

Technical Review – Blue Sky Meats APP-20222295



5 March 2025

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Revision Schedule

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1. Introduction

1.1 Purpose of this report

This report was commissioned by Environment Southland (ES) following a series of correspondences starting in September 2022 in relation to the application lodged by Blue Sky Meats (NZ) Limited (trading as 'Blue Sky Pastures', herein abbreviated as 'BSM'). Under Section 92 (s92) of the Resource Management Act 1991 (RMA), consent authorities such as ES:

...may, at any reasonable time before the hearing of an application for a resource consent or before the decision to grant or refuse the application (if there is no hearing), by written notice, request the applicant for the consent to provide further information relating to the application. (s92(1))

In addition:

...A consent authority may commission any person to prepare a report on any matter relating to an application, including information provided by the applicant in the application or under this section, if all the following apply:

(a) the activity for which the resource consent is sought may, in the authority's opinion, have a significant adverse environmental effect; and

(b) the applicant is notified before the authority commissions the report; and

(c) the applicant does not refuse, under section 92B(1), to agree to the commissioning of the report. (s92(2))

This report was so commissioned, following consultation between ES and BSM. Work on this report began following receipt of agreement from BSM (via email to Ryan Hodgson, Senior Consents Officer, ES) on 21 November 2023.

Our (Stantec's) scope for this report is limited to assessment of the following aspects of the application:

- Discharges to land
- Discharges to surface water
- Groundwater takes from confined aquifer.

All other aspects, including air quality/odour effects associated with the application to discharge contaminants to air, are being addressed separately by ES and/or third party consultants.

The intention of this report is to provide a summary of the above aspects of the application, and subsequent information received, and provide an independent technical opinion regarding the adequacy and completeness of the information as well as commentary on the potential effects of the proposed activities. This opinion is intended to inform the decision of the consenting planner (and in particular, to inform the findings of the planner's assessment under Section 42a of the RMA). Throughout the report, the objective is to identify whether the information now available (following completion of the s92 process) is sufficient to reliably inform the consenting authority's decision regarding the application.

1.2 Background

A bundled consent application was lodged to ES by Mitchell Daysh on behalf of BSM (APP-20222295). The details of this application are provided in Section 2.2 below. On 17 August 2022, Stantec received a request for assistance from ES to review selected aspects of the application in accordance with s92 of the RMA. An initial review was undertaken, and a request for further information was submitted to ES (to be forwarded to the applicant) on 28 October 2022.

Several general issues were identified with regards to the application documents, given the complexity of the proposal and the likelihood that this application may be notified and/or be considered in a Council (ES) hearing in future. These included:

- The application was not concise, consisting of over 800 pages of material (in the initial submission) with minimal cross-referencing between the main assessment and supplementary technical documents.
- Due to the large volume of information and poor organisation of the documents, it was difficult to ascertain exactly which activities were included in the scope of the proposal.
- Some of the technical information provided by the applicant's advisors was not pulled through into the main Assessment of Environmental Effects (AEE) in any great detail. In some cases, the information was contradictory. Where there was a contradiction and this was not clarified by the applicant (after clarification was requested), reviewers had to assume that the contents of the 2022 AEE reflected the final position of the applicant.

The applicant submitted their response to the initial S92 questions to on 21 August 2023, and several discussions were subsequently held between the applicant and ES to clarify the information and obtain an optimal level of detail (to address the issues raised by Stantec's initial s92 request).



This report has been developed over a number of iterations and includes consideration of all materials provided by the applicant since the initial s92 request was made in October 2022. These materials, alongside the original application documents, include:

- Report prepared by Pattle Delamore Partners (PDP) entitled 'Consent Application [APP-2022295] – Response to Stantec (NZ) Ltd Request for Clarification (dated 1 November 2022) – Environment Southland', July 2023. Appendices to the report:
 - Updated proposed consent conditions
 - Table addressing Issue ID 23, referenced as "Any draft conditions proposed should have been cross-referenced in Table 17 as key mitigation measures"
 - Updated Wastewater Farm Environmental Management Plan
 - Wastewater Treatment Plant Operation and Maintenance Manual
- Completed s92 issues register (including our original requests and subsequent response(s) from the applicant) dated 8 September 2023.
- Further letter to BSM from PDP (subsequently passed on to ES by BSM) entitled 'Response to Environment Southland Post-Lodgement Questions – Blue Sky Meats Land Discharge of Wastewater and Biosolids', dated 23 February 2024, 118pp.
- Letter from Mitchell Daysh to ES on behalf of the applicant, 'Re: Blue Sky Meats – APP2022295 Technical Meeting Response', dated 28 August 2024, 80pp.
- Further information provided in December 2024 from Mitchell Daysh to ES, including comments on this report, a revised figure of the planting programme, and revised consent conditions, which shows some but not all amendments to those proposed in Appendix B of this memo.

1.3 Reviewers' qualifications and experience

This review and report has been conducted by suitably qualified and experienced practitioners, as detailed below.

Surface water effects and overall Assessment of Effects methodology:

Jessica Grinter (Principal Environmental Scientist) is a Certified Environmental Practitioner – Impact Assessment Specialist (CEnvP-IA) and has worked in the water industry as an environmental scientist in New Zealand, Australia, the United Kingdom and the Pacific region for over 15 years. She holds a Masters degree in Integrated Water Management from the University of Queensland (Australia; 2014) and a Bachelor of Science degree (Physical geography and Environmental Science) from the University of Auckland (New Zealand, 2009). Jessica led the compilation of this report.

Aquatic ecology:

David Cameron (Senior Principal Environmental Scientist) holds a BSc (Hons) in Zoology from Victoria University of Wellington. He has over 30 years of experience in aquatic ecology and water quality, primarily involved with the assessment of environmental effects of wastewater and stormwater discharges, and of river channel works. He has extensive experience in pre-hearing and hearing processes across New Zealand, including in Southland.

Land discharge effects and overall reviewer:

Sue Bennett (Senior Principal Environmental Scientist) holds a BA (Hons) in Natural Sciences from Cambridge University, UK, where she specialised in Chemistry and Molecular Biology. She is employed by Stantec NZ, based in Dunedin, and has over 30 years' experience in environmental consulting, primarily involved with wastewater, stormwater, solid waste and biosolids management. Her specialist area is the environmental effects of discharges. Sue has worked in New Zealand since 1997 and has undertaken a number of projects in the Southland region over the last ten years.

Groundwater aspects:

Dr Hisham Zarour (Senior Principal Hydrogeologist / Team Leader Geosciences) holds a PhD from Massey University in New Zealand, MSc from the University of Birmingham in the UK, and BSc from King Abdulaziz University in Saudi Arabia, all of which are in hydrogeology. He has over 30 years of experience in groundwater hydrology, quality, and modelling, including about 12 years in New Zealand regional councils. Hisham authored and reviewed over a hundred AEEs, models, and technical reports in New Zealand, Australia, and the Middle East. He has extensive experience in pre-hearing and hearing litigations. Hisham was the main groundwater science provider in regional plans in Manawatu-Wanganui, Canterbury, and Nelson. Hisham's experience includes assessment of groundwater-surface water interaction and the effects of application of treated wastewater to land. *Note: Hisham left Stantec in January 2025.*



2. Application Description

2.1 Consents applied for

BSM operates a sheep and lamb processing facility at Morton Mains, in Southland. An application was submitted on 30 June 2022 to ES, for resource consents associated with the operation of the on-site wastewater treatment facility and the land application of liquid and solid wastes. Whilst the initial application and supporting documents refer to “reconsenting” of the various discharges, we note that under the RMA, there is no process to renew existing consents or reconsenting. The consents applied for, that are relevant to this report, include:

Under the Operative Regional Water Plan for Southland:

- A water permit for the abstraction of groundwater from a confined aquifer where the rate of take is greater than 2 litres per second.
- A discharge permit for the discharge of contaminants or water into water.

Under the Proposed Southland Water and Land Plan:

- A water permit for the abstraction of groundwater from a groundwater management zone at a rate that exceeds the permitted volumes and rates.
- A discharge permit for the discharge of wastewater from industrial premises onto or into land where contaminants may enter water.
- A discharge permit for the discharge of land drainage water and stormwater to water.
- A water permit for the take of groundwater for the purpose of dewatering.

Most of the consents that previously authorised the activity were granted in 2003 and they all expired on 31 December 2022. An additional application was lodged on 29 July 2022 for 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. The consents for the discharge and take of groundwater associated with dewatering were initially granted in 2018 for a short term of three years. The 2022 application was predominantly reliant upon materials submitted for the application in 2018 (including an Assessment of Environmental Effects (AEE) prepared by PDP) with some supplemental information included as an update to support the new application.

The 2022 application sought to “replace this resource consent for a term of 35 years” (additional application document submitted 29 July 2022).

2.2 Proposal, locality and activity footprint

BSM’s Morton Mains facility currently processes up to 30,000 stock units per week (including lambs, sheep, bobby calves, and goats) through its slaughterhouse in peak season (typically January – May). Rendering of up to 5,750 kg/day of raw meat, blood and bone meal and tallow materials is also undertaken. The location and extent of the BSM operational footprint (the area over which the proposed activities will occur) is shown in Figure 2-1 below.





Figure 2-1: Proposed BSM activity footprint within local context



2.3 Activities applied for

The primary discharges relevant to this report for which consent was initially sought included:

- Discharge of treated wastewater from the on-site wastewater treatment plant (WWTP) to an aerated irrigation storage lagoon, and then to land via a surface spray irrigation system.
- Discharge of groundwater from the dewatering system under the WWTP into an existing surface drain, then into a tributary of Waihopai River.
- Discharge of land drainage water, and stormwater collected from the Covered Anaerobic Lagoon (CAL) cover and other hardstand areas around the site into an existing surface drain, via an outlet. The surface drain is connected to a tributary of Waihopai River. *[Discharge of land drainage water from various tile drains around the application areas was subsequently added to the discharges]*
- Discharge of screened stockyard solids, paunch, sand and grit to land via a muck spreader. *[The method of application has changed for this material]*
- Discharge of activated sludge from the sequencing batch reactor (SBR) lagoon to land (mixed with liquid waste stream and irrigated via the surface spray irrigation system). *[The applicant now refers to this material as 'BNR solids']*

Prior to 2019, the waste from the facility was stored and then irrigated to land with minimal treatment, as shown in Figure 2-2. This resulted in a number of operational difficulties, particularly the deleterious impact of the discharge on the soil's ability to receive and treat the waste.

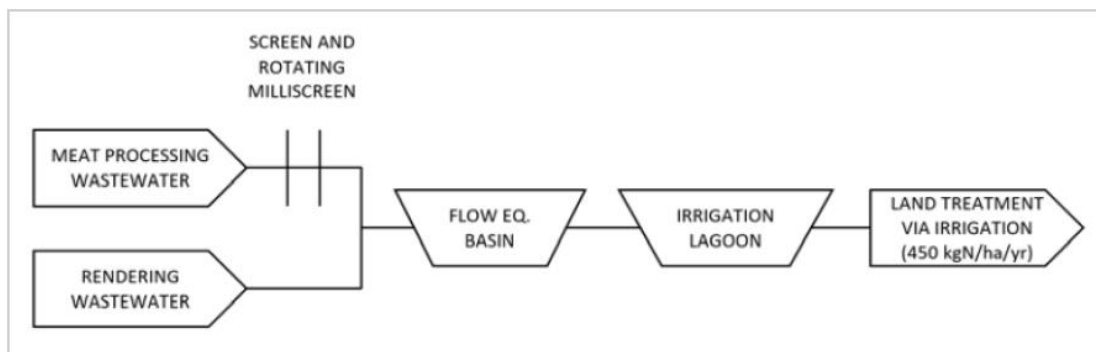


Figure 2-2: Process Diagram of Pre-2019 Wastewater System¹

Following the upgrade in 2019, the on-site wastewater treatment facility is comprised of a pre-existing lagoon used for the storage of treated wastewater for irrigation, as well as additional lagoon-based treatment processes added as part of upgrades in 2019:

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

Figure 2-3 shows the process units employed at the facility since the upgrade.

¹ Figure 3 of Appendix B of Morton Mains Processing Plant: Resource Consent Application and Assessment of Environmental Effects, Mitchell Daysh 30 June 2022.

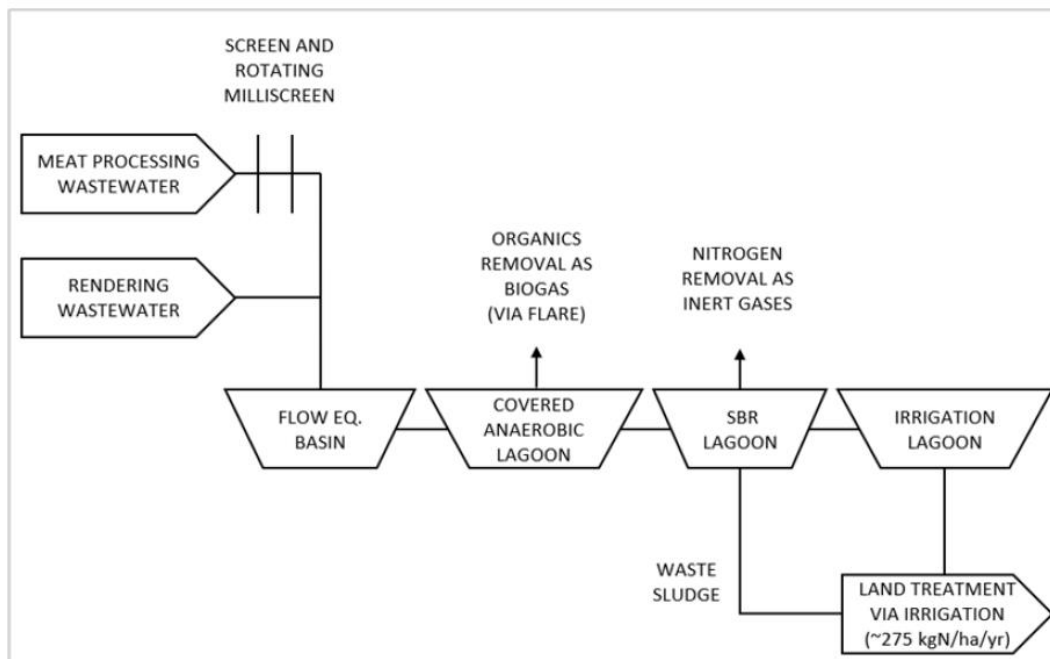


Figure 2-3: Process Diagram of Post-2019 Wastewater System, after the upgrade²

Wastewater is collected and initially held in the CAL with 5,000 m³ capacity. As wastewater is treated through the CAL, biogas is produced. Methane (CH₄) and carbon dioxide (CO₂) are collected by a piped network under the cover of the CAL and then combusted via a flare. Discharges to air associated with this process have been consented separately and are not discussed in this report.

Stormwater is collected from the CAL cover and conveyed into the groundwater dewatering system (described below).

Once wastewater has been treated through the CAL, which focuses on the reduction of oils, fats and grease, it is then passed into the SBR which uses aerobic heterotrophic bacteria (activated sludge) to reduce contaminants in the wastewater. The process primarily targets reduction of Biochemical Oxygen Demand (BOD) and nitrogen, with some additional (lesser) removal of phosphorus.

The wastewater and solids from the WWTP are discharged to land via a spray irrigator (from the meat processing plant and rendering plant) to BSM-owned land and third-party owned land (when available). Screened stockyard solids, paunch, and sand and grit were initially proposed to be discharged to land without treatment via a muck spreader on BSM-owned land only. The proposed treatment of solids has changed through the process as described in Section 5.7. The areas to which material is discharged, along with the soil types, are shown in Figure 2-4.

² Figure 4 of Appendix B of Morton Mains Processing Plant: Resource Consent Application and Assessment of Environmental Effects, Mitchell Daysh 30 June 2022.

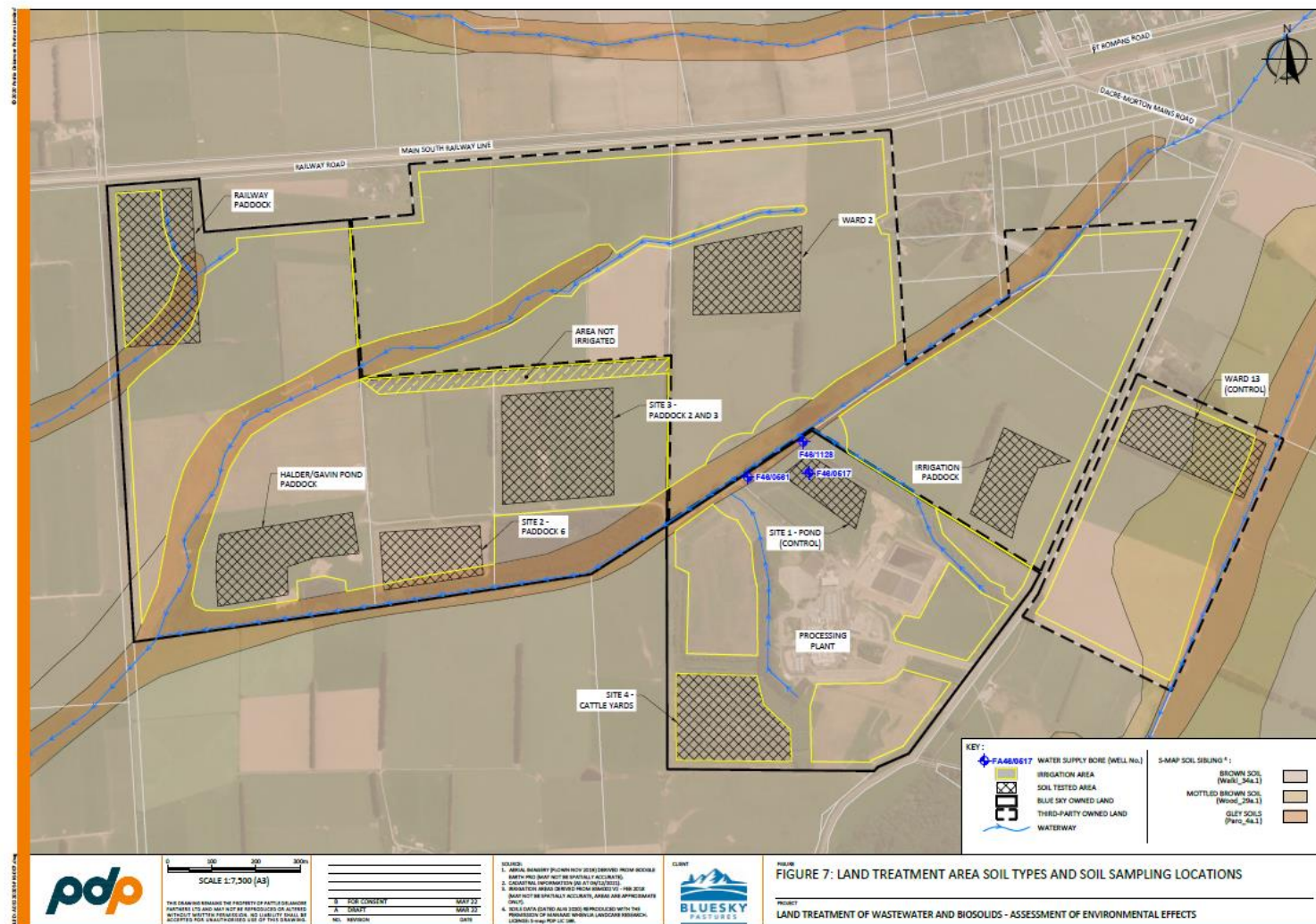


Figure 2-4: Application areas and soil types for both summer (third party land) and winter (BSM land)³

³ Land Discharge of Wastewater and Biosolids – Technical Assessment of Environmental Effects, PDP, Prepared for Blue Sky Meats Limited, June 2022.



