Synlait Milk Limited Request for Plan Change Stormwater Disposal Feasibility

• Prepared for

Synlait Milk Ltd.

• May 2014

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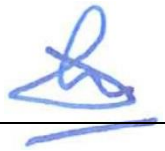
SIGNATURE 

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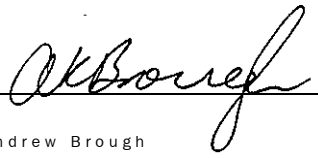
Approved by



Andrew Brough

Limitations:

This report has been prepared on the basis of information provided by Synlait Milk Ltd. [and] [others (not directly contracted by PDP for the work)]. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information. This report has been prepared by PDP on the specific instructions of Synlait Milk Ltd. for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

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1.0 Introduction

1.1 Proposal

Synlait Milk Ltd (Synlait) is making a request for a plan change to the Selwyn District Plan (Rural Volume).

The proposed plan change introduces provisions for a Dairy Processing Management Area (DPMA) covering an area of land containing, and immediately surrounding, the existing Synlait dairy plant at Heslerton Road, Dunsandel. The purpose of the DPMA is to recognise and provide for the continuing efficient use of the dairy plant and its future expansion.

The plan change request introduces new provisions which provide for activities associated with the processing of dairy products as well as rules which define the maximum buildable area within the DPMA. With the DPMA in place, it is anticipated that landuse consents to the Selwyn District Council will be minimised. Consents required from the Regional Council, which may potentially include the discharge of stormwater, would still be required and would be applied for at the time that future built development occurs.

1.2 Scope of Report

Pattle Delamore Partners Limited (PDP) has been engaged by Synlait to assess the feasibility of stormwater discharge to land within the plan change area, assuming full development of the DPMA's capacity.

The area of land within the DPMA is intended to provide sufficient space for the future development of the dairy plant. This is anticipated to occur over a period of decades and will progress in response to a variable range of factors. These include the market demand for dairy products, developments in the dairy industry, the operational requirements for a dairy plant and the size of the catchment area serviced by the dairy plant, including travel distances from farms to plant. Accordingly, there is an optimal scale of development based upon the above considerations.

Whilst the ultimate development scenario for the plant is undefined, the DPMA is generically based upon a scenario which is informed by the existing plant layout and its activities. This scenario anticipates up to 8 dryers with associated drystores, reception, roading and servicing as the maximum scale of development that would occur at this site.

The assessment is based on the depth to groundwater and evaluating potential for the underlying soil strata to treat and infiltrate stormwater into the ground.

This report will demonstrate that even using the most conservative assessment of the size of the stormwater treatment system required, there is sufficient area within the plan change area to manage runoff from future development.

2.0 Existing Stormwater Management System

The stormwater management system used for the existing development consists of a sediment forebay and an infiltration basin located on the Southeastern corner of the site to treat and dispose hardstand runoff.

Runoff from the existing truck washing facility, as well as the milk reception area, is separated from other hardstand areas. They are treated through the wastewater treatment plant to minimise the probability of contaminants entering the stormwater system.

Runoff from the roof area is normally discharged directly into the ground via soakpits separate to other stormwater, except that in some circumstances the roof runoff is combined with treated hardstand runoff and discharged to the same soakpit.

The existing system will be limited to the current extent of development, and stormwater runoff from further development will be treated and discharged into a new treatment system. This was done due to the fact that the existing system has been designed and consented for the current development. The existing system has been managed in accordance with the consent condition and there have not been matters of concern or system failure identified during its lifetime.

3.0 Hydrogeological Setting

The Synlait plant is situated on the central Canterbury Plains located over a few hundred metres of alluvium that has been deposited and reworked by alpine and foothills rivers during successive glacial and inter-glacial periods. Most of the strata have been deposited during glacial periods when sea level was lower and larger glaciers provided a large volume of eroded alpine strata that was deposited by high river flows across the plains. During the intervening inter-glacial periods when sea level was higher, glaciers were smaller, resulting in a smaller volume of new sediments being deposited although the river processes continued to re-work the alluvial deposits. These processes have resulted in zones of high permeability, well sorted gravels, which provide a source for high yielding abstraction bores, separated by zones of lower permeability sands and silts which still transmit water but may not support a high yielding abstraction bore.

