MITCHELL DAYSH

BLUE SKY MEATS (N.Z.) LTD

MORTON MAINS PROCESSING PLANT

Resource Consent Application and Assessment of Environmental Effects for Non-Agricultural Effluent Storage Facilities

29 July 2022

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REPORT INFORMATION

Report Status	Final
Our Reference	MDL000530
File Location	Blue Sky Meats (NZ) Ltd / 000530 Waste Water Consent Strategy / 09 Consent Renewal Application
Author	Nicolai Berry
Review By	Doyle Richardson and Claire Hunter
Version Date	29 July 2022

PART A

Resource Consent Application

FORM 9

APPLICATION FOR RESOURCE CONSENT

Sections 88 and 145, Resource Management Act 1991

To **Environment Southland**

1. **Blue Sky Meats (N.Z.) Ltd apply for the following types of resource consents:**

A land use consent, to provide for:

- The use of land for the maintenance and use of the three existing non-agricultural effluent storage facilities and ancillary structures for the treatment and storage of meat works effluent.

2. **The activity to which the application relates (the proposed activity) is as follows:**

Blue Sky Meats (N.Z.) Ltd ("**BSM**") owns and operates a lamb and sheep processing plant, and ancillary meat rendering plant located at 729 Woodlands-Morton Mains Road, Morton Mains, Southland. The Morton Mains Plant processes up to 27,750 stock units per week (it has capacity for 30,000) and undertakes rendering for meat, blood & bone meal and tallow.

The proposal is to renew resource consent 20181937-01 for the use of land for the maintenance and use of three existing non-agricultural effluent storage ponds / facilities and ancillary structures for the treatment and storage of meatworks effluent.

In 2019, BSM constructed substantial upgrades to the on-site wastewater treatment plant ("**the WWTP**") which was commissioned in January 2020. This upgrade was to allow the Plant to properly operate at full capacity, and to reduce nitrogen loading to the land treatment area. BSM propose to continue the use of the existing flow equalisation basin, the sequencing batch reactor ("**SBR**") lagoon and a covered anaerobic lagoon as part of the ongoing operation of the upgraded WWTP on site.

The significant upgrades to the WWTP have resulted in sizeable improvements to health of the Site, and it is expected that this will extend to the wider ecosystem with time. The ongoing use of the basin and lagoons are critical to the continued operation of the WWTP, and therefore the significant improvements to the health of the site and wider ecosystem.

This application is made in general accordance with the attached Assessment of Environmental Effects, which forms part of this resource consent application.

3. **The site at which the proposed activity is to occur is as follows:**

729 Woodlands-Morton Mains Road, Morton Mains, Southland, within the land parcel legally described as Lot 1 DP 595 owned by Blue Sky Meats (N.Z.) Limited.

The Record of Title for the site is provided in the attached Assessment of Environmental Effects.

4. **The full name and address of each owner or occupier (other than the applicant) of the site to which the application relates are as follows:**

Blue Sky Meats (N.Z.) Ltd is the owner and occupier of the land associated with the Morton Mains Plant.

5. **There are no other activities that are part of the proposal to which this application relates.**

6. **The following additional resource consents are needed for the proposal to which this application relates and have been applied for:**

Blue Sky Meats (N.Z.) Ltd have also applied for water permits and discharge permits from Environment Southland to replace six existing resource consents (which expire on 31 December 2022). These permits will enable the continued operation of the Plant on the Site and relate to the following activities:

- The take of groundwater (for a meat processing plant, and a rendering and blood drying plant);
- The take of groundwater, via the groundwater dewatering system and leak detection system, for the wastewater treatment plant;
- The discharge of wastewater and biosolids to land via a spray irrigator (from the meat processing plant, and rendering plant) and the discharge of screened stockyard solids, paunch, and sand and grit to land via a muck spreader;
- The discharge of contaminants to air (from a meat processing plant, wastewater treatment system, rendering and blood drying plant and associated boilers) that combines two existing air discharge consents; and
- The discharge of land drainage water and stormwater to water.

These additional resource consents are briefly described in the attached Assessment of Environmental Effects, with a more detailed description provided in the Assessment of Environmental Effects lodged with Environment Southland on 30 June 2022.

7. **I attach an assessment of the proposed activity's effect on the environment that—**

(a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and

(a) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and

(b) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

8. **I attach an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.**

9. **I attach an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.**

10. **The value of the investment of the existing consent holder is considerable.**

Blue Sky Meats Ltd is a major contributor to the local economy, employing over 350 staff throughout the season and providing an essential service to the local farming community. BSM has invested $40 million into the Plant and surrounding farmland to ensure that an effective and efficient operation is maintained at all times. Between 2018 – 2022, BSM undertook a substantial upgrade of the WWTP, consisting of a significant financial investment of $4.7 million.

11. **I attach the following further information required to be included in this application by the Proposed Southland Water and Land Plan, the Resource Management Act 1991, or any regulations made under that Act:**

- The Assessment of Environmental Effects;
- Records of Title; and
- Blue Sky Meats Ltd - Wastewater Treatment Plant Land Use Consents
- Blue Sky Pastures – Wastewater Treatment Plant Operation and Maintenance Manual

Date: 29 July 2022

Signature: 

Doyle Richardson, Mitchell Daysh Limited, on behalf of Blue Sky Meats Limited.

Address for Service: Blue Sky Meats Limited
c/- Mitchell Daysh Limited
PO Box 489
Dunedin 9054

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B

PART B

Assessment of Environmental Effects

1. INTRODUCTION

The purpose of this document is to provide the required information to inform a resource consent application by Blue Sky Meats (N.Z.) Limited ("**BSM**") to renew resource consent 20181937-01 for the use of land for the maintenance and use of three existing non-agricultural effluent storage ponds / facilities and ancillary structures for the treatment and storage of meatworks effluent.

BSM owns and operates the lamb and sheep processing plant, and ancillary meat rendering plant ("**the Plant**") located at 729 Woodlands-Morton Mains Road, Morton Mains, Southland ("**the Site**"), legally described as Lot 1 DP 595. The site is shown in **Figure 1** below.

The Record of Title for this property is provided as **Appendix A** of this Assessment of Environmental Effects ("**AEE**").

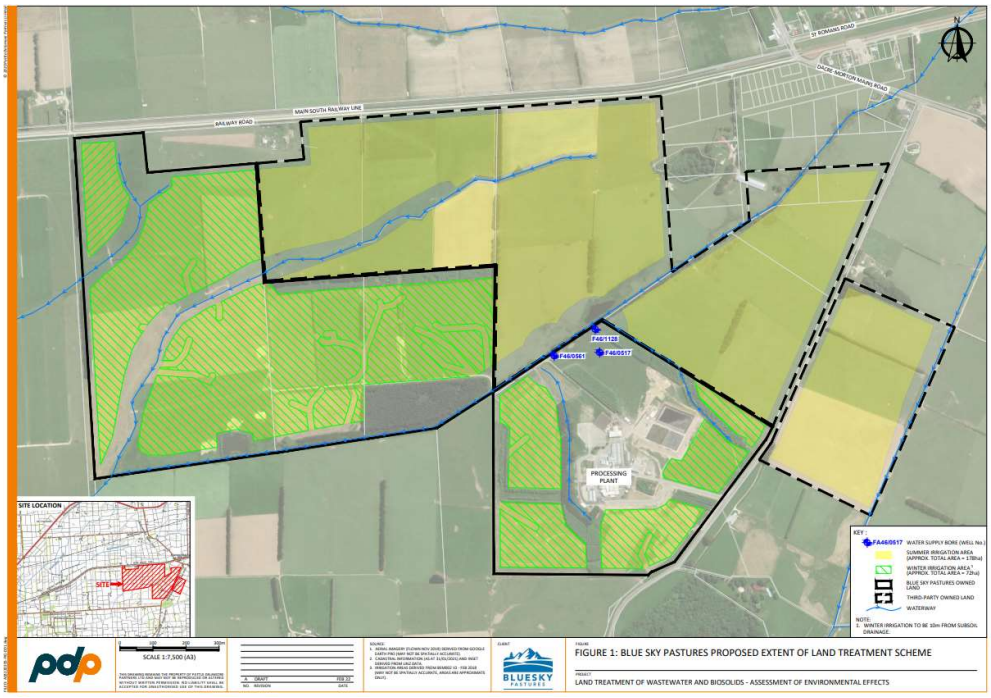


Figure 1: The Site.

BSM currently hold nine resource consents issued by Southland Regional Council ("**Environment Southland**") to operate the Plant on the Site, of which eight expire on 31 December 2022. An application for resource consent for the renewal of six of these

resource consents[1] was lodged with Environment Southland on 30 June 2022 ("**the June Application**"), which related to the following activities:

- The take of groundwater (for a meat processing plant and a rendering and blood drying plant);
- The discharge of wastewater and biosolids to land via a spray irrigator (from the meat processing plant and rendering plant) and the discharge of screened stockyard solids, paunch, and sand and grit to land via a muck spreader to BSM-owned land and third-party owned land;
- The discharge of land drainage water and stormwater to water;
- The take of groundwater, via the groundwater dewatering system and leak detection system, for the wastewater treatment plant; and
- The discharge of contaminants to air (from a meat processing plant, a wastewater treatment system, rendering and blood drying plant and associated boilers) that combines two existing air discharge consents.

The continued use of land for the maintenance and use of non-agricultural effluent storage facilities is considered a permitted activity under the Proposed Southland Water and Land Plan ("**pSWLP**"), and as such, no resource consent was sought for this activity in the June Application.

This permitted activity status was largely determined by the following:

- No works are proposed to the existing basin or lagoons; and
- The Commissioners' Decision on the pSWLP stated the use of the existing non-agricultural effluent storage facilities (which is interpreted by BSM to include the existing basin and lagoons and storage facilities associated with the Wastewater Treatment Plant "**WWTP**")) remain a permitted land use by virtue of there being no rules restricting the use of land for this purpose.

However, from discussions with Environment Southland following the lodgement of the June Application, we understand that Environment Southland have a different interpretation of Rule 32C of the pSWLP, namely that it does not just apply to applications for resource consent for 'new' ponds, but that it also applies to existing ponds if they were originally granted resource consent and constructed under Rule 32C of the pSWLP.

As resource consent was obtained under Rule 32C of the pSWLP to construct, maintain and use two new non-agricultural effluent storage ponds, and to reconstruct, maintain and

[1] The proposed activities can continue without the one other resource consent that is also expiring that does not form part of this application or the June Application.

use a non-agricultural effluent storage pond as part of the proposed WWTP upgrade in 2018 (refer to **Appendix E** of the June Application), Environment Southland have stated that resource consent is required for the ongoing maintenance and use of the lagoons because they were new ponds built under Rule 32C.

BSM do not agree with this position on the basis that the wording of Rule 32C refers to the construction, use and maintenance of 'new' ponds only, however, to move the process forward, BSM has agreed to apply (on a without prejudice basis) for the additional consents for the ongoing use and maintenance of the existing ponds.

As with the other six applications for resource consent renewal, BSM are seeking to replace this resource consent for a term of 35 years. Refer to the AEE that was lodged as part of the June Application ("**June AEE**") for further details.

2. DESCRIPTION OF THE ACTIVITY

In 2019, BSM constructed substantial upgrades to the on-site WWTP which was commissioned in January 2020. This upgrade was to allow the Plant to properly operate at full capacity, and to reduce nitrogen loading to the land treatment area.

BSM propose to continue the maintenance and use of the flow equalisation basin, the sequencing batch reactor ("**SBR**") lagoon and a covered anaerobic lagoon as part of the ongoing operation of the WWTP on site.

The basin and lagoons hold process wastewater at various stages of wastewater treatment including:

- The flow equalisation basin, which receives primary screened wastewater;
- The covered anaerobic lagoon, which contains partially treated anaerobic process wastewater, settleable anaerobic sludge and may at times have a floatable fat-based sludge layer; and
- The SBR lagoon, which contains partially treated to treated process wastewater (depending on the stage of the process) and activated sludge. The SBR is optimised for biological nitrogen removal.

The active storage volumes of the basin and lagoons are shown in **Table 1** below.

Table 1: Upgraded WWTP Lagoon Storage Volumes

Lagoon	Active Storage Volume
Flow equalisation basin	800 m^3
Covered anaerobic lagoon	5,000 m^3

Lagoon	Active Storage Volume
SBR lagoon	6,000 m^3

Both the covered anaerobic lagoon and the SBR lagoon are lined and covered in High Density Polyethylene ("**HDPE**"). The flow equalisation basin was an existing effluent holding pond that was repurposed.

The design of the upgraded WWTP which included the relevant ponds was overseen by suitably qualified and experienced Chartered Professional Engineers (Daniel Garden, PDP, Chartered Professional Engineer 1018789, and Azam Khan, PDP, Chartered Professional Engineer 194400).

Please refer to the June AEE for a full description of the current Morton Mains Plant activities, product processing, wastewater treatment process / WWTP and land discharge treatment system.

3. ENVIRONMENTAL SETTING

The site is located at 729 Woodlands-Morton Mains Road, Morton Mains, Southland, and legally described as Lot 1 DP 595. The site is owned by BSM.

Table 2: Site Details

Address	Legal Description	Title Reference
729 Woodlands-Morton Mains Road	Lot 1 DP 595	SL9C/43

A detailed summary of the environmental setting of the Site and the surrounding area is provided within the June AEE. However, a summary of the environmental setting as it relates to the existing basin and lagoons is provided below.

- The Site is located 25 km north-east of the Invercargill City centre at 729 Woodlands-Morton Mains Road, Southland.
- The Site is bounded by Woodlands-Morton Mains Road to the southeast and farmland on all other sides. The site area immediately surrounding the Plant is agricultural land owned by BSM, with the land use surrounding the Site predominantly in pasture. The processing plant and WWTP are generally hidden from view from neighbouring properties and from Woodlands-Morton Mains Road by existing mature trees.

- The topography of the site is flat to gently undulating, and gently graded towards the tributaries which pass through the Site. The overall grading is towards the south-eastern corner of the Site.
- The Site is underlain by a shallow, unconfined aquifer which is formally classified as part of the Waihopai Groundwater Management Zone, along with a deeper confined aquifer (which at depth is interbedded with Gore Lignite Measures – as discussed below). Across the Site, the shallow aquifer is approximately 10 m thick and made up of sandy gravels within a matrix of weathered clays. Recent monitoring on the Site has shown the depth to shallow groundwater as between 0.7 and 3.2 m. This depth to groundwater at the Site is shallower than the typically reported depth across the oxidising zone in Southland (between 5 and 10 m). The shallow groundwater on the Site generally flows to the southwest.
- The underlying Site geology consists of Middle Pleistocene (Quarternary) river deposits from the ancestral Mataura River, comprised of gravel, sand, silt and clay. The zone below the unconfined aquifer consists of a thick sequence of Gore Lignite Measures of the East Southland Group, which are comprised of deeper lenses of sandy and gravelly strata interbedded within thick sequences of siltstone / mudstone and other fine grained / low permeability strata. The lignite measure deposits are underlain by sand and shell bed deposits of the Chatton Formation.

4. PLANNING REQUIREMENTS

As discussed in Section 1 of this document, the use of land for the maintenance and use of non-agricultural effluent storage facilities and ancillary structures (the flow equalisation basin, SBR lagoon and covered anaerobic lagoon) requires resource consent under the pSWLP.

Rule 32C(a) provides for the construction, maintenance and use of *new* non-agricultural effluent storage facilities as a restricted discretionary activity provided that a number of conditions are met.

The proposed continued use of the existing basin and lagoons as part of the upgraded WWTP will meet these conditions, therefore resource consent is required as a **restricted discretionary** activity in accordance with Rule 32C(a) of the pSWLP.

The relevant matters of discretion under Rule 32C(a) include:

- The design of the new non-agricultural effluent storage facility and ancillary structures, including its storage capacity, the nature of effluent it will store, and the anticipated life of the storage facility;
- Methods to be used to protect the effluent storage facility embankments from damage by animals and machinery;

- The potential adverse effects of the maintenance and use of the effluent storage facility on: lakes, rivers, artificial watercourses, modified watercourses, natural wetlands, installed subsurface drains, groundwater, bores, registered drinking-water supplies, the coastal marine area, stop banks, residential dwellings, places of assembly and urban areas;
- The distance of the effluent storage facility from landholding or road boundaries;
- The height of the effluent storage facility's embankments and placement and orientation of the effluent storage facility relative to flood flows and stormwater runoff; and
- The quality of, and compliance with, the operational management plan.

5. ASSESSMENT OF ENVIRONMENTAL EFFECTS

As discussed in Section 1 of this document, BSM applied to Environment Southland for resource consent in 2018 to construct substantial upgrades to their on-site wastewater treatment facility, with the upgrades constructed in 2019 and commissioned in January 2020. To support this application for consent, PDP prepared a technical assessment titled "Assessment of Environmental Effects Technical Report – New Wastewater Treatment Plant for Blue Sky Meats, Morton Mains" dated December 2018 (the "**PDP Proposed WWTP Assessment**"). Refer to **Appendix E** of the June AEE for a copy of this report.

As discussed in Section 1, BSM propose to continue to use the flow equalisation basin, the SBR lagoon and covered anaerobic lagoon to store and treat non-agricultural effluent as part of the WWTP.

The PDP Proposed WWTP Assessment provided a detailed description of the flow equalisation basin, wastewater lagoons and WWTP, and an assessment of effects from the construction, maintenance and use of the basin and lagoons (i.e., non-agricultural effluent storage ponds). This assessment concluded that the continued use of land for the wastewater basin and lagoons within the upgraded WWTP will not have any adverse effects, noting that:

- The ponds have been designed, constructed and appropriately located and in accordance with best practice;
- The effluent system is maintained and operated in accordance with best practice guidelines and a comprehensive operational management plan;
- A robust leak detection system has been installed to proactively identify any unexpected issues;
- The WWTP facilities are set back an appropriate distance from sensitive receptors and the road boundary;

- The WWTP is appropriately placed relative to flood flows and stormwater runoff and the embankments of the wastewater lagoons will not be overtopped;
- No effects are expected on other groundwater users; and
- The discharge of untreated effluent to water will be avoided.

The PDP Proposed WWTP Assessment also stated that whilst the upgraded WWTP is located adjacent to an existing farm drain, it is removed from the main floodplain of the Waihopai River and its tributaries. The drain invert is approximately 2 – 3 m below the ground level in the location of the WWTP. Flooding of this drain, should it occur, is unlikely to reach the WWTP. Furthermore, it is not expected that floodwater would overtop the lagoon embankments even in severe flood conditions as they are approximately 2.5 – 3.0 m above the surrounding ground level. Additionally, the lagoons do not divert an existing floodway or overlay flow path.

PDP have reviewed the PDP Proposed WWTP Assessment for this resource consent application and provided an updated letter report / assessment to support this application for consent, titled "Blue Sky Meats Ltd Wastewater Treatment Plant Land Use Consents", dated July 2022 (the **"PDP Land Use Consents Letter**") (refer to **Appendix B** of this application). The PDP Land Use Consents Letter confirms that the Proposed WWTP Assessment is still relevant, and in addition to the assessment provided above, notes the following items of relevance:

- The MCC building (ancillary structure) structural design producer statement 1 (PS1) was issued by Roger Twiname (CPEng ID No. 71526). As stated in the PDP Proposed WWTP Assessment, the design of the upgraded WWTP was overseen by suitably qualified and experienced Chartered Professional Engineers (Daniel Garden, PDP, Chartered Professional Engineer 1018789, and Azam Khan, PDP, Chartered Professional Engineer 194400);
- The design life of the infrastructure complies with the New Zealand Building Code B2 Durability;
- The design life of the lagoon HDPE liner is approximately 20 years, at which time these should be replaced. The leak detection system and monitoring procedures are in place to identify leaks from the lagoons (should they occur), and if a leak is detected, the lagoon can be emptied to the irrigation storage lagoon;
- The "Blue Sky Pastures – Wastewater Treatment Plant Operation and Maintenance Manual" (attached as **Appendix C** to this application) was last reviewed on 16 March 2022, with the only updates to personnel contact details; and
- The WWTP ponds are protected from potential damage through:
    - Full perimeter fencing with deer netting to prevent unauthorised access by people and animals that could potentially damage the embankments;

- Vegetation types near the embankment being limited to shallow rooting pasture to ensure roots cannot cause damage to the embankment structure or lining; and
- The provision of a designated gravel paving area for vehicle traffic (required for typical maintenance operations) on the embankments to prevent them from vehicle damage.

Overall, PDP conclude that the previously prepared PDP Proposed WWTP Assessment is consistent with what has been built on the site and is still relevant to the current application and that the continued maintenance and use of the non-agricultural effluent storage ponds associated with the upgraded WWTP will have no adverse effects.

6. MITIGATION, MANAGEMENT AND MONITORING OF ACTUAL AND POTENTIAL EFFECTS

The following monitoring is proposed to ensure that the continued use of the lagoons will not have any adverse effects on the surrounding water quality:

- Visually inspect each pond for signs of erosion or slumping of the embankment; and
- Operate the ponds in accordance with an Operational Management Plan.

7. STATUTORY ASSESSMENT

7.1 SECTION 104

Section 104 of the Resource Management Act 1991 ("**RMA**") lists the matters a consent authority must have regard to when determining whether a resource consent should be granted. Those matters relevant to this consent application are considered below.

Potential effects of the continued use of the basin and lagoons as part of the WWTP are considered in Section 5 above and in the June AEE, and BSM are not proposing any measures to ensure positive effects to offset or compensate for adverse environmental effects (sections 104(1)(a) and 104(1)(ab)).

In terms of section 104(1)(b) of the RMA, the following sub-sections provide an assessment of this application for resource consent is provided against the:

- The Southland Regional Policy Statement ("**RPS**");
- The National Policy Statement for Freshwater Management 2020 ("**NPS-FM**"); and
- The Proposed Southland Water and Land Plan ("**pSWLP**").

7.1.1 The Southland Regional Policy Statement

The relevant provisions of the RPS relate to tangata whenua and water quality. These are considered below.

With regard to tangata whenua, BSM has, and will continue to consult with Te Ao Marama on how the proposed renewal of resource consents at the Plant (including the ongoing use of the basin and lagoons as part of the WWTP) may adversely affect mana whenua values, and how any adverse effects can be avoided, remedied or mitigated.

Furthermore, as discussed throughout the June AEE, BSM has made significant upgrades to the WWTP. This has resulted in significant improvements to health of the Site, and it is expected that this will extend to the wider ecosystem with time. The ongoing use of the basin and lagoons are critical to the continued operation of the WWTP, and therefore the significant improvements to the health of the Site and wider ecosystem.

With regard to water quality, the June AEE and the accompanying technical assessments detailed the improvements made by BSM through the upgraded WWTP, including the substantial removal of organic matter (including fats, oils and greases) and nitrogen from the treated wastewater discharged from the Site. The basin and lagoons are a critical component of the WWTP and without the continued use of the basin and lagoons, these improvements will not be able to be continued to be realised.

Furthermore, the continued use of the basin and lagoons enables the discharge of treated wastewater to land which is preferable to discharges to water.

7.1.2 The National Policy Statement for Freshwater Management 2020

The fundamental concept of the NPSFM encompasses Te Mana o te Wai, a concept that refers to the fundamental importance of water and recognises that protecting the health of freshwater will protect the health and wellbeing of the wider environment. The relevant policies of the NPS-FM for this application relate to tangata whenua and the protection of the health of freshwater.

With regard to tangata whenua, as discussed above, BSM has, and will continue to consult with Te Ao Marama on how the renewal of the consents at the Plant may adversely affect mana whenua values, and how any adverse effects can be avoided, remedied or mitigated.

Furthermore, PDP have concluded that the upgraded WWTP lagoons are of sound design and construction, that various measures are in place to protect the lagoons from damage and that the site has procedures in place to monitor the lagoon for any failure. This will ensure that the lagoons will not have any adverse effects on freshwater.

7.1.3 The Proposed Southland Water and Land Plan

There are no provisions in the pSWLP which directly address the use of land for a non-agricultural effluent pond. However, for completeness, it is noted that the storage ponds sit comfortably with the policy direction included in the pSWLP for 'agricultural effluent ponds' noting that:

- The existing ponds associated with the upgraded WWTP are located appropriately and have been designed and constructed in accordance with best practice;
- The effluent system will be maintained and operated in accordance with the best practice guidelines; and
- The discharge of untreated effluent to water will be avoided.

7.2 PART 2

With regard to Part 2 matters, overall, the proposal is considered to satisfy Part 2 of the RMA and promote the sustainable management of natural and physical resources. The Plant provides employment for 350 staff and provides direct economic benefit to the regional economy through the payment of wages and salaries, and spends an estimated $87.5 million per annum in the Southland region on goods and services (including livestock). The BSM Plant is reliant on being able to operate under the consent sought by this application in conjunction with the other consents sought in the June AEE. Not granting the resource consent as sought would place the ongoing operation of the Plant in question.

Furthermore, the improvements in the quality of the discharges to land as a result of the upgraded WWTP, which the existing basin and lagoons are a critical component of, will also contribute to a long-term improvement in the life-supporting capacity of the air, water, soils and ecosystems.

8. CONCLUSION

BSM are apply for resource consent for the continued maintenance and use of the three existing non-agricultural effluent storage ponds / facilities and ancillary structures for the treatment and storage of meatworks effluent as part of the Morton Mains Plant.

These storage ponds consist of the flow equalisation basin, covered anaerobic lagoon and SBR lagoon as part of the WWTP on the Site, and are necessary for the continued treatment of wastewater from the Plant operations.

The continued maintenance and use of the existing basin and lagoons requires resource consent for a **restricted discretionary activity** in accordance with Rule 32C(a) of the pSWLP.

The potential adverse effects have been assessed in accordance with section 104(1)(a) of the RMA and it is considered that there will be no adverse effect associated with the ongoing use and maintenance of the existing basin and lagoons. The relevant objectives and policies have been considered in accordance with section 104(1)(b) of the RMA, and the continued maintenance and use of the basin and lagoons is assessed as being consistent with these.

It is considered that the continued maintenance and use of the basin and lagoons is consistent with the purpose of the RMA, and that there is no reason that the renewal of the resource consent sought by BSM should not be granted.

APPENDIX A

Record of Title

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **SL9C/43**
Land Registration District **Southland**
Date Issued 20 April 1990

Prior References
SL9A/524 SLB1/977

Estate Fee Simple
Area 78.7049 hectares more or less
Legal Description Lot 1 Deposited Plan 595 and Part Lot 7-8 Deposited Plan 159

Registered Owners
Blue Sky Meats (N.Z.) Limited

Interests

159846.1 Fencing Covenant

Subject to Section 308 (4)(5) Local Government Act 1974

158702.8 Transfer creating the following easements

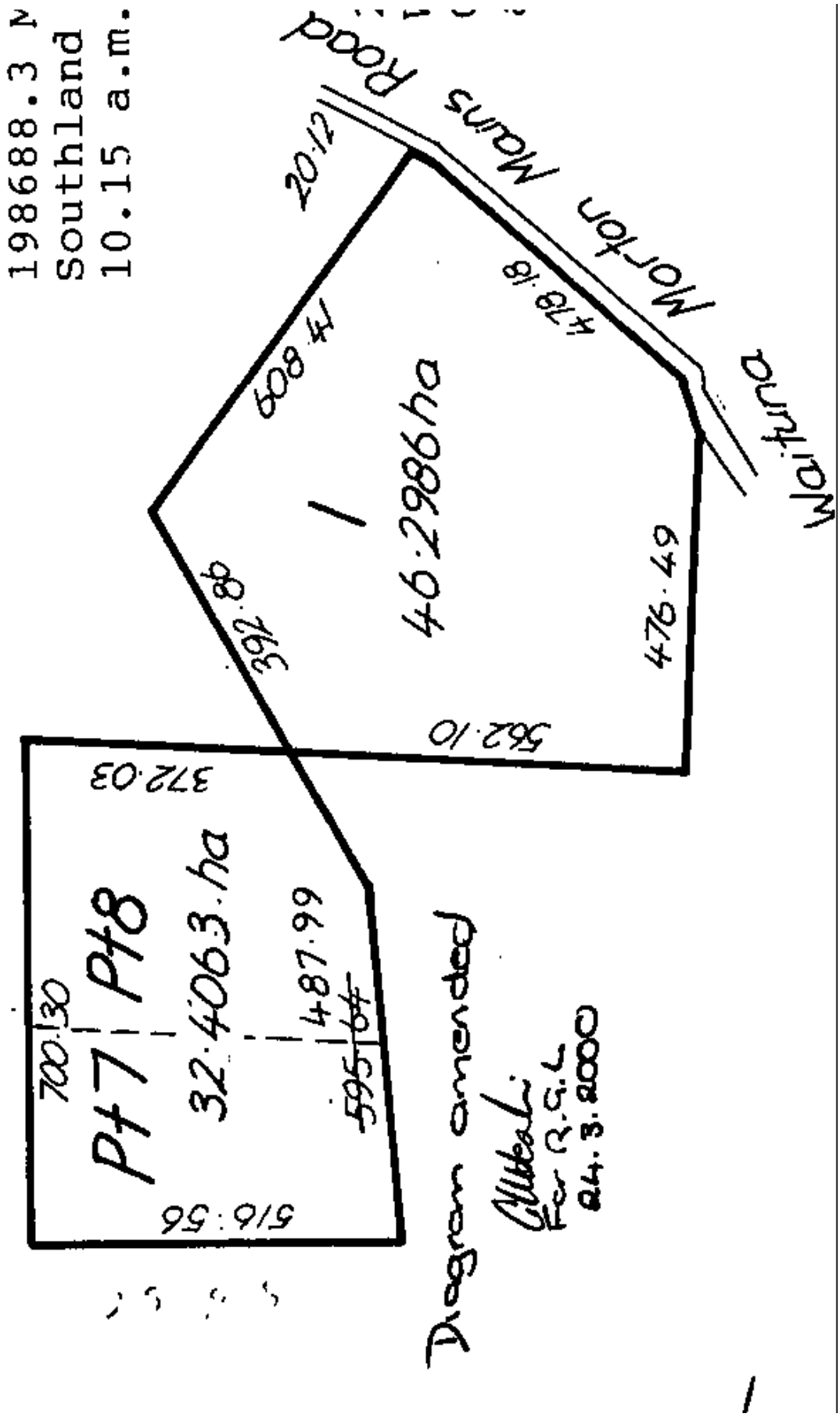
Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Right of way	Lot 9 Deposited Plan 159 - CT SLA4/1013	A Transfer 158702.8	Part Lot 7-8 Deposited Plan 159 - herein	

173786.1 Easement Certificate specifying the following easements

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Right of way	Lot 1 Deposited Plan 12194 - CT SL9C/42	A DP 12194	Lot 1 Deposited Plan 595 and Part Lot 7-8 Deposited Plan 159 - herein	

203807.2 Mortgage to (now) Westpac New Zealand Limited - 19.11.1992 at 11.16 am

11669070.3 Variation of Mortgage 203807.2 - 24.4.2020 at 2:38 pm


198688.3 N
Southland
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Road
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Waihuna
46.2986ha
392.88
476.49
562.10
372.03
P47
P48
32.4063.ha
487.99
700.30
516.56
Diagram amended
For R.S.L.
24.3.2000

B

APPENDIX B

Blue Sky Meats Ltd Wastewater Treatment Plant Land Use Consents letter

PATTLE DELAMORE PARTNERS LTD
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235 Broadway, Newmarket, Auckland 1023
PO Box 9528, Auckland 1149, New Zealand

Office +64 9 **523 6900**
Web **www.pdp.co.nz**
Auckland Tauranga Hamilton Wellington
Christchurch Invercargill

solutions for your environment

11 July 2022

Consents Processing Officer
Environment Southland
Corner of North Road and Price Street
Waikiwi
INVERCARGILL 9810

To whom it may concern,

BLUE SKY MEATS (N.Z.) LTD WASTEWATER TREATMENT PLANT LAND USE CONSENTS

1.0 Introduction

This letter report has been prepared on behalf of Blue Sky Meats (N.Z.) Ltd (trading as Blue Sky Pastures (BSP)) by Pattle Delamore Partners Ltd (PDP) to support renewal of land use consent AUTH2018937-01 associated with the onsite wastewater treatment plant (WWTP) at BSP's Morton Mains sheep and lamb processing facility.

Environment Southland indicated via email correspondence (Ryan Hodgson, 6 July 2022) that the above activities requires additional consent under Rule 32(c):

"Construction, maintenance, and use of new non-agricultural effluent storage facilities – being the three ponds associated with the wastewater treatment plant as outlined in the application."

This was not included in the resource consent renewal applications submitted on the 30 June 2022 as the lagoons in question are existing (i.e., not new).

PDP prepared Technical Report No. A03220201R001, dated 13 December 2018 and attached to this letter to support the 2018 resource consent applications to Environment Southland for the above consents. The original Assessment of Environmental Effects (AEE) report remains valid, and the purpose of this letter report is to supplement the previous Technical AEE report and provide updates where applicable for the purpose of reconsenting.

2.0 Background

In 2019, BSP upgraded their onsite WWTP to include two new lagoon based treatment processes:

- A Covered Anaerobic Lagoon (CAL); and
- A Sequencing Batch Reactor (SBR).

These lagoons are additional to a pre-existing irrigation storage lagoon, and a re-purposed flow equalisation basin.

The anaerobic lagoon provides substantial removal of organic matter (including fats, oils, and greases) through settling out solids and breaking down organic matter via anaerobic autotrophic bacteria. The main by-product of anaerobic decomposition is biogas, mainly CH_4 and CO_2, which is collected by gas collection pipework under the cover and combusted via a flare. The SBR is an aerated lagoon which uses aerobic heterotrophic bacteria (activated sludge) to reduce contaminants in the wastewater, particularly BOD and nitrogen together with some phosphorus reduction. The addition of these systems in 2019 provided substantial improvement to the performance and environmental sustainability of BSP's existing discharge to land.

3.0 Description of Activity

As described in the background section, BSP have four (4) onsite WWTP lagoons that hold process wastewater at various stages of treatment including:

- Flow equalisation basin, which receives primary screened wastewater.
- Anaerobic biological treatment lagoon, which will contain partially treated anaerobic process wastewater, settleable anaerobic sludge and may at times have a floatable fat based sludge layer.
- Sequencing batch reactor lagoon, which will contain partially treated to treated process wastewater (depending on the stage of the process) and activated sludge.
- Irrigation lagoon, which will contain treated process wastewater.

The dimensions, embankment slopes etc for the lagoons are best described by Appendix A of the attached Technical AEE (Technical Report No. A03220201R001, dated 13 December 2018).

4.0 Updates to the Existing AEE

The previously prepared AEE (Technical Report No. A03220201R001, dated 13 December 2018) is still relevant. In addition to the information provided in the document, please note the following additional information and clarifications:

- The MCC building (ancillary structure) structural design producer statement 1 (PS1) was issued by Roger Twiname (CPEng ID No. 71526). As stated in the previous AEE, the design of the upgraded WWTP was overseen by suitably qualified and experienced Chartered Professional Engineers (Daniel Garden, PDP, Chartered Professional Engineer 1018789, and Azam Khan, PDP, Chartered Professional Engineer 194400). We maintain that the structural integrity of the lagoon structures continue to be maintained at acceptable levels.
- Design life of the WWTP upgrades complies with the New Zealand Building Code B2 Durability i.e., greater than 50 years on all structural building elements, difficult to replace elements, and difficult to detect failure elements.
- The design life of the lagoon HDPE liner is approximately 20 years, at which time these should be replaced. The leak detection system and monitoring procedures are in place to identify leaks from the lagoons should these occur. The site can take advantage of shut-down periods, and resiliency provided by the irrigation storage lagoon to empty any lagoon if a leak is detected.
- The WWTP lagoons are protected from damage in the following ways:
  - They are fully fenced with deer netting to prevent unauthorised access by people and animals that could potentially cause damage.
  - Vegetation types on or near the embankments are limited to shallow rooting pasture, so that roots cannot cause damage to the embankment structure or lining.

  - The embankments have designated gravel pavement areas for vehicle trafficking required as a part of typical maintenance operations. Therefore, they are protected from damage by vehicles.

  Refer to Figure 2 for more detail.

- The Blue Sky Pastures – Wastewater Treatment Plant Operation and Maintenance Manual was last reviewed on the 16 March 2022. Updates were required to personnel contact details only.

Figure 1: Photograph taken June 2029 showing Animal Fencing and Maintenance Vehicle Access

In general, the upgraded WWTP lagoons are of sound design and construction. There are measures in place to protect the lagoons from damage by vehicles, stock, and tree roots. In addition, the site has procedures in place to monitor the lagoon for any failure.

5.0 Maintenance Requirements for the Lagoon Structures

There are no specific requirements to monitor the lagoon other than visual observations of any erosion or slumping of the embankment.

6.0 Summary

In conclusion, the previously prepared 2018 Technical AEE is consistent with what has been built on site and is still relevant to the current application. For completeness, further detail on the WWTP lagoon design life, protection for damage and site operations and maintenance procedures on site is provided in this letter report.

It is our opinion that continued maintenance and use of the non-agricultural effluent storage ponds associated with the WWTP will have no adverse effects.

