Before the Independent Hearing Commissioner
At Ashburton District Council

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under: the Resource Management Act 1991

in the matter of: application LUC23/0109 to the Ashburton District Council relating to the proposed equestrian centre located on 279 Stranges Road, Ashburton

between: **Southern Parallel Equine Centre Limited**
Applicant

and: **Ashburton District Council**
Consent Authority

Statement of evidence of Victor Mthamo

Dated: 20 March 2024

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STATEMENT OF EVIDENCE OF VICTOR MTHAMO

INTRODUCTION

1 My full name is Victor Mkurutsi Mthamo.

2 I am a Principal Consultant for the environmental science, engineering and project management consultancy Reeftide Environmental and Projects Limited (*Reeftide*). I have been in this role for almost 12 years. Prior to this I was a Senior Associate with the surveying, environmental science and engineering, and resource management consulting firm CPG New Zealand Limited (now rebranded to Calibre Consulting Limited), where I was also the South Island Environmental Sciences Manager. I have worked in the area of environmental science and engineering for over 29 years.

3 I have the following qualifications:

3.1 Bachelor of Agricultural Engineering (Honours) with a major in Soil Science and Water Resources (University of Zimbabwe);

3.2 Master of Engineering Science in Water Resources (University of Melbourne in Victoria, Australia);

3.3 Master of Business Administration (University of Zimbabwe); and

3.4 Advanced Certificate in Overseer Nutrient Management modelling qualification.

4 I am a member of Engineering New Zealand (MEngNZ) and am a Chartered Professional Engineer (CPEng) and an International Professional Engineer (IntPE).

5 I am a past National Technical Committee Member of:

5.1 Water New Zealand; and

5.2 New Zealand Land Treatment Collective (NZLTC).

6 My specific experience relevant to this evidence includes:

6.1 Three waters feasibility studies and optioneering reports. In this role I have:

(a) prepared several feasibility studies for Christchurch City Council (*CCC*) new water supply pump stations and reservoir sites; and

(b) undertaken assessment of water supply and waste infrastructure for Hurunui District Council for future planning and assest management purposes

6.2 Stormwater planning, catchment hydraulic and hydrological modelling and design;

6.3 Presenting evidence at a regional council hearing on catchment wide modelling that I carried out to assess the effects of flooding in the lower reaches of the Waitaki catchment in South Canterbury;

6.4 Regular engagements by CCC as a Three Waters Planning Engineer. In this role as a stormwater planning engineer, I review stormwater designs and modelling by various engineers from consulting firms and I also peer review their reports (concepts, calculations and detailed designs) and provide them with the required guidance for solutions that are acceptable to the CCC. As a result, I am conversant with various hydrological modelling tools, flooding assessments and flood mitigation;

6.5 Designing and implementing numerous on-farm irrigation schemes, soil investigations and land use assessments. Examples of projects include the Hunter Downs Irrigation Scheme, the North Bank Hydro Project, the Mararoa-Waiau Rivers Irrigation Feasibility Study and the North Canterbury Lower Waiau Irrigation Feasibility Assessment;

6.6 Assessing large subdivisions in relation to stormwater management, earthworks and the associated actual and potential impacts on soils, groundwater and surface waterways and including the effective use of erosion and management control plans to mitigate the potential impacts that may occur during the construction works;

6.7 Assessing effects on soils and groundwater associated with onsite and community wastewater discharge systems such as the Wainui Community wastewater discharge consent;

6.8 Assessing actual and potential effects on groundwater and surface water associated with groundwater and surface water takes;

6.9 Providing quarry soils and rehabilitation expert evidence for the extension of the Road Metals Quarry on West Coast Road in Templeton in 2018;

6.10 Acting as a soils and rehabilitation expert witness for the proposed Roydon Quarry in Templeton in 2019 and 2020. As a part of this role I provided an assessment of the soils'

versatility and the effect of the requested changes to the land use on the land's productivity potential;

6.11 Acting as an expert witness at the proposed Fulton Hogan Miners Quarry extension in 2020 and 2021. I provided an assessment of the soils, their versatility and productivity potential with and without mitigation post quarrying; and

6.12 More recently, I have been involved with a number of plan changes across the Selwyn and Waimakariri Districts with my evidence providing soils/land productivity and infrastructure assessments.

7 I have been engaged by Southern Parallel Equine Centre Limited (*SPEC*) to provide expert evidence in relation to its application for a resource consent (*Application*) to establish an equine centre in Lake Hood (the *Proposed Equine Centre*).

8 I was also engaged to liaise with the Ashburton District Council (*ADC*) on water supply options for the equine centre. I prepared a report on water supply in response to the ADC's request for further information.

9 I also prepared and lodged the resource consent applications to the Canterbury Regional Council for the Proposed Equine Centre that I discuss in more detail in paragraph 57 of my evidence.

CODE OF CONDUCT

10 Although this is not an Environment Court hearing, I note that in preparing my evidence I have reviewed the Code of Conduct for Expert Witnesses contained in Part 9 of the Environment Court Practice Note 2023. I have complied with it in preparing my evidence. I confirm that the issues addressed in this statement of evidence are within my area of expertise, except where relying on the opinion or evidence of other witnesses. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

11 My evidence provides details on:

11.1 a description of the site soils;

11.2 the proposed wastewater discharge, including the comment on the suitability of the treatment system, the basis for selecting the system and the proposed discharge to ground;

11.3 a description of the consents and bylaw authorisation applied for from the Canterbury Regional Council:

(a) to use land for earthworks.

(b) to install a culvert and construct bridges across Lagmhor Creek.

(c) to take and use groundwater for dewatering purposes.

(d) to discharge dewatering water.

(e) to discharge contaminants to land from an onsite wastewater system.

(f) authorisation under the Flood Protection and Drainage Bylaw 2013 for vegetation clearance, earthworks, bridge removal and installation of bridges and pipes within 7.5 metres of Laghmor Creek.

11.4 a description of the options for manure disposal offsite;

11.5 assessment of the water demands and supply options for the proposed development;

11.6 the description of the proposed waterway crossings.

12 In preparing my evidence, I have reviewed:

12.1 The Application;

12.2 Various background and project specific documentation from **Ms Catherine Stuart** (SPEC);

12.3 Lowe Environmental Impact Limited technical assessment of the wastewater consent application;

12.4 Submissions on the Application; and

12.5 The section 42A report.

SUMMARY OF EVIDENCE

13 SPEC propose to development an equine centre at 279 Stranges Road.

14 For the development to progress there are a number of consents that are required from the Canterbury Regional Council. These include onsite wastewater discharge, land use consents for works near the waterways, dewatering (take and discharge) and diversion consents.

15 I was engaged by SPEC to apply for these consents from the Canterbury Regional Council. The consents are in process. As far as

I am aware all technical issues have been resolved. Draft conditions for all the consents were received on the 15th of March 2024.

15.1 I sent these with mark-ups back to the Regional Council on the 17th of March 2024 and got a respose from back from Ms Victoria Wilson (the processing planner) on the 18th of March confirming that they accepted my suggested changes.

15.2 On the 20th of March I received another email from the ECan planner advising that "*I have a decision maker lined up but thought would be best to have one final clean version of conditions sent (just ignore the titles, been some weird formatting in these)*". I replied on the same day confirming that I was happy with the final conditions. I attach a copy of this correspondence in **Attachment 1**. I am confident that by the time of this hearing the all consents would have been issued.

16 I have highlighted the list of consents that I applied for in Paragraph 11.3 and I discuss these in more detail in Paragraph 57. The wastewater discharge consent (Paragraph 11.3(e) and 57.5) was the consent whose potential environmental effects received the most scrutiny from the Regional Council. Their concern was in regard to the efficacy of the treatment system and the effects of the discharge to land in particular the leaching of nitrates and phosphorus. These concerns have now been resolved.

17 SPEC proposes to use the BioGill treatment system. The influent or raw wastewater will undergo primary, secondary and tertiary treatment then pass through a UV system for microbial disinfection and then discharged into storage tanks. From the tanks the treated effluent is pumped into a drip irrigation for discharge to land.

18 The assessment of effects and modelling demonstrated that the leaching of nitrates and phosphorus will be less than that under the current arable land use. To demonstrate this point in more detail I oversaw or provided direction to modelling of nutrient losses using Overseer for the site. This analysis showed that the loss of nitrogen and phosphorus from the site as a result of the proposal was 9kg N/ha per year and 0.3 kg P/ha per year. This is considerably less than the losses under the current arable farming system, which has losses of 71 kg N/ha per year and 0.7 kg P/ha per year.

19 Manure from the operation will be taken off site in the short term. In the long-term SPEC are looking at options to use the manure for a fertiliser substitute, energy generation or for burning it off to create biochar. These activities may need separate consents and if required they will be applied for at the time a final decision is made on the options.

20 SPEC propose to manage the manure by taking it offsite. SPEC is also investigating a Biochar solution for the future management of the manure.

21 I have also demonstrated that the proposal can be supplied with water from the ADC network provided that SPEC undertake network improvements to bring the required water to the site.

22 In summary, I do not see any material issues with the project being able to be successfully implemented, with it being both feasible and having less than minor effects on the receiving environment.

DESCRIPTION OF THE SITE SOILS

23 High productive land is regarded as the best possible land or soils for agricultural production because of their properties. The site is comprised of Land Use Capability (*LUC*) Classes 1, 2 and 3 (predominantly LUC class 1) which makes it highly productive land.

24 The LUC classification classifies land according to those properties that determine its capacity for long-term sustained production.[1] There are eight different classes, illustrated on Figure 1 below. As set out further below, the LUC classification of a site is one of the key 'criteria' in determining whether soils are highly productive or not.

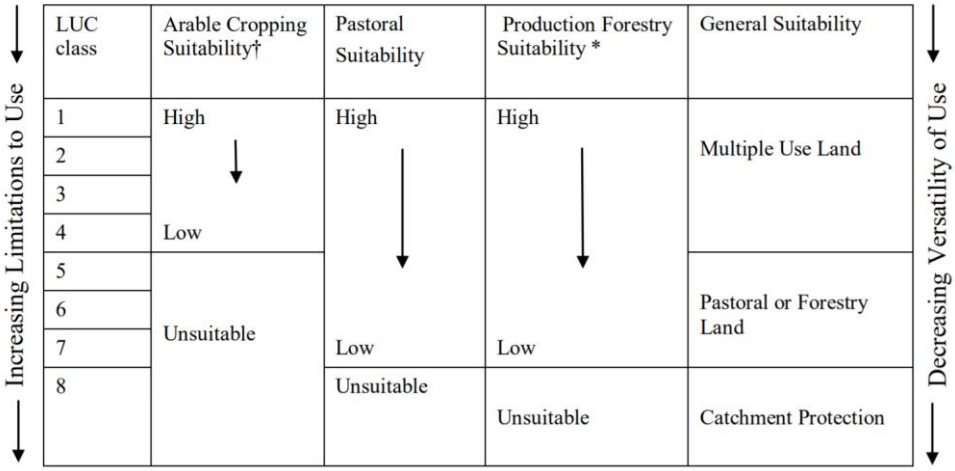

Figure 1 – Relationship between the Versatility and LUC Classes (Lynn et al, 2009[2])

25 LUC classification is a high-level tool. To determine the true productive capacity of a particular site, it is necessary to look at more detailed soil information. The Canterbury Maps GIS system soil layer from S-Maps[3] provides further details of the soils under

[1] Land Use Capability (LUC) Survey Handbook, 3rd edition (tupu.nz), page 8.