3.1 Soil Strata

Landcare's soil map database shows that the underlying soil of the proposed plan change area mainly consists of Lismore and Mayfield type. The majority of the site's soil consists of Lismore, while around the Eastern and Western side of the site consists of Mayfield. The soil distribution map and the soil's detailed description are attached in Appendix B.

The soil report indicated that Lismore soil is classed as a well-drained soil, while Mayfield soil is classed as a moderately well drained soil due to the relatively higher clay content.

3.2 Groundwater Level

ECan's GIS shows that there are two water intake wells located within the proposed plan change area, with several other wells in its periphery. Well locations are shown in Appendix C, while details of the active wells within Synlait's plant are described in Table 1.

Table 1: Well Details at Synlait Plant

ECan Bore Number	Date Drilled	Diameter (mm)	Initial Static Water Level – Depth Below Ground (m)
L36/1533	June 2002	300	20.75
L36/2247	May 2009	50	30.14

Details of the active wells located around Synlait Plant's peripheral areas are described in Table 2.

Table 2: Well Details Around Synlait Plant

ECan Bore Number	Date Drilled	Diameter (mm)	Initial Static Water Level – Depth Below Ground (m)
BX22/0014	December 2013	50	13.00
BX22/0015	November 2013	50	13.15
L36/0840	August 1994	125	22.00
L36/0995	June 1996	300	23.35
L36/1625	January 2003	150	20.00
L36/1626	April 2003	300	19.30
L36/2015	April 2005	300	22.30

From the well information details shown in Table 1 and Table 2, it is clear that the groundwater level varies between 13 m and 30 m below the surface level.

Furthermore, based on ECan GIS' piezometric contour, the proposed plan change site is located at a level of 68 m to 75 m, against an average ground level of 86 m; the groundwater level is therefore approximately between 11 m – 18 m below the surface level.

3.3 Summary of Hydrological Setting

Based on understanding of the hydrogeology under the proposed plan change area and an observation of the existing stormwater management facilities on the site, it is expected that the underlying strata will be sufficiently permeable to allow stormwater to infiltrate through the strata without resulting in ponding on the ground surface.

4.0 Proposed Stormwater Treatment Method

A range of potential stormwater management solutions exist for runoff from the site. As development within the Plan Change area may occur over a period of decades the selected option will depend on the nature of the stormwater to be treated and the relevant planning rules that apply at that time. This report takes a conservative approach and assumes that:

- Development will occur over the full buildable area within the proposed Dairy Processing Management Area, requiring the largest amount of land area for stormwater disposal; and
- Runoff is treated through an infiltration basin for all events regardless of duration up to the 50 year return period events.

Please note that subject to the planning rules that exist at the time an application is made for the stormwater discharge consent a different standard of treatment, taking less area may be suitable.

5.0 Assessment of Stormwater Treatment and Disposal

Calculation of the developed area was based on the consented stage 4 development plan where out of the factory's total developed area of 23.6 ha, 3.8 ha consisted of roof area, while roading and hardstand area takes 6.5 ha. The ratio of areas covered by the roof is 16%, while hardstand is 28% of the total development area.

Assuming that similar areal composition is to be retained through the total proposed development area of 44 ha, it is estimated that the road and hardstand area is to cover 12.3 ha of land in the ultimate scenario. Based on that assumption, coupled with a worst case scenario of the requirement to treat all rainfall for the critical duration (24 hour in this case) 50 year rainfall event, the stormwater management area required is 1.2 ha, based on the assumption that the basin has an active depth of 1.0 m, a side slope ratio of 1:4, a length to width ratio of 2:1, and 0.2 m freeboard.

The stormwater management areal requirement could be easily accommodated within the proposed plan change area at the ultimate development phase.

Conservatively, it has been assumed that all road and hardstand areas are to be treated by the stormwater management system. The area may be reduced as, like at present, some of the hardstand areas may be treated by the wastewater treatment facility due to the potential contaminants present in the stormwater from those areas. This type of treatment provides further security to the stormwater treatment system, preventing more toxic contaminant from the stormwater treatment devices.

Additionally, stormwater runoff from the consented and any future expansion of the transport yard is assumed to be treated separately from the rest of the system to prevent hydrocarbon contamination.

