PROPOSED PLAN CHANGE 15

TO
CENTRAL OTAGO DISTRICT PLAN

REQUEST DOCUMENT

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THE CLYDE CLAIM LIMITED & HOULAHAN ENTERPRISES LTD, COLIN FOSTER, VICKI GILLIES & OSTEX CORPORATION LTD

REQUEST FOR A CHANGE TO THE OPERATIVE CENTRAL OTAGO DISTRICT PLAN

DUNEDIN: P.O. Box 5933, Dunedin 9058. T 03 477 3245
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ALEXANDRA: P.O. Box 103, Alexandra 9340. T 03 448 8775
CROMWELL: P.O. Box 84, Cromwell 9342. T 03 445 1826
QUEENSTOWN: P.O. Box 2645, Queenstown 9349. T 03 441 4715
WANAKA: P.O. Box 283, Wanaka 9305. T 03 443 0110

Job No: A4723 & A4702
Date: 27 February 2020
Status: Final

Prepared For:
The Clyde Claim Ltd, Houlahan Enterprises Ltd, Colin Foster, Vicki Gillies & Ostex Corporation Ltd

Prepared By:
Peter Dymock
RPSurv/BSc/DipMgt/MNZIS
Senior Planner

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1.0 Introduction

1.1 The Requestors

The requestors are:

The Clyde Claim Limited
Houlahan Enterprises Limited
Colin Fredrick Foster & Vicki Anne Geytha Gillies
Ostex Corporation Limited

The address for service is:

c/- Paterson Pitts Limited Partnership
P O Box 103
ALEXANDRA 9340

Attn: Peter Dymock
Email: peter.dymock@ppgroup.co.nz
Phone: (03) 448 8775 (0274) 377 910

1.2 Overview

The Clyde Claim Ltd, Houlahan Enterprises Ltd, Colin Foster, Vicki Gillies & Ostex Corporation request a change to the Operative Central Otago District Plan ("the District Plan") to re-zone approximately 13ha of land adjoining Mutton Town Road, Sunderland Street & State Highway 8 on the southern periphery of Clyde from Rural Residential Resource Area (Ru[RR])to Residential Resource Area (R).

The amendments proposed to the Plan are the addition of (R) zoning on planning Map 11 and minor changes to the rules in Section 7 (Residential Resource Area) of the plan to accommodate reverse sensitivity issues with development adjacent to State Highway 8 and to prevent subdivision and development of the site until the Clyde Wastewater Reticulation Scheme is available to service the site.

No changes are proposed to the issues, objectives, policies, methods of implementation, principle reasons for adopting objectives, policies and methods and environmental results anticipated in Sections 6 & 7 of the Plan.

The re-zoning of the site will enable the normal range of residential activities that prevail throughout the District's urban areas, including the possibility of a retirement village.

The request is timed to coincide with the commissioning of the Clyde Wastewater Project in late 2020.

2.0 The Site

A plan of the land subject to the request is shown at **Appendix 'A'.**

The land is contained within the following records of title:

- Lot 2 DP 18990 RT 17D/327 (6.1405ha) owned by The Clyde Claim Ltd
- Lot 2 DP 525753 RT 842310 (2.5573ha) owned by Houlahan Enterprises ltd.
- Lot 2 DP 331535 RT 129618(2.4760ha) owned by Houlahan Enterprises Ltd, Colin Fredrick Foster & Vicki Anne Geytha Gillies
- Lot 1 DP 525753 RT 842309 (1.3487ha) owned by Hunter Alexander Clarke, Elaine May Clarke & T T T Trustee Ltd. Ostex Corporation Ltd has an unconditional Sale & Purchase agreement in place to purchase this property.

A copy of the above titles are at **Appendix 'B'**. The land subject to the request also includes 4970m2 of road to be stopped. Acquisition of this land is subject to a concurrent process under the Public Works Act with the Central Otago District Council and the Southern District Health Board. A plan of this action is at **Appendix 'C'**. The total land area subject to the request is 13.0195ha.

3.0 The Existing Environment

The site is on the immediate south-eastern periphery of Clyde Township, along Mutton Town Road (which was formerly State Highway 8 prior to the Clyde Power Project realigning the highway above the Clyde Dam).

The site is generally flat within a location that exhibits a mixture of lot sizes and uses that reflect its Rural-Residential zoning i.e. predominately that of small "lifestyle blocks" averaging 2ha, most with existing dwellings.

The site does not have access to an irrigation supply and there is no significant productive use made of the site. There are two dwellings on the site and various sheds. A bund (earth mound) has been constructed along the State Highway 8 frontage of Lot 2 DP 18990.

Dunstan Hospital is across Mutton Town Road to the south west of the site. The most recent subdivision development in Clyde is directly opposite the site, across Sunderland Street. The Clyde Recreational Reserve (golf course) is some 159m distance along Sunderland Street and the historic centre of Clyde, 1.6km distance along Sunderland Street.

4.0 Purpose & Reason for the Request (the Objectives of the Request)

There is a demand for more residentially zoned land in Clyde to accommodate projected population growth in the township. However, Clyde has reached the limits of its existing urban zoning. There is no more land available for future subdivision and development in Clyde. Clyde does not currently have a reticulated waste water system and this has prevented any further expansion of the township's urban form – effectively an "urban growth ring", with the inevitable escalation of property prices that goes with restricting the supply of land. The current requirement for a minimum lot size of 800m^2 (because of the lack of reticulated wastewater) has also prevented any infill development of existing residential sections. However, the instigation of the Clyde Wastewater project now provides the opportunity for Council to zone further "greenfields" land to cater for urban growth.

This site is the most suitable direction for Clyde to expand:

- It is immediately adjacent to the existing urban area of Clyde.
- It will not involve "jumping" State Highway 8.
- It is well integrated with available infrastructure services and roading.
- It is not affected by any outstanding natural values, ecological values or significant landscape features, nor is it of high value for rural production (in particular not having any suitable irrigation source available to realise any productive potential).
- Land ownership is not too fragmented, which will enable a co-ordinated and coherent pattern of development and a logical and effective roading pattern.
- The only other suitable direction that Clyde can grow is across the Clutha River, beyond the Picnic Creek development. This however will involve urban development on land with a high productive potential and/or existing productive use on high quality soils with an irrigation supply.

In 2012, a non-complying application (RC 120183) was made to subdivide Lot 2 DP 18990 into 8 "lifestyle" lots, averaging 0.7ha. The grounds on which Council refused consent to this application are of direct relevance to this request, as follows:

> *"Section 5 directs the consent authority's attention to sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations. It may be that in future further consideration will need to be given to the identification of land where Clyde can expand onto, particularly if reticulated wastewater disposal becomes available.*
>
> *Future growth of Clyde is constrained to the west by the Clyde Golf Course and the Clutha River/Mata au; to the north-west by the Clyde Dam, Lake Dunstan and rising land; and to the north-east by State Highway 8 and the Otago Central Rail Trail.*
>
> *The land generally to the south-east of Sunderland Street adjacent to Mutton Town Road, including the subject, is the logical area within which future residential growth could be accommodated. The proposed subdivision would result in fragmented ownership of the subject site, within residential allotments ranging in area from 6316m² to 8489m². The orderly future expansion of Clyde, including appropriate provision for internal roading and the provision of services, would be better facilitated by the status quo or alternatively by controlled activity subdivision into average allotments of 2 hectares as provided for in terms of the Rural Residential Notation. The Council notes in this context that the amended plan of subdivision makes no provision for a future roading connection to the boundary of the Clarke property being Part Lot 1 DP 12610. Such provision would have been beneficial as it would reduce the likelihood of traffic utilising the Mutton Town Road/State Highway 8 intersection.*
>
> *The Council's initial review is that the subject site and other land at Mutton Town Road appear to be suitable for Residential Resource Area status in future, subject to appropriate provision being made for wastewater disposal via a reticulated*

wastewater system. The determination of whether the land should be included in the Residential Resource Area is a matter that could be addressed via a plan change or via the District Plan Review. These are the appropriate mechanisms for meeting the reasonable foreseeable needs of future generations in this instance." (my underlining)

Clearly, it is self-evident that this site is the logical area to accommodate future residential growth in Clyde.

The requestors are not pursuing a "master planned" or "structure planned" approach to the development of this site. The existing provisions of the District Plan's "Residential Resource Area" are very enabling and provide for a wide range of residential opportunity and housing topologies to meet contemporary market demand, including traditional stand-alone housing, town house type developments, apartments and retirement villages.