[2] *http://envirolink.govt.nz/assets/Envirolink/83-mldc7-MarlboroughSoilsAdvice.pdf*

[3] *https://smap.landcareresearch.co.nz/1*

the proposed site. Table 1 provides details of the soil orders within the site:

Table 1: Drainage Properties of the Soils

Drainage Description	Area (ha)	Percentage (%)
Gley Soils	6	9%
Pallic Soils	24	38%
Recent Soils	34	53%
Total Area	**≈65**	100%

26 Table 1 shows that the soils are dominated by Recent and Pallic Soils with these soils covering 91% of the site.

26.1 Pallic Soils tend to be dry in summer and wet in winter.

26.2 Recent soils tend to be well drained with very low vulnerability of water logging in non-irrigated conditions and have moderate to low soil water holding capacity.

27 In Table 2 I present the soil types for the site. These are loamy soils:

Table 2 - Area Under Each Soil Type

Sibling	Family Name	Soil Order	Area	Proportion
Waka_2a.1	Wakanui	Pallic Soils	15 ha	23.30%
Raka_1a.1	Rakaia	Recent Soils	12 ha	18.60%
Kaia_1a.1	Kaiapoi	Recent Soils	11 ha	17.30%
Waka_6a.1	Wakanui	Pallic Soils	8 ha	11.70%
Waim_42a.2	Waimakariri	Recent Soils	7 ha	11.50%
Long_4a.1	Longbeach	Gley Soils	3 ha	5.30%
Raka_2a.1	Rakaia	Recent Soils	3 ha	4.80%
Ayre_7a.1	Ayreburn	Gley Soils	2 ha	3.50%
Temp_3a.2	Templeton	Pallic Soils	2 ha	2.60%
Rang_18b.1	Rangitata	Recent Soils	< 1 ha	0.40%
Rang_19a.1	Rangitata	Recent Soils	< 1 ha	0.40%
Wate_2a.1	Waterton	Gley Soils	< 1 ha	0.40%
Wate_3a.1	Waterton	Gley Soils	< 1 ha	0.10%

28 Four tests pits were dug to confirm the soil profiles. Table 3 provides a summary of the general soil profile across the test pits:

Table 3: Soil Profile Descriptions

Profile Depth	Soil Texture
0-300 mm	Topsoil – loam
>300 mm	Loamy clay

29 I consider these soil properties are reflected in the nature of the LUC classifications for the site. The soils are ideal for pasture and forage growth.

THE PROPOSED WASTEWATER TREATMENT AND DISCHARGE SYSTEM AND POTENTIAL EFFECTS ON THE ENVIRONMENT

Usage Numbers and Estimates of Flows

30 SPEC propose to establish a world-class equine centre at 279 Stranges Road, Huntingdon. The Proposed Equine Centre will encompass a range of outdoor and indoor facilities that are integral to establishing a high quality equine stud breeding facility. The project will have associated built and outdoor facilities which will include a selling centre, veterinary clinic, quarantine facility, stabling, grazing pasture, training arenas and associated parking.

31 The Proposed Equine Centre will have a number of the wastewater sources. Each source will have varying occupancy numbers and number of days that facility is expected to be occupied. In **Attachment 2** I provide a summary of the expected numbers from SPEC and the various assumptions I made regarding sources of wastewater and the wastewater flows to estimate the volumes of effluent that will be generated.

32 In summary, I expect the SPEC proposal to generate:

32.1 16.75-61.5 m^3/day of wastewater with the lower limit being the expected effluent generation on normal days (340 days of the year) and the upper limit being the volume generated during the period around the event days (25 days per year).

32.2 6,648 m^3/year of wastewater.

Wastewater Treatment System

33 SPEC has proposed a BioGill system to treat effluent arising from the proposal. Since my engagement by SPEC I have been in constant communication with Kloud Water who are the agents for BioGill in Australia regarding the proposed system. I believe that the BioGill system is suited to the site as a treatment system in relation to which I have attached a process flow diagram in **Attachment 3**). I expect the influent generated from the Proposed Equine Centre operation that will be fed into the BioGill treatment system to be within the range in my Tables 4 and 5 below. In Table 4 I present the best case scenario influent quality i.e. influent that is not strong which is similar to typical domestic wastewater. In Table 5 I present the worst possible influent quality which assumes that the wastewater will mainly be black water.

Table 4 – Best Case Influent Quality

Parameter	Influent Concentration
Total Nitrogen	<50 mg/L
Total Suspended Solids	150-200 mg/L
Total Phosphorus	<10 mg/L
Biological Oxygen Demand	<300 mg/L

Table 5 – Worst Case Influent Quality

Parameter	Influent Concentration

Total Nitrogen	95 mg/L
Total Suspended Solids	200 mg/L
Total Phosphorus	20 mg/L
Biological Oxygen Demand	600 mg/L

34 I have spoken to the BioGill agent at length about their system and they are confident that the system will produce the treated effluent quality in Table 6 below regardless of the whether the influent qualities are those in Table 4 or 5.

Table 6 – Treated Effluent from the BioGill System

Parameter	**Influent Concentration**
Total Nitrogen	<30 mg/L
Total Suspended Solids	<30 mg/L
Total Phosphorus	<10 mg/L
Biological Oxygen Demand	<100 mg/L

35 I have worked with a number of treatment systems over the years, and I believe the effluent quality in Table 6 is as good as some of the better systems found in New Zealand.

Discharge of the Treated Effluent

36 As part of my assessments I looked at a number of options for dealing with the treated effluent. This also assisted with the consideration of alternatives (as required by the RMA).

37 The possibilities included:

37.1 discharging to a Council sewer; or

37.2 combined treatment plant and central dispersal to water or to land.

38 As SPEC's objective is to develop a site that is as environmentally friendly as possible, I focused in the first instance on the possibility of water re-use. The option to discharge into the Council sewer (i.e. via possible upgrades to the existing network capacity) is discussed later in my evidence.

39 As a part of any combined systems the treated wastewater will need to be stored. SPEC proposes storage of the treated wastewater in three 30 m^3 PE tanks which may be buried below ground or sit above ground.

40 With this system, the treated effluent will be conveyed to the 30 m^3 storage tanks. These tanks will provide the equivalent of 1.5-5.3 days storage based on the daily volumes I estimated in paragraph 32. This would then be pumped to the dispersal field.

41 I have considered a number of options for discharging treated wastewater to land. These included:

41.1 discharge to land via infiltration trenches;

41.2 discharge to land via infiltration beds;

41.3 discharge to land via mounds;

41.4 discharge to land via evaporation assisted beds;

41.5 discharge to land via sprinkler/spray irrigation methods; and

41.6 discharge to land via subsurface drip irrigation.

42 In selecting the chosen method, I took into account:

42.1 factors such as soil type and soil profile, soil permeability and the quality of the effluent from the treatment; and

42.2 SPEC's desire to ensure that the health and safety of the high value horses was not compromised by above ground irrigation equipment through injury.

43 A subsurface dripline scored the most on consideration of all the above factors and was thus selected. The subsurface drip system would:

43.1 involve the use of pressure compensated dripline to ensure constant discharges from any long submains;

43.2 discharge at low application rates (from 1.6 L/h to 2.2 L/hr) to allow for good final treatment of effluent within the soil matrix;

43.3 be spaced 1 m apart with the drippers 0.6 m apart. The dripline will be placed approximately 150 - 200 mm below the ground surface to protect public health, the horses and to minimise risk of frost damage to the irrigation system;

43.4 be automated and alarmed system for remote control and to warn of any problems with water levels or failure in the treatment plant;

43.5 have at least 24 hours emergency capacity as a contingency plan should power supply fail or the system breakdown;

43.6 be managed and operated in accordance with an Operations and Maintenance Plan (the supplier of the system will provide this) for the proposed wastewater treatment system. This will address the operation of the treatment plant and will detail procedures for maintaining the process unit and will involve a management contract with the suppliers of the treatment technology or suitably trained contractors or maintenance staff.

44 In Table 7 below I present the minimum irrigation areas or Land Treatment Areas (*LTA*) using a drip system and flows estimated above:

Table 7 - Land Treatment Area Estimates

Parameter	Flow Scenario	
	Minimum Flow Scenario	**Maximum Flow Scenario**
Flow (m^3/day)	16.75	61.5
Peak DR (mm/day)	4	4
Net LTA Area (m^2)	**4187.5**	**15,375**

45 Against the requirements above, a gross area of 40 ha is available. (this is the area shown as grazing areas on the master plans).

46 This is considerably more irrigation area than the minimum LTA areas required for the minimum and maximum flow scenario as Table 7 shows. Application depths can therefore also be managed if required to be considerably lower than the 4 mm/day recommended for the types of soils found in the area.

Potential Effects on the Environment

47 I have also assessed the effects on the discharge of the treated effluent to land via the subsurface dripline.

48 I consider the effects on groundwater, surface water and soils are less than minor. I will elaborate on this in the next section when I talk about the status of the Canterbury Regional Council consents being sought by SPEC.

49 I should also note my understanding that Rūnanga were supportive of the proposal based on their review of the proposed treatment system and discharge methodology.

Alternative Wastewater Management Option

50 In Paragraph 37 I discussed the two wastewater management options (i.e. (i) discharge to the Council network or (ii) treatment and discharge to land on site).

51 As I discussed, the main reason for initially focusing on the land treatment option is because SPEC wants to be as sustainable as possible.

52 However, subsequent to lodging the consent applications for the treatment plant and discharge to land, I understand that SPEC has been in discussions with ADC regarding the alternative option of discharging treated wastewater to the Council network.

53 In **Attachment 4** I attach an email from Mr Andrew Guthrie (ADC Water Asset Manager) where he confirms in principle Council'sa acceptance of the treated wastewater flows from the site into the Council network.

54 Mr Guthrie's email includes a number of conditions, including:

- *Inclusion of a primary step including screening and grit removal prior to entering the BioGill system.*
- *Inclusion of filtration and UV treatment following the BioGill system.*
- *Separate engineering approval of the total treatment process and supporting management system to the satisfaction of the Group Manager- Infrastructure and Open Spaces.*
- *Payment of all Council fees and charges acceptable at that time.*

55 My only comment with regard to conditions 1 to 3 above set is that from a technical perspective they can be achieved. Condition 4 is a matter for SPEC itself.

DESCRIPTION OF CANTERBURY REGIONAL CONSENTING PROCESSES

Consents Being Sought

56 In addition to the wastewater investigations and assessments I have described in the preceding paragraphs, I have also been responsible for the applications to the Canterbury Regional Council. This has included consideration of the Canterbury Land and Water Regional Plan (*CLWRP*), the National Environmental Standards for Freshwater, the Canterbury Regional Policy Statement and other relevant planning documents.