6.0 Conclusion

Based on assumptions stated above and the ratio of rood and hardstand from the consented stage 4 development plan, there is more than sufficient land area available within the plan change area to treat and dispose stormwater generated by the full built development scenario.

The sub-surface gravel strata is expected to be sufficiently free draining to allow stormwater to infiltrate through to the underlying groundwater without resulting in water ponding at the ground surface.

The depth to groundwater is sufficient so that there is opportunity for stormwater to be treated further as it passes through the unsaturated gravel strata, further minimising any risk to groundwater.

Therefore, assuming the adoption of a standard best practice means there is nothing from a physical or hydro-geological perspective that introduces uncertainty in terms of the ability to effectively manage stormwater within the proposed Dairy Management Processing Area.

Overall the proposed plan change area is able to be effectively managed for stormwater runoff from any future development.

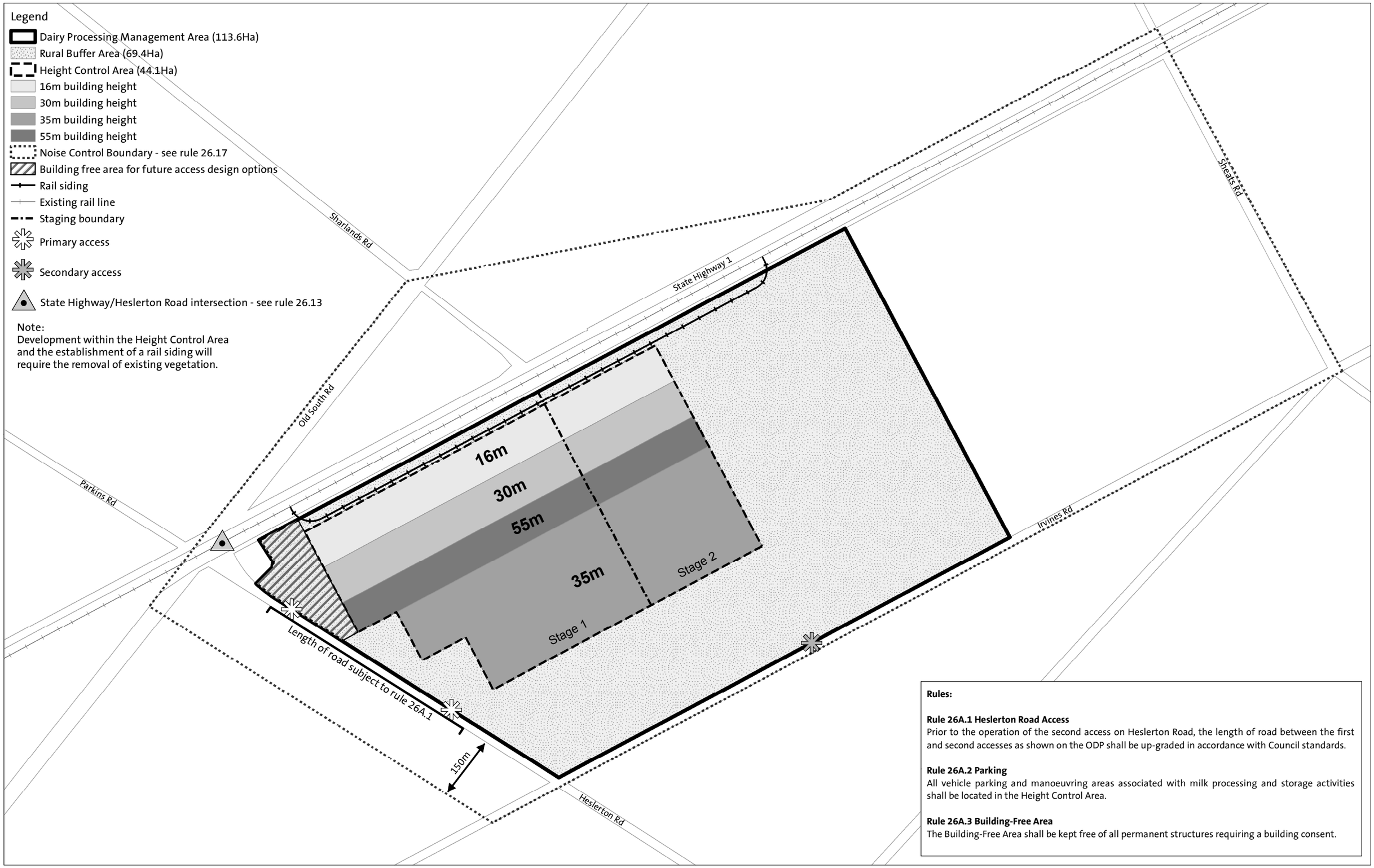
Appendix A

Plan Change Outline Development Plan

Legend

- Dairy Processing Management Area (113.6Ha)
- Rural Buffer Area (69.4Ha)
- Height Control Area (44.1Ha)
- 16m building height
- 30m building height
- 35m building height
- 55m building height
- Noise Control Boundary - see rule 26.17
- Building free area for future access design options
- Rail siding
- Existing rail line
- Staging boundary
- Primary access
- Secondary access
- State Highway/Heslerton Road intersection - see rule 26.13

Note:
Development within the Height Control Area and the establishment of a rail siding will require the removal of existing vegetation.



Rules:

Rule 26A.1 Heslerton Road Access
Prior to the operation of the second access on Heslerton Road, the length of road between the first and second accesses as shown on the ODP shall be up-graded in accordance with Council standards.

Rule 26A.2 Parking
All vehicle parking and manoeuvring areas associated with milk processing and storage activities shall be located in the Height Control Area.

Rule 26A.3 Building-Free Area
The Building-Free Area shall be kept free of all permanent structures requiring a building consent.