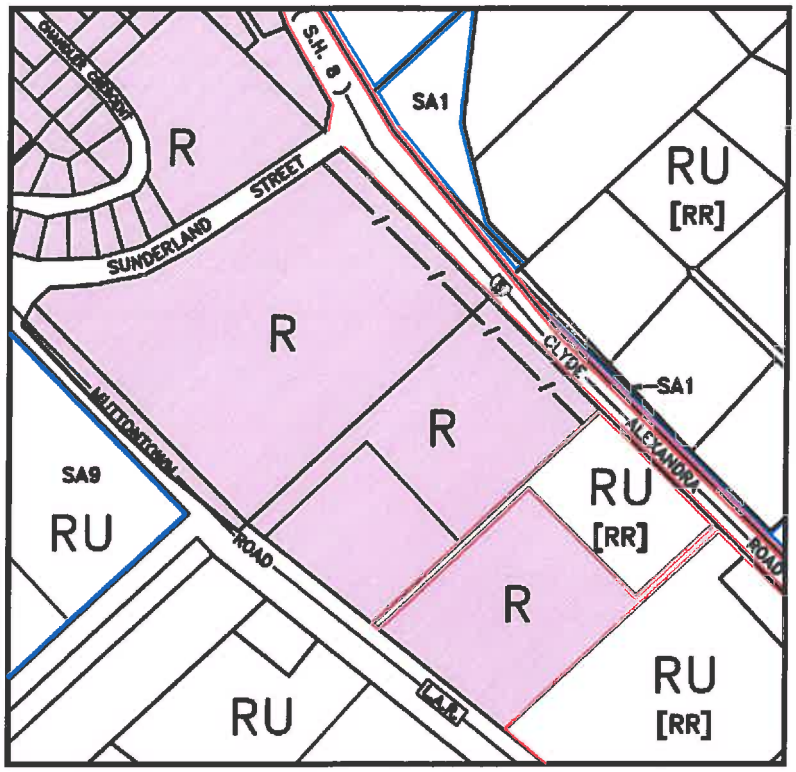
Master planned developments inevitably fall victim to changing economics and market preferences over the life of the development. Constant revisions of the "masterplan", often involving further complex plan changes or non-complying resource consent applications are a common feature of these types of development.

The requestors prefer to retain the flexibility afforded by a single "global" rezoning of their site. An overall yield of approximately 150 dwelling units/allotments for the site is anticipated.

5.0 The Proposed Changes to the Operative District Plan

The proposed changes to the District Plan are as follows:

(i) Amend Planning Map 11 to insert new Residential Resource Area boundaries and a building line restriction offset 20m from SH8 legal boundary, as shown on Fig 1 below.



(ii) Insert new **Rule 7.3.6(xii)(c):**
(c) Acoustics: Residential Resource Area in Lot 2 DP 189920 and Lot 2 DP 525753

New residential buildings located in the Residential Resource Area in Lot 2 DP 189920 and Lot 2 DP 525753 within 80m of the seal edge of State Highway 8 shall be designed and constructed to meet noise performance standards for noise from traffic on State Highway 8 that will not exceed 35dBA Leq (24hr) in bedrooms and 40dBA Leq (24hr) for other habitable rooms in accordance with satisfactory sound levels recommended by Australian and New Zealand Standard AS/NZ2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors.

This shall take account of any increases in noise from projected traffic growth during a period of not less than 10 years from the commencement of construction of the development.

(iii) As a consequence of (ii) above, insert an addition to **Rule 7.3.3 (ii) Breach of Standards.**

An activity that fails to comply with the following rules:

Rule 7.3.6 (xii) (c) Acoustics: Residential Resource Area in Lot 2 DP 18990 and Lot 2 DP 525753 is a discretionary restricted activity.

(iv) Insert a new Rule **7.3.6 (vi) Access (h)**

(h) No residential lots in Lot 2 DP 18990, Lots 1 & 2 DP 525753 and Lot 2 DP 331535 shall have direct access to State Highway 8, Sunderland Street and Mutton Town Road. Road access to any subdivision and development in Lot 2 18990 shall be only onto Sunderland Street.

The non-complying cross-reference note to this rule also needs amended to refer to "(h)".

(v) As a consequence of (iv) above insert a new **Rule 7.3.5 (vii)**

(vii) Access – Lot 2 DP 18990, Lots 1 & 2 DP 525753 and Lot 2 DP 331535

Any activity that fails to comply with Rule 7.3.6 (vi)(h) is a non-complying activity.

The cross reference note to this rule also needs amended to refer to "(h)".

(vi) Insert new Rule **7.3.6 (xiii) Screening Lot 2 DP 18990 & Lot 2 DP 525753**

On all site boundaries of Lot 2 DP 18990 & Lot 2 DP 525753 adjacent to State Highway 8 a landscaped strip shall be provided within the 20m wide Building Line Restriction. The strip shall not be paved or have any structures erected on it (including fences) and shall create the opportunity for landscaping to provide visual enhancement or screening. Landscaping shall not impede traffic visibility or shade State Highway 8 and shall be maintained in a healthy and tidy condition at all times. Provision shall be made for the landscaped strip on the plan of subdivision and landscaping shall be established along the entire landscaped strip at the time of subdivision. The retention and future maintenance of the landscaping in the landscaped strip shall be provided for as a condition of subdivision consent that is to be subject to a consent notice.

Reason

Landscaped buffers along State Highways within the District's Residential Areas assist in mitigating reverse sensitivity effects, provide for beautification of the entrances into the District's urban areas, screen built form from users of the highway and enhance the privacy and amenity of dwellings adjoining the highway.

A cross-reference note to this note is required as follows:

Breach

Discretionary Activity see Rule 7.3.4(i)

(vii) As a consequence of (vi) above insert an addition to Rule **7.3.4 Discretionary Activities (i) Breach of Standards**

Rule 7.3.6(xiii) Screening Lot 2 DP 18990 & Lot 2 DP 525753

(viii) Insert new Rule **7.3.5(vii) Subdivision & Development within the Residential Resource Area of Lot 2 DP 18990, Lots 1 & 2 DP 525753 and Lot 2 DP 331535**

Subdivision & Development within the Residential Resource Area of Lot 2 DP 18990, Lots 1 & 2 DP 525753 and Lot 2 DP 331535 prior to the provision of a reticulated wastewater scheme servicing the land is a non-complying activity.

The request includes any necessary consequential changes to the plan required by the Council to accommodate the above proposed changes to the Plan.

6.0 Statutory Matters

6.1 Part 2 RMA91

5. Purpose

(1) The purpose of this Act is to promote the sustainable management of natural and physical resources.

(2) In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while –

a. Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and

b. Safeguarding the life-supporting capacity of air, water, soil, and ecosystems, and

c. Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

The request enables the well-being of the Clyde community and surrounding area by expanding the urban area to accommodate the growing population in the most logical location for expansion and with a zoning that provides for a wide range of lot sizes, housing typologies and affordability levels. The life supporting capacity of air, water and soil will be maintained by the reticulation and disposal of wastewater into an established reticulation and treatment scheme.

The request includes provisions to avoid, remedy and mitigate adverse effects on the environment as to increased traffic generation and provision of suitable infrastructure.

6. Matters of National Importance

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural

and physical resources, shall recognise and provide for the following matters of national importance:

(a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and drivers and their margins, and the protection of them from inappropriate subdivision, use, and development.
(b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use and development.
(c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.
(d) The maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers.
(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga.
(f) The protection of historic heritage from inappropriate subdivision, use, and development.
(g) The protection of protected customary rights.
(h) The management of significant risks from natural hazards.

Paragraphs (a) and (d) are not relevant to this Request.
(b) The site does not contain any outstanding natural features or landscapes.
(c) The site does not contain any areas of significant indigenous vegetation and significant habitats of indigenous fauna.
(e) So far as is known, the site does not contain any sites of particular importance to Maori. The best way to deal with this issue is by way of discovery protocols as a condition of consent on any subsequent resource consents to subdivide or develop the site.
(f) The site does not contain any items of historic heritage.
(h) The site is not subject to any significant risk from natural hazards.

7. Other Matters

In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development and protection of natural and physical resources, shall have particular regard to –

(a) Kaitiakitanga
[(aa) The ethic of stewardship]
(b) The efficient use and development of natural and physical resources
[(ba) The efficiency of the end use of energy]
(c) The maintenance and enhancement of amenity values
(d) Intrinsic values of ecosystems
(e) Repealed
(f) Maintenance and enhancement of the quality of the environment
(g) Any finite characteristics of natural and physical resources
(h) The protection of the habitat of trout and salmon
[(i) The effects of climate change]
[(j) The benefits to be derived from the use and development of renewable

energy]

Paragraphs (a), (aa), (ba), (d), (g), (h), (i), and (j) are not relevant to this Request.

(b) It is efficient to expand Clyde in a location that is well suited for residential development and that is contiguous with the existing township and the amenity that it provides.

(c) & (f) The prosed zoning is the same as the existing Clyde Township's zoning, the objectives, policies and rules of which specifically provide for the maintenance and enhancement of amenity values in residential subdivision and development.

No matters arise with regard to Sec 8 (Treaty of Waitangi) of Part 2.

6.2 Section 73 and Schedule 1 RMA91

Under Section 73(2) of the Act any person may request a territorial authority to change a district plan, and the plan may be changed in the manner set out in Schedule 1. Clause 22 of Schedule 1 (Form of request) requires that the request:

- *Shall be made in writing and shall explain the purpose of, and reasons for, the change to the plan and contain an evaluation report prepared in accordance with Section 32 for the proposed plan or change; and*

A Section 32 evaluation is appended at **Attachment 'E'**.

- *Where environmental effects are anticipated, shall describe those effects, taking into account clauses 6 and 7 of Schedule 4, in such detail as corresponds with the scale and significance of the actual or potential environmental effects anticipated from the implementation of the change.*

An Assessment of Environmental Effects is appended at **Attachment 'D'**.

