Environmental Management

Integrated Land Management Plan

Environmental systems and procedures for Silver Fern Farms Takapau land based activities

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Revision History

Date	Details	Amended by
June 1998	Farm Management Plan created	
June 2009	Updated Wastewater Irrigation & Farm Management Plan (draft)	
6 July 2011	Effluent & Solid Waste Management Plan 2011/2012	M J Perry (Technical Manager)
April 2018	Update to Integrated Land Management Plan. Revisions include format, continual improvement, and content update as required.	Group Environmental

Terms Used

Buffer	A defined area from an activity being undertaken and a fixed point between which the activity is restricted.
Cut-and-carry	The term used to describe the resultant harvesting and removal of grass from a paddock following irrigation.
IANZ	International Accreditation New Zealand.
PLC	'Programmable logic controller' – runs the automation programmes interfacing with infrastructure and receives / messages automated alarms.
Primary treatment	The physical separation of components from the incoming waste stream, particularly settleable and suspended solids.
SCADA	'Supervisory Control and Data Acquisition' – Computer programme which is the interface between staff and the automation systems. Is controlled by the PLC's.
Soil Testing	A laboratory analysis of soil cores to evaluate the fertility status of the soil, providing a basis for fertiliser recommendations.
Wastewater	Liquid streams generated from meat processing operations and general wash-down water.
Wastewater treatment plant	Facility where onsite wastewater is treated [primary treatment plus dissolved aeration flotation (DAF)] prior to being discharged to land.

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1 Background

1.1 Environmental Management Plans

Silver Fern Farms next generation Environmental Management Plans are living documents that will be continuously improved upon. These consist of a roadmap to a larger set of documents, company-wide and plant specific, covering what is required to appropriately manage the relevant environmental aspects across Silver Fern Farms operations.

This Management Plan should be read in conjunction with the supporting programme, Characteristics of the Land Holdings and Operational Controls for Takapau. The Characteristics of the Land Holdings outlines the key land features and attributes of the property, identified risks and the systems and procedures in place to avoid or remedy the risks.

Each section of the Management Plan sets out the context to the subject matter, and a reference to the elements that make up the day-to-day systems and controls that guide what we do.

1.2 Integrated Land Management Plan

The aim of this Integrated Land Management Plan ('Management Plan') is to provide guidance to the systems and controls for the effective management of land-based wastewater irrigation, the spreading of stockyard solids, and related land-based activities, at Silver Fern Farms Takapau operation.

Ensure alignment with other Silver Fern Farms Takapau management plans, and other relevant company requirements, along with compliance with applicable legal requirements.

The systems and procedures referenced within ensure that land-based wastewater irrigation and spreading of stockyard solids activities are undertaken in accordance with company's environmental objectives, and regulatory approvals (e.g., resource consents).

This document consists of:

- Introduction – contains an oversight of the land holdings (Section 2).
- Responsibilities – sets out sites organisational chart and duties (Section 3).
- Health & Safety – identifies the risks and mitigation measures to ensure zero harm (Section 4).

- Wastewater Treatment – describes the treatment system, operation, storage, and their management (Section 5).
- Irrigation network – describes the infrastructure, irrigation area, and the management to mitigate effects (Section 6).
- Stockyards Solids – describes the areas and technique for stockyard solids disposal (Section 7).
- Land Management – describes the soil, pasture, stock, waste, and wetland and riparian management (Section 8).
- Environmental Monitoring & Measurement – describes the environmental monitoring undertaken (Section 9).
- Incidents, Emergencies, and Response Measures – outlines the responses to any emergency or environmental incident (Section 10).
- Environmental Reporting and Review – outlines the environmental performance from discharging meat processing wastewater (Section 11).

2 Introduction

2.1 Physical address

Fraser Road, RD 2, Takapau

2.2 Land Holdings

The Silver Fern Farms Takapau land holdings comprise a total of 482 hectares.

2.3 Ownership and Tenure

The collective area of the Silver Fern Farms, Takapau land holdings are shown in Figure 2.3 below.

Figure 2.3: *Indicative land area.*

❖ **Systems and Controls**

Overarching details and characteristics of the land resources are outlined and managed through a series of operational controls company policies, supporting programmes and task instructions:

Element	Programme Type	Document ID (if applicable)
Characteristics of the Land Holdings*	Supporting programme	-
Operational Controls	Supporting programme	-

**The Characteristics of the Land Holdings complementary reference document outlines the land holdings at Takapau, and the land practices associated with managing these land-holdings in order to support the principal core meat processing operations.*

Note: Blocks F and G, River South, Wells and Non potable, Dam, Top Block, and Control Blocks are outside the parcels of land consented for the application of meat processing wastewater. Refer to Characteristics of Land Use, map 3, page 9 for area locations.

2.4 References

The relevant resource consent for this land-based activity is summarised in Table 2.3:

Consent No.	Activity
DP981043Ld & DP981044Ad	• To discharge contaminants onto land. • To discharge contaminants onto land where they may enter water. • To discharge contaminants to air from the land application of the wastewater.

Table 2.4: *Relevant resource consent.*

3 Responsibilities

3.1 Organisation Chart

Figure 3.1 below presents a simplified organisation chart. Whilst company–wide standards and guidance is cascaded down to operating sites, and assistance is provided cross-functionally, the roles specific to land-based activities are shaded light blue.