57 On behalf of SPEC I have applied for the following resource consents and bylaw authorisation:

57.1 CRC242397 - to use land for earthworks.

57.2 CRC242398 - to install a culvert and construct bridges across Lagmhor Creek.

57.3 CRC242399 - to take and use groundwater for dewatering purposes.

57.4 CRC242400 – to discharge dewatering water.

57.5 CRC242401 - to discharge contaminants to land from an onsite wastewater system.

57.6 Bylaw Authorisation number FPB125581 - Authorisation under the Flood Protection and Drainage Bylaw 2013 for vegetation clearance, earthworks, bridge removal and installation of bridges and pipes within 7.5 metres of Laghmor Creek. This authorisation excluded plantings within the riparian areas and

a separate authorisation will be sought for planting within the riparian margins once a planting plan has been developed in consultation with Rūnanga. I should point out that the actual planting work is a permitted activity (refer to paragraph 58.4) under the CLWRP and only the bylaw authorisation is required.

58 For completeness I also note that there are other activities managed by the Regional Council planning framework that can be undertaken on the basis of being permitted. Examples of these are:

58.1 stormwater discharge during both the operational and construction phases (the stormwater discharge during the construction and operational phase complied with all the conditions under Rule 5.94A and Rule 5.96 of the CLWRP, respectively);

58.2 the passive discharge of contaminants (which complied with all the conditions under Rule 5.187 of the CLWRP); and

58.3 the use of land for the collection, storage and treatment of animal effluent (which is a permitted activity under Rule 5.33).

58.4 Plantings within the riparian margins which is permitted under Rule 5.163.

59 I lodged the applications for the Canterbury Regional Council consents on the 13th of November 2023. Initially these were returned on the 8th of December 2023 under Section 88 of the RMA as being incomplete. After a site meeting on the 13th of December 2023 with the Regional Council processing team where the project was discussed in detail, the applications were relodged again on the 19th of December 2023 and verbal confirmation of acceptance was given on the 20th of December 2023 with a formal letter received on the 10th of January 2024.

Progress and Status of the Wastewater Consent

60 While the processing of the wastewater consent was being done internally by the Regional Council, the review of the consent application was contracted out to a private consultancy (Lowe Environmental Impact Limited or *LEI*) who assisted ECan with the technical comments.

61 SPEC has received three RFIs for this application which primarily related to the BioGill treatments system, the effects on the environment arising from the proposed discharge system and management of the manure. The RFIs have been focused on seeking clarity as to what is proposed and the effects associated with the proposal. I have listed these in **Attachment 5**.

62 My understanding is that all the wastewater issues have now been resolved. This understanding is based on the peer review memo that was issued by LEI commenting on my response to their Request for Further Information (*RFI*) which I have attached as **Attachment 8**. The memo confirmed that all the issues had been resolved except for Item 13 which related to the use of the treated wastewater for "other uses". In Item 13 LEI said:

> *"The other uses need to be further defined, with their effects and human safety assessed – nutrients are not the issue. It is generally not acceptable for garden watering or for cleaning unless in defined areas with public safety taken into account. Either the Applicant defines these other uses and areas and assesses the risks, or only uses the dedicated land treatment areas. Firefighting is a separate issue and not covered here*".

63 In my response to Item 13 I wrote to CRC that "*I have reconfirmed with SPEC and Catherine advises that they plan to still have a UV system installed at the end of the BioGill treatment process as they want the discharge to be as "clean" as possible to protect the horses. The UV system will be operated in compliance with the manufacturer's specs. UV destroys all microbes. Given the nano filtration through the BioGill system we don't envisage turbidity, TSS to be constraints to the operation of the UV but these are all O&M issues that SPEC can address".*

64 After consulting with SPEC, I sent an email to the Regional Consents Planner confirming that SPEC will no longer use the treated effluent for "other uses". This resolved and closed out the issue. I should point out that in conceding this it did not mean the quality of the wastewater would be injurious to people or animals as suggested. UV systems are used in water supply systems as a way of irradiating or kills microbes and bacteria to make the water safe for drinking.

65 As I write this brief of evidence SPEC is waiting on the draft consent conditions for review and acceptance.

Progress and Status of the Other Consents

66 I understand that the processing of the other consents listed in paragraph 57 is also progressing well.

67 Like the wastewater consent I received a list of RFIs and/or comments which are also included in **Attachment 5**.

68 As I have presented in **Attachment 1**, these CRC consents are close to being granted as at 20 March 2024.

OFFSITE DISPOSAL OF MANURE

Introduction

69 One of the RFI issues under the wastewater RFIs in **Attachment 5** related to the manure management. The RFI said:

Please provide details on the following; the frequency of solids removal, the frequency of washing of stalls and wastewater volumes anticipated, temporary storage of manure, the leachate fate, the method and frequency of removing solids from temporary storage off site.

70 In my responses I said:

70.1 frequency of solids removal = 2-7 times per week.

70.2 frequency of washing of stalls = 2-7 times per week.

70.3 the muck is collected and placed into skips or bins which are collected for disposal offsite. No leachate is expected as the skips are fully contained. The bins are collected on a daily basis to meet commitment on odour control and in keeping with horse stud health and hygiene practices.

71 To put the quantities of manure in context, each horse produces approximately 300-350 kg of manure per month. For the purposes of assessment, I have assessed 100 horses as being permanently based on site and up to a further 500 horses 25 days per year which in total would give 567 tonnes of horse manure per year. This is conservative, as I understand the additional 500 horses will only be on site for the annual sales event which will occur only 2-3 days per year. In practice I understand that the actual number of horses on site is likely to vary but will be within this range, therefore my assessment is based on a reasonable and conservative estimate of the amount of manure potentially produced.

72 I understand SPEC have been in discussions with local farms and businesses who have agreed to receive the manure from the site. These recipients of the manure are unlikely to require resource consent for this on the basis of the following permitted activity rules in the CLWRP:

72.1 Rule 5.29 which provides for "*The discharge of solid animal waste (excluding any discharge directly from an animal to land), or vegetative material containing animal excrement or vegetative material, including from an intensive farming process or industrial or trade process, into or onto land, or into or onto land in circumstances where a contaminant may enter water is a permitted activity, provided the following conditions are met".*

72.2 Rule 5.38 which provides for "*The use of land for a silage pit or the stockpiling of decaying organic matter (including compost) and any associated discharge into or onto land where a contaminant may enter water is a permitted activity, provided the following conditions are met".*

72.3 Rule 5.39 which provides for "*The use of land for a silage pit or the stockpiling of other decaying organic matter (including compost) not permitted by Rule 5.38 and any associated discharge into or onto land where a contaminant may enter water is a permitted activity, provided the following conditions are met".*

73 While the manure can and will be managed as I highlighted above, SPEC's desire is for an environmentally sustainable equine management solution in which as much of the materials generated on site is reused or disposed of sustainably.

74 Two of the medium-long term options SPEC has looked at include:

74.1 use of the manure waste to generate energy for the site and possible supply into the grid; and

74.2 development of an Equine Biochar Facility.

75 With either of these two options SPEC also see an opportunity to manage equine waste beyond just their site but to serve the district and possibly the region.

76 I set out more detail on the Biochar facility below.

Biochar facility

77 Ms Stuart informs me she has investigated this option in more detail. Horse manure can be converted into biochar through a process called pyrolysis. Biochar is a highly stable form of carbon that can improve soil structure, retain moisture, and enhance nutrient availability when added to agricultural soils.

78 Again, this is a solution being explored for the medium to long term. Should SPEC decide to progress with this solution, any consents required (e.g. for air discharges and discharge of contaminants to land associated with by-products such as Biochar) would be sought at that point in time.

WATER SUPPLY

79 In November 2022 I was engaged by SPEC to investigate options for water supply to the development. At the time the proposed development was different to the current one now before the Council (with the proposal now being of a lesser scale in terms of people numbers). For that proposal I estimated the water demands and volumes in Tables 8 and 9 below.

Table 8 – Potable Water Demands

User/Use	DEMAND					
	ADD		PDD		PHD	
	m^3/day	L/s	m^3/day	L/s	m^3/hr	L/s
	Normal Water Supply Demands					

Normal Demand	**64.5**	**0.75**	**129.0**	**1.49**	**26.88**	**7.47**
	Water Supply Demand on Event Days - 8 Events/Year					
Events Demand	**154.5**	**1.79**	**309.0**	**3.58**	**64.38**	**17.88**

ADD – Average Daily Demand
PDD – Peak Daily Demand (=ADD x 2)
PHD – Peak Hourly Demand (=PDD x 5)

Table 9 – Water Supply Volumes

User/Use	Days of Use/Year	Annual Volume (m^3)
Normal Water Supply Volumes		
Volume with No Events		**21,555**
Water Volumes with Events On - 8 Events/Year		
Volumes with Events		**22,275**

80 SPEC (Ms Stuart) and I met with the ADC's Mr Guthrie, Mr Chris Stanley (ADC – Water Engineer) and Ms Zani van der Westhuizen (ADC – Development Engineer). In the meeting ADC confirmed that:

80.1 The project could be supplied with potable water from the ADC network based in the demand estimates I had provided to the Council.

80.2 The project would need to have its own dedicated pipeline from Tinwald. This would be installed parallel to the existing DN225 supplying the Lake Hood and Huntingdon Subdivisions.

80.3 SPEC's new pipeline for the project to consider or include redundancy for the existing ADC DN225 pipe i.e. the new pipe to also include the capacity of the existing Lake Hood and Huntingdon developments.

80.4 If the costs of upsizing the pipe are within its budget, the Council will enter into an Infrastructure Provision Agreement (*IPA*) with SPEC.

80.5 The IPA would detail the cost share arrangements for the new pipe. ADC's contribution to the extra pipe capacity or redundancy will be the difference between (i) the cost of materials and installation of the upsized pipe and (ii) the cost of materials and installation associated with the SPSC requirements.

80.6 ADC will also require the procurement process for the upsized pipe to be in line with the Council processes to ensure transparency and will reserve the right to review the procurement process to confirm this.

81 The discussions with ADC and the confirmation provided were based on the flows in Tables 5 and 6 – a greater scale of flows to the current proposal.

82 For the Proposed Equine Centre I estimate the water demand requirements per Tables 10 and 11 below.

Table 10 – Potable Water Demands

User/Use	DEMAND					
	ADD		PDD		PHD	
	m^3/day	L/s	m^3/day	L/s	m^3/hr	L/s
	Normal Water Supply Demands					
Normal Demand	**37**	**0.43**	**67.00**	**0.78**	**19.50**	**5.42**
	Water Supply Demand on Sell Days					
Sell Days Demand	**72**	**0.83**	**102.00**	**1.18**	**54.50**	**15.14**

ADD – Average Daily Demand
PDD – Peak Daily Demand (=ADD x 2)
PHD – Peak Hourly Demand (=PDD x 5)

Table 11 – Water Supply Volumes

User/Use	Days of Use/Year	Annual Volume (m^3)
Normal Water Supply Volumes		
Volume – Non-Sell Days	**340**	**12,580**
Water Volumes On Sell Days		
Volumes – Sell Days	**25**	**1.808**

83 Therefore, the amount of water that will now be required for the development is much less than previously confirmed as available for the site by ADC.