0 300 m
1:8,000 @ A3

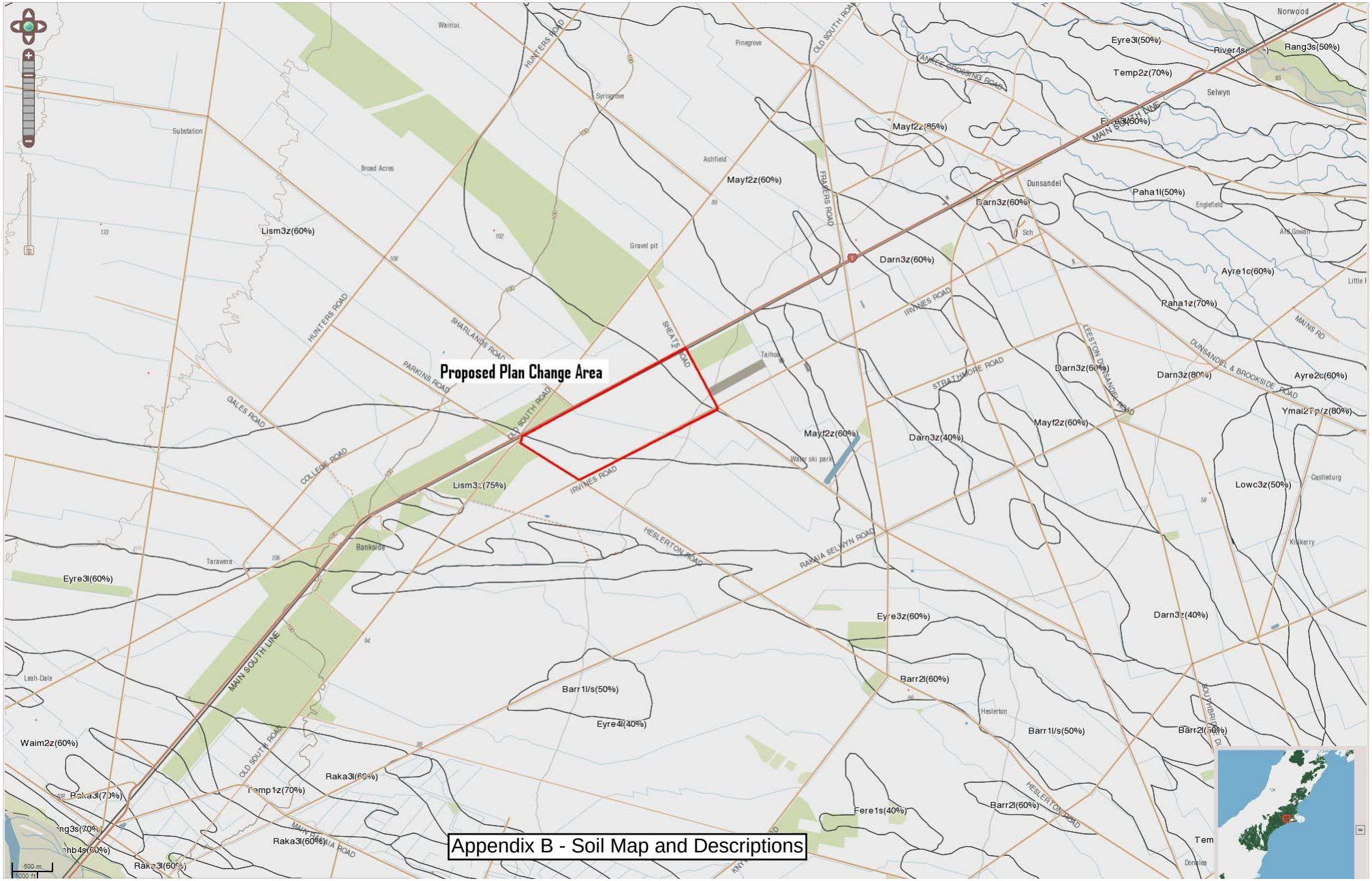
Appendix 26A

Outline Development Plan

Date: 13 May 2014 | Revision: 6

Appendix B

Soil Maps and Descriptions



Appendix B - Soil Map and Descriptions

Landcare Research Manaaki Whenua

S-map Soil Report

Report generated: 30-Aug-2013 from http://smap.landcareresearch.co.nz

This information sheet describes the typical average properties of the specified soil to a depth of 1 metre, and should not be the primary source of data when making land use decisions on individual farms and paddocks.

Lismore*f*

Lism3z (75% of the mapunit at location (5161239, 1531013), Confidence: Medium)

S-map ref: Lism_1.1

Key physical properties

Depth class (diggability)		Shallow (20 - 45 cm)
Texture profile		Silty Loam
Potential rooting depth		Unlimited
Rooting barrier		No significant barrier within 1 m
Topsoil stoniness		Slightly stony
Topsoil clay range		15 - 25 %
Drainage class		Well drained
Aeration in root zone		Unlimited
Permeability profile		Moderate Over Rapid
Depth to slowly permeable horizon		No slowly permeable horizon
Permeability of slowest horizon		Moderate (4 - 72 mm/h)
Profile available water	(0 - 100cm or root barrier)	Moderate (100 mm)
	(0 - 60cm or root barrier)	Moderate (88 mm)
	(0 - 30cm or root barrier)	High (60 mm)
Dry bulk density, topsoil		1.09 (g/cm3)
Dry bulk density, subsoil		1.42 (g/cm3)
Depth to hard rock		No hard rock within 1 m
Depth to soft rock		No soft rock within 1 m
Depth to stony layer class		Shallow

Key chemical properties

Topsoil P retention	Medium (43%)

