 21 Blk XV Kaupokonui SD (Discharge site)

Catchment: Kapuni

*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. This consent authorises discharges to the areas of land shown in Appendix 1 attached to this document.
2. The discharge shall not exceed 1,470 cubic metres per day.
3. 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 adverse effects on the environment from the exercise of this consent.
4. The consent holder shall ensure that the discharge of contaminants to land in accordance with this consent is maximised and, conversely, the discharge of contaminants to the Kapuni Stream in accordance with consent 1766-3 is minimised.
5. Subject to the other conditions this consent, this consent shall be exercised in accordance with an 'Effluent Disposal Management Plan' (the 'Management Plan') that has been approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The Management Plan shall detail methods and procedures undertaken by the consent holder to ensure that the conditions of this consent are met and can be shown to be met, including but not necessarily be limited to details of:
 - (a) effluent application rate (volume and components);
 - (b) application method;
 - (c) pasture and soil husbandry;
 - (d) run-off prevention;
 - (e) effluent monitoring;
 - (f) soil and herbage monitoring;
 - (g) groundwater monitoring;
 - (h) how the discharge of contaminants to land is maximised;
 - (i) surface water monitoring (chemical and biological);
 - (j) management of contingency events;
 - (k) reporting on the exercise of consent; and
 - (l) the size and adequacy of the irrigation area.

Note: The Management Plan required by this condition may be combined with Management Plans required by the conditions of other consents held by the consent holder for the site.

6. Within 3 months of this consent being issued, the Management Plan required by condition 5 shall be submitted by the consent holder to the Taranaki Regional Council for certification by the Chief Executive.
7. A copy of any reviewed Management Plan, in accordance with conditions 5 and 6, shall be provided to the Department of Conservation and Fish and Game New Zealand (Taranaki Region), for the Taranaki Regional Council to take into account any comments received (within a two week timeframe from when the Plan was provided).
8. The discharge authorised by this consent shall not give rise to an odour that is offensive or objectionable, at or beyond the boundary of the property or properties on which spray irrigation is occurring.
9. The exercise of this consent shall not result in any spray drift beyond the boundary of the property or properties on which this consent is being exercised.
10. The discharge shall not occur within:
 - (a) 25 metres from the banks of any watercourse;
 - (b) 50 metres from any bore, well or spring used for water supply purposes;
 - (c) 20 metres from any public road;
 - (d) 20 metres from any property boundary; or
 - (e) 150 metres from any dwellinghouse unless the written approval of the occupier has been obtained to allow the discharge at a lesser distance.
11. The Total Nitrogen applied to any hectare of land shall not exceed:
 - (a) 1000 kilograms in any 12-month period for 'cut and carry areas'; or
 - (b) 300 kilograms in any 12-month period for any other land (including grazed pasture).

For the purposes of this consent 'cut and carry areas' is land that is not grazed and any vegetation is routinely cut and removed.

12. The consent holder shall provide to the Chief Executive, Taranaki Regional Council for review, programmes of water treatment used at the Ammonia Urea Plant, including raw water, boiler water and cooling water. Further, the consent holder shall notify the Chief Executive, Taranaki Regional Council, of any change in water treatment chemical, or increase in maximum concentration of any water treatment chemical used, at least one month prior to change of a water treatment programme.
13. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, for review, programmes of chemical cleaning used at the Ammonia Urea Plant. Further, the consent holder shall notify the Chief Executive, Taranaki Regional Council, of any change in chemical cleaning agent, or increase in maximum concentration of any chemical cleaning agent used, at least one month prior to change of a chemical cleaning programme.