7.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Blue Sky Meats Ltd and others (not directly contracted by PDP for the work), including Hill Laboratories and Mitchell Daysh. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Blue Sky Pastures Ltd for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

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Appendix A: 2018 Operational Consents Application Technical Documents

1. PDP Technical Report No. A03220201R001 (dated 13 December 2018) and titled 'Assessment of Environmental Effects Technical Report - New Wastewater Treatment Plant for Blue Sky Meats, Morton Mains'.
2. PDP Letter Report No. A03220201L001 (dated 15 January 2019) and titled 'RESPONSE TO SECTION 92 REQUEST FOR ADDITIONAL INFORMATION: RESOURCE CONSENT APPLICATION – 2018/53297. REFERENCE 360/10/18/297 KELWYN OSBORN'.

Auckland Tauranga Wellington Christchurch

PATTLE DELAMORE PARTNERS LTD

Assessment of Environmental Effects Technical Report – New Wastewater Treatment Plant for Blue Sky Meats, Morton Mains

Blue Sky Meats (N.Z.) Limited

Assessment of Environmental Effects Technical Report - New Wastewater Treatment Plant for Blue Sky Meats, Morton Mains

Prepared for

Blue Sky Meats (N.Z.) Ltd

December 2018

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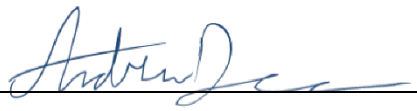
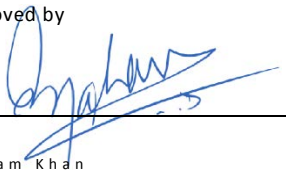
SIGNATURE 

Andrew Dean

Reviewed and approved by

SIGNATURE 

Azam Khan

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1.0 Introduction

Blue Sky Meats (N.Z.) Ltd (Blue Sky Meats) own and operate a lamb & sheep processing and an ancillary meat rendering plant at Morton Mains, Southland.

Pattle Delamore Partners Ltd (PDP) has been engaged by Blue Sky Meats to undertake detailed design of a new wastewater treatment plant (WWTP) for the Morton Mains plant. The contract for construction of the new WWTP will be tendered during December 2018 and early-2019.

New resource consents, certificates of compliance, or variations to existing resource consents held by Blue Sky Meats, are required from Environment Southland and Southland District Council (SDC) for discharge and land use activities associated with the new WWTP.

The purpose of this Assessment of Environmental Effects (AEE) technical report is to support resource consent applications to Environment Southland and Southland District Council associated with discharge and land use activities.

1.1 Background

Blue Sky Meats processes up to 5,000 lambs and sheep per day at their Morton Mains plant. The site also undertakes rendering for meat, blood & bone meal and tallow.

Wastewater from the primary slaughterhouse is presently screened before being transferred to a holding pond and combined with untreated wastewater from the rendering plant. Wastewater from the holding pond is transferred into an irrigation storage lagoon which is aerated for storage purposes, however is not necessarily biologically treated. From the aerated irrigation storage lagoon wastewater is irrigated onto pastoral farm land operated as a “zero grazed” system (cut and carry only) under Environment Southland Resource Consent No. 201191.

Managing the nitrogen load presently applied to the irrigation area is constraining the site’s rendering plant operation. An improved wastewater treatment system is required to allow the plant to operate at full capacity, and to reduce nitrogen loading to the irrigation disposal system.

Construction of the new WWTP will involve modifying and building on existing infrastructure to develop a full biological nitrogen removal treatment system. This will include a covered anaerobic treatment lagoon and activated sludge plant operated as a sequencing batch reactor (SBR).

Relevant drawings showing general arrangements of the proposed new WWTP are attached to this report as Appendix A. The general layout of the Blue Sky Meats Site, and of the proposed new WWTP system is shown in Drawings D001 and D002, Appendix A.

2.0 Description of the Environment

2.1 Site Description

The site is located at 729 Woodlands-Morton Mains Rd, Morton Mains, Southland within the land parcel legally described as Lot 1 DP595 owned by Blue Sky Meats (N.Z.) Limited.

The site is presently zoned Rural under the Southland District Plan.

The proposed WWTP will be located adjacent to the existing aerated irrigation storage pond as shown on Drawing D001, Appendix A. The proposed WWTP site is presently stockyards associated with the processing plant and grazing land.

The Blue Sky Meats site is bounded by Woodlands-Morton Mains Road to the south east (approximately 200 m from the proposed WWTP site) and farmland on all other sides. The nearest sensitive receptor (dwelling) to the Blue Sky Meats site is approximately 500 m to the south east. The processing plant and the proposed location of the new WWTP are generally hidden from view from neighbouring properties and from Woodlands-Morton Mains Road by existing mature trees.

The proposed WWTP site slopes in a general north east direction towards the drain shown on Drawing D001, Appendix A. Stormwater runoff from the wider Blue Sky Meats site is also directed to this agricultural drain (PDP site inspection, August 2018), which eventually flows to an unnamed tributary of the Waihopai River.

2.2 Site Geology and Geotechnical Investigation

The GNS Science New Zealand Geology Web Map describes the geology of the site as weathered gravel, sand, silt and mud of alluvial and colluvial origin.

As part of the detailed design phase, four geotechnical test pits were excavated in the location of the proposed WWTP in August 2018. The test pits were excavated to a maximum depth of 3.7 m below ground level (bgl), and encountered ground conditions generally consistent with the GNS geological description. The near surface soil profile encountered in the four test pits is summarised in Table 1.

Table 1: Near Surface Soil Profile	
Depth (m bgl)	**Geological Description**
0 – 0.2 m	Topsoil, Dark brown, loosely packed and friable, dry, slightly plastic.
0.2 – 1.3 to 2.4 m	Silty Clay, light brown, firm, moist, plastic, bedded, alluvial silt/clay.
1.3 to 2.4 – 3.1 to 3.7 m	Gravel in a matrix of light grey to light brown becoming orange brown below 2.5 m silt and clay, dense, slightly plastic, wet. Gravels are sub rounded to rounded, Alluvial gravels.

Notes:

1. *Geotechnical information sourced from email from Gerald Strayton (PDP Technical Director – Geotechnics) to Josh Lotter (PDP Environmental Engineer) dated 28 August 2018.*

In one test pit the gravel layer was not present and a silty sand, white streaked yellow, medium dense and bedded was present to the base of the excavation at 3.7 m bgl.

No fill material was encountered in the four test pits excavated.

2.3 Surface Water

The site is located within the Waihopai River catchment. The Waihopai River drains a north east to south west aligned catchment of approximately 250 km² between the Edendale terrace (lower Mataura Valley), and Invercargill. Only the lower catchment is urbanised where the Waihopai River discharges to the New River Estuary at Invercargill. The primary catchment land use is agricultural land, with the catchment classified under the Land Air Water Aotearoa (LAWA) online database as predominantly 'lowland pastoral farmland'.

Stormwater from the Blue Sky Meats site is presently discharged via the existing surface drain to the north east of the site shown on Drawing D001, Appendix A as a permitted activity. This drain flows on a general north west alignment before turning to the south west and flowing into an upper tributary of the Waihopai River to the south of Woodlands Morton Mains Road.

Water quality sampling is carried out in the lower Waihopai River upstream of Queens Drive, Invercargill where the river enters the urban area. Beacon Environment Southland online GIS and LAWA's online database report the following water quality states and trends for the Waihopai River at Queens Drive summarised in Table 2.

Table 2: Water Quality Summary Waihopai River at Queens Drive

Water Quality Indicator	5 Year Median Value	State Relative to Like Sites	Trend (10 year)
Bacteria – E. *coli*	330 MPN/100 mL	Worst 25% of like sites	Very likely improving
Clarity - Turbidity	3.4 NTU	Worst 50% of like sites	Not assessed
Nitrogen – Total Nitrogen	2.8 g/m³	Worst 25% of like sites	Very likely improving
Nitrogen – Ammonia Nitrogen	0.0165 g/m³	Worst 25% of like sites	Very likely improving
Phosphorus – Dissolved Reactive Phosphorus	0.009 g/m³	Best 50% of like sites	Very likely improving
Phosphorus – Total Phosphorus	0.028 g/m³	Worst 50% of like sites	Very likely improving

Notes:

1. *All data sourced from LAWA, 20 November 2018 (https://www.lawa.org.nz/explore-data/southland-region/river-quality/waihopai-stream/waihopai-river-us-queens-drive/).*

Further to Table 2, Environment Southland report that the Macroinvertebrate Community Index (MCI) for the Queens Drive monitoring site is 'Poor' (Beacon GIS, LAWA,).

2.4 Groundwater

Three out of four test pits described in Section 2.2 encountered groundwater seepage into the excavation at approximately 2 to 2.5 m bgl (August).

The Blue Sky Meats site is located within the Waihopai groundwater management zone under both the Southland Regional Water Plan (RWP) and the Proposed Southland Water and Land Plan (pSWLP). Environment Southland's Groundwater Zone Information Sheet includes general groundwater quality information for the Waihopai zone. Groundwater quality in this zone is influenced by nutrient enrichment, however generally remains within the limits set by the Drinking-water Standards for New Zealand 2005 (Revised 2008)[1].

The Waihopai groundwater catchment consists of a relatively thin (<30 m) layer of gravels overlying tertiary sediments (low permeability soils). Recharge to the Waihopai groundwater zone is exclusively from rainfall recharge estimated at 521 mm/year[1].

[1] Environment Southland's Groundwater Zone Information Sheet for the Waihopai zone

Numerous partially incised streams exist across the Waihopai groundwater zone, which forms the rolling topography. The major component of groundwater flow occurs to local rivers and streams. Surface water quality characteristics are therefore expected to reflect groundwater quality.

2.4.1 Nearby Groundwater Bores

Four well records exist at the Blue Sky Meats site associated with onsite water supply bores F46/0517, F46/0518, F46/0561, F46/1128. Details for wells F46/0561 and F46/1128 are available on Environment Southland's Beacon Online GIS. These wells were drilled to depths of 121.8 and 118 m bgl respectively, and are screened near the base. The initial water level readings in these wells were 29 and 26.4 m bgl respectively. As such, these bores are not expected to be influenced by changes in shallow groundwater levels.

There are no other production bores within 1.0 km of the site listed on Environment Southland's Beacon Online GIS. The nearest production bores to the proposed WWTP site, which also draw water from shallow groundwater, are domestic supply wells F46/0376 and F46/0874. These bores are located at Morton Mains approximately 1.2 km from the proposed WWTP site. An initial water level of 1.7 m bgl was recorded in F46/0874.

3.0 Proposed Works

3.1 WWTP System Description

The proposed WWTP is a biological treatment plant utilising both a covered anaerobic treatment lagoon and aerated treatment lagoon operated as a sequencing batch reactor.

The biological treatment plant is proposed to comprise of the following processes:

1. Screened wastewater from the primary slaughterhouse and untreated wastewater from the rendering plant will be discharged to the existing holding pond, which will be converted to a flow equalisation basin.
2. From the flow equalisation basin wastewater will be pumped into a new High Density Polyethylene (HDPE) lined and covered anaerobic lagoon with an active volume of 5,000 m^3 (active storage volume) allowing for biogas management through biogas flaring and a contingency biofilter. These components are shown on D005.
3. Partially treated wastewater from the covered anaerobic lagoon will flow via a gravity transfer into a 6,000 m^3 (active storage volume) HDPE lined aerobic lagoon operated as a sequencing batch reactor (SBR) and optimised for biological nitrogen removal (BNR). 230 kW of aeration in the SBR lagoon will allow for reduction of nitrogen to allow sustainable

land treatment. Further provision is made to increase aeration to 300 kW.

4. Treated wastewater will be discharged via a decant system to the existing irrigation storage lagoon, which may contain some level of mechanical aeration to ensure dissolved oxygen levels are maintained prior to land treatment.

The proposed system is shown in D005, Appendix A. Design of the WWTP has been overseen by suitably qualified and experienced Chartered Professional Engineers (Daniel Garden, PDP, Chartered Professional Engineer 1018789, and Azam Khan, PDP, Chartered Professional Engineer 194400).

3.2 Construction Works

Once consents are granted, Blue Sky Meats propose to carry out the works during early and mid-2019.

The primary components of the construction works (with respect to resource management) will involve:

- Bulk earthworks to form the wastewater lagoons through cut to fill (approximately 5,000 m^3).
- Construction of HDPE liners and HDPE cover on the anaerobic lagoon.
- Installation of a biogas management system including biogas flare unit and contingency biofilter.
- Groundwater dewatering and leak detection systems, as well as stormwater management systems.
- Installation of above and below ground pipelines, pumps, manholes, mechanical pipework, electrical and control systems including control building and other systems associated with operating the WWTP.

3.3 Leak Detection System

It is proposed to install a leak detection underdrainage system below the invert of the lagoons as shown on Drawing D007 and D114, Appendix A. The leak detection system will discharge to a manhole with a closed valve on the outlet.

Blue Sky Meats personnel will periodically inspect the manhole to check for leakage of wastewater. The leak detection system may from time to time intercept groundwater. If this occurs, Blue Sky Meats personnel will confirm that the water present is groundwater in accordance with the site Operation and Maintenance Manual (O&M manual; to be prepared by the Contractor as part of the contract works) and discharge the standing water to the stormwater system.

3.4 Groundwater Management

The seasonal high groundwater level at the construction site may be slightly above the proposed new lagoon invert level (Section 2.2 and Section 2.4). There is a risk that groundwater may be present to this level during construction, and could therefore impact on construction of the new wastewater lagoons.

Seasonal high groundwater is not expected to impact on operation of the WWTP when the lagoons are full.

An existing 160 mm outer diameter groundwater dewatering drain exists in the location of the proposed lagoons. Further 160 mm outer diameter land drains are proposed to be installed at the perimeter of the proposed new wastewater lagoons as shown in Drawing D007, Appendix A.

The proposed dewatering system will discharge to the surface drain to the north east of the existing irrigation lagoon. It is expected that the groundwater dewatering system will only intercept groundwater periodically.

If groundwater is encountered during construction, the contractor may increase the dewatering flowrate by pumping water out of the groundwater dewatering system. This water will be discharged in accordance with the site erosion and sediment control plan (Section 4.2.1) and the Environment Southland Builders Pocket Guide (Practical Advice on Managing Worksites and the Environment, 3rd Edition).

3.5 Stormwater Management

The primary new impervious area associated with the proposed WWTP is the new anaerobic lagoon. Stormwater runoff from the surrounding WWTP site will discharge to the surrounding pervious areas. Roof runoff from the MCC building (Drawing D002, Appendix A) will be discharged to the existing site stormwater system.

Rainfall on the anaerobic lagoon cover will be directed to a sump at the centre of the lagoon via preformed channels as shown on D007, Appendix A. From there, the stormwater will be pumped to MH1, and discharged to the surface drain to the north east of the site.

The stormwater from the anaerobic lagoon cover sump is expected to be pumped at a discharge flowrate of approximately 4.5 L/s. Based on a Rational Method estimate for the pre-developed wastewater lagoon area, this flowrate is less than the 2 year Average Recurrence Interval (ARI) 1 hour rainfall event runoff.

The discharge to the existing stormwater drain will be via a stabilised outlet.

Stormwater runoff from the HDPE cover is expected to contain low levels of stormwater contaminants, similar to roof runoff. The HDPE cover will be fully sealed, and therefore no wastewater, wastewater aerosols or sludge will be entrained in stormwater runoff from the HDPE cover.

3.6 Biogas Management

Biogas is a by-product of anaerobic digestion of wastewater containing organic matter. Biogas consists predominantly of methane (50-60%) and carbon dioxide (40-50%) but also contains very low levels of trace gases such as hydrogen, nitrogen and odour generating hydrogen sulphide. Other than hydrogen sulphide, small amounts of other odour generating compounds are also present.

The proposed covered anaerobic lagoon will have an air-tight gas collection system, which will discharge to a biogas flare to allow combustion of biogas and contingency biofilter treatment system to eliminate the potential environmental and nuisance effects associated with biogas.

3.6.1 Biogas Collection

On average, the biogas production rate from the anaerobic lagoon is estimated to be in the order of 4,500 N m^3/d. This is based on the design carbonaceous Biochemical Oxygen Demand ($cBOD_5$) loading from the processing plant. A peaking factor of 2 provides a conservative estimate for biogas generation during peak production conditions at Blue Sky Meats, corresponding to a peak biogas production rate from the proposed anaerobic lagoon in the order of 9,000 m^3/d.

Windsor Engineering Limited has prepared a preliminary design for the Blue Sky Meats biogas flare system on the basis of the biogas production rates calculated by PDP.

Provision is made in design for at least 1,000 m^3 storage of biogas under the HDPE floating cover at atmospheric pressure.

3.6.2 Biogas Treatment

Burning biogas through the flare system will significantly reduce greenhouse gas emissions from the site. Sulphurous compounds and other gases will be neutralized by the flaring process. The capture and combustion of gases from covered anaerobic lagoon is considered best practice.

Gas flaring will be utilised as the primary treatment system for the biogas. The captured gas is distributed through a collection pipe to the flare, via a fan, to be burnt off. The captured gas is not required to be pressurised or stored in the process.

The flare will operate on a pressure switch; when the pressure reaches the set point, the control valves will open and the flare will operate until pressure reduces below the lower pressure threshold. To minimise any ingress of oxygen from outside the pressure under the cover will not be allowed to reduce below atmospheric pressure.

The flare tip will be shielded to ensure that complete combustion occurs and to provide a wind shield to the naked flame. The flare unit will be maintained with continually cycling electrical auto-ignition unit (no pilot flame requirement).

Odour generating gases will be destroyed during combustion and therefore no objectionable odour will be discharged after the flare unit.

The contingency biofilter will provide for biogas biofiltration in the event the flare or the extraction blower is malfunctioning. A temperature sensor will be installed at the flare tip to identify if the flare is not operating. This will trigger an alarm (electronic notification to the plant operator) and biogas will be diverted to the contingency biofilter.

The design empty bed residence time (EBRT) for the biofilter is 500 seconds, which is a conservative design parameter. The biofilter media will be fine bark/compost overlying a drainage bed. This will be irrigated during extended periods of low rainfall to maintain suitable moisture content. The biofilter will be seeded with material from the existing rendering plant biofilter, and periodic manual diversion of biogas to the biofilter will maintain the required microbiological population in the biofilter media.

While the biofilter will reduce a limited amount of the methane in the biogas, it will reduce odorous hydrogen sulphide levels so that odour discharge will not cause nuisance effects, even during flare malfunction.

During biofilter operation, the odorous gases will be treated to the extent that any objectionable odour will be reduced to low levels at the biofilter.

All condensates (liquids condensing from the biogas stream) from the biogas prior to the flaring unit and the leachate from the biofilter underdrain will be collected and directed into the WWTP influent wastewater stream.

3.6.3 Anticipated Emissions from Flare and Biofilter

Anticipated air discharge volumes and constituents are outlined in Table 3.

Table 3: Anticipated Air Discharge Requirements

Parameter	Flaring	Biofilter
Peak flow rate (N m^3/d)	9,000	9,000
Average flow rate (N m^3/d)	4,500	4,500
Duration (days per year) – Nominal Estimate Only	360	5
Estimate of Bulk Air Discharge Constituents		
Carbon dioxide (and water vapour)	100%	40%-50%
Methane	0%	50%-60%

Notes:

1. *The biofilter is to be operated under contingency only and the discharges through the biofilter is given as maximum values under worst case.*
2. *Both the flare unit and biofilter are sized to handle 9,000 m^3/d of biogas.*

The biofilter emission characteristics will be similar to the biogas constituent, with the exception of hydrogen sulphide and other odour generating gases, which will be significantly reduced by the biofilter prior to discharge.

Carbon monoxide (CO) emissions may be expected as the flare temperature may not necessarily be above 850 °C at all times. Studies based on open landfill flares[2] suggest that carbon monoxide concentration in efficiently operated biogas flares is approximately 3 g/m^3 in exhaust gases.

3.7 Monitoring, Operation and Maintenance

Once operational, the treatment system will require regular monitoring and maintenance. A separate Operation and Maintenance Manual (O&M manual) will be prepared for the system. This O&M manual will include, but not be limited to:

- Health and safety considerations and requirements;
- A description of wastewater treatment system;
- System layout diagrams and drawings;
- Discharge details and criteria;
- Solids management and gas management system details;
- Stormwater and groundwater management system details;
- Process control;
- Operational limits;
- General operation and maintenance details;
- Pipework, pump and valve details;
- Asset resilience and maintenance procedures;
- Equipment schedules;
- Maintenance schedules;
- Contingency measures for pump failures, blockages, chemical spills and System Performance Problems.

3.7.1 Wastewater Solids Management

Microbial solids are a by-product of all wastewater treatment systems. Solids that accumulate in the wastewater treatment system will require periodic removal.

[2] DEP (2010). *Engineering Evaluation/Fact Sheet R13-2592B*, West Virginia Department of Environmental Protection, Division of Air Quality.

For the covered anaerobic lagoon solids accumulation will require a long term management plan (10 year plan or longer). If excavation and removal of anaerobic lagoon solids is required, any associated permits or consents will be sought as required.

Activated sludge from the SBR will be periodically pumped out and mixed with the treated wastewater stream to be irrigated to land under Environment Southland Resource Consent No. 201191. The resulting discharge will be consistent with the existing resource consent conditions.

4.0 Assessment of Environmental Effects

4.1 Positive Impacts

The proposed wastewater treatment plant will have significant environmental benefit by reducing the leachable nitrogen loading to the existing irrigation system. It will also reduce odour associated with the existing land treatment system.

4.2 Construction and Earthworks

The construction works have the potential to cause short-term adverse environmental effects. The following sections assess actual and potential effects on the environment associated with the proposed construction works.

4.2.1 Runoff

Prior to construction the contractor will prepare and give effect to an erosion and sediment control plan (ESCP) in accordance with the Environment Southland Builders Pocket Guide (Practical Advice on Managing Worksites and the Environment, 3rd Edition). The ESCP will include but not be limited to:

- silt fencing around any excavation areas which may generate sediment;
- mitigation of tracking of soil from trucks such as a wheel wash system;
- temporary runoff collection and decanting structures for containment of sediment laden stormwater runoff;
- covering of exposed earth surfaces as soon as is practicable to avoid erosion;
- monitoring of erosion and sediment control devices.

These measures are considered appropriate for the scale of the works and will ensure that sediment laden runoff is contained and or treated prior to discharge.

4.2.2 Vibration

Vibrating rollers and other standard vibro-compaction machinery may be utilised in the works. It is not expected that the short term use of this machinery will have any effect beyond the Blue Sky Meats site.

4.2.3 Construction Noise

Construction noise and hours of work associated with the proposed new WWTP will comply with Southland District Plan limits (Rule NSE.12).

4.2.4 Dust

There is potential for minor dust generation during the construction as the earthworks activity will be limited to excavation of in-situ material and deposition and compaction of material within the proximity of the cut area. Once the earthworks are completed there will be no potential for dust to occur, as all exposed areas will be either under synthetic liner or grassed.

The contractor will have a water cart and water supply available on-site for dust suppression as required. All exposed earth surfaces will be covered as soon as practicable to minimise dust generation potential.

4.2.5 Traffic

There will be some increased vehicle movements to the site during construction of the treatment facility, however once operational, traffic movements associated with ongoing management will be unaffected.

4.3 Discharges to Air and Odour

The collected biogas will destroyed by combustion (thermal oxidation) with the use of a flare system specifically designed for purpose. Thermal oxidation or destruction is considered one of the most effective techniques for odour control because it removes not only hydrogen sulphide but also methyl mercaptan and practically any other objectionable odorous gas that could be present in the biogas. Flaring essentially eliminates all odours.

The discharge of contaminants into the air from the proposed biogas flare system will be combustion by-products, namely carbon dioxide, small amounts of oxides of nitrogen and sulphide and water. There is generally no objectionable odour associated with the combustion of biogas.

A biofilter will also be constructed at the site as a contingency system. Biofilters are a widely accepted method for odour control and all odorous gases are expected to be removed to levels that are deemed no longer objectionable at the site boundaries.

The proposed biogas collection and flaring system has been designed to ensure that the discharge will not result in an objectionable odour effect at or beyond the boundary of the subject property.

From the SBR lagoon, the discharges to air will be carbon dioxide and this presents no odour risk.

Spray drift resulting from the aerator operation in the SBR lagoon will be negligible. The spray zone will be limited to just above the water surface around the aerators in the SBR. The aerators will be located in the middle of the SBR with no potential for aerosols forming to the extent beyond the initial spray zone and the spray drift to occur beyond the edge of the SBR.

Once the WWTP is constructed the irrigation storage lagoon will hold biologically treated wastewater with low BOD_5. It is therefore unlikely that anaerobic conditions would develop, and no perceivable odour discharge is expected from the irrigation storage lagoon.

4.4 Noise

The aerated lagoon will produce minor noise through the use of the aerators. Noise levels at the outer batter of slope are expected to be less than 45 dBA.

4.5 Effects on Groundwater

4.5.1 Groundwater Quantity

The proposed dewatering system will draw the localised groundwater level down by a maximum of approximately 1 - 1.5 m (based on the estimated high groundwater level outlined in Section 2.4). The zone of influence of the groundwater dewatering system is expected to be limited to the immediate area of the WWTP, in the order of 20 m beyond the perimeter of the dewatering drains.

No effects are expected on other groundwater users, as the drawdown effect will be localised, and nearby production bores generally draw water from deeper aquifers (Section 2.4).

4.5.2 Groundwater Quality

The proposed wastewater lagoons will be lined with a 1.5 mm thickness HDPE liner. The liner material will be subject to a manufacturer's guarantee of 20 years minimum design life applicable to water holding applications and use for wastewater containment.

A leak detection system will be installed and monitored to provide first warning of any leakage which may occur in accordance with the site O&M manual.

This containment system is at least equivalent to the industry standard level of groundwater protection for a WWTP of this type and groundwater environment.

4.6 Effects on Surface Water

4.6.1 Groundwater Dewatering

As outlined in Section 2.4, the water quality in the Waihopai River system is expected to reflect shallow groundwater quality, and as such it is not expected that the discharge of groundwater from the proposed groundwater dewatering system will affect surface water quality.

The estimated dewatering flowrate of approximately 1 – 6 L/s (based on nominal aquifer parameters determined from a visual assessment of the site soils) is expected to augment base flows in the surface water system and may provide some ecological enhancement.

4.6.2 Stormwater Discharge

Stormwater discharged to surface water from the aerated lagoon cover is expected to have similar water quality characteristics as roof water runoff, and will contain low levels of typical stormwater contaminants.

Stormwater runoff from gravel, slabs and other surrounding areas of the WWTP is expected to have similar characteristics to runoff from the wider Blue Sky Meats site. There will be no direct pathways for wastewater contamination to occur in routine stormwater discharges. All air valves will be fitted with tubing to direct leakage back into the WWTP.

Any hazardous substances stored at the WWTP site will be contained or kept indoors in accordance with Blue Sky Meats protocol.

Stormwater will be discharged via pumping at a flowrate of approximately 4.5 L/s. This flowrate is expected to be less than the 2 year Average Recurrence Interval (ARI) 1 hour rainfall event runoff for the existing site area.

4.6.3 Wastewater Storage

The crest of the proposed SBR and Anaerobic Lagoon embankments will be approximately 2.5 to 3.0 m above the surrounding ground level (Drawing D002, Appendix A). The WWTP site is located adjacent to an existing farm drain; however is removed from the main floodplain of the Waihopai River and its tributaries. The drain invert is approximately 2-3 m below the ground level in the location of the proposed WWTP. Flooding of this drain, should it occur, is unlikely to reach the WWTP site. It is not expected that floodwater would overtop the lagoon embankments even in severe flood conditions.

The proposed lagoons will not divert any existing floodway or overland flow path.

4.7 Cultural and Archaeological Values

There are no anticipated issues associated with cultural and archaeological values. However, should any archaeological remains be uncovered during the minor excavation works proposed, all work will cease in the vicinity of the discovery and the New Zealand Historic Places Trust (NZHPT) will be contacted so that the appropriate action can be taken before any work continues.

5.0 Mitigation Measures

Adverse effects on the receiving environment associated with the proposal are being minimised and/or eliminated by the following mitigation measures:

i. Use of wastewater treatment technology that will reduce solids, organic and nitrogen loadings discharged to land via irrigation;

ii. Reduction of greenhouse gas emissions by controlled collection and combustion of biogas;

iii. Ensuring a contained physical extent for the wastewater treatment plant, including a site which avoids any negative visual, noise and aesthetic impacts and having the levels generally present prior to development of the wastewater treatment plant;

iv. Significantly reducing the potential for groundwater contamination with the use of a HDPE liner;

v. Minimising and/or controlling any discharges of silt and stormwater run-off during construction;

vi. Eliminating the potential for objectionable odour by collecting all gases generated from the anaerobic treatment facility and controlled thermal destruction of all gases.

vii. Mitigation of potential fugitive dust occurring during construction by applying water or covering exposed earth surfaces.

viii. Restriction of work hours and maintaining acceptable levels of construction noise.

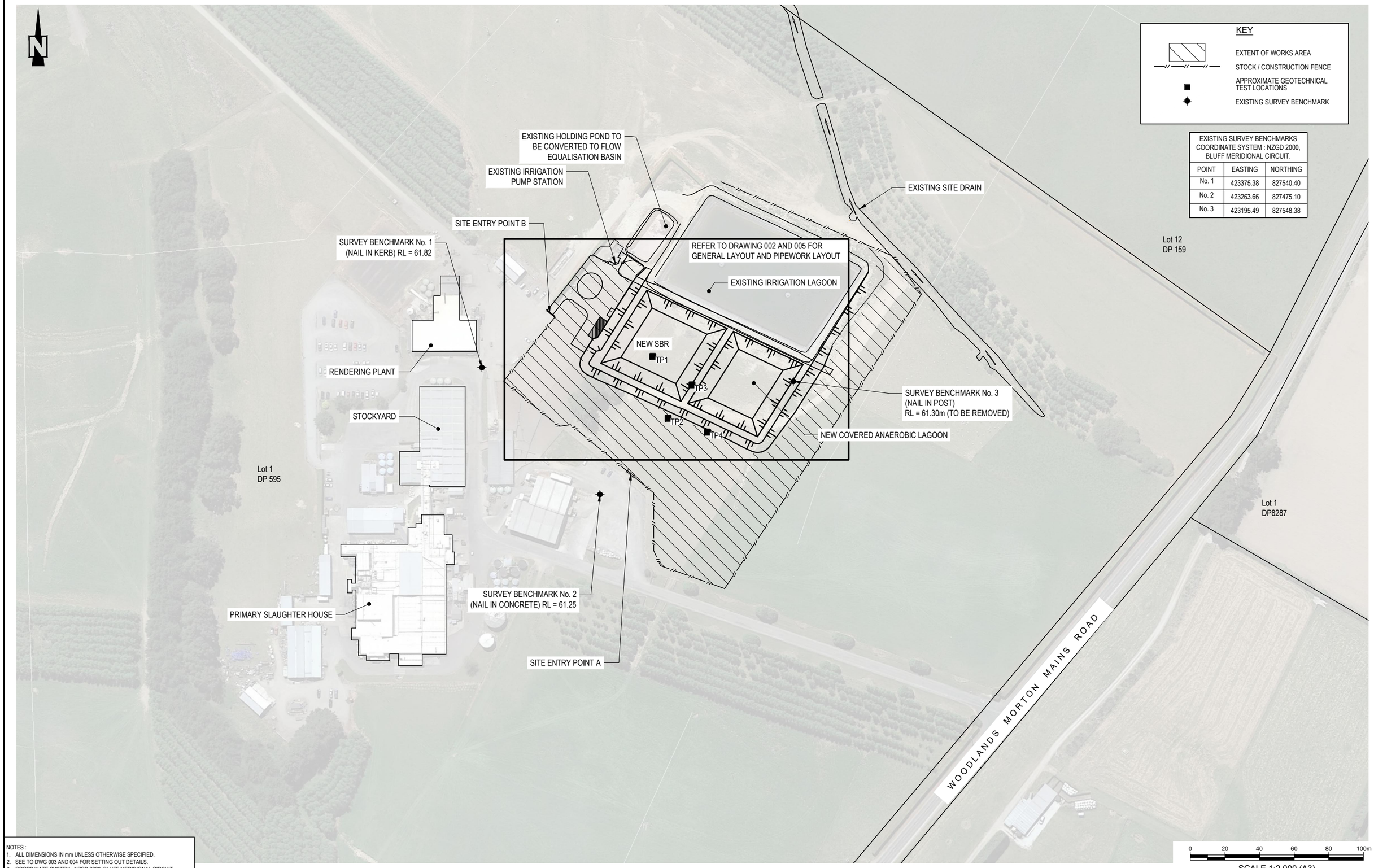
6.0 Concluding Statement

The proposed WWTP will have significant environmental benefit through reducing the leachable nitrogen loading (and other contaminant loadings) discharged to the existing irrigation field.

Potential negative environmental effects associated with the proposal, particularly during the construction phase, will be mitigated and managed as outlined in this report.

Appendix A

PDP WWTP Design Drawings



EXISTING SURVEY BENCHMARKS COORDINATE SYSTEM : NZGD 2000, BLUFF MERIDIONAL CIRCUIT.		
POINT	EASTING	NORTHING
No. 1	423375.38	827540.40
No. 2	423263.66	827475.10
No. 3	423195.49	827548.38

NOTES :
1. ALL DIMENSIONS IN mm UNLESS OTHERWISE SPECIFIED.
2. SEE TO DWG 003 AND 004 FOR SETTING OUT DETAILS.
3. COORDINATE SYSTEM: NZGD 2000, BLUFF MERIDIONAL CIRCUIT. LEVEL DATUM: MEAN SEA LEVEL DUNEDIN-BLUFF VERTICAL DATUM 1960
4. THE IDENTITY AND LOCATION OF ANY SERVICES SHOWN ON THIS DRAWING CANNOT BE GUARANTEED TO BE COMPLETE OR ACCURATE.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION AND PROTECTION OF ALL SERVICES PRIOR TO UNDERTAKING ANY EXCAVATION.