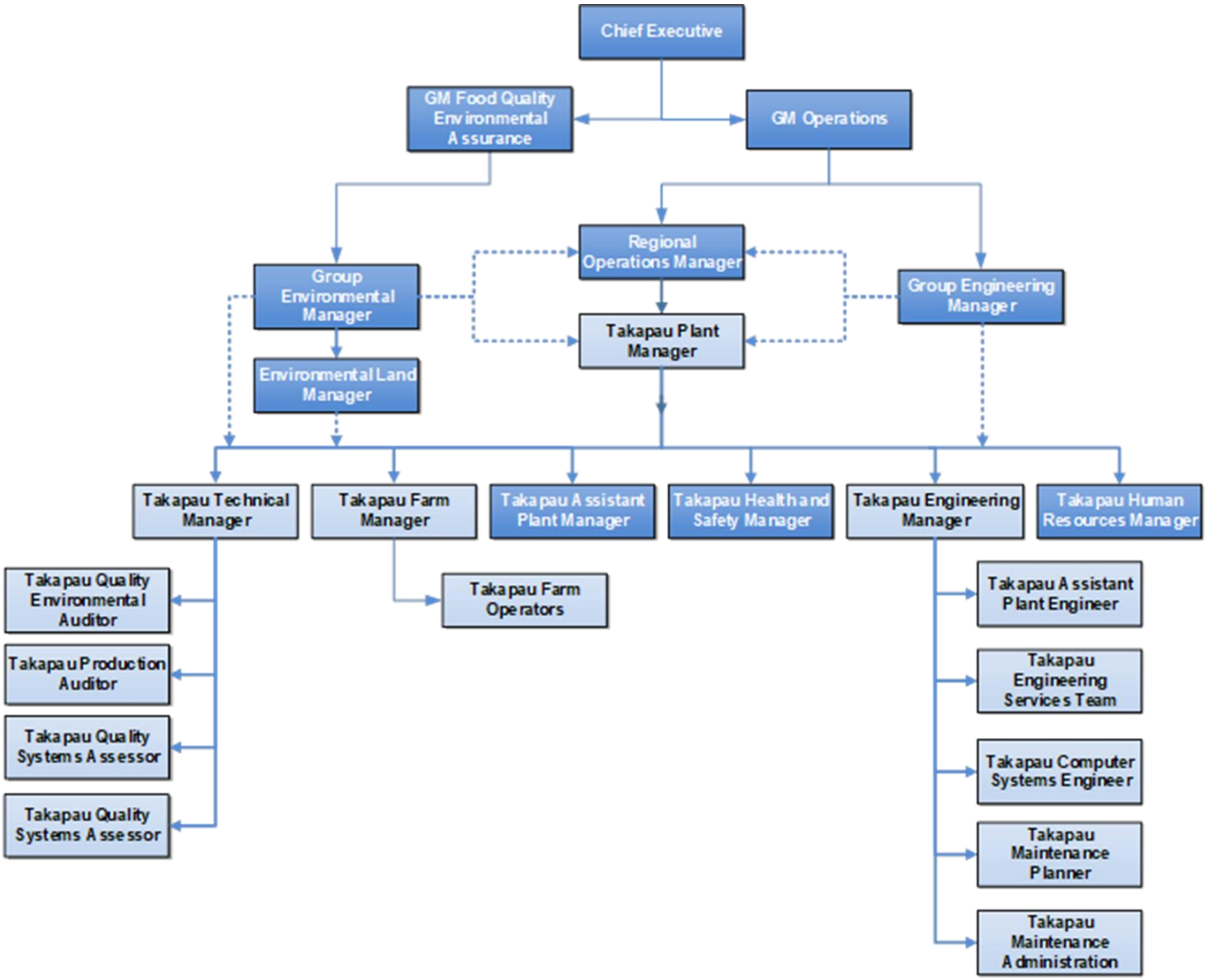


Figure 3.1: *Simplified organisation chart.*

3.2 Company Contact

Contact details for company representatives who act as contacts for the site are;

Plant Manager – Graeme Orvis (Acting Plant Manager)	027 544 1674
Engineering Manager – Trevor McDonnell	027 544 1673
Farm Manager – Bevan Oliver	027 499 9726
Silver Fern Farms Takapau Reception	06 858 6016
Silver Fern Farms Head Office	03 477 3980

3.3 Site Responsibilities

A summary of site responsibilities is provided in Table 3.3 below.

Plant Manager	• Is responsible and accountable for their site. • Appoints competent line personnel to take responsibility and accountability for environmental performance at site-level; clearly specifying their roles, KPI's, and delegation of responsibilities. • Provides resources to control risks associated with this operation.
Technical Manager	• Appoints competent personal to oversee environmental performance. • Provides the necessary resources to achieve monitoring and reporting objectives.
Environmental Land Manager (Group Environmental)	• Provides guidance and direction to Takapau Farm Manager. • Assists to develop land management budgets, develop and maintain land management systems and procedures.
Quality Environmental Auditor	• Communicates to relevant internal and external parties, including annual reporting and circumstances where an incident may have occurred. • Responsible for the day-to-day monitoring programme and maintenance of data within the Environmental Paddock.
Engineering Manager	• Has overall responsibility for the day-to-day operation and maintenance of equipment and services. • Provides the necessary resources to achieve operational objectives and maintaining services.
Assistant Engineering Manager	• Active involvement • Deputises to Engineering Manager • Responsible for developing systems for Plant monitoring. • Provides the necessary resources to achieve operational objectives and maintaining services.
Electrical Engineer	• Responsible for maintaining technical and electrical services at the plant...
Systems Engineer	• Responsible for IT & computer systems for processing operation.
Team leader	• Supervises the day-to-day servicing and maintenance of DAF & contrashear
Farm Manager	• Responsible for the day-to-day operation and management of the land-based wastewater disposal. • Provides the necessary resources to achieve operational objectives. • Selection, approval and engagement of required support contractors.
Farm Operators	• Active involvement. • Responsible for carrying out tasks in managing the operations of the land-based wastewater disposal. • Responsible for alerting management to all environmental incidents or hazards which may result in an environmental incident, regardless of the nature or scale.
Contractors	• Active involvement. • Responsible for carrying out tasks in accordance with their contractual requirement. • Responsible for alerting management to all environmental incidents or hazards which may result in an environmental incident, regardless of the nature or scale.

Table 3.3: *Summary of site responsibilities*

4 Health, Safety, Environmental and Training

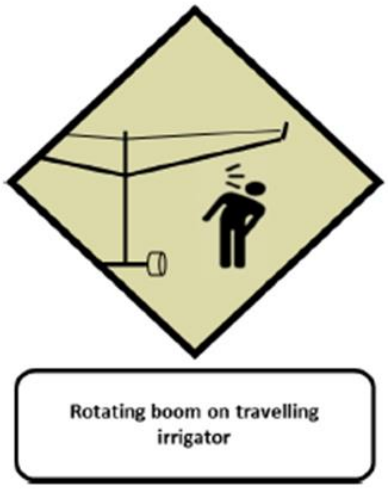
Health, safety and environmental management is a cornerstone of all Silver Fern Farms operations, with an emphasis on zero harm to people or the environment.