DESCRIPTION OF THE PROPOSED WATERWAY CROSSINGS

84 SPEC proposes six new waterway crossings (one culvert and five bridges) to link internal roads. One of the crossings will be a culvert over the ADC water race forming the main entrance into the site. Three of the crossings will be over Lagmhor Creek and two will be over the unnamed creek.

85 SPEC propose to install Hynds Landspan Bridge System whose technical specs are provided in **Attachment 7**.

86 The following are some of the proposed specs for each bridge:

86.1 Bridges 1, 3 and 4 will be single laned vehicle crossings and so they will be 4.2 m wide (i.e. 1 x 4.2 m wide beams).

86.2 Bridge 5 will be a two laned crossing and will be comprised of 2 x 4.2 m wide beams.

86.3 Bridge 2 will be a walkway bridge for horses and riders providing a link between the quine veterinary clinic and

breeding services centre and the main stables. This will be comprised of a 2 x 1.05 m wide beams.

86.4 The bridge piles will be installed at least 2 m from the waterway edges.

87 The bridges will straddle the waterways. There will be no changes to the existing waterways profiles. In other words, the existing flows through the waterways will not be affected as a result of each the bridge construction.

88 Construction of the bridges will involve the following works:

88.1 Construction of stabilised entrance and construction platforms for bridge works.

88.2 Installation of the erosion and sediment devices - silt fences along edge of the watercourses.

88.3 Installation of the bridge piles – drill pile holes and either stockpile material or remove directly offsite. Install reinforcing cages and pour concrete piles.

88.4 Construction of the bridge abutments.

88.5 Installation of the precast bridge beams and topping slab.

89 At the entrance from Stranges Road is an ADC water race. The applicant proposes to install a culvert over the water race. The culvert will be:

89.1 0.6 m diameter circular barrel, approximately 8-10 m long. A culvert for this section is required to match the size of the ADC water race. SPEC has installed similar sized culverts on advice from ADC on another property down the road. The 0.6 m culvert will also ensure that there is not an unnecessary gap in the bunding either side of the channel, which would result in ponding in areas other than the channel and reduce the effectiveness of the channel.

89.2 Embed the culvert up to 25% under the channel bed so there are no vertical drops. Scour protection rip rap will be installed on either end of the proposed culvert.

90 The work to install the culvert will be undertaken as far as practicable when the water race is dry. However, this may not always be possible and so they be a need to damn and/or temporary diversion of the flows in the drain by pumping around the area of works to keep the area of works dry. This work will be undertaken in consultation with the ADC.

91 Regional Council permissions for these works have been sought in the application for CRC242398, as described above.

RESPONSE TO SUBMISSIONS

92 I have reviewed the submissions in opposition to the proposal by:

92.1 John Skevington and Jo Ruane; and

92.2 Craig, Annabelle and Tim Read.

John Skevington and Jo Ruane

93 In paragraph 2.7 the submission states "*These numbers raise several questions for the submitter. Regarding the intensive nature of the activity, the proposed wastewater system is the largest bioreactor in the BioGill product range. The BioGill Report states that the design is specified for a loading equivalent of 500 patrons on site at any one time*". In response, I note that:

93.1 there is nowhere in the application where it says the selected BioGill is the largest in the range. BioGill systems are modular and the size selected for the SPEC project is based on the anticipated flows (Paragraph 32 and I have provided more detail **Attachment 3**).

93.2 In my wastewater consent application and Assessment of Environmental Effects (*AEE*) to ECan I identified all the wastewater sources and I provide a summary of these in **Attachment 3**. I also identified and described the population, and the occupancy days per year, the assumptions adopted for the wastewater generation estimates. The estimates were highly conservative and were based on NZS1547:2012[4] rates for recreational camping grounds with a reticulated water supply for SPEC clients, staff and visiting consultants. I have reproduced these values in **Attachment 3**.

93.3 The people numbers in the AEE and the BioGill report are the same. BioGilll by default size their systems with a 50% redundancy and so a volume of 92.25 m^3/day was shown but this does not mean that a 92.25 m^3/day capacity system would be built from the outset. Instead as the system is modulised only the required modules would be installed to match the flows generated from the site.

94 In paragraph 2.8, the submissions states that "*The application states that horse manure is to be removed from the site on a daily*

[4] *Australia and New Zealand Standards - AS/NZS 1547:2012 On-Site Domestic-Wastewater Management*

basis. Where will the manure be discharged, and what are the volumes likely to be? "

94.1 I have discussed the options for manure management in paragraphs 69-78 above.

95 In paragraph 2.9 the Skevingtons write "*How many additional truck movements will be required for the manure removal? Is an additional resource consent from ECan required for the site where discharge of the manure will take place*?"

95.1 I have provided the weights of manure produced in paragraph 71 above. During the normal production or non-sell days 35 tonnes or manure is produce per month or 1.2 tonnes. During the 25 days of selling 145 tonnes is produced and this equates to 5.8 tonnes. Therefore, during normal days (i.e. 340 days of the year) there will one to two trucks required to get rid of the daily manure (equivalent of two to four truck movements). During selling days larger trucks will used to reduce the number of truck movements.

95.2 The manure will be disposed of through one of the methods set out earlier in my evidence.

96 In paragraph 3.7 the submission states "*The application for stormwater discharge has not been applied for (at the time of writing), and questions whether there is also a requirement for an application for the daily discharge of the manure that is to be removed from the site"*.

96.1 I have provided comments in Paragraph 58 why some consents including stormwater consents were not sought. In summary, the activity is permitted under the relevant rules of the CLWRP.

Craig, Annabelle and Tim Read

97 Under the section titled *"Appropriate wastewater disposal and monitoring"* the submission states *"we understand the applicant proposes to address the significant wastewater disposal demand created by the proposal with a new municipal wastewater treatment plant (WWTP) supplied by BioGill capable of treating wastewater from the sports facility itself and additional 750 people at any one time"*.

97.1 As I have responded to the Skevington submissions above (Paragraph 93), the proposed volumes and people numbers (refer to **Attachment 2**) where provided in the Regional Council wastewater consent I prepared. No where in any of the reports I prepared for the Regional Council consents do I or the reports mention a figure of 750 people as suggested in the submission.

98 Under the same section, the submission states "*While we expect the ADC will seek engineering advice to ensure the viability of the proposed system for its intended use, should consent for the SPSSCL be granted, we would like conditions to be included requiring the consent holder to carry out regular inspections of the WWTP system by a suitably qualified and experienced person to ensure the various systems and infrastructure that constitute the WWTP system are adequately maintained to ensure any adverse effects on the receiving environment are less than minor. If the WWTP were to malfunction and adversely affect the receiving environment, we would like conditions to establish a process for affected parties to raise these potential issues with the consent holder and the ADC monitoring and enforcement team to help limit these potential effect".*

98.1 SPEC has applied for onsite wastewater discharge consents as I discussed in the preceding sections. The applicant proposed a suite of conditions as part of those consent applications and these will include conditions to monitor the discharges.

98.2 I should also point out that the:

(a) the proposed treatment system is one of the best systems on the market and will produce high effluent quality;

(b) the application also proposes that the system be operated and maintained in accordance with a Operation & Maintenance Manual (O&M Manual) which will also be used by ECan for compliance monitoring; and

(c) modelling indicates that the contaminant discharge (nitrogen, *E. coli* and phosphorus) when this development has been completed will be less than the predevelopment i.e. under the current land use. I have appended the LEI peer reviews of the proposal in **Attachment 8** that agree with this conclusion.

99 Under the section titled "*Nitrogen Budgeting & Management provisions*" the submission comments on nitrogen and phosphorous budgeting and management. They write "*Having completed nutrient budgets to determine the historic nitrogen and phosphorus loss from farming activities at 703 Gramhams (sic) Road, we understand intensive winter grazing and livestock accommodation are not feasible within the immediate area due to nitrogen and phosphorus that would be released into the environment, something that would be contrary to Objective 3.2 of the Ashburton District Plan and Section 6 of the Resource Management Act 1991. While these budgets are dependent on historic farming practices, soil types and parameters that are unique to each property, we ask ADC to consider where the proposed activity is technically viable in light of*

these nitrogen and phosphorus budgeting and management requirements so consent isn't granted for an activity that would breach these budgeting requirements. If consent is granted and the management and control of livestock numbers will enable compliance with these budgeting requirements, we believe robust stock reporting and monitoring conditions should be provided for in the consent".

99.1 I understand the submitter's concerns. I also agree that any new proposals should not increase nitrogen losses above the modelled nitrogen baseline for the property.

99.2 In my application for the Regional Council wastewater consent I provided a detailed assessment of how the nitrogen losses were less than minor. This was primarily because the equine activity generated less nitrates than an arable farm or a dairy farm.

99.3 SPEC engaged CG Ag (an agricultural consulting firm) who under my instructions and directions who undertook Overseer modelling to demonstrate whether or not the leaching under the equine system would be more than under the existing arable system. The LEI review I mentioned in Paragraphs 58-62) and the memo I have attached in **Attachment 8** provide commentary on the modelling results and also notes that the losses as a result of the proposal are 9kg N/ha per year and 0.3 kg P/ha per year as modelled by CG Ag. This is considerably less than the losses under the current arable farming system.

RESPONSE TO SECTION 42A REPORT

100 I have reviewed the Section 42A report prepared by Mr Nick Bynes and I generally agree with his assessment on matters relevant to my areas of expertise.

CONCLUSIONS

101 The activities proposed by SPEC have less than minor effects on the environment. I have applied for a number of separate Canterbury Regional Council consents and my assessment of effects in relation to those applications came to that same conclusion.

102 Wastewater will be collected, treated using a BioGill system and most likely discharged to ground via a dripline. Alternatively, ADC disposal appears to be a viable option.

103 The Overseer modelling demonstrates that the nitrogen and phosphorus discharge from the proposed equine operation will be less than the discharges under the existing land uses (arable farming).

104 There are a number of options for the disposal of manure offsite. In the long term, SPEC is exploring options to use the manure for energy generation or for burning to create biochar. These activities may need separate consents which will be applied for at that time.

105 I have also demonstrated that the proposal can be supplied with water from the Council network. SPEC will undertake network improvements to bring the required water to the site.

106 In summary, I do not see any material issues to the project being successfully implemented as it is both feasible and it will have less than minor effects on the receiving environment.

Dated: 20 March 2024

_____

Victor Mthamo

ATTACHMENT 1 – CORRESPONDENCE WITH ECAN

Lucy Forrester

From: Victor Mthamo <reeftide@gmail.com>
Sent: Wednesday, 20 March 2024 4:43 pm
To: 'Victoria Wilson'
Cc: 'Catherine Stuart'
Subject: RE: CRC242397-CRC242401: Final version of draft conditions
Attachments: CRC242397 Proposed conditions.docx; CRC242399 Conditions.docx; CRC242400 Conditions.docx; CRC242401 Conditions.docx; CRC242398 Conditions.docx

Hi Victoria,

The changes suggested for CRC242397 line up well with what I suggested the other day regarding the use of the loading rates instead of the N concentration. In summary, I am happy with the final version of the conditions.

