	AGENDA - UPPER SELWYN HUTS COMMITTEE			
Date	26 June 2019	**Time**	4.30 – 6.00 pm	**Location:** Springston South Soldiers Memorial Hall, Days Road
Council Committee	Mayor (Sam Broughton), Councillors (Grant Miller, Malcolm Lyall, Debra Hasson), Chief Executive (David Ward)			
Community Reps	Upper Selwyn Huts Representatives – Graeme Young, Graham Evans, Robin Hyde			
Staff	Douglas Marshall (Property & Commercial Manager), Murray Washington (Asset Manager), Murray England (Water Services Manager), Greg Bell (Corporate Services Manager), Tanya Maylam (PA Property & Commercial Manager)			
Apologies				

1. **Welcome and Apologies**

2. **Notes from Previous Meeting**

- Attached are the notes from the meeting held on 29 May 2019 for information (Appendix 1)

3. **Matters Arising from Last Meeting**

- Cost of work to date as follows:

GL	Upper Selwyn huts - Compliance Cost	Amount (NZD)
460090009	CCTV inspection with Water blasting (approx.)	13,800
460090009	Days Road drive way improvement entrance way to pond area built and fenced as per quote from GM for trucks to turn and reverse into this area for removal of liquid waste.	20,405
460090009	Carting of Extra volumes of Treated waste to Selwyn Rd PS (starting 7th June 4 trips X26 m3 -104 m3)	2,530
460090009	Weld sluice valve on disposal field gates at Selwyn huts	2,530
460090009	Manhole benching repair	4,855
460090009	Fencing Cost (approx.)	7,000
	Total	51,120

	• Question on Robson Environmental Discharging into the Pong - Council confirms that Robson Environmental have been engaged to pump wastewater from the Upper Selwyn Huts wastewater pond and dispose of it to the ESSS sewer scheme (Rolleston). The attached plot (Appendix 2) shows pond levels. Where there are large drops in pond level, this illustrates where a discharge to the disposal field has occurred. Where there are small drops in pond level, these are where wastewater is being trucked away from the pond. • Water Quality Sample Results – Attached (Appendix 3) are example water quality results for the pond and monitoring bores. Staff will lead the working group through these at the meeting. • Land ownership around the ponds – Map showing ownership attached (Appendix 4)
4.	**Cost Estimate and Assessment on Option – Report from Stantec** • Attached (Appendix 5) is the working draft of the Upper Selwyn Huts WW Assessment (version 2) as discussed with Murray England. The four agreed options for pricing included are: - existing reticulation and large package treatment at WWTP site - STEPS scheme with existing WWTP and disposal - STEPS scheme with new smaller package treatment at WWTP site - STEPS scheme with Vault and disposal to Ellesmere The LPSS and STEPs would have similar installation and maintenance costs. There would be a small OPEX saving with no de-sludging of the units. Please note that the Stantec costs are conservative at this stage and will be further refined.
5.	**General Business**

	NOTES FROM A MEETING OF THE UPPER SELWYN HUTS COMMITTEE			
Date	29 May 2019	**Time**	4.00 – 5.00 pm	**Location:** Springston South Soldiers Memorial Hall, Days Road
Council Committee Present	Mayor (Sam Broughton), Councillors (Grant Miller, Malcolm Lyall, Debra Hasson)			
Community Reps Present	Upper Selwyn Huts Representatives – Graeme Young, Graham Evans, Robin Hyde			
Staff Present	Douglas Marshall (Property & Commercial Manager), Murray England (Water Services Manager), Tanya Maylam (PA Property & Commercial Manager)			
Apologies	David Ward (Chief Executive), Murray Washington (Asset Manager), Greg Bell (Manager Corporate Services), Douglas Marshall (Property & Commercial Manager) for lateness			

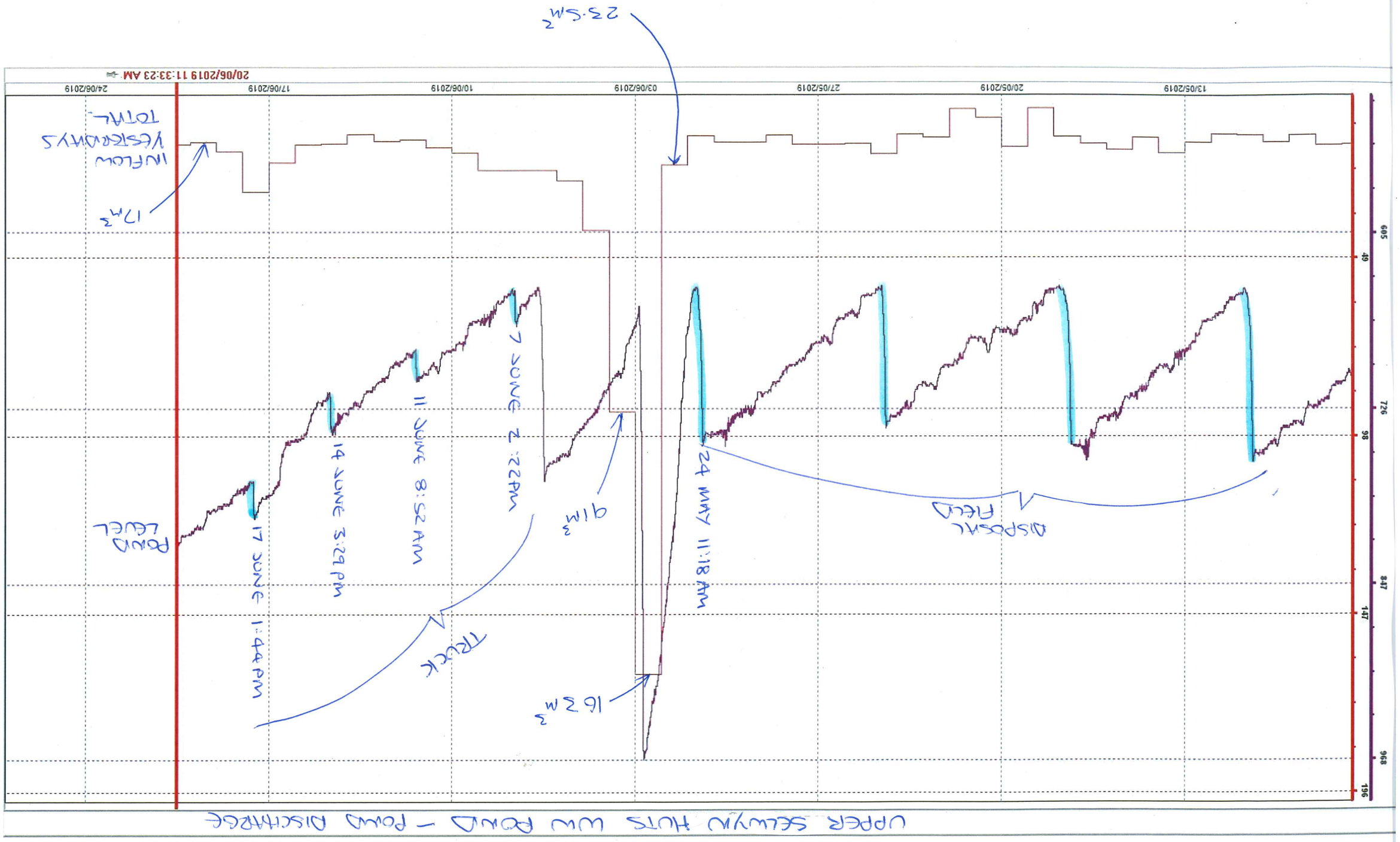
1.	**Welcome and Apologies** The Mayor assumed the Chair of the meeting in the absence of the Chief Executive Officer and Douglas Marshall. Round table introductions were made. Gaham Evans advised that a meeting of over 50 people had been held earlier in the month and felt that the representation as elected at the meeting was a fair representative of the hut owners.
2.	**Resolution from Council – 8 May 2019** "1. That Council acknowledges: a) That climate change over the next 100 years means the sea level rise that will result in changes to the environment around Lake Ellesmere specifically resulting in the lake not being able to be opened to the sea s easily or possibly as often, thus resulting in the lake area likely increasing in volume and area and the water table lifting. b) That Council needs to continue to provide wastewater services but will do so in the most prudent and cost effective manner. c) That the wastewater solution will be funded by the Selwyn Huts community. 2. That Council requests the Upper Selwyn Huts community to identify 3 members by 31 May 2019 to join the Council Subcommittee to review options for wastewater collection and treatment; the cost of those options, any proposed changes to the licence agreement to have effect from 1 July 2020, and that the appointed group report back to Council with their recommended proposal to the 10 September 2019 Council meeting. 3. Council now determines that hut licences and subsequent renewals are short term and ultimately for a finite period." • The Mayor read through the resolutions adopted at the meeting held on 8 May 2019 as above. • It was **agreed** that the focus of the group was a solution on to the wastewater issue.