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A	PRELIMINARY	OCT 18	

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DESIGNED	J.L.	D.G.	OCT 18
DRAWN	J.G.G.	D.R.	OCT 18
APPROVED ISSUE FOR :	TENDER		DEC 18
APPROVED :			

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CLIENT: BlueSkyMeats

PROJECT: NEW WASTEWATER TREATMENT PLANT

TITLE: SITE PLAN

PROJECT NO. : A03220201 | SCALE 1:2,000 (A3) | SHEET : OF : | DRAWING NO. : 001 | REV : 0

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EXISTING IRRIGATION PUMPSTATION AND MOTOR CONTROL CENTRE (MCC)

MOTOR CONTROL CENTRE (MCC) BUILDING (SEE DWG 115 AND 116)

NEW 500 kVa TRANSFORMER

SHAPED AGGREGATE ACCESS ROAD (SEE DETAIL 31/117)

SITE ENTRY B

DECANT PUMPSTATION (SEE DWG 107)

CRANE LIFTING AREA

BIOGAS FLARE (SEE DWG 112)

EXISTING OVERHEAD CABLING (TO BE REMOVED)

LIFT PUMP STATION (SEE DWG 104 AND 105)

EXISTING HOLDING POND TO BE CONVERTED TO FLOW EQUALISATION BASIN (800m³)

EXISTING IRRIGATION LAGOON (15,000m³)

INSTRUMENT BEAM AND LEVEL PROBE (SEE DETAIL 34/118 33/118)

INSTRUMENT BOOM (SEE DETAIL 32/118)

NEW 75kW AERATOR

EXISTING 45kW AERATORS TO BE REMOVED

9No. ANCHOR POSTS (SEE DETAIL 05/106)

MOORING CABLES

VENT POINTS FOR GAS GEONET AS AT 10m CRS ACROSS BOTH LAGOON BASES (SEE DETAIL 06/106)

NEW 75kW AERATOR

8No. VENT POINT (SEE DETAIL 12/110)

PERIMETER BEAM (SEE DETAIL 09/109)

8No. ANCHOR POSTS (SEE DETAIL 05/106)

4No. COVER ACCESS FLOATS (SEE DETAIL 10/110)

DECANT

SBR (6000m³)

2No. 11kW MIXERS

NEW 75kW AERATOR

ANAEROBIC LAGOON COVER STORMWATER SUMP (SEE DETAIL 15/111)

COVERED ANAEROBIC LAGOON (5000m³)

4No. GAS VENTS (SEE DETAIL 08/109)

4No. HDPE LADDERS

STOCK / CONSTRUCTION FENCELINE

FUTURE 75kW AERATOR

GRAVITY TRANSFER PIPEWORK (SEE DWG 102)

DN 1050 CONCRETE MANHOLE FOR GROUNDWATER AND STORMWATER MH1

2No. SLUDGE COLLECTION HATCHES (SEE DETAIL 11/110)

DN 1050 CONCRETE MANHOLE FOR LEAK DETECTION MH2

VENT POINTS FOR GAS GEONET AS AT 10m CRS ACROSS BOTH LAGOON BASES (SEE DETAIL 08/109)

CONTINGENCY BIOFILTER (SEE DWG 113)

ANAEROBIC LAGOON COVER STORMWATER DRAINAGE PATHS (SEE DETAIL 18/111)

EXISTING IRRIGATION LINE (TO BE RELOCATED)

ACCESS ROAD

PP

61.0 61.5 62.0 62.5

KEY

- z — EXISTING OVERHEAD CABLING
- IR — EXISTING IRRIGATION / INFLUENT PIPEWORK
- AGGREGATE SURFACE

0 10 20m

SCALE 1:500 (A3)

NOTES :
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CLIENT: BlueSkyMeats

PROJECT: NEW WASTEWATER TREATMENT PLANT

TITLE: GENERAL SITE LAYOUT

PROJECT NO. :		SHEET :	DRAWING NO. :	REV :
A03220201	SCALE 1:500 (A3)	OF :	002	0

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EXISTING IRRIGATION PUMPSTATION AND MOTOR CONTROL CENTRE (MCC)

EXISTING OVERHEAD CABLING (TO BE REMOVED)

NEW SLUDGE PUMP (SEE DWG 108)

FLOW EQUALISATION BASIN TO LIFT PUMP STATION GRAVITY TRANSFER

SHAPED AGGREGATE ACCESS ROAD (SEE DETAIL 31/117)

LIFT PUMP STATION (SEE DWG 104 AND 105)

WATER SUPPLY TO REEL OF 20m 20mm HOSE MOUNTED ON MCC BUILDING

MOTOR CONTROL CENTRE (MCC) BUILDING (SEE DWG 115 AND 116)

CRANE LIFTING AREA

CONDENSATE / UNDER DRAINAGE TO LIFT PUMP STATION

HYGRADE DN 600 HDPE MINI MANHOLE WITH CLASS C COVER IL = 59.7m RL

IL =60m RL

SITE STOCK WATER SUPPLY LOCATION TBC BY ENGINEER

FROM CONDENSATE TRAP No.2

BIOGAS FLARE (SEE DWG 112)

BIOGAS CONDENSATE TRAP No.1 (SEE DETAIL 20/112)

BIOFILTER UNDER DRAINAGE WASTEWATER TO LIFTPUMP STATION

BIOGAS RETICULATION PIPE TO FLARE

BIOFILTER IRRIGATION PIPE TO BE CONNECTED TO SITE STOCK WATER SUPPLY TBC BY ENGINEER

DECANT PUMPSTATION (SEE DWG 107)

SLUDGE PIPEWORK TO NEW SLUDGE PUMP (SEE DETAIL 04/103)

DECANT

SBR (6000m³)

TRANSFER PIPE VALVE CHAMBER

GRAVITY TRANSFER PIPEWORK (SEE DWG 102)

CONTINGENCY BIOFILTER (SEE DWG 113)

EXISTING HOLDING POND TO BE CONVERTED TO EQUALISATION BASIN (800m³)

EXISTING HOLDING POND SUMP

EXISTING TRANSFER PIPE

TREATED WASTEWATER RETICULATION TO IRRIGATION LAGOON (SEE DETAIL 08/109)

3No. EXISTING PVC IRRIGATION PIPES

INFLUENT WASTEWATER RETICULATION TO SBR (SEE DWG 103)

EXISTING IRRIGATION LAGOON (15,000m³)

EXISTING UNDER DRAINAGE OUTLET WITH CONDUCTIVITY PROBE

EFFLUENT AND IRRIGATION PIPEWORK ALIGNMENT (SEE DWG 103)

CLEANOUT CHAMBER 1 (SEE DWG 103)

4No. HDPE LADDERS

CLEANOUT CHAMBER 2 (SEE DWG 103)

PERIMETER BEAM

INFLUENT WASTEWATER RETICULATION TO COVERED ANAEROBIC (SEE DWG 103)

COVERED ANAEROBIC LAGOON (5000m³)

4No. GAS VENTS (SEE DETAIL 08/109)

BIOGAS RETICULATION PIPE TO CONTINGENCY BIOFILTER

RELOCATED IRRIGATION PIPEWORK

MH1

MH2

KEY

- z — EXISTING OVERHEAD CABLING
- IR — EXISTING IRRIGATION / INFLUENT PIPEWORK
- IR — RELOCATED IRRIGATION PIPEWORK
- w — BIOFILTER IRRIGATION PIPE
- ww — WASTEWATER RETICULATION PIPEWORK
- G G — BIOGAS RETICULATION PIPEWORK
- // // — STOCK / CONSTRUCTION FENCING
- AGGREGATE SURFACE

0 10 20m

SCALE 1:500 (A3)

NOTES :
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CLIENT: BlueSkyMeats

PROJECT: NEW WASTEWATER TREATMENT PLANT

TITLE: PIPEWORK LAYOUT

PROJECT NO. : A03220201 | SCALE 1:500 (A3) | SHEET : OF : | DRAWING NO. : 005 | REV : 0

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DN 225 PVC-U SN16 STORMWATER PIPE TO SOAKAGE ZONE (PROVISIONAL)

EXISTING STORMWATER SUMP WITH DN 80 OUTLET TO SOAKAGE ZONE TO BE RETAINED

HYNDS 600 x 600mm STORMWATER CATCHPIT WITH CLASS D GRATE AND COVER. (PROVISIONAL)

DN 100 PVC-U SN16 STORMWATER PIPE FROM MCC BUILDING DOWPIPE TO EXISTING STORMWATER SUMP

GROUNDWATER INTERCEPTION SYSTEM

ANAEROBIC LAGOON COVER STORMWATER DRIANAGE PATHS (SEE DETAIL 18/111)

ANAEROBIC LAGOON COVER STORMWATER SUMP (SEE DETAIL 15/111)

160 OD PERFORATED NOVAFLO IN FILTER SOCK AT 1V:300H FOR GROUNDWATER INTERCEPTION (SEE DETAIL 25/114)

STORMWATER OUTFALL TO SITE DRAIN APPROX 57.3m RL (SEE DETAIL 16/111)

DN 225 PVC-U SN8 AT 1:300

63 OD PE100 SDR17 STORMWATER PIPE (SEE DETAIL 14/111 13/111)

160 OD NOVAFLO AT 1V:300H

160 OD PERFORATED NOVAFLO AT 1V:300H IN FILTER SOCK FOR LEAK DETECTION

110 OD PERFORATED NOVAFLO AT 1V:300H IN FILTER SOCK FOR LEAK DETECTION (SEE DETAIL 24/114)

DN 150 PVC-U AT 1V:300H

DN 150 PVC-U SN8 AT 1V:100H

EXISTING GROUND WATER INTERCEPTION PIPEWORK TO BE RETAINED AS PER SPECIFICATION

LEAK DETECTION SYSTEM (SEE DETAIL 24/114)

MH1

LL = TO MATCH SURROUNDING GL
IL= 57.27
IL_{OUT} 57.57
IL_{IN} = 57.60
IL_{IN} = 57.60
IL_{IN} = 57.60

DN 1050 CONCRETE MANHOLE FOR GROUNDWATER AND STORMWATER WITH CLASS D COVER

DN 150 GATE VALVE WITH EXTENSION SPINDLE AND SURFACE VALVE BOX. AVK GIBUILT FLANGE ADAPTORS EACH END

MH2

LL = TO MATCH SURROUNDING GL
IL= 57.91
IL_{OUT} 57.91
IL_{IN} = 57.93

DN 1050 CONCRETE MANHOLE FOR LEAK DETECTION WITH CLASS D COVER

5.00m
10.00m
10.00m
10.00m
10.00m

61.0 61.5 62.0 62.5

KEY

- SV → STORMWATER PIPEWORK
- STORMWATER DRAINAGE PATH
- GROUNDWATER PIPEWORK
- LEAK DETECTION PIPEWORK
- EXISTING GROUNDWATER INTERCEPTION PIPEWORK

0 10 20m

SCALE 1:500 (A3)

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APPROVED :			

CLIENT: BlueSkyMeats

PROJECT: NEW WASTEWATER TREATMENT PLANT

TITLE: STORMWATER AND GROUNDWATER LAYOUT

PROJECT NO. :	SCALE	SHEET :	DRAWING NO. :	REV :
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Auckland Tauranga Wellington Christchurch

15 January 2019

Kelwyn Osborn
Southland District Council
PO Box 903
INVERCARGILL 9840

Dear Kelwyn

RESPONSE TO SECTION 92 REQUEST FOR ADDITIONAL INFORMATION: RESOURCE CONSENT APPLICATION – 2018/53297. REFERENCE 360/10/18/297 KELWYN OSBORN

1.0 Introduction

Blue Sky Meats (N.Z.) Limited (Blue Sky Meats) has lodged an application for Land Use Consent on 14 December 2018 to construct and operate a new Wastewater Treatment Plant (WWTP) at their meat processing site at 729 Woodlands Morton Mains Road, Morton Mains. Southland District Council has since submitted a request for further information on 9 January 2019, pursuant to Section 92 of the Resource Management Act 1991.

This letter report provides responses to the three items raised within the Section 92 request.

2.0 Response to Items 1-3

1. 'Please provide a description of the planned earthworks – depth of cut and height of fill.'

Section 3.2 of the PDP Assessment of Environmental Affects (AEE) report dated 13 December 2018 highlights the primary components of the proposed construction works. Balanced cut-to-fill earthworks will be carried out to form the two new treatment lagoons (expected to be approximately 5,000 m³ based on earthworks modelling undertaken by PDP), with part of the resulting water storage volume provided below the existing ground level and part retained above existing ground level.

The proposed finished invert level of the treatment lagoons (58.7 m RL) will be approximately 1.9 m below the average existing surrounding ground level. The maximum excavation depth will be approximately 2.1 m to allow for placement of a 200 mm imported sand layer at the base of the lagoons.

The proposed finished embankment crest level (62.7 m RL) will be approximately 2.1 m above the average existing ground level.

2. 'Will there be any spoil removed from site, or will all the material extracted be used or stored on site.'

It is expected that additional imported good quality earth clean fill may be required to supplement the excavated cut material in the event that unsuitable material is encountered for embankment formation or for blending with the excavated material to achieve the required compaction characteristics. It is not expected that there will be any surplus excavated material. In the unlikely event that surplus excavated material did result from the earthworks, then this material will be used on site.

3. 'Provide an assessment of the soil disturbance in the HAIL site against the NES for Assessing and Managing Contaminants in Soil to Protect Human Health and how Pattle Delamore conclude this complies with activity Rule 8(3).'

Please refer to the accompanying PDP Hail Assessment letter report dated 15 January, 2019.

3.0 Limitations

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Blue Sky Meats (N.Z.) Ltd. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions Blue Sky Meats (N.Z.) Ltd for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Yours faithfully

PATTLE DELAMORE PARTNERS LIMITED

Prepared by

Josh Lotter

Environmental Engineer

Reviewed by

Andrew Dean

Senior Environmental Engineer

Approved by

Daniel Garden
Technical Director – Water Infrastructure

APPENDIX C

Blue Sky Pastures – Wastewater Treatment Plant Operation and Maintenance Manual

BLUESKY

PASTURES

Blue Sky Pastures – Wastewater Treatment Plant Operation and Maintenance Manual

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Quality Control Sheet

TITLE	Blue Sky Pastures – Wastewater Treatment Plant Operation and Maintenance Manual
CLIENT	Blue Sky Pastures
VERSION	Revision 2
ISSUE DATE	16 March 2022
JOB REFERENCE	A03220202_O&M_Manual.docx
SOURCE FILE(S)	A03220202_O&M_Manual.docx.

DOCUMENT CONTRIBUTORS

Prepared by

SIGNATURE

Andrew Dean

Reviewed and Approved by

SIGNATURE

Azam Khan

Limitations:

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Revision Record

Revision Record			
Revision	**Revision Date**	**Description of Changes**	**Entered By**
Draft	February 2020	Original document prepared by PDP	PDP
Revision 1	13 October 2020	Updated following ES review	PDP
Revision 2	16 March 2022	Updated personnel contact details	PDP

Glossary

Glossary	
Ar	Argon
BOD	Biological Oxygen Demand
$cBOD_5$	5-Day Carbonaceous Biochemical Oxygen Demand
CH_4	Methane
CO_2	Carbon Dioxide
DAF	Dissolved Air Flotation
DRP	Dissolved Reactive Phosphorus
E. coli	Escherichia coli
EC	Electrical Conductivity
H_2S	Hydrogen Sulphide
N_2	Nitrogen
NO_2^-	Nitrite
NO_3^-	Nitrate
NH_4^+	Ammonium
NH_4-N	Ammoniacal Nitrogen
NOx-N	Oxidised Nitrogen
NO_2-N	Nitrite Nitrogen
NO_3-N	Nitrate Nitrogen
TKN	Total Kjeldahl Nitrogen
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
WAS	Waste Activated Sludge
MLSS	Mixed Liquor Suspended Solids
SBR	Sequencing Batch Reactor

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Appendices

1.0 Operation and Maintenance Manual Overview

1.1 Introduction

Blue Sky Pastures (BSP) owns and operates a lamb and sheep processing and ancillary meat rendering plant in Morton Mains, Southland. BSP also operates the biological wastewater treatment plant (WWTP) on the same site, constructed in 2019. The WWTP treats primary slaughterhouse and rendering wastewater prior to irrigation to land.

BSP presently hold Environment Southland Resource Consent 201191 for the discharge of meat processing and rendering plant wastewater to land via spray irrigation. This consent will expire on 31 December 2022.

The WWTP must be well managed so that the treated effluent quality remains within the limits set out in Resource Consent 201191.

BSP hold other resource consents from Environment Southland (ES) associated with the operation of the WWTP, including a land use consent and a consent for the discharge of land drainage water and stormwater to surface water.

1.2 Purpose and Scope

The purpose of this Operation and Maintenance (O&M) Manual is to describe the procedures for:

- Safe and effective operation of the BSP WWTP and,
- To maintain compliance with the conditions of the Resource Consents associated with the WWTP.

This document is intended to be used by the plant operators to assist with general plant operation. Notwithstanding, this document can only detail foreseen events. If systems are not operating as expected, then professional assistance shall be sought.

Operators shall familiarise themselves with the conditions of the Resource Consents and the requirements to maintain compliance.

The scope of this O&M Manual is to provide guidance on:

a.) Key Health and Safety (H&S) considerations related to the WWTP operation.

b.) Day-to-day treatment system operational, maintenance and management procedures.

c.) How treatment systems will be optimised to remove nutrients (principally nitrogen) and BOD.

d.) Odour reduction and minimisation procedures.

e.) O&M of various mechanical equipment.

f.) Wasting of waste activated sludge (WAS).

g.) Emergency measures and procedures for uncommon events.

1.3 Review of the O&M Manual

This document shall be periodically reviewed and updated by BSP to ensure that it continues to provide an up-to-date reference of O&M procedures.

Any changes shall be recorded in the revision record section at the beginning of the document. This O&M Manual is to be reviewed annually in accordance with Condition 10 of Resource Consent AUTH-20181937-01.

1.4 Roles and Responsibilities

The key personnel responsible for the O&M of the WWTP are detailed in Table 1. The key roles and responsibilities include but are not limited to the following:

1.4.1 General Manager Operations

- Overall responsibility for operations at the Morton Mains site.
- Engagement of Wastewater Technical Experts, as required.

1.4.2 WWTP Engineer/Manager

- Overall responsibility for operation of the WWTP.
- Overseeing O&M of the WWTP.
- Engagement and Liaison with the Wastewater Technical Experts.

1.4.3 Health Safety Environment Manager

- Responsible for the site's environmental performance and for ensuring compliance with the site's Resource Consent conditions.
- Liaising with ES and the local community on environmental matters.
- Responding to and reporting on odour complaints.

1.4.4 Operations Manager/ WWTP Operators

- Operate and monitor the wastewater and odour control systems.
- Identify maintenance requirements to minimise waste and odour emissions.
- Liaising with the Wastewater Technical Experts.
- Operational and environmental matters.
- Staff training.

1.4.5 Wastewater Technical Expert[1]

- Assist with operation of the wastewater system via the available monitoring tools.
- Providing advice and assistance with the WWTP operation.
- Providing troubleshooting guidance.
- Providing advice to and assisting the WWTP Engineer with environmental issues.
- Assistance with reporting to ES on environmental matters.
- Reviewing and updating this manual.

1.4.6 All Site Employees

- Adhere to BSP's environmental policies and procedures relevant to his or her area of work.
- Minimise waste and discharges to the environment by all practicable means.
- Advise WWTP Engineer of all operational issues, plant or equipment failures, or newly identified H&S hazards.

Table 1: WWTP Roles and Contacts

Role	Name	Contact Phone Number
General Manager Operations	Jason O'Connell	027 267 0621
WWTP Engineer/Manager	John Patrick	027 223 1135
Health Safety Environment Manager	Paulus Smith	027 598 5595
Key Plant Operators	Peter Bain	027 549 8152
	Stu Graham	
	Wayne Jones	027 239 4779
Wastewater Technical Experts	Azam Khan	021 608 198
	Daryl Irvine	021 524 326
Environment Southland		0800 76 88 45

[1] Wastewater Technical Experts are PDP Engineers or other suitably qualified experts not employed directly by BSP. Technical Experts are to be engaged/utilised on an as-required basis with the approval of the General Manager Operations or WWTP Engineer.

2.0 Health and Safety

2.1 General

Work practices at the site shall comply with all regulations set out under the Health and Safety at Work Act 2015 (HSWA). Additionally, the BSP H&S Policy for the site shall apply at all times.

The key hazards associated with the operation of the WWTP are discussed in the following sections.

2.2 Personal Protective Equipment (PPE) on WWTP Site

The following PPE shall be worn at all times when working on the WWTP site:

1. Safety boots.
2. Hi-vis clothing/overalls.
3. Safety glasses.

Please note that specific actions and activities will have further PPE requirements as outlined by the site H&S plan and specific sections below.

2.3 Flow Equalisation Basin

All invasive works associated with the Flow Equalisation Basin (excavations, maintenance of pipework, maintenance of concrete chamber) requires a Permit to Work, issued by the Health Safety Environment Manager which must cover the specific hazards, risks and mitigation measures relevant to the activity.

The clay-lined Flow Equalisation Basin contains raw wastewater from the plant and like the other lagoons, is potentially a significant hazard. WWTP Operators must stay at least 1.5 m clear from the embankment edge at times without a permit to work.

Occasionally, and as wastewater loads increase to the plant, a thick crust can build up on the water surface of the Flow Equalisation Basin which, depending on the level of wastewater, can appear to be a solid surface. It is imperative that appropriate controls are in place to safeguard personnel access to the Flow Equalisation Basin.

2.4 Anaerobic Lagoon

All work on the Anaerobic Lagoon and associated biogas collection systems requires a Permit to Work, issued by the Health Safety Environment Manager which must cover the specific hazards, risks and mitigation measures relevant to the activity.

H&S procedures for the Anaerobic Lagoon:

1. Ensure the lagoon areas remain closed to all personnel except authorised operators and contractors.
2. Be cautious when walking on the cover. Access shall be limited to float supported areas **ONLY**.
3. Personnel walking out on unsupported sections of the Anaerobic Lagoon cover must be harnessed to the lagoon embankments. A spotter person must always be present on the embankment.
4. Take extreme care when opening access hatches as toxic and explosive gases are likely to be present, including methane and hydrogen sulfide gas. Allow sufficient time for the hatch to vent before working near the hatch. There shall be no naked flames or electrical equipment which is not intrinsically safe allowed near open hatch vents (see Section 2.11).
5. Only one person (harnessed at all times) shall stand next to an open Anaerobic Lagoon cover hatch. For specific tasks, a work plan must be prepared prior to having more than one person working at open hatches.

2.5 Sequencing Batch Reactor (SBR) Lagoon

The SBR Lagoon contains electrical/mechanical equipment including mixers, aerators, decanter and decant pump (P3). When working on or near the SBR Lagoon:

1. Machinery shall be manually deactivated at the Human Machine Interface (HMI) panel **and** isolated at the lagoon embankment.
2. The Otterdock Safe Docking Platform must always be used for safe access to the mixers and aerators.
3. **DO NOT** stand on the aerator/mixer pontoons.
4. For sludge (MLSS) settling tests, the Otterdock Platform must be used for sample collection.
5. Take care when walking near the lagoon to not step on the SBR liner as this can be slippery, particularly when accessing the level transmitters or pH and dissolved oxygen (DO) probes.

Gloves, safety glasses and a Personal Flotation Devices must be worn at all times when accessing the Otterdock Platform.

2.6 Irrigation Lagoon

The existing Irrigation Lagoon includes similar hazards to that of the Flow Equalisation Basin and the SBR lagoon, albeit the likelihood of a crust formation on the water surface is low.

Care shall be taken to not stand on the liner as it may be slippery.

WWTP Operators must stay at least 1.5 m clear from the embankment edge without a permit to work.

2.7 Wastewater Contact

Personnel shall avoid direct contact with the wastewater at all stages of the treatment process by using gloves and eye protection. Similarly, contact with wastewater spray shall be avoided where possible. If there is contact with wastewater, ensure that the affected area is washed thoroughly. If ingested, seek medical help.

2.8 Hazardous Gases

Hazardous gases such as methane and hydrogen sulphide may occur in any area where wastewater is contained or flowing. High risk locations where hazardous gas may occur include:

- Within the Lift Pump Station wetwell chamber.
- Within the cleanout pipe chambers on the central embankment.
- **Under the Anaerobic Lagoon cover.**
- Within the biogas pipework, flare and biofilter.
- **Within the wastewater transfer pipework riser.**
- Within all wastewater pipes and all other chambers.

Accessing any of the above areas requires a Permit to Work, issued by the Health Safety Environment Manager which must cover the specific hazards, risks and mitigation measures relevant to the activity.

Hazardous gases are particularly of concern in confined spaces. Confined Space Entry is discussed in Section 2.13.

2.9 Chemical Handling

The daily operation of the WWTP does not involve any direct chemical handling. Any chemical handling that is required, shall be done in accordance with the recommendations of the respective safety data sheet (SDS). Ensure that the SDS is read and understood prior to working with any chemicals.

Chemicals which may be used at the WWTP in the future may react with glove materials. Before handling chemicals or equipment, ensure the correct type of gloves are worn. Other forms of PPE, such as full cover safety glasses and overalls, are required.

2.10 Electrical Systems

All adjustments/alterations to any electrical equipment shall only be made by a Registered Electrician. All personnel shall employ general electrical safety, especially in, and around water. When carrying out maintenance and repair procedures on any electrical equipment, the equipment shall be deactivated via the local or plant HMI and shall be physically electrically isolated (switched OFF at the junction box). Any equipment that can impact safe maintenance/repair events (i.e. either in the vicinity or upstream) shall also be deactivated and isolated.

2.11 Biogas Treatment System

All invasive work on the Biogas Treatment System requires a Permit to Work, issued by the Health Safety Environment Manager which must cover the specific hazards, risks and mitigation measures relevant to the activity.

Biogas produced from the Anaerobic Lagoon is highly flammable and can be toxic even if a confined space is not present. This is due to the potential for the presence of poisonous and corrosive H_2S. Extreme care shall be taken when working on the gas collection and treatment system. At minimum this shall require two people and the use of a calibrated personal gas meter which requires specific training.

The cover hatches shall not be opened without conducting a safety assessment. Any work requiring the safety hatches to be opened shall be carried out during off-peak production, and the air around the hatch shall be tested with a gas meter prior to commencement and while the work is conducted.

There shall be no smoking, naked flames, sparks or ignition sources near the Anaerobic Lagoon. This includes any hot work of any nature. If hot work is required on the gas treatment system, the biogas blower shall be turned off and the inlet valves closed from the Anaerobic Lagoon for at least an hour prior to the start of any hot work. All pipe work shall be purged with inert gas (CO_2, N_2 or Ar) prior to any hot work on biogas lines.

When accessing any gas collection pipes or the Anaerobic Lagoon cover hatch, care shall be taken to ensure that there is adequate ventilation. The open hatch/pipe shall be left to disperse any retained biogas before any work commences.

The heat trace from the biogas flare can carry for a significant distance from the biogas flare (greater than 5 m) during strong winds. It is essential that the biogas flare is turned off prior to walking or working near the biogas flare or the corner of the SBR Lagoon closest to the biogas flare.

2.12 Hot Work

All hot work including welding, grinding or any other activity potentially generating flame, sparks or heat requires a Permit to Work, issued by the Health Safety Environment Manager which must cover the specific hazards, risks and mitigation measures relevant to the activity.

2.13 Confined Space Entry

All confined space work requires a Permit to Work, issued by the Health Safety Environment Manager which must cover the specific hazards, risks and mitigation measures relevant to the activity.

All areas on the site that are generally classified as a confined space shall be labelled as such, however, changing conditions may create confined spaces in other areas of the WWTP. Entry to a confined space must be avoided at all times where possible. If unavoidable in repair/maintenance events or emergencies, **only personnel with the relevant training and qualifications** shall enter the confined space. The training shall meet all requirements under Australian Standard: AS 2865 Confined Spaces.

All site H&S procedures relating to confined spaces shall be strictly followed.

3.0 Wastewater Treatment Plant Process Summary

3.1 Treatment System Description

The general layout of the WWTP is shown in Figure 1 and the plant Piping and Instrumentation Diagram (P&ID) is shown in Figure 2.

The process flow through the WWTP is briefly outlined as follows and further detail on the unit processes is outlined in the following sections:

- Wastewater from the slaughterhouse and rendering passes through a Contra-shear Milliscreen unit before entering the Flow Equalisation Basin.
- The Flow Equalisation Basin is hydraulically connected to the Lift Pump Station.
- Wastewater is pumped from the Lift Pump Station to the Anaerobic Lagoon.
- Wastewater then flows on to the SBR Lagoon via an interconnecting gravity pipe.
- Wastewater from the Lift Pump Station is also pumped directly to the SBR during the fill phase (see Section 3.5).
- The SBR discharges via a decant structure and associated pump to the existing Irrigation Lagoon.
- From the Irrigation Lagoon, wastewater is pumped to land via the irrigation system.

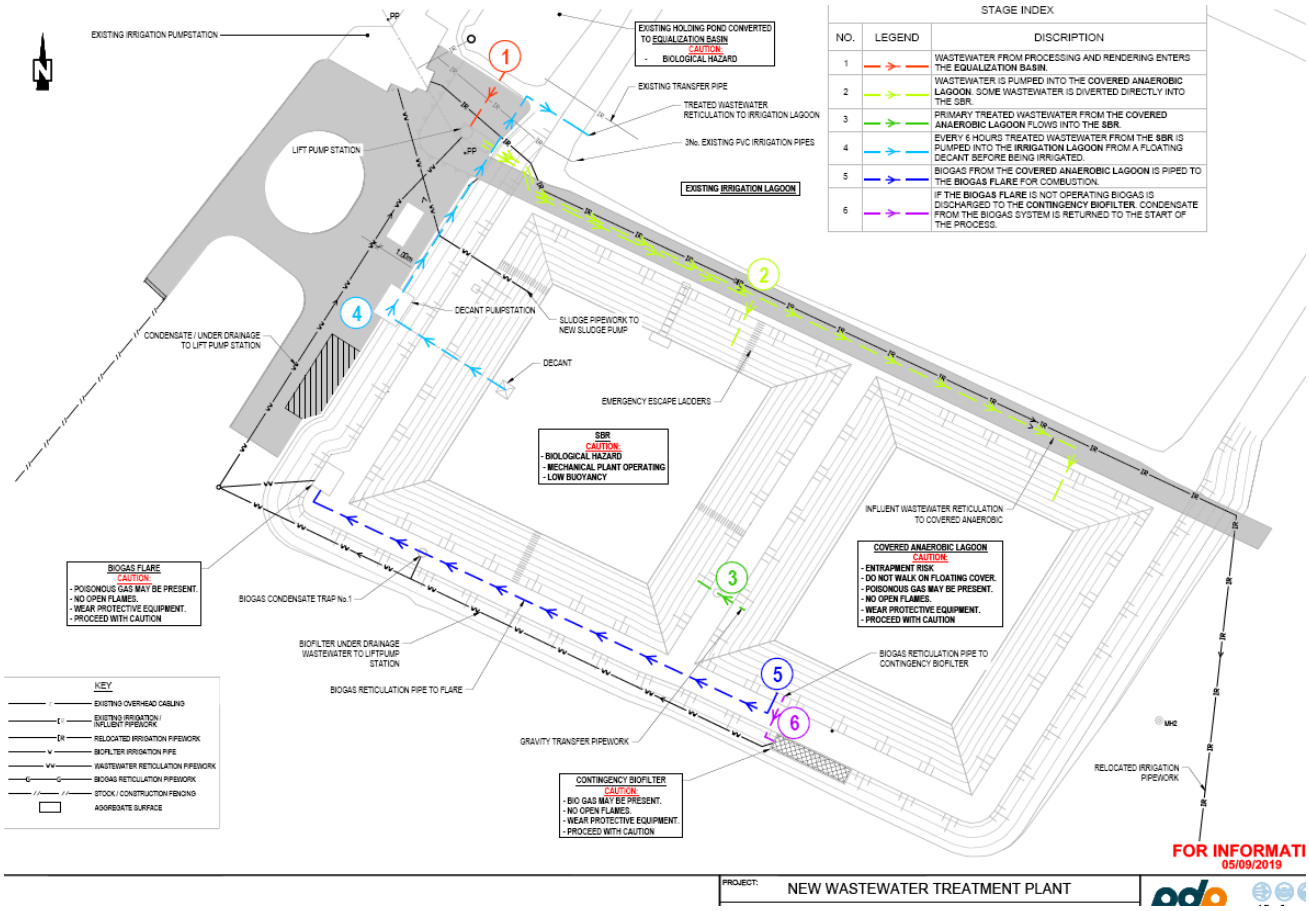

Figure 1 - WWTP General Layout

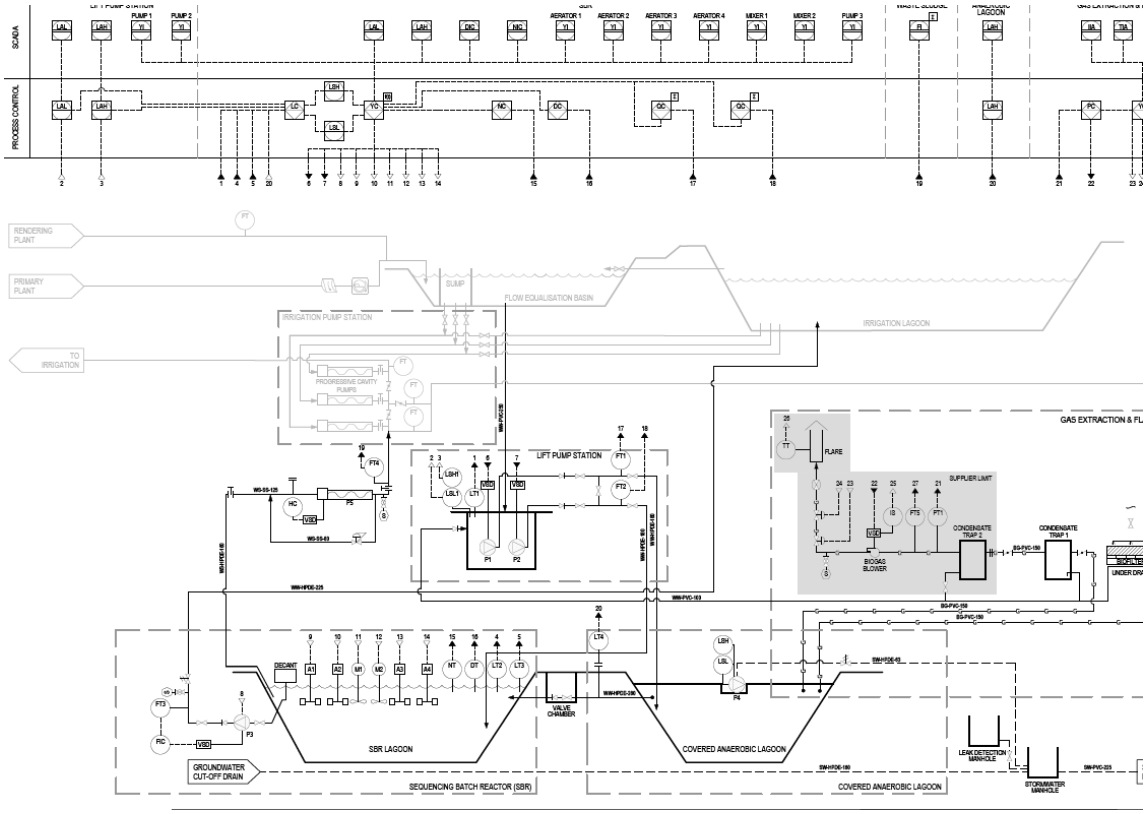

Figure 2 - WWTP P&ID

3.2 Wastewater Sources

Wastewater is generated from the meat processing plant, including slaughter floor, boning room and stockyards amongst other areas. Additional high strength wastewater is also generated from the rendering plant, located adjacent to the main slaughterhouse.

3.3 Flow Equalisation Basin

The existing clay-lined Flow Equalisation Basin has an approximate capacity of 1,000 m^3. The Flow Equalisation Basis balances peak inflows upstream of the WWTP. All raw wastewater from the site passes through this basin which is connected hydraulically to the Lift Pump Station via an interconnecting polyvinyl chloride (PVC) pipe.

3.4 Anaerobic Lagoon

The Anaerobic Lagoon has a capacity of 5,000 m^3, providing a hydraulic retention time (HRT) of approximately 5 days at peak production. The Anaerobic Lagoon is lined with a high-density polyethylene (HDPE) liner and has an HDPE cover for biogas collection.

The inlet to the Anaerobic Lagoon is via a single inlet pipe at the northern end of the central embankment. The inlet pipe passes through a manhole adjacent to where it enters which contains a blank flanged tee to provide a flushing/rodding point in the event of a pipe blockage.

The Anaerobic Lagoon wastewater is treated by settling out solids and breaking down organic matter via anaerobic autotrophic bacteria. The main by-product of anaerobic decomposition is biogas, mainly CH_4 and CO_2, which is collected by a gas collection pipework under the cover.

Solids settle out in the Anaerobic Lagoon and are slowly digested into a liquid stream but leaving some residual solids. The cover has two access hatches that can be utilised to enable infrequent sludge removal and seeding of the lagoon if required.

Discharge from the Anaerobic Lagoon is via a single gravity polyethylene (PE) pipe which connects it to the SBR. A rising PE pipe is connected to the transfer pipe which contains a pressure level transmitter to measure the level in the Anaerobic Lagoon. The transfer pipe also passes through a manhole which contains a manual isolation valve and a non-return valve.

3.5 Sequencing Batch Reactor

The SBR is an aerated lagoon which utilises aerobic heterotrophic bacteria (activated sludge) to reduce contaminants in the wastewater, particularly BOD and nitrogen together with some phosphorus reduction. The SBR is an HDPE

lined lagoon, with a capacity of 6,000 m^3 and contains three 75 kW floating mechanical aerators and two 11 kW floating downdraft mixers.

The SBR operates in batch treatment cycles and consist of the following phases:

1. Fill: filling the reactor whilst mixing (option to aerate during filling).
2. Aerate: aeration and mixing.
3. Settle: bacterial solids allowed to settle.
4. Decant: the water layer on the surface of the lagoon is decanted for discharge.

The SBR operates 24 hours per day based on four 6-hour cycles. The end of one phase of the cycle and the start of the next is dictated by the time steps allocated to each cycle; once one cycle ends, the next then begins.

3.6 Irrigation Storage Lagoon

The Irrigation Storage Lagoon is HDPE lined with an approximate capacity of 15,000 m^3 to provide storage of treated wastewater prior to disposal to land via the Irrigation Pump Station and the associated irrigation system.

3.7 Discharge

During the decant phase of SBR treatment, treated wastewater is pumped from the SBR to the Irrigation Storage Lagoon via a dry mount pump at the Decant Pump Station (Decant Pump). The pump starts at the start of the decant phase and stops based on level control ('Low Level Alarm') or when the time period for the decant phase ends. The pump discharges into the Irrigation Storage Lagoon. Stored treated wastewater is then pumped to the irrigation system via the progressive cavity pumps at the Irrigation Pump Station.

3.8 Biogas Management

Biogas produced in the Anaerobic Lagoon collects under the HDPE cover where it is extracted via slotted collection pipework (via pressurisation under the cover or assisted by the biogas blower located on the biogas flare). When the biogas flare is in operation, the collected biogas passes through a primary condensate trap and then finally a further secondary condensate trap on the biogas flare skid, upstream of the biogas blower. This biogas is then burnt off in the self-igniting biogas flare. The biogas flare converts the CH_4 content of the biogas to CO_2, and oxidises odorous gases, such as H_2S, to form non-odorous compounds.

If the biogas flare is not operational, biogas is to bypass the biogas flare and be treated through the contingency biofilter. The micro-organism community in the biofilter remove odorous components from the biogas via biological oxidation of hydrogen sulphide. The biofilter media consists of a fine bark and lime mix. The lime helps maintain the pH of the media to allow efficient removal of pollutants.

Note, the biofilter does not effectively oxidise CH_4 and as such, the biogas flare should always be the primary method of biogas management.

If the biogas blower fails, and the biogas is unable to pass to the biofilter, then biogas will collect under the cover, creating a positive pressure and expanding the cover. This should be considered an emergency event. Vent points on the cover are designed to release the gas once the cover has expanded, however in this instance, a significant risk and hazard still exists and should be treated as such.

3.9 Rainwater Management

Rainwater that collects on the Anaerobic Lagoon cover is conveyed to a sump in the centre of the HDPE cover by channels filled with weighted PE pipes. There is a submersible pump in the cover sump which is operated from a field switch at the north western corner of the Anaerobic Lagoon. The pump also has a float switch cut-off. Stormwater is pumped via a 63 mm diameter riser to the northern end of the Anaerobic Lagoon. Stormwater is discharged as follows:

- If potential stormwater contamination is observed, such as from extensive bird faeces or windblown debris, stormwater is to be discharged to the Irrigation Storage Lagoon for irrigation to land.
- If no potential contamination sources are present on the cover (i.e. the cover is clean) stormwater may be discharged to Manhole (MH) 1 which flows by gravity to the site drain to the east of the WWTP.