Under Clause 25 of Schedule (1) the Council may reject the request in whole or in part but only on certain grounds:

(a) The request or part of the request is frivolous or vexatious; or
(b) Within the last 2 years, the substance of the request or part of the request –
(i) Has been considered and given effect to, or rejected by, the local authority or the Environment Court; or
(ii) Has been given effect to by regulations made under Section 360A; or
(c) The request or part of the request is not in accordance with sound resource management practice; or
(d) The request or part of the request would make the policy statement or plan inconsistent with Part 5; or
(e) In the case of a proposed change to a policy statement or plan, the policy statement or plan has been operative for less than 2 years.

- The request is not frivolous or vexatious,

- Within the last 2 years, the substance of the request has not been considered by the Council or the Environment Court;
- The request accords with sound resource management practice;
- The request would not make the Operative Plan inconsistent with Part 5 of the Act;
- The District Plan has been operative for more than 2 years

Preliminary discussions were held with Council's Planning Department in this matter and Council confirmed, on a without prejudice basis and subject to receipt and consideration of the full text of the Request, that it was not likely to refuse to accept a request for a private plan change for further processing on the grounds outlined in Section 25(4) of Part 2 Schedule 1 of the RMA 91 (email dated 31 October 2019 from David Campbell, Planning Manager).

6.3 Section 74 RMA91

Section 74 (2) (a) requires consideration of any Proposed Regional Policy Statement (PRPS) or Proposed Regional Plan (PRP). The PRPS is considered in the Sec 32 evaluation at **Appendix 'E'**

In summary, the Request is consistent with and gives effect to the PRPS. There are no relevant PRPs.

With regard to Section 74 (2) (b):

- There are no relevant management plans or strategies prepared under other Acts.
- There are no relevant entries on the NZ Heritage List/Rarangi Korero.

With regard to Section 74(2A). The Kai Tahu ki Otago Natural Resource Management Plan 2005 (NRMP) is considered in the Sec 32 evaluation at **Appendix 'E'.**

With regard to Sec 74 (3), the Request does not involve any trade competition (other than competition in the residential land and property market).

6.4 Sec 75 RMA91

With regard to Sec 75 (3) any relevant National Policy Statement, National Environmental Standard and the Regional Policy Statement (RPS) are considered in Sec 32 evaluation at **Appendix 'E'**.

In summary, the Request is consistent with all relevant NPS and NES and is consistent with and gives effect to the RPS.

Under Sec 75 (4) there are no relevant Regional Plan considerations. Any consents required under the Regional Plan to give effect to the development enabled by the Request will be applied for at the time of subsequent subdivision and/or development. However, it is not anticipated that any Regional Council consents will be required to subdivide or develop the site.

7.0 Documents to Support the Request

The following documents are appended:

Appendix	Assessment	Title/Author	Date
D	Assessment of Environmental Effects	Paterson Pitts Limited Partnership (Peter Dymock)	27 February 2020
E	Sec 32 Evaluation	Paterson Pitts Limited Partnership (Peter Dymock)	27 February 2020
F	Market/Economics Assessment	Clyde Residential Growth & Demand Analysis: M E Consulting (Natalie Hampson)	28 February 2020
G	Integrated Transport Assessment	Mutton Town Road Integral Transport Assessment – WSP (Chris Baker)	28 February 2020
H	Soil Contamination Assessment	Detailed Site Investigation Insight Engineering (Claude Midgely)	3 March 2020
I	Infrastructure Assessment	Paterson Pitts Limited Partnership (Myles Garmonsway)	27 February 2020

Appendix 'A'

Land Subject to the Request

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PLOT DATE: 28 February, 2020 - 8:32 AM BY: Kathryn Garthorsway

CROMWELL BRANCH
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PO Box 84,
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E cromwell@ppgroup.co.nz

Client/Location
Mutton Town Road

Purpose/Drawing Title
Proposed Private Plan Change
Lot 2 DP 18990, Lot 2 DP 525753, Lot 2 DP 331535 & Road To Be Stopped.

Surveyed by:	
Designed by:	DP
Drawn by:	GP/KWG
Checked by:	DP
Approved by:	DP
Job Ref:	A4702 / A4723
Original Size:	A3
Scale:	1:2,000
	DO NOT SCALE
Sheet No:	1
Revision No:	C
Date Created:	26/02/2020

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Appendix 'B'

Records of Title

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**OT17D/237**
Land Registration District	**Otago**
Date Issued	25 July 1996

Prior References
OT4C/359

Estate	Fee Simple
Area	6.1405 hectares more or less
Legal Description	Lot 2 Deposited Plan 18990

Registered Owners
The Clyde Claim Limited

Interests

Subject to Section 59 Land Act 1948

440764 Gazette Notice declaring a portion of State Highway No 8 (Clyde-Alexandra) fronting the within land to be a limited acess road - 26.5.1975 at 1.53 pm

614040 Gazette Notice declaring a portion of State Highway No 8 fronting the within land to be a limited acess road - 4.5.1984 at 10.30 am

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**842310**
Land Registration District	**Otago**
Date Issued	30 August 2018

Prior References
OT4D/1399

Estate	Fee Simple
Area	2.5573 hectares more or less
Legal Description	Lot 2 Deposited Plan 525753

Registered Owners
Houlahan Enterprises Limited

Interests

Subject to the reservation to the Crown of the right at any time and from time to time without being deemed to commit a trespass and without payment of compensation to enter upon the said land and to take, lay, construct, maintain, inspect, repair or re-construct water-races, drains and all other works which the Minister of Works deems necessary for the supply of water to the said land or to any other land and subject also to the owner of the said land being required to take water from races so provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or breakaway of any race or channel.

Subject to Section 59 Land Act 1948

440764 Gazette Notice declaring a portion of No: 8 State Highway (Clyde-Alexandra) fronting the within land to be a limited access road - 26.5.1975 at 1.53 pm

483128 Proclamation defining the middle line of a portion of State Highway No: 8 (Timaru-Milton) fronting the within land - 15.8.1977 at 9.39 am

485428 Compensation Certificate pursuant to Section 17 Public Works Amendment Act 1948 - 27.9.1977 at 10.49 am

614040 Gazette Notice declaring a portion of State Highway No. 8 fronting the within land to be a limited access road - 4.5.1984 at 10.30 am

11120436.4 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 30.8.2018 at 11:07 am

Subject to a right of way over part marked A on DP 525753 created by Easement Instrument 11120436.5 - 30.8.2018 at 11:07 am

Appurtenant hereto is a right to convey telecommunications, computer media and electricity created by Easement Instrument 11120436.5 - 30.8.2018 at 11:07 am

The easements created by Easement Instrument 11120436.5 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Easement Instrument 11120436.6 - 30.8.2018 at 11:07 am

11254918.3 Mortgage to Bank of New Zealand - 17.12.2018 at 4:47 pm

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	129618
Land Registration District	Otago
Date Issued	18 March 2004

Prior References
OT4D/1400

Estate	Fee Simple
Area	2.4760 hectares more or less
Legal Description	Lot 2 Deposited Plan 331535

Registered Owners
Houlahan Enterprises Limited as to a 3/4 share
Colin Frederick Foster and Vicki Anne Geytha Gillies as to a 1/4 share

Interests

Subject to the reservation to the Crown of the right at any time and from time to time without being deemed to commit a trespass and without payment of compensation to enter upon the said land and to take, lay, construct, maintain, inspect, repair or re-construct water-races, drains and all other works which the Minister of Works deems necessary for the supply of water to the said land or to any other land and subject also to the owner of the said land being required to take water from races so provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or breakaway of any race or channel.

Subject to Section 59 Land Act 1948

440764 Gazette Notice declaring a portion of No: 8 State Highway (Clyde-Alexandra) fronting the within land to be a limited access road - 26.5.1975 at 1.53 pm

483128 Proclamation defining the middle line of a portion of State Highway No: 8 (Timaru-Milton) fronting the within land - 15.8.1977 at 9.39 am

488893 Compensation Certificate pursuant to Section 17 Public Works Act 1948 - 5.12.1977 at 11.21 am

614040 Gazette Notice declaring a portion of State Highway No: 8 fronting the within land to be a limited access road- 4.5.1984 at 10.30 am

Subject to a right to take,pump,convey water & convey electricity over part marked A DP 331535 created by Easement Instrument 5936412.7 - 18.3.2004 at 9:00 am

The easements created by Easement Instrument 5936412.7 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Easement Instrument 5936412.8 - 18.3.2004 at 9:00 am

11636992.3 Mortgage to Obsidian Group Nominee Company Limited - 24.1.2020 at 4:14 pm

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**842309**
Land Registration District	**Otago**
Date Issued	30 August 2018

Prior References
OT4D/1399

Estate	Fee Simple
Area	1.3487 hectares more or less
Legal Description	Lot 1 Deposited Plan 525753

Registered Owners
Hunter Alexander Clarke, Elaine May Clarke and T T T Trustee Limited

Interests

Subject to the reservation to the Crown of the right at any time and from time to time without being deemed to commit a trespass and without payment of compensation to enter upon the said land and to take, lay, construct, maintain, inspect, repair or re-construct water-races, drains and all other works which the Minister of Works deems necessary for the supply of water to the said land or to any other land and subject also to the owner of the said land being required to take water from races so provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or breakaway of any race or channel.