During the construction of the upgrades in 2019, investigations revealed that seasonal shallow groundwater was present below the new lagoon systems. Sub-soil drainage was installed around the lagoon perimeter to lower the groundwater beneath the lagoons ‘permanently and passively’ (PDP, 2022; p2). Permeable bedding and perforated pipelines are used to convey dewatered groundwater, as well as stormwater collected from the CAL cover, to a nearby surface water drain.

The stormwater and groundwater conveyance system is illustrated in the schematic below (Figure 2-5).

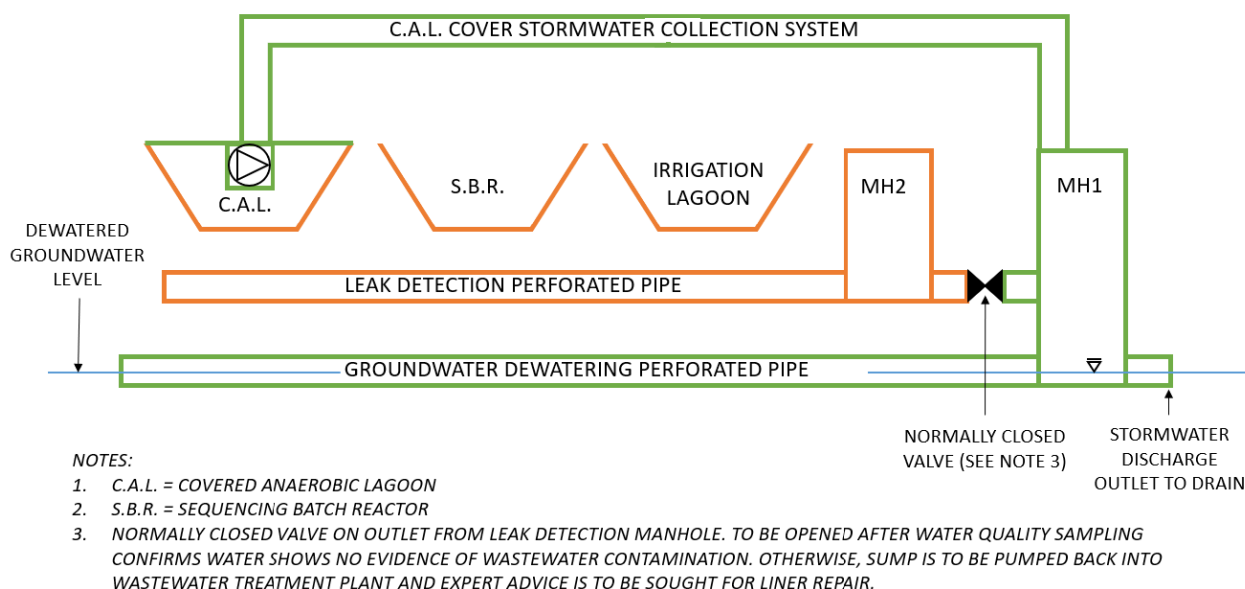


Figure 2-5: Schematic of stormwater and groundwater conveyance (from Figure 1 in PDP 2022, p3)

2.4 Alternatives assessment

The application references a review of potential options for the treatment and discharge of wastewater from the BSM site to land and surface water. The review was completed as part of the assessment undertaken for the previous 2018 application, prior to the upgrades to the on-site wastewater system (refer to 2022 Consent Application Part B: AEE, Section 8).

The 2022 Consent Application AEE states that ‘BSM selected the option to discharge to land with anaerobic treatment and biological nitrogen removal’ in part because it ‘reduces reliance on third-party owned farmland, which would have otherwise been required for reducing nitrogen loads per hectare. This in turn provides BSM with certainty that environmental effects are minimised without relying on participation of third parties’ (p74-75).

However, this argument is not consistent with what has been proposed in the application, which indicates a reliance on third party land to irrigate the required volume of treated wastewater, particularly once the WWTP’s capacity is increased. Clarification on this issue was sought through the s92 process (Issue 32 in the Stantec questions). The PDP letter dated 23 February 2024 stated that ‘The current agreement between BSM and third-party landowners is informal, with no future certainty of access. It is considered unlikely that BSM will be able to secure any long-term agreements, and that the relationship will only continue while there is mutual benefit.’ The letter notes that ‘the assessed envelope of effects was on the basis that third party land may not be available into the future’ as a worst case.

We understand that the third party land is a potential part of the application, but is not considered to be essential by the applicant. The assessment of effects undertaken is based on an envelope which includes effects when the non-BSM land is unavailable. Applying some of the summer load to the non-BSM land reduces the nitrogen load delivered to the aquifer and hence the effects of the activity. Therefore, we suggest that the following should be considered, as possible, to make this option more secure and mitigate the associated risks of it not being available:

- A long term agreement is in place with the third parties owning irrigation land, to allow the operation to continue for the proposed consent term (at minimum). This could also address any management issues to minimise the potential health effects for workers on these areas when interacting with the material applied.
- Detailed measures that will be implemented to avoid restriction of access to this land (to be agreed in advance with both the third party and the consenting authority).

- Identify potential other contingencies in the event the third party owned land can no longer be used and the nitrogen load to the aquifer is higher than anticipated.



3. Activities undertaken to date

BSM were granted a permit 'to discharge meat processing and rendering plant wastewater to land via a spray irrigator' in May 2003, with the consent expiring on 31 December 2022 (Consent No. 201191). The 2003 consent conditions were reviewed and subsequently amended by Environment Southland in August 2012. In 2017/2018, it was identified that 'changes to the current wastewater treatment operation at the Site were identified as being necessary.'

The 2022 AEE noted that 'a review of the wastewater system indicated difficulties in adequately managing the nitrogen load within the wastewater that was being applied to the land via irrigation' (PDP 2022 AEE, p4). It also listed key issues with the system prior to 2019 as follows:

- Elevated levels of nitrogen discharged into shallow groundwater and the connected surface water.
- Blinding of soils within the irrigation area due to elevated levels of fats, oils and greases in wastewater applied to the area (and resulting reduction in soils' hydraulic capacity). This leads to uncontrolled runoff of wastewater from the site.
- Poor system performance overall.

The on-site WWTP was upgraded in 2019, with the upgrades commissioned in January 2020. The changes to the treatment process are shown in Figure 2-2 and Figure 2-3. Further 'refinements' continued through to January 2021. The upgrades were designed to address the issues identified above. A full list of the upgrades completed is provided below (from the 2022 AEE, Section 2.3).

The BSM wastewater system following upgrades undertaken since 2019 includes:

- inlet screen and rotating milliscreens to remove solids from meat processing wastewater prior to biological treatment. We understand that these solids are applied to land along with the other solids produced by the processing plant with no treatment according to the initial application. The applicant now intends to manage these materials as described in Section 5.7.
- screens for stockyard solids waste stream. Liquid waste is returned to the WWTP; solids are disposed directly onto land as described in Section 5.7.
- dissolved air flotation (DAF) plant as a part of product recovery within the rendering plant. This removes all solids, such that screening or other primary treatment is not required of the liquid waste passed forward.
- wastewater storage to buffer flows into the WWTP (and to provide emergency storage capacity), by the 800 m³ flow equalization basin.
- 5,000 m³ covered anaerobic lagoon (CAL) and dedicated biogas flare unit.
- contingency biofilter for air discharges from the CAL.
- biological nutrient removal (BNR) system operated as an SBR, including mechanical aeration (with 6,000 m³ active storage volume).
- 15,000 m³ irrigation holding lagoon, which PDP have indicated will provide sufficient capacity to store wastewater during rain events until soil conditions are suitable for irrigation.
- Installation of a groundwater dewatering system comprised of subsoil drainage (permeable bedding and perforated pipelines) around the perimeter of the WWTP lagoons to lower groundwater locally beneath the lagoons 'permanently and passively'.

The upgrades have resulted in a reduction of predicted nitrogen load discharged to the aquifer from 11,350 kg N. yr (including nitrogen sources from the entire land application system) under the previous consent, to between 2,875 kg N.yr (with non-BSM land) and 4,600 kg N/yr (BSM land only), which is a reduction in predicted nitrogen loss to the aquifer of between 75% and 60%. As part of this review, we requested information on how the damage to the irrigation area from the waste application prior to the WWTP upgrade has been / will be remediated prior to further discharges of treated wastewater to the area under any new consents. In the PDP letter dated 23 February 2024, information was provided on the remediation methods that have been used, and provided the 2021 and 2023 reports of surveys of soil quality from Land and Water Science Ltd. The letter summarises the results of the surveys as follows:

- 'Since 2020, soil infiltration rates have been recovered and stable.'
- ESP levels in the soil are elevated, which indicates a risk to the soil structure from monovalent cations (i.e. sodium and potassium) and will need ongoing management, as proposed by the proposed Condition 23.
- Phosphorus levels in the soil are elevated indicating the potential risk from runoff to surface water, which PDP indicate would be addressed by the early implementation of the planting programme discussed below in this report.



The PDP letter states that with the management regime proposed *'there are no apparent soil issues that would preclude the proposed land treatment activity.'*

Given that the activity could result in elevated phosphorus in the runoff to surface water, the applicant has implemented a planting programme, which has two parts. The suitability The first part has already been implemented as part of the response to the issues identified above and is identified in Figure 3-1 as the existing planting programme The second part is now to be implemented if existing planting is removed. The effectiveness of the plan is reviewed in Section 5.2.

The following issues arose in reviewing the planting programme during the S92 process:

- The plan includes riparian planting along the open-channel streams next to irrigation areas. It excludes the tile drained stream in the north-west of the BSM site and any other tile drains, the reaches of the streams to the north of the processing plant, and also the streams that are in the third party owned land. These tile drains and streams are close to irrigation areas, hence they would be at risk from surface runoff and intercepting shallow groundwater. Whilst the tile drains are not open channels, they represent a discharge route which could be mitigated with planting.
- In the initial application, the planting performed under Stage 1 did not achieve a minimum of 5m width at all locations, which was identified in the current application as being required to reduce effects on the surface water quality. This meant there would have been some inconsistency between the width of existing planted buffers, and that of future ones. This inconsistency has been rectified in the current proposed plan, but the 5m width has been maintained.
- The application indicated that Stage 2 will be undertaken when the phosphorus load exceeds a specified limit. The PDP 2024 letter indicates that phosphorus is already high in the soils and represents a current risk to surface water quality rather than being a future risk as loads increase. This "Stage 2" planting is now part of the existing planting and is no longer a contingency response to increased phosphorus load.

The issues raised throughout the s92 process (and related responses from the applicant) were captured in an initial draft of this report. Sue Bennett and Hisham Zarour attended a site visit alongside BSM representatives, PDP and ES personnel on 16 May 2024. A meeting with the wider teams was held on the same day to discuss remaining issues to be addressed. The outcome of this meeting were identified in an email from Ryan Hodgson (ES) to BSM on 11 June 2024, and a response was received from Mitchell Daysh on 28 August 2024. A revision of this report was provided to ES and the applicant in October 2024. A further meeting was held on 12 November 2024 with the purpose of closing out any unresolved issues. The resulting changes have been reflected in this report.



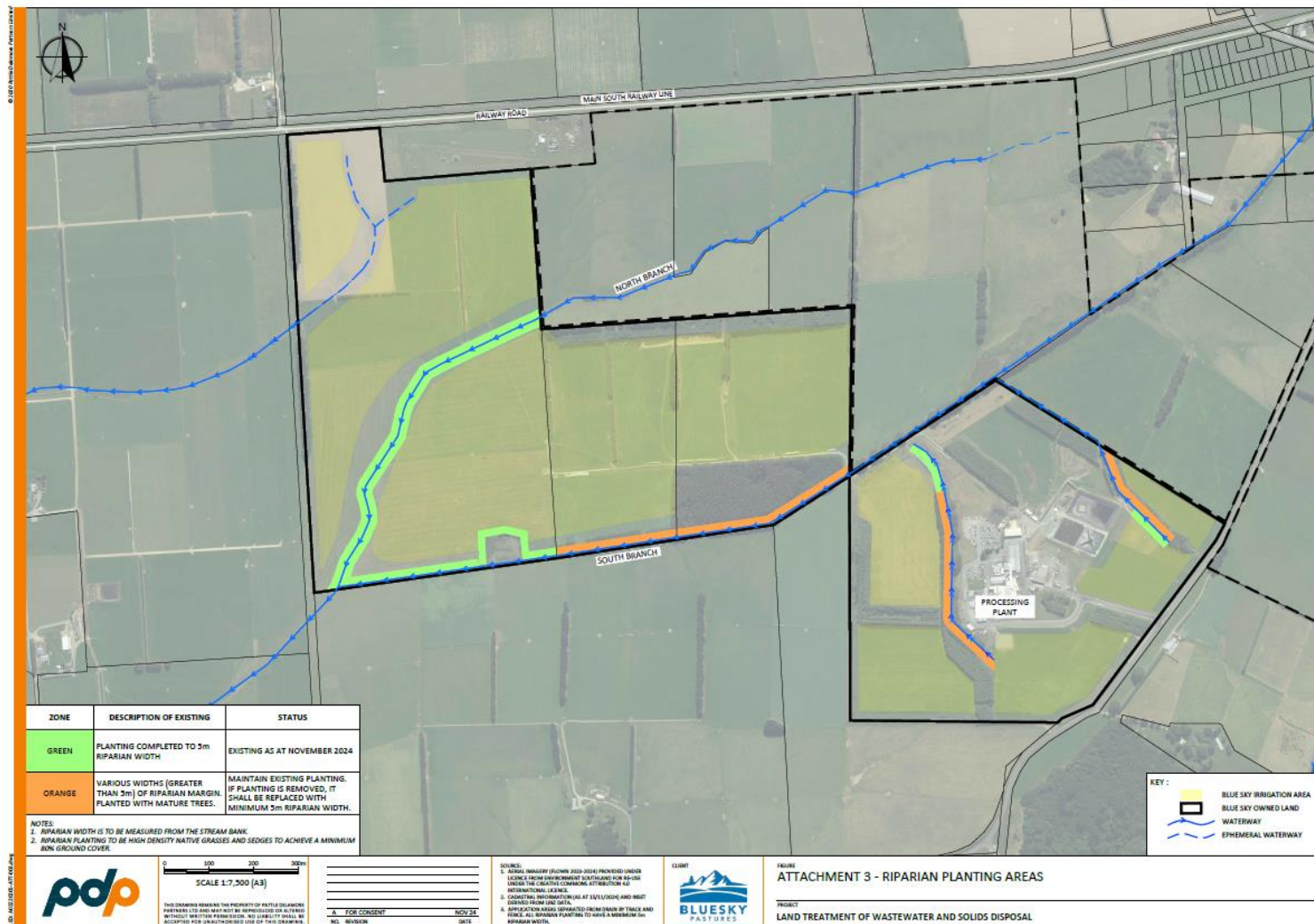


Figure 3-1: Existing and Proposed Planting Plan⁴

⁴ Provided as part of document 'Proposed consent conditions 6 December 2024 (excluding the Air Discharge Consent) – Post-12 November 2024 Meeting with Environment Southland and Stantec to discuss technical review report', Mitchell Daysh, 6 December 2024.



4. Character of the proposed receiving environment

This section summarises the receiving environment for the proposed discharges from the BSM site, including information supplied in the application and supplementary materials, as well as any gaps identified during our independent review.

4.1 Land

The nearest sensitive receptor is a dwelling approximately 500 metres south-east of the factory site and approximately 220m south east of the BSM discharge area near the south east boundary. Woodlands-Morton Mains Road runs along the south-east boundary. Topography is flat to gently undulating, with overall grading towards the south-eastern corner of the site.

Underlying geology is comprised of 'weathered gravel, sand, silt and mud of alluvial and colluvial origin' (GNS Science New Zealand Geology Web Map, in PDP 2018 AEE technical report, p2). Geotechnical investigations undertaken within the irrigation area in 2018 concluded that the soils on the site were consistent with the description of surface geology provided by GNS. Additionally, they found that:

- Topsoil depth is up to 0.2 metres below ground level (mbgl); topsoil is loosely packed, friable, dry and slightly plastic.
- Topsoil is underlain by silty clay (0.2 to 1.3-2.4 mbgl), and sub-rounded to rounded alluvial gravels (1.3-2.4 mbgl to 3.1-3.7 mbgl).
- No fill material was found at the four locations investigated.

In the Proposed Southland Water and Land Plan (pSWLP) physiographic zones, the majority of the area is identified being an oxidizing zone with artificial drainage, for which the principal risks are from the discharge of nitrogen to the underlying groundwater, and contaminant loss to surface water in heavy or prolonged rainfall. The stream channels are gleyed, for which a key concern is overland flow from the land to the surface water.

There have been considerable issues with damage to the soil at the site resulting from the previous land application of the processing factory's waste, however, generally, soil quality has gradually been improving since 2020. This is discussed further in Section 3 above.

4.2 Groundwater

The site is located within the Waihopai groundwater management zone under both the Southland Regional Water Plan (RWP) and the pSWLP. 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).

The Waihopai groundwater catchment consists of a relatively thin (<30 m) layer of gravels overlying tertiary sediments (low permeability deposits). Recharge to the Waihopai groundwater zone is exclusively from rainfall recharge estimated at 521 mm/year⁵. Groundwater is connected to surface water within this zone.

There are three functioning groundwater abstraction bores on the BSM site (and one that was decommissioned in 2017), consented for the extraction of water for use in the meat processing plant. There are also seven monitoring bores. All bores have been monitored under the existing consent, and data gathered for this purpose were used to characterise existing groundwater quality on site for the application. The monitoring results are discussed further in Section 5.2 below.

4.3 Fresh water bodies (surface)

The site is located within the Waihopai River catchment. Two first-order streams drain the site to the main channel of the Waihopai River; these are referred to in the application as the 'North Branch' and South Branch'. The Waihopai River drains a northeast to southwest aligned catchment of approximately 250 km² between the Edendale terrace (lower Maitara Valley), and Invercargill (PDP 2018 AEE, p3). It eventually drains to the New River Estuary. As shown on Figure 2-1 above, the Waihopai River and the BSM site are located within the Oreti Freshwater Management Unit as defined by the proposed Southland Land and Water Plan (pSLWP).