The discharge of stormwater to MH1 is to be approved by the WWTP Engineer.

WWTP Operators must monitor the level of water in the sump and the weighted drainage paths to determine if discharge of stormwater is required and as such, should observe the water on the cover often, especially during and after rainfall events. A reasonable volume of water is to be maintained in the sump at all times to provide weight to maintain the geometry of the stormwater channels and sump. To achieve this, the pump should be stopped manually rather than relying on the float switch which is provided as a contingency measure only.

3.10 Groundwater Management

A groundwater interception drain surrounds the lagoons and leads to MH1 (Refer to Drawing 007 of the Construction Drawings) which flows to the site drain via gravity. It is normal for this groundwater interception drain to discharge water, especially during the winter months.

The Anaerobic Lagoon and the SBR also contain under-liner leak detection systems which are installed in the sand layer directly beneath the liner. These systems discharge by gravity to MH2 (Refer to Drawing 007 of the Construction Drawings).

Sampling of MH2 is to be conducted to test for wastewater contamination (indicative of potential liner failure):

- Sampling conducted quarterly.
- Samples should be analysed for E. *coli* (cfu/100 mL).
- If analysis shows E. *coli* levels > 10^4 cfu/100 mL, may indicate wastewater contamination, and professional advice should be sought.
- If analysis shows low E. *coli* levels, then the valve downstream of MH2 may be opened and the accumulated volume of water in MH2 discharged before the valve is closed again.

The shared outlet for the inputs into the manholes (cover stormwater, groundwater, leak detection) includes a small concrete headwall with rock spall stabilised face.

3.11 Solids Management

3.11.1 Managing Solids in the Anaerobic Lagoon

The Anaerobic Lagoon removes most of the TSS from the wastewater. These solids will slowly accumulate inside the lagoon as a result of settled non-degradable solids and anaerobic bacterial cells. The accumulation of solids in the Anaerobic Lagoon is an essential part of the treatment process as the solids in the wastewater settle and break down through anaerobic digestion. With time the volume of solids will increase to a level where it starts to have an impact on the HRT in the system and the efficiency of the treatment system.

The solids management procedure for the Anaerobic Lagoon is as follows:

- Measure the solids content by probing for solids through the access hatches.
- If solids make up over 70% of the lagoon volume, desludging is required.
- If desludging is required, the removal shall occur during maintenance shutdown or during the low processing period.

The solids removal procedure for the Anaerobic Lagoon is as follows:

- A contractor shall be commissioned to pump the solids from the access hatches.
- Solids can be removed from the base of the lagoon using a submersible open impellor pump/mixer or vacuum pump.
- To aid in dewatering, the removed solids can be mixed with a polyelectrolyte (polymer). A polymer supplier or a Wastewater Expert can assist with polymer and dose rate selection.

- After dewatering, return the supernatant to the Anaerobic Lagoon.
- The solids can be disposed to landfill, onto farmland, or composted (subject to appropriate consents being in place).

3.11.2 Managing Solids in the SBR

Sludge settling tests shall be carried out at least weekly to determine the concentration of solids in the SBR. During commissioning or processing start-up after an extended break, sludge settling tests and TSS sampling is to be carried out more frequently (daily) to assist in determining the frequency of wasting.

The sludge settling test is as follows:

1. Take a one litre sample in a measuring cylinder/settleometer.
2. Leave for 30 minutes.
3. Observe settling.

If the mixed liquor settles but the level is greater than 60% of the sample depth the WAS pump (Pump 5) should be manually switched ON during the fill and mix and aeration phases. The duration of sludge wasting each day is to maintain consistent levels of sludge in the SBR, equivalent to 60% mixed liquor as measured by the sludge settling tests. Sludge wasting duration will be confirmed by the WWTP Engineer based on experience and guidance from the Wastewater Technical Experts.

If settling is poor (solids remain in suspension) in the sludge settling tests, despite wasting, this could indicate overloading of the system.

3.12 Treatment System Instrumentation Controls

3.12.1 Automated Control System

The WWTP is operated predominantly on an automatic control. The system is controlled via an HMI screen in the WWTP Motor Control Centre (MCC) building. System setpoints can be amended by accessing the HMI ‘Setpoints’ function and processing data can be observed in the ‘Trends’ function when a particular process/plant item is selected (e.g. Aerator 1). The ‘Reports’ function shows daily, weekly and monthly totalised flow and run hours data. Figure 3, 4 and 5 show the main HMI screen, ‘Setpoint’ screen and the ‘Reports’ screen respectively.

The EIS WWTP HMI Manual is included as Appendix B which describes the HMI symbology in more detail. It is important that Operators have a fundamental understanding of the WWTP Functional Description which is also appended to this O&M Manual.

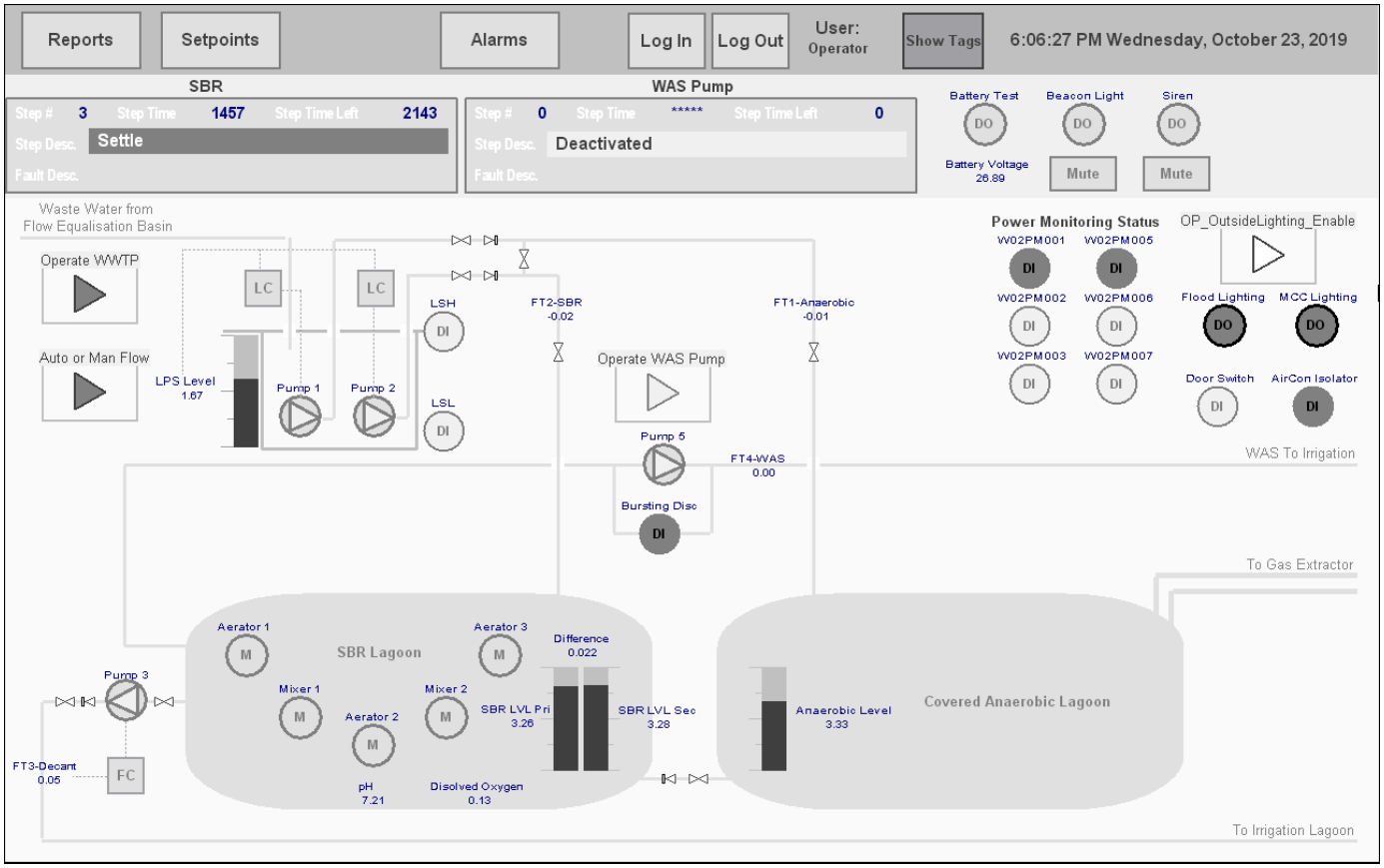

Figure 3 - Main HMI Display

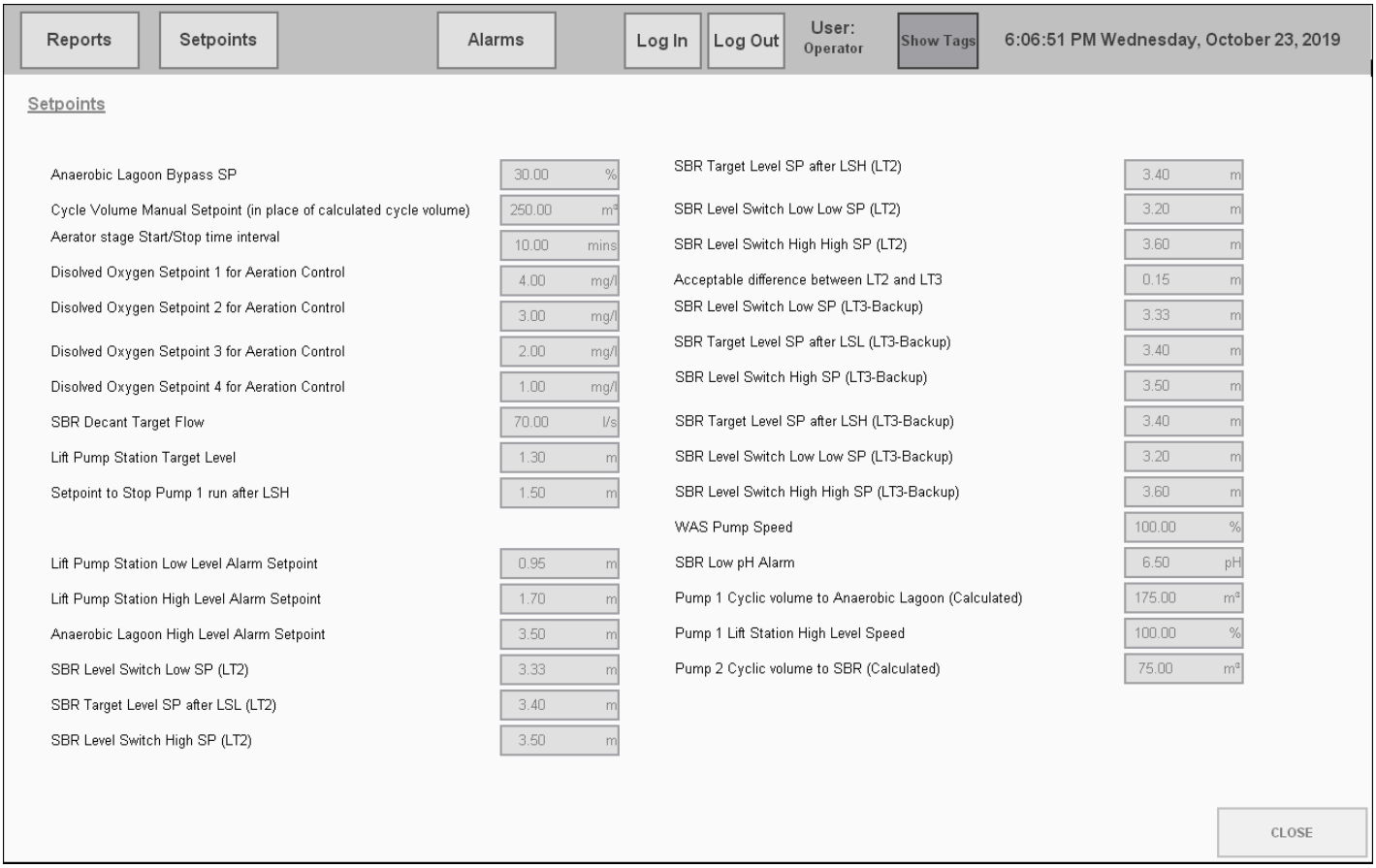

Figure 4 - HMI Setpoints Screen

Figure 5 - HMI Reports Screen

3.12.2 Anaerobic Lagoon

The Anaerobic Lagoon is filled from the Lift Pump Station, with the fill operation calculated by the Programmable Logic Controller (PLC).

The discharge from the Anaerobic Lagoon to the SBR is controlled by the level in the SBR lagoon. There is a level transmitter in the transfer pipe which will stop any further wastewater from being pumped into the Anaerobic Lagoon if the Anaerobic Lagoon High Level Alarm Setpoint is reached.

3.12.3 SBR Control

The SBR is controlled by the PLC. The PLC controls the four SBR cycles and mixer and aerator operation, based on a timer sequence with override control based on SBR water level and DO concentration.

The PLC timer is the controller setting the phase of operation at any given time. The SBR is operated on four 6-hour cycles, with each cycle split up into phases as detailed in Table 2.

Table 2: SBR Phasing	
Phase	**Plant Operation**
Fill/Anoxic – 1 Hour (Starting at 0700 every day)	• P2 ON as required to supply carbon to the SBR Anaerobic Lagoon (Anaerobic Lagoon Bypass). • P1 to maintain level in Flow Equalisation Basin. • Mixers ON, OR Aerators and Mixers ON to maintain a shorter anoxic phase.
Aerate – 3 Hours	• One mixer and aerator(s) ON as required to maintain the DO setpoints. • P1 to transfer daily volume and maintain level in Flow Equalisation Basin. • P2 OFF.
Settle – 1 Hour	• Aerators and mixers OFF. • P1 to transfer daily volume and maintain level in the Flow Equalisation Basin.
Decant – 1 Hour	• Aerators and mixers OFF. • P1 to transfer daily volume and maintain level in Flow Equalisation Basin. • P3 ON.

DO or pH will control aerator operation during the aerate phase, turning the aerators ON and OFF as required by the wastewater load. The operator can select on the HMI if pH or DO is to be used to control aerator operation, with adjustable setpoints available for each.

In the decant phase, P3 will run until the phase is complete, or until 'SBR Level Switch Low' is reached as determined by two level transmitters (one pressure and one radar). The operator can select which transmitter is set to primary duty, and as such, the non-selected transmitter will become the backup.

3.12.4 Biogas Flare

The supplier-provided biogas flare Functional Description and O&M Manual is included within the WWTP Function Description (Appendix A).

The biogas collection system operates on pressure control as well as timer control. When the pressure under the lagoon cover rises, due to biogas production, the biogas blower starts and operates the biogas flare. When the pressure under the cover reaches a set vacuum pressure ('low pressure cut-out'), the biogas blower and biogas flare stop and will not start again until the pressure rises to the restart pressure and the pre-set time delay has elapsed. If the pressure under the cover gets too high an alarm is triggered. If the biogas flare

fails to ignite, biogas is to be re-directed to the biofilter. The manual valve on the biogas pipework allows the biogas to be directed to only the biofilter so that maintenance or repair work can be undertaken on the biogas flare.

Operational setpoints for the biogas flare are to be modified only with approval from the WWTP Engineer.

3.12.5 Flow Management

In its current state, the wastewater treatment system is designed to manage wastewater flows up to 1,000 m^3/d, but the PLC is programmed such that flows less than 1000 m^3/d or up to 1,200 m^3/d can also be handled. Table 3 shows the key level and flow control setpoints.

The Flow Equalisation Basin balances flow variations from the processing plant. The two submersible pumps (P1 and P2) in the Lift Pump Station pumps the balanced wastewater to the Anaerobic Lagoon and SBR respectively at a rate of up to 23 L/s (each). These pumps are Variable Speed Drive (VSD) operated. Their operation is based on the reading from a radar level transmitter in the Lift Pump Station. When the water level in the Lift Pump Station is between two setpoint values, the PLC will alter the VSD rate to maintain the level in the Lift Pump Station i.e. P1 (and during the fill phase, P2) will try and maintain the same flow as what is coming in from the WWTP.

While the level setpoints will override operation of the lift pumps (to make sure the Flow Equalisation Basin does not overflow or run dry), the WWTP Operator can select how the flow of wastewater into the WWTP is managed from the HMI:

1. Manual - the WWTP Operator can manually enter a target flow using the 'Setpoints' function on the HMI.
2. Auto - the PLC will match the previous day's influent volume.

When the WWTP is fully operational, the flow is expected to perpetually run in Auto. Some days of the processing season may require a manual run (e.g. season start, season end, addition of another shift).

3.12.5.1 Anaerobic Lagoon Bypass

While most wastewater will be routed from the Flow Equalisation Basin into the Anaerobic Lagoon, some raw wastewater needs to be pumped into the SBR to provide a carbon source. The percentage to be pumped directly to the SBR is a set value specified using the HMI 'Setpoints' function ('Anaerobic Lagoon Bypass SP'). This is transferred via P2 during the fill phase. The default percentage to be used is 30%.

3.12.5.2 Flow Transfer into the SBR

Flow between the Anaerobic Lagoon and the SBR is via gravity. The transfer flowrate will therefore respond to higher inputs from the Lift Pump Station, increasing the water level in the Anaerobic Lagoon.

Table 3: Level and Flow Control Setpoints

Control Parameter	Setpoint
Anaerobic Lagoon High Level Alarm Setpoint	3.70 m
Anaerobic Lagoon Bypass Setpoint	30 % (or as specified by the Wastewater Technical Expert)
SBR Level Switch Low SP	3.33 m
SBR Level Switch High SP	3.50 m
SBR Level Switch High High SP	3.60 m
SBR Decant Target Flow	70 L/s

4.0 WWTP Operation

4.1 Overview

This section outlines the general requirements that are necessary to maintain efficient wastewater treatment and recommended methods for solving treatment performance problems if they occur. Treatment performance problems are to consider the WWTP treatment system holistically, as problems can often be resolved in various system components.

4.2 Management of Wastewater Contaminants

The key treatment processes for the WWTP is removal of BOD_5, TSS and nitrogen.

4.2.1 Managing BOD_5

The Anaerobic Lagoon is designed to remove 80% to 90% of the incoming BOD_5 in the raw processing wastewater. The effluent wastewater from the SBR is intended to have a BOD_5 concentration of less than 50 g/m^3. The following conditions are required to consistently achieve the target effluent BOD_5 concentration:

- The incoming wastewater quality is reasonably consistent.
- No accumulation of solids in the Anaerobic Lagoon to a level that exceeds 70% of the pond volume.
- The temperature of the Anaerobic Lagoon is maintained below 35°C and the pH is above 6.0.
- The aeration capacity of the SBR is maintained.
- The MLSS in the SBR are maintained above 2,000 g/m^3 and less than 6,000 m^3.
- The pH in the SBR is above 5.5.
- No undesirable chemicals have been discharged to the wastewater treatment system.

If the BOD_5 in the final discharge is consistently higher than 50 g/m^3 then the system performance needs to be investigated.

Analyse the Anaerobic Lagoon effluent and check if 80% removal occurs (sampling of the influent and discharge). If not, then check the following:

- The quality of the incoming wastewater (to check for unexpected discharges e.g. chemicals, spills, unusual rendering load).
- The Anaerobic Lagoon effluent temperature (to see that it does not exceed 35°C).

- The Anaerobic Lagoon pH (to check that pH is above 6.0).

If the Anaerobic Lagoon is achieving 80% BOD_5 removal then the SBR Lagoon operation will require assessing, including:

- Recalibrating the DO probe.
- Checking that the required DO setpoint is being maintained.
- Checking that the aerators are all operational.
- Checking that the MLSS in the SBR are maintained above 2,000 g/m^3 and less than 6,000 m^3.
- If the above investigations are unable to identify an apparent issue, or an issue is identified that cannot be easily amended, consult a Wastewater Technical Expert.

4.2.2 Treated Effluent Suspended Solids

Under normal operation, the TSS concentration in the treated effluent needs to be consistently below 150 g/m^3. If in exceedance of this level, then solids will carry over from the SBR to the Irrigation Storage Lagoon. The TSS concentration is reduced by wasting solids via P5. Check by performing the mixed liquor settling test, described below:

1. Take a one litre sample in a measuring cylinder/settleometer.
2. Leave for 30 minutes.
3. Observe settling.

If the mixed liquor settles but the level is greater than half of the sample depth, waste solids as instructed by the Wastewater Technical Expert or the wasting plan. However, if settling is poor (solids remain in suspension), this could indicate overloading of the system. Consult with a Wastewater Technical Expert.

4.2.3 Nitrogen Management

Proteins in the raw effluent from the meat processing plant are broken down in the Anaerobic Lagoon, releasing NH_4^+ into the wastewater. Bacteria in the SBR oxidise the NH_4^+ to NO_3^-, whilst other bacteria convert NO_3^- to N_2, which is released from the wastewater to the atmosphere. This two-stage process is sensitive to the operational parameters of the SBR, including DO levels, pH, BOD concentration, and bacterial solids concentration (MLSS). It is important that the following SBR operational setpoints are maintained for optimal treatment:

- DO level > 0.5 g/m^3
- 6.5 < pH < 7.5
- 2,000 g/m^3 < MLSS concentration < 6,000 g/m^3

The wastewater treatment system has been designed such that the treated wastewater consistently achieves:

- NH_3-N concentration < 50 g/m^3
- NO_3-N concentration < 100 g/m^3 (preferred < 50 g/m^3)

If the nitrogen levels in the treated effluent are found to consistently exceed these levels, then the above operating parameters need to be investigated.

1. If the NH_3-N concentration is consistently above 50 g/m^3, this could be due to:
   - Low DO setpoint (i.e. insufficient aeration).
   - Low pH.
   - Low MLSS concentrations.

   If the NH_3-N load entering the SBR from the Anaerobic Lagoon is consistently above the design level then this may be causing a high NH_3-N concentration in the treated effluent. If this occurs:
   - Investigate the NH_3-N load from the Anaerobic Lagoon.
   - Provision to install a further 75 kW aerator.
2. If the NO_3-N concentration is consistently above 100 g/m^3, this could be due to:
   - High DO setpoint.
   - Aerators turned ON together with the mixers during the initial 1-hour 'Fill/Anoxic' phase.
   - Insufficient supply of BOD from the Anaerobic Lagoon.
   - The flow split of raw wastewater to the SBR may be too small.

   The investigation procedure for high NO_3-N concentration is:
   - Investigate each parameter outlined above.
   - The total combined BOD load entering the SBR from the Anaerobic Lagoon needs to be at least four times the NH_3-N load entering SBR Lagoon. To increase the BOD load being supplied from the Anaerobic Lagoon, the flow from P2 (Anaerobic Lagoon Bypass SP) will need to be increased.
   - The DO level needs to be maintained at or below 1.0 g/m^3.

   If the cause of the high nitrogen levels is unable to be identified and remedied, consult with a Wastewater Technical Expert.

4.3 Odour Management

If an odour is identified at the site, then this must be investigated immediately and where possible minimised and eliminated. Possible sources of odour include:

- Biogas emissions from the Anaerobic Lagoon cover or treatment systems.
- Odour emissions from the SBR lagoon.

If it is identified that the odour is passing beyond the site boundary and a complaint has been received, refer to Section 8 of the Manual.

4.3.1 Biogas Odours

If it is identified that odours are being emitted from the biogas collection and/or treatment system, then identify the exact source and arrange for immediate repair.

If the odour is being generated from the biofilter, it is noted that while the biofilter will remove a majority of H_2S from the biogas, it is unlikely to completely remove it and potential odours may still be detectable in close proximity to the biofilter when it is operating. There is no need to raise alarm if only a slight detection of H_2S occurs, only do so if the odour is detectable beyond the property boundary.

To maximise the biofilter efficiency, the biofilter must be kept moist and maintained at a pH level between 5 to 8. Thinly spread 10 kg of hydrated lime on the biofilter surface to maintain pH as required.

4.3.2 SBR Odours

Odour generation from the SBR can be an indication that the SBR is being over-loaded. In this case a loading assessment of the SBR Lagoon needs to be conducted, along with an investigation into the treatment performance of the Anaerobic Lagoon. In this case, it is recommended that the following actions be taken:

1. Stop all flows through P2 by setting the Anaerobic Lagoon Bypass setpoint to zero on the HMI, in preference of all flows passing though the Anaerobic Lagoon (P1).
2. Turn the aerators ON together with the mixers during the Fill/Anoxic phase (effectively changing this phase from an anoxic phase to an aerobic phase).
3. Assess the DO setpoint, and if possible, increase it to 2.5 g/m^3.

4. If the aerators are unable to provide ongoing maintenance of DO levels beyond 0.1 mg/L, then sample the Anaerobic Lagoon effluent from the transfer pipe between the two lagoons.

    a. If the BOD concentration is above 1,000 mg/L, investigate raw wastewater loads to identify any over-loading issues or performance problems with the Anaerobic Lagoon.

5. If the odour from the SBR Lagoon continues, consult with a Wastewater Technical Expert.

4.4 Summary of Operational Limits

Table 4 summarises the recommended operation limits for the WWTP. If the WWTP is operating outside any one of these limits and remedial action is not obvious from this O&M Manual, seek advice from a Wastewater Technical Expert.

Table 4: Process Operational Criteria

Parameter	Lower limit	Higher limit
Anaerobic Lagoon Sludge Levels	10%	70%
SBR MLSS	2,000 mg/L	6,000 mg/L
Final Effluent		
Peak Daily Flow	-	1,200 m^3/d
Instantaneous Flow	-	90 L/s (from Decant Pump Station)
BOD_5	-	50 mg/L
pH	6.0	8.0
NH_4-N	-	50 mg/L
NO_3-N	-	100 mg/L
TSS	-	150 mg/L
Biofilter		
Bed Media pH	5.0	8.0
Bed Media Pressure Drop	20 mm	100 mm

5.0 Plant Maintenance

5.1 Supplier Documentation and General

This section provides details of maintenance procedures for individual components of the WWTP. Regular routine maintenance is essential for reliable operation. Note that H&S considerations are not explicitly stated in the maintenance requirements. The operator shall refer to the H&S section of this O&M manual and the site-specific H&S requirements.

The available supplier documentation is listed in Table 5.

Table 5: Supplier Documentation List			
SUPPLIER	**DOCUMENT NAME(S)**	**HARDCOPY (H) ELECTRONIC (E)**	**LOCATION**
Miscellaneous[1]			
Xylem	Flygt Pumps Maintenance Schedule and Checklist	E	
Unknown	ABB Watermaster Flowmeter Package	E	
Flow Equalisation Basin			
Unknown	Contrashear Milliscreen Data Sheet	E	
Lift Pump Station			
Xylem	Flygt 3127 Pump Data Sheet	E	
SBR Lagoon			
Unknown	Jumo Maera F27 Level Transmitter	E	
Unknown	Siemens EchoMax XPS Level Transducer	E	
Unknown	Siemens LUT400 Ultrasonic Controller	E	
Hach	SC200 Controller, LDO Sensor, pHD SC Sensor Package	E	
Aeris Global	Aquaturbo Aerator, Mixer, Decant Package	E, H	MCC Building
Anaerobic Lagoon			
Unknown	Nivopress NK 41-03 Level Transmitter	E	
Lowara	Lowara Submersible Stormwater Pump	E	
Decant Pump Station			
Xylem	Flygt 3153 Pump Data Sheet	E	
Deeco	Vent-O-Mat RGX Data Sheet	E	
Deeco	RGX Owner's Manual	E	
Irrigation Pump Station			
Wallace Murray Electrical	Mono E Range Pumps Maintenance Manual	E	
Custom Controls	Fike Rupture Disc	E	
Biogas Flare			
Windsor Engineering	Biogas Flare Instrumentation and Valve Supplier Package	E	
Windsor Engineering	Biogas Flare Written Documentation[2]	E, H	

Notes:

1. *Miscellaneous items which may be relevant to more than one process area such as flowmeters*
2. *Includes drawings, logic tables, O&M manual, functional description etc.*

5.2 Pipework and Valves

Operation procedure for the pipework and valves:

- Conduct regular checks to ensure the inlet and outlet pipes are clean. This may involve observing how flow is exiting pipes.
- Inspect all exposed pipes, fittings and valves.
- Open/close checks on all valves at three monthly intervals.
- Flush/cleanout the main delivery pipes to the Anaerobic and SBR Lagoons annually.

5.3 Pumps

Maintain pumps as follows:

- Check operation daily.
- Mechanically inspect the pumps every six months.
- Conduct regular checks of lifting handles and chains of sumps only.
- Conduct intermediate and major overhauls every 2-3 years or 5,000-8,000 run hours as dictated by the maintenance manual for the specific pump. Note that different pump models from the same manufacturer may require different servicing intervals.
- Update the Maintenance Log after any maintenance.

5.4 Instrumentation

Instrumentation maintenance procedure:

- Conduct validation of flowmeter outputs annually.
- Calibrate level transmitters and sensors as per the specific manufacturer's instructions OR when these have encountered wastewater (radar transmitters only).

5.5 Lift Pump Station Maintenance

In addition to the maintenance of the pumps and instruments inside the GRP chamber, the Lift Pump Station shall be maintained as follows:

- Inspect and clean the Lift Pump Station GRP chamber monthly, including pressure cleaning all surfaces. Care should be taken to not damage any instrumentation during this process.

5.6 Flow Equalisation Basin

- Check the wastewater level daily and note the surface condition (e.g. thick crust, foam etc.).

- Annually drain, excavate the sludge and re-trim/shape the Flow Equalisation Basin and dispose of the contents appropriately.

5.7 Anaerobic Lagoon Maintenance

The Anaerobic Lagoon is a sensitive treatment process and is crucial to the successful operation of the WWTP.

- The Anaerobic Lagoon freeboard shall be maintained at a minimum of 400 mm and a maximum depth of 3.6 m.
- Inspect the cover stormwater sump and activate pump to drain rainwater from the cover daily. Always leave a portion of rainwater remaining on the cover such that the channels remain flooded.
- De-sludge the Anaerobic Lagoon during shutdown when the sludge level reaches approximately 70% of the lagoon volume, or when the treatment performance is affected.

5.8 SBR Lagoon

The SBR Lagoon contains several mechanical components that require regular maintenance.

- The SBR lagoon freeboard shall be maintained at a minimum of 500 mm and a maximum pond level of 3.5 m.
- Check the aerators and mixers are functioning properly (should be able to see water surface move in a circular pattern during the fill phase).
- Clean the DO and pH probes in the SBR on a weekly basis.
- Calibrate the DO and pH probes in accordance with manufacturer's documentation.
- Conduct sludge settling tests daily to determine wasting. This process is covered in Section 4.2.2.
- Check that the aerator and mixer mooring cables are attached securely weekly or whenever the cable systems have been adjusted or used.
- Maintain the aerators and mixers as per manufacturer's instructions.

5.9 Biogas Treatment

The gas treatment system shall be maintained in accordance with the biogas flare manufacturer requirements and as detailed below:

- Drain condensate from Condensate Trap 2 weekly by opening the drain valve.

- Conduct regular maintenance on the biogas blower unit as per the manufacturer's instructions.
- Conduct daily "smell test" downwind of the biogas flare by sniffing for odours. If an odour is detected, check the biogas flare system temperature.
- Replace the biofilter media when required or once every five years. The media may need to be replaced earlier, and the need for this can be characterised by increased odours when the biofilter is in use, or deterioration of integrity of the media mix.
- Pass collected gases through the biofilter for one hour at normal gas production rates once per month to assess performance.
- If the pH in the biofilter is below 5, spread hydrated lime thinly over the top of the biofilter and irrigate. Check this monthly.
- Check that the pressure drop across the biofilter is below 100 mm via the manometer mounted on the biofilter.
- If the moisture levels are too low (i.e. the media is dry), then manually irrigate the biofilter media.
- Remove weeds from the biofilter as soon as they begin to grow.

5.10 Daily O&M Checklist

A daily O&M checklist is provided in Appendix C.

5.11 Routine Maintenance Schedule Summary

A routine maintenance summary has been developed and is attached as Appendix D.

6.0 Contingency, Response and Troubleshooting

In the event of process malfunctions or equipment failure, Table 6 outlines contingency measures to remedy potential issues. This table outlines recommended resolution procedures for some potential operational problems, but other undiscussed issues may require expert input.

Table 6: Contingency and Response Procedures	
Event/Risk	**Contingency/Response**
HIGH LEVEL ALARMS 'High Level Alarms' in any part of the WWTP (Flow Equalisation Basin, Lift Pump Station, Anaerobic Lagoon, SBR Lagoon or Irrigation Storage Lagoon) will require **immediate** attention by the operator to prevent loss of treatment performance, a spill to the environment or damage to equipment and hazardous working environments. In the event of a 'High Level Alarm': ⁘ The HMI panel will light up with an alert. ⁘ An alarm will sound. ⁘ An alarm will appear on the main site SCADA.	
'High Level Alarm' in WWTP	**Contingency:** A 'High Level Alarm' in either the SBR or Anaerobic Lagoons will stop P1 and P2, ceasing flow into the lagoons. The 'High Level Alarm' condition will be alleviated once the decant phase of the SBR begins and effluent is pumped out. The Flow Equalisation Basin will provide contingency storage in such an event. If a 'High Level Alarm' is raised in the Lift Pump Station, P1 will ramp up to meet the incoming flow. If a 'High Level Alarm' is raised in the Irrigation Storage Lagoon, one or more of the irrigation pumps can be used to irrigate the wastewater to land.
	Response: 'High Level Alarms' in these areas may be caused either by a pump or instrument (level) failure: 1. If the 'High Level Alarm' is due to a pump failure, the response shall be as outlined in the following procedure. 2. If the 'High Level Alarm' is due to equipment failure, run the pumps in manual mode and clean/repair/replace the level equipment as soon as possible.

Table 6: Contingency and Response Procedures	
Event/Risk	**Contingency/Response**
PUMP FAILURE A pump failure alarm will require **immediate** action by the operator to prevent loss of treatment performance, a spill to the environment or damage to equipment and hazardous working environments. In the event of a pump failure: ⁘ The HMI panel will light up with an alert. ⁘ An alarm will sound. ⁘ An alarm will appear on the main site SCADA.	
Pump Failure	**Contingency:** If either P1 or P2 in the Lift Pump Station fails, the valving arrangement can be manipulated to utilise the operational pump to discharge to either the SBR or Anaerobic Lagoons. If P3 fails, it is considered a critical event and repairs should be conducted as soon as possible. Flow into the WWTP should be shut off. If there is insufficient volume in the Flow Equalisation Basin to attenuate the flow, then a temporary pump can be used to direct the raw wastewater directly to the Irrigation Storage Lagoon whilst the pump is repaired or replaced. If an irrigation pump fails, the Irrigation Storage Lagoon provides 12-15 days' storage depending on the processing flows.
	Response: In the event of a pump failure the operator shall: 1. Restart the duty pump manually. 2. If this fails, manually change the valve arrangement if possible, as required. 3. If P3 fails, assess available time based on current SBR phase and level in the Flow Equalisation Basin. 4. Remove pump(s) and investigate/seek supplier advice or carry out repairs as soon as possible. 5. If not easily fixed, provide a temporary pump to pump incoming wastewater directly to the Irrigation Storage Lagoon. 6. Notify the General Manager Operations as a cease in processing may be required.

Table 6: Contingency and Response Procedures

Event/Risk	Contingency/Response
BIOGAS FLARE FAILURE Failure of any part of the biogas flare (e.g. ignition or biogas blower) is an important but non-critical event and shall be addressed by the duty WWTP Operator as soon as practicably possible. In the event of a failure on the biogas flare skid: ⁘ An alarm will be raised and shown on the HMI panel. ⁘ The alarm will be relayed to the main site SCADA.	
Biogas Flare Failure	**Contingency:** The biofilter provides a contingency means of managing the biogas generated from the Anaerobic Lagoon. However, due to limited H_2S removal capabilities, it should only be used in an emergency (i.e. biogas flare failure) or during maintenance of the biogas flare.
	Response: In the event of a biogas blower failure, the WWTP Operator shall: 1. Attempt to restart the biogas flare system. 2. If this fails, immediately check on the operation of the biofilter to ensure biogas is passing freely through it. Check the manometer reading, media moisture and pH. 3. If required, engage assistance from the biogas flare supplier Windsor Engineering which may involve off-site repair or replacement of certain components.
CHEMICAL SPILLS For daily operation, no special chemicals are required. Any spillage of chemicals that are used shall be dealt with on a case-by-case basis and according to the chemical SDS. It shall be the WWTP Operator's responsibility to address these issues.	
Chemical Spills	**Contingency:** It is not expected that hazardous chemicals will be used as part of routine operation of the WWTP.
	Response: In the event of a chemical spill, the WWTP Operator shall: 1. Review the H&S plan for the site and specific chemical SDS which should have been read and understood prior to the chemical use. 2. Add neutralising agents if required.