Subject to Section 59 Land Act 1948

485428 Compensation Certificate pursuant to Section 17 Public Works Amendment Act 1948 - 27.9.1977 at 10.49 am

Subject to a right to convey telecommunications, computer media and electricity over part marked B on DP 525753 created by Easement Instrument 11120436.5 - 30.8.2018 at 11:07 am

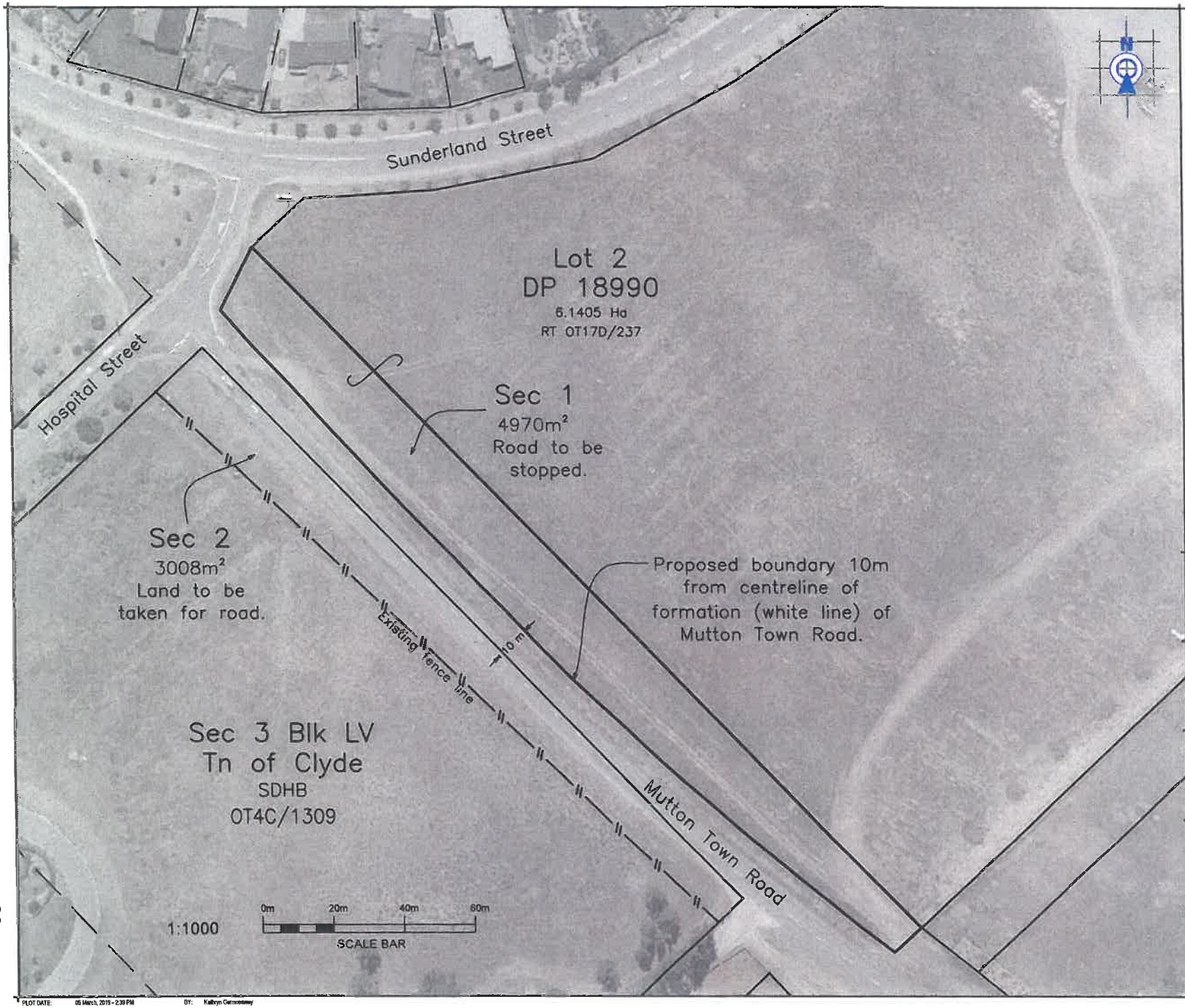
Appurtenant hereto is a right of way created by Easement Instrument 11120436.5 - 30.8.2018 at 11:07 am

The easements created by Easement Instrument 11120436.5 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Easement Instrument 11120436.6 - 30.8.2018 at 11:07 am

Appendix 'C'

Road to be Stopped



Notes:
Sec 1 to be amalgamated with Lot 2 DP 18990.

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CROMWELL BRANCH
30 The Mall,
or
PO Box 84,
Cromwell 9342.
T 03 445 1826
E cromwell@ppgroup.co.nz

Client/Location:
Dunstan Village Ltd
Mutton Town Road

Purpose/Drawing Title:
Sec's 1 & 2 Being Proposed Road to be Stopped & Land to be Taken

Surveyed by:		Original Size: A3	Scale: 1:1000
Designed by:			
Drawn by:	KWB		
Checked by:	PD		DO NOT SCALE
Approved by:	PD		
Job Ref: A4690_SCM	Sheet No: 1	Revision No: B	Date Created: 05/03/2019

PLOT DATE: 05 March, 2019 - 2:39 PM BY: Kathryn Germonseway

J:\A_4690 DUNSTAN VILLAGE\CAD\A4690_SCM_10.DWG

Appendix 'D'

Assessment of Environmental Effects

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THE CLYDE CLAIM LIMITED , HOULAHAN ENTERPRISES LTD, COLIN FOSTER, VICKI GILLIES & OSTEX CORPORATION LTD

ASSESSMENT OF ENVIRONMENTAL EFFECTS

Request for a Change to the
Operative Central Otago District Plan

February 2020

DUNEDIN: P.O. Box 5933, Dunedin 9058. T 03 477 3245
CHRISTCHURCH: P.O. Box 160094, Christchurch 8441. T 03 928 1533
ALEXANDRA: P.O. Box 103, Alexandra 9340. T 03 448 8775
CROMWELL: P.O. Box 84, Cromwell 9342. T 03 445 1826
QUEENSTOWN: P.O. Box 2645, Queenstown 9349. T 03 441 4715
WANAKA: P.O. Box 283, Wanaka 9305. T 03 443 0110

Job No: A4702 & A4723
Date: 27 February 2020
Status: FINAL

Prepared For:
The Clyde Claim Ltd, Houlahan Enterprises Ltd, Colin Foster, Vicki Gillies & Ostex Corporation Ltd

Prepared By:
Peter Dymock
Senior Planner/RPSurv/BSc/DipMgt/MNZIS

Paterson Pitts Limited Partnership (Cromwell Office)
30 The Mall
P O Box 84
Cromwell 9342
Telephone: +64 3 445 1826
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Web: www.ppgroup.co.nz

Contents

1.0 Introduction

Section 22 of the RMA 91 requires that

> *(2) where environmental effects are anticipated, the request shall describe those effects, taking into account [[clauses 6 and 7]] of Schedule 4, in such detail as corresponds with the scale and significance of the actual or potential environmental effects anticipated from the implementation of the change, policy statement, or plan]*

Schedule (4) provides that the following matters taken into account with any such environmental assessment.

> ***(6) Information required in assessment of environmental effects***
> *(1) An assessment of the activity's effects on the environment must include the following information:*
> *a) If it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:*
> *b) An assessment of the actual or potential effect o the environment of the activity:*
> *c) If the activity incudes the use of hazardous ... installations, an assessment of any risks to the environment that are likely to arise from such use:*
> *d) If the activity includes the discharge of any contaminant, a description of –*
> *i. The nature of the discharge and the sensitivity of the receiving environment to adverse effects; and*
> *ii. Any possible alternative methods of discharge, including discharge into any other receiving environment:*
> *e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect:*
> *f) identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted:*
> *if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved:*
> *if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).*

> ***(7) Matters that must be addressed by assessment of environmental effects***
> *(1) An assessment of the activity's effects on the environment must address the following matters:*
> *a) Any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:*
> *b) Any physical effect on the locality, including any landscape and visual effects:*

c) *Any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:*
d) *Any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generates:*
e) *Any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminates:*
f) *Any risk to the neighbourhood, the wider community, or the environment through natural hazards ... or hazardous installations.*

This assessment takes into account the technical reports in **Attachments 'D' to 'I'** of the Request, which form an integral part of the Request.

