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Appendix 4: Servicing Report

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Engineering Servicing Report

Leeston Plan Change

CLIENT	ADDRESS	REFERENCE
Holly Farm	High Street, Harmans Road and Leeston Dunsandel Road, Leeston	6129

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Report Information

Reference:	6129
Title:	Engineering Servicing Report
Client:	Holly Farm
Filename:	6129 – ENG-RPT-Servicing Report
Version:	6
Date:	November 27, 2019
Prepared by:	James Hopkins
Reviewed by:	Clayton Fairbairn

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Contents

1 Introduction

This purpose of this report is to demonstrate the serviceability of the proposed plan change area in north-west Leeston as indicated in Figure 1, below.

The proposed plan change area will have the potential to comprise approximately 410 new lots. Currently the area is zoned a mixture of Living 1 and Living 2 zone (both with deferred status) and outer plains zone in Selwyn District Council Plan. The proposed plan change will address the servicing issues that led to the deferred zoning as well as increasing the density of the zoning. Furthermore additional lower density land is included in the plan change area. The proposed plan change area is shown in green in Figure 1 below.

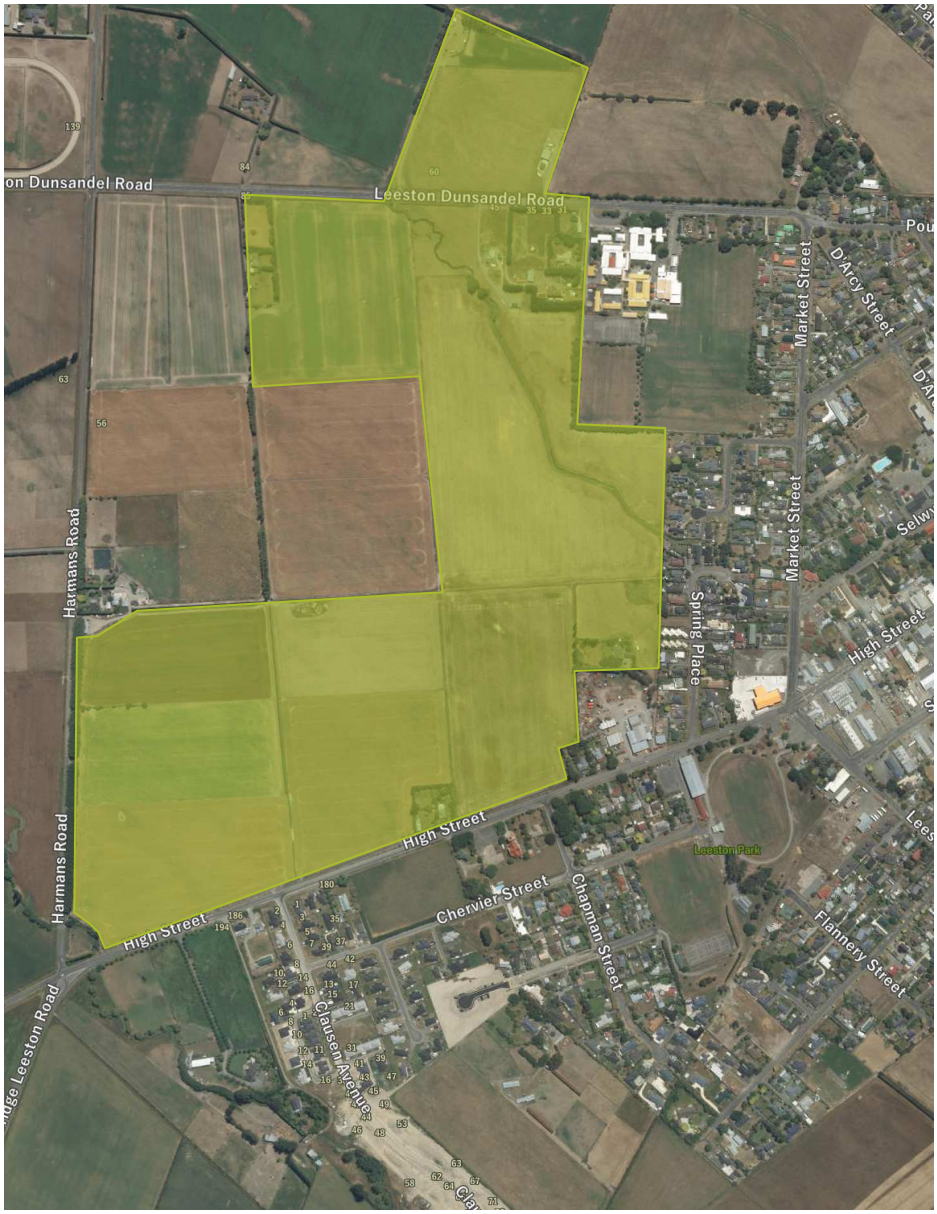

Figure 1: Plan Change Area

2 Wastewater

2.1 Existing Infrastructure

The wastewater infrastructure in Leeston generally comprises of gravity reticulation with 7 pump stations that discharge to a wastewater treatment facility located southeast of the township. An existing DN150 sewer main is located in High Street, terminating outside number 129, in the south east corner of the proposed plan change area. This sewer conveys wastewater from existing dwellings surrounding the plan change area via a trunk main in Leeston and Lake Road to the Ellesmere treatment plant.

The existing disposal system for the Ellesmere treatment plant is limited in capacity, especially at times of high groundwater. The proposed plan change would exceed the capacity remaining in the current disposal system. Therefore it is proposed that a trigger rule, requiring an upgrade to the disposal system upon development within the plan change area exceeding the current remaining capacity. The trigger rule will require upgrade(s) to the disposal of treated wastewater after the 80th allotment has been created.

2.2 Potential Disposal Methods