About this publication

- This information sheet describes the *typical average properties* of the specified soil to a depth of 1 metre.
- For further information on individual soils, contact Landcare Research New Zealand Ltd: www.landcareresearch.co.nz
- Advice should be sought from soil and land use experts before making decisions on individual farms and paddocks.
- The information has been derived from numerous sources. It may not be complete, correct or up to date.
- This information sheet is licensed by Landcare Research on an "as is" and "as available" basis and without any warranty of any kind, either express or implied.
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Landcare Research Manaaki Whenua

Lismore*f*

Lism3z (75% of the mapunit at location (5161239, 1531013), Confidence: Medium)

S-map ref: Lism_1.1

Additional factors to consider in choice of management practices

Vulnerability classes relate to soil properties only and do not take into account climate or management

Soil structure integrity

Erodibility of soil material	Moderate
Structural vulnerability	Moderate (0.52)
Pugging vulnerability	not available yet

Water management

Water logging vulnerability	Very Low
Drought vulnerability - if not irrigated	Moderate
Bypass flow	Medium
Hydrological soil group	A
Irrigability	Flat to very gently undulating land with good drainage/permeability and soils with moderate PAW

Contaminant management

N leaching vulnerability	High
P leaching vulnerability	not available yet
Bypass flow	Medium
Dairy effluent (FDE) risk category	D