Training awareness is conducted to all employees and contractors as part of induction and onsite awareness sessions.

Training systems are such to ensure that any person(s) performing a task is competent in the activity and aware of hazards, risks, controls and expected behaviours in relation to their workplace activities.

Potential hazards for irrigation operators and farming personnel associated with the wastewater treatment system and stockyard solids at Silver Fern Farms Takapau are:

Hoses, wires and hydrants in paddocks whilst driving farm vehicles



Rotating boom on travelling irrigator

Falling into wastewater holding ponds

Ensure personnel hygiene is maintained following the handling of wastewater

Care should be taken to avoid ingestion or inhaling spray

❖ Systems and Controls

These aspects are managed through a series of company policies and procedures; on-site manuals, supporting programmes and task instructions:

Element	Programme Type	Document ID (if applicable)
ORA Health and Safety Policy	Company Policy	-
Environmental Policy	Company Policy	-
Induction	Company Standard	-
Training Coordinators Manual	Company Guidance	-
Takapau Health and Safety Manual	Site System	-
Site Specific Aspects, e.g., o Site induction o Contractor induction o Isolation tagging o Hot work permit o Confined spaces o Working at heights o Project management	Various*	-
Personal Hygiene	Task Instruction	FAR 01
Personal Safety PPE	Task Instruction	FAR 02

*There are multiple documents that include on-site H+S management – the Site ORA Health and Safety team administer these.

5 Wastewater Treatment System

Wastewater is sourced from across Silver Fern Farms Takapau operations (primary butchery, secondary butchery, animal assembly, and areas of potentially contaminated storm water). Control of 'wet' activities within operational areas has direct influence on volumes and loadings of the wastewater discharged from those areas, this is largely influenced by food safety requirements.

Figure 4, page 14, shows a simplified schematic of the wastewater treatment system.

The wastewater stream undergoes primary treatment and is mechanically screened for the recovery of solids through a series of 1.0mm and 1.5mm screens. Recovered solids are transported and processed to either a composting facility or rendering operation.

Following primary screening the wastewater is passed through a DAF tank (Dissolved Air Floatation) with a capacity of 316m^3, then held within a holding pond prior to being discharged onto company owned land via spray irrigation.

Solids collected from the stockyards is spread onto company land.

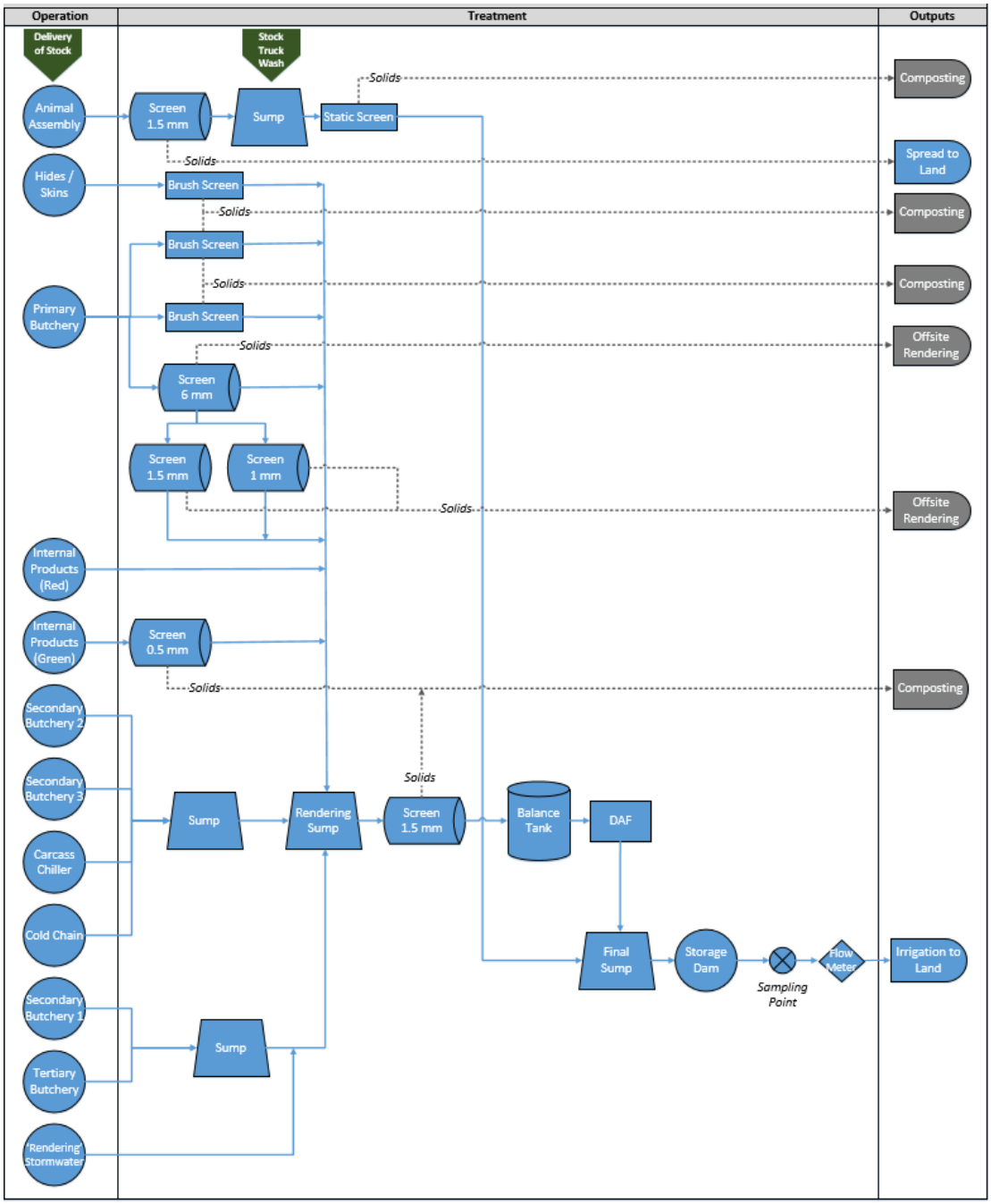


Figure 5: *Simplified schematic of the wastewater treatment system.*

5.1 Management of Wastewater Volume and Loading

There are a number of activities carried out across operational areas to manage the flow of wastewater and the overall contaminant loadings where possible.