Stormwater from the BSM factory site is discharged via an existing surface drain to the northeast of the site. This drain then flows north-west before turning to the south-west and flowing into an upper tributary of the Waihopai River to the

⁵ Environment Southland's Groundwater Zone Information Sheet for the Waihopai zone.



south of Woodlands Morton Mains Road. It is understood that stormwater discharges from the factory site are a permitted activity, with the exception of those proposed discharges from the cover of the CAL.

A Baseline Surface Water Quality and Ecological Assessment was completed by PDP on behalf of BSM in June 2020; the assessment was based upon a review of previous monitoring data and a supplemental field survey undertaken in January 2020.

The North and South Branch tributaries are described in the 2020 baseline assessment as being 'heavily impacted by local land-use' with degraded water quality (PDP 2020, p iii). This is exacerbated both by inputs of poor quality groundwater from the shallow aquifer underlying the BSM site, and also from activities on the site itself which have likely contributed to elevated nutrients and microbial contaminations. Both streams were noted as having 'poor' to 'fair' ecological health" based upon the Macroinvertebrate Community index (MCI) scores determined as part of the baseline assessment. Inanga (*Galaxias maculatus*) and an unidentified galaxiid group (*Galaxias* spp.) likely including small giant kōkopu (*Galaxias argenteus*) and Gollum galaxias (*Galaxias gollumoides*) were found in the South Branch. These fish species have high conservation value. No fish were caught during surveys of the North Branch.

The baseline condition of the tributaries is summarised in Table 4-1 in terms of stream flow. South Branch is the larger of the two tributaries, draining a bigger contributing catchment and with higher mean annual flow even in baseflow (low flow) conditions such as may be encountered in summer.

Table 4-1: Baseline flow parameters for tributaries of the Waihopai River draining the BSM site (adapted from PDP 2020, p8)

Parameter	North Branch	South Branch
Receiving catchment area (km ²)	0.94	2.36
Mean flow (L/sec)	14	35
Mean annual low flow (L/sec)	2	5

The 2022 AEE noted that 'studies undertaken by Environment Southland in recent years have indicated that the water quality of the Waihopai River is improving.' And references the inclusion of Waihopai catchment in the Living Streams study undertaken between 2005 – 2015, which awarded the Waihopai 'Most Improved River' status. However, Schedule X of the pSWLP as given on the ES Beacon site identifies the catchment degradation status. The Waihopai catchment in which the activity is located is identified as degraded for all the indicators considered, including macroinvertebrate community index (MCI), E.coli, suspended sediment, total nitrogen and total phosphorus.

4.4 Estuary

The New River Estuary is the ultimate receiving environment for discharges from the BSM site to surface water and groundwater.

Surface runoff from the site discharges into a tributary of Waihopai River and flows for approximately 8 km before joining the main stem of Waihopai River. After a further ~20 km, the Waihopai River drains into the New River Estuary west of Invercargill (close to the airport).

There is a connection between groundwater at BSM's Morton Mains site and the New River Estuary. Groundwater from the site is intercepted by sub-surface and open drains within the site, which discharge into streams and the tributaries of the Waihopai River. Groundwater and associated contaminant loads entering the Waihopai River tributaries in BSM's Morton Mains site's area will eventually discharge into the New River Estuary. This contaminant transport mechanism is much faster than contaminant transport via groundwater. Assuming groundwater flow velocity in the order of 0.00002–0.02 m/day (Section 5.2) and estimated surface water flow velocity in the order of 0.1–0.5 m/s (8,640–43,200 m/d), advective surface water contaminant transport would be more than 2 million times faster than advective groundwater contaminant transport.

The 2022 AEE (Section 4.9 and 4.10) described the estuary as containing high nutrient levels and being heavily impacted by upstream land uses. The AEE noted that the estuary was 'currently receiving nutrient and sediment inputs beyond its assimilative capacity'.

Through this process, several measures have been identified and will be implemented to reduce the potential effects on the New River Estuary. These include the predicted significant reduction of the nitrogen load discharged to the underlying aquifer by between 60% to 75% of the current discharged load as determined by Overseer. However, we have identified some concerns with how representative this modelling is as discussed in Section 5.1.4. The improvement in the soil quality and the riparian planting plan will reduce the risks of surface runoff and hence the phosphorus load to the surface water and hence the Estuary. These are reflected in the proposed consent conditions, along with improved monitoring requirements. However, some concerns remain as discussed in Section 5.6.



5. Technical assessment of effects

The scope of this section is limited to those aspects for which Stantec was requested to provide technical review and commentary as part of the s92 process. Any issues originally raised and subsequently resolved through the s92 process have not been included here but are summarised in the register of all issues raised, and the applicant's subsequent responses, which is included as Appendix A. The Applicant has provided revised conditions as at 10 December 2024. Whilst this shows some edits in track changes, they do not show all edits to those given in Appendix B. This includes the deletion of a number of Conditions which are included in Appendix B to address concerns raised in this section. We have not reviewed the BSM revised conditions as a whole except as specifically identified in this report.

5.1 Land

5.1.1 Effects on soil quality

As described in Section 3 above, the land on which BSM intends to irrigate treated wastewater has been severely compromised as a result of past activities and non-compliance with the existing consent.

In their response to requests for further information, the applicant confirmed that *'[the] key remediation method has been to change from primary effluent irrigation to secondary treated wastewater irrigation. To further enhance this process, the BSM undertakes [the] following soil maintenance activities:*

- *Mechanical aeration of soils.*
- *Applications of gypsum to manage the exchangeable sodium percentage (ESP).'* (21 August 2023)

The application relies on consent conditions which focus on preventing further damage (or a repeat of past issues) such as a limit for Exchangeable Sodium Percentage (ESP) of 5%, and a minimum soil saturated hydraulic conductivity of 6 mm/hr. A further response received from the applicant (23 February 2024; p4) linked the application of gypsum with a corresponding reduction in pH. This finding is flawed as gypsum application would not cause a change in soil pH.

A Soil Monitoring Report was completed by Land and Water Science (LWS) in June 2021, and appended to the 2022 consent application. This report is produced annually under the existing consent (201191) to report the results of routine soil monitoring within the existing BSM irrigation area and control locations. The 2023 LWS report⁶ which was provided with the PDP letter of 23 February 2024 confirmed the following:

- Gypsum was applied in December 2022 across BSM Paddocks 1, 2, 3, and 6; cattle yards, and the railway site (and not on control sites).
- Five soil moisture sensors are present on the site; these continuously record soil moisture (%) and deficit (in mm).
- Soil infiltration rates across the areas irrigated with treated wastewater had improved from 2022 (with the exception of one location which exhibited 'slow' infiltration as low as 4 mm/hour).
- Improvements in soil infiltration rates were attributed to ploughing, re-sowing of pasture, and gypsum application over the preceding year. However, the report identified that the soils had not been mechanically aerated within the reporting period, and that this should be undertaken when infiltration rates reduce to maintain soil structure.
- The report recommended that gypsum application and long return periods for irrigation continue to be maintained, especially in wetter periods.
- While Olsen P concentrations were lower overall than they had been prior to 2023, they remained close to what is considered 'excessive concentrations for pastoral growth' (LWS 2023, p12).
- ESP was above 5% at one location within the irrigated area, Site 2. This is the threshold indicated in the current consent, above which soil structural damage could occur. In 2023, ESP was lower at Site 2 than it has been in the past, but still requires remedial action.

Overall, the LWS 2023 report supports the applicant's statement that the land within existing BSM irrigation areas predominantly recovered between 2020 and 2024, although the recovery has taken longer for some parameters (e.g. Olsen P) than others (hydraulic conductivity and ESP). Recovery will continue while land treatment is ongoing and some parameters will require active management to ensure that the soil can adequately receive and treat the material applied.

⁶ Land and Water Science 2023 *Blue Sky Pastures Mortan Mains Plant: Soil Monitoring Report 2023*, reported prepared by Dr Lisa Pearson, Land and Water Science Report 2023/11, June 2023, 28pp.



Further information submitted by the applicant in August 2024 included proposed phosphorus limits which would “require BSM to apply solids more evenly across the site [when third party land is available] so that phosphorus application rates match the agronomic requirements of the farming system”.

When third party land is not available, initially the applicant indicated that riparian enhancement would be used to mitigate additional phosphorus losses. This staged approach to riparian planting is no longer proposed in the November 2024 Planting Plan, with the enhancements being completed already. Some issues with the plan are discussed in Section 5.2 below.

Based on the information presented, it is agreed that the continued irrigation of treated wastewater (as proposed in the consent application) will likely have negligible adverse effects on the quality and integrity of soils across the irrigated areas of the BSM site. However, this would be the case only if the activities as identified by the applicant and summarised below are undertaken for the consent term:

- Mechanical aeration of the entire irrigated area on a regular basis, as indicated by the monitoring particularly of infiltration rates.
- Continuation of cut and carry operations on BSM land to remove excess nutrients and grazing on third party land to remove excess nutrients, where and when this land is available to BSM.
- Irrigation of the entire available land area, to manage contaminant loads (including to operate within the individual total nitrogen and total phosphorus limits where third party land is available).
- Seasonal adjustment of irrigation rates to account for soil infiltration, precipitation and soil moisture conditions.
- Regular (at least annual) review of irrigation return periods, taking into account hydraulic and organic loading of all sources. This is required as the final load characteristics may vary over time (within the bounds of consented limits).
- Application of gypsum across all irrigated areas as indicated to be required by the soil monitoring, to continue improvement of soil quality (particularly reduction of sodium and potassium).
- Longer-term reviews of the limits, mitigation and management measures related to nutrient load reduction to ensure that water quality is maintained and enhanced in the receiving catchment. It is recommended that reviewing at a minimum of 6-yearly intervals from commencement of the new consent would be prudent, with the understanding that for the first two reviews the effects of the actions taken to improve site operations and reduce nutrient loads since 2019 may not be fully realised.

It is therefore recommended that all of these actions are reflected in consent conditions, as detailed in Section 6 of this memorandum.

5.1.2 Contingency irrigation area

The application and initial supporting information provided did not clearly describe any intention to set aside an additional area of land as a contingency for the irrigation system.

Similar schemes within New Zealand (and in similar settings internationally) would typically set aside less suitable or poor production land (or any other portion of their property) to allow for future expansion or emergency situations where the wastewater system becomes overwhelmed (such as in a storm).

Instead of setting aside land as a contingency, the applicant has relied upon the capacity of the irrigation storage lagoon within the treatment system. A total irrigation storage volume of 15,000 m³ has been incorporated into the proposed design (as per Section 5.2.1 of the Technical AEE (June 2022)). This allows for storage of up to ten days' peak volume wastewater flows (and up to 13.5 days of flow at a future peak of 7,000 m³ per week), and incorporates dead storage in the base of the lagoon to hold the liner in place. It is envisaged that this level of buffering (storage) would only be required during large wet weather events; irrigation system maintenance, and shut down periods (e.g. when no staff are on site).

This is an acceptable contingency approach, although it is noted that in the event irrigation cannot resume when the storage capacity is reached, the plant would have to cease operations until conditions improved. Based on the water balance and storage balance calculations provided, and the assumptions made regarding future climate change, it is unlikely that this situation would arise within the proposed consent term.





Figure 5-1 Possible soil moisture conditions, corresponding plant and hydrological conditions (Source: Zarour, H. 2018)

5.1.3 Discharge flows, ponding and surface runoff

The applicant proposes to discharge a peak flow of 1,500 m³/day of treated wastewater, and up to 6 m³/day of separated solids/paunch/grit to be spread over land. Future average daily flow of wastewater is expected to be no more than '690 m³/day averaged across a 6-day working week, 12-month working year' (applicant response to Issue 9, 21 August 2023).

The wastewater flows and loads for the site have been estimated using the following definition of a 'stock unit', according to the applicant's response to the request for further information:

'A single animal in the context of the number of animals processed through the plant. This is different to lamb equivalents, based on weight of animal.' (applicant's response, 21 August 2023)

It was also subsequently confirmed that the operation typically does not kill adult cattle and is instead processing sheep and bobby calves which are smaller animals and are all of a similar size, such that there is limited variation between stock units (August 2024).

The wastewater flows and loads calculations presented by the applicant (Appendix C to the application) show that flows and loads have been estimated using number of kills per day in the processing plant. Calculations involving 'stock units' as a parameter included:

- Estimated production capacity of the meat processing plant
- Number of skins treated
- Stock water demand
- Total volume of solids and paunch discharged
- Volume of liquid waste generated per kill.

Therefore, no differentiation was made between either different animal species (e.g. lambs versus beef cattle) nor their body weight or nutritional intake. The approach assumes that the proportion of animals (e.g. lambs, beef) remains the same every day throughout the term of the consent. If the proportion changes during the consent term, the flows and loads may have been under-or over-estimated.

The applicant was asked to confirm how human domestic waste generated on the site (for example, staff toilets) would be managed. Even if domestic waste is discharged as a permitted activity, it needs to be made clear how it is managed (e.g. specify any other consents/authorities or permitted activities being relied on) so that these potential risks can be ruled out. The applicant initially stated that the 'application does not include matters related to domestic effluent disposal, which is managed separately.' In their comments on the draft version of this report, they confirmed that "domestic wastewater is taken off site for processing. It doesn't form part of the application nor is it relevant to an assessment of cumulative effects".

The 2022 AEE was undertaken on the assumption that irrigation would be stopped if ponding or runoff occurred, and that in this situation wastewater would be diverted to the irrigation storage lagoon until conditions allowed for irrigation to resume. However, in subsequent materials including revised proposed consent conditions, it was indicated that irrigation would continue even in wet periods when soil moisture is above field capacity, as long as daily inspections of the irrigators and the field conditions are undertaken (as per proposed Condition 36).

We note that the terms 'soil moisture' and 'field capacity' represent two distinct concepts, and are measured differently. This is illustrated in Figure 5-1 below. **Field capacity** is a [constant] hydraulic property of soil. **Soil moisture** [content] is a condition (status) that changes. Soil moisture content (SMC) can be measured and related to field capacity (FC), e.g. where FC = 100 mm and SMC = 80 mm, you can say there is a 'water deficit'.

Water deficit is the amount of water needed to bring the soil moisture content back to field capacity. Where FC < SMC, there is a situation of waterlogging, perhaps better known as saturation. Above FC, there is no space for air in the pores, so the roots cannot 'breathe'. The soil structure can also suffer damage. Above saturation (over saturation, but practically happens at less than 100% saturation), the soil cannot take more water and there will be surface run off.

Good practice would be to avoid irrigating during wet periods, especially if any ponding is observed (even if minor). This avoids the potential effects associated with uncontrolled surface runoff and increased loads to groundwater as the treatment capacity of the soil is reduced when saturated. As such, it is proposed that Condition 36 as currently drafted in Appendix B is tightened to ensure that irrigation will not occur during wet periods.

5.1.4 Overseer modelling limitations

Overseer is a tool that provides a 'guide' to calculate modelled contaminant loss. Overseer outputs were provided by the applicant as part of the initial s92 process (August 2023), post-lodgement. Four scenarios were presented in the application:



1. Irrigation on 77 Ha of BSM land + 101 Ha of Third-party land (over 11 months), loading of 200 kg N.Ha.Yr.
2. Scenario 1, over 12 months.
3. Irrigation on 77 Ha of BSM land only (over 11 months), loading of 350 kg N.Ha.Yr.
4. Scenario 3, over 12 months.

These scenarios were updated and re-run in response to s92 queries raised in May 2024, and the revised model outputs were submitted to ES in August 2024. The models were edited to include nitrogen and phosphorus losses via sub-soil drainage of the site (reflecting the removal of requirements to permanently block / decommission sub-soil drains on the BSM site). These revised models show no change in total nitrogen losses, and an increase in phosphorus loss to water via subsoil drains of 0.1 kg P.Ha.Yr (PDP, August 2024). Conditions 46 and 47 in Appendix B address the definition of the losses from the tile drains during the consent term.

In response to our request in October 2022, the applicant provided raw Overseer outputs without any commentary or a summary of results, which would have enabled us to review how the modelling had been performed.

In each scenario, the nutrient load within materials applied were applied to land in the model as 'custom fertiliser' within the Overseer model. For example, the liquid waste stream was applied in the model as 'Custom soluble fertiliser: Dry season irrigation nutrients' and 'Custom soluble fertiliser: Wet season irrigation nutrients' while the Waste Activated Sludge was applied as 'Custom organic fertiliser: WAS-Other organic material'.

Overseer was originally designed as a nutrient management tool for farmers; to inform decisions regarding fertiliser application. While significant work has been undertaken to refine the model over the years (most recently in 2022-23 to improve the reliability of nitrogen-loss estimates⁷), the intent and design of the model is primarily for use in managing farm systems. Given that the BSM operation involves cut and carry and grazing, it is appropriate that Overseer is used as a tool to estimate nutrient losses from those activities. There are limitations of the model when applying it to estimate nutrient-loss in land treatment systems. However, the models have helped to inform selection of appropriate mitigation measures to reduce contaminant loading, which is beneficial.

During the process, the applicant identified that they wished to move to a 12 month operation rather than have a shut down period for a month over winter, as had been previous practice and the basis for the flows and loads assessment undertaken for the design of the WWTP in 2018.

Our concern was that if the processing period was extended, then the total annual load from the processing plant would increase, particularly over the winter months when the soil is less able to reduce the loads to both groundwater and surface water. Clarification of the effect of this change was requested as Issue 8.

In the PDP response dated August 2023, it was stated that BSM had advised that they planned an increase to 900,000 stock units per year, from a total of 807,160 in the 2020/2021 season, which was an 11 month season. This is an almost 12% increase in the amount of animal processed by the facility.

PDP stated that the change from 11 month to 12 month would not affect the loads to land or groundwater (as indicated in Table 2 of that report). However, Figures 1 and 2 of the same report and section indicates that the loads to land for the 11 and 12 month scenarios are different, especially in the months of July, October and December, with no apparent reduction in the loads in the other months. (Note that the two graphs use a different scale on the y-axis, the 11 month scenario having a maximum of 50, and the 12 month scenario maximum being 70. This data was not provided in numerical form.)

Given these issues, we are concerned that Overseer may not be adequately representative of the expected losses that result from the activities to be conducted on the site. This concern is further addressed in Section 5.6.

5.1.5 Annual Nutrient Loading

The consent application lodged in 2022 proposed that the following annual nitrogen loads would be applied across the irrigation area:

- 350 kg N.Ha.Yr on areas of BSM land where pasture is cut and carried (harvested and transported off site for feed).
- 200 kg N.Ha.Yr on all other areas including both BSM and third-party land where cut and carry is not undertaken.

These maximum annual limits have been retained and remain proposed as a result of discussions held between the applicant, Stantec and ES throughout the s92 process and are included in Condition 9 of Appendix B.