2.0 Affected Persons & Consultation

Letters were set out to the following persons who are considered to be affected persons, seeking preliminary comments on the Request:

Address	Person/Organisation	Response
	Otago Regional Council	
	Aukaha	Yes
	NZTA	Yes
	Southern District Health Board	Yes
103 Mutton Town Road	Glenys & Philip Bradley	
84 Mutton Town Road	James & Rosemary Hutton	Yes
89 Mutton Town Road	Maureen Weir	
	John & Patricia Lines	
81 Mutton Tow Road	Ester & John Weatherall	
86 Mutton Town Road	Elaine & Hunter Clarke	
83 Mutton Town Road	Mark Weatherall	Yes

Responses received are attached at **Appendix 'A'.**

Several informal meetings were held with Council's Planning & Infrastructure staff. The Requesters have been advised by Ms Julie Muir (Council's Infrastructure Manager) that the Clyde Wastewater Project was being designed to serve future development along Mutton Town Road, including Dunstan Hospital. A public "drop-in" evening was held at the Clyde Bowling Club on Wednesday 12 February 2020.

Approximately 50 people attended and the general response was overwhelmingly supportive. Written comments provided at the meeting are attached at **Appendix 'A'.**

3.0 Effects Relating to Urban Land Supply & Growth.

The supporting document "Clyde Residential Growth & Demand Analysis" prepared by M.E. Consulting considers whether the Request responds to projected demand for additional residential capacity in Clyde. The M.E. report finds that Clyde may expect an additional 274-289 urban households by 2048, assuming no constraints on growth. However the reliance on septic tanks and disposal fields has effectively imposed an "urban growth boundary" around Clyde.

The effects of the imposed "urban growth boundary" are now being felt. Capacity to accommodate projected dwelling growth, even in the short term, is not available. The current zoned urban area is largely developed, and no more zoned Greenfield land remains to be subdivided. Dwelling growth has been slowing as the number of remaining vacant residential lots dwindles and is likely to cease altogether unless additional urban land is zoned (or consented for development). The consequences of high demand and insufficient capacity to grow are being felt in the form of steeply rising house and rental prices and these trends will continue if nothing is done to enable an increase in dwelling supply.

Council have now (2018) invested in a reticulated public wastewater network for Clyde and work is underway, albeit scheduled over a 25 year period. This infrastructure removes the impediment to urban expansion in Clyde and facilitates redevelopment and intensification in the existing urban area, although this is not expected to greatly increase the supply of dwellings in the long term.

The potential for infill development to meet the demand for household growth is limited by the extended staging of the wastewater project and the over capitalisation of much post 1970's subdivision within Clyde.

In response to the opportunity now provided by the wastewater reticulation, the Requestors are seeking to rezone their land on the urban boundary of Clyde to provide much needed greenfield expansion. M.E. estimates that this new capacity would cater for projected growth over the next 10 years or more, based on current data. The economic benefits of enabling future growth in this location are expected to outweigh any economic costs. The plan change will be effective in meeting demand growth in the short-medium term and is a more efficient use of the land than the current rural-residential zoning. The plan change will also facilitate economic growth and opportunities for local and district wide employment.

The request will therefore have positive effects on the environment in relation to urban land supply and population growth.

4.0 Effects in Relation to Transportation

The effects of the Request on associated transportation issues are addressed in the supporting document "Mutton Town Road – Integrated Transport Assessment" prepared by WSP. The Assessment concluded as follows:

- *The amount of traffic generated by the site is unlikely to have a material effect on network performance due to the low baseline and forecast volumes. State Highway intersections with both Sunderland Street and Mutton Town Road have sufficient spare capacity to support background traffic growth and traffic expected from the development.*

- *At the time of writing, full plans for the development were not available, but the concept generally aligns with relevant transport policies and strategies. Opportunity exists to promote active modes through use of the nearby Otago Rail Trail, which would help contribute to local and national mode shift objectives.*

- *The site's proximity to the Otago Rail Trail will make cycling an attractive mode for travelling to Alexandra. It is recommended that this be taken advantage of by clearly*

signposting the route to the existing underpass on Albert Drive and providing adequate facilities to get to the route.

- *The Sunderland Street/State Highway 9 intersection is a 100km/h environment and thus has an inherent risk for high severity crashes. However, the intersection has turning bays on all approaches and ample sight distance in both directions. Limited crash history exists at the site and the calculated crash rate before and after development suggests the existing layout is appropriate. Upgrading the intersection to a roundabout would be costly and provide limited benefits given the low existing crash risk and relatively low current and forecast traffic volumes.*

- *The crash risk at the Mutton Town Road/State Highway 8 intersection has been calculated to increase significantly if used by all southbound traffic from the development, primarily due to poor visibility to the north. Several possible mitigations are presented in Section 7. The most cost-effective option is considered to be providing access to the Clyde Claim Lot (DP 18990) via Sunderland Street only. Additional signage should be provided at the Houlahan lots directing traffic to the highway via Sunderland Street.*

The Request proposes a rule in the District Plan such that access to Lot 2 DP 18990 is via Sunderland Street only, to mitigate adverse effects and the SH8/Mutton Town Road intersection.

5.0 Effects in Relation to Infrastructure

The supporting infrastructure report addresses stormwater disposal, wastewater, water supply, reticulated utility services and roading construction.

In summary, development facilitated by this Request is able to be serviced for infrastructure and no adverse effects will arise in relation to infrastructural services.

6.0 Effects in Relation to Natural Hazards or Hazardous Installations

A search of the Otago Regional Council's Natural Hazardous Database showed that the Otago Regional Council has no record of any natural hazard adversely affecting the site. None of the test pits excavated for the infrastructure report showed any sign of deleterious material. The site is flat and ground slope instability is unlikely to be an issue. Any engineered fills will need to be placed, compacted and certified in accordance with NZS4431:1989. This is addressed at the resource consent/land use consent stage of subsequent subdivision and development of the site.

The proposed Residential Resource Area zoning of the site does not anticipate the use of hazardous materials or hazardous installations, as per existing District Plan Rule 7.3.6(ii) which requires all land use activities to be associated with the use of the site only for residential purposes.

7.0 Effects in Relation to Soil Contamination

The Preliminary Site Investigation (PSI) and Detailed Site Investigation (DSI) prepared by Insight Engineering addresses this issue.

The PSI (appended to the DSI) found that there was no risk to human health from the development of Lot 2 DP 18990 and Lots 1 & 2 DP 525753, but that the presence of the top soil on Lot 2 DP 331535 imported from a former orchard required further investigation. Accordingly, a DSI for this site was commissioned including soil testing.

The DSI concluded that it was highly unlikely that there was any risk to human health from development on Lot 2 DP 331535.

8.0 Effects on Cultural Values & Other Special Values

The site comprises of unirrigated pasture, with some pine shelter belts, sheds and several dwellings with surrounding curtilage and outbuildings. The site has been periodically and sparingly grazed for many decades.

So far as the Requestors are aware, the site does not contain any special ecosystems, natural habitats, or sites of recreational, cultural, scientific, historical or spiritual value.

Possible disturbance of unknown cultural remains is best covered at the subsequent resource consent stage of developing the site by conditions of consent imposing an accidental discovery protocol. Possible disturbance of unknown archaeological sites by earthworks is governed by the requirements of the Heritage NZ Pouhere Taonga Act (2014).

9.0 Discharge of Contaminants & Unreasonable Emission of Noise

Wastewater will be discharged to the Council reticulation and stormwater direct to land within the site. The residential zoning of the site will ensure that there will be no emission of unreasonable noise from the site. Noise emission is governed by existing District Plan Rule 12.7.4.

10.0 Landscape Effects

The Request provides for a medium scale residential housing development, immediately adjacent to the existing Clyde residential area.

The immediate receiving environment is a mixture of existing adjacent residential development across Sunderland Street, "lifestyle block" (rural- residential) development along Mutton Town Road and Dunstan Hospital across Mutton Town Road.

When viewed from SH8 and Mutton Town Road approaching the site, the existing urban area of Clyde is clearly apparent and any urban development on the site will appear as a natural extension of and integral with the existing urban form. There is little remaining "naturalness" within the site, which has the capacity to absorb change without adverse effects. Change from semi-rural to urban is an inevitable consequence of growth into Greenfield areas, close to the urban-rural interface (c.f. District Plan objective 7.1.3 and policy 7.2.8 "Management of Change").

The Request provides for a landscaped buffer along SH8 to soften views of built development from the highway.

11.0 Effects on Adjoining Properties

Two of the adjoining property owners along Mutton Town Road consulted indicated that they opposed any further growth in Clyde and wished to retain their quiet rural environment, although both owners were not opposed to a retirement village on the site.

The Requestors consider that if it is an unreasonable expectation that persons living on the fringes of an existing urban area can have any long term expectation that the area will remain semi-rural for ever.

Given the established future demand for housing in Clyde, the Requestors believe it unreasonable not to re-zone further greenfields land for urban use, given the contribution that a lack of land for houses makes to the increased unaffordability of the District's housing. The Requestors could also subdivide their land into 6 allotments (more if subdivision were staged) with no minimum lot size, under the site's current zoning. Further housing development within the site is therefore a "given".

Although it has no clear plan of the future of Dunstan Hospital, the Southern District Health Board (SDHB) has advised that it is critical that it maintains its existing rights to operate its facilities and the flexibility to expand/change to meet the needs of the community. The SDHB is concerned about the possibility of residents within the site complaining about its existing legal rights and conditions of the hospital – i.e. "reverse sensitivity" in particular the operation of the air ambulance activity at the hospital.