Note, stock throughput has a direct bearing on the wastewater volume and loading at any particular time of the year. In addition, food safety cleaning requirements may also have a strong influence over wastewater volumes, e.g., if there is a global food safety issue MPI will automatically defer to increased cleaning requirements to protect NZ supply to those global markets.

❖ Systems and Controls

Wastewater volumes and contaminant loadings are managed by:

Element	Programme Type	Document ID (if applicable)
Cleaning – between breaks and shifts	Task Instruction	-
Containment Procedures	Task Instruction	FAR 40
Automatic chemical dosing systems (where possible)	System Design	-
Water flow restriction valves on sterilisers within the primary and secondary butchery	System Design	-
Discharge to land	System Design	-

5.2 General Operation and Maintenance

5.2.1 Wastewater Treatment Plant

Operational and maintenance procedures are in place for individual components of the wastewater treatment plant.

All plant and equipment is operated, maintained, inspected and tested using systems and procedures that manage risk.

Procedures control the operation and maintenance of plant and equipment that have a potential to impact performance. This plant and equipment is maintained, inspected and tested on a regular basis to ensure fit for purpose.

❖ **Systems and Controls**

General operation of the wastewater plant is managed by:

Element	Programme Type	Document ID (if applicable)
Routine inspection and maintenance of equipment as required	Performance Standard Preventative Maintenance Scheduling	-
Annual inspection and maintenance	Preventative Maintenance Scheduling	-
PLC Alert if 'Fault' condition	Alert - SCADA & Cell	-
Environs / Solid Waste Disposal	Task Instruction	FAR:27
Reading the wastewater meter	Task Instruction	FAR:38

5.2.2 Electrical Control System

The controls for the wastewater discharge electrical system are located at the pump shed beside the storage pond. The system is connected to a central PLC and local computer monitor to display on the SCADA.

The switchboard for these systems is located in the same area allowing the wastewater discharge to be controlled manually if necessary.

❖ **Systems and Controls**

Electrical control of the wastewater discharge is also managed by:

Element	Programme Type	Document ID (if applicable)
Manual Control	System Design	-

5.2.3 Primary Treatment

A number of different screens are used to remove gross solids from the wastewater stream; 5 x rotating screens (contrashears) with apertures of 1.0mm and 1.5mm.

Following screening the wastewater is passed through the DAF to remove additional top solids before being pumped to the holding pond.

❖ **Systems and Controls**

The primary treatment system is also managed by:

Element	Programme Type	Document ID (if applicable)
Automated spray cleaning – removes fouling on screens	System Design	-
Visual inspection – checking screen display, wear and tear	Preventative Maintenance Scheduling	-
DAF	Performance Standard	-

5.2.4 Pipework and Valves

Regular routine maintenance of the pipelines and valves at the stages of wastewater treatment is essential to provide reliable operation.

❖ **Systems and Controls**

To ensure pipelines and valves remain operational, the following is also undertaken:

Element	Programme Type	Document ID (if applicable)
Regular inspection of exposed pipes, fittings and valves	Preventative Maintenance Scheduling	-
Replacing pipes, fittings and valves as needed	Preventative Maintenance Scheduling	-
Painting pipework's with corrosion protection paint	Preventative Maintenance Scheduling	-
Use of non-return valves	Performance Standard	-
PLC alert if valves are in a 'Fault' condition	Alert - SCADA & Cell	-
Corrective actions for pipeline failures	Task Instruction	FAR 40
Pipeline flushing	Task Instruction	FAR 32
Clearing pipelines in the pump shed	Task Instruction	FAR 35
Opening and closing pipeline valves	Task Instruction	FAR 36
Walking the line	Task Instruction	FAR:62

5.2.5 Pumps

The wastewater discharge system has two pumps, both Hydro Titan 125-100-250 with full size impellor and a Booster pump – Verbloc BS10 Model 125v-26 with full size impellor.

❖ **Systems and Controls**

Pumps within the wastewater treatment plant are managed by:

Element	Programme Type	Document ID (if applicable)
Daily visual inspection to monitor pumps operation	Preventative Maintenance Scheduling	-
Annual pump overhaul	Preventative Maintenance Scheduling	-
PLC alert if a pump is in a 'Fault' condition	Alert - SCADA & Cell	-

5.2.6 Wastewater Storage Capacity

The storage pond, has a capacity of 5,500m^3 acts as a buffer to ensure there is a constant pumping pressure and constant flow when irrigating.

❖ **Systems and Controls**

The storage pond is managed by:

Element	Programme Type	Document ID (if applicable)
Daily emptying of storage pond	Maintenance Scheduling	-
PLC alert if a pump is in a 'Fault' condition	Alert - SCADA & Cell	-
Waste Water Storage Pond Readings	Task Instruction	FAR 26
24 hour proportional sample from the wastewater storage pond	Task Instruction	FAR 61

5.2.7 Pumping Operation

Under normal flow conditions, wastewater is pumped from the holding pond to the land irrigation network.

❖ **Systems and Controls**

Discharges to the land irrigation network are also managed by:

Element	Programme Type	Document ID (if applicable)
Understanding the effluent pump system	Task Instruction	FAR:37
PLC – alert if there is a pump failure, 'Fault' condition	Alert - SCADA & Cell	-

5.2.8 Flow Meter

A flow meter is located on the pipe at the pump shed.

The flow meter provides both instantaneous and totalised flows discharged volumes and is linked back to the sites PLC control and SCADA system.

❖ **Systems and Controls**

The discharge flow meter is also managed by:

Element	Programme Type	Document ID (if applicable)
Discharge volumes	PLC Monitoring	-
Regular inspection of exposed pipes, fittings and valves	Preventative Maintenance Scheduling	-
Five yearly flow meter verification – undertaken by a suitably qualified technician	Preventative Maintenance Scheduling	-
Understanding the fault light indicators on the effluent pump system	Task Instruction	FAR:58
Reading the effluent meter (automated)	SCADA system	FAR 38

5.2.9 Discharge Scheduling

Discharges to the land-based irrigation areas are determined by set return period irrigation scheduling based on the previous application depth. Due to the free draining nature of the majority of the underlying soils, land-based irrigation activities across the Silver Fern Farms Takapau irrigation areas are largely moisture constrained rather than nutrient constrained.