The following limits have been added as a result of the s92 process:

⁷ MPI 2023 *Overseer Redevelopment Programme Report*, MPI Technical Paper No: 2023/12, August 2023, Ministry for Primary Industries, New Zealand Government, 35pp.



- The total annual plant available nitrogen load shall not exceed 35,600 kg N (equivalent to 200 kg N.Ha.Yr over 178 Ha of available land; proposed condition 9(1)).
- Total annual phosphorus loading rate shall not exceed 70 kg P.Ha.Yr (from the irrigation of treated wastewater, CAL stormwater, stockyard solids, paunch, WAS and fertiliser applications; proposed condition 10). The current wording means that this applies everywhere and overrides proposed condition 11.
- The total annual plant available phosphorus load shall not exceed 110 kg P.Ha.Yr on land owned by BSM and operated as cut and carry, subject to consent condition requirements for riparian planting (proposed conditions 11 and 12).

In the December 2024 draft conditions, the applicant has changed Condition 11 to remove the staged approach, such that provided the revised Planting Plan is implemented then the increased Phosphorus load can be applied. If the planting is not implemented, then the lower rate in Condition 10 applies. The link to allowing the higher P load is the only mechanism that requires the Planting Plan to be implemented in the conditions as currently drafted. We recommend that an additional condition be included which requires the implementation of the Planting Plan.

We suggest that a total annual plant available phosphorus load be included, similar to that proposed for nitrogen (condition 9(1)); i.e. the total annual plant available phosphorus load shall not exceed 12,460 kg P (equivalent to 70 kg P.Ha.Yr over 178 Ha of available land). In addition, the area over which the application rates apply should be clearly defined in the consent conditions as the irrigable areas (as given in Figure 3-1 above). The applicant has added a definition of “application area” to the conditions as revised in December 2024. We have not checked whether this change has been appropriately edited through the various conditions that should reference this change.

5.2 Groundwater

The 2022 AEE noted that *‘total sodium, and chloride are elevated in the downgradient bores relative to the upgradient bores. This is a legacy effect from the previously consented land treatment operation and will be present until all impacted groundwater has moved through the aquifer.’* Total Inorganic Nitrogen (Nitrate-N, Nitrite-N and ammoniacal-N) was also found to be elevated in downgradient bores compared with upgradient. Shallow groundwater flows towards the streams on the site and in a similar direction to the Waihopai River. It is noted that due to the estimated lag time of at least ten years (for groundwater to move through the aquifer beneath the site) it may be some time before the improvements made to site operations by BSM are reflected in improved groundwater quality. Nonetheless, Section 4.4 of this report clarifies that impacted groundwater could also be discharged from the shallow aquifer at a faster rate through discharge into the nearby tributary of the Waihopai River.

Groundwater monitoring results⁸ for total phosphorus within the downgradient bore MW1D were identified as being inconsistent during the independent review of the application, with the median value for TP being reported as 3.8 mg/L, while the other statistics (e.g. minimum, maximum) were reported as 0 mg/L. This issue has not been addressed by BSM.

The applicant undertook further hydrogeological investigations in 2023 and found that *‘shallow groundwater velocities are estimated to be in the order of 0.00002 to 0.02 m/day’* equating to 7 m/year or less in the vicinity of the site (Appendix F to response report, 4 August 2023). On this basis, the applicant concluded that *‘effects of the historic activities, where higher nutrient loading rates occurred, are likely to still be occurring and will take time to reduce...given the distances between irrigation areas and the drains/streams, improvements to water quality could occur over long time periods (potentially decades or more).’*

The investigation, and historic monitoring to date, has focused on the site itself and not extended beyond Waihopai River and its tributaries. It also primarily considered only horizontal flow components, ignoring vertical flows. Given the direction of horizontal flows, it is assumed that while groundwater may move very slowly away from the site, as soon as it reaches a watercourse (as it does within approximately 500 m of the southern site boundary) or is intercepted in a tile or surface drain within the site, the speed at which contaminants may reach Waihopai River and ultimately the New River Estuary will significantly increase (Section 4.4).

This information is relevant as it concerns potential effects relating to the potential transport of nutrients downgradient and downstream, into receiving environments that are already facing degradation due to excessive nutrient loads (including Waihopai River downstream, and the New River Estuary). It is relevant to consider these effects given the applicant’s commitment to ongoing mitigation throughout the consent term (for continuous improvement).

⁸ 2020 – 2021; provided as Table 15 in the applicant’s response report dated 4 August 2023.



The applicant has proposed that a minimum of seven groundwater monitoring bores be maintained on the site. These shall include a minimum of three shallow (i.e. up to 3 mbgl⁹) upgradient, three shallow downgradient and one deeper (i.e. more than 10 mbgl) downgradient bore (approximately 40 metres deep). We anticipate that the plume of contaminated groundwater from historic discharges beneath the site will gradually reduce in contaminant concentrations over the term of the consent due to the reduced applied loads from the site and rainfall recharge into the aquifer, and reduced concentrations in the incoming aquifer due to wider catchment measures.

As discussed above, this plume will slowly migrate through the aquifer, hence monitoring down gradient of the site may not indicate changes in the aquifer, particularly during the initial part of the consent term and hence will not adequately reflect the progress that is being within the aquifer as a result of the changed activities on the site. In particular, this does not allow for informed changes to be made in operations during the consent term if the expected improvements do not occur.

Therefore, we consider it necessary to add at least four further bores (with screening to a depth of approximately 10 mbgl) throughout the site itself and an additional downgradient bore on the southern side of the tributary of Waihopai River. Our justification for this approach is as follows:

- Bores located within the site will allow for more accurate and proactive monitoring of the diffusion of a groundwater plume into the underlying shallow aquifer. There are currently only two groundwater monitoring bores located within the site footprint (bores CG11/0020 and CG11/0019, both of which are upgradient of the majority of the application areas); the remaining five are on or beyond the boundary.
- Maintenance of a downgradient bore into the shallow aquifer on the opposite side of the tributary to the site will allow for detection of any contamination that may continue being transported via groundwater beyond the nearby tributary of the Waihopai River (i.e. the component of groundwater flow that is not intercepted by surface water, constituting river baseflow). We recommend that this bore be situated in either of the proposed locations shown on Figure 5-2 below (indicated by yellow circles).

All groundwater monitoring bores including the seven originally proposed by the applicant and the additional five (or more) bores would be monitored quarterly from commencement of the consent as per the proposed Condition 26. This would include recording of referenced groundwater levels and collection of samples across the monitoring network concurrently during each monitoring event (i.e. each event completed within a maximum of 3 days). It is recommended that the groundwater monitoring results are reviewed every six years for the duration of the consent term.

⁹ Depths as per the information published by Environment Southland on the Waihopai Groundwater Management Zone at <https://www.es.govt.nz/environment/water/groundwater/groundwater-management-zones/waihopai>, accessed 18 October 2024.



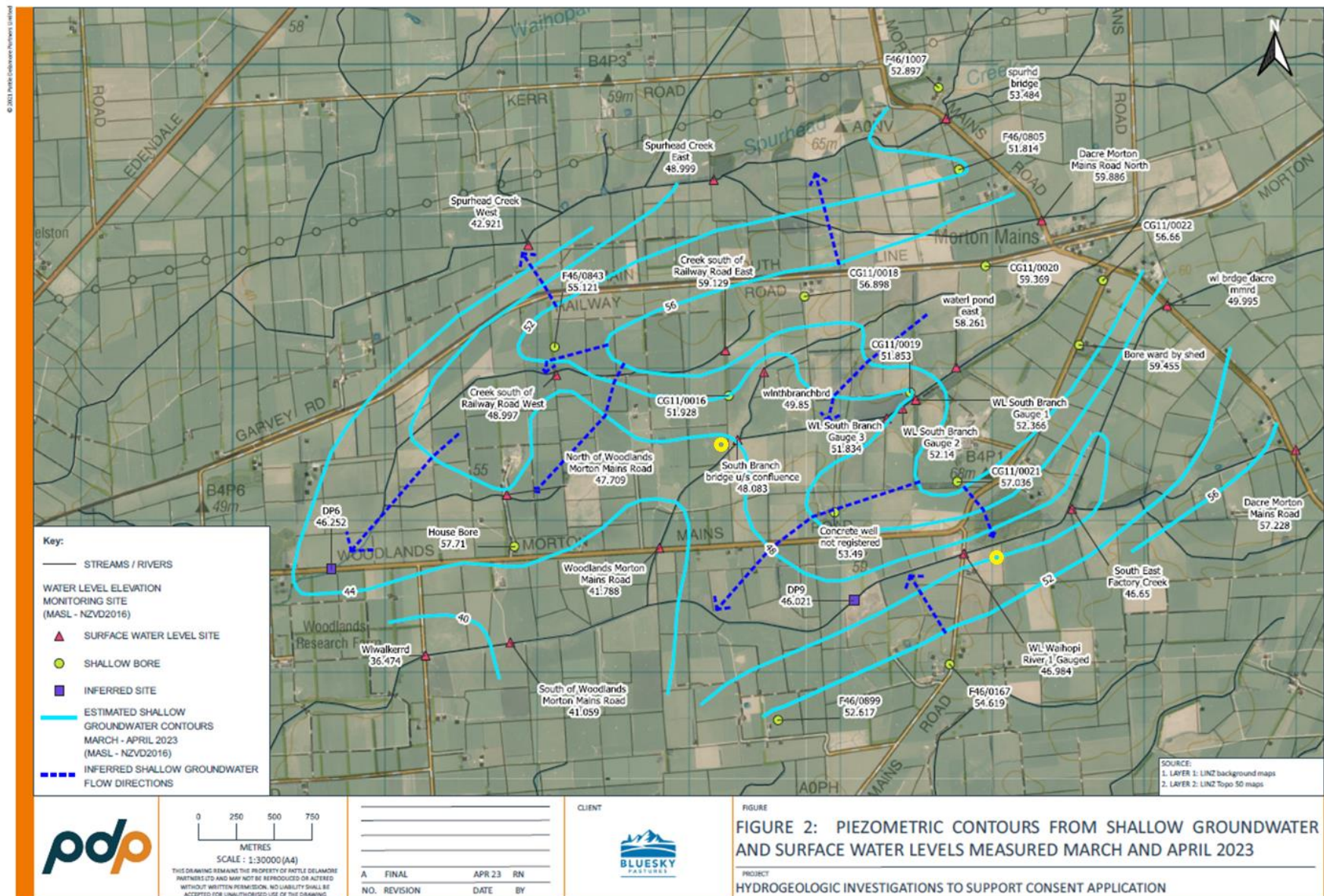


Figure 5-2 Proposed off-site downgradient groundwater monitoring bore locations (yellow circles; adapted from PDP 2023)



The applicant provided information on the expected nitrogen loads to groundwater as predicted by Overseer, which indicate that the loads for the worst-case modelled, maximum allowed load to BSM land only the predicted nitrogen load to groundwater would be 24 kg N.Ha.Yr. As shown in Figure 5-3, this is at the higher end of the 2022 range of sheep and beef farms for which Overseer modelling is available. Also, it is noted that the site is within an oxidising physiographic zone¹⁰, which has minimal capacity to reduce nitrogen loads within the aquifer.

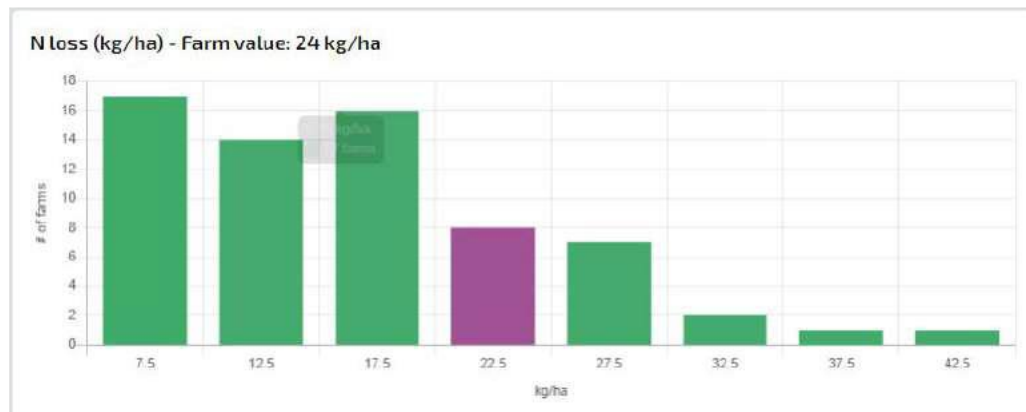


Figure 5-3: OverseerFM Benchmarking Nitrogen Leaching for all Sheep and Beef Farms in Southland Year Ending 2022 Models (BSM shown in Purple) (Figure 14 of PDP 2022 AEE).

The application proposed that riparian vegetation buffers could be used to mitigate the flow of contaminants from the soils within the irrigation area, to shallow groundwater and surface water bodies downgradient. It also claims that this planting will increase the resilience of soils to nutrient loss if the applicant loses access to irrigate on third-party land (see Section 1.1.3 above for further commentary regarding third-party land). We note that no planting is proposed on the third party land.

The efficacy of vegetative buffers to intercept the shallow groundwater is highly reliant on riparian planting being implemented correctly (i.e. with species appropriate for nutrient reduction, planted in the right locations and at effective planting densities) and as soon as possible.

The proposed planting programme is considered insufficient for this purpose. The Riparian Buffer Design Guide (NIWA, 2022) states that “Self-sustaining, weed free planted riparian buffers are more likely to be achieved when buffers are wider (10+ m) than narrower (5-6 m, Parkyn et al. 2000). Wide planted riparian buffers provide more opportunities for nutrient uptake and storage in plant tissue and soil, and more opportunity for microbial denitrification.” Therefore, we recommend that the buffers be made wider to at least 10m to reduce the potential for discharges due to surface runoff and from the shallow groundwater to result in increased nutrient loads to surface water.

Furthermore, it is appropriate for Council to require the applicant to submit a detailed planting plan including specification of:

- scheduled dates (to the nearest month) by which different stages of planting will be completed, planting maps
- species lists
- required maintenance.

Riparian planting and subsequent maintenance should be completed by a suitable qualified and experienced horticultural contractor.

5.3 Surface water quality

Potential effects on surface water quality identified in the application included:

- Phosphorus loss via runoff from irrigated areas, leading to increased growth of nuisance plant species in riparian margins and in-stream (within tributary channels).
- Nitrogen leaching from the irrigated area to groundwater (and subsequently to surface water as shallow groundwater is ‘daylighted’).

¹⁰ Environment Southland information on the Waihopai Groundwater Management Zone available at <https://www.es.govt.nz/environment/water/groundwater/groundwater-management-zones/waihopai>, accessed 18 October 2024.

- Leaching of sodium and chloride from groundwater into surface water as groundwater is 'daylighted' (as a result of dewatering activities).
- Contribution of microbes to groundwater (with *E.coli* as an indicator), although bacteria will likely die off as they are transported through the shallow aquifer. No commentary was given regarding the fate of other pathogens such as norovirus and enterovirus from the treated wastewater. Refer to discussion in Section 5.7.

The application ventures that for the majority of these effects, the proposed activity will have negligible effects and result in surface water quality (within the North and South Branch tributaries of Waihopai River) either the same or marginally improved from the baseline state. However, as noted in Section 4.3, the current state of both the streams and the Waihopai catchment is degraded, and hence substantial improvements are required, rather than the marginal ones.

The effects assessment and discussion of mitigation measures is strongly focused on the management of nutrients, particularly phosphorus. As for the nitrogen to groundwater, the PDP 2022 AEE provided the worst case phosphorus loss, which would predominantly be to surface water, using Overseer of between 0.3 to 0.4 kg P.Ha.Yr, which is similar to the majority of sheep and beef farms in Southland in 2022 as shown in Figure 5-4.

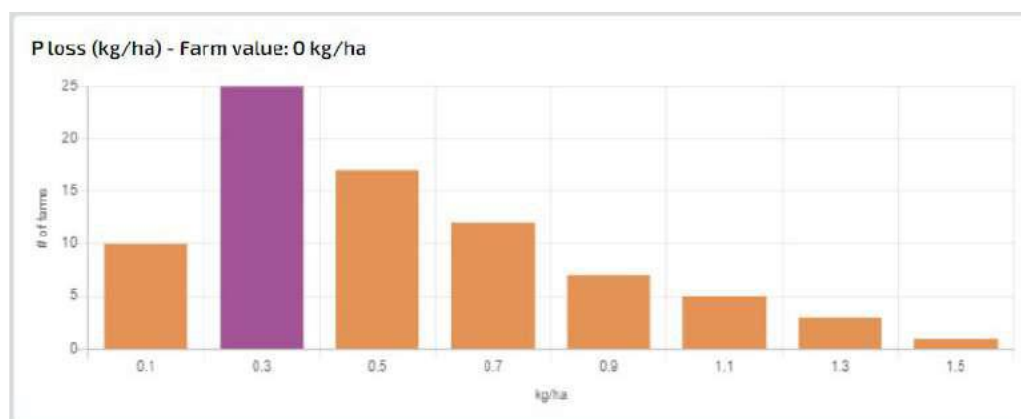


Figure 5-4: OverseerFM Benchmarking Phosphorus Loss for all Sheep and Beef Farms in Southland Year Ending 2022 Models (BSM shown in Purple) (Figure 15 of PDP 2022 AEE)

The application states that the effectiveness of riparian buffers in reducing phosphorus loss is between 30-90% (i.e. the buffer removes 30-90% of phosphorus mass from runoff before it reaches the tributary) (Abu-Zreig et al. 2003 in 2022 AEE, p64). The application assumed the most conservative end of this range, at 30% effectiveness. The riparian buffers will be relied upon to ensure that 'the proposed activity will result in less phosphorus loss to surface water than is currently occurring' (2022 AEE, p64).

We note the 2023 Land and Water Science soil monitoring (provided with PDP letter of 23 February 2023) indicates that phosphorus concentrations in the soil are high, and are expected to remain so, indicating the significant risk from surface runoff from the site to the streams and connected water bodies. Figure 3-1 shows the proposed planting programme for the site. Initially, the plan had two stages: the planting which are already been undertaken (Stage 1) and the additional planting which is proposed when applied phosphorus load exceeds a nominated limit (Stage 2). The November 2024 version of the Plan removed this staging. Issues that have been identified with the programme are given above.

In relation to the discharges of land drainage water and stormwater to water, the applicant has proposed limits (after reasonable mixing within the receiving environment) for total ammoniacal-nitrogen (1 mg N/L) and Biochemical Oxygen Demand (cBOD₅ 2 mg O/L). These are both constituents which could indicate leakage through the bases of the lagoons in the WWTP. If these limits were exceeded, it would likely result in adverse effects on ecosystem health. We note that the ammoniacal nitrogen limit is quite high and would require dilution to avoid toxicity effects in the stream.

In response to s92 questions, the applicant has also proposed a total nitrogen limit (TN >5 mg N/L) to reflect the potential for the dewatered nitrogen to contain elevated nitrogen from upgradient sources, which BSM are extracting from the aquifer and discharging directly to the streams. We note that this concentration is high and dependent upon the relative volume of flows in the dewatered groundwater and the stream, it could result in nutrient effects.