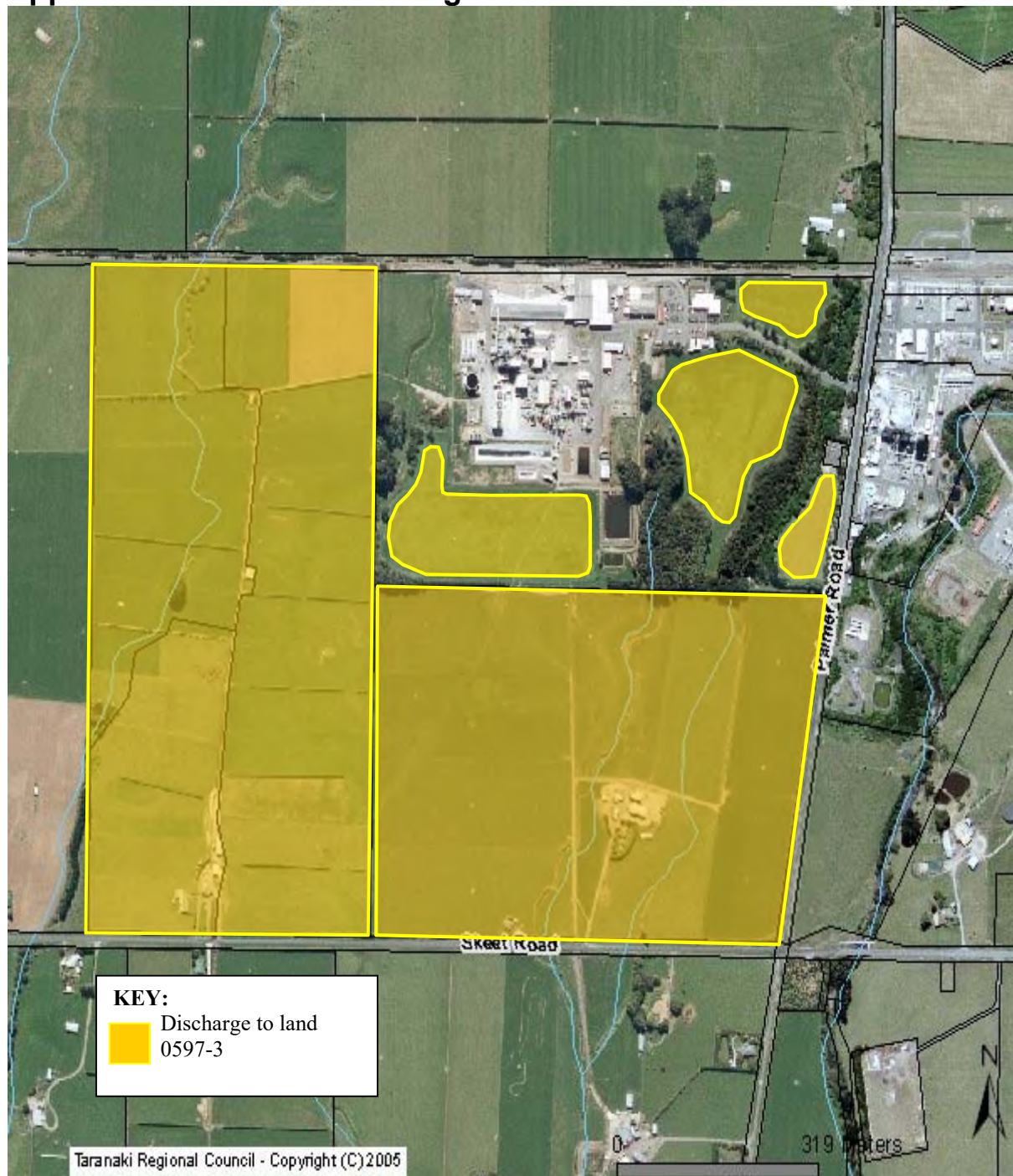
14. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2017 and/or June 2023 and/or June 2029 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 31 August 2012

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Appendix 1- Ballance discharge to land locations



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

Name of
Consent Holder: Ballance Agri-Nutrients (Kapuni) Limited
 P O Box 439
 HAWERA 4640

Decision Date: 31 August 2012

Commencement
Date: 31 August 2012

Conditions of Consent

Consent Granted: To discharge:

- stormwater from non-process areas; and
- raw water treatment plant wastewater,

from an ammonia/urea plant to the Kapuni Stream and into
an unnamed tributary of the Kapuni Stream at or about
(NZTM) 1700851E-5629366N and 1700454E-5629380N