Application rates are controlled by speed settings (cam) on each travelling irrigator.

Detailed records of wastewater discharged to each irrigation run are maintained.

❖ **Systems and Controls**

Discharges to the land-based irrigation areas are managed by:

Element	Programme Type	Document ID (if applicable)
Automated scheduling system	System design	-
Interpreting Soil Moisture Monitoring	Task Instruction	FAR:22
Soil Moisture Monitoring - Aquaflex	PLC / SCADA	-
Setting up an irrigator	Task Instruction	FAR 04
Irrigation of E wet	Task Instruction	FAR:20
Ten commandments of Effluent Management	Task Instruction	FAR:19
Reading the effluent meter	Task Instruction	FAR:38
Pot testing	Task Instruction	FAR 21

6 Irrigation Network

6.1 Irrigation Objective

To operate the irrigation system so that application rates optimise nutrient uptake by plants, and manage risks associated with wastewater applications to ensure resource compliance.

6.2 Irrigation

This section outlines the systems and procedures in place for irrigation scheduling and the management of the land-based irrigation network. The irrigation network, systems and controls were designed specifically for Silver Fern Farms Takapau type of wastewater to avoid potential environmental effects of leaching, ponding, run-off, spray drift, and odour: standard irrigation systems will simply not operate.

The land-based irrigation network consists of twelve modified Briggs Model 25 travelling rotary boom irrigators all of which have been extended to incorporate flow metres, six include further modifications incorporating solar panels, telemetry gear and auto shut-offs mechanisms when in-line pressure drops below 200kPa – see figure 6.2

Figure 6.2 – Control panel

The wastewater application areas are generally referred to as Blocks A, B, C, D, E.

The irrigation system is operated through the PLC-SCADA, with real-time monitoring of soil moisture, wastewater flow, and onsite weather station parameters.

❖ **Systems and Controls**

Irrigation and land based activities are managed by overarching systems and controls:

Element	Programme Type	Document ID (if applicable)
Operational controls –Land Based Activities	Overarching document	-
Scheduling of irrigation runs	System design	-
Ten commandments of Effluent Management	Task Instruction	FAR:19
Visual inspections throughout day	Preventative Maintenance	-

6.3 Travelling Irrigators

Whilst every component is designed for peak reliability, performance and efficiency, the irrigators and associated equipment are nevertheless regularly inspected for wear & tear, and overall ongoing integrity.

Wastewater applications to land are managed through a series of on-site procedures, manuals and task instructions that outline corrective actions for pipeline failures, opening and closing pipeline valves, flushing of wastewater main lines, and the operation and maintenance of irrigators.

Silver Fern Farms Takapau ensures travelling irrigators with pressure control technology installed are operating on the network alongside irrigators without these modifications.

Any break in an underground pipe will cause a pressure drop over the entire network, irrespective where the break occurs. If travelling irrigators with pressure control technology are dispersed over the network, it is expected when there is a significant pressure drop due to a pipe failure the technology will effectively shut the entire wastewater network down at the pump. This means not all travelling irrigators require the technology to manage this risk.

❖ **Systems and Controls**

The systems and controls in place to maintain irrigation infrastructure are:

Element	Programme Type	Document ID (if applicable)
Routine inspection and maintenance of equipment	Performance Standard Preventative Maintenance Scheduling	-
Annual inspection and maintenance	Preventative Maintenance Scheduling	-
Quarterly inspection and maintenance	Preventative Maintenance Scheduling	-
PLC Alert if 'Fault' condition	Alert - SCADA & Cell	-
Real Time Monitoring – Moisture, Flow, Wind	SCADA	-
Annual weather station verification – undertaken by qualified professional	Preventative Maintenance Scheduling	-
Manual Control (if required)	System Design	-
Cleaning air breeders	Task Instruction	FAR:48
Irrigator pot testing	Task Instruction	FAR:21
Setting out an irrigator	Task Instruction	FAR 04
Packing up a travelling irrigator	Task Instruction	FAR:51
Laying out a hose for travelling irrigators	Task Instruction	FAR:52
Winding up a hose for travelling irrigators	Task Instruction	FAR:53
Turning on hydrants	Task Instruction	FAR:54
Running Modified irrigators	Performance Standard	FAR:02

Figure 6.3 below, shows the travelling irrigators employed at the site.

Figure 6.3: *Briggs 25 irrigator.*

6.4 Irrigation Area

Silver Fern Farms Takapau currently utilises around 214 hectares, of the total 482 hectares land holding, for land-based wastewater irrigation, shown below in Table 6.4.

	Irrigation Method	Area (ha)	Run Number
A Block	Travelling irrigators	70.88	A North: runs 1-20 A South: runs 1-19
B Block	Travelling irrigators	22.23	B1: runs 1-9 B2: runs 1-5 B3:runs 1-11
C Block	Travelling irrigators	25.4	C1: runs 1-5 C2: runs 1-15
D Block	Travelling irrigators	25.89	D1: runs 1-18
E Block (wet)	Travelling irrigators	26.69	E1a: runs 1-3 E4: runs 1-5 E6: runs 1-12
E Block (dry)	Travelling irrigators	42.42	E1: runs 1-4 E2: runs 1-5 E2a: runs 1-3 E3: runs 1-5 E5: runs 1-8 E7: runs 1-5

Table 6.4: *Irrigation method per Block*

The distribution of soils at the site are largely related to the underlying landform and can be classified into three broad groups.

Blocks A, B, C & D contain Allophonic and Orthic Brown soils that are well drained with no limitation to rooting depth and medium to good phosphate retention[1].