The Requestors consider that any such complaints by residents is unlikely, given that a large proportion of new residents are expected to be retirees for which the proximity of Dunstan Hospital is likely to be a significant attraction. Indeed, if a retirement village ever went ahead on the site, the proximity of Dunstan Hospital would almost certainly feature heavily in the village's marketing.

Enquiries with the current operators of the Air Ambulance Service have ascertained that the service has never had a complaint about its operations at Dunstan Hospital and that public complaints over the last 25 years of its total operation throughout Otago are "extremely rare".

The air ambulance service advises that its standard flight path is not over the subject site. The helicopter pad is some 230m from the site at its closest and the majority of the site is no closer to the helipad than much of the adjoining Sunderland Estate subdivision, from which no complaints have ever emanated.

The Requestors are of the opinion that people simply do not complain about a service that "there for the grace of god go I".

It is also noted that small rural hospitals (and large public hospitals in major cities) adjacent to residential areas are a common feature (e.g. Frankton Hospital) and do not appear to be generating significant reverse sensitivity effects. Overall, it is considered that the risk of reverse sensitivity effects on the SDHB caused by the Request are very low and are acceptable.

12.0 Conclusion

In summary, the Request will have no significant adverse effects on the environment. Any adverse effects are less than minor, have been recognised and their avoidance or mitigation has been provided for in the Request.

The net effects of the Request are, on balance, overwhelmingly positive.

Appendix 'A'
Response to Consultation

Peter Dymock

From: Julie Rickman <Julie.Rickman@southerndhb.govt.nz>
Sent: Friday, 20 December 2019 12:07 p.m.
To: Peter Dymock
Cc: Paul Pugh
Subject: Application for Private Plan Change - Dunstan

Hi Peter
We acknowledge your letter dated 12 November 2019 regarding the Application for Private Plan Change by Clyde Claim Limited and Houlahan Enterprises Limited. Your clients intend applying to Central Otago District Council for a private plan re-zone of the land from "Rural-Residential Resource Area" to "Residential Resource Area".
Currently Central Otago Health Services Limited and Southern District Health Board provide health care services from a property adjacent to the land which is proposed to be re-zoned. Dunstan Hospital (operated by Central Otago Health Services Limited) is a rural hospital within the Southern District Health Board network of hospitals.
As you will appreciate the Dunstan Hospital operates 24 hours a day seven days a week, and has operated since 1863. We frequently have air ambulance (helicopter) activity in addition to road ambulance for the transportation of our patients. With the growth in the Central Otago region, the health care services are evolving and at this time we do not have a clear plan of our future state.
However, it is critical that we maintain our existing rights to operate our facilities and the flexibility to expand/change to meet the needs of our community.
Therefore, any re-zoning which may place limits on operations or which anticipates a scenario where future residents could complain about our existing legal rights and conditions at the hospital, would be a concern.
We would appreciate remaining connected to the re-zone process that we can understand fully the plans and work effectively with you.
Apologies for the delay in response.
Enjoy your Xmas and break.
Kind regards
Julie Rickman

Julie Rickman, Executive Director Finance, Procurement and Facilities
Cellphone: 027 581 5313 | Email: julie.rickman@southerndhb.govt.nz

Southern District Health Board
Kind – Manaakitanga | Open – Pono | Positive – Whaiwhakaaro | Community – Whanaungatanga

TRANSPORT AGENCY
WAKA KOTAHI

Level 2, AA Centre
450 Moray Place
PO Box 5245
Moray Place
Dunedin 9058
New Zealand
T 64 3 951 3009
F 64 3 951 3013
www.nzta.govt.nz

11 December 2019

K Kennedy
c/- Peter Dymock
Paterson Pitts Group
PO Box 84
CROMWELL 93429058

via email:cromwell@ppgroup.co.nz

Dear Peter

PRIVATE PLAN CHANGE -CLYDE CLAIM LTD & HOULAHAN ENTERPRISES LTD -NZ TRANSPORT AGENCY PRELIMINARY COMMENTS

Thank you for forwarding information on the proposal for a private Plan Change to rezone an area of land partially bounded by State Highway 8 (SH8), Sunderland Road and Mutton Town Road, Clyde from rural residential to residential resource area.

We understand the proposed residential development could potentially create 150 new residential lots adjoining both Mutton Town Road and SH8. No direct access from SH8 is proposed. The timing of the proposal is to coincide with the completion of the Clyde Wastewater reticulation project.

The information has been received and assessed. We note that SH8 is a Limited Access Road in this location. As a result, if the Plan Change was to go ahead the NZ Transport Agency would support the proposal for no direct access from the highway. The NZ Transport Agency would also support potential rules around preventing reverse sensitivity issues around highway noise for properties located adjacent to the highway.

However, for a change of this size we would require a comprehensive Traffic Impact Assessment to be undertaken to fully assess the potential effects of the development on SH8. As part of the Traffic Impact Assessment the NZ Transport Agency would like to see the effects of the proposal assessed particularly on the Mutton Town Road intersection with SH8 and also the Sunderland Road intersection SH8 intersection.

If you have any questions or would like to discuss this proposal further, please do not hesitate to contact the NZ Transport Agency.

Yours sincerely

Julie McMinn
Consultant Planner to the New Zealand Transport Agency

Ref: 2019-1148

Aukaha

10 December 2019

Paterson Pitts Group
P O Box 84
Cromwell 9342

Attention: Peter Dymock

Preliminary Statement – Clyde Claim Ltd & Houlahan Enterprises Ltd
Proposed Private Plan Change – Mutton Town Road, Clyde

In regards to information received 12 November 2019. We have reviewed the information supplied to date, which at this stage of the project is limited. Our preliminary comments are as follows:

At this stage of the proposed Plan Change, Ngā Rūnanga have no concerns regarding the site specific provision of a 20 metre buffer zone along State Highway 8 and an 80 metre reverse sensitivity provision and prevention of direct access onto State Highway 8.

Ngā Rūnanga would request that the following be a condition of the Private Plan Change:

- That the Heritage New Zealand Pouhere Taonga Archaeological Discovery Protocol (attached) should be adhered to in undertaking earthworks.

Ngā Rūnanga would like it noted that although there are no recorded Māori archaeological sites within the boundary of the proposed subdivision. The Clutha River/Mata-au was an important river as an ara tawhito (pathway) and source of mahika kai (food and resource gathering) and there is the potential to disturb unrecorded sites during any earthworks for any future development. Therefore, any earthworks undertaken should be carried out in a way that allows contractors to monitor for artefacts or archaeological material.

Please note that this reply is made without prejudice. The Rūnanga reserves the right to reconsider its position in light of additional information and/or research.

Thank you for seeking our feedback at this early stage and encourage consultation throughout the development of the above proposal.

Nāku noa, nā

Richardson

Tania Richardson
Consents Officer

cc Kāti Huirapa Rūnaka ki Puketeraki
Te Rūnanga o Ōtākou
Hokonui Rūnanga

Aukaha
Level 1, 258 Stuart Street, P O Box 446, Dunedin 9054, New Zealand
Phone - 03 477 0071
info@aukaha.co.nz www.aukaha.co.nz

HERITAGE NEW ZEALAND
POUHERE TAONGA

Heritage New Zealand Pouhere Taonga Archaeological Discovery Protocol

Under the Heritage New Zealand Pouhere Taonga Act (2014) an archaeological site is defined as any place in New Zealand that was associated with human activity that occurred before 1900 and provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand. For pre-contact Maori sites this evidence may be in the form of bones, shells, charcoal, stones etc. In later sites of European/Chinese origin, artefacts such as bottle glass, crockery etc. may be found, or evidence of old foundations, wells, drains or similar structures. Burials/koiwi tangata may be found from any historic period.

In the event that an unidentified archaeological site is located during works, the following applies;

1. Work shall cease immediately at that place and within 20m around the site.
2. The contractor must shut down all machinery, secure the area, and advise the Site Manager.
3. The Site Manager shall secure the site and notify the Heritage New Zealand Regional Archaeologist. Further assessment by an archaeologist may be required.
4. If the site is of Maori origin, the Site Manager shall notify the Heritage New Zealand Regional Archaeologist and the appropriate iwi groups or kaitiaki representative of the discovery and ensure site access to enable appropriate cultural procedures and tikanga to be undertaken, as long as all statutory requirements under legislation are met (*Heritage New Zealand Pouhere Taonga Act*, *Protected Objects Act*).
5. If human remains (koiwi tangata) are uncovered the Site Manager shall advise the Heritage New Zealand Regional Archaeologist, NZ Police and the appropriate iwi groups or kaitiaki representative and the above process under 4 shall apply. Remains are not to be moved until such time as iwi and Heritage New Zealand have responded.
6. Works affecting the archaeological site and any human remains (koiwi tangata) shall not resume until Heritage New Zealand gives written approval for work to continue. Further assessment by an archaeologist may be required.
7. Where iwi so request, any information recorded as the result of the find such as a description of location and content, is to be provided for their records.
8. Heritage New Zealand will determine if an archaeological authority under the *Heritage New Zealand Pouhere Taonga Act* 2014 is required for works to continue.