Expiry Date: 1 June 2035

Review Date(s): June 2017, June 2023, June 2029

Site Location: 309 Palmer Road, Kapuni

Legal Description: Pt Lot 1 DP 13121 & Lot 1 DP 15254 (Discharge sites)

Catchment: Kapuni

*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 discharge shall not exceed 1,920 m³ per day to the Kapuni Stream, or 4,080 m³ per day to an unnamed tributary of the Kapuni Stream.
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 adverse effects on the environment from the exercise of this consent.
3. Constituents of the discharge shall meet the standards shown in the following table.

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.5 to 9.0
Zinc	Concentration not greater than 0.5 gm ⁻³

4. Beyond a mixing zone of 200 metres downstream from the discharge point, the discharge shall not cause constituents in the Kapuni Stream to exceed the maximum concentrations shown in the table below.

<u>Constituent</u>	<u>Maximum concentration</u>
Un-ionised ammonia	0.025 gm ⁻³
Sodium	40 gm ⁻³

5. After allowing for reasonable mixing, within a mixing zone extending 200 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - (a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - (b) any conspicuous change in the colour or visual clarity;
 - (c) any emission of objectionable odour;
 - (d) the rendering of fresh water unsuitable for consumption by farm animals;
 - (e) any significant adverse effects on aquatic life.
6. The consent holder shall monitor the Kapuni Stream for pH, unionised ammonia, and sodium, at locations and at a frequency that enables compliance with condition 4 to be determined.
7. The consent holder shall manage its stormwater disposal system in such a manner as to minimise the discharge of dissolved reactive phosphorus to the Kapuni catchment.

8. Subject to the other conditions this consent, this consent shall be exercised in accordance with an 'Effluent Disposal Management Plan' (the 'Management Plan') that has been approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The Management Plan shall detail methods and procedures undertaken by the consent holder to ensure that the conditions of this consent are met and can be shown to be met, including but not necessarily limited to details of:

- (a) exclusion of contaminated stormwater;
- (b) minimisation of dissolved reactive phosphorus in the discharge;
- (c) monitoring of the discharge;
- (d) monitoring of the Kapuni Stream;
- (e) discharge to the Kapuni tributary in times of extreme rainfall; and
- (f) reporting on exercise of consent.

Note: The Management Plan required by this condition may be combined with Management Plans required by the conditions of other consents held by the consent holder for the site.

9. Within 3 months of this consent being issued, the Management Plan required by condition 8 shall be submitted by the consent holder to the Taranaki Regional Council for certification by the Chief Executive.
10. A copy of any reviewed Management Plan, in accordance with conditions 8 and 9, shall be provided to the Department of Conservation and Fish and Game New Zealand (Taranaki Region), for the Taranaki Regional Council to take into account any comments received (within a two week timeframe from when the Plan was provided).
11. The consent holder shall provide to the Chief Executive, Taranaki Regional Council for review programmes of raw water treatment used at the Ammonia Urea Plant. Further, the consent holder shall notify the Chief Executive, Taranaki Regional Council, of any change in water treatment chemical, or increase in maximum concentration of any water treatment chemical used, at least one month prior to change of a water treatment programme.
12. 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 2017 and/or June 2023 and/or June 2029, 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 31 August 2012

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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

Name of
Consent Holder: Ballance Agri-Nutrients (Kapuni) Limited
PO Box 439
Hawera 4640

Decision Date
(Change): 15 January 2021

Commencement Date
(Change): 15 January 2021 (Granted Date: 31 August 2012)

Conditions of Consent

Consent Granted: To take and use water from the Kapuni Stream (at times when the normal water supply has failed) for the operation of an ammonia/ urea plant, and a hydrogen plant