Table 6: Contingency and Response Procedures	
Event/Risk	**Contingency/Response**
	3. Clean the area with the appropriate agents. 4. Review the possible effect on the wastewater treatment system which is likely to involve specialist advice.
FOAMING At system commissioning prior to establishment of bacterial populations in the SBR, foaming is expected. Once the system has stabilised, foaming is expected to subside. If significant foaming or foam with a change in characteristics (e.g. odour, thickness, colour) is observed, this may indicate overloading of the system or various other treatment issues. Additionally, foam can be blown to the nearby site drain which could trigger conductivity alarms. Any significant foaming or foaming out of the ordinary shall be dealt with immediately.	
Foaming in SBR	**Contingency:** Once established, the system will be relatively resilient to minor changes in loading and as such is expected to adjust to minor day-to-day changes in kill numbers.
	Response: In the event of significant foaming: 1. On the HMI, switch the duty level transmitter to PRESSURE (LT3). 2. Determine if there will be any implications with discharge to the surface drains or any surface water (e.g. stormwater from Anaerobic Lagoon or directly to site drain). Mitigate any of these issues by isolation wherever possible. 3. If isolation is not possible and the condition persists, the WWTP can be shut down and relevant controls implemented to transfer incoming effluent to the Irrigation Storage Lagoon. 4. Take photos and document the event. These can be sent to the Wastewater Technical Expert to determine the best course of action. 5. Implement any actions as advised by the Wastewater Technical Expert. 6. Ensure the WWTP is restarted, and the equipment and walkways washed down and fully functional (e.g. level transmitters fully functioning with no errors). 7. Document the event and notify the Environment Southland if required under the consent conditions.

Table 6: Contingency and Response Procedures	
Event/Risk	**Contingency/Response**
	8. Haul the aerators and mixers to the Otterdock pontoon and hose them down to clear any foam deposits.
POWER OUTAGES In the event of a power outage (scheduled or unscheduled), the WWTP will have limited ability to treat incoming effluent or to keep wastewater from becoming anaerobic and generating objectionable odour. Any power outages shall be dealt with by the duty WWTP Operator **immediately**, with assistance from the relevant external parties (e.g. main power company and/or EIS).	
Power Outage	**Contingency:** TBC by BSP/EIS
	Response: In the event of a power outage, the duty WWTP Operator shall: 1. Ensure that it is a mains power outage (not a local issue within the WWTP site). 2. Ensure that all key system operation is functioning correctly, by checking for any specific alarms on the HMI/site SCADA and do a physical walk over for confirmation. 3. Repeat this process once mains power has been restored.

7.0 Monitoring

Monitoring confirms the satisfactory operation of the WWTP and confirms that the discharge from the WWTP complies with the conditions of the Resource Consent and that these discharges are not having adverse impacts on the surrounding environment. This section only covers the monitoring requirements for the final effluent discharge under Consent No. 201191 and does not cover the consent requirements for surface water or soil sampling which are also stipulated under the same consent.

Additionally, this section covers the monitoring requirements under Discharge Permit AUTH-20181937-03 for the discharge of groundwater (land drainage water) to the site drain. The relevant consent documents are attached as Appendix F.

All plant monitoring shall be done by a fully trained and qualified plant operator or by an appointed external expert. All analyses shall be carried out by a laboratory with IANZ accreditation or equivalent. All persons undertaking sampling for monitoring purposes must be aware of the relevant treatment components and processes, and how they can affect sampling quality, consistency and strategy. With regular monitoring, any developing problems will be identified early, before they cause major problems.

7.1 Treated Effluent Consent Limits

The consent does not specify limits for individual treated effluent quality parameters except Sodium Adsorption Ratio. However, it does specify the permitted maximum daily discharge rate and the annual nitrogen loading rate to land. Table 7 highlights the key consent requirements.

Table 7: Key Resource Consent Requirements

Parameter	Trigger Level
Maximum Rate of Discharge	1,000 m^3/d
Annual Nitrogen Loading (assuming cut and carry)	450 kg/N/ha
Annual Nitrogen Loading (all other areas)	350 kg/N/ha
Maximum Wastewater Sodium Adsorption Ratio	17

In addition to the above requirements, effluent shall be sampled and analysed at minimum on a monthly basis. Effluent samples shall be collected from the sampling valve on the Decant Pump Station pipework at the mid-point of a decant cycle (when P3 is running). Table 8 shows the parameters to be analysed.

Table 8: Treated Effluent Sampling Parameters

Quality Parameter	Unit
$cBOD_5$	mg/L
pH	pH units
EC	dS/m
TSS	mg/L
NH_4-N	mg/L
TN	mg/L
TP	mg/L
DRP	mg/L
Oil and Grease	mg/L
E. coli	cfu/100 mL
Calcium	mg/L
Magnesium	mg/L
Sodium	mg/L

Although not a direct condition of the discharge consent, flow monitoring and recording of daily flow volumes from P3, WAS (P5) and effluent discharged to land shall be kept.

7.2 Groundwater and Surface Water Sampling

Groundwater discharging from the sub-soil drain shall be sampled for the parameters outlined in Table 9, in accordance with Condition 4 of Resource Consent AUTH-20181937-03. The grab samples are to be taken from:

- MH1.
- The surface water 5-20 m upstream of the discharge to the site drain (to the South East of the Irrigation Storage Lagoon).

These samples shall be collected within two hours of each other. This sampling shall be conducted annually in accordance with Condition 4(c) of Resource Consent AUTH-20181937-03.

Table 9: Groundwater and Surface Water Sampling Parameters

Quality Parameter	Unit
$cBOD_5$	mg/L
pH	pH units
EC	dS/m
NH_4-N	mg/L
NO_3-N and NO_2-N	mg/L
TP	mg/L
E. *coli*	cfu/100 mL
Temperature (Field Measurement)	°C

The laboratory analysis results are to be submitted with a report to the consent authority (email: escompliance@es.govt.nz) within 30 days of receipt. The report shall include:

- The location of the samples.
- Comparison of the land drainage water and the water in the drain.
- Comments on any contamination of the land drainage water samples by wastewater.

Note: contamination of the land drainage water with wastewater is most likely to be indicated by elevated E. *coli*. For guidance on indicators of wastewater contamination, contact the Wastewater Technical Expert.

7.3 Other Monitoring Requirements

For effective WWTP operation, conduct the following monitoring procedures outlined in Table 10.

Table 10: Monitoring of WWTP Parameters for Effective WWTP Operation

Monitoring	Description	Monitoring Frequency	Monitoring Timeframe
SBR MLSS concentration	∴ Take a TSS sample from the SBR during the aerate phase. ∴ Evaluate MLSS concentration to aid in determining the correct wasting rates.	Once per week	First six months of operation; First three months of each new operating season
Anaerobic Lagoon $cBOD_5$ removal performance	∴ Take a $cBOD_5$ sample from the transfer pipe between the Covered Anaerobic and SBR Lagoons. ∴ Determine if effective BOD removal is occurring. ∴ Measure the field temperature for the grab sample immediately.	Once per month	On-going
Site Drain	∴ Observe/record any visible changes to the normal appearance of the water e.g. discoloration plume, a film or foam/scum on the surface, objectionable odour.	Once per week; During groundwater and surface water sampling	On-going
Lagoon Leak Detection System	∴ Take a sample from MH2 connected to the leak detection system. ∴ An IANZ accredited laboratory must test samples for NH_3-N and E. *coli*. If E. *coli* < 10^3 cfu/100 mL and NH_3-N < 10 g/m³: ∴ Valve can be opened, and groundwater discharged. ∴ Valve is to be closed once the chamber has drained. If E. *coli* > 10^3 cfu/100 mL and NH_3-N > 10 g/m³: ∴ Contact the Wastewater Technical Expert	Once every three months	On-going

Table 10: Monitoring of WWTP Parameters for Effective WWTP Operation			
Monitoring	**Description**	**Monitoring Frequency**	**Monitoring Timeframe**
Biogas Diversion to Biofilter	⁘ If biogas is passed through the biofilter, the date, time and reason (e.g. biogas flare failure or maintenance) must be recorded and reported as per Section 10.2.	Every occurrence	On-going
Lagoon Embankments	⁘ An inspection of the embankments must be conducted by the WWTP Engineer to check for cracks, holes, defects. ⁘ Photographs of the structure must be taken. ⁘ A record for the annual inspections (including photographs) is to be maintained. If there is any indication that the structures are not structurally sound (e.g. leakage, slumping, hollows, bulges, or defects on either the inside or outside walls): ⁘ Seek specialist advice immediately. ⁘ Notify Environment Southland within 48 hours (in accordance with Condition 7 of Resource Consent AUTH-20181937-01).	Annually	On-going
Lagoon Embankments	⁘ A suitably qualified person is to inspect the lagoon embankments to confirm that the structures have no visible cracks, holes, or defects that would allow effluent leakage. ⁘ If defects are found, notify Environment Southland in accordance with Condition 6 of Resource Consent AUTH-20181937-01.	Once only	2022

8.0 Nuisances and Complaints

8.1 Odours and Spray Drift

Under normal operation, odours and spray drift from the site should be negligible and not perceivable beyond the perimeter fence boundary. If an odour or spray drift complaint is received, the complaint must be investigated immediately along with an investigation of the likely source and mitigation measures as detailed:

1. Visit the address of the complainant.
2. Note the wind direction and the likely direction of the source.
3. Note the characteristics of the odour, intensity and any objectionable nature of the odour.
4. If the odour is likely to be coming from the WWTP, investigate the potential source and mitigate in accordance with Section 5.0.
5. Record the complaint as per Section 8.4.

8.2 Noise

Under normal operation, noise from the site (pumps and aerators) is unlikely to be a cause of complaint. However, in the case of a plant malfunction there is the potential for excessive noise production, therefore it is essential that the WWTP maintenance is adhered to.

If a noise complaint is received, the following action shall be undertaken:

1. Identify the noise source if from the WWTP.
2. If the noise is caused by a mechanical part of the WWTP, determine if the noise is 'abnormal'. If abnormal, turn 'noisy' equipment off and call an appropriate service technician.
3. Report the complaint as per Section 8.4.

8.3 Pests and Vermin

Vermin can become established at WWTP sites. However, vermin risk at the WWTP is not expected to be increased relative to the wider Blue Sky Pastures site. Regular poison baiting shall be conducted which will control vermin under most circumstances. If vermin population appears to be increasing, then a more intensive vermin control programme may be necessary thus seek expert advice.

Historically, gulls have been noted to congregate near the WWTP in large numbers. This congregation must not be allowed within the WWTP site, especially on the Anaerobic Lagoon cover as bird faeces will contaminate the stormwater discharge.

8.4 Recording of Nuisances and Complaints

All complaints are to be recorded in a "Complaint Form" (see Appendix E), this shall include a record of:

1. Time and type of complaint including details of the incident (e.g. duration, location and any effects noted).
2. Name, address and contact phone number of the complainant (if provided).
3. The weather conditions including wind direction, wind strength and temperature at the time of the incident.
4. The likely cause of the complaint and the response made by the consent holder (including any corrective action taken).
5. Future actions proposed as a result of the complaint.
6. The response from the consent holder to the complainant.

The complaint log (or 'diary') shall be made available to Environment Southland upon request.

9.0 Notification of Non-Compliance

The Health Safety and Environment Manager shall notify Environment Southland whenever a consent condition is breached due to any accidental discharge, plant breakdown, or other circumstances which have, or are likely to result in the performance standards of the Resource Consent being exceeded.

The procedure for non-compliance reporting is to be as specified in the applicable Resource Consent, however should always include:

1. Investigate the cause of the non-compliance.
2. Take steps to remedy any problems and engage specialist advice if required.
3. Provide notification to Environment Southland as soon as practicable and within 24 hours.
4. Provide written notification and detail to Environment Southland within 7 days of the event occurring.

10.0 Reporting and Record Keeping

10.1 Routine Maintenance and Repairs

Operators shall make direct reference to the specific manufacturer's instructions and this O&M manual with regards to all maintenance and repair events. All maintenance and repair events shall be logged on a digital system that is centrally linked for external access. Each log must include but is not limited to:

- Date and time of maintenance/repair.
- Staff member and/or company undertaking maintenance/repair.
- Item serviced/repaired (including specific item numbers and models).
- Whether the maintenance/repair event is routine or an emergency.
- A full system check after maintenance/repair and all alarms cleared (if present).
- Inventory status of any spare parts (e.g. bearings, lubricants, spare pumps).
- The next scheduled date for maintenance.

Any significant repairs or maintenance events shall be reported to the General Manager Operations and distributed amongst all WWTP Operators within 24 hours of occurrence.

10.2 Monitoring Data

All sampling and monitoring results and records as required by this O&M Manual shall be made available to Environment Southland in an organised format.

Additionally, the following reporting is required:

1. The effluent sampling for the WWTP shall become part of the annual report required for the consent conditions under the existing Consent No. 201191.
2. For all groundwater (land drainage water) and surface water sampling, BSP shall report the results in writing to Environment Southland (escompliance@es.govt.nz) within 30 days of the receipt of the sample results. The report shall include:
    - The location of the samples.
    - Comparison of the land drainage water and the water in the drain.
    - Comments on any contamination of the land drainage water samples by wastewater.

3. If the biofilter is used for biogas discharge (as opposed to the biogas flare) for more than 20 days in the calendar year ending 31 December, then a report specifying the dates and reason for these occurrences must be submitted to Environment Southland within 60 days.

Appendix A

WWTP Functional Description

BLUE SKY MEATS LTD
NEW WASTEWATER TREATMENT PLANT
FUNCTIONAL DESCRIPTION

1.0 General Requirements

1.1 Introduction

This Functional Description (FD) describes the control requirements for PLC programming of the Blue Sky Meats (BSM) Wastewater Treatment Plant (WWTP).

The following sections describe the operational requirements along with equipment control tables.

This document shall be read together with the full Specification and the piping and instrumentation diagram (P&ID):

- P&ID: A03220201
- P&ID Key: A03220201

1.2 Process Flow Overview

Incoming influent from the Blue Sky Meats slaughterhouse and rendering plant enters the existing Flow Equalisation Basin and the Lift Pump Station.

Effluent will be pumped from the Lift Pump Station to the covered Anaerobic Lagoon and Sequencing Batch Reactor (SBR) during pre-determined time periods. The flow split to Anaerobic Lagoon and SBR (bypassing the Anaerobic Lagoon) will be operator selected.

Effluent from the Anaerobic Lagoon will transfer via gravity to the SBR.

During the decant time period (refer to Section 2.0), effluent will be pumped from the SBR to the Irrigation Lagoon.

From the Irrigation Lagoon the treated wastewater will be irrigated to land utilising the existing Irrigation Pumps and control equipment.

Sludge will be wasted from the SBR via a new sludge pump that will discharge directly into the irrigation pipeline downstream of the existing irrigation pumps.

Biogas will be drawn off below the Anaerobic Lagoon cover to the biogas flare via a packaged blower and flare unit. A biofilter will be operated on a contingency basis in the event that the flare is unavailable due to maintenance or failure.

1.3 Scope

The Contractor shall supply and install all electrical and telemetry hardware and connections necessary for the control of the equipment shown on the P&ID and within this FD.

The Contractor shall allow for their staff to be onsite together with the Engineer and BSM for testing and commissioning of the treatment plant in accordance with this FD.

1.4 General Site Control Information

The BSM WWTP shall incorporate three components which are interlinked for control purposes. The control systems in MCC-B shall be programmed to meet the functional description control requirements described in this document.

The WWTP components and location of the control shall be:

1. Existing Irrigation Pump Station Operations (MCC-A);
2. New WWTP Equipment (MCC-B);
3. Biogas System (Proprietary Package) (MCC-C);

In general terms, the BSM WWTP will be fully automated and will be controlled using a PLC system. The PLC shall be an Allen Bradley unit.

Remote monitoring and SCADA access shall also be provided for into the existing system and the biogas system via Ethernet connections.

1.5 Control Mode – Automatic and Manual

The control system shall allow the operator the ability to change the control mode of any pump, mixer or aerator by selecting the following states:

‘Auto’	Control is automatic by the PLC programme
‘Manual’	Control is no longer automatic and select motors can be run manually from the field
‘Off’	The item is turned off/closed out and will not be used during automatic control

Remote-Manual intervention from the SCADA computer shall be available in which a supervisor can place a pump into Remote control and run a pump to confirm operation. The pump will stop on low level.

1.6 HMI Screen Display

A Contractor supplied human machine interface (HMI) screen shall be located in MCC-B. The HMI screen shall be generally based on the P&ID drawing. Multiple pages are likely to be required to accommodate the P&ID graphical display.

An operator password system is required for the HMI.

The operational displays are to include graphical representation and trending of the following:

1. Motors that are operational;
2. Per VSD:
    a. Motor speeds;
    b. Motor Voltage;

c. Motor Current;

d. Line Current;

e. Motor Power – Active;

f. Motor Power Factor;

3. Hours run for each pump, aerator and mixer;
4. Local manual control buttons for motor start, stop, reversing and speed control;
5. Lift Pump Station Wetwell water level;
6. Anaerobic lagoon water level;
7. SBR water level;
8. Discharge flows (all flow meters);
9. Motor status, alarms and long-term trends of flow rate and process variables;
10. Report generation (refer Section 1.8);
11. Operator set point and parameter changes within the software program (via a password protected menu);
12. Other operational parameters as required by BSM.

The colour of the motor icons on the SCADA screens shall be clear and in-line with industry best practice. Use of colour is reserved to animating abnormal conditions – e.g. yellow denotes warning condition, red denotes alarm.

1.7 Trending

A single standard trend page shall be available from the main overview screen. This trend shall show the following data points, staggered so that all pen traces are discernible.

- Motor currents;
- Motor speeds;
- Lift Pump Station level;
- SBR Level;
- Anaerobic Lagoon Level;
- Discharge Flows;
- Biogas Flows;

This should be available with ‘1-click’ and always revert to standard scaling. An operator should be able to temporarily alter any pen’s scaling or trend timebase.

1.8 Power Failure

A battery and battery charger system shall keep the PLC running in the event of power failure to the site.

Motors shall restart automatically in ‘Auto’ mode once power is restored.

1.9 Alarms

Industry best practice SCADA standards for alarm annunciation shall be followed.

A dedicated alarm page shall be provided on the HMI screen that includes alarm name, description, date and time.

Alarming shall occur on:

- Power failure alarm;
- Loss of radio telemetry link;
- Motor fault alarm;
- Motor over temperature alarm;
- Motor water ingress protection alarm;
- Motor over or under current alarm;
- VSD fault alarm;
- Low level alarm – Lift Pump Station;
- High-high level alarm – Lift Pump Station;
- High level alarm – Anaerobic Lagoon;
- Low level alarm – SBR;
- High level alarm – SBR;
- Low Pressure Alarm – Irrigation System
- High Pressure Alarm – Irrigation System
- High High-Pressure Alarm – Irrigation System
- Security/intruder alarm on MCC-B door switch.

All of the alarms listed above shall be transmitted to the central SCADA system.

Acknowledged alarms that are still in the alarm condition must remain on the alarm list until cleared.

Previously acknowledged alarms that have cleared shall disappear. Unacknowledged alarms that are now cleared shall remain on the alarms list until acknowledged at which time they will be removed.

In the event of an alarm, the site PLC must continue to control pumps in accordance with the FD.

1.10 Reports

Reports are to be configured as follows in a clear and well laid out appearance.

1.10.1 Daily Performance Reports

Content to include:

- Peak daily, average daily and minimum daily flow rates and daily totalised flows (all flow meters);
- Peak daily, average daily and minimum daily pH;
- Peak daily, average daily and minimum daily DO;

1.10.2 Weekly Performance Reports

Content to include:

- Totalised and average flows for the week (all flow meters);
- Average weekly pH;
- Average weekly DO;

1.10.3 Monthly Asset Operation Reports

Content to include:

- Totalised and average flows for the month (all flow meters);
- Average monthly pH;
- Average monthly DO;
- Table of hours run for all motors during the month;
- Table of totalised hours run readings for all motors;
- Totalised power consumption for the month.

2.0 Lift Pump Station and SBR Control

2.1 Equipment Reference

Equipment relevant to this section includes:

- P1: Lift Pump 1 – to Anaerobic Lagoon
- P2: Lift Pump 2 – to SBR Reactor
- P3: SBR Decant Pump – to Irrigation Lagoon
- M1: Mixer 1
- M2: Mixer 2
- A1: Aerator 1
- A2: Aerator 2
- A3: Aerator 3
- LT1: Level Transducer – Lift Pump Station
- LT2: Level Transducer – SBR
- LT3: Level Transducer – SBR (back-up)
- LT4: High Level Alarm Level Transmitter – Anaerobic Lagoon
- LSH1: High Level Alarm Float – Lift Pump Station Wetwell
- LSL1: Low Level Alarm Float – Lift Pump Station Wetwell
- LSH3: High Level Alarm – SBR
- LSL3: Low Level Alarm – SBR
- FT1: Flow Meter – Anaerobic Lagoon Influent
- FT2: Flow Meter – SBR Influent
- FT3: Flow Meter – SBR Decant
- FT4: Flow Meter – WAS
- DT: DO Transducer
- NT: pH Transducer

2.2

2.2 Control Description

The SBR Cycle Start Time shall be programmed to commence at 07:00 each day (not operator adjustable), to coincide with the start of processing at the site. The SBR cycle is 6 hours long, and therefore there will be four cycles per day (0700 – 1300, 1300 – 1900, 1900 – 0100, 0100 – 0700).

The speed of P1 and P2 shall be controlled through a control loop (PID Controller) working to maintain a certain level in the Lift Pump Station, while also limiting the total volume transferred each 6-hour SBR cycle via the calculated volume based on the previous day's totalised wastewater flow or by an operator selected cycle volume.

If a high level is detected in the Lift Pump Station then the overriding status shall be that P1 shall START to transfer from the Lift Pump Station to the Anaerobic Lagoon until the high level alarm is no longer detected, regardless of the SBR phase.

On START P1 and P2 shall ramp up from 0 to 30 Hz in 5 seconds, and then have a maximum ramp rate (up and down) of 1 Hz per 1 second. The minimum run speed is 30 Hz. On STOP the ramp shall be 30 to 0 Hz over 5 seconds.

When an aerator is called to START (ON) it shall remain running for a minimum time period of 10 minutes before stopping if called to STOP (OFF). Similarly, when an aerator is called to STOP (OFF) it shall remain stopped for a period of 10 minutes being starting if called to START (ON).

The aerators shall include an automated roster changeover so that the START sequence is rotated on a weekly basis.

2.2.1 Flow Split to Anaerobic/SBR Lagoons

The flow split from the Lift Pump Station to the Anaerobic Lagoon and SBR Lagoon shall be automated by PLC control.

The Cycle Volume (Table 1) shall be calculated by one of two selectable options:

1. Based the previous days totalised wastewater flow, as measured by the Anaerobic Lagoon Influent and SBR Influent flow meters; or,
2. An operator selected Cycle Volume (as specified in Table 3).

The flow split between P1 Volume to Anaerobic Lagoon and P2 Volume to SBR shall be calculated based on the user adjustable ‘Anaerobic Lagoon Bypass Set Point’, as outlined in Table 1.

Table 1: Transfer Split to Anaerobic Lagoon and SBR

Parameter	**Comment**	**Value (m^3)**
Totalised Daily Anaerobic influent Flow (measured from 00:00 to 23:59)	From FT1	A
Totalised Daily SBR Influent Flow (measured from 00:00 to 23:59)	From FT2	B
Total Previous Day Flow	From calculation	A + B
Cycle Volume	Option 1: Cycle Volume from calculation	(A + B)/4
	Option 2: Cycle Volume Operator selected	C
P1 Volume to Anaerobic Lagoon	From calculation	Cycle Volume * (100% - Anaerobic Lagoon Bypass Set

		Point)
P2 Volume to SBR	From calculation	Cycle Volume * Anaerobic Lagoon Bypass Set Point

2.2.2 Level Transmitters

Under normal operation LT2 will be the duty level transmitter in the SBR lagoon. LT3 will be a standby unit. The level readings from the duty and standby level sensors are continuously compared and if the difference exceeds a maximum setpoint then an alarm shall be generated. If the duty level transmitter fails (loss of echo), the standby level transmitter is used to measure the level and control the pumps. The duty level transmitter shall be operator selectable.

Control functionality for the Lift Pump Station and SBR equipment is outlined in Table 2 and operator adjustable set-points are outlined in Table 3.

2.2.3 Equipment Control Tables

Table 2: Lift Pump Station and SBR Process Control

Timer Control (Phase)	Secondary Controllers	Parameter/Condition	Action
Fill/Mixing Time: 0 – 60 min <u>Overriding Equipment Status</u> P3 OFF P1 ON if high level alarm in Lift Pump Station Mixers ON Mixers OFF if SBR Level Alarm Low Aerators OFF	Flow	Volume Transferred to SBR as measured by FT2 < P2 Cycle Volume	P2 ON
		Volume Transferred to SBR as measured by FT2 > P2 Cycle Volume	P2 OFF
	Level	Level < Lift Pump Station Control Level	P2 ramp DOWN on VSD to maintain level = Lift Pump Station Control Level
		Level > Lift Pump Station Control Level	P2 ramp UP on VSD to maintain level = Lift Pump Station Control Level
		LAL1 = ON (Low Level in Lift Pump Station)	P2 OFF
		LAH3 = ON (High Level in SBR)	P2 OFF
	pH	pH < Low pH set point	Low pH alarm ON P2 OFF
Aerate Time: 60 – 240 min	DO	DO > DO Set Point 1	Aerator 1 OFF Aerator 2 OFF

			Aerator 3 OFF
<u>Overriding Equipment Status</u> P1 ON if high level alarm in Lift Pump Station Mixers OFF and Aerators OFF if SBR Level Alarm Low P2 & P3 OFF Mixer 1 ON when 2 or less aerators ON Mixer 1 & 2 ON when 1 aerator ON		DO Set Point 2 < DO < DO Set Point 1	Aerator 1 ON Aerator 2 OFF Aerator 3 OFF
		DO Set Point 3 < DO < DO Set Point 4	Aerator 1 ON Aerator 2 ON Aerator 3 OFF
		DO < DO Set Point 4	Aerator 1 ON Aerator 2 ON Aerator 3 ON
	pH	pH < Low pH set point	Low pH alarm ON
	Flow	Volume Transferred to Anaerobic Lagoon as measured by FT1 < P1 Cycle Volume * (100% - Anaerobic Lagoon Bypass Set Point)	P1 ON
		Volume Transferred to Anaerobic Lagoon as measured by FT1 > P1 Cycle Volume * (100% - Anaerobic Lagoon Bypass Set Point)	P1 OFF
	Level	Level < Lift Pump Station Control Level	P1 ramp DOWN on VSD to maintain level = Lift Pump Station Control Level
		Level > Lift Pump Station Control Level	P1 ramp UP on VSD to maintain level = Lift Pump Station Control Level
		LAL1 = ON (Low Level in Lift Pump Station)	P1 OFF
		LAH2 = ON (High Level in Anaerobic Lagoon)	P1 OFF
Settle Time: 240 – 300 min <u>Overriding Equipment Status</u> P1 ON if high level alarm in Lift Pump	Level	LAH3 = ON (High Level in SBR)	P3 ON
		LAH3 = OFF	P3 OFF

Station P2 OFF Mixers OFF Aerators OFF			
Decant Time: 300 – 360 min <u>Overriding Equipment Status</u> P1 ON if high level alarm in Lift Pump Station P2 OFF Mixers OFF Aerators OFF	Level	LSL3 = OFF	P3 ON
		LSL3 = ON	P3 OFF

Table 3: Lift Pump Station and SBR Set Points

Control Item	Units	Scale	Default Value
Operator selected Cycle Volume[1]	m^3	0 - 300	250
Anaerobic Lagoon Bypass Set Point	%	0 – 100	30%
Lift Pump Station Control Level Set Point	Metres of water	0.0 – 3.0	0.70 m
Lift Pump Station Level Alarm High	Metres of water	0.0 – 3.0	1.50 m
Lift Pump Station Level Alarm High-High	Metres of water	0.0 – 3.0	1.90 m
Lift Pump Station Level Alarm Low	Metres of water	0.0 – 3.0	0.50 m
Aerator stage start/stop time interval	Minutes	0 – 60	10 min
SBR DO Set Point 1	Milligrams per litre	0.00 – 10.00	4.0 mg/L
SBR DO Set Point 2	Milligrams per litre	0.00 – 10.00	3.0 mg/L
SBR DO Set Point 3	Milligrams per litre	0.00 – 10.00	2.0 mg/L
SBR DO Set Point 4	Milligrams per litre	0.00 – 10.00	1.0 mg/L
SBR Low pH Set Point	pH units	0 – 14	6.5
SBR Level Switch Low	Metres of water	0.0 – 4.0	3.33 m
SBR Level Switch High	Metres of water	0.0 – 4.0	3.50 m
SBR Level Alarm High	Metres of water	0.0 – 4.0	3.60 m
SBR Level Alarm Low	Metres of water	0.0 – 4.0	3.20 m
SBR LT Maximum Discrepancy	Metres of water	0 – 0.100	0.020 m
Anaerobic Level Alarm High	Metres of water	0.0 – 5.0	3.50 m
Decant Pump (P3) Flow Limit Set Point	Litres per second	0 – 30	28 L/s

Notes:

1. The operator selected cycle volume will be used to determine the cycle volume only if initiated by the selector switch, otherwise the cycle volume will be calculated via Table 1.

3.0 Waste Activated Sludge Pump

3.1 Equipment Reference

Equipment relevant to this section includes:

- P5: WAS Pump – from SBR to Irrigation Pipeline
- FT4: Flow Meter – WAS
- PT1: Pressure Transmitter – Existing on Irrigation Line
- PT2: Pressure Transmitter – Bursting Disc Rupture Indicator

3.2 Control Description

P5 shall be manually operated via a START/STOP button on the HMI.

P5 shall STOP if a low level alarm is triggered in the SBR.

The pump speed shall be operator adjustable via the HMI.

There is an existing pressure transmitter (or transmitters) on the irrigation system (not shown on the P&ID) (PT1). This pressure transmitter activates two existing alarms:

- Low Pressure Alarm – Irrigation System;
- High Pressure Alarm – Irrigation System.

P5 shall STOP if either of these alarms is triggered.

There is an emergency pressure relief bursting disc installed at the Waste Activated Sludge Pump pipework (PT2). This bursting disc has an electronic burst sensor. PT2 is not shown on the P&ID.

Rupture of the bursting disc will trigger the High High Pressure Alarm – Irrigation System. P5 shall STOP if this alarm is triggered.

4.0 Biogas Flare System

All PLC programming for the biogas flare system will be undertaken by Winsdor Engineering Ltd who will be engaged directly by Blue Sky Meats outside of the Contract Works.

The Biogas Blower and Fan system is a packaged system supplier by Windsor Engineering Ltd which includes all equipment and instrumentation and will be supplied with its own PLC system which will be installed in the field adjacent to the flare unit (MCC-C). MCC-C will be connected to MCC-B by an Ethernet cable and all process information and control will be duplicated from MCC-C onto MCC-B.

A Functional Control Description for the biogas flare system prepared by Windsor Engineering is attached to this FD.

5.0 Anaerobic Lagoon Cover Stormwater Pump

5.1 Equipment Reference

Equipment relevant to this section includes:

- P4: Stormwater Pump – from Anaerobic Lagoon Cover to Drain
- LSL: Level Switch (Float) Low – Pump STOP

5.2 Control Description

The Stormwater Pump shall be manually started and stopped by the operator by the field mounted ON/OFF switch.

The pump shall STOP if a low level float in the pump sump is triggered.

Attachment 1: Windsor Engineering Functional Description for Biogas Flare System

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Blue Sky Meats Flare 06/06/19

The flare control panel will have a colour touch screen mounted on the front face. All control actions, feedback, alarms etc will be via this HMI. In addition to this the site Scada will have the ability to view and control the flare via a table of words specifically addressed for this function if required. We will address these to a continuous block of words at this stage undefined.

The following is the basic control logic for control of flare;

Flare is enabled or stopped at HMI. Once enabled the inlet pressure is checked if above (Start pressure) 1mBar then flare is allowed to try and start. via OP0.0 energising R10.
As the Kromschroder (BCU370) programmer proceeds through start cycle the suction fan will receive a start signal OP0.3- R13. Fan runs at low speed until after flame is established, R14 releases the fan to modulate.
If burner fails to lite [BCU permits 4 re-start attempts before lockout] the system will go to lockout R4. The system can be reset at HMI with a 2sec [max] on pulse of R12.
Once burner lites R2 is energised and after short stabilisation time R14 is energised to allow modulation control of inlet pressure. NOTE; The fan control is inverse logic. The lower (-) the SP value the greater the output needs to be to achieve this.
The control SP is -0.3 mBar and maximum low pressure suction cut off will be -0.4mBar. [it is suggested that a small time delay be put on this low level stop point to overcome process dips in line pressure that would cause a nuisance shutdown. Flare run timer]
The high pressure SP is suggested to be 1 mBar however this should not prevent flare from operating but should generate an alarm. If a hi limit alarm or high pressure SP is reached during the stop time delay period then over ride timer and restart flare.
The flare can operate continuously if within these pressure SP. Once the low pressure set point is reached both the flare and fan stop.
After time delay if pressure is above 1 mBar then flare can repeat as above to re-lite.
If a Lockout occurs; alarm OP0.5 is on. Keep fan on at LSP. Alarm also for fan fault. Reset at HMI is required for both Lockout alarm and Fan fault alarm. Alarm for high pressure at inlet.

The range of instrument to be fitted to flare;
Inlet pressure transducer range -10 mBar to 10 mBar. Flow 0-1000 cubic metres range. Temperature 0-1200 C.
The flow and temperature inputs are display only, no control function.

VSD will have LSP set at 15Hz and HSP at 60Hz, we prefer these to be set in drive unit for added safety. HMI will therefore display speed in %.

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- In setup the following options need to be available in Level 1 password page;

Suction LSP	-10 mBar	Flare shutdown when below
Suction HSP	10 mBar	Alarm only
Flare stopped timer	0-120 minutes	Times recovery of pond pressure
Flare run timer [suction low]	0-10sec	Maintained <= LSP to stop flare
Lockout reset pulse	0-3000ms	Reset pulse of BCU370
VSD reset pulse	0-3000ms	Reset VSD
Suction control SP	-10 to 2 mBar	Nominal running pressure

- In level 2 password page we need ability to adjust the fan tuning PID setup including % output of fan and manual control of output.

- On a separate page with password;
Manual control of fan start/stop and speed. Default speed to low speed. This page needs to be interlocked so it [A] Can't be accessed if flare is enabled/running. [B] On leaving this page all manual switches are reset to open /off, or flare can't be enabled until this page is turned to off conditions. [A fault tag would be required to indicate this].
If fan is in manual flare can not be enabled for start. [On attempt to enable needs alert tag to indicate process state].

Suggested list of addressed word data in and out for Scada remote access;

Inlet Pressure PV	R		
Flare flow rate	R		
Flare temperature	R		
Suction fan speed %	R		
Inlet pressure SP	R/W		
Flare run timer SV	R/W		
Flare stopped timer SV	R/W		
Flare run timer value	R		
Flare stopped timer value	R		
Flame stabilize timer SV			
Flame stabilize timer value.			