Therefore, dependent the scale of the discharge of dewatered groundwater, the proposed activities could have a discernible effect on water quality and hence aquatic ecology within the receiving environment. Insufficient information has been provided to fully determine the impact of this discharge.

The information provided regarding surface water quality throughout the application and subsequent materials submitted for review does not adequately address the potential effects of the proposed activities. For example:

- It is not clear how the residual effect stated in the assessment has been arrived at. The application does not justify the statements regarding effects on surface water quality with the use of a risk matrix-based approach (as is common in AEEs) or similar, assessing the likelihood and magnitude of effects.
- Historic surface water monitoring data appears to show that nutrient concentrations (e.g., total nitrogen, Nitrate-N, total ammoniacal-N) have been highly variable. There is no discussion of how this variability has informed the management of discharges in the past, nor how this is proposed to be managed in the future.
- Historic *E.coli* results have been very inconsistent, varying from 200 to over 520,000 colony forming units (CFU) per 100mL of sample. The application and supporting materials do not explain possible reasons for these fluctuations, nor do they indicate how this variability will be proactively managed. For example, it would be useful to know how the final treated wastewater quality may vary depending on microbial activity within the treatment lagoons, and any opportunities that may exist for this to be monitored and inform any subsequent management actions.

We recommend that the sampling locations for the surface water monitoring are extended, consistent with the aquatic ecosystems monitoring, to include the streams impacted by the land drainage discharges from the tile drains and the groundwater dewatering from under the lagoons.

5.4 Surface water quantity

The application proposes to discharge dewatered groundwater via the land drainage system (multiple 160 mm diameter drains) to the existing surface drain on the site, at an expected rate of between 1- 6 L/sec. Dewatering discharges will occur periodically dependent upon the depth to groundwater under the WWTP, and hence would be expected to be higher in winter and at times of elevated rainfall. Stormwater collected from the CAL cover will be discharged to the same drain, at a rate of up to 4.5 L/sec (depending on rainfall). This discharge will flow into the North branch tributary of Waihopai River. Treated wastewater will be applied to land at a maximum depth of 15 mm/day during wetter periods (April to September inclusive), increasing to a maximum of 35 mm/day in dry periods. Some of this flow will reach the surface water through the shallow groundwater.

It is possible that the discharge and water level within the North and South Branch tributaries may increase as a result of surface water and groundwater inputs from the BSM activities, including water that may infiltrate through soils within the irrigation areas to the shallow groundwater aquifer.

The proposed discharges may result in a change to the existing wetting and drying regime within the tributaries, particularly for the North Branch which is a smaller tributary and therefore is more susceptible to intermittent flows.

In considering the estimated discharge volumes and rates of discharge within the wider catchment context it is agreed that the effect on surface water quantity (i.e. local hydrology) would be marginal.

5.5 Aquatic ecology

As given in Section 4.3, the North and South Branch tributaries are 'heavily impacted by local land-use' with degraded water quality. Both streams were noted as having "poor" to 'fair' ecological health' based upon the Macroinvertebrate Community index (MCI) scores. Fish with high conservation value were found in the South branch, but no fish were caught during surveys of the North Branch. The Waihopai catchment is identified as degraded for all indicators assessed. The effects on the New River Estuary are discussed in Section 5.6.

The application relied predominantly upon the establishment of riparian buffers (both existing and proposed) to enhance the ecological values present on the BSM site and hence mitigate any potential effects of the proposed activities on terrestrial and aquatic ecology.

In the initial application, several zones of riparian planting were identified, of varying widths (all less than five metres) around the site as shown in Figure 17 of the 2022 AEE. The planting plan has largely been implemented and the current plan is shown in Figure 3-1.. Riparian buffers with a minimum width of five metres have been established to help reduce nutrient loss to surface water bodies from irrigated soils. The issues identified with this programme are discussed earlier in this report.

The proposed consent conditions¹¹ include a requirement for ecological monitoring to be undertaken within the North and South Branch tributaries after the first 12 months of operation under the new consent, and every five years thereafter. The monitoring will include:

- Macroinvertebrate sampling (for MCI, EPT relative abundance, taxonomic richness).
- Stream Ecological Valuation (SEV; using NIWA's published methodology).

¹¹ Condition 29, Discharge of Treated Wastewater, Stockyard Solids, Paunch and Waste Activated Sludge to Land (September 2023 version, draft)



- Periphyton sampling.

Periphyton sampling was added by the applicant post-lodgement to provide an additional measure of potential ecological effects from changes in the nutrient balance within the receiving environment.

The above monitoring was only proposed in relation to the discharge of treated wastewater, stockyard solids, paunch and Waste Activated Sludge to land. No such condition is proposed for the consent relating to the discharge of land drainage water and stormwater to water. The latter discharges may also have an effect on aquatic ecology within the tributaries and Waihopai River, therefore ecological monitoring should also be required for that consent (or potentially the consents to cross-reference to each other to allow for a consolidated monitoring programme / reporting). We recommend that the sampling locations for the aquatic ecology monitoring are extended, consistent with the surface water monitoring, to include the streams impacted by the land drainage discharges from the tile drains and the groundwater dewatering from under the lagoons.

5.6 Estuary

It has been estimated that a reduction of at least 2,115 tonnes N per year from lakes and rivers contributing to the New River Estuary is required in order to achieve the Freshwater Objectives (FWOs) identified in the proposed Southland Water and Land Plan (pSWLP)¹². This is a significant reduction that will require efforts from all dischargers in contributing catchments such as the Waihopai River.

There are three key issues remaining with the proposed activity relating to potential effects on the estuary:

1. Predicted nutrient loads to groundwater and eventually to the estuary, using Overseer
2. Phosphorus losses to surface water (from surface runoff) and the planting program proposed to address this
3. Discharge of the nutrient plume in underlying groundwater to surface water, via the tile drains and de-watered groundwater from under the lagoons and potential mitigation measures for this route. This route is not recognised in the Overseer modelling or in direct phosphorus loss estimates.

The applicant summarised the results of nutrient load modelling undertaken in Overseer in Section 5.2.1.1 (including Table 14) of the 2022 AEE, and commentary on potential phosphorus losses is given in Section 5.3.1.1.

Following a request for further details regarding estimated nitrogen and phosphorus losses (compared with activities under the previous consent, and with the proposed activities; refer to Section 5.1.4 above) under s92, we were provided with a series of raw data outputs from Overseer; the results were not summarised nor any commentary provided.

The application claims that 'the proposal will result in improvement in the nitrogen loads to the New River Estuary' (2022 AEE, p67). They have estimated, for example, that the "total leachable fraction of nitrogen will reduce from 11,350 kg N/yr to 2,875 - 4,600 kg N/yr" (as stated in Section 5.5.1 of the 2022 AEE). This equates to a predicted reduction of 60% (for BSM land only) from 11.35 tonnes N/yr to 4.6 tonnes N/yr or up to 75% reduction to 2.88 tonnes N/yr (if third party land is included). This is recognised as a significant reduction in estimated leachable nitrogen loads to the aquifer, for the proposed activity.

However, issues have been identified in the methods by which nitrogen loads have been estimated and lack of confidence in the resulting estimates adds a degree of uncertainty as to whether this will actually be achieved in practice (refer to further discussion in Sections 2 and 3, and 5.1.4). Overseer may not be accurately reflecting the operations of a wastewater land application scheme.

The applicant also claims that under the proposed consent "less phosphorus loss than has occurred in recent years under the existing consent" (2022 AEE, p67). Phosphorus losses for the proposed activity on BSM land only, and including third party land, are estimated in Table 14 of the 2022 AEE. However, losses for the activities under the previous consent were not summarised (as was done for nitrogen, noted above). As such, the predicted reduction in phosphorus loss was not presented numerically in the application. In addition, the proposed riparian planting (to reduce phosphorus loss to surface water, from surface runoff) is still not considered to be adequate as discussed in other Sections.

The focus of the application with respect to the diversion of groundwater via tile drains and through groundwater abstraction was on the detection of leakage through the liner of the lagoons, and did not sufficiently address the resultant effects on surface water in terms of nutrient load from the diverted groundwater. This nutrient load would otherwise remain within the groundwater and not impact upon surface water as directly. This was discussed during s92 interactions and the site visit in 2024. The potential loads to surface water from the tile drains and from groundwater (dewatered from beneath the lagoons), and potential mitigation for these loads, are still unresolved. There are potential options to treat the discharges from the tile drains and/or the diverted groundwater, such as wood chip beds which could be implemented progressively at the site to address this load.

¹² Land Water People 2021 Table 17, in *Assessment of Nutrient Load Reductions to Achieve Freshwater Objectives in the Rivers, Lakes and Estuaries of Southland Including Uncertainties*, report prepared to inform the Southland Regional Forum process, November 2021, 113pp.



5.7 Public health

Our principal concern with respect to the potential public health impacts of the activity relate to the discharge of solids to land.

The initial application and supporting materials directly equate Waste Activated Sludge (WAS) with 'biosolids', which is incorrect. Waste Activated Sludge is not considered to be biosolids unless it meets the process or product standards as defined in the guidelines (NZWWA 2003 and WaterNZ 2017 and 2024). This includes both stabilisation (pathogen reduction, vector attraction reduction, and product pathogen standard) and contaminant requirements. The stabilisation requirements are most relevant for the mitigation of potential risks to public health resulting from application of the product to land.

The applicant was requested to demonstrate how the sludge from the SBR would meet the process or product standards and stabilisation grade required to attain the status of 'biosolids' (as per NZWWA 2003). Their response (21 August 2023) stated that 'it isn't biosolids according to the NZWWA 2003 definition. Rather it is 'organic solids from wastewater treatment processes' or 'organic materials' according to the proposed new 2017 draft guidelines.

The USEPA defines biosolids as 'a product of wastewater treatment process where the bacterial solids are separated from wastewater'. The applicant has suggested that the broad definition of biosolids established by the United States Environmental Protection Agency (USEPA) be used for the application and they considered this a valid interpretation because 'the NZWWA 2003 guidelines have excluded any bacterial solids generated from industrial processes, including meat processing wastewaters' (applicant's response, 21 August 2023, Issue 5).

The applicant's use of the USEPA definition of biosolids is not considered appropriate and could lead to misinterpretation.

While they are not currently finalized, the draft 2017 guidelines are a useful resource to interpret data and inform decisions regarding sludge management. Section 1.1.1 of the draft 2017 Guideline states that:

'Raw organic materials, often a waste product from other activities, which are suitable to make these products include:

- *organic wastes from the secondary sector, such as meatworks wastes'*

Based on this definition, the WAS could be used as an organic material for application to land under the terms of the 2017 guidelines. However, in order to be compliant with the 2017 Guidelines and hence be 'safe', they need to be processed to at least Grade B, in terms of stabilisation of the organic and pathogenic content. The methods for stabilising the product are given in Section 5.1.2 of the 2017 Guidelines, which states '*Most, if not all, organic materials contain pathogens, particularly when they derive from animals or humans. ... Therefore all such material requires careful management to minimise any health risks while gaining the benefits.*'

The methods for achieving the stabilisation grades are similar in both the 2003 and 2017 Guidelines. The guidelines have been subsequently updated again¹³ and the 2024 guidelines have similar requirements with respect to stabilisation as the 2003 and 2017 versions. The 2024 draft guidelines (Section 1.2.1) state that "*Biosolids are derived from wastewater sludge, a mix of water, organic and inorganic materials that are a byproduct of the sewage treatment processes.*" Hence, the 2024 Guidelines are not specifically relevant to the solid discharges from BSM. However, Section 1.2.2 states "*The content of this Guide was principally developed to enable beneficial use of biosolids to land. The extensive research on biosolids has some applicability to other organic materials, which can be used to support their beneficial use as well.*" It further states "*The risk management principles of assessing hazards, identifying risks and mitigating risks can be applied to support the beneficial use of other organic materials, such as: ...• Processed waste from meat processing plants ...*"

The stabilisation requirements in all three versions of these Guidelines are required to minimise the risks to public health from exposure to pathogens in the waste, which could be transferred via vectors, such as birds or rodents. These controls are required whether the material is applied to BSM or third party land, as the potential effects from vectors could spread beyond the BSM activity footprint.

Following the meeting held between the applicant, PDP, Mitchell Daysh, ES and Stantec in May 2024 the applicant has volunteered that since (in their opinion) the paunch component of the solids applied to land presents the greatest risk for vector attraction (due to fugitive losses of animal protein), this component will be managed via vector attraction reduction methods in accordance with the NZWWA 2003 guidelines. This will namely be achieved by incorporating the paunch solids containing animal protein into soil, and implementing an exclusion (maturation) period of at least 30 days before the soil can be used.

This commitment has been outlined in December 2024 proposed Conditions 37-1 and 37-2, with some changes which are considered appropriate. It was also confirmed with the applicant that where paunch is mixed in with other solids from the site, the mixture will be subject to the proposed Conditions 37-1 and 37-2.

¹³ 2024 Guidelines for Beneficial Use of Biosolids and Organic Materials on Productive Land, by WaterNZ dated October 2024, Draft for Public Comment



The Applicant has noted that if stockyard solids are separated out and do not contain any other solid waste, these should not need to be stabilised in line with NZWWA 2017, because the discharge of stockyard solids (equivalent to animal waste from a 'high intensity farming process') is a permitted activity under Rule 38 (Animal and Vegetative Waste) of the Proposed Southland Land and Water Plan (Operative in Part). The nutrient loads from the stockyard solids regardless of stabilisation status would need to be addressed as part of the farm nutrient budget.

The applicant has also proposed (as of August 2024) that the remainder of the WAS (other than the paunch component containing animal protein) will be "applied directly to land in a manner that appropriately minimises adverse effects". Our interpretation of the applicant's statement above in August 2024 was that WAS (BNR solids) will be managed so as to achieve the minimum stabilisation standard for Grade B biosolids (as per NZWWA 2017). In particular, the WAS should not exceed an SOUR of 1.5 g.hr.m³ at 20°C¹⁴ (Table 5-3, NZWWA 2017) or equivalent stabilisation requirement, and the application methods and exclusion times in NZWWA 2017 should be complied with. As such, we suggested including another condition (similar to 37(1)) to require WAS to be managed in accordance with NZWWA 2017.

To date this approach to WAS (BNR solids) has not been agreed to by the applicant. In the December 2024 Conditions, the Applicant has changed the name of this material from WAS to BNR solids. They have also included a proposed definition of BNR solids as "*Solids generated from the biological nitrogen removal plant that are entirely bacterial in origin and post aerobic treatment.*" This definition is not considered to be accurate, as it does not reflect the risk of pathogens and other material other than purely bacterial matter being present in the solids removed from the aerated lagoon. The "BNR solids" are treated the same as the treated wastewater and CAL stormwater in their December 2024 revised Conditions.

They have not provided any information on how their current procedures comply with NZWWA 2017 requirements with respect to stabilisation, application and exclusion of the WAS (BNR solids). This is considered a potential public health risk that is unresolved.

A potential pathway to resolve this issue, would be for the applicant to verify that the WAS (BNR solids) is either stable in terms of vector attraction or contains minimal concentrations of pathogens, as they have asserted. This confirmation would need to be made using the sampling, analysis and management methods specified in the Guidelines. This could be undertaken in a staged manner as part of consent conditions on a gateway basis with continued monitoring through the consent term as follows:

- Verify that the WAS (BNR solids) are stable and do not present a risk from vector attraction. This could be from the collection of samples for analysis of the SOUR. Compliance with the SOUR standard would mean that the WAS could be managed as Grade B biosolids. However, if this sampling indicates that the WAS does not comply with the required Grade B standard then:
- Verify that the WAS contains pathogens concentrations less than or equivalent to Grade A biosolids through a verification sampling programme and ongoing routine monitoring throughout the consent (Table 3 of the 2017 Guidelines). We note that there are no equivalent pathogen standards for Grade B biosolids, but the applicant has indicated that there are no pathogens in the WAS. Whilst this is not strictly in accordance with the Guidelines, this would indicate that the risks to public health from the WAS are minimal and WAS could then be managed as Grade B biosolids. This would require some modification from their current practise. However, if the WAS does not comply with the pathogen requirements, then:
- The WAS would need to be appropriately treated to reduce the public health risk from its application to land, such as storage, soil incorporation or cover after application, treatment process as given in Table 2 of the 2017 Guidelines. This is likely to require some degree of capital investment.

5.8 Continuous Improvement

Throughout this process and particularly at the site meeting, the need was discussed for continuous improvement throughout the term of the consent in the effects caused by the activities authorised by the consents. The applicant included some conditions which required periodic reviews of the operation, which needed to be reported to Environment Southland. However, these Conditions did not require the Consent Holder to make the improvements which have been discussed in the reports (application and subsequently through the s92 process) and site meeting.

The Conditions as proposed by the applicant imply that these improvements would need to be implemented through an Environment Southland review of the consent under Section 128 of the RMA, as given in Condition 49. We do not support this approach, because the onus to implement improvements should be on the consent holder not the regulator. We

¹⁴ Vector Attraction Reduction methods for liquid sludge from aerobic processes operating at 10-30°C and less than 2% dry solids content.



propose that the methods to achieve improvement throughout the consent term are integrated into the consent through the new Condition 48-1 in Appendix B.

The purpose of the continuous improvements proposed in Condition 48-1 are to reduce the loads of nitrogen and phosphorus which are discharged into the aquatic environment (not the loads to the soil) from the activities authorised by the consents. This is to address the potential effects in the Waihopai catchment and particularly the New River Estuary which are discussed in previous sections of this report. The applicant has predicted reductions in the nitrogen loads modelled by Overseer to the aquifer of between 60% to 75% from those allowed by the current consent. Principally, our concerns relates to whether this accurately reflects the actual reductions that will be achieved under the new consent. The applicant agreed during the various meetings that continuous improvement in effects over the term of the consent would be appropriate.

Therefore, we had proposed a new condition 48-1, which the Applicant has deleted from the Conditions that they have provided in December 2024, but remains in Appendix B of this report. The purpose of the Condition as initially drafted was to provide the Objective of the Improvements which was: to reduce the nitrogen and phosphorus loads to aquatic environment (being surface water, shallow groundwater and deep groundwater) by 10% for every six year period of the consent term, excluding the initial three years after commencement of the consent. Therefore, if a consent term of 21 years is granted: by year 9, there would be a 10% reduction from the initial load estimated to have occurred ("initial load") over the first three years; by year 15, there would be a 20% reduction from the initial load; and by year 21, there would be a 30% reduction from the initial load.