Expiry Date: 1 June 2035

Review Date(s): June 2023, June 2029

Site Location: 309 Palmer Road, Hawera

Grid Reference (NZTM) 1701490E-5630830N

Catchment: Kapuni

*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 rate of water taken shall not exceed 33 litres per second.
2. This consent authorises taking only at times when the consent holder's water supply from the Waingongoro River (under consent 0596-3) has failed.
3. The consent holder shall maintain a record of taking to an accuracy of $\pm 5\%$, including date and daily volume taken. The record shall be provided to the Chief Executive, Taranaki Regional Council, no later than 31 July each year, or earlier upon request.
4. At all times the consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the abstraction of water, including, but not limited to, the efficient and conservative use of water.
5. Each time the consent is exercised the consent holder shall immediately advise the Chief Executive, Taranaki Regional Council, and within five days provide a written report. The report shall detail how the normal supply failed and the work programme proposed to reinstate it as soon as practicably achievable. If the time taken to reinstate the normal supply is longer than five days the consent holder shall provide progress reports in a form and at a frequency as may be directed by the Chief Executive, Taranaki Regional Council.
6. 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 2017 and/or June 2023 and/or 2029, for the purposes 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 15 January 2021

For and on behalf of
Taranaki Regional Council



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: Ballance Agri-Nutrients (Kapuni) Limited
 P O Box 439
 HAWERA 4640

Decision Date: 31 August 2012

Commencement
Date: 31 August 2012

Conditions of Consent

Consent Granted: To discharge treated plant production effluent and
 contaminated stormwater from an Ammonia/Urea plant into
 the Kapuni Stream when wet ground conditions do not
 allow spray irrigation onto and into land at or about (NZTM)
 1700851E-5629366N

Expiry Date: 1 June 2035

Review Date(s): June 2017, June 2023, June 2029

Site Location: 309 Palmer Road, Kapuni

Legal Description: Lot 1 DP 15254 (Discharge site)

Catchment: Kapuni

*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 consent may be exercised only when the effluent cannot be immediately assimilated into the soil and on-site effluent storage is nearing full capacity.
2. The discharge shall not exceed 1000 cubic metres per day.
3. 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 adverse effects on the environment from the exercise of this consent.
4. Constituents of the discharge shall meet the standards shown in the following table.

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.5 to 9.0
Zinc	Concentration not greater than 1.5 gm ⁻³

5. Beyond a mixing zone of 200 metres downstream from the discharge point, the discharge shall not cause constituents in the Kapuni Stream to exceed the maximum concentrations shown in the table below.

<u>Constituent</u>	<u>Maximum concentration</u>
Un-ionised ammonia	0.025 gm ⁻³
Nitrite	0.2 gm ⁻³

6. After allowing for reasonable mixing, within a mixing zone extending 200 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - (a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - (b) any conspicuous change in the colour or visual clarity;
 - (c) any emission of objectionable odour;
 - (d) the rendering of fresh water unsuitable for consumption by farm animals;
 - (e) any significant adverse effects on aquatic life.

7. Subject to the other conditions this consent, this consent shall be exercised in accordance with an 'Effluent Disposal Management Plan' (the 'Management Plan') that has been approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The Management Plan shall detail methods and procedures undertaken by the consent holder to ensure that the conditions of this consent are met and can be shown to be met, including but necessarily limited to details of:
- (a) conditions under which this consent may be exercised;
 - (b) how compliance with condition 2 is determined;
 - (c) notification to the Taranaki Regional Council about the exercising of this consent;
 - (d) monitoring of the discharge;
 - (e) monitoring of the Kapuni Stream; and
 - (f) reporting on exercise of consent.

Note: The Management Plan required by this condition may be combined with Management Plans required by the conditions of other consents held by the consent holder for the site.

8. Within 3 months of this consent being issued, the Management Plan required by condition 7 shall be submitted by the consent holder to the Taranaki Regional Council for certification by the Chief Executive.
9. A copy of any reviewed Management Plan, in accordance with conditions 7 and 8, shall be provided to the Department of Conservation and Fish and Game New Zealand (Taranaki Region), for the Taranaki Regional Council to take into account any comments received (within a two week timeframe from when the Plan was provided).
10. 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 2017 and/or June 2023 and/or June 2029 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 31 August 2012

For and on behalf of
Taranaki Regional Council

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: Ballance Agri-Nutrients [Kapuni] Limited
 P O Box 439
 HAWERA 4640