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Suggested list of addressed word bit data in and out for Scada remote access;

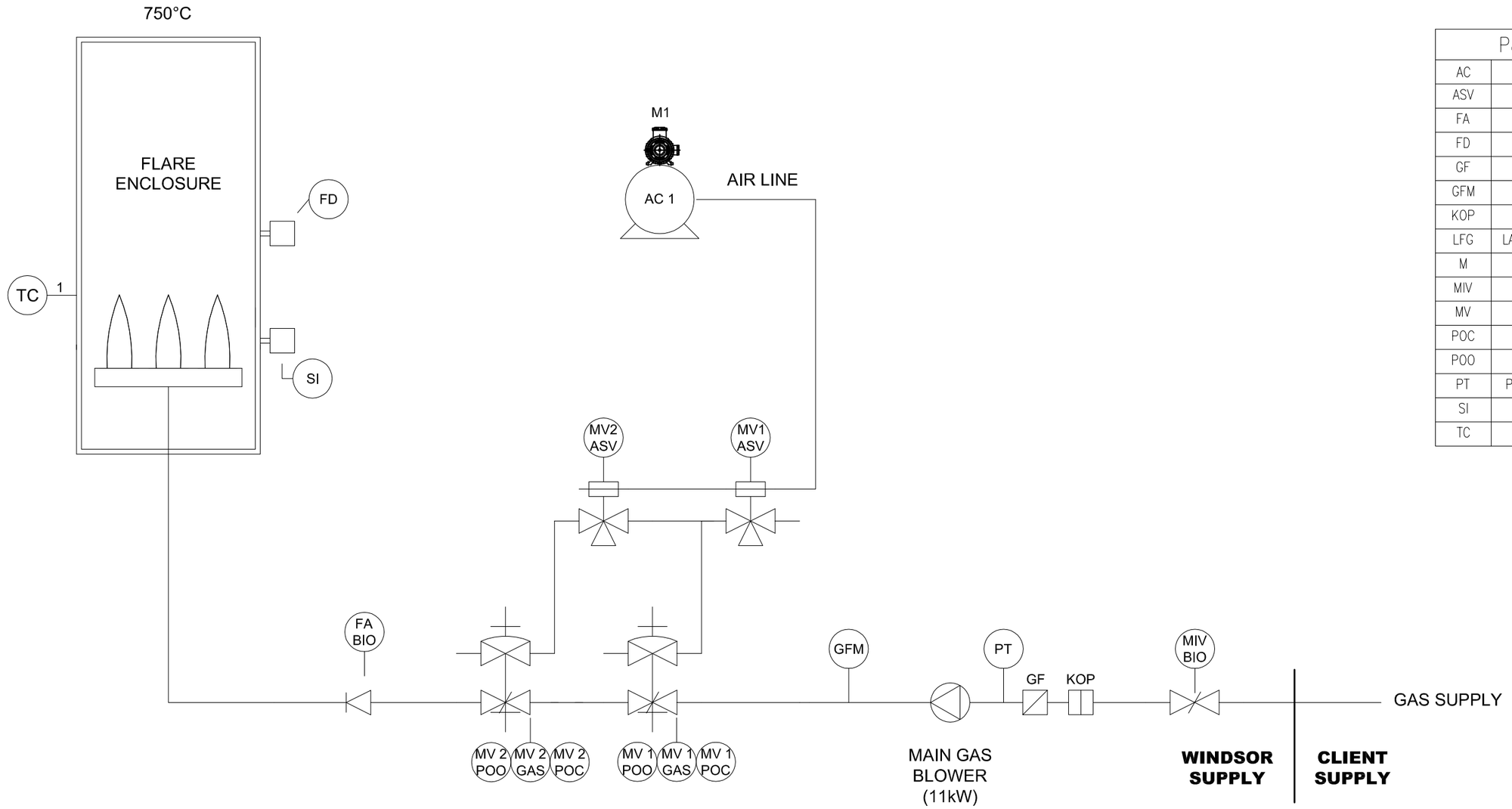
Flare enable p/b	W	Toggle on/off	
Burner reset p/b	W	Timed 2 sec 1 shot pulse	
VSD fault reset p/b	W	Timed 2 sec 1 shot pulse	
Emergency stop p/b operated.	R		
Burner RCBO fault.	R		
Fan VSD fault	R		
Fan VSD running.	R	>=LSP	
Fan start command	R		
Burner on	R		
Burner Lockout	R		
Bio-filter valve on	R		
Fan held on LSP	R		
Flare enabled	R	PLC feedback	
Bio-filter valve in Manual	R	PLC feedback	
Suction fan speed ref in manual.	R	PLC feedback	
Hi pressure alarm			

			P&ID CODE	DESCRIPTION	FUNCTION		
1	System Standby Condition	1	PT	Inlet gas Pressure - Pond gas pressure above 1 mBar	Confirm gas pressure at inlet to fan normal	yes	Continue
						No	Alarm until corrected
		2	TC 1	Temperature Control Thermocouple	Display temp only	yes	continue
		3	AC1	Air Pressure Switch made	Confirm air pressure is above 6 Bar	yes	Continue
						no	Alarm until corrected
		4	FD	Flame Detector Ultra Violet	Confirm no flame signal at flame amplifier	yes	Continue
						No	Shutdown
2	Initiate Start						
		5	MV1 PC & MV2 PC	Main Gas Valve 1 & 2 Proof of Close Limit Switch	Main Gas Valves proved closed	yes	Continue
						no	Alarm until corrected
		6	MV1 & MV2 LFG	Main Gas Valve 1 & 2 Landfill Gas source	Main Gas Valves proved closed	yes	Continue
						no	Alarm until corrected
		7	BLOWER	Extraction Blower	Extraction blower starts at minimum pre-set speed	yes	Continue
						no	alarm until corrected
		8	SI	Spark Igniter High Tension Transformer	Ignition transformer energized. 3 second delay		
					Ignition timer energized	yes	Continue
		9	MV1 & MV2 LFG	Main Gas Valve 1 & 2 Landfill Gas source	Main Gas Safety Valves energized	yes	Continue
						no	Alarm until corrected
		10	FD	Flame Detector Ultra Violet	Flame detected	yes	continue
						no	initiate ignition cycle
		11	PLC	PLC Timer	Flame detected Ignition timer times out	yes	
		12	SI	Spark Igniter High Tension Transformer	Ignition transformer de-energized	yes	
		13	MV1 & MV2 PC	Main Gas Valve 1 & 2 Proof of Closure Limit Switch	Main Gas Valves proved open	yes	Continue
						no	Alarm until corrected
		14	TC 1	Temperature Control Thermocouple -	Temperature Controller monitoring temperature only for display		
		15	PLC	PLC Timer	Initiate delay timer	yes	
		16	BLOWER	Extraction Blower	Extraction blower released to modulate mode	yes	Continue
					Modulation control is:		
		17	PT	Inlet gas Pressure – Pond gas	4-20 mA signal from pressure transducer fitted at inlet to extraction fan		

Table 2: Start up and Operation Logic

TOLERANCE TO WEGL SPEC | DIMENSIONS IN MILLIMETRES U.O.S. | DO NOT SCALE PRINT | IF IN DOUBT – ASK

REV	INIT & DATE



P&ID CODE	
AC	AIR COMPRESSOR
ASV	AIR SOLENOID VALVE
FA	FLAME ARRESTOR
FD	FLAME DETECTOR
GF	GAS FILTER
GFM	GAS FLOW METER
KOP	KNOCK OUT POT
LFG	LANDFILL or BIOGAS GAS
M	ELECTRIC MOTOR
MIV	MANUAL INLET VALVE
MV	MAIN VALVE
POC	PROOF OF CLOSE
POO	PROOF OF OPEN
PT	PRESSURE TRANSDUCER
SI	SPARK IGNITOR
TC	THERMO COUPLE

Windsor Engineering
www.windsor.co.nz

ITEM NO. OR DESCRIPTION OF COMPONENT TO BE MANUFACTURED	MAKE QTY	PACK QTY	MADE BY	CH'KD BY

G.A. DRG. TABLE	
BOM APPROVED	
BOM RELEASED	
DXF CHECKED	
PAINT/GALV. SPEC	
PACKING LIST	

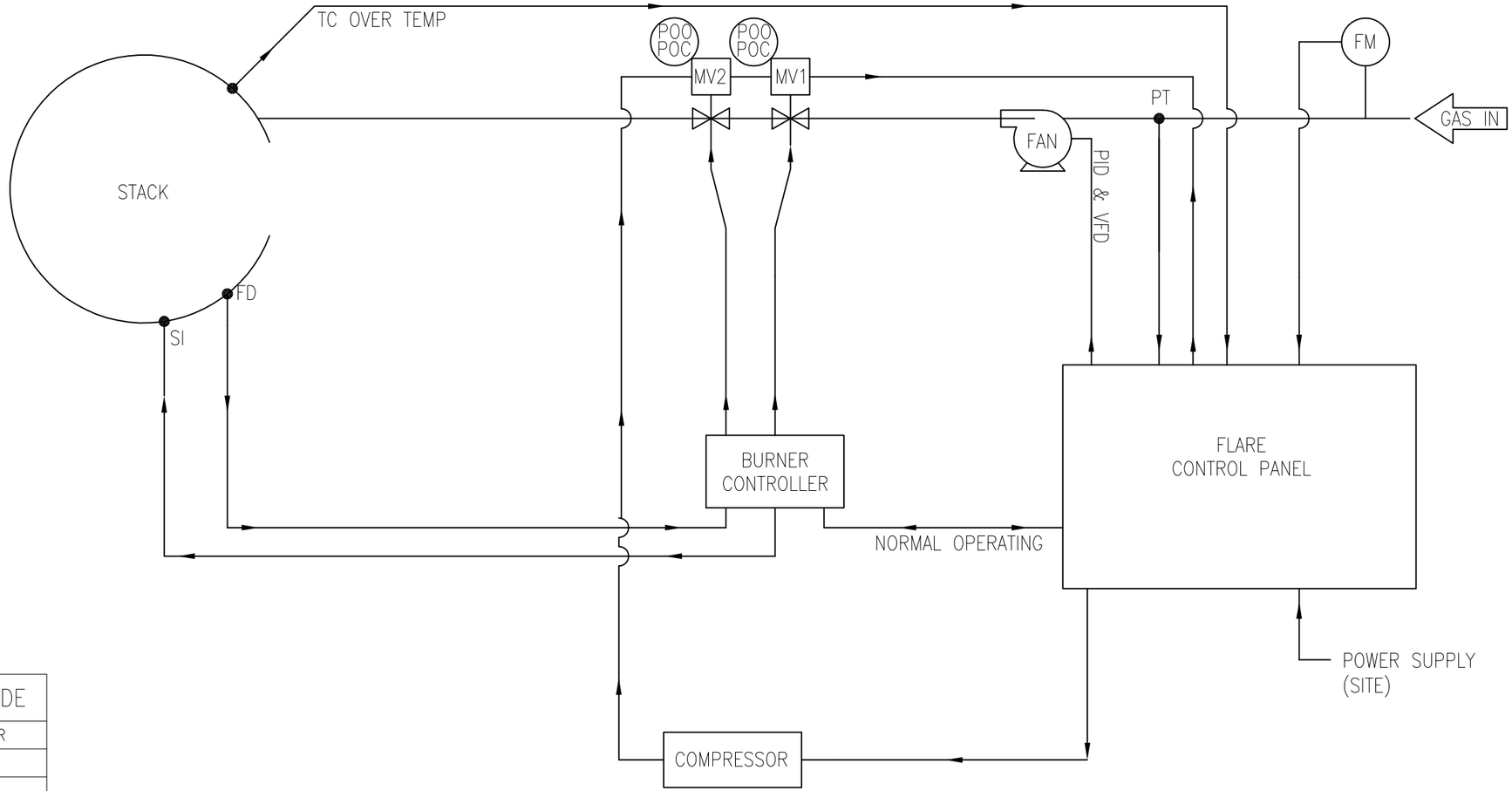
GENERATED FROM:
SCALES: 1:1
DRAWN JKH DATE 11/02/2019
CHECKED AK DATE 8/03/2019
STD APPROVED DATE

CATEGORY: REF. ONLY
STATUS: CHECKED
JOB: 11831
UPDATE?
SUBCODE: E
SHEET SIZE: A3

TITLE: P&ID DRAWING FOR PATTLE DELAMORE PARTNERS LTD
DRAWING NUMBER: A3-11831-005-1 SHT 1 of 1
REVISION: A

TOLERANCE TO WEGL SPEC | DIMENSIONS IN MILLIMETRES U.O.S. | DO NOT SCALE PRINT | IF IN DOUBT – ASK

REV	INIT & DATE



LOGIC DIAGRAM CODE	
FD	FLAME DETECTOR
FM	FLOW METER
MV	MAIN VALVE
PID	PID CONTROL LOOP
POC	PROOF OF CLOSE
POO	PROOF OF OPEN
PT	PRESSURE TRANSDUCER
SI	SPARK IGNITOR

Windsor Engineering
www.windsor.co.nz

ITEM NO. OR DESCRIPTION OF COMPONENT TO BE MANUFACTURED	MAKE QTY	PACK QTY	MADE BY	CH'KD BY	
					G.A. DRG. TABLE
					BOM APPROVED
					BOM RELEASED
					DXF CHECKED
					PAINT/GALV. SPEC
					PACKING LIST

GENERATED FROM:
SCALES: 1:1
DRAWN JKH DATE 11/02/2019
CHECKED AK DATE 8/03/2019
STD APPROVED DATE

CATEGORY: REF. ONLY
STATUS: CHECKED
JOB: 11831
SUBCODE: E
UPDATE?
SHEET SIZE: A3

TITLE: LOGIC FLOW DIAGRAM FOR PATTLE DELAMORE PARTNERS LTD

DRAWING NUMBER: A3-11831-004-1
SHT 1 of 1
REVISION: A

Blue Sky Meats NZ LTD

Operation and Maintenance Manual

For

Bio-Gas Flare

Model: GF500C

Job No. 11831

INDEX

1. INTRODUCTION

1.1 OVERVIEW

This manual provides instructions for the operation and maintenance of the bio-gas flare installed. It is important that the instructions and procedures set out in this manual are observed by the operators of the flare system.

The flare is designed to oxidise odorous gases extracted from the landfill/digester pond. The installation consists of a single burner and associated control equipment mounted within its own compound a short distance from the pond site. A purpose designed pipeline and system of collection pipes conveys the gas from the capped pond to the flare compound.

The gas extraction fan blows the gas through the pipework of the flare where it is ignited by a high-tension spark ignitor. The gas flowrate is controlled to maintain certain gas conditions by slowing down or speeding up the extraction fan.

1.2 CONTROL SYSTEM

A burner control panel is located on the flare support tower. One half of the burner panel contains the main circuit breaker and the variable speed controller for the gas extraction fan. The other half contains the Programmable Logic Controller (PLC) to control start up and operation of the flare, HMI touch screen and the extraction fan control system as well as the Krom Schroder Burner Controller Unit (BCU 370).

1.3 GAS BURNER AND PIPEWORK

The supplied biogas burner is especially suited to biogas, maximising aeration for improved flame stability, as the gas has potentially variable quality. An adjustable flame deflector is used to alter aeration and flame conditions. This is adjusted during commissioning and should not be subsequently changed.

The burner is ignited with a direct spark ignition system. Flame is monitored through an Ultra Violet (UV) sensor calibrated for the unique wavelength of methane combustion. A shroud provides basic protection to the flame root from the wind and other elements. During normal operation the flame will extend beyond the shroud.

The biogas is transported to the burner through an integrated gas train which includes a gas extraction fan, flame arrestor and safety shut off valves. The gas has been de-watered prior to the gas train but a final 'trim' knockout pot is included to help remove any remaining moisture. The burner and pipework are discussed in more detail in **Section 3** of the manual.

1.4 OPERATION

The flare is mounted within its own compound a short distance from the capped digester pond.
The flare is designed to oxidise hazardous and odorous gases generated at the digester pond. A purpose designed pipeline and system of collection pipes transports the gas from the pond to the compound.

The flare consists of a purpose designed alloy steel combustion head, residence chamber and associated control equipment.

A burner control panel is located on the burner support tower. This panel houses the burner flame safety system, the inverted frequency drive controller controlling the speed of the gas extraction fan, the PLC system to control the start up and operation of the flare and the HMI (touch screen) to allow operators to operate the system from the control panel. Remote monitoring and control is possible if a suitable communication system is installed by the owner.

The gas extraction fan is an integral part of the flare installation. The flare is ignited automatically using a high tension spark igniter. An HMI screen mounted on the burner control panel permits starting or shutdown of the flare system and it also supplies information on the operating parameters of the flare. The flare is designed for continuous operation. Details of the various components of the flare are included in relevant sections of this manual.

1.5 MAINTENANCE

The flare requires maintenance to continue to operate correctly. For more information on routine servicing and maintenance requirements, refer to **Section 5**.

2. EMERGENCY PROCEDURES

NOTE
This installation incorporates a proprietary design flame arrestor. This unit prevents any flame from passing beyond it into the pipework associated with the safety system or the landfill site reticulation

UNCONTROLLED FIRE IN THE GAS BURNER SYSTEM
Shut down the system at the burner control panel control centre.
The gas burner will shut down automatically.
If possible close the manual isolation valve on the gas supply to the gas burner system.
Isolate the electrical supply to the burner control panel.
If the fire does not go out use the EMERGENCY ALARM to call the fire brigade.

HOT SPOTS
If an unusual hot spot is detected around the flare:
Protect the area so that there is no danger to personnel or property.
Shut down the gas burner system via the normal shutdown procedure.
The cause of the hot spot should be determined and rectified before restarting the system.
If situations dangerous to personnel and property have developed as a result of a hot spot use the EMERGENCY ALARM system.
Call the fire brigade if necessary.

ELECTRICAL HAZARD
Isolate 415VAC power from the gas burner control via the master isolator at the main control panel.
Call a trained electrical service technician.

GAS LEAK
Close down the gas burner via the normal control system and isolate electrically.
Isolate the gas supply at the nearest valve upstream of the leak. Where possible ensure adequate natural ventilation. Call a trained gas service technician. Once the area has been made safe, have a trained gas fitter trace and repair the leak before turning on the gas supply.

2.1 HAZARD ASSESSMENT

The following safety hazards and measures for reducing risk are highlighted.

Hazard	Risk Reduction Method
Electrical shock from Burner Control Panel.	• Ensure that only qualified personnel work on electrical devices and that the devices are isolated and tagged before work commences. • Refer to manufacturers leaflets before working on proprietary equipment.
Electrical shock from field devices (Solenoid valves, Pressure switches, Modulation motors, Flame sensors, Fan motors.) NB: These are normally 230 VAC, but sometimes are 24 VAC.	• Ensure that only qualified personnel work on electrical devices and that the devices are isolated and tagged before work commences. • Refer to manufacturers leaflets before working on proprietary equipment.
Gas leakage from control train items.	• Ensure only qualified personnel work on gas train items and that gas supplies to these items are isolated, and where appropriate purged and tagged before work commences. NB: All work on gas train items must be carried out in accordance with applicable gas codes and regulations by personnel with the appropriate gas fitting qualifications. • Report any smell of gas to your supervisor, who must take appropriate action. • Ensure access to manual isolation valves is maintained at all times.
Burns from burner head area (The burner casings may become hot adjacent to the burner mounting flange area during operation).	• Assume that all burner surfaces will be hot if the burner has been on. Wear gloves.
Burns from combustion chamber and ducting (the combustion chamber, ducting, and particularly the exhaust flue, may be hot after the system has been in operation).	• Assume that all ducting surfaces are hot if the gas burner has been on. Do not lean on or rub against the gas burner system at any time. Wear gloves.
Motors being started while work is being done on combustion air fans.	• Fans should always be electrically isolated and hold cards / padlocks fitted before commencing work on the fan.
Explosion / fire caused by vapours released from product being processed.	• Ensure ventilation rates are maintained by keeping supply, exhaust, and combustion air fan intakes clean and free from obstruction.

2.2 LOCKOUT PROCEDURE

Before working on any moving machinery i.e. fan, valves, etc.

The machinery must be isolated

- Identify site lockout protocols where applicable.
- Identify equipment to be isolated.
- Switch off equipment before isolating. **Do not try to isolate if equipment is running.**
- If a local isolator is fitted
  - Isolate, use a suitable label (Hold Tag) and where possible a padlock.
  - Attempt to start the equipment to ensure the correct supply/control has been isolated and to prove the isolator is working.
- If there is no local isolator
  - Identify the point of supply, (MCC).
  - Isolate, use a suitable label (Hold Tag) and where possible a padlock.
  - Attempt to start the equipment to ensure the correct supply/control has been isolated and to prove the isolator is working.
- If there is more than one person working on different aspects of the machinery, then each person must attach their personalised card and lock.

SAFETY INFORMATION

This gas burner system was designed and installed to comply with the requirements of: New Zealand Standard: AS/NZS 5601.1:2013 Gas Installation and Australian Standard: AS 3814:2015 Industrial and Commercial Gas-Fired Appliances
No changes should be made to the operating procedures or the control system without prior reference to the manufacturers.
Failure to comply with this instruction may result in the system no longer complying with the above regulations.
There are severe penalties for operating burner systems that do not comply.

3. DESCRIPTION OF SYSTEM

3.1 GENERAL

The flare system is connected to a bio-gas extraction reticulation system consisting of a number of inter-connected pipework to a ring main. This ring main delivers the gas via a de-watering system to the flare location. The equipment within the flare compound comprises:

- Knock out pot with auto drain function
- Gas filter
- The landfill gas extraction blower
- Manual gas isolation valve
- Automatic gas isolation valves
- Flame arrestor
- High tension spark generator and ignition system
- Dynamic self check flame monitoring system
- Pressure transducer to monitor the landfill gas inlet pressure
- Gas burner and residence chamber.

3.2 RESIDENCE CHAMBER

The residence chamber consists out of 253MA stainless steel construction. There is one thermocouple in the residence chamber. This TC monitor the temperature of the chamber and provides over-temperature protection. The UV flame detector is mounted on the flare shroud which monitors the flame signal for the BCU.

3.3 LANDFILL GAS BURNER

The LFG burner is an integral part of the system. It is a purpose designed burner specifically designed for oxidizing the variable and low quality bio-gas.

3.4 COMBUSTION AIR DAMPERS

N/A on candle flares

3.5 GAS FILTER

This is a Dungs model GF40100/4 gas filter. It is specifically designed to filter out all particles greater than 50 micrometers to protect downstream fittings such as the safety shut off valves.

3.6 SPARK IGNITION SYSTEM

The flare is ignited through twin spark rods located near the exit of the gas urner. A dual coil transformer delivers 15000V of energy to the bio-gas by means of a five second spark. If the gas does not ignite at either stage the system goes into lockout.

3.7 FLAME MONITORING

The flame is monitored by a Krom Schroder UVC 1 dynamic self-checking ultra violet detector. This is a critical component in the gas safety system. If the detector cannot detect the flame then the system will lock out immediately.

3.8 LANDFILL GAS BURNER GAS TRAIN

The burner is provided with an integrated gas train incorporating the gas safety shut-off system and gas pressure controls. Bio-gas is supplied to the gas trains from the site distribution manifold. The distribution manifold is connected to the pond collection pipework. **Table 1** lists the components in the gas train.

Component	**Function**
Pentair Keystone Fig 612-DEE3 lug style butterfly valve	- Manual isolation valve
Knock Out Pot	- Water removal
Dungs GF40100/4	- Particulate Filter 5 micron
Landfill gas Extraction Blower c/w Exe rated direct drive 5.5kW motor	- Gas extraction from wells
Pentair AGA Safety shut off valves with closed position indicators	- Main Automatic Isolation Valves
Elmac DFB-100AD Flash back Arrestor	- Prevents any flame passing back through to the safety valves and the pipework

Table 1: A list of components in the gas train

3.9 BURNER CONTROL PANEL

The burner control panel is split into two sections. Section 1 (left hand section) contains the inverted frequency controller for the extraction fan and the main power switch. Section 2 (right hand section) contains the system controls – PLC and burner management.

Figure 1 below shows the layout of the panel.

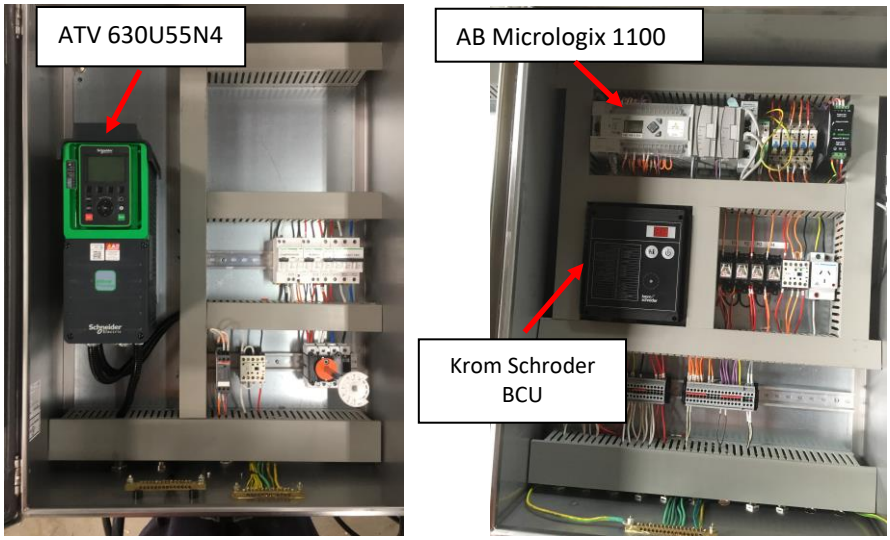
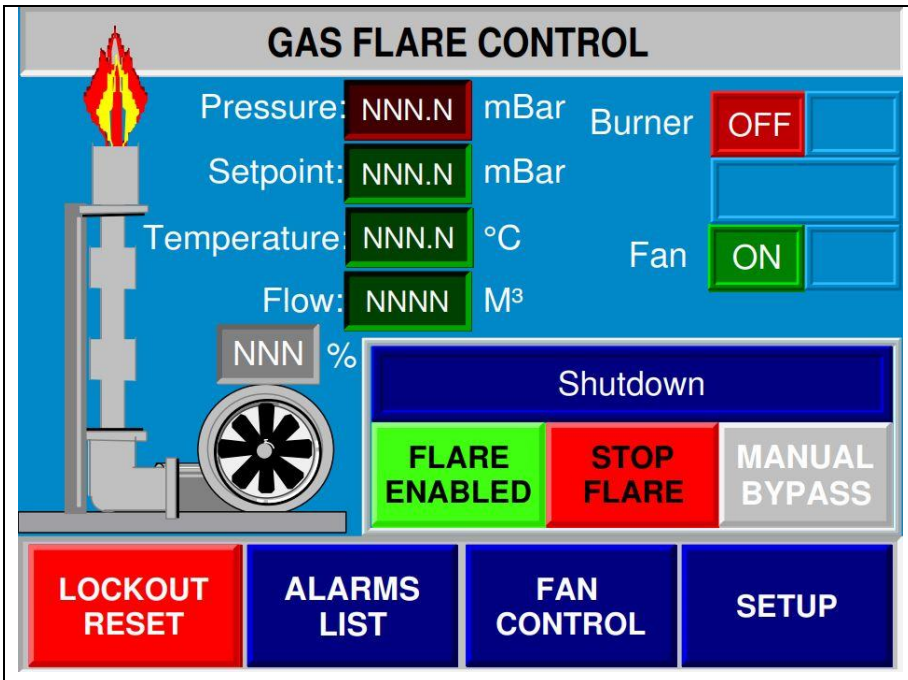


Figure 1: Key components of the Burner Control Panel

3.10 BURNER CONTROL PANEL HMI

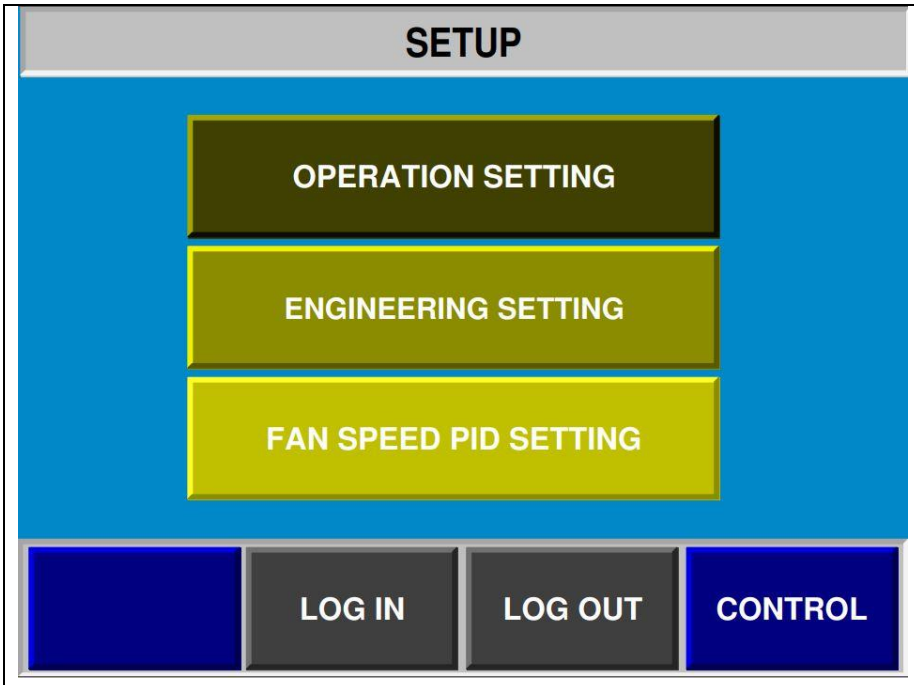
The burner is controlled through an HMI touch screen which displays sensor readings and allows configuration changes. The unit is password protected and there are three levels of access. The passwords are held by nominated personnel.

Note: On initial power on the screen takes 1-2 minutes to boot-up and load its operation application.



Main page:

This page provides access to all operation screens. This is the only page with the system 'STOP' and 'START' push button controls for the burner operation. The 'LOCKOUT RESET' alarm requires resetting after each power on. This feature is included to check the function of the over-temperature controller at each start up.
This page will indicate the status of the fan, isolation valves and if the burner is on. The controls are active by changing from red to green.



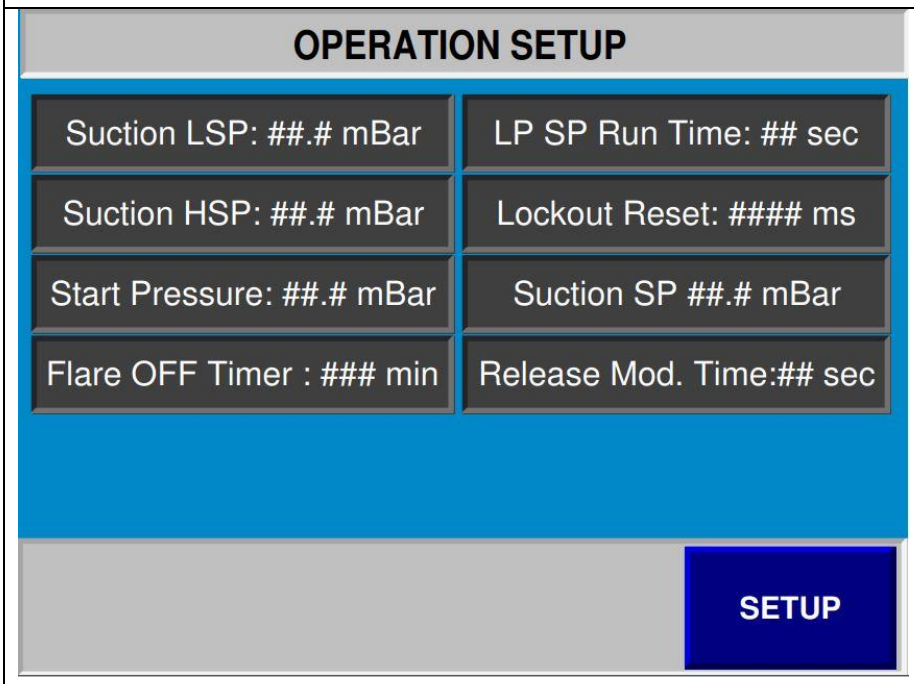
Setup page:
This page will allow engineers or Windsor to log in to adjust operational parameters.

Login Passwords:

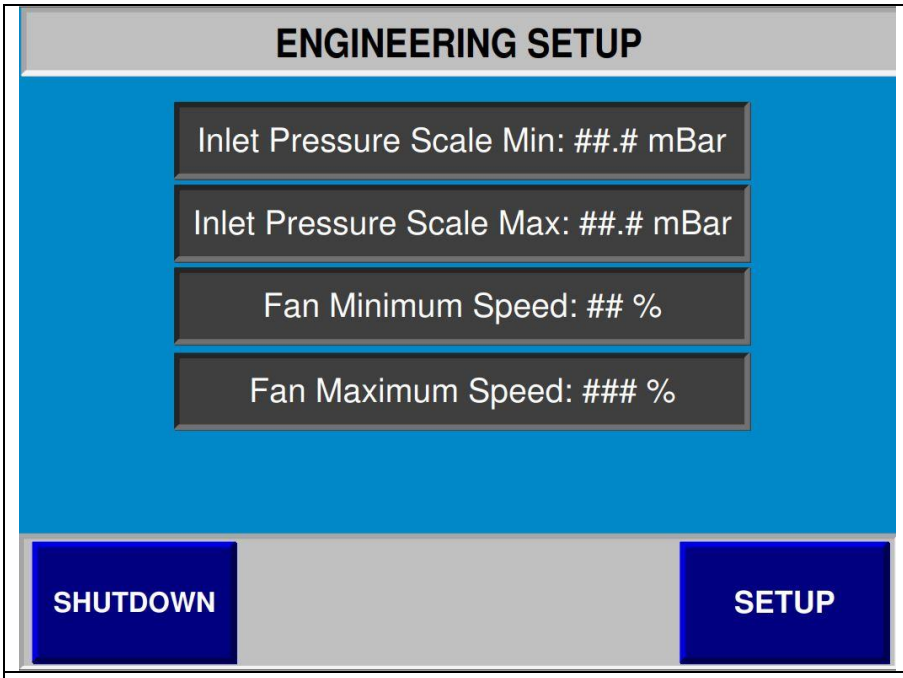
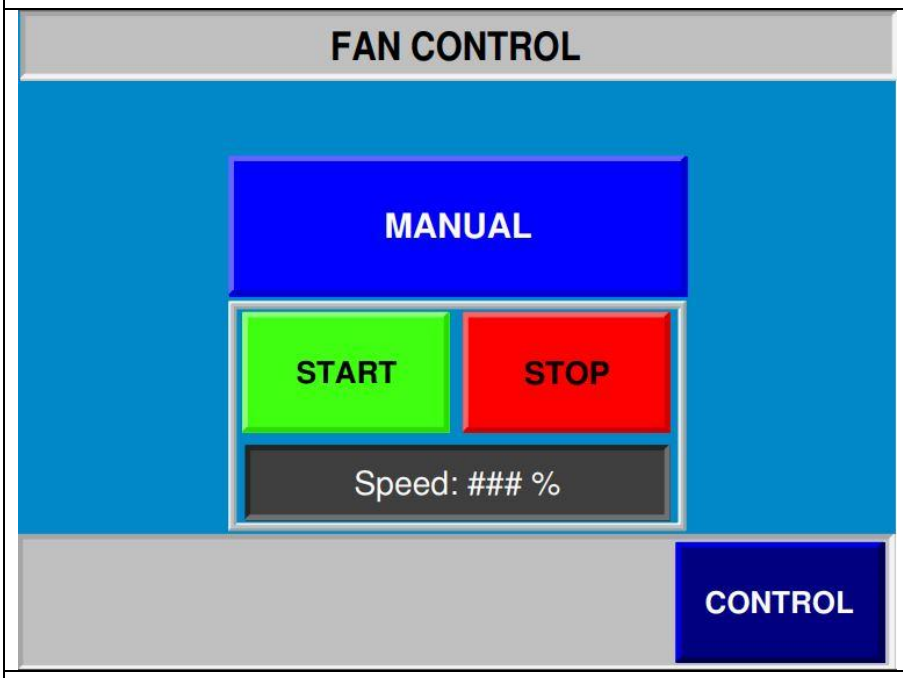
Operator level –
Username: op
Password: 1239

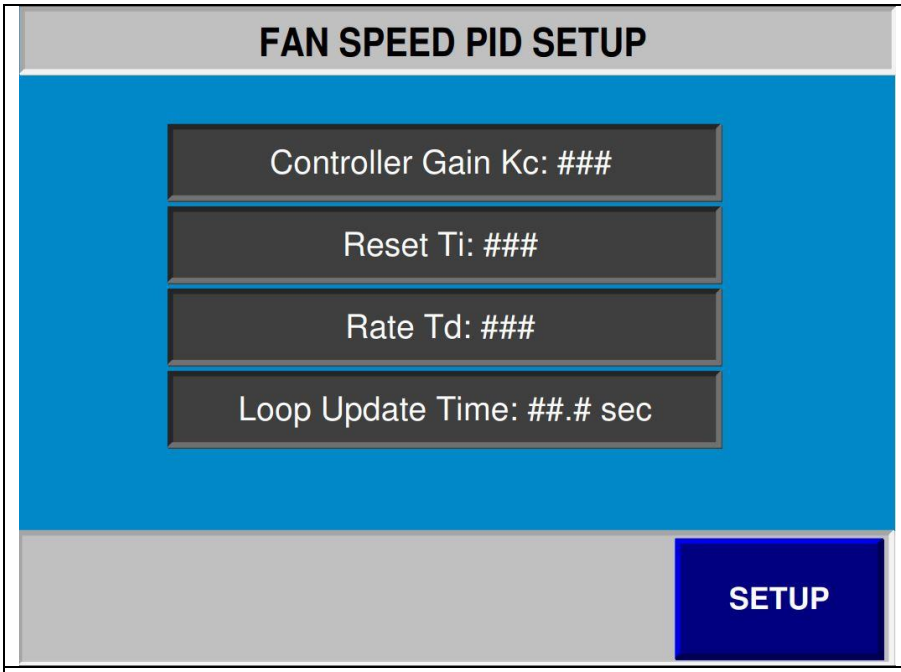
Engineering –
Username: eng
Password:4232

Fan speed PID –
Username: win
Password: 8109



Operation Setup page:
This setup page will be used to set the operating parameters for the following.
Suction Low Setpoint:
-10 to 0 mBar
Suction High Setpoint:
-10 to 0 mBar
Flare Start Pressure:
-10 to 10 mBar
Flare OFF Timer:
0 to 999 min
Low Pressure Setpoint Run Time:
0 to 99 sec
Lockout Reset:
0 to 9999 msec
Suction Setpoint:
-10 to 0 mBar
Release Modulate Time:
0 to 99 sec

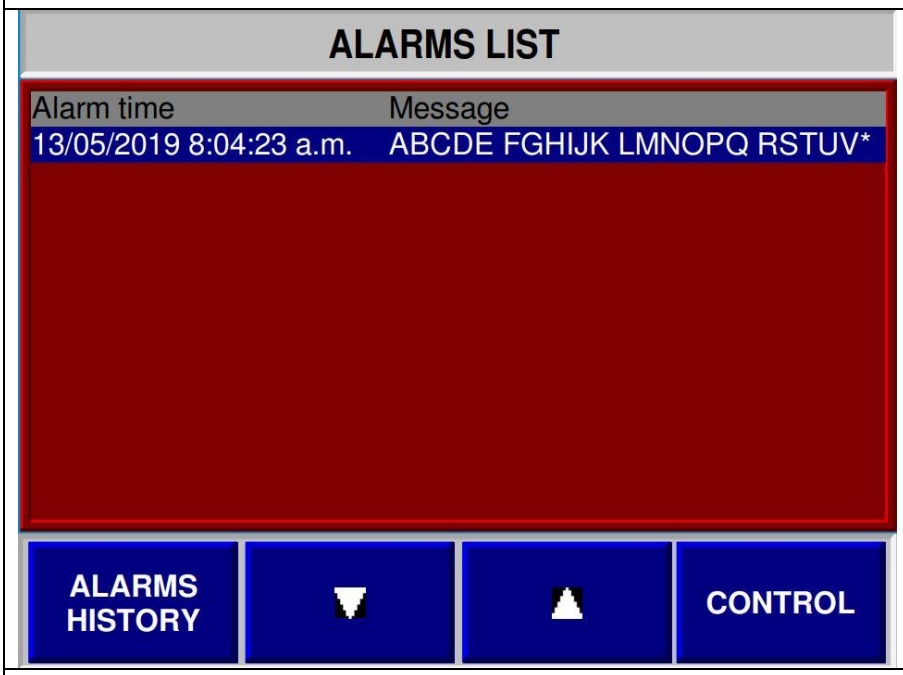
	Engineering Setup page: This setup page will allow instrument parameters to be set. IP Scale Min Setpoint: -10 mBar IP Scale Max Setpoint: 10 mBar Fan Min Running Speed: 0 % Fan Max Running Speed: 100 %
	Fan Manual Operation: This page set parameters for extract fan operation and the % in Hz the operator would like the fan to operate at. This is a commissioning and maintenance tool and safety measures should be applied when usning this function.