It is an offence under S87 of the *Heritage New Zealand Pouhere Taonga Act 2014* to modify or destroy an archaeological site without an authority from Heritage New Zealand irrespective of

Peter Dymock

From: Peter Dymock
Sent: Friday, 6 December 2019 8:32 a.m.
To: Kim Whipp
Subject: RE: Private plan change mutton town road

Dear Kim

Receipt of your email is acknowledged

Peter Dymock
Senior Planner
M 027 437 7910
T 03 445 1826

PATERSONPITTSGROUP
Surveying • Planning • Engineering
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From: Kim Whipp <kwhipp@icloud.com>
Sent: Friday, 6 December 2019 6:56 a.m.
To: Peter Dymock <Peter.Dymock@ppgroup.co.nz>
Subject: Private plan change mutton town road

Good morning Peter please see attached preliminary opposition notes. Mark and his mother Esther Weatherall will strongly formally oppose the majority of what is being proposed in due course.

Kindly acknowledge receipt.

Sent from my iPad

In response to the application to rezone the Lots of Muttontown Road, Alexandra I OPPOSE the said Application.

I strongly oppose and will strongly oppose the subdivision of proposed split of 74 Muttontown Road. I would like to point out that the Council approximately 1 year ago turned down an application to split this block into two Titles. This would have allowed one extra residential property to be built which would have been with the keeping of the area. A number of small sections would be broken away from the actual town would be an eye sore and detract from rural vibe that makes Muttontown Road such a unique place. This would be outrageous for the neighbouring properties who live where they live for the rural lifestyle.

The current operation of the commercial entity at the end of Muttontown Road has already added extra traffic and noise to the area. This entity has become an absolute eye sore to the neighbouring properties. A proposed extra 151 sections would put stress on the roading system and in my view is simply a money making venture to the developers who are not giving mindful consideration to area and the people that live there.

Is this development to encourage affordable housing? If so this will attract more families to Clyde which will have an impact on the 1 primary school and 1 early childhood centre. This could also have a large effect on buses commuting kids to the local High School in Alexandra. The High School and close residents to the High School are already impacted by a large number of students travelling by car to school and lack of parking space, this could make an increasing problem only worse.

If you are going to encourage more people to live in Clyde and travel to Alexandra and surrounding districts for work this could put a possible increase of 200 plus vehicles on the already stretched roading out of Clyde, peak hours morning and night. The increase of vehicles trying to get out of Clyde onto a 100km main highway is an accident waiting to happen. This would no doubt put more pressure on rate payers to look at redeveloping the roading structure. Yet another increase in rates could a small community take that or put up with that, I don't think so!. Extra people would need extra amenities. Let's not overcrowd a beautiful town.

I will be strongly pointing out to the Council and ensuring the Community is aware of my view that the Central Otago District Council has a responsibility to the Alexandra Hub to encourage more development within the township of Alexandra to encourage families/prospective business owners to the area. The Alexandra business centre needs urgent attention given the number of empty shops/commercial spaces. A large subdivision is already underway on Dunstan Road with more room for development. The Council should be encouraging more developments within the town boundaries. Especially with families as Alexandra is where all the facilities are for people, swimming pool, bike park, sporting arenas and schooling. The town centre has the space for developing without the need to ruin the uniqueness of the Clyde town centre.

Part of the land in the Application is directly opposite the Hospital. If this was going to be developed at all I believe the block directly on the entrance to Clyde only should be looked at for the development of a Retirement Village. This would be

reasonably stand alone if done correctly and wouldn't involve the heavy traffic during peak hours.

Very careful consideration needs to be given to ensure that any development of Clyde does not unnecessarily allow it to become over populated and have the outcome of looking more like Lake Hayes (Nappy Valley) with undue stress being put on current resources which detracts from the natural beauty and attraction of visitors to the area.

As I said Clyde is a unique and beautiful town that needs to be looked after not have it's integrity destroyed. In particular the residents of Muttontown Road live there for a reason, for the quiet rural environment. If we wanted to have close neighbours we would move to town.

As I said any application for such a large number of residential sections within this subdivision will be strongly opposed.

Peter Dymock

From: twohuttons <twohuttons@xtra.co.nz>
Sent: Thursday, 5 December 2019 11:29 a.m.
To: Peter Dymock
Subject: Application for Private Plan Change on Muttontown Road

Dear Peter
I have several concerns regarding this matter.
We brought our property as a retirement property. Space, quietness and privacy are among our top desires for retirement. Hence the purchase of the ground and location. This would be totally reversed if your clients proposal was to go ahead.
The number of proposed sections makes the opportunity of privacy and peace non existent . As older residents quietness is important. It is only natural young families are going to create noise. Especially if we have homes on two boundaries.
At night we are used to darkness without street lights. If this development was to go ahead it will be a well lite area.
The traffic along Muttontown Road is increasing all the time. The entry to SH8 is a dangerous entry as it is.Increased traffic will only enhance the chance of a serious accident. Especially when you are entering a 100k area.
It had been mentioned a retirement village be built opposite the hospital. This would have more appeal regarding traffic problems
Dust, as the result of any excavation would be horrendous. Not at all desirable for ones health or home.
These are my main concerns for any rezoning to go ahead

Yours faithfully
James Hutton

Sent from Samsung tablet

Proposed Rezoning of Land
Mutton Town Road, Clyde
Information & Consulting Evening

Name	Address	Comment
Helen McCormick	39 Hazlett St Clyde	
~~Daryl & Fleur Markham~~	16 chandler cres -	lots of 550-600 and you have our full ~~support~~.
TONY WILLEMS	106 SHIELDS ST.	WE WANT A RETIRED VILLAGE NOW.
Gordon McKeever		Get it going soon
Callum Laurie	112 Hazlett Street	All for it.
Sarah-Jane Thompson	112 Hazlett St.	Excited, want it started!

Proposed Rezoning of Land
Mutton Town Road, Clyde
Information & Consulting Evening

Name	Address	Comment
Garry-Sandra Sutherland	54 Hazlett ST Clyde.	Fully Support.
Marg Allen	63 Newcastle St Clyde	"
Bob Allen	63 Newcastle St Clyde 9330	Much needed.
Paul Kilmore	14 Chandler Cres Clyde	Bring it on
David Smythe	Mutton town Rd Clyde	Rezone the whole road.
Denis Alexander	Vincent Place. Clyde	Yes.

Proposed Rezoning of Land
Mutton Town Road, Clyde
Information & Consulting Evening

Name	Address	Comment
Len Holder	129 FACHE ST. Clyde	
Raghnailag anth. house STEWART	39 Chandler Cres 39 CHANDLER CRES	WE ARE TARGETING SECTION SIZES 600. RETIREMENT VILLAGE WOULD BE GREAT
Erin Tumbly	30 Chandler Cres	
Ruth Wells Karen Bain	125 Fache st 41 whitby st clyde.	Build a retirement village & free up lots of houses.
Leanne Downie	25 Sunderland	Concerned that rezoning allows for 250sqmt sections with no protection once zoning happens
Sue + Brian Williamson	7 Annan Street Clyde.	

Proposed Rezoning of Land
Mutton Town Road, Clyde
Information & Consulting Evening

Name	Address	Comment
James Rabbette	48 Hazlett st Clyde	Have our full support. Look forward to seeing this start ASAP
Jeff Bell	10 Naylor-St Clyde	Has to happen Soon
Dad Tyrrell.	6 Vincent Place Clyde.	Access should be via Mutton town Rd not Sunderland St.
Phil Bradley	Clyde	yes all good.
MARK WEATHERALL	CLYDE.	Against Residential surrounded by Rural blocks
Pat Christie	33 Chandler Cres. Clyde	Progress

Proposed Rezoning of Land
Mutton Town Road, Clyde
Information & Consulting Evening

Name	Address	Comment
Esther Weatherall	Muttontown Rd 1 RD Alexandra.	not in favour of Residential zoning in Rural blocks
Conor Muir	Albert Drive	Good to see progress for the town.
Leon Van Boxtel	136 Fache St CLYDE	Good to See Progess in Clyde

Appendix 'E'

Sec 32 Evaluation

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THE CLYDE CLAIM LIMITED, HOULAHAN ENTERPRISES LTD, COLIN FOSTER, VICKI GILLIES & OSTEX CORPORATION LTD

Evaluation under Section 32 of the Resource Management Act 1991

Request for a Change to the Operative Central Otago District Plan

February 2020

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Job No: A4702 & A4723
Date: 27 February 2020
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Prepared For:
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Contents

1.0 Introduction

The Request needs to be evaluated in accordance with Sec 32 of the Resource Management Act 1992. Sec 32 states:

"32 Requirements for preparing and publishing evaluation reports

(1) An evaluation report required under this Act must –
- *(a) Examine the extent to which the objectives of the proposal being evaluated are the most appropriate way to achieve the purpose of this Act; and*
- *(b) Examine whether the provisions in the proposal are the most appropriate way to achieve the objectives by –*
  - *(i) Identifying other reasonably practicable options for achieving the objectives; and*
  - *(ii) Assessing the efficiency and effectiveness of the provisions in achieving the objectives; and*
  - *(iii) Summarising the reasons for deciding on the provisions; and*
- *(c) Contain a level of detail that corresponds to the scale and significance of the environmental, economic, social, and cultural effects that are anticipated from the implementation of the proposal.*