Additional information

Soil classification	Pallic Firm Brown Soils
Family	Lismore*f*
Sibling number	1
Profile texture group	Silty
Soil profile material	Rounded stony soil
Rock class of stones/rocks	From Hard Sandstone Rock
Rock origin of fine earth	From Hard Sandstone Rock
Parent material origin	Alluvium

Characteristics of functional horizons in order from top to base of profile:

Functional Horizon	Thickness	Stones	Clay*	Sand*
Loamy Weak	15 - 30 cm	0 - 10 %	15 - 25 %	5 - 30 %
Loamy Weak	5 - 25 cm	0 - 10 %	12 - 25 %	5 - 30 %
Very Stony Loamy Compact	0 - 20 cm	35 - 60 %	10 - 22 %	10 - 50 %
Very Stony Loamy Loose	0 - 20 cm	50 - 70 %	6 - 12 %	20 - 70 %
Very Stony Sandy Loose	40 - 55 cm	60 - 75 %	1 - 4 %	85 - 95 %

* clay and sand percent values are for the mineral fines (excludes stones). Silt = 100 - (clay + sand)

S-map Soil Report

Report generated: 30-Aug-2013 from http://smap.landcareresearch.co.nz

This information sheet describes the typical average properties of the specified soil to a depth of 1 metre, and should not be the primary source of data when making land use decisions on individual farms and paddocks.

Mayfield*f*

Mayf2z (60% of the mapunit at location (5161561, 1532972), Confidence: Medium)

S-map ref: Mayf_2.1

Key physical properties

Depth class (diggability)		Moderately Deep (45 - 90 cm)
Texture profile		Silty Loam
Potential rooting depth		Unlimited
Rooting barrier		No significant barrier within 1 m
Topsoil stoniness		Stoneless
Topsoil clay range		20 - 35 %
Drainage class		Moderately well drained
Aeration in root zone		Moderately limited
Permeability profile		Moderate Over Slow
Depth to slowly permeable horizon		40 - 70 (cm)
Permeability of slowest horizon		Slow (< 4 mm/h)
Profile available water	(0 - 100cm or root barrier)	Moderate (98 mm)
	(0 - 60cm or root barrier)	Moderate (76 mm)
	(0 - 30cm or root barrier)	Moderate (46 mm)
Dry bulk density, topsoil		1.22 (g/cm3)
Dry bulk density, subsoil		1.53 (g/cm3)
Depth to hard rock		No hard rock within 1 m
Depth to soft rock		No soft rock within 1 m
Depth to stony layer class		Moderately deep

Key chemical properties

Topsoil P retention	Low (19%)

About this publication

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Additional factors to consider in choice of management practices

Vulnerability classes relate to soil properties only and do not take into account climate or management

Soil structure integrity

Erodibility of soil material	Moderate
Structural vulnerability	High (0.62)
Pugging vulnerability	not available yet

Water management

Water logging vulnerability	Low
Drought vulnerability - if not irrigated	Low
Bypass flow	High
Hydrological soil group	C
Irrigability	Flat to very gently undulating land with slight drainage/permeability restrictions and soils with high PAW

Contaminant management

N leaching vulnerability	Medium
P leaching vulnerability	not available yet
Bypass flow	High
Dairy effluent (FDE) risk category	D

Additional information

Soil classification	Typic Argillic Pallic Soils
Family	Mayfield*f*
Sibling number	2
Profile texture group	Silty
Soil profile material	Moderately deep soil
Rock class of stones/rocks	From Hard Sandstone Rock
Rock origin of fine earth	From Hard Sandstone Rock
Parent material origin	Alluvium