- Murray England advised that by December 2019 Council needed to lodge a consent for wastewater, whatever the solution may be.
- Council has engaged Aqualinc to prepare the consent application.
- It was noted that Stantec used to be MWH and they had been requested to update their report also.
- Stormwater inflow (via roof water or low gully traps) into the wastewater system is where hut owners can have a great impact on reducing the loading into the wastewater system and therefore reduce future operational costs / size of future treatment systems
- Ecan advised that Council were in breach of their consent due to the monthly discharge volume exceeding the limit stated in the consent. Since December 2018 the consent has been fully compliant. Any volume in excess of the monthly limit needs to be trucked away which is at the cost of the hut owners.
- What is the cost of the work currently being done on the ponds? Forward this information to those present or perhaps have available at the next meeting. Mr Hyde believed that the cost would have been significant ($80k). Murray England advised that it was Council's intention to get a truck/trailer unit into the site and the access needed to ensure that vehicles can continue to access the site in wet weather. Murray England believed that the costs were in the order of $18K for the access track but would confirm.
- The goal was to reduce the volume of infiltration into the reticulation. Murray England outlined what the options were and the ways of doing this. Low pressure reticulation systems and individual pump systems were discussed.
- A question was asked whether if the outflow from the oxidation pond was cleaned up, could it be pumped out to the paddocks using the existing system?
- Individual vaulting system - Murray England outlined the difficulties with this system (access / poor maintenance) – low risk to the Council as responsibility on the hut owner to manage/empty.
- Community vaulting system – tied in with water metering e.g. water flow going in verse water flow going out which would indicate usage per hut and associated charging costs. Again, this option is likely to have high operating costs.
- Outlined updating existing pond system and the difficulties associated with this system.
- It was suggested to look at land ownership around the ponds with the view to a possible extension of border dyke system.
- Vaulted system is more expensive operationally but longer term perhaps better for the licence holders, because there is no consent issues.
- Utilising existing structure would be low cost but you also run the risk of having a shorter consent.
- Concern with the lake getting very close to the border dykes
- No guarantee that a long term consent could be given.
- The group have been advised (by a third party) that there are options with the possibility of a portable system installed at the ponds to monitor water quality, with the water going to the border dyke system as a high quality discharge.
- Councillor Millar advised that it would be difficult to get consent from Ngai Tahu to dispose of the water onto the border dyke system as they do not want water disposed of that close to the lake.
- It was suggested to obtain the cost of the trial to see whether it is worth undertaking the trial as a possible solution. Graeme Young will provide Council with this information once available.
- Murray England suggested getting data in relation to the water sampling figures to see what the water going out was like to see if Ecan would be acceptable of the current WQ.
- Mr Hyde was of the view that there probably needed to be a lot of upgrading of the existing system including pipe works/infrastructure rather than either individual vaulting or community vaulting system.
- Concern at the cost of using MWH for a further report as opposed to using contractors directly.

	• Comment that SICON are going into the reserve about 5-6 times per day and it was questioned why there was a need for so many vehicles as this was costly. • The group wanted to keep an eye on the cost of the project to keep the cost to the community affordable. • Trucking of the vaulting system proposal was very expensive • The committee thought that building a new plant was not an option because it was too expensive. • Following all the discussion it was summarised as having two options left –Upgrade of the existing system with additional treatment (Graeme Young to provide details) or installing a community vaulted system. Those present generally **agreed** with this. • The group are to come back with their proposal as soon as possible for further discussion at the next meeting.
3.	**Update on Wastewater Options** • Consulting Engineer Stantec have been asked to look at further wastewater options for reporting back to the Committee. Their updated report will build on their report they did in 2017 and will include information on capital and operating costs for the options that they consider are viable.
4.	**Report on Infiltration Issues** • Gully trap inspection report for Upper Selwyn Huts – May 2019 – A copy of this report was attached for information. • Please note that any reference to specific properties was been removed to protect individual property owners' privacy. • Murray England expanded on the report previously circulated on the gully traps and outlined the process that had been undertaken within other townships in the district. Letter written to house owners to rectify the problem where it was identified. • Graham Evans advised that he had about 3-4 boulder pits around his hut that dealt with stormwater. Agreed that a letter to be written and followed up • Look at individual stormwater as well as community stormwater boulder pits and the fall of the reserve and existing drainage via swales.
5.	**Water Metering** • Measuring flow in (drinking) • Measuring flow out (bathrooms, kitchen/laundry) Water metering is a good way of ensuring that those who use more water pay more and those who use less pay less. It could also be a way of charging for wastewater in the future.
6.	**Chlorination** • Little support for the chlorination because of the perceived damage that it creates to pipe work and cylinders • Murray England outlined the risk assessment undertaken district wide in relation to chlorination and where Sewlyn Huts sat on the list of those supplies that needed to be considered. Further community meeting to be held. • Murray England noted that UV systems treat water at one point but there can be contamination after that UV point. Can have a very small amount of chlorination in the system. Looking at the systems most at risk and Selwyn Huts is at the bottom of the list. • Question in relation to potential claim as a result of earthquakes for the lateral movement of the pipework and whether Council was able to make a claim. EQC possibility. Douglas Marshall undertook to investigate further and report back.
7.	**General Business** • **Draft Reserve Management Plan**