A silica pan underlies the soils (Perch-gley Pallic soil) in E Block that restricts plant rooting depth, infiltration rates and versatility of the land[2]. The balance of the soils are Fluvial raw soils

[1] Landcare Research (updated 29 Jan 2018) *The digital soil map for New Zealand*
[2] Landcare Research (updated 29 Jan 2018) *The digital soil map for New Zealand*

All wastewater areas have been developed under adaptive management as 'cut-and-carry' herbage production system with vegetation harvested around five times each season. No stock grazing is undertaken on the land-based wastewater irrigation areas unless required as a management tool for intermittent pasture control.

No artificial fertilisers are applied to the land-based wastewater irrigation areas unless required to correct a nutrient imbalance.

All land-based maintenance / development activities are planned for on a seasonal basis and managed through the annual budget process.

Vegetation harvesting, land development and management is carried out through contractual arrangements. Most of the vegetation grown is sold 'standing' through the Agricultural contractor, small amounts are retained on-site for feed as required.

❖ **Systems and Controls**

The systems and controls in place to maintain the irrigation areas are:

Element	Programme Type	Document ID (if applicable)
Annual Soil Testing	Task Instruction	FAR:18
Annual Budget	Group Standard	-
Weekly inspection of land holdings	Preventative Maintenance	-
Annual plant density counts	Preventative maintenance	FAR:67
Minimum cultivation	Preventative measure	-
Accredited Agricultural Contractors	Contractual	-

6.5 Spray drift and Odour Management

6.5.1 Spray drift and Odour Objective

To avoid spray drift and odours beyond the boundary of the property.

The travelling irrigator has large diameter nozzles to produce large droplets. These nozzles and irrigation conducted at low pressure prevents significant aerosoling.

Set buffer distances are maintained around the irrigation Blocks and shelter lines, both exotic and indigenous, are maintained to provide a visual and spray drift barrier to neighbouring properties. The exotic lines are regularly trimmed to ensure size and shape is maintained.

In the event of an excessive or off-odour noted by those working onsite or from an external complaint, actions taken include a boundary survey to identify the source and take corrective action if required.

❖ **Systems and Controls**

The systems and controls in place to avoid or remedy odours and spray drift are:

Element	Programme Type	Document ID (if applicable)
On-site odour control	Task Instruction	FAR:44
Pipeline flushing	Task Instruction	FAR:32
Cleaning air breathers	Task Instruction	FAR 48
Irrigator scheduling	Preventative measure	
Shelter belts	Preventative Maintenance Scheduling	
Borders and buffers	Preventative measure	
Incident reporting	Flash Report	
Environmental complaint	Environmental Complaint Report Form	

6.6 Ponding and run-off Management

6.6.1 Ponding and run-off objective

To manage wastewater application rates to achieve less than minor ponding (less than 2 hours for any ponding).

There can be times when prevailing climatic conditions contribute to surface ponding.

❖ **Systems and Controls**

The systems and controls in place to avoid run-off and significant ponding are:

Element	Programme Type	Document ID (if applicable)
Irrigator placement	Preventative measure	
Visual inspection	Preventative measure	
Corrective actions for effluent ponding	Task Instruction	FAR:43
Borders and buffers	Preventative measure	
Walking the line	Task Instruction	FAR: 62

6.7 Nutrient Management

6.7.1 Nutrient Objectives –

- *To maximise plant uptake of wastewater nutrients.*
- *To manage to annual gross nitrogen wastewater loadings of 600kgN/ha for grass pastures and 650kgN/ha for Lucerne pastures.*
- *Achieve optimum Olsen P levels in the soil.*

Processing wastewater contains a valuable source of nutrient for the pastures, that when harvested provide a source of revenue for the land holdings.

❖ **Systems and Controls**

The systems and controls in place to manage nutrient objectives are:

Element	Programme Type	Document ID (if applicable)
Daily electronic records of wastewater nutrient loadings	Supporting programme	-
Electronic records of nutrient removed in harvested product taken off-site	Supporting programme	-
Annual Nutrient Mass Balance calculation	Supporting programme	-
Irrigator scheduling	Preventative measure	-
24 hour proportional sample from wastewater pond	Task Instruction	FAR:60
Time flow proportional sample from wastewater storage pond	Task Instruction	FAR:61
Irrigator pot testing	Check and balance	FAR:21
Soil Sampling	Task Instruction	FAR:18
Soil Moisture Monitoring - Aquaflex	PLC / SCADA	-
Trac map for organic solids	Task Instruction	FAR:27
Lysimeter sampling	Task Instruction	FAR:33
Certified spreading contractor, with GPS technology (dryland blocks)	Preventative measure	-

7 Sheep yard Solids

Wastewater form the stockyards is screened by a contrashear to remove solids. Solids are then collected in a muck spreader and applied to Blocks S1 and S2, authorised by Resource Consent, and Blocks F and G authorised under a Certificate of Compliance (see figure 7 below).

❖ Systems and Controls

The systems and controls in place to discharge screened stockyard solids are:

Element	Programme Type	Document ID (if applicable)
Characteristics of Land Holdings	Supporting Programme	-
Trac map	Task instruction	FAR:27
Application of sheep-yard solids to land	Task Instruction	FAR:55
Calibration of Muck Spreaders	Task Instruction	FAR 27