The Applicant objected to this Condition given the considerable reduction in predicted load to the aquifer by the Overseer modelling and that further reductions as indicated would not be feasible. We recognize this concern and suggest that Condition 48-1 is still required but can be reframed to set target reductions from the previous consented loads and confirming whether these predicted reductions are being achieved under the new consent. In this context, we suggest that the following target reductions in nitrogen and phosphorus loads to the aquatic environment as compared to the loads under the previous consent be required:

- Within 6 years, reduction of nitrogen load to the aquifer of 50% and reduction in phosphorus loads to surface water of 30%
- Every 12 year after this, achieve a further reduction in both nitrogen and phosphorus load to the aquatic environment of 10% from the previous load.

We note that Condition 48-1 as included in Appendix B requires an assessment that involves interpretation of all the monitoring and modelling required under the consent rather than just Overseer modelling. The Condition requires that every six years the Consent Holder prepare an Implementation Plan that identifies the actions to achieve the Objective of the Condition for the next six years. Once developed, this Implementation Plan would be submitted for certification by Environment Southland that it is in accordance with the Objective of this condition, i.e. would be expected to result in this reduction in load in the timeframe required.

The development of this Implementation Plan for each six year period will be based on an estimate of the nitrogen and phosphorus loads from the annual Nutrient Management Budgets required by Condition 32 and the various Environment Monitoring required by the consent. This will result in an understanding of the loads:

- i) from each of the sources/activities authorised by this consent, and
- ii) that are discharged to each of surface water, shallow groundwater and deep groundwater through the various pathways discussed in previous sections of this report.

This load information will enable the prioritisation of actions that impact on the various sources and receiving environments and assist with defining how the reduction in loads will be achieved.

The information relating to the actions that could result in the load reduction will be derived from the following reviews currently required by the consent of the options for improving operations and reducing the loads, being:

- Condition 45 (Review of the Wastewater Farm Environment Plan)
- Condition 46 (Surface Runoff and Land Drainage Management Review)



- Condition 48 (Nitrogen and Phosphorus Limits, Mitigation and Management Review).

The Implementation Plan will be incorporated in the Wastewater Farm Environment Plan, which will be updated in accordance with Condition 45, including any changes in management regimes, processes, and/or commissioning of new facilities. The Consent Holder is then required by Condition 44 to “undertake all onsite activities in accordance with the certified Wastewater Farm Environmental Management Plan”. This process will result in the actions in the Implemented Plan being undertaken.

We note that a change in processes could result in a reduction in load of more than required in a given six-year period. If this occurs, then subsequent periods would not be required to achieve the target, and this further reduction over and above the requirement can be credited to later periods. This is to ensure that the benefits from a capital investment that results in a significant load reduction are recognised in the consent.



6. Suggested changes to consent conditions

There are a number of suggested changes to the consent conditions which would arise from the discussion given in Appendix A to this report, which summarises the information exchange during the S92 process. The applicant also suggested changes to the consent conditions, which are summarised in Appendix B. The latter also contains our response to the proposed consent conditions, with suggested edits where relevant and reflects changes up to the previous draft of this report in October 2024.

The applicant provided a revised set of conditions in December 2024. We have not fully reviewed them. Specific conditions have been checked as recorded in this final version of the report. The conditions as provided by the applicant do not show tracked changes from those in Appendix B and hence a thorough review of the full set of conditions would require extensive time and effort, which is not considered appropriate at this time.





Appendices

Appendix A Record of s92 requests and responses



Appendix B Summary of Changes in Proposed Conditions since Lodging

The applicant has submitted revised consent conditions following the s92 process. These are detailed below with the change identified. Where a change did not occur, the condition revisions and commentary are marked as "N/A".

Given that the consents form a package and are designed to work together, we suggest that it may be appropriate to use a continuous numbering system for conditions throughout all the consents. This would enable easier cross-referencing between consents.

No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
Abstraction and Use of Groundwater			
1	This permit authorises the abstraction of water from up to three bores. These bores are: a) F46/0517; b) F46/0561; and c) F46/1128.	N/A	N/A Four existing groundwater bores were identified in Section 4.2 of the 2022 application.
2		The combined rate of abstraction from the three bores identified in Condition 1 shall not exceed: a) 1,500 m ³ /day b) 7,000 m ³ /week c) 365,000 m ³ /year	Change in units from litres to cubic metres. Corrected timeframe for b) and c).
3	The consent holder shall install a backflow prevention device on the bores identified in Condition 1 or take other appropriate measures to ensure water and/or contaminants cannot return to the water source.	N/A	N/A
4	The bores identified in Condition 1 are to be maintained so that: a) there is a seal, made of concrete or similar material, placed at ground level around the outside of the casing. The seal will be sufficient to prevent foreign material, surface water, spillage or other leakage entering the space between the casing and the wall of the borehole; b) the top of the casing is sealed to prevent the entry of contaminants into the casing; and c) fencing is installed to prevent stock accessing the bores	N/A	N/A

¹⁵ Summary of changes proposed by Applicant throughout the process from those they initially proposed in the application. Comments or additional changes recommended by Stantec are highlighted in yellow



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
Groundwater Quantity Monitoring and Reporting			
5	The consent holder shall: a) provide and maintain access to the heads of each bore to enable measurement of water level in each bore; b) monitor groundwater levels at each bore once each calendar month; and c) when monitoring groundwater levels, record whether or not the bore has been in use during the previous 24 hours and, if it has, the rate of abstraction from the bore during the previous 24 hour period.	N/A	N/A Previously suggested that for consistency with the following point, a) should refer to groundwater level rather than water level. This change has not been made and we recommend that it is.
6	A system must measure on a continuous basis the volume taken via the bores identified in Condition 1. The system must have a reliable calibration and must be maintained to an accuracy of +/- 5 percent.	N/A	N/A
7	Within six months of the commencement of this consent the Consent Holder must provide the Environment Southland Compliance Manager: a) a copy of any relevant manufacturer calibration certificate; or b) evidence from a suitably qualified person showing that the system required by Condition 6 is verified as accurate to +/- 5 percent.	N/A	N/A
8	The Consent Holder must engage a suitably qualified person to undertake additional verification of the accuracy of the system required by Condition 6: a) at a frequency of no less than five yearly from the date of the first verification required by Condition 7; and b) to the satisfaction of the Environment Southland Compliance Manager. Evidence documenting each additional verification must be forwarded to the Environment Southland Compliance Manager within 30 working days of the verification being completed.	N/A	N/A
9		The Consent Holder must measure and record the volume of water taken on a cubic metre basis to confirm compliance with Condition 2. When no groundwater is being taken the data must specify the take volume as zero.	Change in spelling – meter to metre.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
10		The Consent Holder must submit a report in electronic spreadsheet format to the Environment Southland Compliance Manager by 1 August each year that contains daily, weekly, and annual values for the immediately preceding year ending 30 June – of the volume of groundwater taken pursuant to this consent.	Addition of annual values.
Take Groundwater for Dewatering			
1	The permit authorises the passive taking of groundwater for dewatering the ground beneath the wastewater treatment plant via the subsoil drainage system shown in Attachment 1 - (A03220201 – Drawing No. 007) located at 729 Woodlands Morton Mains Road (1,265,070E 4,857,630 N).	N/A	No conditions proposed for this consent. Groundwater diverted under this consent is one of the sources of the land drainage water referred to in other consents.
Discharge of Land Drainage Water and Stormwater to Water			
1		This consent authorises the discharge of land drainage water taken in accordance with Consent [reference take of groundwater for dewatering consent], and stormwater from the covered anaerobic lagoon to water in the open drain at the location shown in Attachment 1 – (A03220201 – Drawing No. 007 Rev 0).	Condition reworded to detail stormwater from covered anaerobic lagoon instead of just the WWTP, and reference map of site appended. Linked the land drainage water to the groundwater dewatering consent.
Monitoring and Reporting			
2		a) The Consent Holder shall sample the land drainage water prior to the discharge point within three months of the commencement of this consent and quarterly thereafter and have it analysed for the following: i. biochemical oxygen demand ii. total ammonia nitrogen iii. total nitrate nitrogen iv. total nitrite nitrogen v. total nitrogen vi. E. coli vii. Dissolved Reactive Phosphorus viii. Total phosphorus b) the Consent Holder shall also sample water from the open drain at a minimum 20 metres upstream and at downstream edge of mixing zone specified in Condition 5 of the discharge point, and have the samples analysed for the same parameters as are listed in Condition 2(a). Concurrent observations of compliance with the standards in	Condition 2a) details sampling within three months of consent commencement instead of one year, and quarterly thereafter instead of yearly. Total nitrate nitrogen, total nitrite nitrogen, total nitrogen and E. coli have been added for sampling. Condition 2b) details sampling at a minimum distance of 20 m upstream of discharge point, instead of between 5-20 m upstream. Added requirement to monitor stormwater discharged from CAL (assume it refers to stormwater collected from the cover). Condition d) of this condition should require monitoring of at least 4 discharge of CAL stormwater event in each year to adequately characterise the discharge. Parameters should include total suspended solids and ammoniacal nitrogen to enable



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		Condition 4 shall also be made and recorded; c) sampling in accordance with Condition 2(b) shall occur within 2 hours of samples taken in accordance with Condition 2(a); d) Stormwater discharged from the Covered Anaerobic Lagoon shall be sampled at least four times in each year following a rain event that exceeds 10 mm/day, and analysed for: i. 5-day carbonaceous biochemical oxygen demand; ii. Total Kjeldahl nitrogen; iii. Total phosphorus; and iv. E. coli v. total suspended solids vi. ammoniacal nitrogen vii. total nitrogen Concurrent observations of the surface water at the 2 locations in Condition b) for compliance with the standards in Condition 4 shall also be made and recorded; If stormwater is not being discharged under this consent, then this sampling is not required. e) 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'; and f) the analysis is to be carried out by a laboratory with IANZ registration or equivalent, or as agreed to in writing with the Environment Southland Compliance Manager.	interpretation of the results and total nitrogen for comparison against limit in Condition 3. Observations of compliance with the standards in Condition 4 should be made concurrent with this monitoring as shown.
3		a) The Consent Holder shall report to the results of monitoring required by Condition 2a and Condition 2d in writing to the Environment Southland Compliance Manager (email: escompliance@es.govt.nz) within 30 working days of receipt of the analysis results. b) If the concentration of contaminants in a sample of land drainage water collected in accordance with Condition 2(a) exceeds: i. a total ammonia concentration of 1 gram per cubic metre; and/or	Removal of Condition 3b as it achieves same outcome as subsequent sub conditions and is void. Now only a-d, instead of a-e (subsequent have been shuffled forward one place). Rewording within Condition 3a) to clarify requirements in written report to ES Compliance Officer. New Consent Conditions 3(b) and 3(c) detail steps Consent Holder must take if exceedances occur.



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		ii. a 5-day biological oxygen demand concentration of 2 grams per cubic metre; then the consent holder shall include in the written report required by Condition 3(a), the cause of the exceedance and if necessary, identify a preferred mitigation option for addressing the cause of the exceedance. c) If the concentration of contaminants in a sample of stormwater collected in accordance with Condition 2(d) exceeds: i. a total nitrogen concentration of 5 grams per cubic metre; and/or ii. a 5-day biochemical oxygen demand concentration of 2 grams per cubic metre; d) then the consent holder shall include in the written report required by Condition 3(a), the cause of the exceedance and if necessary, identify a preferred mitigation option for addressing the cause of the exceedance. The Consent Holder shall implement the preferred mitigation option identified in the report prepared in accordance with Condition 3(a) as soon as practicable.	Rewording of Condition 3(d) to reference condition 3(a). Include advice note that this condition assists in detecting leakage through the base of the lagoons into the groundwater diversion system (indicated by ammonia and cBOD₅) or significant contamination of the stormwater from the cover of the CAL (indicated by TN and cBOD₅). Suggest this condition is linked to groundwater monitoring and mitigation plan (Conditions 26, 27, 46 of other discharge consent) as it is part of the overall load to the catchment that needs to be addressed



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
4		After reasonable mixing as defined by Condition 5: a) the discharge shall not result in the following effects in the open drain as identified in Condition 1: 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 (Attachment 2)	Changed to reference Attachment 2 instead of Appendix 1. Include references to Conditions 1 and 5 to clarify terms "reasonable mixing" and "open drain" Need to add monitoring for the observable effects as specified in b) to the monitoring required by Condition 2.
5	For the purposes of Condition 4, reasonable mixing shall have occurred: a) in the drain within 20 metres of the point of discharge to the drain, and b) in the tributary within 30 metres of the confluence of the drain within the tributary	N/A	N/A



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
6		Prior to the first discharge of stormwater from the covered anaerobic lagoon authorised by this consent, the Consent Holder shall notify Environment Southland Of its intention to discharge the stormwater to the open drain. The notification shall include: a) a description of the measures implemented to prevent pest bird congregation on the covered anaerobic lagoon; b) evidence demonstrating the effectiveness of these measures over three months and c) a minimum of two stormwater samples collected in accordance with Condition 2(d) that meet the stormwater quality targets stated in Condition 3(c).	New consent condition (assume in replacement of Condition 7, now deleted). Now refers to “first discharge” of stormwater as opposed to “prior to the discharge” (which implied any discharge, not just the first one). We note that the CAL stormwater can be discharged to the irrigation lagoon and discharged with the treated wastewater authorised by the other consent (as is current practice), or to the open drain under this consent. This condition is to ensure that the stormwater is as predicted and not worse before the start discharging to the drain. Monitoring is given in condition 2d
Discharge of Treated Wastewater, Stockyard Solids, Grit, Paunch and Waste Activated Sludge Biosolids and Covered Anaerobic Lagoon (CAL) Stormwater to Land			
1		This consent authorises the discharge of treated wastewater, stockyard solids, grit, paunch, waste activated sludge and Covered Anaerobic Lagoon (CAL) stormwater onto land at the following legal descriptions: Lot 1 DP 14802, Pt Lot 7 DP 159, Pt Lot 8 DP 159, Lot 9 DP 159, Lot 12 DP 159, Lot 13 DP 159, Lot 1 DP 595, Lot 292 DP 155, Lot 293 DP 155, Lot 1 DP 12194, and Lot 1 DP 8287.	Terminology change from biosolids to waste activated sludge. Later conditions refer to grit as one of the items being discharged. Need to specify the source of the stormwater allowed by this consent. It is only that from the CAL cover, but the whole site. Recommend that a definition of the total area (in Ha and on a map) of land to be irrigated is included here or as a separate condition. Subsequent Conditions assume that the total area of land for irrigation is 178Ha
2		Irrigation of wastewater, waste activated sludge, stormwater from the covered anaerobic lagoon, and land application of stockyard solids, paunch to third-party owned land shall only occur from October to March (inclusive). Third-party land is at the following legal descriptions: Lot 9 DP 159, Lot 12 DP 159, Lot 13 DP 159, Lot 292 DP 155, Lot 1 DP 12194, and Lot 1 DP 8287.	Terminology change from biosolids to waste activated sludge. Addition of stormwater. Removal of Lot 293 DP 155 (third party land).
3	No discharge shall occur onto land that is predominantly Paroa (formally Dacre) Silt Loam soils.	N/A	N/A



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
5		The treated wastewater, waste activated sludge, stormwater from the covered anaerobic lagoon, and stockyard solids and paunch authorised to be applied to land under this consent shall be applied no closer than: a) 10 metres to any watercourse or open drain, whether flowing continuously or intermittently; b) 20 metres to any external property boundary or public road. The distance to a property boundary may be reduced with the written agreement of the adjacent property owner and occupier. A copy of this written agreement shall be provided to the Environment Southland Compliance Manager prior to disposal of treated wastewater, stockyard solids, paunch of waste activated sludge occurring; c) 100 metres to any residential dwelling, school, or marae (excluding any dwellings owned by the Consent Holder) unless the written agreement of the owner and occupier has been obtained. A copy of this written agreement shall be provided to the Environment Southland Compliance Manager prior to disposal of wastewater, stockyard solids, stormwater from the covered anaerobic lagoon, paunch or waste activated sludge occurring; and d) 100 metres from any potable water abstraction point. <i>Advice note: The above setback distances shall be calculated from the edge of the spray wetted radius. For example, an operator placing a pod irrigation system with a maximum spray radius of 15 metres should position the pods no closer than 25 metres to any watercourse.</i>	Terminology change from biosolids to waste activated sludge. Added stormwater from CAL. Removal of Condition 5b) regarding no application within 10 m of any tile drain. Addition of advice note regarding how to determine setback distances.
Compliance Limits			
6		The depth of treated wastewater application onto any area of land shall not exceed; a) 35 millimetres for any individual application in the period 1 October to 31 March; b) 15 millimetres for any individual application in the period 1 April to 30 September. The rate of application of treated wastewater, waste activated sludge and covered aerated lagoon stormwater to land must not exceed 6 millimetres per hour.	Terminology change from biosolids to waste activated sludge. Added stormwater from CAL.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
7		Following an individual application event, discharge of treated wastewater, waste activated sludge and covered anaerobic lagoon stormwater must be withheld for a minimum period of seven days before another individual application of that material can be applied onto the same area of land.	Terminology change from biosolids to waste activated sludge. Added stormwater from CAL. Added clarification that condition is relevant to individual application events.
8		a) Stock must be withheld from accessing the land area subject to an individual application event for a minimum of 14 days following the completion of that event. b) Land used for treated wastewater, waste activated sludge and/or covered anaerobic lagoon stormwater disposal between 1 April and 30 September shall not be grazed by cattle or horses.	Change from discharge event to an individual application event requiring stock being withheld. Additional condition that stock must be kept off land to which treated wastewater, WAS, and CAL stormwater has been applied between April and September incl. This restriction will affect both BSM and non-BSM land. We have added "or" to the condition as shown. Condition will apply to non-BSM land as well as BSM land. Include reference to Condition 37-1 which controls the application of the solids to be applied under the consent and hence has additional controls on the WAS. The proposed withholding period of 14 days is less than required by NZWWA 2017¹⁶. The guidance states that the withholding period should be at least six months for Type B material of human origin onto pasture (Table 9-1). Given that the WAS is not of human origin, the proposed withholding period is considered sufficient.