	The Reserve Management Plan requires a formal public consultation process to be followed to adopt and make the plan a statutory document. • **Matters that Members of the Committee and representatives from the community wish to raise for future discussions** If a targeted rate to fund the project then it would be best to get a longer term for the loan to make it more affordable to the community.
Next Meeting	Wednesday, 26 June 2019 at 4.30 pm at the Springston South Soldiers Memorial Hall

APPENDIX 2


UPPER SELWYN HUTS WW ROAD – POND DISCHARGE
20/06/2019 11:33:23 AM
24/06/2019
17/06/2019
10/06/2019
03/06/2019
27/05/2019
20/05/2019
13/05/2019
INFLOW YESTERDAYS TOTAL
17m³
23.5m³
POND LEVEL
17 JUNE 1:44 PM
14 JUNE 3:29 PM
11 JUNE 8:52 AM
7 JUNE 7:22 PM
TRUCK
9m³
16.3m³
24 MAY 11:18 AM
24
DISPOSAL FIELD
605
49
726
98
847
147
968
196

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Selwyn District Council	**Lab No:**	2191045 SPv1
Contact:	Lisa Shaw	**Date Received:**	11-Jun-2019
	C/- Food and Health Standards (2006) Limited	**Date Reported:**	17-Jun-2019
	PO Box 7469	**Quote No:**	96306
	Christchurch 8240	**Order No:**	
		Client Reference:	Selwyn Huts
		Submitted By:	Catherine McGoldrick

Sample Type: Aqueous

Sample Name:		Oxidation Pond 11-Jun-2019 9:15 am	Upstream Bore 11-Jun-2019 9:00 am	Downstream Bore 11-Jun-2019 9:30 am		
Lab Number:		2191045.1	2191045.2	2191045.3		
Individual Tests						
Electrical Conductivity (EC)	mS/m	-	17.1	16.8	-	-
Total Ammoniacal-N	g/m³	-	0.042	< 0.010	-	-
Nitrite-N	g/m³	< 0.10	< 0.002	< 0.002	-	-
Nitrate-N	g/m³	0.33	0.35	0.30	-	-
Nitrate-N + Nitrite-N	g/m³	0.35	0.35	0.30	-	-
Total Phosphorus	g/m³	-	0.043	0.013	-	-
Faecal Coliforms	cfu / 100mL	-	180 #1	< 1 #1	-	-
Faecal Coliforms and E. coli profile						
Faecal Coliforms	cfu / 100mL	89,000 #1	-	-	-	-
Escherichia coli	cfu / 100mL	86,000 #1	-	-	-	-

Analyst's Comments

#1 Statistically estimated count based on the theoretical countable range for the stated method.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter. Performed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch.	-	1-3
Electrical Conductivity (EC)	Conductivity meter, 25°C. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2510 B 23rd ed. 2017.	0.1 mS/m	2-3
Total Ammoniacal-N	Filtered Sample from Christchurch. Phenol/hypochlorite colourimetry. Flow injection analyser. (NH_4-N = NH_4^+-N + NH_3-N). APHA 4500-NH_3 H (modified) 23rd ed. 2017.	0.010 g/m³	2-3
Nitrite-N	Filtered sample from Christchurch. Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I (modified) 23rd ed. 2017.	0.002 g/m³	2-3
Nitrite-N	Filtered sample from Christchurch. Automated Azo dye colorimetry, Flow injection analyser, screen level. APHA 4500-NO_3^- I (modified) 23rd ed. 2017.	0.10 g/m³	1
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N. In-House.	0.0010 g/m³	1-3
Nitrate-N + Nitrite-N	Filtered sample from Christchurch. Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO_3^- I (modified) 23rd ed. 2017.	0.002 g/m³	2-3

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Nitrate-N + Nitrite-N	Filtered sample from Christchurch. Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser, screen level. APHA 4500-NO_3^- I (modified) 23rd ed. 2017.	0.10 g/m^3	1
Total Phosphorus	Total phosphorus digestion, ascorbic acid colorimetry. Discrete Analyser. APHA 4500-P B & E (modified from manual analysis and also modified to include a reductant to reduce interference from any arsenic present in the sample) 23rd ed. 2017. NWASCO, Water & soil Miscellaneous Publication No. 38, 1982.	0.004 g/m^3	2-3
Faecal Coliforms and E. coli profile			
Faecal Coliforms	Membrane Filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9222 D 23rd ed. 2017.	1 cfu / 100mL	1-3
Escherichia coli	Membrane filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9222 G 23rd ed. 2017.	1 cfu / 100mL	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

eurofins | ELS

Eurofins ELS Limited

Selwyn District Council - Groundwater
2 Norman Kirk Drive
Rolleston 7614
Attention: Bridgette Johnson

Analytical Report

Report Number: 19/3009
Issue: 1
25 January 2019

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
19/3009-01	Selwyn Huts Sewage Pond	SDCHutsSP	22/01/2019 13:30	23/01/2019 08:50	0

Notes:

	Test	Result	Units	Signatory
0002	Suspended Solids - Total	48	g/m³	Marylou Cabral KTP
0083	Total Kjeldahl Nitrogen	23.5	g/m³	Gordon McArthur KTP
0515	Nitrite Nitrate Nitrogen	0.233	g/m³	Divina Lagazon KTP
2080	Total Phosphorus	4.87	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	19.0	g/m³	Divina Lagazon KTP
M0102	Faecal Coliforms	300	cfu/100ml	Maria Norris KTP
R-0056F	Dissolved Oxygen - onsite reading	12.4	g O2/m³	Rob Deacon .

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA Online Edition Method 2540 D	3 g/m³
Total Kjeldahl Nitrogen	APHA Online Edition 4500-N(org) B	0.8 g/m³
Nitrite Nitrate Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500-NO3 I.	0.005 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G. Persulphate digestion follows APHA Online Edition 4500-P B.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500-NO3 I. Persulphate digestion follows APHA Online Edition 4500-N C.	0.05 g/m³
Faecal Coliforms	APHA 9222D:Online Edition	1 cfu/100ml
Dissolved Oxygen - onsite reading	APHA Online Edition Method 4500-O G. Field measurement.	1 g O2/m³

Unless otherwise stated, all tests are performed in Wellington.

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	Selwyn District Council	**Lab No:**	2090840 SPv1
Contact:	Lisa Shaw C/- Food and Health Standards (2006) Limited PO Box 7469 Christchurch 8240	**Date Received:**	03-Dec-2018
		Date Reported:	11-Dec-2018
		Quote No:	96306
		Order No:	
		Client Reference:	Selwyn Huts
		Submitted By:	Catherine McGoldrick

Sample Type: Aqueous

Sample Name:		Oxidation Pond 03-Dec-2018 3:30 pm	Downstream Bore 03-Dec-2018 3:40 pm			
Lab Number:		2090840.1	2090840.2			
Individual Tests						
Electrical Conductivity (EC)	mS/m	-	17.2	-	-	-
Total Ammoniacal-N	g/m³	-	0.020	-	-	-
Nitrite-N	g/m³	< 0.10	0.002	-	-	-
Nitrate-N	g/m³	< 0.10	0.30	-	-	-
Nitrate-N + Nitrite-N	g/m³	0.10	0.30	-	-	-
Total Phosphorus	g/m³	-	0.096	-	-	-
Faecal Coliforms	cfu / 100mL	-	< 10 #1	-	-	-
Faecal Coliforms and E. coli profile						
Faecal Coliforms	cfu / 100mL	33,000	-	-	-	-
Escherichia coli	cfu / 100mL	33,000	-	-	-	-

Analyst's Comments

10cm below ground level

#1 Statistically estimated count based on the theoretical countable range for the stated method.