There is currently no wastewater reticulation servicing the plan change area itself, however surrounding existing dwellings are connected to the existing Leeston gravity sewer network. The following is a discussion of four options for wastewater disposal from the proposed plan change area. Two options are proposed to service the subject site. The general layout showing key components of the wastewater system servicing the plan change area can be seen in the Outline Serving Plan in Appendix A.

Option 1: Gravity network discharging to central pump station

Sewer from each lot would discharge via gravity laterals and gravity wastewater mains in the street to a new communal pump station within the plan change area. The pump station would be owned and operated by the Selwyn District Council (Council) and would pump flows which would discharge via a new rising main into the existing trunk sewer or existing rising main as appropriate and subsequently onto the existing wastewater treatment plant. Gravity networks are generally preferred due to their inherently lower operations and maintenance costs.

Option 2: Low Pressure on-site systems pumping to communal pressure mains

In locations where standard gravity infrastructure is not viable a common alternative is low pressure wastewater systems utilising individual pump stations on each lot, pumping via a shared small diameter rising main. With low pressure systems in new developments Council typically would own and maintain the pressure pipe within the road reserve, while the pump stations would be the responsibility of the individual property owners. Low pressure systems are particularly beneficial in sites where:

- There is insufficient natural fall for gravity network without an excessive number of municipal pump stations; or
- Weak or soft ground conditions may result in settlement of pipes resulting in loss of grade; or
- Seismically induced ground settlement may result in settlement of pipes resulting in loss of grade; or
- Ground conditions make excavation for deep gravity pipes expensive or dangerous.

Low pressure systems have a potential secondary benefit of managing peak flows. Individual pump stations can be controlled by a control module that communicate with a central system that can manage individual pump operation times to avoid or minimise pumping during peak flows in the downstream network, thus typical diurnal flow peaks are practically eliminated in medium to large scale low pressure systems.

Option 3: Vacuum Sewer

The option of vacuum sewer, was not investigated as it is difficult to economically justify in developments of fewer than 400 lots and they are better suited to substantially worse ground conditions than encountered in the plan change area.

Option 4: On site treatment and disposal

Due to high groundwater conditions in the proposed plan change area the option of on site treatment and disposal is not viable.