Fan PID page:
The PID control loop for the fan can be set via this page providing Level 3 password is activated.

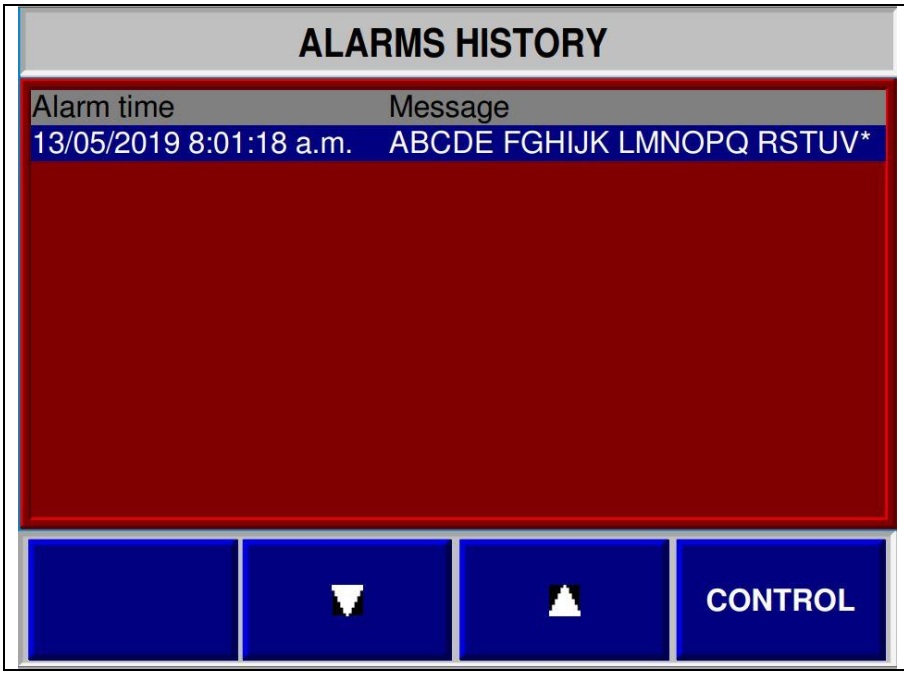
P =
I =
D =

Loop update time: sec



Alarm page:
This page can be accessed from the 'Main page' with the "ALARM LIST" tab and will provide information on which alarm was active on a specific date and time.

Note:
An active alarm will pop up in a tab on the screen. This will indicate which alarm is active and necessary steps can be taken to rectify the issue.



Alarm History page:

The alarm history will be available to provide information of previous alarms and assist with fault finding.

Below are default set points for the set up screens.

Operation setup:			Range:
Suction Low Setpoint:	(	)	-10 to 0 mBar
Suction High Setpoint:	(	)	-10 to 0 mBar
Flare Start Pressure:	(	)	-10 to 10 mBar
Flare OFF Timer:	(	)	0 to 999 min
Low Pressure Setpoint Run Time:	(	)	0 to 99 sec
Lockout Reset:	(	)	0 to 9999 msec
Suction Setpoint:	(	)	-10 to 0 mBar
Release Modulate Time:	(	)	0 to 99 sec

Engineering Setup			
IP Scale Min Setpoint:	(	)	-10 mBar
IP Scale Max Setpoint:	(	)	10 mBar
Fan Min Running Speed:	(	)	0 %
Fan Max Running Speed:	(	)	100 %

Fan Speed PID Setup		
Controller Gain Kc	P =	
Reset Ti	I =	
Rate Td	D =	
Loop update time		seconds

NOTE: Set points will be set by Windsor personnel during commissioning.

The following isolator is located on the front of the Burner Control panel

MAIN ISOLATOR SWITCH

- Main power supply switch (415 V 3 phase)
- Used to isolate burner control panel power supply (lockable)

4. START-UP & OPERATING INSTRUCTIONS

The start up sequence is fully automatic. The start up is initiated by TAPPING the [START] icon on the HMI (touch screen).

4.1 PRE-START CHECKS

Before starting the flare:

- Check that all parts of the plant are safe and ready to operate and ensure that all landfill operating procedures are complied with.
- Check that the manual gas isolation valve is OPEN.
- Check that the panel isolator is on.

4.2 START-UP & OPERATION

Once all pre-start checks are completed, and the [START] icon at the HMI is TAPPED the system goes through the programmed start up procedure. This is a fully automatic process controlled by the Allen Bradley PLC.

An integral part of the sequencing is the Krom Schroder BCU 370 Burner Controller. **Figure 2** explains the display on the front of the burner controller. **Table 2** details the start-up logic. When a System Start is initiated a 5 second delay takes place prior to the start of the extract blower. This delay allows the system to check the signal from the UV flame detector.

```
Burner
(P11) s Minimum burner pause time..... = 0
(P07) Burner start-up attempts..... = 4
(P22) s Switch-on delay time..... = 10
(P21) s Pre-ignition time..... = 2
(P12) s Safety time 1 on start-up..... = 5
(P13) s Flame proving period 1..... = 5
(P14) s Safety time 2 on start-up..... = 5
(P15) s Flame proving period 2..... = 5
(P29) s Controller enable signal delay time..... = 0
(P10) s Minimum combustion time..... = 0
s Timing cycle..... = 12
(P09) Safety time operation..... = 2 s
(P27) V2 during burner operation..... = (0) Off
(P08) Burner restart..... = (0) Off
(P02) µA. Burner switch-off threshold..... = 1
Offset..... = 50
Test value..... = 37
(P17) UVS check..... = (0) Off
(P16) Operating time manual mode..... = (1) Limited to 5 min.
```

Figure 2: Description of lights on the burner controller.

FAN CONTROL:

The landfill gas extraction blower is controlled by an inverted frequency controller. Under normal operating conditions the speed of the extraction blower is controlled by the signal from the pressure transducer monitoring the inlet pressure to the extraction blower. However, for commissioning and testing purposes it is possible to run under 'fixed speed' control. The selection of the various options is made on the HMI screen and the procedures are detailed in Section 3.10.

TEMPERATURE PROBE POSITION:

There are two thermocouple location points along the length of the residence chamber section of the flare. The site PLC will collect the data from the flare thermocouple and this will provide information if the flare is running or not.

VARIATIONS IN LFG: N/A

The flare management system monitors Oxygen (O_2) and Methane (CH_4) levels in the landfill gas continuously. This monitoring system is installed to protect the flare components and ensure safe and reliable operation. **It does not act as a landfill site control system**. If any of the monitored gases vary outside the safety levels the flare is shut down and the alarm condition that caused the shutdown is logged in the alarm page of the management system. The limits for each gas are detailed in the as commissioned data in the relevant section of the manual. In event of an alarm condition and shutdown operators will need to determine the alarm condition and then proceed to a check list to establish the reason for the alarm.
It is expected that a correct management system will detect if any of the wells are going out of control and instigate corrective action.
The flare management system is to protect against a catastrophic failure such as rupture of the landfill gas transmission pipe work or lack of gas monitoring at the wells.

4.3 CHECKS DURING OPERATION

During operation of the flare, check for the following:

- Excessive heat on electrical cabling at UV flame detector.
- Flame moving downward – flame abnormality has occurred. Shut down system and check settings and burner head. Log any abnormalities in setup and atmospheric conditions and notify Windsor Engineering.
- Gas leakage
- Excessive vibration in gas extraction fan. If found, contact Windsor Engineering

4.4 SHUTDOWN

Shutdown is initiated from the HMI or site PLC. The fan will slow to its low set point. Once it is safe to do so the main safety valves will slam shut and the system will stop.

5. MAINTENANCE

5.1 FAULT FINDING

The control system installed is self diagnostic. Failure of any system that will lead to a shutdown will be indicated by an appropriate alarm.

Sections 10–27 of this manual contain manufacturer's instructions on all proprietary equipment installed.

In the event of a system shut down it is recommended that you follow the following procedure:

1) Return HMI (touch screen) to the [ALARM] screen and note the last alarm.

2) Then

- Conduct pre-start checks as per **Section 4.1**.
- Establish that the 415VAC power supply is available at the panel.
- Establish that the 230VAC power supply is available to the control section of the panel.
- At the burner control panel, return to the [HOME PAGE] TAP the [START] icon.
- Monitor the system start up and establish the position of the failure.
- If reason for failure is not easily established by inspection refer to manufacturers leaflet for detailed instructions.

5.2 MAINTENANCE INSTRUCTIONS

It is recommended that a log book be instigated and a record of all maintenance actions be recorded in it. This will greatly assist in investigating faults in the equipment. A sample log sheet is provided in Section 6 of this manual.

5.2.1 PROPRIETARY EQUIPMENT

The manufacturer datasheets included in **Section 10-27** of this manual cover the maintenance procedures for that piece of proprietary equipment and therefore reference is only made to it in the maintenance procedures where special attention is required. Where no reference is made the recommendations of the manufacturer apply.

Gas Flow meter maintenance

The FT3 Fox thermal mass flow meter do not require much maintenance and can be calibrated in situ if doubt arise. If the flow meter do fault usually the following occur.

Erratic flow readings – This is due to excessive water in the system and care should be taken to reduce water from the system.

The probe might also foul up due to the silica in the bio-gas and the probe will have to be cleaned. See **Section 17** of the manual page 62 for sensor cleaning.

For specialised maintenance contact the supplier:
Instrumatics
19 Beasly Ave, Suite 2
Penrose
Auckland
E-mail: www.instrumatics.co.nz
Tel: 09 526 0096

5.2.2 ROUTINE MAINTENANCE

The instructions detailed below cover the maintenance of the burner, the burner safety system and associated controls.

Weekly Maintenance

- Inspect extraction fan for vibration. If a fault is detected determine the cause and rectify.
- Inspect the compressor for loose belts and excessive noise. Drain the water drain on the tank and listen for leaks in the air lines.
- Drain the flare extraction blower and knock out pot and note if any water is present. If excessive amounts of water is present (1 litre or so) please check the site water drop out pot.

Monthly Maintenance

- Check pilot system ignition wiring and plumbing for corrosion. Fix or replace if required.
- Check all components and pipework are free of water. (Isolate the flare from the landfill prior to opening any valve to atmosphere. Certified gas fitters are required to do work on the flare if any break in pipework or parts needs replacing.)

Six Monthly Maintenance

- Carry out a full check of the complete system to ensure that all units are operating as commissioned. This will require checking that all gas pressure monitors, proximity sensors and limit switches are operating and that all air and bio-gas pressures are as set during commissioning. It is suggested that this work

be carried out by a service engineer familiar with Industrial Combustion Equipment.

- Check alignment of UV sensor and spark ignitor
- Inspect gas particulate filter. Filter element should be replaced after one year. The gas filter has to be inspected once every eight weeks for a period of six months from initial start up of the flare, or if any changes and additions have been made to the gas field.
- Carry out a test to confirm that the temperature probes are reading accurately (e.g a boiling kettle test). If the probes are not reading accurately they must be replaced.

Annual Maintenance

- Check all wiring (actuators, temperature probes, etc) for tightness and corrosion. Fix if required

Please refer to the manufacturer's leaflets included in Section 10 - 27 of this O&M File provided.

6. COMMISSIONING DATA/MAINTENANCE LOG

Some of these figures may be changed as the field gas volume and composition varies over the life of the field. Some of these settings are password protected at a second level of protection. These settings should only be adjusted by experienced personnel familiar with this style of control.

Date of Commissioning:

Windsor Engineer:

Maximum Gas Flow achieved		m^3/hr
Maximum Suction on gas Inlet		mbar
Temperature Control set point		^oC
Overtemperature Control		^oC
Inverted Frequency Drive Minimum Speed	20	Hz
Inverted Frequency Drive Maximum Speed	50	Hz
Control Pressure Set Point		mbar
Flow Control Set Point		m^3/hr
Maximum Oxygen (O2)		%
Minimum Methane Alarm (CH4)		%
Minimum Methane (CH4) operating set (Shut down)		%
Fan Start Up speed		%
Crowcon Gas Leakage Detector Alarm and Shut Down		%
Burner pressure		mbar
Maximum system pressure		kPa
Methane composition upon commissioning		%
Oxygen upon commissioning		%

BURNER MAINTENANCE LOG

Date	Time	Fault/Problem	Action Taken	By (Name)	Supervisors Initials

7. RECOMMENDED SPARE PARTS LIST

ITEM	DESCRIPTION	WINDSOR PART NO	QTY
1	Krom Schroder BCU 370	09905	1
2	Krom Schroder UV flame detector	09904	1
3	Flame Rod	09884	1
4	Thermocouple	06075	1
5	Gas filter complete unit	TSD256411	1
6	Gas filter element and O-ring	TSD243312 & TSD243314	1
7	Ignition transformer	09883	1
8	AB Micrologix 1400	1766-L32	1
9	Analog I/O module	1762-IF2OF2	1
10	Analog Input Module	1762-IF4	1
11	Screen Panel View 7	2711PT 6C22D8S	1
12	Stratex Ethernet switch	1783-U5ST	1
13	Main shut off valves REF: Quote 18-4664 - J11831H	M13655 AGA 100 mm Butterfly Valves, Nitrile Seat, Ductile Iron Body, SS316 Disc, SS431 Stem, Fail Close Actuator, with 230VAC ASCO Solenoid 11100263 VLV BFY GRL 100 D12N A1 K B0 2023810 ACT PNEU F79U STC 024 KA1E 240 AC AGA 2018603 KIT MTG F79U 024 BOSS F C	1

8. Drawings

9. Electrical Drawings

Appendix B

EIS WWTP HMI Manual

BlueSkyMeats

Waste Water Treatment Plant

Operation and Control

pdp | PATTLE DELAMORE PARTNERS LTD

BCL BOND CONTRACTS LTD
Waste & Underground Services Specialists

eis

Contents

Issue	Description	Date	By	Checked	Approved
A	As Built (#35661)	27 Sep. 2019	TT/EIS	PH/EIS	PH/EIS

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MCC Panel Hard Wired Controls

Manual/Auto Control Selections

- Emergency Stop – note this is NOT a point of isolation
- If pressed this will illuminate and control of the motor is not possible until reset

- Total Run Hours of the Motor

- Auto Manual selection – note this is NOT a point of isolation
- In the Auto position the PLC has control of the motor
- In the Off position the motor will not start in either PLC or Manual control
- In the Manual position the motor is controlled by the Start/Stop buttons below – the PLC will not have any control in this state

- On to indicate manual selection is active

- In Manual this button is used to start the motor
- In the event of a power disruption, If the motor was running in manual it will not automatically restart
- In Off or Auto this button has no control
- The button will illuminate when the motor is running

- In manual this button is used to stop the motor
- In Off or Auto this button has no control
- The button will illuminate when the motor and/or soft start has faulted, the fault can be reset from the HMI (see DOL/Softstarter Popup)
- In the event of a fault being cleared while running in manual the indicators will clear but the motor may not restart until pressing the stop button and start again

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Duty Selections

- Mixer Duty Selection
- Selects which Mixer is first to run

- Aerator Duty Selection
- Has no function

iFix SCADA

Alarm indication has been added to the existing iFix SCADA application

- No Active Alarms
- No Devices in Manual
- No Active Faults

- Beacon is activated due to active unmuted alarm
- Border flashing red

- Siren is activated due to active unmuted alarm
- Border flashing red

- Devices detected in manual and therefore not being controlled by the PLC automated sequence
- Border flashing yellow

- Beacon is activated due to active unmuted alarm
- Border flashing red

- Combination of active alerts
- Border flashing red/yellow

If any alarm/fault is present a combination of the above may be displayed, for more detail regarding the alarm and to rectify the operator will need to investigate in detail at the WWTP PanelView in the MCC.

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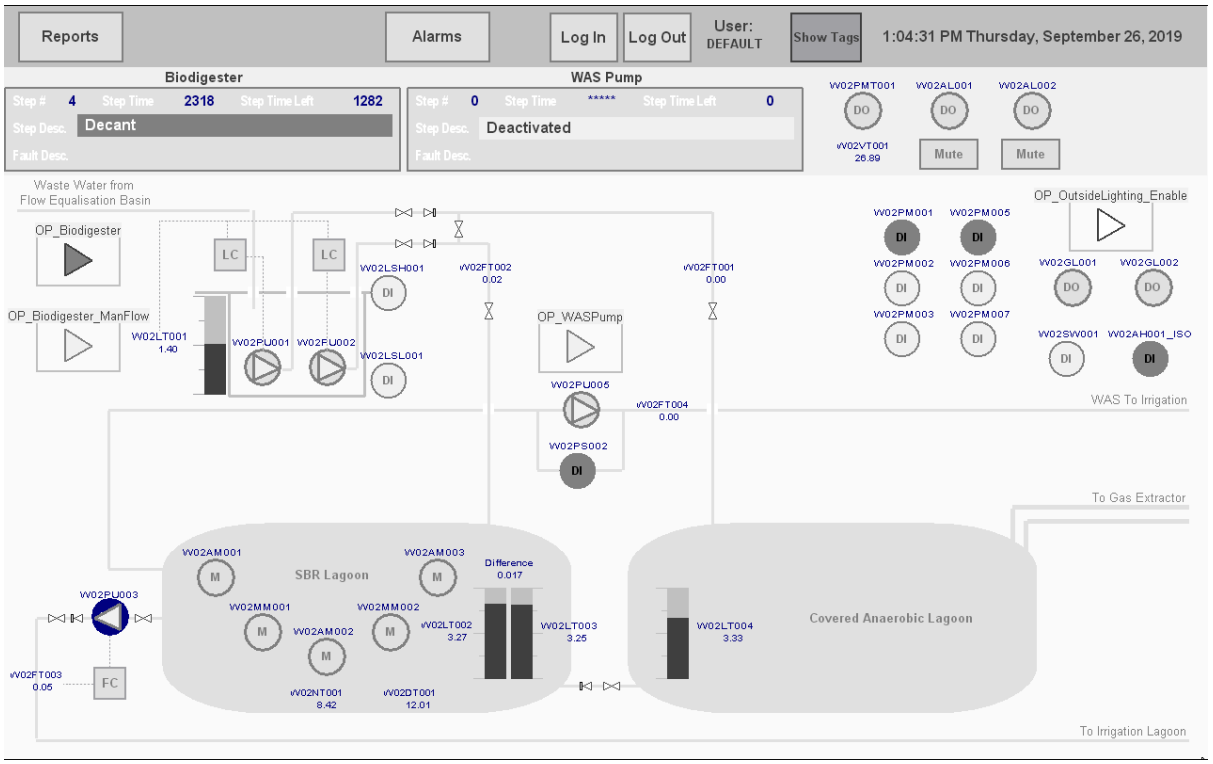
PanelView Plus (HMI)

Main Display



- This shows the overview & status of the WWTP
- Devices show as a light grey when “off” and dark grey when “on/energised”
- If there are unacknowledged alarm(s) then the “Alarm” button will show in red

- If any device is put into manual it will show a manual hand 
    - If a device is in manual, on or off, it will not operate as part of the control sequences, this may result in overflowing of the lift well and/or lagoon, or running of pumps dry, or operation of the Aerators/Mixers below the minimum operating levels causing damage to the lagoon lining
    - Care needs to be taken when running any device in manual.
- If a device is in fault or isolated it will change state to flashing dark/light grey and have a coloured halo around the object
- The popup for the Setpoints, PID, Motor, Sequence selections or general outputs are only available once logged in as a suitable user, when logged out (shown as DEFAULT) an access denied alert will be presented if an attempt to select one of these devices

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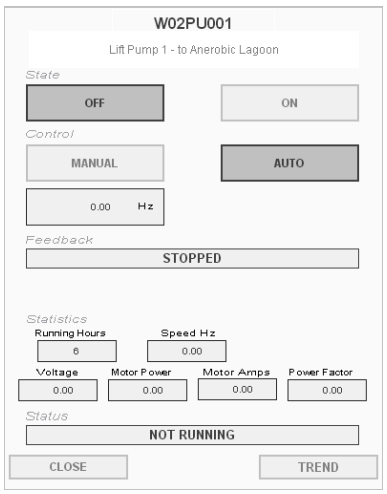
Popups

Shown when opened from main HMI display, some popups only show if logged in



VSD Popup

- State
  - On – VSD Output energised
  - Off – VSD Output de-energised
- Control
  - Manual – VSD is in Operator manual
  - Auto – VSD is in PLC/Auto control
  - Hz – current output speed to VSD, display only if in Auto, manual setpoint if in Manual
- Feedback
  - Stopped
  - Running
  - Faulted
    - A RESET button will be displayed, this is used to reset and clear the fault
    - If this continues to fault check the VSD & Motor are free of fault and defect
- Statistics
  - Running Hours – Total calculated hours motor has been running
  - Speed Hz – Actual speed reported by VSD
  - Voltage – Output from VSD
  - Motor Power – kW - Output from VSD
  - Motor Amps – Output from VSD
  - Power Factor – Reported by VSD
- Status
  - Not Running, Running FWD, Running REV, E-Stopped, Isolated, Field Manual, Faulted
  - Current status based on PLC and field inputs and VSD feedback

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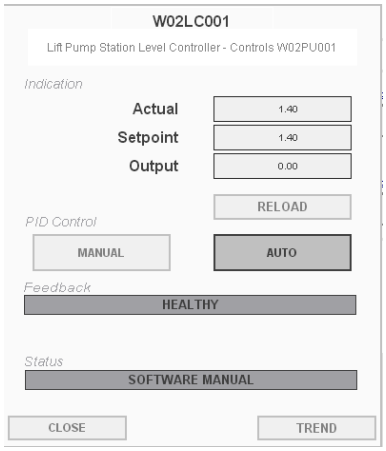

PID Popup

- Indication
  - Actual – The current Process Value from the transmitter
  - Setpoint – The target setpoint when in PID Control
  - Output – The output from the PID controller
  - Reload – If switching between Auto/Manual this is required to reload the PLC Setpoint
- PID Control
  - Manual – Put the PID controller into Manual
  - Auto – Put the PID controller into Auto
- Feedback
  - Healthy – PID Controller is Healthy
  - Faulted – PID Controller Faulted, see status
- Status
  - Software Manual – Output is set by PLC/Not running in PID Mode
  - Auto – Running in PID Control Mode
  - Manual Selected/Manual – Output is set manually by operator
  - Logic Fault – Output is different to PLC expected output (maybe a result of being in manual)
  - PV Loop Fault – a fault caused by the Process Value/transmitter in fault
  - CV Loop Fault – a fault caused by the Control Value/device in fault

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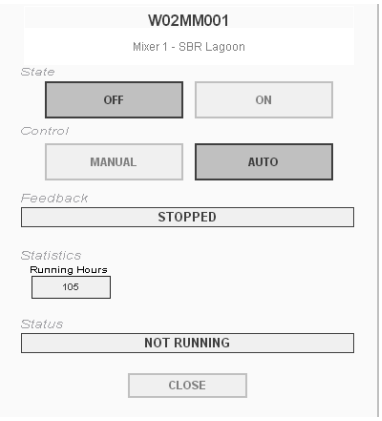

DOL/Softstarter Popup

- State
  - On – Output energised
  - Off – Output de-energised
- Control
  - Manual – Put the control into Manual
  - Auto – Put the control into Auto
- Feedback
  - Stopped
  - Running
  - Faulted
    - A RESET button will be displayed, this is used to reset and clear the fault
    - If this continues to fault check the Soft starter & Motor are free of fault and defect
- Statistics
  - Running Hours – Total calculated hours motor has been running
- Status
  - Not Running, Running FWD, Running REV, E-Stopped, Isolated, Field Manual, Faulted
  - Current status based on PLC and field inputs and Soft starter feedback

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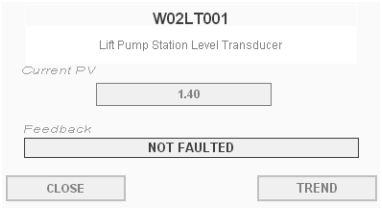

Analog Input Popup

- Current PV – Process value as scaled from the transmitter
- Feedback
    - Not faulted – Process value within ranges and OK
    - Faulted – Process Value out of range of operation/setpoint or faulty transmitter

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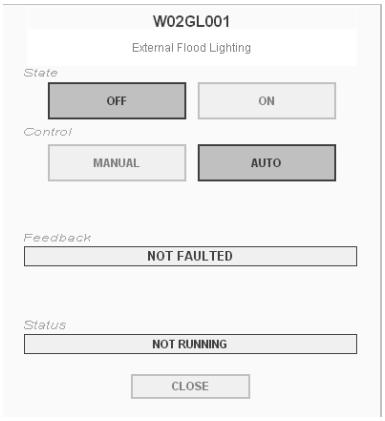

Digital Output Popup

- State
  - On – Output energised
  - Off – Output de-energised
- Control
  - Manual – Put the control into Manual
  - Auto – Put the control into Auto
- Feedback
  - Not faulted – Output operating normally
  - Faulted – Output not operating due to faulted state
- Status
  - Not Running, Running

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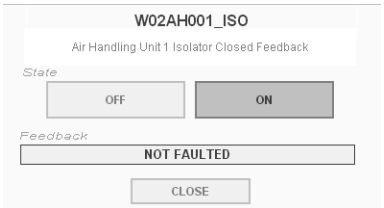

Digital Input Popup

- State
  - On – Input energised
  - Off – Input de-energised
- Feedback
  - Not faulted – Input operating normally
  - Faulted – Input conditions in faulted state

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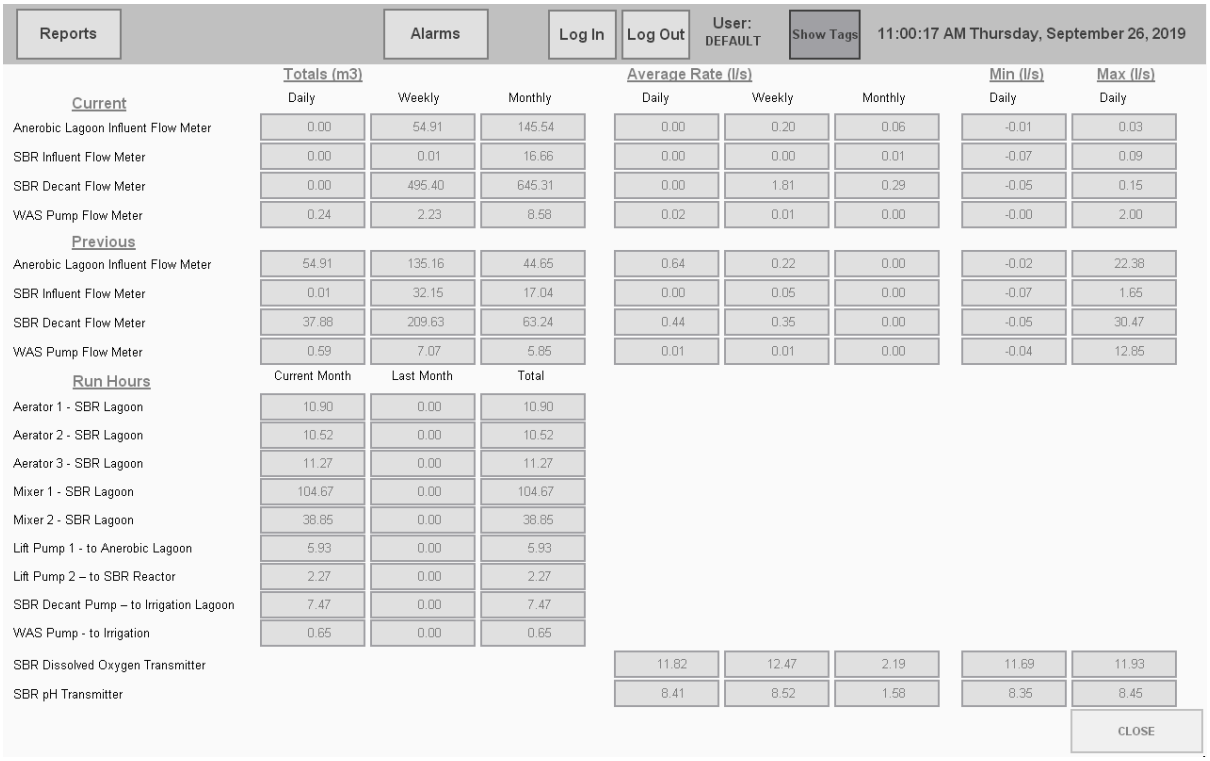
Reports Display



- The report is broken into different time periods:
  - Daily
    - Current/Today
    - Previous/Yesterday
  - Weekly
    - Current/This Week
    - Previous/Last Week
  - Monthly
    - Current/This Month
    - Previous/Last Month
- Flows are displayed as
  - Totals in m^3
  - Average Rate calculated over the time period in l/s
  - Minimum and Maximum flow rate in l/s for the day
- Run Hours are calculated into the Current Month, Last Month and Total hours
- Dissolved Oxygen gives a Daily, Weekly and Monthly average in mg/l, as well as a minimum and maximum reading for the day.
- pH gives a Daily, Weekly and Monthly average pH, as well as a minimum and maximum reading for the day.

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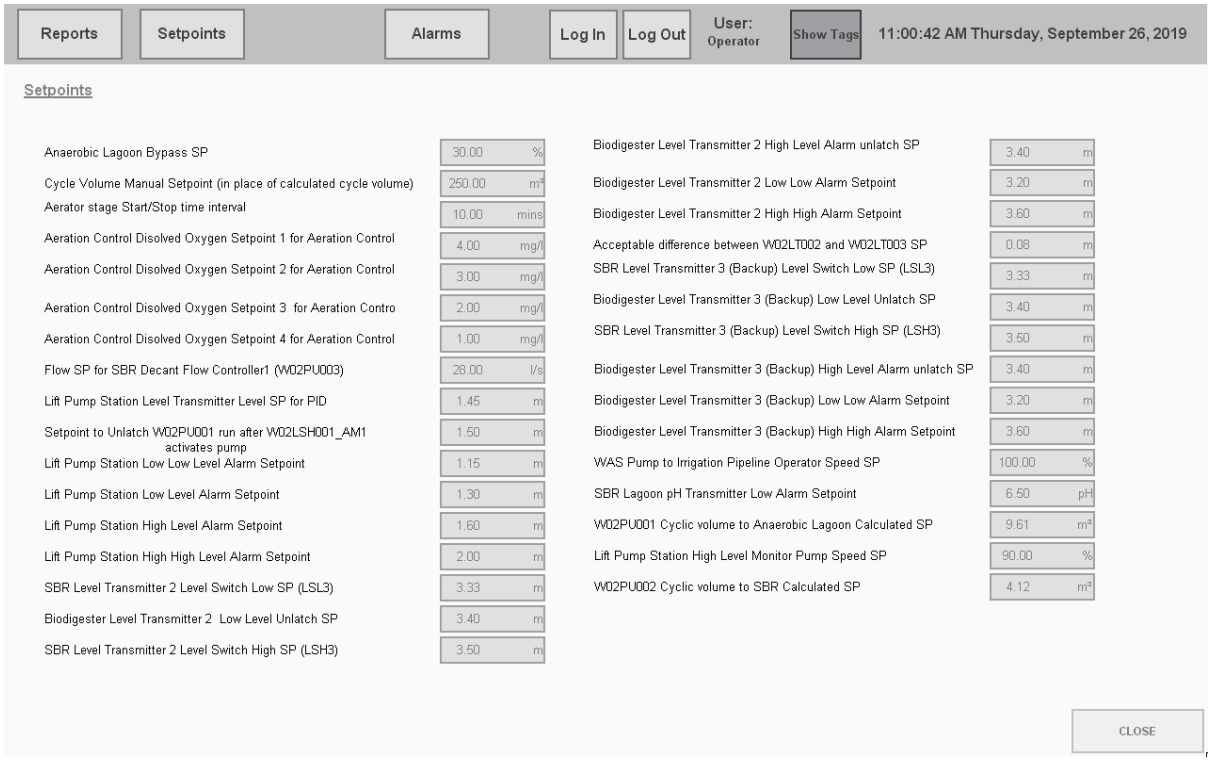
Setpoints Display



The setpoints are only accessible once logged in, these are used by the sequences when in automatic control.