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter. Performed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch.	-	1-2
Electrical Conductivity (EC)	Conductivity meter, 25°C. Analysed at Hill Laboratories - Chemistry; 101c Waterloo Road, Christchurch. APHA 2510 B 22nd ed. 2012.	0.1 mS/m	2
Total Ammoniacal-N	Filtered Sample from Christchurch. Phenol/hypochlorite colourimetry. Flow injection analyser. (NH_4-N = NH_4^+-N + NH_3-N). APHA 4500-NH_3 H (modified) 22nd ed. 2012.	0.010 g/m³	2
Nitrite-N	Filtered sample from Christchurch. Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I 22nd ed. 2012 (modified).	0.002 g/m³	2
Nitrite-N	Filtered sample from Christchurch. Automated Azo dye colorimetry, Flow injection analyser, screen level. APHA 4500-NO3- I 22nd ed. 2012 (modified).	0.10 g/m³	1
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - NO2N. In-House.	0.0010 g/m³	1-2
Nitrate-N + Nitrite-N	Filtered sample from Christchurch. Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO_3^- I 22nd ed. 2012 (modified).	0.002 g/m³	2

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Nitrate-N + Nitrite-N	Filtered sample from Christchurch. Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser, screen level. APHA 4500-NO3- I 22nd ed. 2012 (modified).	0.10 g/m3	1
Total Phosphorus	Total phosphorus digestion, ascorbic acid colorimetry. Discrete Analyser. APHA 4500-P B & E (modified from manual analysis) 22nd ed. 2012. Also modified to include the use of a reductant to eliminate interference from arsenic present in the sample. NAWASCO, Water & soil Miscellaneous Publication No. 38, 1982.	0.004 g/m3	2
Faecal Coliforms and E. coli profile			
Faecal Coliforms	Membrane Filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9222 D, 22nd ed. 2012.	1 cfu / 100mL	1-2
Escherichia coli	Membrane filtration, Count on mFC agar, Incubated at 44.5°C for 22 hours, Confirmation Analysed at Hill Laboratories - Microbiology; 101c Waterloo Road, Hornby, Christchurch. APHA 9222 G, 22nd ed. 2012.	1 cfu / 100mL	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental

eurofins | ELS

Eurofins ELS Limited

Selwyn District Council - Groundwater
2 Norman Kirk Drive
Rolleston 7614
Attention: Bridgette Johnson

Analytical Report

Report Number: 18/47477
Issue: 1
17 October 2018

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/47477-01	Selwyn Huts Sewage Pond	SDCHutsSP	10/10/2018 12:47	11/10/2018 08:06	0

Notes:

	Test	Result	Units	Signatory
0002	Suspended Solids - Total	82	g/m³	Gordon McArthur KTP
0083	Total Kjeldahl Nitrogen	32.6	g/m³	Gordon McArthur KTP
0515	Nitrite Nitrate Nitrogen	0.228	g/m³	Tracy Morrison KTP
2080	Total Phosphorus	4.58	g/m³	Tracy Morrison KTP
2127	Total Nitrogen	31.1	g/m³	Tracy Morrison KTP
M0102	Faecal Coliforms	210,000	cfu/100ml	Sunita Raju KTP
R-0056F	Dissolved Oxygen - onsite reading	4.9	g O2/m³	Rob Deacon .

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/47477-02	Selwyn Huts Bore M36/6930 Bore 1	M36/6930	10/10/2018 12:13	11/10/2018 08:06	0

Notes:

	Test	Result	Units	Signatory
0605	Nitrate - Nitrogen	0.13	g/m³	Shanel Kumar KTP
0760	Ammonia Nitrogen	0.23	g/m³	Divina Lagazon KTP
2080	Total Phosphorus	0.024	g/m³	Tracy Morrison KTP
M0102	Faecal Coliforms	< 1	cfu/100ml	Sunita Raju KTP
O1309	Conductivity at 25°C	3,120	uS/cm	Prashilla Singh (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/47477-03	Selwyn Huts Bore M36/6931 Bore 2	M36/6931	10/10/2018 11:15	11/10/2018 08:06	0

Notes:

	Test	Result	Units	Signatory
0605	Nitrate - Nitrogen	0.28	g/m³	Shanel Kumar KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	Divina Lagazon KTP
2080	Total Phosphorus	0.126	g/m³	Tracy Morrison KTP
M0102	Faecal Coliforms	< 1	cfu/100ml	Sunita Raju KTP
O1309	Conductivity at 25°C	181	uS/cm	Prashilla Singh (transcribed by)

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA Online Edition Method 2540 D	3 g/m³
Total Kjeldahl Nitrogen	APHA Online Edition 4500-N(org) B	0.8 g/m³
Nitrite Nitrate Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500-NO3 I.	0.005 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified).	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500 NH3-H.	0.01 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA Online Edition Method 4500-P G. Persulphate digestion follows APHA Online Edition 4500-P B.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA Online Edition Method 4500-NO3 I. Persulphate digestion follows APHA Online Edition 4500-N C.	0.05 g/m³
Faecal Coliforms	APHA 9222D:Online Edition	1 cfu/100ml
Dissolved Oxygen - onsite reading	APHA Online Edition Method 4500-O G. Field measurement.	1 g O2/m³

Onsite Observation Methodology:

Test	Methodology	Detection Limit
Conductivity at 25°C	Analysed on site by sampler.	1 uS/cm

Unless otherwise stated, all tests are performed in Wellington.

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

Report Released By
Rob Deacon

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

eurofins | ELS

Eurofins ELS Limited

Selwyn District Council - Groundwater
2 Norman Kirk Drive
Rolleston 7614

Attention: Fiona Rayner

Analytical Report

Report Number: 18/18894

Issue: 1

16 May 2018

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/18894-01	Selwyn Huts Sewage Pond	SDCHutsSP	16/04/2018 13:10	17/04/2018 08:34	0

Notes:

	Test	Result	Units	Signatory
0002	Suspended Solids - Total	73	g/m³	Marylou Cabral KTP
0083	Total Kjeldahl Nitrogen	22.6	g/m³	Marylou Cabral KTP
0515	Nitrite Nitrate Nitrogen	0.244	g/m³	Divina Lagazon KTP
2080	Total Phosphorus	3.84	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	24.3	g/m³	Divina Lagazon KTP
M0102	Faecal Coliforms	40,000	cfu/100ml	Juana Tamayo KTP
R-0056Fb	Saturated Dissolved Oxygen	126.3	% O2	Rob Deacon .