2.3 Preferred Options

Both options 1 and 2 are viable options for wastewater disposal for the plan change area. At the time of subdivision consent the advantages and disadvantages of each option can be assessed in detail and the best option selected.

Regardless of the internal reticulation method, wastewater from the proposed plan change area would be transported via gravity pipes to the existing wastewater network in High Street. The wastewater main in High Street joins the main trunk sewer in Leeston and Lake Road. The trunk sewer subsequently turns northeast to the wastewater treatment plant.

2.4 Plan change area predicted flow rates

Design flows have been calculated following Selwyn District Council's Engineering Code of Practice (SDC ECoP).

The following assumptions have been used in the calculations:

- Average sewer flow (ASF) of 220L/person/day (0.00255 L/s);
- Average population density of 2.7 persons/lot;
- Peak flow factor of 2.5;
- Wet weather flow factor of 2.0;
- Number of lots = 410;
- The average dry weather flow from the plan change area is calculated as 2.8 L/s; and
- The design maximum flow (MF) for the plan change area is estimated to be 14.1 L/s.

Note that if a low pressure solution is adopted the peak flow (MF) will not be subject to the same wet weather and peak flow factors. The sealed pressurised nature of low pressure systems substantially reduces inflow and infiltration. Furthermore diurnal peaks are naturally flattened due to the buffering effect of the individual pump station chambers. The actual peak can be further controlled and modified by applying logic to when each pump unit will operate to avoid multiple pumps operating at the same time.

The Ellesmere Area Plan has identified an expected growth in population of 49% by 2031 compared to 2015 (an average rate of 3% per annum for 16 years). It has also been identified at a pre-application meeting with Council that the existing infrastructure will not have sufficient capacity for this growth without further capital investment. Discussions with Council staff has identified that the existing wastewater treatment plant disposal system needs to be upgraded to accommodate the projected growth. It is expected that this would be manged via the trigger rule that require upgrade(s) to the disposal system prior to any development of any allotments beyond the 80th allotment.

3 Stormwater

3.1 Existing Infrastructure

The Leeston Creek currently flows through the plan change area. Discussions with the Council have identified that downstream of the plan change area the Leeston Creek is known to be under capacity. Council is currently in the process of upgrading the drain north of the plan change area to reduce flooding risk (discussed further in 3.2 below). Therefore the preferred stormwater discharge point for the plan change area is the Birdling Brook via an attenuation stormwater pond. There are two possible connection points. The first point is an existing 2,300 by 1,900 box culvert at the intersection of High Street and Harmans Road. The second point is an existing DN600 culvert opposite Chapman Street.

3.2 Leeston North Stormwater Bypass

The Selwyn District Council Activity Management Plan (Vol 4 2018) indicates that a Leeston North Stormwater bypass will be constructed by 2021. Once the diversion network is fully operational, the volume of water entering Leeston via the Leeston Creek will be less, leaving the township less susceptible to flooding. Stage one of this upgrade has already been completed, the remainder of the upgrade relies on a portion land at the northern extent of the plan change area and land within the land parcel to the east known as the Martin Block. Despite this upgrade no additional runoff from the plan change area would be permitted to be discharged in to the Leeston Creek.

3.3 Flooding

Area wide flooding is not addressed specifically in this report as it is addressed within the planning assessment for the proposed plan change.

3.4 Pre-development Flows

The plan change area is approximately 60 Ha and comprises of relatively flat pastoral land. It has been estimated that the pre-development time of concentration is approximately 30 minutes. Assuming a runoff co-efficient of 0.35 the undeveloped primary flow in a critical duration event (for the local system) can be estimated using the rational method as 830 L/s. It has been established that land to the northeast of the Leeston Creek (approximately 20% of the plan change area) currently drains to the Leeston Creek. Land to the south and west of the Creek discharges to Birdlings Brook, either via the box culvert at the corner of High Street and Harmans Road (approximately 8 Ha, estimated flow 108 L/s) or via the culvert at Chapman Place (40 Ha, estimated flow 556 L/s).