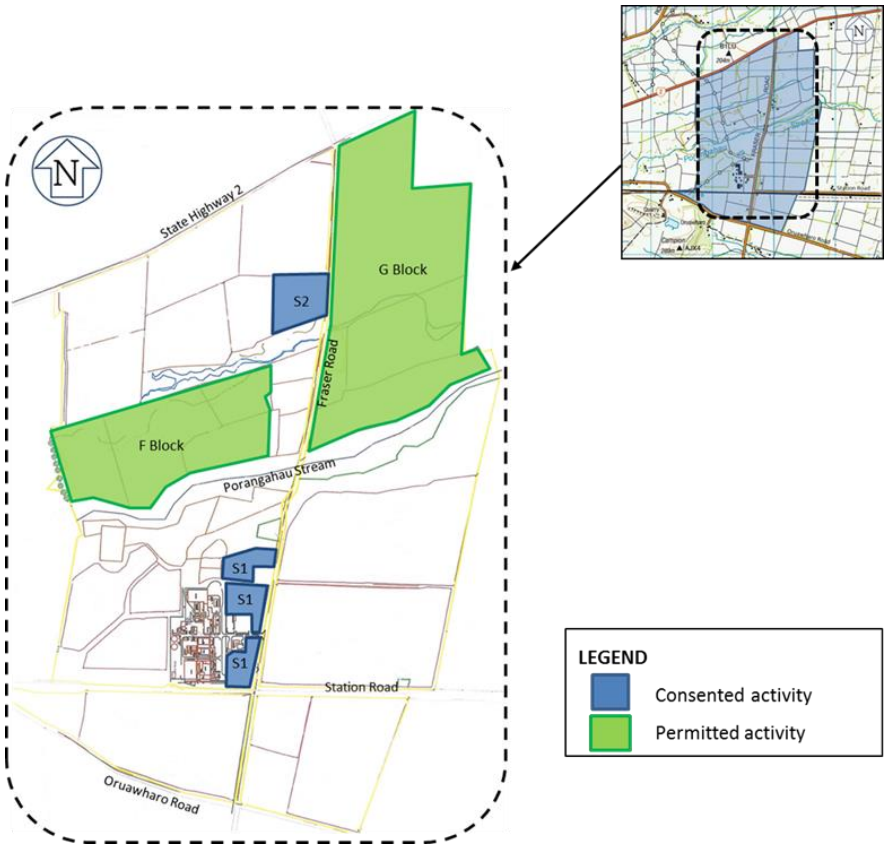


Figure 7 – Screened stock yard solids disposal areas.

8 Land Management

8.1 Soils and Pasture Management

8.1.1 Soils and Pasture Objectives –

- *To maintain or improve the physical and biological condition of the soils*
- *To maintain the pastures in a productive state*
- *To minimise movement of sediment, phosphorus and other contaminants to waterbodies.*

Pastures receiving processing wastewater are sown with a mix of tetraploids and diploid grasses, selected on yield, sugar content, pest and drought tolerance and ability to uptake nitrogen.

Routine soil analysis is undertaken to monitor soil nutrients. In the event that analysis indicates an imbalance in soil nutrients, appropriate supplementary fertilisers may be applied.

Chemical use is minimised to avoid any effects on bacteria and soil micro-organisms, and earthworms.

❖ **Systems and Controls**

The systems and controls in place to maintain soil and pasture health are:

Element	Programme Type	Document ID (if applicable)
Soil sampling	Task Instruction	FAR:18
Pasture mixes	Accredited Agricultural Agronomist	-
Harvesting	Task Instruction	FAR 41
Harrowing	Task Instruction	FAR 16
Riparian and Wetland plantings	Preventative measure	-

8.2 Stock Management

8.2.1 Stock Objectives –

- *Total compliance with the animal welfare code of practice.*
- *Maintain a record of nutrient contribution to land holdings.*

Grazing with short-term low stocking ratio occurs across the dryland blocks to manage plant growth, and to support processing operations when required.

Daily monitoring of feed supply, stock water, stock health and welfare is undertaken to avoid animal stress.

❖ **Systems and Controls**

The systems and controls in place to achieve stock management objective are:

Element	Programme Type	Document ID (if applicable)
No grazing on areas receiving processing wastewater.	Company policy	-
Animal behaviour	Task Instruction	FAR:03
Stock transfer	Task Instruction	FAR:09
Stock mustering	Task Instruction	FAR:11
Checking stock	Task Instruction	FAR:13
Drafting cattle	Task Instruction	FAR:14
Repairing water troughs	Task Instruction	FAR:12
Removal of dead stock	Task Instruction	FAR:50
Daily recording of stock numbers	Supporting programme.	-

8.3 Wetland and riparian management

8.3.1 Wetland and Riparian Objectives –

- *To manage the wetland and stream to their inherent values.*
- *To protect riparian margins in order to act as nutrient filters.*
- *To enhance the wetland to act as a secondary system for 'polishing' any surface run-off.*
- *To ensure that management of the stream, stream margins and wetlands align with community expectations.*

❖ **Systems and Controls**

The systems and controls in place to achieve the wetland and riparian objectives are:

Element	Programme Type	Document ID (if applicable)
Fence maintenance	Task Instruction	FAR: 15
Monthly visual inspection	Preventative measure	-
Exclusion of livestock from permanently flowing waterways, or ephemeral areas during flow.	Company Policy	-

Pest and weed control	Supporting programme	-

8.4 Waste Management

8.4.1 Waste Objective –

- *To adopt the principles of sustainability for land and agricultural related waste by reducing waste, recovering and recycling materials, and reusing any waste stream before considering any residual management.*

Silver Fern Farms, Takapau, is committed to actively caring for the environment as an integral part of its business and environmental policy.

❖ **Systems and Controls**

The systems and controls in place to achieve the objective are:

Element	Programme Type	Document ID (if applicable)
Waste reduction, recovery, reuse, recycling before residual management.	Company Guideline	-

9 Environmental Monitoring & Measurement

Assurance of activities is achieved by monitoring, auditing and reviewing performance and systems to identify trends, measure progress, assess compliance and drive continual improvement.

Monitoring forms an integral part of this management plan to ensure performance indicators are being met, and to identify where additional measures may be required. Each of the applicable resource consents include specific monitoring requirements to measure the performance of the management activities and a programme for implementation.

Key monitoring activities are summarised below.

9.1 Monitoring

The level of environmental monitoring is conducted in conjunction with consent requirements.

Environmental samples are collected by appropriately trained / suitability experienced personnel and are analysed by a laboratories IANZ accredited.

Table 9.1 below summarises the compliance monitoring undertaken to monitor the effects of land-based discharge of wastewater.

Activity	Frequency
Discharge volume	Daily
Soil moisture – real time (Aquaflex)	Real-time
Wastewater 24 hour flow proportional sample	Weekly
Groundwater monitoring bores *(location provided in Characteristic of Land use)*	Monthly
Soil analysis	Annually
Monitoring Porangahau stream	Monthly
Macroinvertebrate	Annually
Lysimeters	Fortnightly

Table 9.1: *Monitoring summary (refer to appropriate resource consent for detail)*

To manage and maintain all data requirements from environmental monitoring, the systematic capture of data is held within the Silver Fern Farms ‘secure intranet data warehouse “Takapau Environmental Paddock”. The control of access to this data storage is managed in order to avoid inadvertent data loss or changes.