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/18894-02	Selwyn Huts Bore M36/6930 Bore 1	M36/6930	16/04/2018 14:02	17/04/2018 08:34	0

Notes:

	Test	Result	Units	Signatory
0605	Nitrate - Nitrogen	0.29	g/m³	Shanel Kumar KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	Divina Lagazon KTP
2080	Total Phosphorus	0.021	g/m³	Divina Lagazon KTP
M0102	Faecal Coliforms	< 4	cfu/100ml	Juana Tamayo KTP
O1309	Conductivity at 25°C	167	uS/cm	Deb Bottrill (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/18894-03	Selwyn Huts Bore M36/6931 Bore 2	M36/6931	16/04/2018 14:55	17/04/2018 08:34	0

Notes:

	Test	Result	Units	Signatory
0605	Nitrate - Nitrogen	0.32	g/m³	Shanel Kumar KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	Divina Lagazon KTP
2080	Total Phosphorus	0.067	g/m³	Divina Lagazon KTP
M0102	Faecal Coliforms	< 4	cfu/100ml	Juana Tamayo KTP
O1309	Conductivity at 25°C	160	uS/cm	Deb Bottrill (transcribed by)

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
Suspended Solids - Total	APHA 22nd Edition Method 2540 D	3 g/m³
Total Kjeldahl Nitrogen	APHA 22nd Edition 4500-N(org) B	0.8 g/m³
Nitrite Nitrate Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-NO3 I.	0.005 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified).	0.01 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500 NH3-H.	0.01 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G. Persulphate digestion follows APHA	0.005 g/m³

85 Port Road Seaview
Lower Hutt 5045 New Zealand
Phone: (04) 576 5016 Fax: (04) 576 5017
Email: mailto:reportselsnz@eurofins.com Website: http://www.eurofins.co.nz

Test	Methodology	Detection Limit
	22nd Edition 4500-P B.	
Total Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-NO3 I. Persulphate digestion follows APHA 22nd Edition 4500-N C.	0.05 g/m³
Faecal Coliforms	APHA 22nd Edition Method 9222D:2012	1 cfu/100ml
Saturated Dissolved Oxygen	Field measurement - Saturated DO measured from DO reading.	0.1 % O2

Onsite Observation Methodology:

Test	Methodology	Detection Limit
Conductivity at 25°C	Analysed on site by sampler.	1 uS/cm

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

85 Port Road Seaview

Lower Hutt 5045 New Zealand

Phone: (04) 576 5016 Fax: (04) 576 5017

Email: mailto:reportselsnz@eurofins.com Website: http://www.eurofins.co.nz

Adjoining Landowners to Springston South Reserve

APPENDIX 4

Selwyn DISTRICT COUNCIL

0 325 650 975 1,300

Metres

19/06/2019
Cadastral Information dervided from Land Information New Zealand's Digital Cadastral Database (DCDB)

Data Projection: NZGD2000 New Zealand Transverse Mercator

Ref	Description	Item	Item Description	Unit	Quantity	Rate	Amount
	Catchment						
C7	Network Renewal - Gravity	1	Supply and Install WW gravity mains, 150mm PVC, depth less than 1.5m (assume 75% of network)	m	1350	$ 372.60	$ 503,010.00
		2	Supply and Install WW gravity mains, 150mm PVC, depth greater than 1.5m (assume 25% of network)	m	450	$ 512.02	$ 230,407.01
		3	Supply and install DN625 PE maintenance chamber (in lieu of 50% of manholes)	ea	18	$ 3,693.00	$ 66,474.00
		4	Supply and install DN1050 concrete manhole	ea	18	$ 7,386.00	$ 132,948.00
		5	Upgrade of lateral connections (supply and install) from each property through to new gravity main. Assume 20m per property, 100mm PVC, depth less than 1.5m.	m	1980	$ 131.64	$ 260,647.20
	Sub-Total						$ 1,193,486.21
	P&G (15%)						$ 179,022.93
	Engineering and Contingency (30%)						$ 411,752.74
	Total					Rounded	$ 1,785,000.00
C11	Septic Tank Effluent Pumping Systems (STEPS)	1	4,000 L STEP tank installed	ea	33	$ 12,500.00	$ 412,500.00
	defined as 99 households, 3 hh per unit	2	Supply and Install pressure sewer in trench, 600mm cover, backfill with selected excavated material	m	700	$ 135.00	$ 94,500.00
		3	Upgrade of lateral connections (supply and install) from each property through to the STEP tank. Assume 20m per property, 100mm PVC, depth less than 1.5m.	m	1980	$ 131.64	$ 260,647.20
		4	Electrical supply to the pumps. Assumed separate network to household connections, cable in common trench with pressure sewer, including cable and mag tape.	m	700	$ 119.36	$ 83,552.00
		5	Electrical Transformer	PS	1	$35,000	$ 35,000.00
		6	Isolating valve kit	ea	33	$ 750.00	$ 24,750.00
	Sub-Total						$ 910,949.20
	P&G (15%)						$ 136,642.38
	Engineering and Contingency (30%)						$ 314,277.47
	Total					Rounded	$ 1,362,000.00
	OPEX	A	O&M - Plant and Power for STEPs tanks	% CAPEX	5%	$ 616,687.50	$ 30,834.38
		B	Sludge Removal every 3 years	% CAPEX	1%	$ 616,687.50	$ 6,166.88
		C	O&M - Staff attendance (18hrs per unit per year)	hr	594	$ 60.00	$ 35,640.00
	Total					Rounded	$ 73,000.00
				NPV over 15 years and 6% discount (rounded)			$ 752,000.00
				NPV over 30 years and 6% discount (rounded)			$ 1,131,000.00
	Treatment and Disposal						
TD5a	Package Plant – Existing Disposal AX700	1	AdvanTex AX700 package treatment plant. Offered as treatment post STEPS system.	ea	1	$ 700,000.00	$ 700,000.00
		2	Site works including provision for power and geotechnical requirements	PS	1	$ 140,000.00	$ 140,000.00
	Sub-Total						$ 840,000.00
	P&G (15%)						$ 126,000.00
	Engineering and Contingency (30%)						$ 289,800.00
	Total					Rounded	$ 1,256,000.00
	OPEX	A	O&M - Plant and Power for Treatment Plant	% CAPEX	5%	$ 1,046,500.00	$ 52,325.00
		B	Sludge Disposal	% CAPEX	3%	$ 1,046,500.00	$ 31,395.00
		C	O&M - Staff attendance (20 hrs per week)	hr	1040	$ 60.00	$ 62,400.00
	Total					Rounded	$ 147,000.00
				NPV over 15 years and 6% discount (rounded)			$ 1,513,000.00
				NPV over 30 years and 6% discount (rounded)			$ 2,317,000.00
TD5b	Package Plant – Existing Disposal AX400 (reduced inflows)	1	AdvanTex AX400 package treatment plant. Offered as treatment post STEPS system.	ea	1	$ 350,000.00	$ 350,000.00
		2	Site works including provision for power and geotechnical requirements	PS	1	$ 105,000.00	$ 105,000.00
	Sub-Total						$ 455,000.00
	P&G (15%)						$ 68,250.00
	Engineering and Contingency (30%)						$ 156,975.00
	Total					Rounded	$ 681,000.00
	OPEX	A	O&M - Plant and Power for Treatment Plant	% CAPEX	5%	$ 523,250.00	$ 26,162.50
		B	Sludge Disposal	% CAPEX	2%	$ 523,250.00	$ 10,465.00
		C	O&M - Staff attendance (20 hrs per week)	hr	1040	$ 60.00	$ 62,400.00
	Total						$ 100,000.00
				NPV over 15 years and 6% discount (rounded)			$ 1,030,000.00
				NPV over 30 years and 6% discount (rounded)			$ 1,545,000.00
TD8	ESSS – Cartage	1	Storage Tanks (20m3 tanks)	ea	6	$ 26,390.32	$ 158,341.89
		2	Site works including provison for power/level controls and geotechnical requirements	PS	1	$ 31,668.38	$ 31,668.38
	Sub-Total						$ 190,010.27
	P&G (15%)						$ 28,501.54
	Engineering and Contingency (30%)						$ 65,553.54
	Total					Rounded	$ 285,000.00
	OPEX	A	O&M - Cartage to and disposal at Leeston. Annual average volume ~7,000m3	m3	7000	$ 67.00	$ 469,000.00
	Total					Rounded	$ 469,000.00
				NPV over 15 years and 6% discount (rounded)			$ 4,827,000.00
				NPV over 30 years and 6% discount (rounded)			$ 6,840,000.00