In longer duration events the critical duration is governed by the time of concentration (Tc) to critical locations in the greater stormwater network. Typically this is at the downstream end of the network and the critical duration is in the order of hours rather than minutes. As there is adequate land set aside in the proposed Outline Development Plan (ODP) to construct a stormwater attenuation basin this is not considered critical for the plan change.

3.5 Post-development Flows

In general, fully developed residential land has a runoff coefficient of 0.55 (as stated in the SDC ECOP Section 5.12.3). time of concentration is expected to reduce from approximately 30 minutes to 25 minutes. Therefore there is a 57% increase (0.55/0.35) in runoff in the 10% AEP event. However the presence of a stormwater attenuation basins designed for long duration events would mitigate the alteration in time of concentration and runoff coefficient for short duration events. The primary discharge from the stormwater management pond would be to the existing DN600 culvert at Chapman Place.

3.6 Proposed Stormwater System effects

The proposed gravity stormwater network would discharge to a newly constructed stormwater treatment facility. The treatment facility would include an attenuation pond that would attenuate runoff to pre-development flow rates prior to discharge. Birdlings Brook also has no residual capacity to accept an increase of stormwater flows resulting from increased hardstand. Council requires stormwater from a 2% AEP storm to be attenuated. Attenuation can be provided in the form of an attenuation basin located in the southern portion of the plan change area which is the natural low lying area.

Pipes would be designed based on stormwater volume discharging from the catchment area. First flush runoff from the hardstand areas of the proposed plan change area would drain via kerb and channel to sumps. Sumps would be constructed with a nominal storage depth below the outlet pipe to promote settling of sediment and be fitted with submerged outlets to reduce hydrocarbons discharged to the downstream system.

Each sump would discharge into the attenuation pond via designed pipes. Stormwater from the roof would also pass through designed stormwater pipes to the attenuation pond located at the south of the subdivision. Stormwater would then be discharged into the existing gravity network in Chapman place (where the peak flow rate would be less than the undeveloped flow rates for events up to and including the critical duration for the Birdlings Brook).

The attenuation basin would be sized to manage long duration events (in the order of several hours) where flow rates are substantially lower than in the shorter duration events. A significant positive side effect of this design criteria is that shorter duration events (typically less than 1 hour) become over-attenuated, meaning the flows in shorter duration events would be substantially less than predeveloped. In longer duration events the existing DN600 pipe would not be operating at its peak flow rate so there would be no flooding impact on the downstream pipe network.

Secondary flows from the stormwater management ponds would be split two ways, with some flows being directed towards Chapman Place, with the balance being directed west towards the existing 2,300 x 1,900 box culvert.

Overall the proposed centralised stormwater management area will provide the following key benefits:

- No additional flows are directed towards the Leeston Creek
- Long duration events will be attenuated to ensure post-development flows are less than pre-development flows, ensuring no increase in flooding to the existing pipe networks immediately downstream of the plan change areas, as well as the Leeston Creek or Birdlings Brook.
- Short duration events will be over-attenuated, meaning the flows in the local pipe networks immediately downstream of the plan change area will reduce compared to the natural runoff from the undeveloped land in its current state.
- First flush runoff will be treated to current best practice standards to minimise contaminants such as hydrocarbons, heavy metals and total solids are captured within the treatment facilities and therefore do not result in reduction in downstream water quality.

The general layout of the proposed stormwater system showing key connection points is shown in the outline service plan in Appendix A.

4 Water Supply

4.1 Existing Infrastructure

Water in Leeston is supplied from three wells, two located on Gallipoli Street with a third on Leeston and Lake Road which is used to supply water during the peak periods. Water is pumped and distributed via a network of pipes to households and commercial entities. Existing water supply pipes are present in High Street near the south eastern corner of the plan change area and Leeston Dunsandel Road near the north eastern corner of the plan change area. SDC have advised that the existing pump and pipe network does not have sufficient capacity to service the plan change area, thus augmentation of the existing system is required.

Council has recently purchased a utility allotment within the plan change area and a bore is in the process of being designed and constructed.