¹⁶ Guidelines for Beneficial Use of Organic Materials on Productive Land, Volume 1 Guide, Water NZ, 2017



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
9		Plant available nitrogen loadings rate from all sources must not exceed a maximum of: a) 200 kgN/ha/yr on grazed pasture; b) 350 kgN/ha/yr on cut and carry operations; or c) A pro-rated nitrogen load, in the case of mixed land use on the same piece of land throughout the year. Plant available nitrogen shall be assessed as follows: a) nitrogen applied from treated wastewater, covered anaerobic lagoon stormwater, stockyard solids and paunch shall be considered as 100% plant available; and b) nitrogen applied from waste activated sludge shall be considered 58% plant available.	Terminology change from biosolids to waste activated sludge. Updated notation of units. Added "on the same piece of land throughout the year" to condition 9(c). Added CAL stormwater to description of plant available nitrogen sources.
9-1		Plant available nitrogen loads from all sources must not exceed a maximum of 35,600 kgN/yr.	New condition. In addition we recommend that a definition is added for this condition and proposed condition 9-2, for the area(s) over which the application rates apply (i.e. the irrigable areas).
10		Unless as allowed by Condition 11, the annual phosphorus loading rate from the irrigation of treated wastewater, stockyard solids, paunch, waste activated sludge and fertiliser applications shall not exceed 70 kilograms of phosphorus per hectare per year.	Terminology change from biosolids to waste activated sludge. We recommend the edit indicated (add 'unless as allowed by Condition 11') to resolve conflict between the two conditions.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
11	The Consent Holder may apply plant available phosphorus up to 110 kilograms of phosphorus per hectare per year on land owned by the Consent Holder and operated as cut and carry subject to: a) riparian planting as per the Riparian Planting Plan (Attachment 3 - Figure 17 Riparian Planting Plan for Mitigation of Higher Nutrient Loading). i. areas of new riparian planting shall be high density native grasses and sedges; and ii. achieve a minimum 80% ground cover; and iii. achieve a minimum of five metres width as measured from the stream and/or drain bank. b) areas of existing riparian planting are to be maintained wherever possible. If these need to be removed, the planting shall be replaced in accordance with Condition 11 (a) i-iii above. c) the riparian planting shall be carried out with the advice of a suitably qualified expert.	The Consent Holder may apply plant available phosphorus up to 110 kgP/ha/yr on land owned by the Consent Holder and operated as cut and carry subject to: a) riparian planting as per the Riparian Planting Plan (Attachment 1 - Figure 17 Riparian Planting Plan for Mitigation of Higher Nutrient Loading (PDP Figure No. 17 A03220205)) being undertaken as follows: i. areas of new riparian planting shall be high density native grasses and sedges; and ii. achieve a minimum 80% ground cover; and iii. achieve a minimum of 5 m width as measured from the stream and/or drain bank. b) areas of existing riparian planting completed at the date of consent commencement are to be identified in the Riparian Planting Plan and maintained wherever possible. If these need to be removed, the planting shall be replaced in accordance with Condition 11 (a) i-iii above. c) the riparian planting shall be carried out with the advice of a suitably qualified expert.	Updated notation of units. Update referencing for planting plan. Clarification of condition 11(b) – refers to planting already completed as at commencement of consent. We recommend the additional edits highlighted. Current version of planting plan labels existing plantings as “Recent riparian planting”. We suggest that the Riparian Planting Plan be part of the Wastewater Farm Environment Plan and should be reviewed on a 5-yearly basis as part of the renamed “Surface Runoff and Land Drainage Management Review” in Condition 46. Condition 11b we suggest a timeframe be included within which removed planting should be reinstated.
12		Plant available phosphorus shall be assessed in Conditions 10 and 11 as follows: a) phosphorus applied from treated wastewater, stormwater from the covered anaerobic lagoon, stockyard solids and paunch shall be considered 100% plant available; and b) phosphorus applied from waste activated sludge shall be considered 85% plant available.	Terminology change from biosolids to waste activated sludge. Added CAL stormwater.
12-1		The nitrogen loading rate shall not exceed 50 kgN/ha per irrigation application event .	New condition. Updated notation of units. Recommend that move to be Condition 9-2 to keep the Nitrogen related limits in same place.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
12-1			A new condition should be inserted here (refer to Section 5.1.5 of report): <i>The total annual plant available phosphorus load shall not exceed 12,460 kg P on land owned by BSM and operated as cut and carry, subject to consent condition requirements for riparian planting (proposed conditions 11 and 12).</i>
13	The oil and grease concentration of the treated wastewater discharged as monitored in Condition 14 shall not exceed 50 grams per cubic metre.	N/A	N/A
13-1		The Consent Holder shall maintain flowmeters at or downstream of the irrigation storage lagoon that monitor instantaneous flow and daily discharge volume of: a) treated wastewater discharge to land; and b) waste activated sludge discharged to land. The flowmeters shall be maintained and calibrated annually.	New condition. Minor clarification of wording.
13-2		The Consent Holder shall maintain daily records of all stockyard solids, paunch, and grit spread onto land. The records shall include: a) volume; b) type (stockyard solids, paunch, grit).	New condition. Should refer to "application" of solids (especially for paunch) as opposed to 'spreading'. Grit is not previously mentioned in the consent, nor in the current scope of the consent. All previous lists of solids should be reviewed to determine if it should include "grit".



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
14		The Consent Holder shall monitor the treated wastewater and covered anaerobic lagoon stormwater discharge by taking representative samples of the wastewater from the irrigation storage pond at least once per month, and analysing each sample for the following: i. field measurements of temperature, pH, electrical conductivity, and dissolved oxygen; ii. sodium adsorption ratio including sodium, potassium, calcium, and magnesium concentrations; iii. chloride concentration; iv. total nitrogen concentration; v. nitrate nitrogen concentration; vi. nitrite nitrogen concentration; vii. ammoniacal nitrogen concentration; viii. <i>Escherichia coli</i> (<i>E. coli</i>) concentration; ix. total phosphorus concentration; x. dissolved reactive phosphorus; and xi. oil and grease.	Additional testing parameters – field measurements of temperature, conductivity, dissolved oxygen, sodium absorption ratio, and chloride concentration. Added CAL stormwater. Recommend add oil and grease to parameters to enable comparison to limit in Condition 13. Also recommend combining nitrate and nitrite nitrogen into a single Total oxidised nitrogen rather than separate analyses.
14-1		In addition to the analysis required by Condition 14, one treated wastewater and covered anaerobic lagoon stormwater discharge sample shall also be analysed annually for: i. total arsenic; ii. total cadmium; iii. total chromium; iv. total copper; v. total lead; vi. total nickel; and vii. total zinc.	New condition. Add CAL stormwater.
15		The Consent Holder shall monitor the waste activated sludge by taking a representative sample at least once per month, and analysing each sample for the following: i. total solids; ii. total Kjeldahl nitrogen; iii. ammoniacal nitrogen; iv. total phosphorus; and v. dissolved reactive phosphorus vi. Total oxidised nitrogen vii. Standard Oxygen Uptake Rate @ 20°C.	Terminology change from biosolids to waste activated sludge. Addition of 'representative sample'. Recommend that monitoring for SOUR in WAS is included to indicate the stability of the WAS. The NZWWA 2017 guideline provides this as a VAR method (Table 5-3 - SOUR @ 20°C ≤ 1.5 g/m³ for liquid sludges from aerobic processes)



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
16		In addition to the analysis required by Condition 15, one waste activated sludge discharge sample shall also be analysed for: i. total arsenic; ii. total cadmium; iii. total chromium; iv. total copper; v. total lead; vi. total nickel; and vii. total zinc.	Rewording of condition as it is repetitive to Condition 15. Deleted reference to 'annually' (covered by Condition 15). We recommend that annual analysis is reinstated here.
17		The Consent Holder shall monitor the combined paunch, stockyard solids and all other solids (combined as wastewater solids) applied to land by taking representative samples of each of the solids at least once per month, and analysing each sample for the following: i. bulk density; ii. total solids; iii. total Kjeldahl nitrogen; iv. ammoniacal nitrogen; v. total phosphorus vi. dissolved reactive phosphorus; and vii. total oxidised nitrogen	Inclusion of terminology to emphasise need for representative sample of each type of solid. All terms used should be defined at the start of conditions or in advice notes, especially "wastewater solids". Addition of sampling parameter – bulk density and total oxidised nitrogen. Currently contradicts the amended approach to manage paunch separately. We suggest that the analysis be of each type of solid separately as they will have different characteristics.
17-1		In addition to the analysis required by Condition 17, one sample shall also be analysed for each type of solids annually for: i. total arsenic; ii. total cadmium; iii. total chromium; iv. total copper; v. total lead; vi. total nickel; and vii. total zinc.	New condition. We recommend that a separate sample be taken of each type of solids



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 unnamed tributary is to be monitored upstream and downstream of the land treatment site, at the locations shown in Attachment 2 - Figure 11 Surface Water Monitoring Locations – (PDP Figure No. 11 A03220205);
- b) samples are to be taken at least once every three months;
- 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:
 - i. pH;
 - ii. electrical conductivity;
 - iii. dissolved oxygen concentration;
 - iv. ammoniacal nitrogen concentration;
 - v. total nitrogen concentration;
 - vi. dissolved reactive phosphorus concentration;
 - vii. *Escherichia coli* (*E. coli*) concentration;
 - viii. nitrate nitrogen;
 - ix. nitrite nitrogen;
 - x. temperature (field measurement); and
 - xi. 5-day carbonaceous biochemical oxygen demand (cBOD₅).
- e) In addition to the analysis required by Condition 18(d), one set of samples shall also be analysed in the first year of operation and every three years after that for:
 - i. total arsenic;
 - ii. total cadmium;
 - iii. total chromium;
 - iv. total copper;
 - v. total lead;
 - vi. total nickel; and

18b) changed monthly sampling to quarterly. Subsequent change to "once every three months".

18d) terminology change of BOD to 5-day cBOD.

Updated reference to Attachment 2.

New sub condition 18e) detailing sampling suite for first year of operation and every subsequent 3 years (reduced from 5 years originally proposed).

Should clarify that for clause d)(iii) DO is measured in g/m³ and % saturation.

No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
		vii. total zinc.	
19		The Consent Holder shall maintain the conductivity meter at a site downstream of the land treatment area in the unnamed tributary. The conductivity meter shall be located in the position shown in Attachment 2 – Figure 11 Surface Water Monitoring Locations - (PDP Figure No. 11 A03220205). The conductivity meter shall continuously monitor and electronically record (at 15 minute intervals) electrical conductivity. - the meter shall be calibrated periodically and shall be maintained in accordance with the manufacturers guidelines; - the conductivity readings are to be reported to the Environment Southland Compliance Manager via a system that can automatically send the data into Environment Southland's computer database in CSV format, Hilltop or Tide data format, or XML formatted or formatted as required by the Environment Southland Compliance Manager. The data is to be provided at least once per day; and - if the electrical conductivity readings exceed 280 µS/cm (or other value agreed in writing by the Environment Southland Compliance Manager), the Consent Holder shall, without undue delay, inspect the unnamed tributary at the upstream and downstream sites identified in Attachment 2 - Figure 11 Surface Water Monitoring Locations (PDP Figure No 11 A03220205). If the inspection shows a conspicuous change in the colour or clarity of the tributary, the Consent Holder shall advise the Environment Southland Compliance Manager (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.	Addition to reference Attachment 2 which shows where the conductivity meter to be located. Minor updates to wording. Question for ES – do they want the conductivity to be provided to them on a daily basis as required by Condition 19(b). This seems onerous for both parties, unless it is automated.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
20		Water, treated wastewater, stormwater from the covered anaerobic lagoon waste activated sludge, stockyard solids and paunch quality monitoring shall comply with the following criteria: a) the results of the monitoring specified in Conditions 14 to 18 are to be supplied to the Environmental Southland Compliance Manager no later than 20 working days after the receipt of the laboratory analytical data; b) the results of the monitoring specified in Conditions 14 to 18 are to include reference to the method of analysis; c) the parameters specified in conditions 14 to 18 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 Environment Southland Compliance Manager; and d) 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 Environment Southland Compliance Manager 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 14 to 18 above. The cost of each audit is to be met by the Consent Holder.	Terminology change from biosolids to waste activated sludge. Added CAL stormwater.



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 seven treated wastewater, waste activated sludge, covered anaerobic lagoon stormwater, stockyard solids and paunch **disposal sites**:
 - i. at least four **sites** on land operated as cut and carry;
 - ii. at least two **sites** on land operated as grazed pasture; and
 - iii. at least one control **site** (in an area where treated wastewater, stormwater from the covered anaerobic lagoon, waste activated sludge, stockyard solids and paunch are not discharged, and which is typically representative of the soil characteristic within the **irrigated areas**).
- b) to this end, the Consent Holder shall take no less than 10 representative subsamples to a minimum depth of 15 cm at each **site** to form one composite for each **site**;
- c) soil samples shall be analysed for the following:
 - i. soil pH;
 - ii. exchangeable calcium;
 - iii. exchangeable magnesium;
 - iv. exchangeable potassium;
 - v. exchangeable sodium;
 - vi. phosphorus (Olsen P);
 - vii. cation exchange capacity;
 - viii. total nitrogen concentration and
 - ix. bulk density
- d) analysis shall include the calculation of exchangeable sodium percentage (ESP) values for each sampling site; and
- e) at each **site**, **at least one sample shall be taken and tested for soil infiltration**;
- f) in addition to the analysis required by Condition 21(c.), one set of samples shall also be analysed in the first year of operation and every five years after that for:
 - i. total arsenic;
 - ii. total cadmium;
 - iii. total chromium;

Terminology change from biosolids to waste activated sludge.

Addition to Condition 21a) iii. clarification on the control site needing to be representative of irrigated areas.

Addition of Condition 21f) detailing sampling suite for first year of operation and every subsequent five years.

Added CAL stormwater

Condition uses the term "site" for different things, which lacks clarity.

In first sentence, it appears to refer to the whole site as defined in Conditions 1 and 2. The next use in part a refers to the application or "irrigation" areas. We note that not all the material will be irrigated, so the term is not appropriate in this instance, nor is the use of the term "disposal" in this condition.

In the rest of the condition "site" refers to the location from which a sample is taken. This would be usefully clarified by providing distinct defined terms for the first 2 usages instead of "site".

Part e) - Soil infiltration rate is an in situ test and hence needs to be carried out in the field

No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
		iv. total copper; v. total lead; vi. total nickel; and vii. total zinc.	
22	The Consent Holder shall maintain the soil's natural infiltration capacity by ensuring the exchangeable sodium percentage (ESP) of the soil at annual monitoring compliance sites does not exceed five percent, and that saturated soil infiltration rates are not less than six millimetres per hour.	The Consent Holder shall maintain the soil's natural infiltration capacity by ensuring the exchangeable sodium percentage (ESP) of the soil at annual monitoring compliance sites does not exceed 5%, and that saturated soil infiltration rates are not less than 6 mm/hr.	Updated notation of limits.
23	If it is determined by monitoring required by Condition 21 that ESP exceeds five percent, action, such as fertilisation with gypsum or other suitable method, shall be undertaken such that the elevated ESP reduces to less than five percent.	If it is determined by monitoring required by Condition 21 that ESP exceeds 5%, action, such as fertilisation with gypsum or other suitable method, shall be undertaken such that the elevated ESP reduces to less than 5%.	Updated notation of limits. We recommend that a timeframe be included in the condition within which the action is to be completed
24	If it is determined by monitoring required by Condition 21 that saturated soil infiltration rates are less than six millimetres per hour, the Consent Holder shall take appropriate remedial action by ripping the paddock, tilling the paddock and resowing, or other suitable mechanical method.	If it is determined by monitoring required by Condition 21 that saturated soil infiltration rates are less than 6mm/hr per hour, the Consent Holder shall take appropriate remedial action by ripping the paddock, tilling the paddock and resowing, or other suitable mechanical method.	Updated notation of limits. We recommend that a timeframe be included in the condition within which the action is to be completed
25	DELETED BY APPLICANT		
26		The Consent Holder shall maintain a minimum of seven groundwater monitoring bores on site. The bores shall comprise a minimum of three shallow upgradient, three shallow downgradient and one deep (approximately 40 metres deep) downgradient bores. The bores shall be positioned to achieve effective coverage of the operation. The Consent Holder shall measure the referenced groundwater level and then collect samples from each of the seven groundwater monitoring bores concurrently across all bores on a quarterly basis each year and analyse each sample for the following: - Field measurements of temperature, pH, electrical conductivity, and dissolved oxygen; - sodium adsorption ration including sodium, potassium, calcium and magnesium concentrations; - chloride concentration; - total nitrogen concentration; - nitrate nitrogen concentration; - nitrite nitrogen concentration; - ammoniacal nitrogen concentration; - Escherichia coli concentration; - total phosphorus concentration; and - dissolved reactive phosphorus.	Rewording of consent to detail what bores need sampling (and where), and the sampling parameter suite. Removal of bore coordinates. Deleted requirement to monitor for sulphate and bicarbonate. This means that it will not be possible to complete ionic composition analysis if needed. We recommend that these parameters be re-instated We recommend that a requirement is included as shown to measure the referenced water level in each bore before sampling. Clause a) needs to clarify that DO should be measured as g/m³ and % saturation We recommend that a further five (at minimum) groundwater bores be added to this condition, including:



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
		k) Calculated sodium adsorption ratio from the concentrations of sodium, calcium, and magnesium	- Four bores to be located within the site's footprint (namely in irrigation areas) - At least one bore located downgradient, on the opposite side of the Waihopai River tributary to the site (see Section 5.2 of this report). Each monitoring event shall involve concurrent sampling across all bores (i.e. within a 3 day period).
27		From the date that this consent commences, in addition to the monitoring requirements stipulated by Condition 26, the Consent Holder shall also sample bore water at the seven bores identified in Condition 26 for heavy metals total arsenic, total cadmium, total chromium, total copper, total lead, total nickel and total zinc in the first year of operation and five yearly intervals after that.	Clarification that 'total' metals are to be measured. However, we recommend that this is changed to dissolved metals, as interpretation of total metals can be complicated if the samples include sediment. Addition that bore sampling shall occur in the first year of operation and thereafter at 5 yearly intervals. This condition should be updated to match Condition 26 (i.e. number of bores to be monitored)



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
28		The Consent Holder shall carry out, on-site soil moisture measurements within each wastewater irrigation areas as follows: a) the Consent Holder shall record soil moisture measurements using a device as agreed by the Environment Southland Compliance Manager; b) unless otherwise agreed by the Environment Southland Compliance Manager the soil moisture data collected in accordance with this condition is to be recorded and provided to the Council with each annual monitoring report required by Condition 31 for the preceding period 1 July to 30 June; c) 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 Environment Southland Compliance Manager as part of the Annual Report required by Condition 31.	Date now given for soil moisture data provision to Council (in monitoring report). Condition 28a) does not specify the frequency with which soil moisture measurements should be recorded. We recommend this be stipulated and be at least weekly, particularly over the winter period, and more frequently during wet periods (which will require definition). Soil moisture measurements should be required for all "application areas" receiving any discharge authorised by this consent, not just the wastewater irrigation areas. As stated before, defined terms for these areas at the start of the consent would assist with specifying these requirements clearly. Soil moisture monitoring should be formed at each of the application areas not just representative areas. Reporting period should be made consistent with reporting period as specified in later conditions