Kind Regards,
Victor

From: Victoria Wilson <Victoria.Wilson@ecan.govt.nz>
Sent: Wednesday, March 20, 2024 3:44 PM
To: victor.mthamo@reeftide.co.nz
Cc: 'Catherine Stuart' <catherine@southernparallelcampus.nz>
Subject: CRC242397-CRC242401: Final version of draft conditions

Hi Victor

I have a decision maker lined up but thought would be best to have one final clean version of conditions sent (just ignore the titles, been some weird formatting in these). I note CRC242397 has two highlighted comments, these were just some suggestions from Rob so wondering if you are fine with those amendments.

Many thanks,
Victoria

Victoria Wilson
Principal Consents Planner
Environment Canterbury
Christchurch Office

+64 3 367 7399

Victoria.Wilson@ecan.govt.nz

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

PO Box 345, Christchurch 8140
Customer Services: 0800 324 636
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ecan.govt.nz

ATTACHMENT 2 – WASTEWATER ASSUMPTIONS

Table 2.1: Wastewater Sources and Occupancy Numbers

Normal Days' Usage Numbers		
Facility	**No. of Persons/Horses**	**Number of Days Per Year**
SPEC Clients	100-250	100
Staff	40	340
Visiting Consultants	10	340
Horses on site	100	340
During Sale Days		
Facility	**No. of Persons/Horses**	**Number of Days Per Year**
SPEC Clients	250	25
Staff	40	25
Visiting Consultants	10	25
Horses on site	600	25

Table 2.2: Wastewater Generation Assumptions

Source	Generation	Source of Assumption
SPEC Clients	65 L/p/day	NZS1547:2012 – using the values adopted for recreational camping grounds with a reticulated water supply
Visiting Consultants – Day Visitors	65 L/p/day	
Staff – Day	65 L/p/day	
Horses	70 L/horse/day	Estimated in Table 1.3 below

L/p/day – Litres per person per day

Estimates of Effluent Generated Using International Literature

Reeftide used by Penn State College of Agricultural Research and Cooperative Extension titled '*Horse Stable Manure Management*' which can be found at https://extension.psu.edu/downloadable/download/sample/sample_id/58584/.

The assumptions, parameters and calculations adopted using the Penn State data are presented in Table 2.3 below.

Table 2.3 – Calculation of the Effluent Generated by a Horse

Average Weight per Horse	1,000	lbs
Horse Effluent Generation Per Day (from the Penn State)		
Faecal Matter	31	lbs
Urine	2.4	gallons
Stall Waste	12	lbs
Urine Waste Generated		
Urine in Bedding - 10% absorption of urine in bedding straw	10%	
Urine "Lost" in Bedding	0.24	gallons
Net Urine Generated as effluent	9.504	L/day/horse
Solid Waste		
Solid Waste Suspension - Assume 15% of total solids	15%	
Total Suspended Waste (15% of total solids)	10.23	L/horse/day
Washdown Waste Volume		
Flow Rate	10	L/minute
Time to Clean	10	minutes
% Hose is Run Continuously	50%	
Time Hose is Continuously Run	5	minutes
Washdown Volume	**50**	**Litres per stall**
Total Flow Rate Per Stall or Per Horse	**69.734**	**L/day**

Water Use During Showers

Table 2.4– Effluent Generated from the Showers

Showers		
Average No of Times a Horse is Showered	2	times/week
Average No of Horses Showered	29	Horse/Day
Flow Rate	10	L/minute
Times to Clean	7	minutes per horse
Total Flow Per Day	2,030	L/day
Average Per Horse	70	L/day

In summary:

- Horses are showered 2-3 times per week.
- Stalls are cleaned 2-3 times per week.
- On any given day in a week SPEC expect 50% of the horses to be washed and 50% of the stables to be cleaned.

Wastewater Flows and Volumes

Using the population projections and the assumptions above the wastewater volumes have been estimated for (i) minimum population expectations and (ii) maximum population expectations. These are provided in 2.5 and 2.6 below.

Table 2.5: Normal Day's Wastewater Flows and Volumes Generated from Various Sources

Facility	No. of Persons/Horses	Number of Days Per Year	Wastewater Generation (L/p/day)	Flow Rate (m^3/day)	Annual Volume (m^3)
SPEC Clients	100-250	100	65	16.25	1,625
Staff	40	340	65	2.6	884
Visiting consultants	10	340	65	0.65	221
Horses	100	340	70	7	2,380
Total Volume				**16.75**	**5,110**

Table 2.6: Sale Day's Wastewater Flows and Volumes Generated from Various Sources

Facility	No. of Persons/Horses	Number of Days Per Year	Wastewater Generation (L/p/day)	Flow Rate (m^3/day)	Annual Volume (m^3)
SPEC Clients	250	25	65	16.25	406
Staff	40	25	65	2.6	65
Visiting consultants	10	25	65	0.65	16
Horses	600	25	70	42	1,050
Total Volume				**61.5**	**1,538**

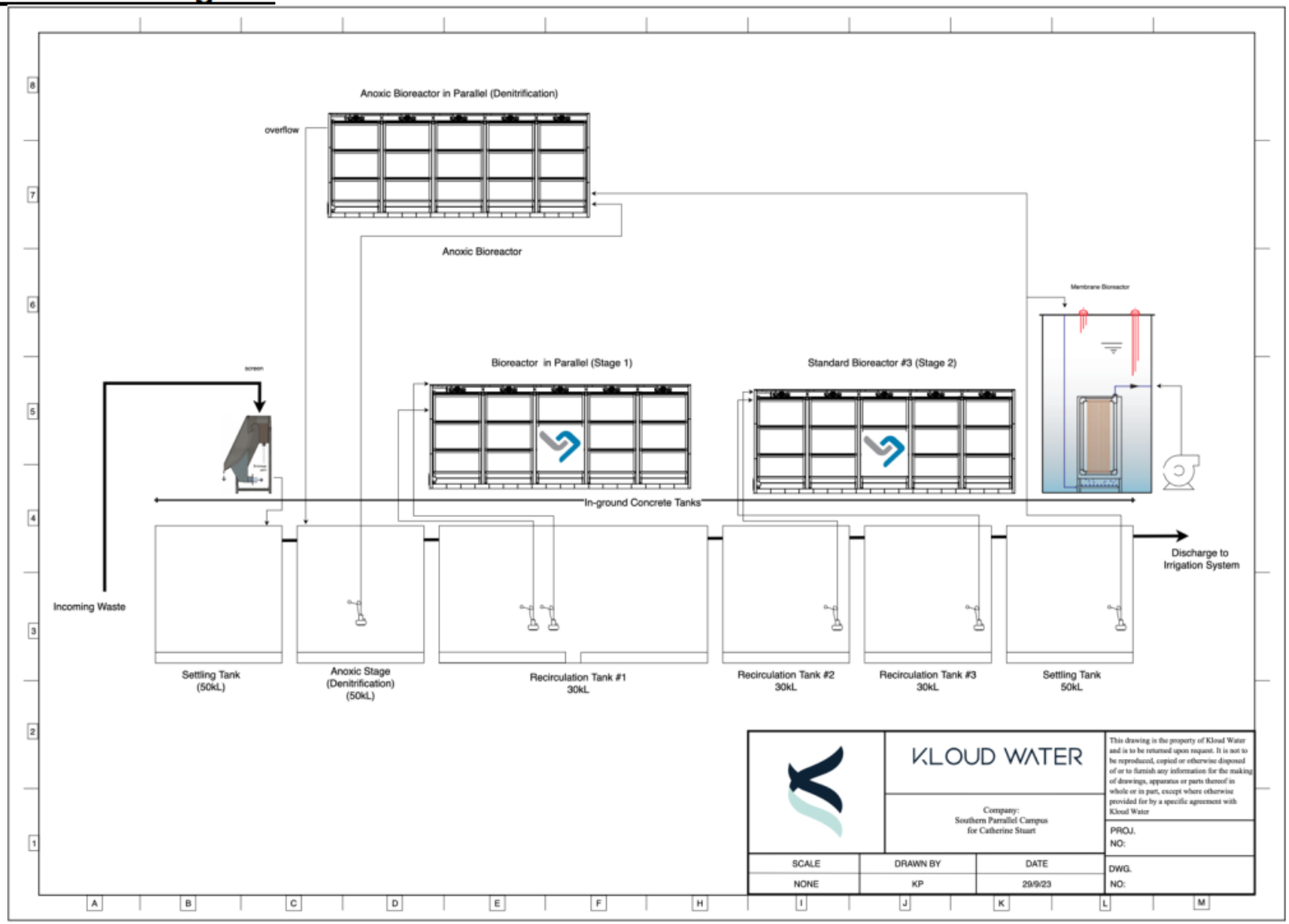
The total volume of wastewater discharged is summarised in Table 2.7 below.

Table 2.7: Wastewater Discharge Eates and Volumes

Facility	Flow Rate (m^3/day)	Annual Volume (m^3)
Normal Operating Days	16.75	5,110
Sale Days	61.5	1,538
Total Volume		**6,648**

ATTACHMENT 3 – BIOGILL PROCESS DIAGRAM

Process Flow Diagram



ATTACHMENT 4 – ADC CORRESPONDENCE

FW: Potential Access to ADC WW Network

Ian Hyde <Ian.Hyde@adc.govt.nz>
Wed 3/13/2024 12:00 PM
To:Nick Boyes (Core+) <nick@coreplanningandproperty.co.nz>

From: Andrew Guthrie <Andrew.Guthrie@adc.govt.nz>
Sent: Thursday, February 22, 2024 4:49 PM
To: Catherine Stuart <catherine@southernparallelsports.com>
Cc: Neil McCann <Neil.McCann@adc.govt.nz>; Ian Hyde <Ian.Hyde@adc.govt.nz>
Subject: Potential Access to ADC WW Network

Dear Catherine

You have enquired as to the possibility of ADC accepting a treated effluent discharge to our network. This is being explored in tandem to your efforts to obtain a land discharge consent through Environment Canterbury. My understanding based on our discussions is that this is a "fall-back" position should the discharge to land consent be unsuccessful. I indicated that we would be able to give you some undertakings in regard to the treated wastewater disposal from the proposed SPECL site by 23/02/24.

I have now reviewed the information contained in the resource consent application on the Environment Canterbury website and the other collateral you provided. The key aspect to note is that the only network that Council could potentially accept a discharge is our Transfer Pipeline that conveys treated effluent from the Wilkins Road WWTP to the Ocean Farm WWTP. Almost all of the treatment occurs at the Wilkins Road WWTP. As this pipeline conveys treated wastewater, any discharges into it would have to be highly treated.

In order to evaluate if this proposed system could treat wastewater generated at the site to a standard acceptable enough for ADC to receive, we reviewed the discharge quality table supplied within the BioGill proposal. Reproduced below.

Discharge Requirement:

Currently no specification for discharge requirements. Assuming a requirement of the following into the BioGill System:

	Influent	Effluent
Flow	100 kL/day	100 kL/day
BOD	<300 mgBOD/L	<20-50 mgBOD/L
TN	<50 mgTN/L	<30 mgTN/L
TSS	<150-200 mgTSS/L	<30 mgTSS/L
TP	<10 mgTP/L	<10 mgTP/L

We undertook a comparison between the assumed discharge requirements used by BioGill and our effluent quality as received at Ocean Farm WWTP. This comparison is shown in the following table.