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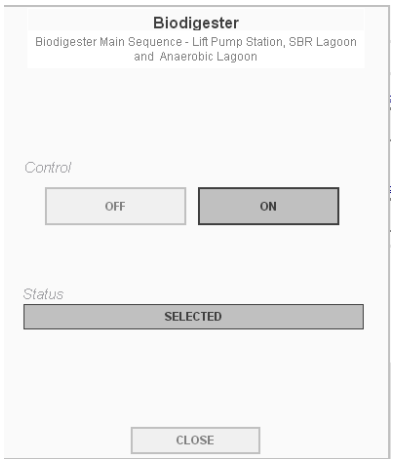
Sequence/Selections



Biodigester Selection

The main sequence

0) Deactivated
    a. In this step the sequence is off and the plant is not operating
1) Fill & Mix
    a. This will fill the SBR Lagoon using the lift well pumps
    b. While filling the mixers run in the SBR Lagoon
2) Aerate
    a. The aerators run dependant on the DO measured by W02DT001
    b. The mixers operate depending on the number of aerators running to maintain circulation in the SBR Lagoon
3) Settle
    a. The mixers and aerators are off during this step to allow the SBR Lagoon to settle
4) Decant
    a. The SBR Lagoon is pumped out during this step to the Irrigation Lagoon

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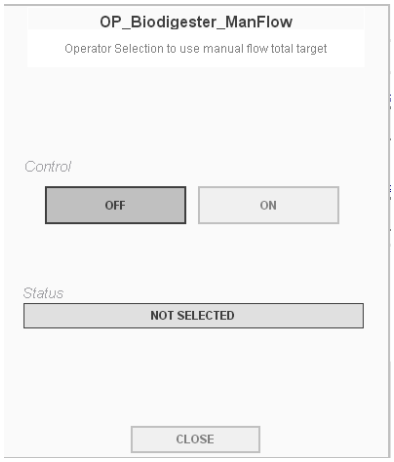

Biodigester Manual Flow Selection

Enable Manual Flow setpoints for the Biodigester sequence instead of calculated setpoints

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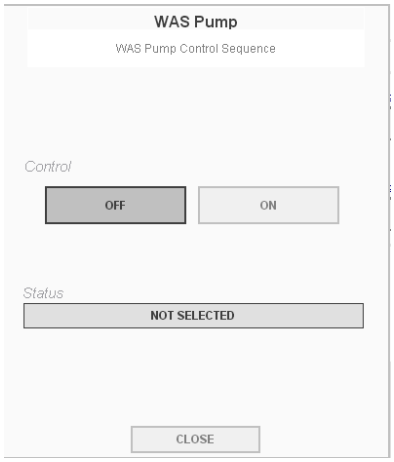

Waste Activated Sludge Pump Selection

WAS to Irrigation pump sequence

0) Deactivated
    a. In this step the sequence is off and the pump is not operating
1) Pump WAS
    a. The WAS Pump will run at a fixed speed

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Outside Lighting Enable Selection

Enable automatic control of the lighting outside the MCC and around the Pond(s) based on time of day setpoints

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HMI Tag Descriptions

Lagoon Devices

W02AM001	Aerator Motor 1 - Sbr Lagoon
W02AM002	Aerator Motor 2 - Sbr Lagoon
W02AM003	Aerator Motor 3 - Sbr Lagoon
W02AM004	Aerator Motor 4 - Sbr Lagoon
W02FC001	Sbr Decant Pump Flow Controller - Controls W02Pu003
W02FT003	Sbr Decant Flow Meter
W02LT002	Sbr (Primary) Level Transducer
W02LT003	Sbr (Secondary) Level Transducer
W02LT004	Anaerobic Lagoon Level Transducer
W02MM001	Mixer Motor 1 - Sbr Lagoon
W02MM002	Mixer 2 - Sbr Lagoon
W02PU003	Sbr Decant Pump To Irrigation Lagoon

Lift Station Devices

W02FT001	Anerobic Lagoon Influent Flow Meter
W02FT002	Sbr Influent Flow Meter
W02LC001	Lift Pump Station Level Controller - Controls W02Pu001
W02LC002	Reduces Speed Of W02Pu001 As W02Lt001 Drops Below Sp
W02LSH001	Lift Pump Station Wetwell High Level Switch
W02LSL001	Lift Pump Station Wetwell Low Level Switch
W02LT001	Lift Pump Station Level Transmitter
W02PU001	Lift Pump 1 To Anaerobic Lagoon
W02PU002	Lift Pump 2 To Sbr Reactor

WAS Pump Devices

W02FT004	Was Pump Flow Meter
W02PS002	Irrigation Line Burst Disc Pressure Switch For W02Pu005 Shutoff
W02PU005	Was Pump - To Irrigation

Misc Devices

W02AH001_ISO	Air Handling Unit 1 Isolator Closed Feedback
W02AL001	Station Alert Beacon Light
W02AL002	Station Alarm Sounder
W02PM001	S01 Mains Mccb Aux Contacts Closed
W02PM002	Bt1-2 Phase Failure Relay
W02PM003	Tb1-2 Surge Diverter
W02PM005	24Vdc Power Supply Monitoring - T01
W02PM006	24Vdc Power Supply Monitoring - Low Volts C002
W02PM007	24Vdc Power Supply Monitoring - Reg Fail Q20
W02PMT001	Battery Test Relay
W02SW001	Electrical Room Main Door Msb-B / Mcc-B Door Switch Activated

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Appendix C

Daily Operation & Maintenance Checklist

Appendix C: Daily Operation and Maintenance Checklist (Refer to Section 5 of the Operation and Maintenance Manual)							
MONDAY DATE:	**TICK**						
	Mon	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**
OPERATOR INITIALS:							
SYSTEM CHECK							
FLOW EQUALISATION BASIN							
Water level within expected operation ranges (not too high, not too low)							
Crust formation not significant							
Contrashear operational with no operational issues							
COVERED ANAEROBIC LAGOON							
Stormwater cover levels maintained as low							
Lagoon water level below maximum (3.6 m)							
Lagoon cover flat, with no major biogas pockets							
SBR							
Lagoon water level below maximum (3.5 m)							
Clean and calibrate DO and pH probes (Monday only)							
Aerators and mixers all operating as normal (Fill & Aerate phase only)							
Sludge SVI test <500 mL/1,000 mL (weekly test)							
No significant foaming or scum formation on SBR surface							
IRRIGATION STORAGE LAGOON							
Water level within expected ranges (not too high)							
WAS Pump							
Rupture disc intact							

GENERAL SITE OBSERVATIONS	Y/N						
	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Objectionable odours present? If yes - where from and will it carry beyond the site boundary? Comments: …… ……							
Any warnings or alarms on HMI panel? Comments: …… ……							
Any other general site observations Comments: …… …… Wind direction, weather, rain? ……							
BIOGAS FLARE							
Flare operational							
Sniff test downwind of the flare. Odour? Refer to above odour item.							
No notifications or warnings/alarms on flare controller. Comments: …… ……							
Drain condensate from flame arrestor bungs (Monday only)							
BIOFILTER							
Biofilter media damp? Irrigate if not.							
Manometer differential pressure < 100 mm							

Appendix D

WWTP General Maintenance Schedule Summary

Appendix D: Routine Maintenance Summary (Refer to Section 5 of the Operation and Maintenance Manual).						
Task	**Daily**	**Weekly**	**Monthly**	**3 Monthly**	**6 Monthly**	**Annually**
GENERAL						
Pipework and Valves						
Inspect all exposed pipework, fittings and valves						
Open/close checks on all valves						
Flush main SBR and Anaerobic delivery pipelines						
Pumps						
Check general pump operation						
Mechanically inspect pumps						
Intermediate pumpset maintenance	As per manufacturer's instructions/recommendations for specific pump					
Major pumpset overhaul	As per manufacturer's instructions/recommendations for specific pump					
Instrumentation (see specific areas for specific instrumentation)						
Conduct validation of flowmeter outputs						
Calibrate level transducers/sensors	As per manufacturer's instructions/recommendations for specific unit					
LIFT PUMP STATION						
Clean lift pump station wetwell						
FLOW EQUALISATION BASIN						
Check wastewater level and surface condition						
Excavate, trim and shape						
SBR LAGOON						
Check freeboard available (visual)						
Check aerator and mixer operation (visual)						
Clean pH and DO probe						
Calibrate pH and DO probe	As per manufacturer's instructions/recommendations					
Check sludge settling (settling test)						
Check aerator and mixer mooring cables attached securely						
Maintain aerators and mixers	As per manufacturer's instructions/recommendations					
EMBANKMENT STRUCTURES						
Check for potential indicators of failure or leakage such as cracks slumping, hollows or bulges.						

Task	Daily	Weekly	Monthly	3 Monthly	6 Monthly	Annually
COVERED ANAEROBIC LAGOON						
Check freeboard available (visual)						
Inspect stormwater on cover and operate pump as required						
Desludge lagoon	At 70% filled solids or less					
IRRIGATION STORAGE LAGOON						
Check operating level (visual)						
BIOGAS MANAGEMENT SYSTEM						
Conduct sniff test downwind of flare						
Drain flame arrestor bungs						
Check biofilter moisture and irrigate if necessary						
Remove weeds from biofilter media	As soon as they begin to grow					
Take pH reading and spread lime if required						
Run biogas through biofilter only for 1 hour						
Turn over biofilter media						
Dispose and replace biofilter media	Once every 5 years					
Maintain biogas flare	Strictly as per manufacturer's instructions/recommendations					

Notes:

1. *This summarised table shall be read in conjunction with 'Appendix C: Daily Operation and Maintenance Checklist', and the O&M which may offer further detail or stipulate further requirements to the above.*

Appendix E

Complaint Form

BLUESKY

PASTURES

Complaint Record

Date/Time of complaint: _____ Operator: _____

Complainant Details

Name _____

Address _____

Phone Number _____

Odour incident details (e.g. Frequency, Intensity, Duration, Offensiveness, Location, and any other effects noted):

_____

_____

_____

Weather conditions:

Wind direction at time of incident: _____

Wind speed at time of incident: _____

Strength of wind at time of complaint (circle one):

None Light Moderate Strong

Results of Investigation:

Date and time of investigation: _____

Likely cause of complaint: _____

_____

Corrective action undertaken: _____

_____

Further actions proposed: _____

_____

_____

Response from the Blue Sky Meats to the complainant: _____

_____

_____

_____

Appendix F

Relevant Resource Consents

environment SOUTHLAND

Application No: B094-006
Consent No:201191

Cnr North Road and Price Street
(Private Bag 90116)
Invercargill

Telephone (03) 215 6197
Fax No. (03) 215 8081
Southland Freephone No. 0800 76 88 45

Discharge Permit

Pursuant to Section 105(1) of the Resource Management Act 1991, a resource consent is hereby granted by the Southland Regional Council (the "Council") to **Blue Sky Meats (NZ) Ltd** (the "consent holder") of **Morton Mains, R D 1, Invercargill** from 23 May 2003.

Please read this Consent carefully, and ensure that any staff or contractors carrying out activities under this Consent on your behalf are aware of all the conditions of the Consent.

Details of Permit

Purpose for which permit is granted:		To discharge meat processing and rendering plant wastewater to land via a spray irrigator
Location	- site locality	Morton Mains
	- map reference	F46:745:195
	- catchment	Waihopai
	- receiving environment	Land
Legal description of land at the site:		~~Lot 1 DP 595~~ B5 and ~~Part Lots 7~~ 1 & ~~8 DP 159~~ B being ~~part~~ Section 42 Block VIII Lothian Hundred; ~~Lots~~ 8 ~~9, 12 and 13 DP 159 and Lots 292 and~~ 8 ~~293 DP 155 being Section 42 Block VIII Lothian Hundred~~; Lot 1 DP 12016 being part Section 12 Block VIII Lothian Hundred; ~~Lot 1 DP 8287~~ G
Expiry date:		December 31, 2022

Consent Amended

Conditions reviewed on 22 August 2012 as follows:

Schedule of Conditions

Consent Period

1. This resource consent shall:

(a) commence upon expiry, surrender or lapse of Resource Consent 94301; and
(b) shall expire on 31 December 2022.

Effluent Irrigation

2. The effluent shall be irrigated on to the land identified in Schedule 1.

3. The maximum rate of discharge shall not exceed 1,000 m^3/day.

4. (a) This consent authorises the discharge of treated effluent to land via spray irrigation.

(b) Only wastewater with a sodium adsorption ratio less than 17, shall be discharged onto land.

(c) This consent does not authorise the disposal of treated or untreated effluent to any surface watercourse, or disposal of effluent directly into the ground via artificial, free-draining areas.

(d) No discharge shall occur onto:

(i) Dacre Silt Loam or Otikerama Silt Loam soils;
(ii) Waikiwi mottled soil during the period 1 May to 30 September;
(iii) Waikiwi mottled soil when the soil is wetter than field capacity.

5. The depth of effluent application onto any area of land shall not exceed:

(i) 30 mm, as an average of each application during the period 1 July to 30 June each year;
(ii) 35 mm for any individual application.

6. There shall be at least 14 days between applications of effluent onto the same area of land.

7. The annual nitrogen loading rate from irrigation of effluent and fertilisers shall not exceed:
(a) 450 kg/ha averaged over irrigation areas predominantly utilising cut and carry of vegetation; and
(b) 350 kg/ha, averaged over all other irrigation areas.

8. There shall be no discharge of treated effluent onto land, including spray drift, within:

(a) 20 metres of any surface watercourse;
(b) 20 metres of any property boundary:
(c) 100 metres of any school, marae, or residential dwelling (excluding any dwellings owned by the consent holder); or
(d) 100 metres of any potable water abstraction point.

9. There shall be no surface runoff/overland flow or significant ponding of wastewater resulting from the application of the treated effluent to pasture.

Monitoring

10. The consent holder shall monitor the treated effluent discharge by taking representative samples, at least once per month, and analysing the samples as follows:

(a) Each sample shall be analysed for:

- pH
- Sodium absorption ratio
- electrical conductivity
- total nitrogen concentration (i.e. nitrate[1] + Kjeldahl nitrogen)
- E. coli concentration;
- total Phosphorus concentration;
- Ammoniacal Nitrogen concentration;
- oil and grease concentration;

has to be lab reports

(b) in addition to the analysis specified in condition 10(a), samples shall be analysed for the following at the frequencies specified in condition 10(c):

- Bromide concentration;
- Chloride concentration;
- Iodide concentration;
- Fluoride concentration;
- Boron concentration;

> to simplify do each time.

(c) (i) until 30 June 2014, each sample shall be analysed for the parameters specified in condition 10(b)

(ii) from 1 July 2014, at least one sample every three months shall be analysed for the parameters specified in Condition 10(b)

11. The consent holder shall monitor the unnamed tributary of the south branch of the Waihopai River that runs through the disposal area as follows:

(a) The tributary is to be monitored upstream and downstream of the spray disposal site, at points determined in consultation with the Council's Environmental Compliance Manager.

(b) Samples are to be taken at least once per month.

(c) The samples taken at the upstream and downstream sites on each monitoring occasion are to be taken at about the same time, within the period of 1 hour. The downstream sample should be taken first on each occasion;

(d) The samples are to be analysed for:

[1] Assumes nitrite is not significant.

- pH
- electrical conductivity
- Dissolved Oxygen concentration
- Ammoniacal Nitrogen concentration
- Total Nitrogen concentration
- Dissolved Reactive Phosphorus concentration
- *E. coli* concentration
- Nitrate nitrogen
- Temperature (field measurement);

(e) In addition to the analysis specified in comdition 11(d), samples shall be analysed for the following at the frequencies spacified in condition 11(f):

- Bromide concentration;
- Chloride concentration;
- Iodide concentration;
- Fluoride concentration;
- Boron concentration;
- Carbonaceous Biochemical Oxygen Demand (BOD_5) concentraton

(f) (i) until 30 June 2014, each sample shall be analysed for the parameters specified in condition 11(e);

(ii) from 1 July 2014, analysis for the parameters specified in condition 11(e), shall occur at the same frequency, and coincide with the same monitoring event, as specified in condition 10(c); 3 monthly.

(g) (i) by 30 September 2012, the consent holder shall install a conductivity meter at a downstream site to be agreed with Environment Southland's Compliance Manager, and shall thereafter continuously monitor and electronically record (at 15 minute intervals) electrical conductivity in the tributary;

(ii) the meters shall be calibrated periodically, and shall be maintained in accordance with the manufacturers guidelines;

(iii) the conductivity readings are to be reported to Environment Southland via a system that can automatically send the data into Environment Southland's computer database in CSV format, Hilltop or Tideda format, or XML formatted as required by Hilltop software. The data is to be provided at least once per day;

(iv) if the electrical conductivity readings exceed 280 µs/cm (or other figure agreed in writing by Environment Southland's Compliance Manager), the consent holder shall, without undue delay, inspect the tributary at the upstream and downstream sites. If the inspection shows a conspicuous change in the colour or clarity of the tributary, the consent holder shall advise Environment Southland (email: escompliance@es.govt.nz, or phone 0800 76 88 45) and shall immediately inspect the wastewater irrigation to ensure that wastewater is not causing the effect in the tributary.

12. Water and wastewater quality monitoring, other than the monitoring in condition 11(g), shall comply with the following criteria:

    (a) the results of the monitoring are to include reference to the method of analysis, and the results of the monitoring specified in Condition 11 are to be supplied to the Council's Environmental Compliance Manager no later than 20 working days after the receipt of the laboratory analytical data;

    (b) the parameters specified in conditions 10 and 11 shall be analysed in accordance with the most recent edition of APHA "Standard Methods for the Examination of Water and Wastewater" or by the methods approved in writing by the Council's Director of Environmental Management; and

    (c) where the laboratories carrying out analyses required by this consent are not accredited to ISO7025, either by IANZ (formerly TELARC) or by an organisation with a mutual recognition agreement with the IANZ, for those analyses, then the Southland Regional Council may once every 12 months audit the consent holder's monitoring methods and analyses by obtaining and analysing split samples of the samples taken in accordance with conditions 10 and 11 above. The cost of each audit is to be met by the consent holder.

13. The consent holder shall monitor soil on the site during the month of May each year as follows:

    (a) Samples shall be taken from, and the measurements made in, at least three wastewater irrigation sites (two sites in the Waikiwi soil and one site in the Waikiwi mottled soils), and at least one control site (in an area where effluent is not discharged).

    (b) Soil samples shall be analysed for the following:

    - infiltration rate
    - soil pH
    - exchangeable calcium
    - exchangeable magnesium
    - exchangeable potassium
    - exchangeable sodium
    - phosphorus (Olsen P)
    - Cation Exchange Capacity
    - Total nitrogen concentration

    Analysis shall include the calculation of exchangeable sodium percentage (ESP) values for each sampling site.

14. By 31 January 2013, the consent holder shall establish, and thereafter carry out, on-site soil moisture measurement at three sites within the wastewater irrigation areas as follows:

    (a) the consent holder shall install and maintain Aquaflex soil moisture tape(s), or alternative soil-moisture measurement device or method of similar accuracy as agreed by the Southland Regional Council's Compliance Manager;

(b) the exact monitoring locations shall be to the satisfaction of the Council's Compliance Manager;

(c) unless otherwise agreed by the Compliance Manager the soil moisture data collected in accordance with this condition is to be recorded at 30 minute intervals using an electronic datalogger system and this record shall be provided to the Council's Compliance Manager at least once every three months;

(d) by 1 October 2013, the consent holder shall, from the on-site monitoring record, determine the soil-moisture contents that are equivalent to field capacity at each of the monitoring sites and shall report this to the Council's Compliance Manager;

(e) until the on-site soil moisture equivalent to field capacity is established in accordance with condition 14(d), the soils of the wastewater irrigation area shall be considered to be at field capacity when Environment Southland's Woodlands soil-moisture monitoring site is at or above field capacity, as shown at http://map.es.govt.nz/Departments/LandSustainability/fde/guidelines/index.aspx#graphs, or by an alternative method agreed by Environment Southland's Compliance Manager;

(f) unless otherwise restricted by measures developed in accordance with condition 22, if wastewater irrigation occurs when soils are at field capacity, the consent holder shall take additional precautions, including but not limited to, inspection of each of the irrigators while irrigating to check for conspicuous signs that soils are saturated, wastewater ponding or run-off, and the position of the irrigator relative to known drains. These inspections shall be noted, and the upstream and downstream conductivity recorded at the time of the inspection. A copy of this record shall be included with the annual report specified in Condition 16.

15. By 31 January 2013, the consent holder shall construct or implement measures to ensure, as far as is practicable, that samples can be taken at the upstream and downstream water sampling sites in the tributary of the Waihopai River under mean to very low flow conditions. These measures shall be agreed by Environment Southland's Compliance Manager prior to construction or implementation.

16. An annual report, summarising and interpreting the monitoring results and compliance with the conditions of this resource consent during the previous 12 months, shall be supplied to the Council's Environmental Compliance Manager by 31 August each year. The summary of results shall include an analysis of any trends in the monitoring results.

Treatment System Failure

17. The consent holder shall notify, in the event of any treatment system failure which may cause a public health nuisance or risk, or the discharge of wastes to areas other than the disposal field, without undue delay, both the Medical Officer of Health (or Health Protection Officer) and the Council's Environmental Compliance Manager, as appropriate.

Administration Conditions

18. (a) The consent holder shall prepare an irrigation management plan that details the procedures to be put in place to irrigate wastewater in compliance with the conditions of this resource consent to minimise the potential for adverse effects due to the discharge. A copy of the plan shall be submitted to the Council's Environmental Compliance Manager by 31 August 2003 and any revisions to the plan during the term of this consent shall be forwarded to the manager before any changes are implemented.

(b) The consent holder shall implement and maintain a system to identify and record the irrigator locations, and the period of irrigation, each day. A copy of this information is to be supplied to Environment Southland's Compliance Manager, or delegate, upon request.

19. The consent holder shall pay an annual administration charge to the Southland Regional Council, collected in accordance with Section 36 of the Resource Management Act, payable in advance on the first day of July each year. The charge shall include the cost of two inspections of the effluent discharge area by Council officers each year.

20. The Southland Regional Council may serve notice, as a result of information received, in accordance with the conditions of this permit, and in accordance with Sections 128 and 129 of the Act, in the period May to September each year, of its intention to review the conditions of the consent for the purposes of:

(i) dealing with any adverse or cumulative effects on the environment which may arise from the exercise of this consent;
(ii) addressing monitoring requirements;
(iii) addressing odour, groundwater contamination or wastewater seepage into tile drains, or
(iv) complying with the requirements of a regional plan.

21. The consent holder may apply to the Council for the change or cancellation of any of the conditions of this consent, other than Condition 1, in accordance with Section 127 of the Resource Management Act, during the period May to September each year.

Further Investigation and Limit Conditions

22. The consent holder shall carry out a review of the wastewater irrigation system and area to identify measures, and set out a timeframe for implementation of those measures, to avoid or mitigate the discharge of wastewater into surface water bodies via tile drains, bypass flow or run-off/overland flow. The review shall conform to the following:

(a) the review is to be carried out or reviewed by a suitably qualified person and shall include, but is not limited to:

- identification and mapping of tile drains in the wastewater irrigation area. The positions of the drains are to be identified by GPS co ordinates, accurate to the nearest metre. The drain positions are to be provided in New Zealand map grid co-ordinates;
- measures to minimise wastewater production;
- measures to defer wastewater irrigation when soils are at field capacity, such as storage of wastewater;

- measures to match wastewater irrigation with soil moisture deficit;
- recommendations for monitoring and control mechanisms to support and check the mitigation measures.

(b) the review is to be completed and reported to Environment Southland's Compliance Manager by 3 December 2012.

23. By 3 December 2012, the consent holder shall provide to Environment Southland's Compliance Manager, an A3-size aerial photograph of the wastewater irrigation areas, at a scale of 1:10,000 or less, showing the soil types identified in condition 4(d).

24. Beyond a zone of reasonable mixing in the unnamed tributary of the south branch of the Waihopai River:

(a) the standards for Lowland Hard Bed waterbodies, as shown in Appendix A, shall apply and be maintained with respect to the effect of any discharge made pursuant to this consent;

(b) there shall be no production of any conspicuous oil or grease films, scums, foams, floatable or suspended materials, nor any conspicuous change in colour, in the tributary as a result of any discharge made pursuant to this consent;

(c) there shall be no emission of objectionable odour from the tributary as a result of any discharge made pursuant to this consent

for the **Southland Regional Council**

W J Tuckey
Director of Environmental Management

Schedule 1 – Legal Description of the Land

The legal description of the land that may be irrigated pursuant to this permit is as follows:

1. Lot 1 DP 595 and Part Lots 7 & 8 DP 159 being part Section 42 Block VIII Lothian Hundred.

2. Lots 9, 12 and 13 DP 159 and Lots 292 and 293 DP 155 being Section 42 Block VIII Lothian Hundred.

3. Lot 1 DP 12016 being part Section 12 Block VIII Lothian Hundred.

4. Lot 1 DP 8287

Appendix A
Standards for Lowland Hard Bed Waterbodies

The temperature of the water:

- shall not exceed 23°C;
- shall not exceed 11°C in trout spawning areas during May to September inclusive;
- the daily maximum ambient water temperature shall not be increased by more than 3°C when the natural or existing water temperature is 16°C or less, as a result of any discharge. If the natural or existing water temperature is above 16°C, the natural or existing water temperature shall not be exceeded by more than 1°C as a result of any discharge.

The pH of the water shall be within the range 6.5 to 9, and there shall be no pH change in water due to a discharge that results in a loss of biological diversity or a change in community composition.

The concentration of dissolved oxygen in water shall exceed 80% of saturation concentration.

There shall be no bacterial or fungal slime growths visible to the naked eye as obvious plumose growths or mats. *(Note: This standard also applies to within the zone of reasonable mixing for a discharge.)*

When the flow is below the median flow, the visual clarity of the water shall not be less than 1.6 metres, except where the water is naturally low in clarity as a result of high concentrations of tannins, in which case the natural colour and clarity shall not be altered. [2]

The concentration of total ammonia shall not exceed the values specified in Table 1 "Ammonia standards for Lowland and Hill surface water bodies".

The concentration of faecal coliforms shall not exceed 1,000 coliforms per 100 millilitres, except for popular bathing sites, defined in Appendix K "Popular Bathing Sites" of the Regional Water Plan, and within 1 km immediately upstream of these sites, where the concentration of Escherichia coli shall not exceed 130 E. coli per 100 millilitres.

[2] Visual clarity is assessed using the black disc method or other comparable method employed by Environment Southland.

For the period 1 November through to 30 April, filamentous algae of greater than 2 cm long shall not cover more than 30% of the visible stream bed. Growths of diatoms and cyanobacteria greater than 0.3cm thick shall not cover more than 60% of the visible stream bed.[3]

Biomass shall not exceed 35 grams per square metre for either filamentous algae or diatoms and cyanobacteria.[4]

Chlorophyll a shall not exceed 120 milligrams per square metre for filamentous algae and 200 milligrams per square metre for diatoms and cyanobacteria. [5]

The Macroinvertebrate Community Index shall exceed a score of 90 and the Semi-quantitative Macroinvertebrate Community Index shall exceed a score of 4.5.

Fish shall not be rendered unsuitable for human consumption by the presence of contaminants.

Table 1 "Ammonia standards for Lowland and Hill surface water bodies"

Total Ammoniacal Nitrogen in mg/m³ at different pH	
pH	NH_4^+-N + NH_3-N mg/m³
6.0	2,570
6.1	2,555
6.2	2,540
6.3	2,520
6.4	2,490
6.5	2,460
6.6	2,430
6.7	2,380
6.8	2,330
6.9	2,260
7.0	2,180
7.1	2,090
7.2	1,990
7.3	1,880
7.4	1,750
7.5	1,610
7.6	1,470
7.7	1,320
7.8	1,180
7.9	1,030
8.0	900
8.1	780
8.2	660
8.3	560

[3] Applies to the part of the bed that can be seen from the bank during summer low flows or walked on.
[4] Expressed in terms of reach biomass per unit of exposed strata (i.e., tops and sides of stones) averaged across the full width of the stream or river.
[5] Expressed in terms of reach biomass per unit of exposed strata (i.e., tops and sides of stones) averaged across the full width of the stream or river.

environment SOUTHLAND
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Te Taiao Tonga

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Discharge Permit

Pursuant to Section 104B of the Resource Management Act 1991, a resource consent is hereby granted by the Southland Regional Council to **Blue Sky Meats (NZ) Ltd** of **729 Woodlands Morton Mains Road, RD 1, Morton Mains, Invercargill 9871** from **28 February 2019.**

Please read this Consent carefully, and ensure that any staff or contractors carrying out activities under this Consent on your behalf are aware of all the conditions of the Consent.

Details of Permit

Purpose for which permit is granted:		To discharge land drainage water and stormwater to water
Location	- site locality	729 Woodlands Morton Mains Road, Morton Mains
	- map co-ordinates	1,264,960E 4,857,750N NZTM
	- catchment	Waihopai River
	- Physiographic zone	Oxidising
	- FMU	Oreti
Legal description of land at the site:		Lot 1 DP 595
Expiry date:		**31 December 2022**

Schedule of Conditions

General conditions

1. This consent authorises the discharge of land drainage water, particularly from dewatering of a construction and treatment pond area, and stormwater, to water in an open drain, as described in the application dated 13 December 2018 (ES Objective references A442772 & A442771) and further information dated 31 January 2019 (ES Objective reference A452229).

2. The land drainage water shall not be discharged to the drain during the period of construction of the wastewater treatment ponds authorised by Resource Consent AUTH-20181937-01. *Note: during the construction period the land drainage water is to be diverted to the wastewater storage pond. This condition does not prevent discharge of the stormwater.*

3. Prior to commencement of the discharge the consent holder shall provide NZTM co-ordinates for the point of discharge of the drain into the tributary of the Waihopai River.

4. (a) The consent holder shall sample the land drainage water and have it analysed for the following:
    i. pH
    ii. electrical conductivity
    iii. biochemical oxygen demand
    iv. Total Ammonia Nitrogen
    v. Nitrate (plus nitrite) Nitrogen
    vi. Total Phosphorous
    vii. E. coli

   (b) The consent holder shall also sample water from the drain between 5 and 20 metres upstream of the discharge point, and have the samples analysed for the same parameters as are listed in Condition 4(a).
    i. Sampling in accordance with Condition 4(b) shall occur within 2 hours of samples taken in accordance with Condition 4(a).

   (c) Samples for Conditions 4(a) and 4(b) shall be taken:
    i. Approximately midway through the construction period (the period when the water is diverted into the wastewater treatment pond);
    ii. Within 48 hours of commencement of the discharge to the drain;
    iii. Between 4 and 6 weeks after commencement of the discharge to the drain;
    iv. Annually thereafter.

   (d) Sample collection, preservation and analysis shall be carried out in accordance with the most recent edition of APHA "Standard Methods for the Examination of Water and Wastewater";

   (e) The monitoring and analyses are to be carried out by a laboratory with IANZ registration or equivalent, or as agreed to in writing with the Consent Authority;

   (f) The consent holder shall report to the results in writing to the consent authority (email: escompliance@es.govt.nz) within 30 days of receipt of the sample results.
    i. The report shall include the sample locations, comparison of the land drainage water and the water in the drain, and comment whether or not the samples indicated any contamination of the land drainage water by wastewater.

5. After reasonable mixing:

   (a) the discharge shall not result in the following effects in the open drain:
    i. The production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
    ii. Any conspicuous plumes, change in colour or reduction of visual clarity
    iii. Any emission of objectionable odour;

   (b) the discharge shall not result in the following effects in the tributary of the Waihopai River that the drain flows into:

    i. The production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials;

ii. Any conspicuous plumes, change in colour or reduction of visual clarity
iii. Any emission of objectionable odour;
iv. The rendering of fresh water as unsuitable for consumption by farm animals;
v. Any significant adverse effects on aquatic life;
vi. Exceedance of the water quality standards for "Lowland Hard Bed" water bodies (Appendix 1)

6. For the purposes of Condition 5, reasonable mixing shall have occurred:
   i. in the drain within 20 metres of the point of discharge to the drain, and
   ii. in the tributary within 30 metres of the confluence of the drain with the tributary

7. The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this consent during the period 1 February to 30 September each year, or within two months of any enforcement action being taken by the Consent Authority in relation to the exercise of this consent, for the purposes of:
   (a) Determining whether the conditions of this permit are adequate to deal with any adverse effect on the environment, including cumulative effects, which may arise from the exercise of the permit, and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of the permit;
   (b) Ensuring the conditions of this consent are consistent with any National Environmental Standards Regulations, relevant plans and/or the Environment Southland Regional Policy Statement;
   (c) Amending the monitoring programme to be undertaken;
   (d) Adding or adjusting compliance limits;
   (e) Ensuring the Oreti Freshwater Management Unit meets the freshwater objectives and freshwater quality limits set in an operative regional plan pursuant to Policy A1 of the National Policy Statement for Freshwater Management; and
   (f) Requiring the Consent Holder to adopt the best practicable option to remove or reduce any adverse effect on the environment arising as a result of the exercise of this permit.

for the **Southland Regional Council**

Aurora Grant
Consents Manager

Notes:

1. *In accordance with Section 125(1)(a) of the Resource Management Act, this consent shall lapse after a period of five years after the date of commencement unless it is given effect to or an application is made to extend the lapse period before the consent lapses.*
2. *Section 126 of the Resource Management Act provides for this resource consent to be cancelled if the consent has been exercised in the past but has not been exercised during the preceding five years.*
3. *If you require a replacement permit upon the expiry date of this permit, any new application should be lodged at least six months prior to the expiry date of this permit. Applying at least six months before the expiry date may enable you to continue to exercise this permit until a decision is made, and any appeals are resolved, on the replacement application.*
4. *The Consent Holder shall pay an administration and monitoring charge to the Consent Authority collected in accordance with Section 36 of the Resource Management Act, payable in advance on 1 July each year.*

Appendix 1
Water quality standards for "Lowland Hard Bed" water bodies[1]

1. The temperature of the water:
   - shall not exceed 23°C
   - shall not exceed 11°C in trout spawning areas during May to September inclusive
   - the daily maximum ambient water temperature shall not be increased by more than 3°C when the natural or existing water temperature is 16°C or less, as a result of any discharge. If the natural or existing water temperature is above 16°C, the natural or existing water temperature shall not be exceeded by more than 1°C as a result of any discharge.

2. The pH of the water shall be within the range 6.5 to 9, and there shall be no pH change in water due to a discharge that results in a loss of biological diversity or a change in community abundance and composition.

3. The concentration of dissolved oxygen in water shall exceed 80% of saturation concentration.

4. There shall be no bacterial or fungal slime growths visible to the naked eye as obvious plumose growths or mats. Note that this standard also applies to within the zone of reasonable mixing for a discharge.

5. When the flow is below the median flow, the visual clarity of the water shall not be less than 1.6 metres, except where the water is naturally low in clarity as a result of high concentrations of tannins, in which case the natural colour and clarity shall not be altered.

6. The concentration of total ammonia shall not exceed the values specified in Table 1 "Ammonia standards for Lowland and Hill surface waterbodies".

7. For the period 1 November through to 30 April, filamentous algae of greater than 2 cm long shall not cover more than 30% of the visible stream bed. Growths of diatoms and cyanobacteria greater than 0.3cm thick shall not cover more than 60% of the visible stream bed.

8. Biomass shall not exceed 35 grams per square metre for either filamentous algae or diatoms and cyanobacteria

9. Chlorophyll *a* shall not exceed 120 milligrams per square metre for filamentous algae and 200 milligrams per square metre for diatoms and cyanobacteria

10. The concentration of faecal coliforms shall not exceed 1,000 coliforms per 100 millilitres, except for popular bathing sites, defined in Appendix G "Popular Bathing Sites" and within 1 km immediately upstream of these sites, where the concentration of Escherichia coli shall not exceed 130 E. coli per 100 millilitres.

11. The Macroinvertebrate Community Index shall exceed 90 and the Semi-Quantitative Macroinvertebrate Community Index shall exceed 4.5

[1] From Appendix G of the Regional Water Plan for Southland

12. Fish shall not be rendered unsuitable for human consumption by the presence of contaminants.

Table 1 "Ammonia standards for Lowland and Hill surface water

Total Ammoniacal Nitrogen in mg/m^3 at different pH	
pH	**NH_4^+-N + NH_3-N mg/m^3**
6.0	2570
6.1	2555
6.2	2540
6.3	2520
6.4	2490
6.5	2460
6.6	2430
6.7	2380
6.8	2330
6.9	2260
7.0	2180
7.1	2090
7.2	1990
7.3	1880
7.4	1750
7.5	1610
7.6	1470
7.7	1320
7.8	1180
7.9	1030
8.0	900
8.2	660
8.3	560
8.4	480
8.5	400
8.6	340
8.7	290
8.8	240
8.9	210
9.0	180

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Discharge Permit

Pursuant to Section 104B of the Resource Management Act 1991, a resource consent is hereby granted by the Southland Regional Council to **Blue Sky Meats (NZ) Ltd** of **729 Woodlands Morton Mains Road, RD 1, Morton Mains, Invercargill 9871** from **28 February 2019.**

Please read this Consent carefully, and ensure that any staff or contractors carrying out activities under this Consent on your behalf are aware of all the conditions of the Consent.

Details of Permit

Purpose for which permit is granted:		To discharge contaminants to air from a wastewater treatment system
Location	- site locality	729 Woodlands Morton Mains Road, Morton Mains
	- map co-ordinates	NZTM2000 1,264,980E 4,857,710N
	- airshed	Southland
Legal description of land at the site:		Lot 1 DP 595
Expiry date:		**31 December 2022**

Schedule of Conditions

General conditions

1. This resource consent authorises the emission of contaminants to air from a wastewater treatment process, as described in the resource consent application dated 13 December 2018 (ES Objective references A442772 & A442771).

2. The discharge shall not cause odour or spray drift that is offensive or objectionable to such an extent that it has an adverse effect on the environment beyond the boundary of Lot 1 DP 595.

3. The Consent Holder shall ensure that biogases generated from any anaerobic treatment facility are combusted via a flare or an energy recovery system at all times except under the following circumstances:

    a. in the event of a combustion equipment failure; or

    b. for combustion equipment maintenance purposes; or

c. for periodic venting of biogases via the flare blower as part of the routine maintenance programme; or

d. during commissioning of the new anaerobic treatment facility when a continuous discharge to the biofilter, may be required until such time as the thermal destruction is self sustaining; or

e. for purposes of supplying a continuous supply of small amounts of biogases from the covered anaerobic treatment facility to enable maintenance of the biofilter.

4. Under the circumstances where biogases are not flared and/or utilised for energy recovery then biogases shall be vented to the contingency biofilter. If use of the biofilter is required for more than 20 days in any calendar year ended 31 December, the Consent Holder shall within 60 days provide Environment Southland with a report which details the reason for the use of the biofilter during the year.

5. The consent holder shall maintain a diary of odour and spray drift complaints.
   a. The diary shall record:
      - the effect observed by the complainant;
      - the date and time of each complaint;
      - weather conditions (such as wind direction, approximate wind speed, temperature);
      - location of the complaint;
      - nature and intensity of the odour or spray drift; and
      - the action taken in response to the complaint.

      (Note: This condition does not require the consent holder to take action over every complaint but it does require that that decision be recorded.)

   b. The consent holder shall provide a record of the complaints diary to the Southland Regional Council on request

6. The consent holder shall maintain an after-hours contact number for the receipt of complaints and concerns about dust emissions. This contact number shall be listed on the consent holder's website (https://bluesky.co.nz).

7. The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of this consent during the period 1 February to 30 September each year, or within two months of any enforcement action being taken by the Consent Authority in relation to the exercise of this consent, for the purposes of:
   a. Determining whether the conditions of this permit are adequate to deal with any adverse effect on the environment, including cumulative effects, which may arise from the exercise of the permit, and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of the permit;
   b. Ensuring the conditions of this consent are consistent with any National Environmental Standards Regulations, relevant plans and/or the Environment Southland Regional Policy Statement;
   c. Amending the monitoring programme to be undertaken;
   d. Adding or adjusting compliance limits;
   e. Requiring the Consent Holder to adopt the best practicable option to remove or reduce any adverse effect on the environment arising as a result of the exercise of this permit.

for the **Southland Regional Council**

Aurora Grant
Consents Manager

Notes:

1. *The Consent Holder shall pay an annual administration and monitoring charge to the Consent Authority, collected in accordance with Section 36 of the Resource Management Act, 1991, payable in advance on 1 July each year.*

2. *In accordance with Section 125(1)(a) of the Resource Management Act, this consent will lapse after a period of five years after the date of commencement unless it is given effect to or an application is made to extend the lapse period before the consent lapses.*

3. *In accordance with section 126 of the Resource Management Act, 1991, this consent may be cancelled by the Consent Authority if not exercised for a continuous period of 2 years or more.*

4. *The Consent Holder is reminded that they may apply at any time under Section 127 of the Act to have any condition of this consent changed except that which specifies the expiry date of this consent.*

5. *If you require a replacement permit upon the expiry date of this permit, any new application should be lodged at least 6 months prior to the expiry date of this permit. Applying at least 6 months before the expiry date may enable you to continue to exercise this permit until a decision is made, and any appeals are resolved, on the replacement application.*