Upper Selwyn Huts Wastewater Assessment

This report has been prepared for the benefit of Selwyn District Council. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

Rev. No.	Date	Description	Prepared By	Checked By	Reviewed By	Approved By
1	27/5/19	Draft for Comment	SB	CM	CM	SB
2	21/6/19	Draft for Comment	SB	MR	MR	SB

1 Introduction

The following table has been compiled to provide a summary of wastewater servicing options for the Upper Selwyn Huts settlement. The purpose of this table is to assess the benefits and limitations of options considered for the conveyance, treatment and disposal of wastewater as it apply to the configuration of the community.

In addition, high level cost estimates have been provided to assist in comparing the various solution sets (combinations of viable options).

1.1 Background

The Upper Selwyn Huts wastewater scheme was initially installed in the 1920s with a septic tank and overflow discharge to the Selwyn River. The system was upgraded in 1988 by adding a pumping chamber to the septic tank, which discharges to an oxidation pond located south east of the township. A border dyke irrigation system was added, which discharges to 0.88 hectares of grassed land.

The principal issue identified is the ability of the existing or new scheme to manage, treat and dispose of the volume of wastewater generated by the community. Any option selected for needs to either accommodate or reduce the peak volumes. A comment will be made against each Conveyance option in the summary table as to whether it might reduce peak volumes. The treatment and disposal options would then be developed and designed on improvements obtained within the Conveyance network.

1.2 References

- "Upper Selwyn Huts Sewerage", MWH/Stantec, 14 January 2016
- SDC / Stantec Workshop Notes, 20 May 2019

Key for Capex / Opex: (relative to other options) Low Medium High

	Ref	Description	Benefits	Limitations	Capex	Opex	Viable
Engagement and Investigation	**EI1**	**Scheme Assessment:** Prior to design, establish tools for understanding flow rates. Water meters by property to understand site usage and I/I rates.	• *Reduced Volume: No benefit* • Once installed, can be used to assess site specific designs and for cost sharing (if required) for households	• As stated, no direct impact on reduction of flows		Monitoring meters	
	EI2	**Education:** Community specific education on the configuration of the scheme and measures required to reduce wastewater flows (i.e. water saving devices, leaks, on site treatment services etc)	• *Reduced Volume: Possible improvement* • Engagement with the community and involvement to achieve common goal • No Surprises approach in solutions and can smooth he path in the selection of Conveyance, Treatment and Disposal options	• Difficult to manage process and to measure impact of the programme • Need to be ongoing as residents could fall back to previous poor habits	No Capex	No Opex	
Conveyance	**C1**	**Status Quo**: aging infrastructure and high levels of Inflow and infiltration (I/I). gravity reticulation to terminal pump station in original community septic tank. Increasing permanent occupation of properties reflected in an increase in ADWF volumes.	• *Reduced Volume: No benefit* • No Capital cost commitments • Low interaction required with property owners	• Does not address concerns • Increasing risk of excursion events / surcharging and blockages in the network • Existing pipeline capacity limited • Increasing risk of environmental impacts with discharges via leaking pipelines • Status Quo for volume of flows may not be accepted by Ecan at time for Resource Consent renewal (Land Disposal)	No Capex	While pumping costs minimal, reactive maintenance potentially high	
	C2	**Inflow reduction**: as per **C1**, but with Inflow reduction programme to remove direct SW connections and remove overland flows (gully trap heights). Site specific inspections of laterals. SW upgrades within the community to take diverted flows, which may require a SW peak flow PS with discharge to river.	• *Reduced Volume: Direct improvements – Peak Flows / Daily Volumes* • Targeted approach with site specific solutions to reduce peak volumes. • Site specific solutions • Meet objectives from ECan to, in part, address incoming flows under the Land Disposal consent	• The percentage of flow/volume reduction is not easy to assess • Although likely reduction, the scale/amount is not guaranteed and does not address condition of existing pipelines • Labor intensive investigations and coordination with landowners • Allocation of costs as the ownership of issue (illegal SW connections) may rest with property owners • Stormwater discharge consent may be required for alterations to the existing scheme	Depending on scale of SW upgrades required	No Opex (unless SW Peak Flow PS required) Potential nett saving if volumes are reduced	
	C3	**Infiltration reduction**: as per **C1**, but with targeted infiltration reduction, requires specific CCTV inspections of laterals, pipelines and manholes. Either spot repairs or lining of existing pipelines.	• *Reduced Volume: Direct improvements – Daily Volumes* • Limits capital expenditure to areas of concern • Targeted repairs to address known problems • Minimises open excavations	• Assets need to be structurally sound, and have the required capacity • Lining QA needs to be managed • Difficult to line smaller diameter pipelines (laterals) • Limited design life for lining options (15-20 years)		No Opex	
	C4	**Greywater / Reuse**: as per **C1**, with modification of the plumbing at each property for reuse of greywater.	• *Reduced Volume: Direct improvements – Daily Volumes* • Environmental benefits with reuse of water resources (lower impacted on total water cycle) • Reduced potable water supply requirements	• Cost of retrofitting properties • Public perception of water reuse may be poor • Potential stagnating water where properties not constantly occupied (health risk)		No Opex	
	C5	**Stormwater Network Enhancement**: as per **C2**, with using the SW peak flow PS and infiltration gallery to lower the GWL within the community to reduce infiltration.	• *Reduced Volume: Possible improvement* • Integration of SW solution with reduction with WW baseflows (infiltration) • Potential retention of existing WW infrastructure • Can be managed to only activate when GWL exceed trigger levels	• Uncertainty on the flow rate required to maintain reduced level • Large infiltration gallery and/or multiple SW PS's required • Risk of subsidence beneath structures with lowered GWL		Assumes constant pumping	
	C6	**Consolidated Community Facilities**: Abandon existing collection scheme and provide one or two ablution/kitchen blocks	• *Reduced Volume: Direct improvements – Daily Volumes* • All services consolidated to set points in the community • Abandonment of aging infrastructure • Potable water, wastewater at/to limited locations • Control of water saving devices	• Likely to be unacceptable to community as would remove water supply services for each property. Otherwise a duplicate network would be required. • Additionally, H&S concerns for property owners accessing facilities in poor weather or at night • Consolidated Community Facility would need to have fully fitted ablutions, kitchens and laundries and be managed under a maintenance contract.			
	C7	**Network Renewal - Gravity**: Lateral and pipeline renewal generally on existing alignments, to a single PS.	• *Reduced Volume: Direct improvements – Daily Volumes* • Approach addresses illegal connections (lateral replacement) and infiltration within network (pipeline renewal). • Simple scheme with low operating costs • Potential to reuse existing assets where compatible with revised design • Design Life – 80-100 years	• High capital cost associated with installation at or below the GWL (dewatering) • Potentially large construction footprint depending on depth to invert required (reinstatement extents / disturbance of community during construction)	+		
	C8	**Network Renewal – LPSS by lot**: Lateral renewal and Low Pressure Sewer System (LPSS) with a unit per property. Pumping to a common discharge main.	• *Reduced Volume: Direct improvements – Daily Volumes* • Approach addresses illegal connections (lateral replacement), infiltration within network (pipeline renewal) and abandons existing terminal PS. • Pipelines/Pressure Mains laid shallow • Can reuse existing RM If connected to Oxidation Pond • Design Life – 80-100 years (civil) 25-30 years (mechanical)	• Each property may not have footprint required for an individual unit • Power supply agreement required with each property owner or local network installed. • Risk of odour / septicity where properties are not permanently occupied (minimum daily flows)			