Parameter	BioGill Treated Effluent (mg/L)	ADC Treated Effluent (g/m3) (12 month average)
BOD	<20-50	16.0
TN	<30	24.0
TSS	<30	36.0
TP	<10	3.2

This indicates that the system may be capable of producing effluent of the same or better quality than the effluent that passes through the transfer pipeline at least for the parameters noted above. Obviously, any formal discussions on a potential discharge approval would need to explore much wider than the short list of parameters noted here, but I see the potential of the proposed system. I do note however, that the BioGill system is a **secondary** treatment process and would have to be implemented in tandem with a primary treatment step (screening and grit removal) in order to meet the discharge quality expectations. This primary treatment step is an important consideration as it requires more frequent maintenance and generates an ongoing waste stream that would have to be appropriately managed and disposed of by SPECL.

So, at this point I am prepared to provide **approval in principle** of the discharge of the final treated effluent to the ADC Transfer Pipeline in Stranges Road.

This is subject to the following conditions:

- Inclusion of a primary treatment step including screening and grit removal prior to entering the BioGill system.

- Inclusion of filtration and UV treatment following BioGill system.
- Separate engineering approval of the total treatment process and supporting management systems to the satisfaction of the Group Manager – Infrastructure and Open Spaces.
- Payment of all Council fees and charges applicable at that time.

I trust this will assist in progressing your applications in the short term.

Regards,

Andy Guthrie

From: Catherine Stuart <catherine@southernparallelcampus.nz>
Sent: Tuesday, February 20, 2024 6:05 PM
To: Andrew Guthrie <Andrew.Guthrie@adc.govt.nz>
Subject: Re: BioGill Ultra Video

Hi Andrew

Many thanks for your time today, please find as promised the BioGill Ultra video – the same system SPEC will install.

https://www.youtube.com/watch?v=HPPakcQ8MVw

Kind regards

Catherine

SOUTHERN PARALLEL CAMPUS
SOUTHERN PARALLEL EQUINE CENTRE

Catherine Stuart

CEO & PROJECT DIRECTOR | SOUTHERN PARALLEL CAMPUS LTD

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Ian Hyde | **District Planning Manager**
DDI 03 307 7750 | **M** 0272562935

Ashburton DISTRICT COUNCIL

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ATTACHMENT 5 – REQUESTS FOR FURTHER INFORMATION

Wastewater Consent RFIs

1. *Are SPEC clients live-in or just visiting? Live-in clients will generate 200-250 L/p/d.*

2. *Will a commercial kitchen provide meals to day visitors?*

3. *If SPEC clients are primarily day visitors, flows can be assumed to be mainly blackwater and much higher strengths.*

4. *Will there be live-in staff and/or managers on site at a residence?*

5. *Will the rental house be connected to the treatment plant?*

6. *Will there be an in-house laundry for horse blankets, staff clothing etc and will this contribute to wastewater flows?*

7. *Please provide further assessments on the estimated horse wastewater flow, with reference to how the horse wastewater flow was determined.*

8. *Please provide further information regarding the proposed Membrane Bioreactor (MBR) including but not limited to operation and maintenance of the MBR*

9. *The N assessment needs to be recalculated for the 100 horses and the short-term 600 horses on site prior to comparison with the historic leaching of 56.9 kg/ha/yr. An OVERSEER model of this and other proposed land management would be good for comparison with rules in the Plan*

10. *Please provide details on the stable wastewater, specifically the volume, urine, nitrogen load and what is removed within the bedding.*

11. *Please provide details on the following; the frequency of solids removal, the frequency of washing of stalls and wastewater volumes anticipated, temporary storage of manure, the leachate fate, the method and frequency of removing solids from temporary storage off site.*

12. *Please provide an additional assessment on how the treated wastewater will be used, apart from irrigation, and provide an assessment on how the use/s may impact the nutrient modelling provided in the AEE.*

Other Consents RFIs

1. *The three HAIL sites all have contamination above the ANZG default guideline sediment quality for lead and copper (and arsenic in Zone C) and also are quite close surface water which presents a risk of this soil being discharged during any earthworks or soil disturbance, so specific controls will be required to prevent erosion of sediment into the stream, or alternatively the soil should be removed at the earliest opportunity and disposed to a landfill licensed to accept that material. Note that contaminated soil should not be taken to a cleanfill and should be kept isolated from clean soil.*

2. *Erosion and sediment control will no doubt be important for Lagmhor Creek and potentially Lake Hood. When the topsoil is removed, groundwater becomes more vulnerable to contamination. 2 ha is a large area and if an area of this size has exposed groundwater sitting in it then there is potential for birds to settle and contaminants to enter groundwater. This can impact on any drinking-water wells downgradient and any groundwater-fed surface water. Land disturbance can also have some effects on turbidity of the groundwater and this can impact on any treatment that nearby wells currently use to improve the water quality.*

3. *Recently aluminium was added to the drinking water guidelines and now has a MAV of 1mg/L. Aluminium is abundant in the environment but with significant soil disturbance it*

may become more mobile. My colleague tells me that near quarries they have detected some elevated aluminium concentrations in groundwater due to soil disturbance. Aluminium solubility also increases with both low and high pH. The pouring of concrete and wetting may generate water that is high in pH which may potentially make aluminium more mobile. We hadn't paid to much attention to this because until recently there was no MAV for aluminium, and we haven't really gone sampling for it much. I do not expect these effects to be long-lasting but just flagging this for any potential future monitoring conditions.

4. *Well interference – the T of 306m/day is a conservatively low estimate for assessing well interference (in that it will predict more effects on wells than a higher value). They have assessed only wells < 20 m deep. I tested the drawdown assessment and found that >0.1 m drawdown would only occur within 500 m of the dewatering site if an average pump rate of 12.5m was assumed (based on the pump being turned off overnight) over 30 days. All wells within 500m are used for water level observation not for domestic supply.*

5. *Stream depletion – for stream depletion, it is more conservative (predicts more effect on the stream) if a higher transmissivity value is assumed. Because the stream is so close (50 m), the predicted depletion rate is likely to be direct to high under the LWRP. Rule 5.119 notes that the stream depletion effect can be mitigated by discharging back to the stream depleted. In this case it appears that the discharge is to land. We can't guarantee that all water discharged to land will flow back towards the stream, although it is likely some will. The stream depletion effect can be calculated using the average pump rate of 12.5 L/s because of the overnight shutoff, even with a low T value of 306, this still predicts 10 L/s effect over 7 days pumping or 11 L/s over 3o days. I recommend that the CP ask the applicant to assess the ecological effect of flow reduction on the stream over the short period of pumping."*

6. *Is there any proposed works to remove the potential contaminated land?*

7. *Is there any proposed long term monitoring for groundwater depth.*

8. *Would you agree to potential monitoring during the construction phase, e.g. aluminium?*

9. *The proposal to discharge groundwater dewatering to the un-named stream may be even more appropriately discharged to "Lagmohr" creek in the summer when it is dry rather than the unnamed stream that may already be wet?*

10 *For the subsurface effluent irrigation, I note they propose a 10m setback from Lake Hood. Given the high value and current enrichment/bloom problems of Lake Hood it would be preferable that setbacks were conservative and therefore greater than 10m so there was no risk of nutrient movement towards the lake.*