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
29		The Consent Holder shall, unless otherwise agreed to in writing by the Environment Southland Compliance Manager, undertake ecological monitoring after the first full year of treated wastewater, waste activated sludge, covered anaerobic lagoon stormwater, stockyard solids and paunch disposal and at 5-yearly intervals after that. The ecological monitoring shall occur along approximately 50 m lengths of the two unnamed tributaries, upstream and downstream of the boundaries of the disposal area. These locations shall be monitored at the same time. The ecological monitoring shall comprise of: a) macroinvertebrate community index for soft bottomed streams (MCI-sb); b) relative abundance of ephemeroptera, plecoptera and trichoptera (EPT); c) taxonomic richness; d) stream ecological evaluation (SEV); and e) periphyton sampling.	Terminology change from biosolids to waste activated sludge. Addition of periphyton sampling for ecological monitoring. Added CAL stormwater Need to state that report to be provided to ES.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
30		The Consent Holder shall keep daily records on a per paddock basis of the following: a) the amount of: i. treated wastewater and covered anaerobic lagoon stormwater irrigation; and ii. waste activated sludge irrigation; and iii. paunch, stockyard solids, and all other solids applied to the land by type of solid. b) the total nitrogen and phosphorus loadings applied to the disposal area from: i. treated wastewater and covered anaerobic lagoon stormwater irrigation; and ii. waste activated sludge irrigation; and iii. paunch, stockyard solids, and all other solids applied to the land. c) the calculated available nitrogen and available phosphorus loading applied to the disposal area (in kilograms per hectare per year). The Consent Holder shall make these records available to the Environment Southland Compliance Manager upon request at any reasonable time.	Terminology change from biosolids to waste activated sludge. Units now given for 30c). “paddock” has not been used previously in the consent. We suggest this reference is revised to “application areas”. These application areas need to be defined in the Farm Environment Management Plan required by Condition 43. The reference to “disposal area” should similarly be revised to “each application area” Each type of solid will have different characteristics and hence need to be reported separately.
		Annual Report	
31		The Consent Holder shall prepare and submit an Annual Report to the Environment Southland Compliance Manager. The report shall include the period from 1 July to 30 June and shall be provided to the Environment Southland Compliance Manager by 31 August each year, or such other date agreed in writing by Environment Southland. The report shall include, but not necessarily be limited to the following information: a) presentation and summary of all treated wastewater, waste activated sludge, covered anaerobic lagoon stormwater, stockyard solids, paunch, receiving environment, and ecological monitoring results and observations as required by this consent; including any	We recommend changing name of report to “Annual Report” as covers more than just monitoring results. Amendment to date that report is due. This will mean the “winter” season will be split between reporting periods. We suggest that the period for the report by aligned with the definition of seasons in the consent. We suggest 1 April to 31 March Terminology change from biosolids to waste activated sludge.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
		recommendations for improved monitoring; b) the identification of any recorded non-compliances with consent limits and standards and the measures taken to ensure compliance is achieved; c) analysis of all treated wastewater, waste activated sludge, covered anaerobic lagoon stormwater, stockyard solids, paunch, receiving environment, and ecological monitoring results using: i. spatial or temporal trends; ii. comparison of environmental monitoring data with limits specified in this consent, relevant standards, and guidelines, where available, including but not limited to National Policy Statement for Freshwater Management national bottom lines (for surface water), Environment Southland standards (various), Wilcox diagram (for groundwater); d) any corrective actions undertaken as required by Conditions 23 and 24; and e) a summary of any complaints and actions undertaken as specified in Condition 38	Applicant changed terminology from biological to ecological (changed back to biological but only for Condition 31(a); assume this is a typo?). All references should be to 'ecological' monitoring. We recommend adding "and observations" to the reporting required as many of the operational controls in the consent are monitored through specifically required observations rather than sample collection. A summary and analysis of these observations should be included in the Annual Report. Addition of sub condition 31c) detailing the required analyses for the data. Added CAL Stormwater Removed reference to analysis of 'long term' monitoring trends. Our recommendation is that "spatial or temporal trends" be specified
32	The Consent Holder shall provide to the Environmental Southland Compliance Manager by 31 August each year a nutrient management budget for the irrigation area including the overall grazed farm, that has been developed based on the outputs of either Overseer or any other nutrient management planning tool approved by the Environment Southland Compliance Manager.	N/A	N/A We recommend that this be clarified to indicate whether this is the estimated nutrient budget from the preceding period or the planned nutrient budget for the forthcoming period. We recommend that the Condition specify that the Nutrient Budget should identify the estimated annual nitrogen and phosphorus loads discharged to each of the surface water, shallow ground water and deep groundwater.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
33		The nutrient management budget required by Condition 32 shall as a minimum record the following information for at least nitrogen (N) and phosphorus (P) (in units of kilograms of N and P per hectare per year): a) inputs from treated wastewater, covered anaerobic lagoon and waste activated sludge irrigation, other solids spreading, fertiliser, and any nutrient source; b) outputs in product, including percentage dry matter; c) results of soil testing; and d) area(s) of land used for irrigation. The above recorded information shall be separated by land used for cut and carry and land used as grazed pasture.	Terminology change from biosolids to waste activated sludge. Addition that the information shall be separate by land use. Added CAL stormwater. Recommend adding clause d) as highlighted. Condition 33b) – there is currently no monitoring of the product removed required by the consent, apart from this reference. We suggest that this is specified in the consent in a similar manner to the input monitoring that has been specified. Recommend it be a new condition
Management			
34		The irrigation of treated wastewater, waste activated sludge, and covered anaerobic lagoon stormwater shall not cause significant prolonged ponding. For the purpose of this consent, significant prolonged ponding is deemed to occur if treated wastewater, waste activated sludge, and covered anaerobic lagoon stormwater remains on an area of more than ten square metres 24 hours after being irrigated.	Terminology change from biosolids to waste activated sludge. Added CAL Stormwater.
35		The treated wastewater, waste activated sludge and covered anaerobic lagoon stormwater irrigation shall not cause overland flow of treated wastewater and/or waste activated sludge to any flowing watercourse, drainage ditch, permanent pond, or property outside the boundary of this Consent.	Terminology change from biosolids to waste activated sludge. Added CAL Stormwater.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
36		If treated wastewater, waste activated sludge, and covered anaerobic lagoon stormwater irrigation occurs when soils are at or above field capacity as determined by Condition 28, the Consent Holder shall take additional precautions, including but not limited to, minimum daily inspections of each of the irrigators while irrigating to check for conspicuous signs of wastewater ponding or run-off and the position of the irrigator relative to known drains. These inspections shall be noted, and the downstream conductivity recorded at the time of the inspection. A copy of this record shall be included with the Annual Monitoring Report specified in Condition 31.	Terminology change from biosolids to waste activated sludge. Note that minimum daily inspections of irrigators are required while irrigating. Removal of requirement for conductivity measurement upstream. Needs to clarify that conductivity measurement relates to surface water. Added CAL Stormwater.
37	Irrigation of wastewater shall be with equipment such that aerosols and spray drift are minimised, and there shall be no detectable spray drift beyond the property boundary.	Irrigation of treated wastewater, covered anaerobic lagoon stormwater and waste activated sludge shall be with equipment such that aerosols and spray drift are minimised, and there shall be no detectable spray drift beyond the property boundary.	Added CAL Stormwater.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
37-1		Land application of paunch solids and stockyard solids shall be managed in accordance with the Guidelines for the Safe Application of Biosolids to Land in New Zealand, August 2003, to reduce vector attraction by: - Applying it to forested areas of the farm; or - Incorporated it into soil via tilling and providing soil cover; or - Field storing or storing it in a stabilisation lagoon for at least one year prior to application; or - Any other suitable method agreed with the Environment Southland Compliance Manager in writing.	New condition proposed. Add stockyard solids as highlighted. We recommend re-structuring this condition as per row below (highlighted).
Alternative 37-1		Within three years of commencement of this consent, the land application of all solids shall be managed to comply with the requirements of at least Class B biosolids as given in Table 5-3 of NZWWA 2017¹⁷. This shall include: For paunch and stockyard solids: Field storing or storing it in a stabilisation lagoon for at least one year prior to application; and then: Applying it to forested areas of the farm; or Incorporating it into soil via tilling and providing soil cover. For Waste Activated Sludge:: Achieving a SOUR rate @ 20°C ≤ 1.5 g/m³ as determined by the monitoring defined in Condition 15. Or any other suitable method agreed with the Environment Southland Compliance Manager in writing.	Add this condition in place of 37-1 above. We recommend that the 2017 Guidelines are referred to in this consent rather than the 2003 Guidelines. We note that Condition 8 specifies withholding periods, which are less than those in Table 9-1 of NZWWA 2017. As the material is not of human origin, the risks to public health are less than human sewage and hence the periods are acceptable.

¹⁷ Guidelines for Beneficial Use of Organic Materials on Productive Land, Volume 1 Guide, Water NZ, 2017



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
Complaints			
38	The Consent Holder shall maintain a diary of complaints for complaints received by the Consent Holder about all aspects of operations at the site. The diary shall record: a) the issue that observed by the complainant; b) the date and time the issue was detected, or the complaint was made; c) the location where the issue was detected by the complainant; d) weather conditions (such as wind direction, approximate wind speed, temperature, and rain) when the issue was detected by the complainant; e) the most likely cause of the issue detected; f) the action taken by the Consent Holder in response to the complaint. Advice Note: This condition does not require the Consent Holder to take action over every complaint, but it does require that the decision is recorded.	N/A	N/A (minor edits to text)
39	The complaints register required by Condition 38 shall be available to the Environment Southland Compliance Manager on request. Complaints received by the Consent Holder which may indicate non-compliance with the conditions of this consent shall be forwarded to Environment Southland Compliance Manager within 5 days of the complaint being received. The complaint information provided to the Environment Southland Compliance Manager shall include all information recorded in Condition 38 above.	N/A	N/A
40	Details of all complaints received in accordance with Condition 38 shall be forwarded to the Environment Southland Compliance Manager on a monthly basis.	N/A	N/A
Incident Management			
41	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 Environment Southland Compliance Manager, as appropriate.	N/A	N/A



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
42	Should an adverse event occur that results in a non-compliance with the Conditions of this Consent, the Consent Colder shall notify the Environment Southland Compliance Manager immediately and shall provide a written report to the Environment Southland Compliance Manager within five working days of the Environment Southland Compliance Manager being notified. The report shall specify: a) the cause or likely cause of the event and any factors that influenced its severity; b) the nature and timing of any measures implemented by the Consent Holder to avoid, remedy, or mitigate adverse effects; and c) the action to be taken in future to prevent recurrence of similar events.	N/A	N/A
Wastewater Farm Environmental Management Plan			
43		No later than three months from the consent commencing the Consent Holder shall prepare and submit to the Environment Southland Compliance Manager an updated Wastewater Farm Environment Management Plan for certification that it is in accordance with this condition. The objective of the Wastewater Farm Environmental Management Plan shall be to detail all actions to be taken to minimise the impacts of the activities authorised by this consent and to ensure compliance with the conditions of this consent. The Wastewater Farm Environmental Management Plan shall include: a) a description of the contents and purpose of the Wastewater Farm Environmental Management Plan; b) responsibilities and contact details of key personnel; c) a summary of the plant purpose, location, layout, and wastewater management infrastructure with specific reference to the treated wastewater, waste activated sludge, covered anaerobic lagoon stormwater, stockyards solids and paunch discharge; d) a description of how the following will be managed to ensure compliance with the conditions of this consent: i. Delineation of application areas	Terminology change from biosolids to waste activated sludge. Revision of Condition 43e) to include irrigation restriction to times when soil moisture is below field capacity. This restriction is not specifically included in the other conditions. For clarity we recommend that it be added into Conditions 34 and 35.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
		ii. disposal buffer zones; iii. irrigation depths and nutrient loading rates; iv. withholding periods; v. riparian planting; vi. monitoring; vii. records of monitoring of treated wastewater and covered anaerobic lagoon stormwater, waste activated sludge, stockyard solids and paunch application; viii. reporting; and ix. complaints management. e) a description of how soil moisture monitoring, including restricting irrigation to times when soil moisture is below field capacity (where practical), will be used to assist in the management of irrigation, including the avoidance of significant ponding and overland flow; f) a description of how treated wastewater, waste activated sludge and covered anaerobic lagoon stormwater irrigation will be managed to ensure there is no detectable spray drift beyond the property boundary; and g) details of how incidents will be managed, including reporting requirements.	
44	The Consent Holder shall undertake all onsite activities in accordance with the certified Wastewater Farm Environmental Management Plan In the event of any inconsistencies between the conditions of consent and the provisions of the Wastewater Farm Environmental Management Plan, the conditions of this consent shall apply.	N/A	N/A (minor edits to wording)



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
45	The Wastewater Farm Environmental Management Plan shall be reviewed by the Consent Holder every three years. The purpose of this review shall be to confirm that the Wastewater Farm Environmental Management Plan accurately reflects current on-site activities and operations and to identify if changes to procedures contained within the Wastewater Farm Environmental Management Plan are required to achieve the objective of this condition. A written report detailing the results of the review shall be submitted to the Environment Southland Compliance Manager within 30 working days of the review being undertaken. If the review results in amendments to the Wastewater Farm Environmental Management Plan, the amended sections shall be provided to the Environment Southland Compliance Manager for certification at this time.	N/A	N/A



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
	Surface Runoff and Land Drainage Management Review		We recommend name change to better reflect the Condition



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
46		Within three years of the commencement of this consent, the Consent Holder shall submit a Surface Runoff and Land Drainage Outlet Mitigation Options Report to the Environment Southland Compliance Manager. This report shall: a) Consider and assess the technical feasibility and practicability of mitigation options that: i. Intercept shallow groundwater prior to it entering surface water via the subsoil drains, including the drain consented in XXX; and ii. Improve nitrate concentrations of the shallow groundwater that is conveyed by the subsurface drains to onsite surface water bodies located on Blue Sky Meats owned land identified in Condition 1, and iii. Reduce the potential loss of phosphorus via overland flow in critical source areas. This should include a review of the Riparian Planting Plan b) Recommend and provide a detailed description of mitigation options for each subsurface drain outlet located on the Blue Sky Meats owned land as identified in Condition 1 of this consent and is impacted by the discharge of treated wastewater, stockyards solids, paunch, waste activated sludge and CAL stormwater to land. c) Include a timeframe to implement the recommended mitigation options that is no later than three years following the submission of the subsurface drain outlet mitigation options report. The Consent Holder shall review the Surface Runoff and Land Drainage Outlet Mitigation Options Report every six years as part of the Continuous Improvement Review required by Condition XXX [New Continuous Improvement Condition] <i>Advice note: subsurface drains impacted by the discharge of treated wastewater, stockyards solids, paunch, waste activated sludge and CAL stormwater to land includes the subsurface drain identified in [reference discharge of land drainage water and stormwater to water consent]</i>	New condition. We recommend that the various time frames given in the conditions be reviewed to ensure that they are coherent. We recommend using “practicability” rather than “commercial viability”. We recommend that this review include the discharge from the other land drainage water and CAL stormwater to water consent. Recommend replacing ‘in critical source areas’ in clause a)(iii) with ‘across the site’. We note that a ground-truthed survey will be required to identify all existing subsurface drains within the first year of the consent. We recommend that part c) be replaced with a reference to the “Continuous Improvement” Condition and the Implementation Plan required by that. The output of this condition will be a critical part of the Plan developed under that Condition.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
47		The recommendations of the Subsurface Drain Outlet Mitigation Options Report, required by Condition 46, shall be implemented in accordance with the implementation timeframe stated in the report.	New condition Need to edit the reference to the timeframe to reflect the Continuous Improvement Condition
	Nitrogen and Phosphorus Limits, Mitigation and Management Review		
48		Prior to the sixth, twelfth, eighteenth and twenty-fourth anniversaries of the date of commencement of this consent, the Consent Holder shall engage an appropriately qualified and independent expert, or experts, to review this consents nitrogen and phosphorus discharge limits and mitigation and management measures, and to provide a report of the findings (the "Review Report") to the Environment Southland Compliance Manager within 1 month of the review being completed. The purpose of this review is to determine whether the discharge limits for nitrogen and phosphorus, as set out in Conditions 9 to 11 and 12-1 and the mitigation measures and management measures as set out in Conditions 3, 5, 6, 22, 23, 24, and 34 to 36 are appropriate for the purposes of maintaining and enhancing water quality in the Waihopai River catchment and the wider New River Estuary catchment. The Review Report shall include: a) an evaluation of the monitoring results in the receiving environment with regard to these limits; b) an assessment of relevant guidelines or standards applicable at the date of the review, and other catchment wide improvements relating to water quality; and c) an assessment of existing mitigation and management practices to determine whether they continue to be appropriate to maintain and improve water quality; and d) recommendations. The Consent Holder's obligations to undertake this review and the associated reporting process shall be completed within six months after being initiated.	New condition. We believe the proposed timing is not frequent enough. Recommend increasing to a review once every six years at minimum. The phrasing of the last paragraph of this condition needs to be clarified



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
	Continuous Improvement Review		
48-1		Three years after the commencement of the consent and every six years thereafter, the Consent Holder shall undertake a Continuous Improvement Review, which will identify the actions that the Consent Holder will undertake over the next six years to reduce the effects of the activities authorised by these consents. The objective of the review will be to reduce the nitrogen and phosphorus load from the activities authorised by this consent that are discharged to the aquatic environment by 10% for each six year period of the consent. The Continuous Improvement Review will include the following: a) review the annual Nutrient Management Budgets and required by Condition 32 and the Environment Monitoring undertaken for this Consent to estimate the nitrogen and phosphorus loads: i) from each of the sources authorized by this consent, and ii) that are discharged to each of surface water, shallow groundwater and deep groundwater b) review the options for improving operations and reducing the loads as identified in outputs from Condition 45 (Review of the Wastewater Farm Environment Plan), Condition 46 (Surface Runoff and Land Drainage Management Review), Condition 48 (Nitrogen and Phosphorus Limits, Mitigation and Management Review) c) Develop a prioritised Implementation Plan of actions to achieve the Objective of this Condition over the next six years. The Implementation Plan shall be submitted to the Environment Southland Compliance Manager for certification that it is in accordance with the Objective of this condition. d) Update the Wastewater Farm Environment Plan to reflect the Implementation Plan in accordance with Condition 45, including any changes in management regimes, processes, and/or commissioning of new facilities.	New Condition suggested by Stantec to implement requirement for continuous improvement in effects from the activity throughout the term of the consent. A 10% reduction in N and P load in each six year period of the consent is considered a reasonable definition of "Continuous Improvement". We note that a change in processes could result in a reduction in load of more than 10% in a six year period. If this occurs, then subsequent periods would not be required to achieve 10%. This is to ensure that the benefits from a significant capital investment are reflected in the consent.



No.	Original Condition	Revised Condition (as of 28/8/2024)	Commentary on changes ¹⁵
49		The consent Authority may, within three months of receiving any Review Report required by Condition 48, serve notice on the Consent Holder under section 128 of the Resource Management Act 1991 of its intention to review the conditions of this consent. The purpose of the review is for any of the following reasons: a) to assess the significance of any exceedance of the discharge limits set out in Conditions 9 to 11 and 12-1, and/or to determine whether the limits should be altered with particular regard had to the reporting undertaken in accordance with Condition 48, or whether the exceedance has resulted in significant adverse effects; or b) determining whether the conditions of this consent are adequate to address any adverse effects on the environment; or c) amending the monitoring programme to be undertaken; or d) adding or deleting any compliance parameters or limits; or e) requiring the Consent Holder to adopt the best practicable option to remove or reduce any adverse effects.	New condition



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