	C9	**Network Renewal – LPSS by cluster**: Lateral renewal and LPSS with a unit per collection or cluster of properties. Pumping to a common discharge main.	• *Reduced Volume: Direct improvements – Daily Volumes* • Approach addresses illegal connections (lateral replacement), infiltration within network (pipeline renewal) and abandons existing terminal PS. • Pipelines/Pressure Mains laid shallow • Can reuse existing RM If connected to Oxidation Pond • Lower capital and opex costs than **C8** with consolidated infrastructure • Design Life – 80-100 years (civil) 25-30 years (mechanical)	• The footprint/position of each unit will need to account for the lateral connections from assigned properties (possible rider mains) • Power supply agreement required with each property owner or local network installed. • Ownership and maintenance requirements need to be defined and agreed • Risk of odour / septicity where properties connected are not permanently occupied (minimum daily flows)			
	C10	**Collection Chambers**: as per **C9**, but as a storage chamber only for collection by sucker truck or similar. (refer to **TD8** and **TD9** for combined option)	• *Reduced Volume: Direct improvements – Daily Volumes* • Approach addresses illegal connections (lateral replacement), infiltration within network (pipeline renewal) and abandons existing terminal PS. • Pipelines laid shallow • No rising mains or mechanical / electrical plant required • Lower capital and opex costs than **C8** with consolidated infrastructure • Design Life – 80-100 years (civil)	• The footprint/position of each chamber will need to account for the lateral connections from assigned properties (possible rider mains) and ability to access for clean out • Power supply agreement required with each property owner or local network installed if controls incorporated • Higher risk of odour / septicity where properties are not permanently occupied (minimum daily flows)		Excludes cartage covered in **TD8 / TD9**	
	C11	**Septic Tank Effluent Pumping Systems (STEPS)**: as per **C9** with a unit per collection or cluster of properties, but with pre-treatment or full treatment at each unit/site and pumping to discharge.	• *Reduced Volume: Direct improvements – Daily Volumes* • Approach addresses illegal connections (lateral replacement), infiltration within network (pipeline renewal) and abandons existing terminal PS. • Pipelines/Pressure Mains laid shallow • Can reuse existing RM If connected to Oxidation Pond • Designed to improve current treatment standards • Design Life – 80-100 years (civil) 25-30 years (mechanical)	• The footprint/position of each chamber will need to account for the lateral connections from assigned properties (possible rider mains) and ability to access for maintenance • Power supply agreement required with each property owner or local network installed • Multiple treatment sites for monitoring and management / maintenance			
Treatment and Disposal	**TD1**	**Status Quo:** High levels of Inflow and infiltration. Comprises an oxidation pond located south east of the township which receives flow via a pumped flow from the existing PS. Discharge via a border dyke irrigation system. Extraordinary volumes carted away.	• No Capital cost commitments	• Discharge limited to 650 m³ per month, compromised by the amount of incoming flows. Renewal of current Resource Consent is therefore at risk • Requires cartage of excess flows that cannot be discharged to border dyke system under the consent. • Risk that current treatment provided may not be acceptable for nutrient removal for new consent(s) • Risk of increasing GWL which may compromise ability for infiltration via border dyke disposal system	No Capex	Extra over cartage costs due to increased volumes	
	TD2	**Increased Storage:** as per **TD1**, with increased storage constructed at the oxidation pond to accommodate peak volumes.	• Existing system, complies with nutrient removal requirements under current Resource Consent • Does not rely on flow reductions being achieved within the network • Reuses existing infrastructure and available footprint with the WWTP site • Partial cartage remains part of option during extreme events.	• Does not alter the treatment process. Risk that current treatment provided may not be acceptable for nutrient removal for new consent(s) • May still require cartage of excess flows that cannot be discharged to border dyke system under the consent. • Application to modify existing consent conditions required for the increase in treatment capacity			
	TD3	**Increased Disposal:** as per **TD1**, with increased disposal area for treated effluent flows (i.e. larger border dyke area)	• Existing system; complies with nutrient removal requirements under current Resource Consent • Does not rely on flow reductions being achieved within the network • Partial cartage remains part of option during extreme events.	• Design investigations and assessment required and new Resource Consent applied for. • Depending on design, additional land purchase may be required • Risk of increasing GWL which may compromise ability for infiltration via border dyke disposal system	Land purchase requirements		
	TD4	**Rapid Infiltration Basin:** as per **TD1**, with addition of a rapid infiltration basin for peak volumes.	• Existing system; complies with nutrient removal requirements under current Resource Consent. Rapid infiltration basin only used under peak events. • Does not rely on flow reductions being achieved within the network • Partial cartage remains part of option during extreme events.	• Design investigations and assessment required and new Resource Consent applied for. • Given current knowledge of the ground conditions at this site, a large footprint would be required to make this option viable. This would be subject to the design parameters to be met • Risk of increasing GWL which may compromise ability for infiltration via proposed disposal system	Land purchase requirements		
	TD5	**Package Plant – Existing Disposal:** Replace existing terminal PS with package treatment plant, pumping treated effluent to existing oxidation pond as flow buffer and border dyke system for disposal.	• New treatment system that can be specified to meet the current or revised Resource Consent conditions • Smaller footprint than current oxidation pond • Existing infrastructure can be repurposed to integrate with the package plant (power to site, existing treatment facility) including for buffering treated effluent prior to discharge • Could be pre or post the current oxidation pond	• Network flow reductions required to mitigate risk of peak flows on Package Plant • Increased O&M requirements compared to Oxidation Pond treatment • Risk of increasing GWL which may compromise ability for infiltration via border dyke disposal system			