ATTACHMENT 6 – PROPSOED WATERWAY CROSSINGS

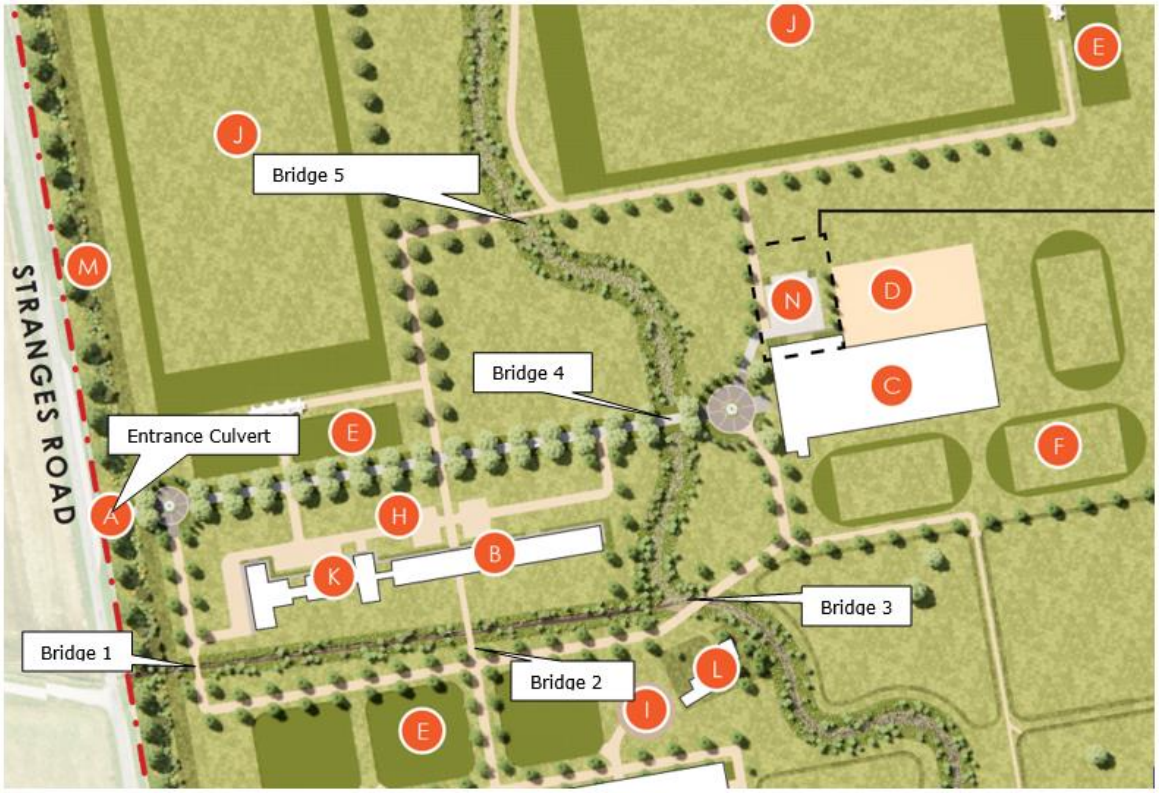

Figure 6.1 - Location of the Proposed Waterway Crossings

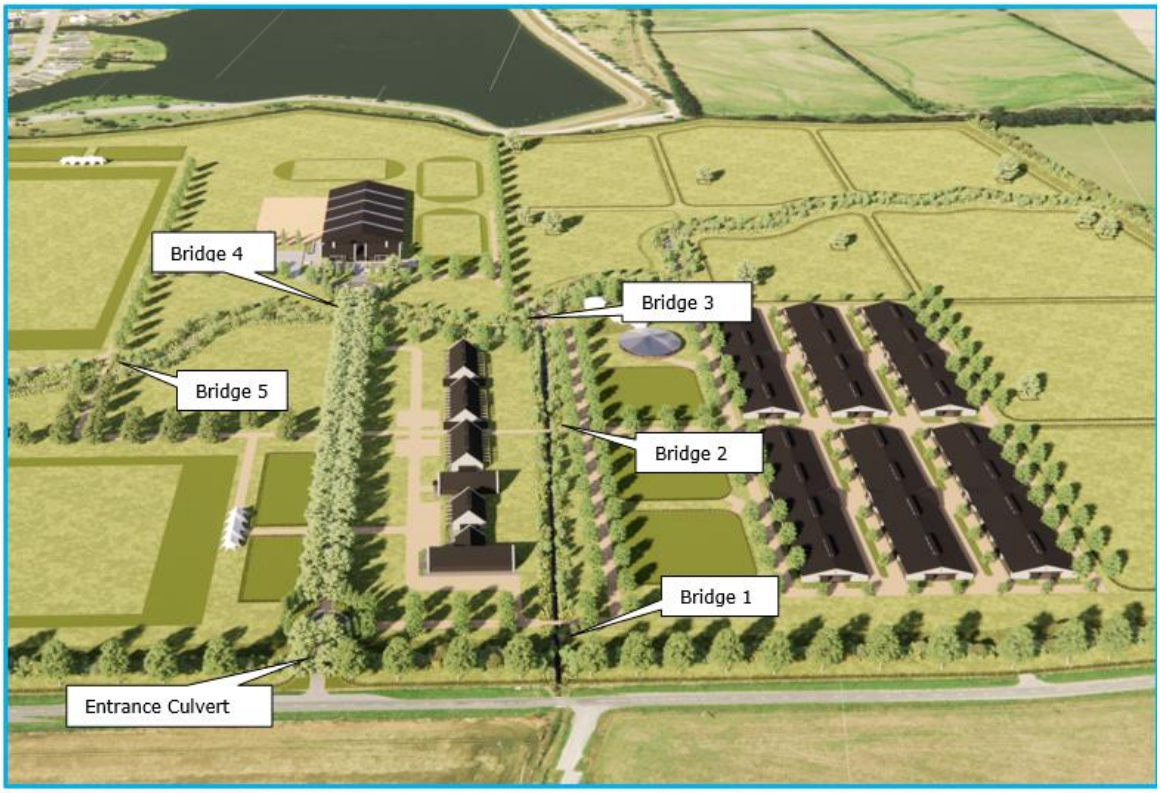

Figure 6.2 - Location of the Proposed Waterway Crossings

ATTACHMENT 7 – BRIDGE DESIGN

Hynds Landspan Bridge System

Technical Guide R4.1

Hynds bridge units simplify the construction process, allowing for the rapid completion of works and offering a more cost effective option than the in-situ construction process.

Applications

Stock and farm vehicle crossings

Rural and commercial

Product Attributes

Purpose designed

Prestressed and pre-stressed

Low cost, quick installation

Simplifies preparation and consent of site plans or council approval

Approvals/Standards

Bridge Design Load 0.9HN(HPMV) Rural Bridge in accordance with the NZTA Bridge Manual (Appendix D)

Seismic zone factor = 0.45(max). Elastic design

We are the supply partner of choice for New Zealand's rural industry, specialising in water and infrastructure based solutions.

HYNDS RURAL

Hynds bridge units simplify the construction process, allowing for the rapid completion of works and offering a more cost effective option than the in-situ construction process.

Design Specifications

- 50 years design life.
- Bridges are available in various spans to suit beam lengths ranging from 10 to 16 m (refer to Table 1 for options).
- Other sizes may be available subject to specific design.

TABLE 1 Bridge Beam Units

Land span	BR10ØTBC	BR12ØTBC	BR14ØTBC	BR16ØTBC
Beam Length(m)	10	12	14	16
Beam width	1.05	1.05	1.05	0.840
Bridge width	4.2	4.2	4.2	4.2
Beams	4	4	4	5

Lightly trafficked rural bridge loading

The design load covers all the loads expected to 0.9 HN loading used by NZ road legal vehicles or trucks.

- The following restrictions apply:
  - Bridge is used for single lane traffic
  - Speed limit is below 70 km/hr
  - Maximum axle and axle set limits for Class 1 roads are complied with or the structure can be bypassed
  - Use of route by logging trucks unlikely
  - Low traffic volume (<100 VPD)
  - Road cannot become a through route

Abutment Options

There are two standard abutment options from 300mm to 2300mm high. Other heights may be available subject to specific design.

Handrail

- Hynds supply a light duty handrail system and side kerbs (type LD) suitable for farm applications.
- A medium duty handrail system and side kerbs (Type PR) is also available to meet AS/NZS1170.1 pedestrian barrier requirements.

Deck finish

- The Hynds Landspan Bridge beams have a broomed finish to the top surface providing a non-slip surface to the bridge deck.
- Differential camber between the pre-stressed beams and manufacturing and installation tolerances may result in a small step varying between 5 and 15 mm between the precast concrete beams. This variation is purely cosmetic and has no effect on the structural integrity of the deck.

Multi-span options

Multi-span options are also available. Contact Hynds for more information.

Installation Requirements

- Hynds provide PS1 and PS4 producer statements for the design and manufacture of the precast and pre-stressed concrete bridge components.
- The asset owner/contractor is responsible for arranging and providing the PS1 – Design and PS4 – Construction Producer Statements, for the site selection and installation design, and construction supervision respectively.
- The asset owner/contractor is responsible for obtaining all the necessary resource and building consents as determined by the local authorities.
- Site selection and installation includes determining the bridge span and height to suit hydraulic requirements, foundation investigation and specification of erosion protection requirements. This work should be undertaken by a consulting engineer familiar with local conditions at the proposed bridge site. Contact Hynds for suggestions in your area.

FIG. 1 Typical Landspan Bridge

FIG. 2 LD Handrail

Abutment Bridge
Showing Standard 4 beam design

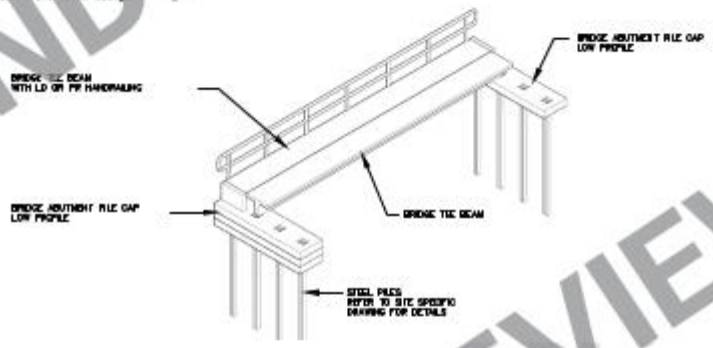

FIG. 3 Landspan Low Profile

Abutment Bridge
Showing Standard 4 beam design

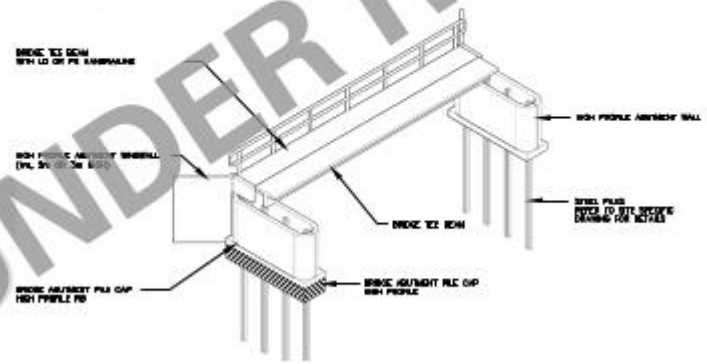

FIG. 4 Landspan High Profile

ATTACHMENT 8 – FEEDBACK FROM LOWE ENVIRONMENTAL ON THE WASTEWATER SYSTEM

Job No.10919

MEMORANDUM

To: Canterbury Regional Council – Victoria Wilson – Principal Consents Planner

From: Rob Potts

Date: 7th March 2024

Subject: **Southern Parallel Equine Centre Wastewater Discharge s92 Response Technical Review**

Lowe Environmental Impact Ltd has been requested by Canterbury Regional Council (ECan) to undertake a technical review of a s92 response from Southern Parallel Equine Centre (SPEC) in response to the LEI memorandum dated 24th January 2024. The response has been prepared by Reeftide Environmental & Projects Limited (Reeftide).

Either verbatim statements, or LEI summarised statements from the documents are shown as black text in *italics.* LEI comments on these statements are shown indented in plain blue text.

The numbering below refers to the Reeftide numbering, which is slightly different to the s92 Request numbering.

1: Introduction: No comment from LEI

2 – 7: Influent Concentration – (RFI 1a – 1f):

Clients are day visitors that will be served lunch from a commercial kitchen with a grease trap installed. An updated Influent and Effluent Table has been provided:

	Influent	Effluent
Flow	92.3 kL/day	92.3 kL/day
BOD	<600 mgBOD/L	<50-100 mgBOD/L
TN	<95	<30 mgTN/L
TSS	<150-200 mgTSS/L	<30 mgTSS/L
TP	<20	<20 mgTP/L

Figure 1 – Expected Influent and Effluent Concentrations

The influent concentrations are more akin to what would be expected for domestic wastewater based on the percentage of blackwater likely to be present.

The loading assessment in Attachment 1 from Biogill shows 600 horses at 70 L/h/d and 100 mg/L of N. This is very conservative as not all 600 horses are houses inside.

If the WWTP designers and operators are accepting of the possible range of influent parameters and will guarantee the proposed effluent output, then no further information is required.

8: Wastewater Flows – (RFI 2):

We consider that the use of the ANZECC (2000) Drinking Water Guidelines are irrelevant for the wastewater produced. However, the Applicant has provided information showing that the wastewater/washdown water per horse, based on their proposed cleaning regime, turns out to be similar at 70 L/h/d. If their proposed cleaning program is adhered to, then the flows are considered acceptable.

9: Wastewater Treatment Design – (RFI 3):

See comments on Attachment 2.

10: Nitrogen Modelling – (RFI 4):

See the attached LEI OVERSEER review memo. The summary of that memo is as follows: The Overseer modelling has adequately characterised the proposed system. From this analysis, the proposed system nitrogen loss is significantly less than that currently authorised landuse nitrogen loss

11: Nitrogen Modelling – Stable Wastewater (RFI 4):

The information provided from the Woodhill Sands Trust facility on horse washdown water nitrogen only provides a small portion of the likely nitrogen content. The information is from horse washdown following an event and, therefore does not contain urine and faeces unless the horse urinates or defecates during its washdown/shower.

The nitrogen load from stall washdown is not included. However, see comments above in Section 2 – 7 regarding WWTP acceptance.

12: Nitrogen Modelling – Manure Management (RFI 4):

Response accepted.

13: Nitrogen Modelling – Treated Wastewater (RFI 4):

The other uses need to be further defined, with their effects and human safety assessed – nutrients are not the issue. It is generally not acceptable for garden watering or for cleaning unless in defined areas with public safety taken into account.

Either the Applicant defines these other uses and areas and assesses the risks, or only uses the dedicated land treatment areas. Firefighting is a separate issue and not covered here.

Attachment 1 - Biogill Memo - 22.02.2024

Biogill's modular trickling filter has a strong record of effective performance in high-loading wastewater, particularly breweries – with influents of average of 4,000mgBOD/L, much higher than any general average of blackwater.