Decision Date: 10 February 2012

Commencement
Date: 10 February 2012

Conditions of Consent

Consent Granted: To discharge emissions into the air from the manufacture
 of ammonia and urea and associated activities at an
 ammonia-urea manufacturing complex at or about (NZTM)
 1700202E-5629703N

Expiry Date: 1 June 2035

Review Date(s): June 2017, June 2022, June 2027, June 2032

Site Location: 309 Palmer Road, Kapuni

Legal Description: Lot 20 Blk XV Kaupokonui 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 to section 36 of the Resource Management Act.

Special conditions

1. 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 effects on the environment arising from discharges to air from the site. The best practicable option includes, but is not limited to:
 - the consent holder at all times operating, maintaining, supervising, monitoring and controlling all processes so that emissions authorised by this consent are maintained at a practicable minimum;
 - urea being handled in such a manner and process and conveying equipment so contained to minimise spillages outside processing, storage and packaging/dispatch buildings or areas, and to prevent transport of dust beyond the boundary of the site;
 - the storage of anhydrous ammonia being undertaken in such a manner that maximum protection is afforded to valves, pipes and other fittings to minimise risk of accidental damage; and
 - the probability of ammonia pressure safety valve [PSV] system discharges being reduced as far as practicable, to ensure that any discharge does not pose a significant risk to people living or working in the area nor to farm livestock.
2. Prior to undertaking any alterations to the plant, processes or operations which may significantly change the nature or quantity of contaminants discharged to air from the site, the consent holder shall consult with the Chief Executive, Taranaki Regional Council, and shall obtain any necessary approvals required under the Resource Management Act 1991.
3. The combined emission of ammonia [as NH₃] from the following sources shall not exceed 295 kg/hour:
 - a) dust scrubber fan D4-GB-1505; and
 - b) blow down tank vent D5-FA-403.
4. The emission of ammonia to the atmosphere under normal operation, start-up and shut-down shall be so controlled to ensure that the maximum ground level concentrations [one-hour average] do not exceed 4.27ppm (v/v) beyond the boundary of the site.
5. Within 12 months of the issue of this consent, the consent holder shall to the satisfaction of the Chief Executive, Taranaki Regional Council, establish two static monitoring locations beyond the boundary of the site for the purpose of monitoring atmospheric ammonia on adjacent property, and to check compliance with condition 4. The consent holder shall record the ground level concentration of ammonia at the static monitoring locations, every Wednesday morning between 7.00 am and 10.00 am, or at an alternative time as agreed to by the Chief Executive, Taranaki Regional Council.

6. The emission of urea shall not exceed:
 - a) 125 mgNm^{-3} [as urea] or 12 kg/hour [mass emission] from the dust scrubber fan D4-GB-1505; or
 - b) 125 mgNm^{-3} [as urea] from any other source.
7. The consent holder shall control all emissions of carbon monoxide and nitrogen dioxide to air so that the maximum ground level concentration of any of these contaminants, arising from the exercise of this consent, measured under ambient conditions does not exceed the relevant ambient air quality standard as set out in the Resource Management [National Environmental Standards for Air Quality Regulations, 2004] at or beyond the site boundary.
8. The consent holder shall control emissions of all contaminants to air, other than those expressly provided for in other special conditions of consent, so that they do not individually or in combination with other contaminants cause a hazardous, noxious, dangerous, offensive or objectionable effect at or beyond the boundary of the property.
9. 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.