4.2 Proposed Servicing

The plan change area is proposed to be serviced via a mains pressure on-demand reticulation system. The existing Utility allotment will be utilised to make this possible. It is anticipated that the additional bore will provide the additional capacity required for the plan change area.

Within the plan change area a new network of water mains and submains would reticulate the water to the net area of each new allotment.

The general outline of the proposed water servicing of the plan change area can be seen in the Outline Servicing Plan in Appendix A

4.3 Water Supplies for Firefighting

For firefighting purposes, the classification for the subdivision would be FW2 (from SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies Code of Practice) based on all properties being residential, non-sprinklered structures. This classification requires at least one fire hydrant to be located within 135 m of any dwelling, and two hydrants located within 270m of any dwelling. Each hydrant must have the capacity to provide a minimum of 12.5 L/s with a minimum residual pressure of 100 kPa. It is envisaged that the augmentation of the existing water supply network would ensure that this requirement can be met with standard fire hydrant spacing.

5 Roading

5.1 Integrated Transport Assessment

Carriageway Consulting has been contacted for Integrated Transport Assessment (ITA) to evaluate the effects of the proposed Plan Change on the adjacent transportation networks. Roading and traffic matters that are covered by ITA are not discussed further in this report.

5.2 Existing Infrastructure

The site is bound by High Street on the south, Harmans Road on the west, Leeston Dunsandel Road on the north and existing residential development on the east. Ellesmere College bounds the plan change area in the north eastern corner. A small portion of the site lies north of Leeston Dunsandel Road.

As there has been a separate transport assessment the nature and suitability of the existing roading network is not discussed further in this report.

5.3 Proposed Internal Roads

A network of new roads within the plan change area would be formed with kerb and channel, cycle lanes (as appropriate), footpaths and grass berms in general accordance with the SDC ECoP. Linkages would be provided for pedestrians and cyclists in accordance with the ODP at the time of subdivision. The internal roads would have connections with Harman Road to the west, Leeston Dunsandel Rd to the north, Spring St to the East and two connections to High Street to the south.

To the north of Leeston Dunsandel Rd a semi-detached block of the plan change area would have a separate internal ring road connecting to Leeston Dunsandel Rd.

The key roads in the proposed plan change area can be seen in the ODP.

6 Electrical and Telecommunications

Orion have confirmed that the plan change area can be serviced with reticulated power from the existing network. A copy of the letter from Orion confirming is attached in Appendix 2.

Chorus NZ Ltd have confirmed that the plan change area can be serviced with reticulated power from the existing network. A copy of the letter from Chorus confirming the ability to connect is attached in Appendix 2.

Each lot can be serviced by underground utilities.

7 Conclusion

This servicing report has been prepared to accompany the proposed plan change application. Based on the preliminary design and discussions to date, the proposed plan change area can be serviced in general accordance with the requirements of SDC ECOP, NZS 4404:2010 and good engineering practice.

Wastewater can be reticulated via gravity or low pressure network and can be discharged via the existing trunk main to the existing wastewater treatment facility. A trigger rule requiring an upgrade to the wastewater disposal system upon development of any allotments after the 80th allotment will be required.

Stormwater can be collected via a gravity pipe network and directed to stormwater treatment and attenuation basins prior to discharging to Birdlings Brook.

Water supply can be full pressure mains, with a new bore and pump located within the plan change area to augment the existing Leeston water supply network. Fire fighting capacity can be provided with new hydrants in accordance with SNZ PAS 4509:2003.