The data is also presented by way of trend graphs in order to quickly evaluate performance. Access to view the trend graphs is provided up to Group Manager / Regional Manager / General Manager.

❖ Systems and Controls

Routine monitoring is managed by:

Element	Programme Type	Document ID (if applicable)
Groundwater Sampling	Task Instruction	FAR:17
Surface water sampling procedures	Task Instruction	FAR 25
Soil Sampling	Task Instruction	-FAR 18
Micro-scan database Services Report	Data Warehouse TAK Enviro performance paddock.	-
Wastewater Discharges	Data Warehouse TAK Enviro performance paddock	-
Wastewater Quality -24 Hour and Grab Samples	Data Warehouse TAK Enviro performance paddock	-
Groundwater Monitoring –Bores	Data Warehouse TAK Enviro performance paddock	-
Soil Analysis	Supporting programme	-
Lysimeters	Data Warehouse TAK Enviro performance paddock	-

10 Incidents, Emergencies, and Response Measures

Environmental incidents and emergencies are reported, corrective action undertaken, investigated and analysed. Procedures and resources are in place to effectively respond to any such events.

The manager responsible for the work area where an incident occurs is responsible for ensuring the appropriate steps are undertaken. Incident details, corrective actions taken and learnings are shared across the company.

In the event of impending adverse weather or other conditions, appropriate precautionary measures may be undertaken to safeguard personnel, property, and/or the environment.

Depending on the consequence of the incident, the relevant internal and external parties are notified in accordance with established timeframes and/or legislative requirements.

10.1 Significant Event

In a significant emergency event, the appropriately trained on-site, and/or off-site, Emergency Response Team(s) may be mobilised to manage the situation.

❖ Systems and Controls

In a serious event the following procedures shall be implemented:

Element	Programme Type	Document ID (if applicable)
Containment Procedures	Task Instruction	FAR: 40
Crisis Management Plan Takapau	Site Management Plan	-
Emergency Procedures	Site Manual	-

10.2 Environmental Incident

In the event of an incident, certain steps are required to be followed. These include:

- Conducting an incident investigation.
- Generating a “Flash report” within 24 hours of the incident occurring.
- Notifying affected parties, both internal and external, of the incident and corrective / preventative actions taken.

Any incidents or near misses, irrespective of whether damage to property or equipment resulted, are reported through 'Flash' reporting and investigated with recommendations made where required on how to prevent a recurrence or deal with any deficiencies in the appropriate systems and controls.

❖ **Systems and Controls**

Environmental incidents are managed by:

Element	Programme Type	Document ID (if applicable)
Containment Procedures	Task instruction	FAR: 40
Flash Report	Group Standard	-
Incident Investigation	Task Instruction	FAR: 40
Corrective Actions Investigation	Task Instruction	FAR: 45
Corrective Actions for Pipeline Failure	Task Instruction	FAR:40

10.3 Enquiry / Complaints Handling

Enquiries and complaints may occur via a number of different mechanisms whether coming from internal or external sources.

All environmental related enquiries and complaints are received, handled, responded to and recorded following a systematic process in accordance with incident management standards and guidelines.

To handle complaints, the responsible personnel shall determine the appropriate corrective and preventative actions to ensure the actions are implemented effectively to rectify the problem.

❖ **Systems and Controls**

In the event that a complaint is received, complaints are managed by:

Element	Programme Type	Document ID (if applicable)
Resource Consent Complaints	Task Instruction	FAR:42
Recording Complaints	Group Standard	-
Takapau Complaint Register	Group Standard	-

11 Environmental Reporting and Review

Environmental performance reporting is carried out to both internal and external parties on a regular basis. Regulatory annual reporting is provided to Hawkes Bay Regional Council for all relevant activities across the Site.

An interpretive annual report is provided to Hawkes Bay Regional Council before 31 December each year. The report summarises the Sites environmental performance for the seasonal reporting period 1 October – 30 September, including:

- A description of the activities carried out over the past season;
- A comprehensive review of the monitoring results and any complaints over the season, including a comparison of the results against:
    - Relevant statutory requirements, limits or performance measures / criteria including where applicable any non-compliance over the last season, and a description of the actions that were, or are being, taken to ensure compliance;
    - Trends in monitoring results.
- A description of any additional measures that may be considered over the next season to improve the environmental performance.

Monthly environmental performance reporting is provided by the Site to Hawkes Bay Regional Council, as well as senior management, who in turn report on a monthly basis the environmental performance for each Operating Site to the Silver Fern Farms Board.

11.1 Environmental Performance

Environmental performance reporting is carried out in accordance with the required timeframes as required internally and externally.

❖ Systems and Controls

Reporting requirements are managed by:

Element	Programme Type	Document ID (if applicable)
Monthly Environmental Report	Internal and External Reporting	-
Annual Environmental Performance Report	External / Internal Reporting	-

11.2 Performance Assessment

Routine environmental performance reviews, formal and informal, are conducted by both Silver Fern Farms personnel and external parties, including regulatory agencies. The findings of these reviews are recorded and actions and/or recommendations addressed and tracked as required.

❖ Systems and Controls

Environmental performance reviews are managed by:

Element	Programme Type	Document ID (if applicable)
Environmental Advice Note	Group Environmental Review	-
Contracted Review (as required)	Contractual	-
Hawkes Bay Regional Council Review (as required)	Legislative	

11.3 Environmental System Assessment

Silver Fern Farms takes the opportunity during the annual reporting process to review the suitability and effectiveness of the Integrated Land Management Plan, in addition to the Environmental Management Systems for the Site.

This Management Plan may also be reviewed at any time depending upon triggering events (carried out as appropriate and based on the magnitude of the trigger):

- Inclusion of lessons identified through incident investigation.
- Inclusion of audit outcome or finding.
- Change in nature of activity and associated risks.
- Change in regulatory or Company requirements.

Consistent with the principles of continuous improvement, the Silver Fern Farms Takapau controls and other related documents will be periodically updated.

If amendments to the Management Plan are made, the updated plan will be submitted to Hawkes Bay Regional Council shortly thereafter as is standard practice.