Note: For the purposes of this condition:

 - The boundary of the site is as illustrated on the map attached; and
 - Assessment under this condition shall be in accordance with the Good Practice Guide for Assessing and Managing Odour in New Zealand, Air Quality Report 36, Ministry for the Environment, 2003.
10. The consent holder shall provide to the Chief Executive, Taranaki Regional Council by 1 June 2012 and every three years thereafter, a written report which includes:
 - a) a review of any technological advances in the reduction or mitigation of discharges to air from the site, and the costs and benefits of these advances; and
 - b) an evaluation and review of ammonia pressure safety valve [PSV] systems, operating parameters, and vent heights to ensure that the probability of PSV discharges have been reduced as far as practicable, and to determine whether flaring or other control rather than vent height is practicable as a means to reduce ground level concentrations of ammonia; and
 - c) details of any complaints received [external to the operation of the plant], to include date, time, operating conditions, weather conditions and measures taken in response; and
 - d) monitoring records required by condition 5.
11. At least once every three years the consent holder shall convene a meeting with representatives of the Taranaki Regional Council and adjacent residential and industrial neighbours, to enable the dissemination and discussion of information relating to this consent.

12. The consent holder shall maintain a contingency plan for the site. The contingency plan shall be adhered to in the event of a spill or emergency and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council, detail measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not authorised by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.
13. 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 2017 and/or June 2022 and/or June 2027 and/or June 2032 for the purpose of ensuring that the ammonia standard specified in condition 4 is appropriate, and 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.