The trickling filter process is not being questioned by LEI, as we are aware of the fixed film process's ability to deal with fluctuating loads.

The below mass calculation, is reapplied considering blackwater and the following influent and effluent parameters are presented.

				BOD		TN		TP	
Activity	Daily Flow per unit (L/day)	Max Persons	Peak (L/day)	mgBOD/L	kgBOD/d	mgTN/L	kgTN/d	mgTP/L	kgTP/d
Day Visitor Clients	65	200	13000	900	11.70	100	1.30	20	0.26
Overnight Clients	230	50	11,500	300	3.45	50	0.58	10	0.12
Staff	65	40	2,600	900	2.34	100	0.26	20	0.05
Veterinary Consultants	65	10	650	900	0.59	100	0.07	20	0.01
Horses	70	600	42,000	300	12.60	100	4.20	20	0.84
		Daily Peak Flow: (L/day)	69,750	Σ kgBOD/d	30.68	Σ kgTN/d	6.40	Σ kgTP/d	1.28
				Composite BOD Concentration (mg/L)	439.78	Composite TN Concentration (mg/L)	91.76	Composite TP Concentration (mg/L)	18.35

The numbers of people in various categories differ from Reeftide's numbers. Reeftide have 4 staff members living in at 250 L/p/d and no other overnight guests. However, the Biogill numbers are more conservative, with a 50% flow buffer added to their design.

The design loads are accepted.

Attachment 2 - Biogill Brochure

No further comment.

Attachment 3 - Biogill Case Study

The treatment plan was for a high strength wastewater including composting toilets leachate. The nitrogen species tested were not usually what is tested for and this was acknowledged by Biogill. The TON (Total Organic Nitrogen not Total Oxidised

Nitrogen) measurements did not include ammoniacal nitrogen. The results show a high degree of TKN removal with just about all the final effluent in organic form rather than the oxidised form of nitrate-N. This is unusual as normally the organic forms would be converted to ammonia, nitrified to NO_2 and NO_3 and then denitrification to convert to gas. Biogill's comments on why there was organic N remaining and not nitrate are accepted. Removal was down to about 24 mg/L TN, with most as organic. This is a better form of N for land treatment than the oxidised forms if the same occurs at the proposed SPEC site.

Attachment 4 – OVERSEER Modelling

See the attached memo.

MEMORANDUM **Job 10919**

To: Rob Potts

From: Asha Skidmore

Date: 07/03/2024

Subject: Overseer Review Southern Parallel Equine Centre Ltd

PURPOSE

The purpose of this memo is to present a review of the Overseer modelling of the proposed equine stud system and original farming system located at 527 Stranges Road, Ashburton.
A report by CG Ag complemented the Overseer equine stud model. The Overseer models and the CG Ag report has formed the basis of my review. I contacted CG Ag to clarify some aspects of their modelling. This has resulted in some slight adjustments of the equine stud model to what is described in their report. Regardless, nitrogen and phosphorous loss has remained the same.

It is presumed that the applicant is operating within the parameters outlined in their Land Use consent (CRC180893) in which the original farming system is consented under. As such, I have reviewed the proposed equine stud system in more detail. I have left some comments on the original system.

While Overseer typically isn't employed as a tool for modelling equine systems, it can offer insights into nutrient losses. To complement this, Reeftide has conducted additional nutrient loss modelling to supplement this Overseer model.

Proposed Equine Overseer

I have used CG Ag's report provided under Attachment 4 – Overseer Modelling in the CRC242397-CRC242401 - Southern Parallel Equine Centre Limited – RFI Response report to guide my assessment as well as the published Overseer analysis termed "Equine Centre scenario v2"

N losses: 9 kgN/ha (v6.5.4)
P losses: 0.3 kgN/ha (v6.5.4)

The proposed scenario of a high-end equine centre has been modelled in OverseerFM with the following comments about the modelling assumptions in the table below. I have commented on these assumptions below.

CG Ag comments	LEI comments
Horse numbers as provided, however doesn't account for horses coming and going for events as these horses will be in stables with all nutrients captured and either applied to land as wastewater or exported. Intend to remove all horse manure from farm which is unable to be modelled in OverseerFM. Horses specified will be in stables for varied hours of the day throughout the year, however unable to model this movement in OverseerFM.	Acceptable due to constraints of Overseer model for equine systems. If all horse manure is removed and animals are in barns this is fine. Wastewater has been accounted for.
Irrigation input as fixed grid for now as subsurface drip is not an option to be modelled in OverseerFM. Irrigation input as fixed grid likely to require higher inputs than subsurface so assume that this model is worst case for water usage and associated drainage through soil profile.	Acceptable due to Overseer constraints. Has highlighted this model would be 'worst case scenario' for water usage It is assumed irrigation would be applied year round as wastewater, however the model does not irrigate during the winter months (May – September). Due to the low depth of wastewater applied at 1.9 mm/month averaged over the 4 ha LTA area, it is assumed there would be minimal difference to nitrogen leaching losses if this was adjusted. Therefore, I consider the irrigation input acceptable.
Agrisea tonic specified as planned to be used but no NPKS data supplied. I have entered a simple fertiliser input to maintain soil fertility given horse manure will be removed. This maintenance fert would need to be reviewed based on soil test trends and knowledge of nutrients removed through manure. Feedstock specified as being brought in but no nutrient data provided so 'Oats Grain' has been input for now	Could further ask manufacturer for these details. No however a maintenance fertiliser has been modelled. However, the proposed system would not cause the model output to increase to a level exceeding the current baseline. Oat grain is reasonable alternative
Wastewater NPKS entered per info in consent application and modelled on a monthly basis as being applied through subsurface irrigation system with setbacks adhered to.	CG Ag has stated "Wastewater N & P has been entered as an 'organic fertiliser' with N & P quantities as provided in the AEE for consent application. Area that receives wastewater is based on setbacks stated in the AEE."

	This is deemed acceptable
100 horses on farm 340 days out of 365 days per year with the horses outside 12 hrs/day and housed for the remaining 12 hrs/day.	Appears model is correct – pasture eaten vs farm supplements is 60:40.
600 horses on farms the other 25 days out of 365 days per year with the horses outside 1hrs/day (within arenas) and housed for the remaining 23 hrs/day if staying overnight. Visiting horses will only be onsite for max 24hrs and will not be placed in paddocks for grazing but will utilise the stabling provided. Competition training the visiting horses will only be onsite for the day and will not stay overnight and will only be on arenas for competition.	Acceptable due to Overseer constraints. It is assumed that manure from the stables will be exported off site. Wastewater has been accounted for.
Areas of soils within blocks under 1.0 ha have been amalgamated with the dominant soil type	Acceptable
Irrigation areas have been adjusted in the irrigation tab within the 5% tolerances allowed by OverseerFM	Acceptable

In addition to the assumptions I have commented on, I have reviewed the Overseer model "Equine Centre scenario v2"

Additional notes I have are:

The original system has a pivot irrigator. However, a solid set is used for wastewater applications as a work around for subsurface drip. I assume that with the new equine centre development, the pivot will be decommissioned hence hasn't been added to the model.

Effluent is added as custom organic fertiliser which has included the wastewater. Wastewater applied has been modelled at a total of 251 kg per year. I have looked at the consent application and calculated nitrogen applied to be total 418 kg N applied as a worst-case scenario based on AEE assuming 50 mgN/L and 8,374 m^3/yr annual volume (Table 9 and Table 14 in AEE).

The modeller may have put a lower N mg/L concentration on. Regardless, both applications are considered to be low total nitrogen applications and are acceptable for wastewater irrigation to pasture and the 167 kg difference is unlikely to increase overall N losses significantly if modelled.

No effluent has been exported in the model due to modelling constraints. As some horses are housed mainly inside (the 600 horses 25 days of the year) it is assumed that their dung will be taken away and urine is accounted for in custom organic fertiliser instead.

Pasture grown is 15 T DM/yr. This is considered very high, given the partial irrigation and low nitrogen. This will likely mean that additional supplements are imported. This will likely increase the nutrient loss. I contacted CG Ag about this issue. The response back was they agreed and have subsequently remodelled by feeding more supplements, which in turn has reduced pasture growth from ~15tDM/ha to ~12.6tDM/ha. This has resulted in no change to farm N loss. Albeit still a reasonably high pasture growth, I believe this is an Overseer modelling constraint, and I understand that the model will be further fine-tuned once the place is operating.

The modelling has made assumptions that I consider acceptable. Even with the suggested changes, I believe this would not drastically change the N leaching losses, and the proposed operation would still be considered a relatively low-intensity system. I consider the overall N leaching loss rate of 9 kgN/ha to be reasonable.

Original System

N losses: 71 kg/ha (v6.5.4)
P losses: 0.7 kg/ha (v6.5.4)

I have used the Overseer model published termed "Block D 09-13 Baseline"

The model has been modelled by Ravensdown as an intensive cropping rotation under centre pivot irrigation. No animals have been modelled within the system.

Nitrogen applied to crops varies between 138 kgN/ha – 331 kgN/ha which can be considered a high fertiliser input.

Irrigation scheduling is modelled as "Fixed depth and return period; visual assessment/dig a hole (%)" which is not an efficient irrigation method and has resulted in excessive drainage and subsequently elevated nitrogen leaching.

It is no longer acceptable for irrigation to be applied as visual assessment/dig a hole (%). Therefore, this model will overestimate what is currently occurring on the farm. The model has produced a comparatively high N loss when compared to the proposed equine system.

Due to the relatively high intensity of a cropping operation compared to an equine system, should the original system be remodelled, I believe the cropping system would still produce a higher N loss than the proposed equine system as arable cropping literature suggests an average nitrogen loss rate of around 35 kgN/ha/yr but can range to over 100 kgN/ha/yr (Ministry of Primary Industries, 2021).

There is not a lot of literature on nitrogen leaching losses in equine systems CG Ag have referenced some papers in their report. However, the system is inherently less intensive (i.e. less fertiliser is applied, horse manure is sold/exported, animals can be housed in stables) which contribute to a lowered N loss.

An Overseer model forms part of the owners Land Use consent (CRC180893) and subsequently the associated nutrient loss is authorised. The consent ensures that the Overseer model and the associated practices are independently audited. The consent also provides limits and sets conditions to reduce nutrient limits, as well as on farm management requirements that limit nutrient contamination.

As the original system and associated nutrient losses are independently audited and authorised under CRC180893, no further analysis has been conducted.

Concluding Remarks

Overall, I have considered the modelling is in line with the capability of what Overseer can model and CG Ag assumptions, I generally agree with, except for the pasture production is high. Even with the adjustments that I have outlined, I believe this would not drastically change the N leaching losses and this would still be considered a relatively low intensity system when compared with the original system.

This model can be used as supplementary evidence for the consent application but shouldn't be the sole basis of reliance. Its design primarily caters to modelling farm systems like dairy, sheep, and cattle which may limit its applicability to other contexts such as equine systems.

REFERENCES

Ministry for Primary Industries (2021). Refining estimates of nitrogen leaching for the New Zealand agricultural greenhouse gas inventory. https://www.mpi.govt.nz/dmsdocument/50431-Refining-estimates-of-nitrogen-leaching-for-the-New-Zealand-agricultural-greenhouse-gas-inventory-Report