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Appendix 1: Outline Servicing Plan

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Leeston North Stormwater Bypass

Leeston Dunsandel Road

Utility Allotment

Harmans Road

Mountain View Place

Spring Place

To Leeston Lake Road

Key

- ODP Boundary
- Parcel Boundaries
- Living 1 Zone
- Living 2 Zone
- Indicative Primary Road
- Indicative Secondary Road
- Stormwater Management Area
- Leeston Main Creek
- Indicative Water Trunk Main
- Indicative Water Bore
- Indicative Wastewater Trunk
- Indicative Rising Main
- Indicative Wastewater Pump Station
- Primary Stormwater Discharge
- Secondary Flow

Ex DN600 Culvert

Ex DN600 Stormwater to Birdlings Brook

Chapman St

High Street

Chervier St

Carston St

Clausen Ave

Lambie St

Birdlings Brook

Ex 1350 Dia Culvert

Ex 2300 x 1900 SW Boy Culvert

Feredays Road

Birdlings Brook

Leeston Plan Change

Scale	1:2000 @A1, 1:4000@A3
Date	31 July 2019
Design	JH
Drawn	EL
Review	AT

A	31/07/19	
B	21/08/19	Match latest ODP
C	23/10/19	RFI updating

Rev.	Date	Amendment

Revision C

Sheet 1

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Appendix 2: Confirmation of Power and Telecommunications network capacity

Chorus Network Services
PO Box 9405
Waikato Mail Centre
Hamilton 3200
Telephone: 0800 782 386
Email: tsg@chorus.co.nz

Sub Div Ref: LSN41929

14 August 2017

Your Ref:

Baseline Group

Attention: Jalesh
Dear Sir / Madam

SUBDIVISION RETICULATION – LSN: 56 Harmans Road, Leeston. 375 Lots (Simple Estimate)

Thank you for your enquiry regarding the above subdivision.

Chorus is pleased to advise that, as at the date of this letter, we would be able to provide ABF telephone reticulation for this subdivision. In order to complete this reticulation, we require a contribution from you to Chorus' total costs of reticulating the subdivision. Chorus' costs include the cost of network design, supply of telecommunications specific materials and supervising installation. At the date of this letter, our estimate of the contribution we would require from you is $690,000.00 (including GST).

We note that (i) the contribution required from you towards reticulation of the subdivision, and (ii) our ability to connect the subdivision to the Chorus network, may (in each case) change over time depending on the availability of Chorus network in the relevant area and other matters.

If you decide that you wish to undertake reticulation of this subdivision, you will need to contact Chorus (see the contact details for Chorus Network Services above). We would recommend that you contact us at least 3 months prior to the commencement of construction at the subdivision. At that stage, we will provide you with the following:

- confirmation of the amount of the contribution required from you, which may change from the estimate as set out above;

- a copy of the Contract for the Supply and Installation of Telecommunications Infrastructure, which will govern our relationship with you in relation to reticulation of this subdivision; and

- a number of other documents which have important information regarding reticulation of the subdivision, including - for example - Chorus' standard subdivision lay specification.

Yours faithfully

Hollie Jackson
Network Services Coordinator

Direct: +64 3 363 9722
Email: craig.marshall@oriongroup.co.nz
Ref: **ES335997**

18 August 2017
Re: 56 Harmans Road

C/O
Jalesh Devkota
Baseline Group
Level 1 140 Welles Street
Christchurch 8011

jalesh@blg.nz

Dear Sir,

Proposed sub-division connection to the Orion network
Lots 1-4 DP 82846, Lot 1 DP 9138, Lot 2 DP 365379, Lot 2 DP 319397 and part RS 5482,5483
Harmans and Dunsandal Leeston roads, Leeston

I refer to your letter and the above-named property(s). I have investigated your request and comment as follows;

1. Orion has the capacity on the network to meet your request

2. There are no specific connections available for this sub division; however,

3. A connection could be made available for one or more dwellings with an alteration to the Orion network.

4. There will be costs associated with providing the connection(s). These costs will be the responsibility of the property owner, not Orion.

5. To comply with Orion's network security conditions an alternative feed from adjoining developments may also be required.

6. This type of work would be a typical design build project. If you decide to proceed; have your designer forward their proposal to Orion for approval. Orion will forward Terms and Conditions for acceptance.

The terms and conditions presented to the applicant will encompass Orion's policies and practices current at the time.

Please don't hesitate to contact me on (03) 363 9722 if you have any questions, or email me at Craig.marshall@oriongroup.co.nz.

Yours faithfully

Craig Marshall
Reticulation Support Engineer

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