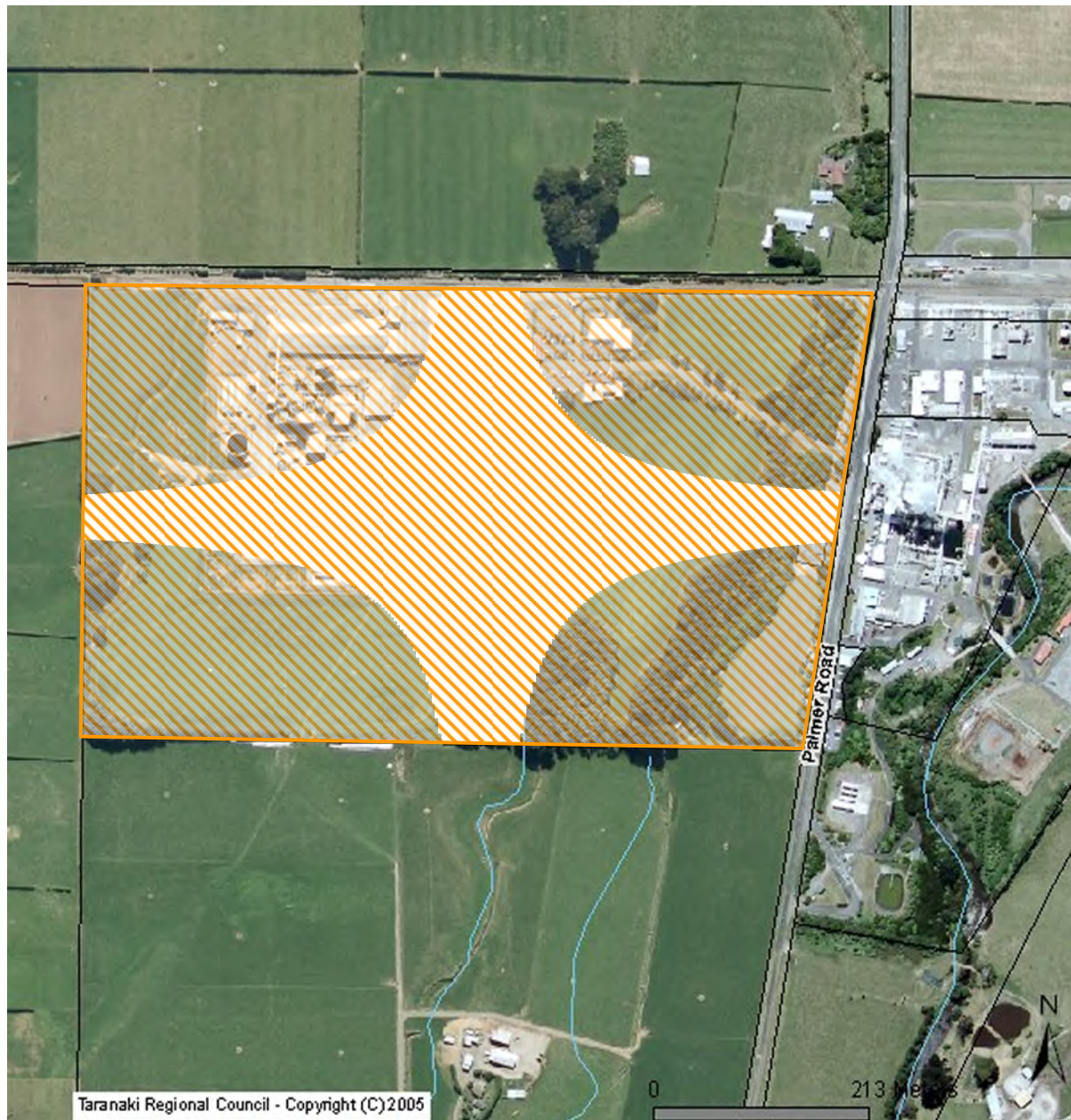
Signed at Stratford on 10 February 2012

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Appendix 1

Map showing site boundary



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

Name of
Consent Holder: Todd Energy Limited
P O Box 802
NEW PLYMOUTH

Decision Date: 27 October 2000

Commencement Date: 27 October 2000

Conditions of Consent

Consent Granted: To discharge treated stormwater from hydrocarbon exploration and production operations at the Mangahewa-A wellsite onto and into land and into an unnamed tributary of the Waitara River at or about GR: Q19:243-360

Expiry Date: 1 June 2021

Review Date(s): June 2003, June 2009, June 2015

Site Location: Mangahewa-A wellsite, Otaraoa Road, Tikorangi
[Property owner: P & S Cole]

Legal Description: Pt Lot 1 DP 658 Pt Otaraoa Block Blk X Waitara SD

Catchment: Waitara

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

General conditions

- a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.
- b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.
- c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
 - i) the administration, monitoring and supervision of this consent; and
 - ii) charges authorised by regulations.

Special conditions

- 1. The consent holder shall at all times adopt the best practicable option to prevent or minimise any adverse effects of the discharge on any water body.
- 2. The Chief Executive, Taranaki Regional Council, shall be advised in writing at least 7 days prior to commencing site works, and again in writing at least 7 days prior to any well drilling operation commencing.
- 3. The consent holder shall provide and maintain, for the written approval of the Chief Executive, Taranaki Regional Council, site specific details relating to contingency planning for the wellsite.
- 4. The design, management and maintenance of the stormwater system shall be generally undertaken in accordance with the information submitted in support of the application.
- 5. Any above ground hazardous substances storage areas shall be bunded with drainage to drilling sumps, or other appropriate recovery systems, and not to the stormwater catchment.
- 6. The following concentrations shall not be exceeded in the discharge effluent:

Component	Concentration
pH (range)	6.5-8.5
suspended solids	100 gm ⁻³
total recoverable hydrocarbons [infrared spectroscopic technique]	15 gm ⁻³

This condition shall apply prior to the entry of the treated stormwater into the receiving waters of the unnamed tributary, at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

7. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the discharge point, the discharge shall not give rise to any of the following effects in the receiving waters of the unnamed tributary:
 - a) an increase in temperature of more than 2 degrees Celsius;
 - b) an increase in biochemical oxygen demand of more than 2.00 gm⁻³.
8. After allowing for reasonable mixing, within a mixing zone extending 25 metres downstream of the discharge point, the discharge shall not give rise to any of the following effects in the receiving waters of the unnamed tributary:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - b) any conspicuous change in the colour or visual clarity;
 - c) any emission of objectionable odour;
 - d) the rendering of fresh water unsuitable for consumption by farm animals;
 - e) any significant adverse effects on aquatic life.
9. The Chief Executive, Taranaki Regional Council, shall be advised in writing at least 48 hours prior to the reinstatement of the site and the reinstatement shall be carried out so as to minimise effects on stormwater quality.
10. The Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2003 and/or June 2009 and/or June 2013, for the purpose of ensuring that the conditions are adequate to deal with any significant adverse effects of the discharge on the environment arising from the exercise of this 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.

Transferred at Stratford on 15 November 2013

For and on behalf of
Taranaki Regional Council

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