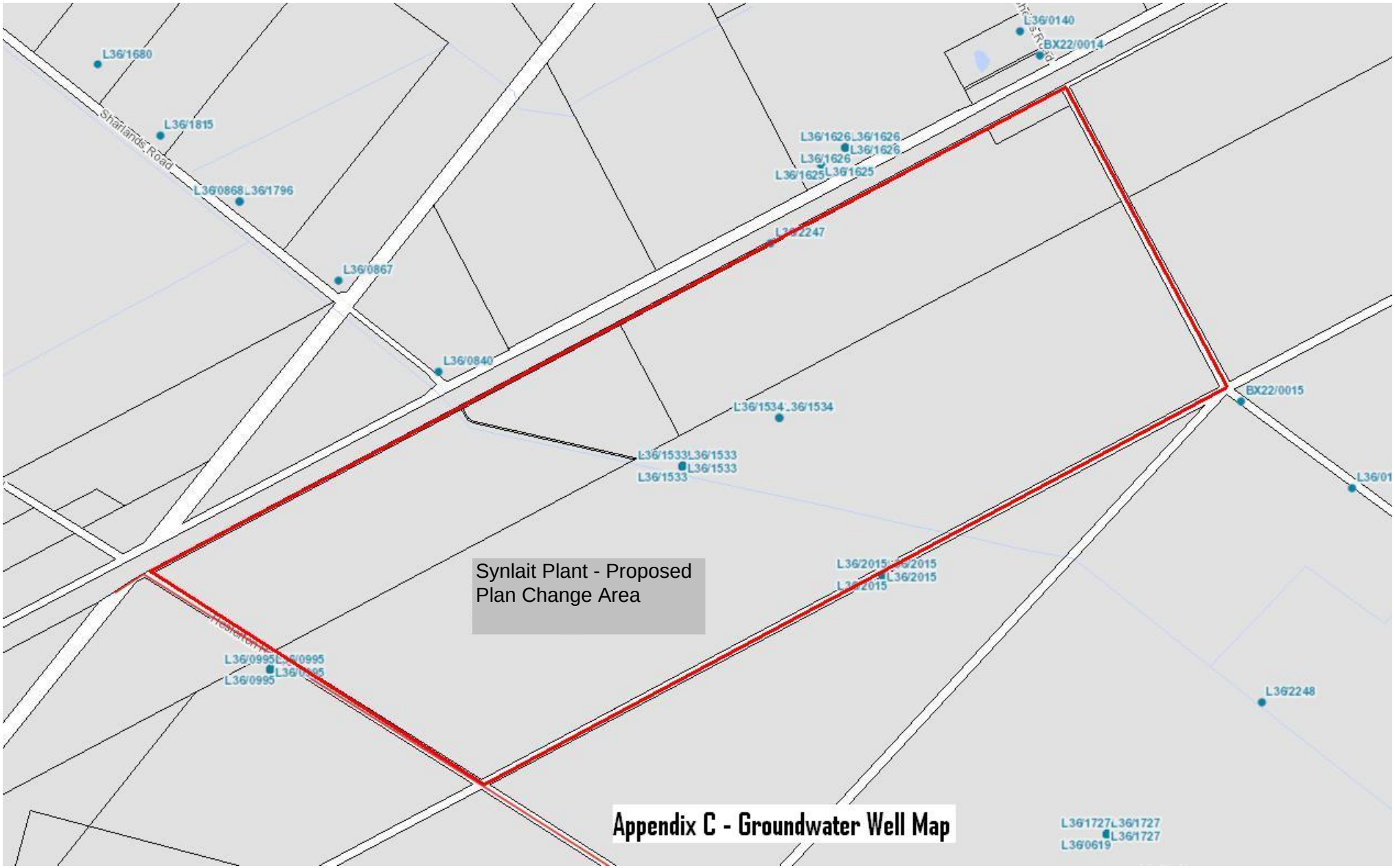
Characteristics of functional horizons in order from top to base of profile:

Functional Horizon	Thickness	Stones	Clay*	Sand*
Loamy Weak	18 - 30 cm	0 %	20 - 35 %	5 - 15 %
Loamy Fine Slightly Firm	10 - 40 cm	0 %	20 - 40 %	5 - 20 %
Loamy Fine Firm	0 - 40 cm	0 %	20 - 40 %	5 - 20 %
Very Stony Loamy Compact	10 - 50 cm	50 - 70 %	8 - 20 %	10 - 60 %
Extremely Stony Sandy	0 - 50 cm	70 - 80 %	1 - 4 %	80 - 90 %

* clay and sand percent values are for the mineral fines (excludes stones). Silt = 100 - (clay + sand)

Appendix C

Groundwater Well Map


L36/1680
L36/1815
Shirlands Road
L36/0868
L36/1796
L36/0867
L36/0840
L36/0140
BX22/0014
L36/1626
L36/1625
L36/1534
L36/1533
BX22/0015
Synlait Plant - Proposed
Plan Change Area
L36/0995
L36/2015
L36/2248
L36/1727
L36/0619
Appendix C - Groundwater Well Map