	TD6	**Package Plant – New Disposal:** Replace existing terminal PS with package treatment plant, pumping treated effluent to land based disposal via sub surface irrigation or earthen mound at the Upper Selwyn Huts domain or elsewhere as appropriate.	• New treatment system that can be specified to meet the current or revised Resource Consent conditions • Smaller footprint than current oxidation pond • Existing infrastructure can be repurposed to integrate with the package plant (power to site) • Mitigates risk of increasing GWL at existing disposal system site	• Network flow reductions required to mitigate risk of peak flows on Package Plant and Disposal field • No flow buffering • Increased O&M requirements compared to Oxidation Pond	+++	++	
	TD7	**Raised Disposal beds:** Aligned to **C11**, where there is in-network treatment, treated effluent to land based disposal via sub surface irrigation or earthen mound at the Upper Selwyn Huts domain or elsewhere as appropriate.	• Mitigates risk of increasing GWL at existing disposal system site	• Design investigations and assessment required and new Resource Consent applied for. • Depending on design, land purchase may be required to find land that is less influenced by increasing GWLs • Performance relies on the treated effluent quality from the in-network treatment devices • Network flow reductions required to mitigate risk of peak flows on the disposal field	++	+	
	TD8	**ESSS – Cartage:** Aligned to **C10**, tanker collection and discharge to the ESSS at Pines WWTP (assuming septage receival facility has been constructed)	• Eliminates treatment and disposal locally • Minimises installed infrastructure • Resource Consent for Disposal not required as accommodated within existing ESSS	• High operator input (network monitoring, cartage) • H&S risk with multiple truck movements per week through the community • Network flow reductions required to minimise operating costs (m^3 per day to be carted) • Capital Contribution required for connection to the ESSS	+	+++ Assumes full cartage	
	TD9	**Ellesmere – Cartage:** Aligned to **C10**, tanker collection and discharge to the WWTP at Leeston WWTP	• Eliminates treatment and disposal locally • Minimises installed infrastructure • Resource Consent for Disposal not required as accommodated within existing Ellesmere Sewerage Scheme	• High operator input (network monitoring, cartage) • H&S risk with multiple truck movements per week through the community • Network flow reductions required to minimise operating costs (m^3 per day to be carted) • Capital Contribution required for connection to the Ellesmere Sewerage Scheme	+	+++ Assumes full cartage	
	TD10	**ESSS – Pumping:** terminal PS or booster PS and RM to discharge at the Allendale Lane PS in Lincoln.	• Eliminates treatment and disposal locally • Resource Consent for Disposal not required as accommodated within existing ESSS	• High CAPEX and OPEX • Network flow reductions required to minimise operating costs (m^3 per day to be carted) • Capital Contribution required for connection to the ESSS	+++	++	

2 Cost Assessment Tables

The options defined in the Summary Table can be collated into Conveyance, Treatment and Disposal Solution Sets for comparison of pricing. In each instance it is assumed that **EI1 – Scheme Assessment** and **EI2 – Education** will have been carried out. The age and condition of the existing Conveyance system suggests that renewal or replacement of all or a portion of the scheme will be required to extend its useful life.

We have also assumed the following in the compilation of these estimates:

- The estimates provided for Opex against each of the elements in the tables below are reported as Net Present Value (NPV) figures using a discount rate of 6%.
- Any Package Treatment plant will have operational visits twice per week.
- An allowance is included for regular desludging of Package Treatment Plants and STEPS systems
- For STEPS or LPSS units, the pumps will be replaced in year 20
- For Package Treatment plants, the mechanical and electrical components will be replaced in year 20
- A contingency allowance of 30% has been included.

2.1 Solution Set 1 – Do Minimum (within collection system)

- Manage / operate within the constraints of the existing collection system. Manage peak flows / inflows under normal maintenance regimes.
- A new package treatment plant with disposal to existing border dyke disposal system. Plant installed pre or post oxidation pond and capable of handling peak flows

Ref	Description	Capex	Opex
C1	Status Quo	-	-
TD5	Package Plant – Existing Disposal: Peak Flow Treatment	$1,256,000	$147,000 annually NPV $1,513,000 over 15 years NPV $2,317,000 over 30 years
	Total	$2,769,000 with 15 years OPEX $3,573,000 with 30 years OPEX	

2.2 Solution Set 2 – STEPS with existing Treatment and Disposal Locally

- Target reduction in peak and daily volumes through network renewal of scheme with a STEPS option (assuming a hub for 3 property connections).
- Use existing oxidation pond with disposal to existing border dyke disposal system.

Ref	Description	Capex	Opex
C11	Septic Tank Effluent Pumping Systems (STEPS)	$1,362,000	$73,000 annually NPV $752,000 over 15 years NPV $1,131,000 over 30 years
	Total	$2,114,000 with 15 years OPEX $2,493,000 with 30 years OPEX	

2.3 Solution Set 3 – STEPS with enhanced Treatment and Disposal Locally

- Target reduction in peak and daily volumes through network renewal of scheme with a STEPS option (assuming a hub for 3 property connections).
- A new package treatment plant with disposal to existing border dyke disposal system. Plant installed pre or post oxidation pond and capable of handling peak flows.

Ref	Description	Capex	Opex
C11	Septic Tank Effluent Pumping Systems (STEPS)	$1,362,000	$73,000 annually NPV $752,000 over 15 years NPV $1,131,000 over 30 years
TD5	Package Plant – Existing Disposal: Reduced Flow Treatment	$681,000	$100,000 annually NPV $1,030,000 over 15 years NPV $1,545,000 over 30 years
	Total	$3,825,000 with 15 years OPEX $4,719,000 with 30 years OPEX	

2.4 Solution Set 4 – STEPS with Vaulted system and Disposal Remotely

- Target reduction in peak and daily volumes through network renewal of scheme with a STEPS option (assuming a hub for 3 property connections).
- Pumping to storage (120 m3), with Collection then Cartage to the Leeston WWTP (Ellesmere).

Ref	Description	Capex	Opex
C11	Septic Tank Effluent Pumping Systems (STEPS)	$1,362,000	$73,000 annually NPV $752,000 over 15 years NPV $1,131,000 over 30 years
TD9	Ellesmere – Cartage	$285,000	$469,000 annually $4,827,000 over 15 years $6,840,000 over 30 years
	Total	$7,226,000 with 15 years OPEX $9,618,000 with 30 years OPEX	

2.5 Limitations on Estimates

With regards to budget estimates provided for the costs of construction, Stantec warrants only that we have exercised the reasonable skill, care and diligence of a Consulting Engineer in the preparation of our professional opinion of those costs. Stantec has no control over costs of labour, materials, competitive bidding environments and procedures, unidentified field conditions, financial and/or market conditions, or other factors likely to affect the probable cost of the works, all of which are and will unavoidably remain in a state of change. Stantec cannot and does not make any warranty, promise, guarantee, or representation, either express or implied, that proposals, bids, project construction costs, or cost of operation or maintenance will not vary substantially from its good faith cost estimate.

Consenting will be required for all options that include new treatment processes or effluent disposal locations, any change to the existing stormwater disposal may also require consent to discharge to the river. Stormwater treatment may be required depending on the consent conditions. The costs associated with consenting are dependent on the conditions and notifications required and therefore any professional service indications are high level for comparison purposes only.