(2) An assessment under subsection (1)(b)(ii) must –
- *(a) Identify and assess the benefits and costs of the environmental, economic, social and cultural effects that are anticipated from the implementation of the provisions, including the opportunities for –*
  - *(i) Economic growth that are anticipated to be provided or reduced; and*
  - *(ii) Employment that are anticipated to be provided or reduced; and*
- *(b) If practicable, quantify the benefits and costs referred to in paragraph (a); and*
- *(c) Assess the risk of action or not acting if there is uncertain or insufficient information about the subject matter of the provisions.*

(3) If the proposal (an amending proposal) will amend a standard, statement, regulation, plan, or change that is already proposed or that already exists (an existing proposal), the examination under subsection (1)(b) must relate to –
- *(a) the provisions and objectives of the amending proposal; and*
- *(b) the objectives of the existing proposal to the extent that those objectives –*
  - *(i) are relevant to the objectives of the amending proposal; and*
  - *(ii) would remain if the amending proposal were to take effect..."*

The objectives of the Request are:

- To re-zone the site to provide sufficient residential development capacity to satisfy the reasonably foreseeable demand for new residential housing in Clyde
- To provide for a wide range of section sizes to enable more affordability and choice of housing typologies to cater for changing demographics and market preferences, including the possibility of a retirement village.
- To retain flexibility to respond to changing market place preferences in an efficient manner.
- To provide for a high level of residential amenity that is compatible with that of the existing Clyde Township and a safe and efficient transport network that integrates well into the existing Clyde Township.

2.0 Options for Achieving the Objectives of the Request

There are a number of options to achieve the objectives of the Request which are outlined and discussed below

Potential Options	Discussion
Do nothing: Retain the Rural-Residential zoning of the site	This option would require resource consents to achieve the objectives of the Request. This creates the following costs: (a) Non-complying subdivision and land use consents would be required to breach almost all of the Rural Resource Area Rules for residential activity. (b) This would create significant transaction costs for applicants and an administrative burden for Council which would be incurred repeatedly and be extremely inefficient for achieving the objectives of the Request. (c) Uncertain outcomes from numerous, public processes. This potential option is not reasonably practical and will not be considered further in this evaluation.
Await Council District Plan Review	The Central Otago District Plan is due for review and an option may be to await the review and then submit requesting suitable zoning for the site. (a) There is no firm timetable for this review and Council advice is that changes to the Operative Plan to give effect to the Cromwell Master Plan will have precedence and that a similar "Masterplan" exercise is planned for Clyde/ Alexandra. (b) Decisions, subject to approval, may be years away. Given the market circumstances, the pressure on the Clyde housing market and the necessity to time this request with the commissioning of the Clyde wastewater project in late 2020, the Requestors wish to proceed with their re-zoning proposal now, rather than wait for the Council review. Accordingly, this option will not be considered further in this evaluation.
Request a Private Plan Change that seeks to rezone the site to an existing resource area, subject to modifying the zoning provisions to enable site specific requirements.	This option is potentially efficient as it utilises and modifies an existing resource area within the District Plan. This option is reasonably practical and is considered further below.
Request a Private Plan Change to create a new resource area with bespoke planning provisions.	This option is for a "Master planned" form of development This option may have some advantages and is considered further below.

Based on the evaluation above, the potential options that are reasonably practical and worth considering further are:

Option 1 Request a Private Plan Change to change the zoning of the site to an existing resource area and to modify the zoning provisions (rules) of the resource area to enable site-specific requirements.

Option 2 Request a Private Plan Change to create a new bespoke resource area.

3.0 Evaluation of the Costs & Benefits of the Preferred Options

Option 1:	Re-zone the site with an existing zone (Residential Resource Area)
Benefits	* The existing zoning is well understood and can be easily implemented. * Compatible with the existing zoning provisions for the Clyde township. * Provides flexibility to respond to changing market and social and economic preferences. * Provides for a wide range of housing styles and lot sizes.
Costs	* Provides less certainty to Council and community as to the outcome of development of the site.
Efficiency	* Only minor amendments required to District Plan, therefore less costs to Council and requester. * Avoids over-complicating the District Plan.
Effectiveness	* Simple and effective method of achieving the objectives of the Request.
Risk of acting (or not acting)	* By not acting, there is the risk that the land ownership would be fragmented by further rural - residential development of the site which would be a lost opportunity to achieve a more efficient and effective use of the land and infrastructure resources. There is no significant risk with proceeding with the Request.

Option 2:	Re-zone the site with a bespoke zoning
Benefits	* Providing some certainty to Council and Community as the out come of the development of the site, typically by way of a "masterplan".
Costs	* Expensive to implement for both the Council and the Requestors requiring detailed design at the outset. * Does not respond well to changing market preferences and socio-economic conditions which can often require further plan changes, and/or non-complying resource consents to implement. * Users of the plan may be unfamiliar with the bespoke provisions.
Efficiency	* Complex changes required to District Plan.
Effectiveness	* Can be an effective way of achieving the objectives of the Request.
Risk of acting (or not acting)	* As above.

On balance, it is considered that the most preferable option is to request a Private Plan Change to change the zoning of the site to the District Plan's existing Residential Resource Area with minor modifications to the rules to enable site-specific requirements to be met.

4.0 Evaluation of the Request Against the District Plan's Objectives and Policies

Sections 6 & 7 of the District Plan has a number of objectives and supporting policies that are relevant to the proposed change:

It is proposed that these existing objectives and policies be retained without amendment. An evaluation of the Request against these existing provisions follows.

4.1 Objectives

Obj 6.3.1 *Needs of People and Communities*

To promote the sustainable management of the urban areas in order to:

(a) Enable the people and communities of the district to provide for their social, economic and cultural wellbeing and for their health and safety; and

(b) Meet the present and reasonably foreseeable needs of these people and communities.

Obj 6.3.2 *Amenity Values*

To manage urban growth and development so as to promote the maintenance and enhancement of the environmental quality and amenity values of the particular environments found within the District's urban areas.

Obj 6.3.3 *Adverse Effects on Natural and Physical Resources*

To avoid, remedy or mitigate the adverse effects of urban areas on the natural and physical resources of the District.

Obj 7.1.1 *Maintenance of Residential Character*

To manage urban growth and development to maintain and enhance the built character and amenity values of those parts of the district that have been identified as the Residential Resource Area as well as the social, economic and cultural wellbeing, and health and safety of the residents and communities within those areas.

Obj 7.1.2 *Protection of Living Environment*

To manage the use of land to promote a pleasant living environment by ensuring that adverse effects of activities are avoided, remedied or mitigated, while accommodating appropriate change at the interface with other resource areas.

Obj 7.1.3 *Management of Change*

To recognise that it is inevitable that the use of land shall change over the period of this plan and beyond in order to enable the community to provide for its wellbeing. The process of change can occur randomly within the various resource areas but will be most obvious at the interface between different resource areas. It is a purpose of this plan to manage that change.

The Request will enable the people and community of Clyde to provide for their wellbeing by increasing residential capacity to meet the needs of the growth of Clyde. The request will enable a mixture of lot sizes for the community to access residential property relative to their needs, including the possibility of a retirement village. An increase in residential capacity will go some way to addressing the shortage of housing supply, a factor (but far from the only one) impacting on housing affordability in Clyde.

The Request successfully manages change at the interface between the current Residential and Rural Residential Resource Areas.

4.2 Policies

Pol 6.4.1 *Maintenance of Quality of Life Within Urban Areas*

To maintain and, where practicable, enhance the quality of life for people and communities within the district's urban areas through:

(a) Identifying and providing for a level of amenity which is acceptable to the community; and
(b) Avoiding, remedying or mitigating the adverse effects on the community's social, economic and cultural wellbeing and health and safety which may result from the use, development and protection of natural and physical resources, and
(c) Recognising that change is inevitable in the use of land to enable the community to provide for its wellbeing

Pol 6.4.2 *Expansion of Urban Areas*

To enable the expansion of urban areas or urban infrastructure in a manner that avoids, remedies or mitigates adverse effects on:

(a) Adjoining rural areas.
(b) Outstanding landscape values.
(c) The natural character of water bodies and their margins.
(d) Heritage values
(e) Sites of cultural importance to Kai Tahu ki Otago.
(f) The integrity of existing network utilities and infrastructure, including their safe and efficient operation.
(g) The life supporting capacity of land resources.
(h) The intrinsic values of areas of significant indigenous vegetation and habitats of significant indigenous fauna.

Pol 7.2.1 *Residential Character*

To ensure that the character and amenity values of residential areas are protected by ensuring that the adverse effects of:

(a) Excessive noise including noise associated with traffic generation and night-time operations,
(b) The generation of traffic over and above that normally associated with residential activities and in particular heavy vehicles, and demand for parking,
(c) Glare, particularly from building finish, and security lighting,
(d) Structures at the street frontages that do not complement the character and/or scale of development in the neighbourhood,
(e) A reduction in privacy, access to daylight and sunlight
(f) A reduction in visual amenity due to excessive signage large areas of hard standing surfaces, and the storage of goods or waste products on the site,
(g) The generation of odour, dust, wastes and hazardous substances,
(h) The use and/or storage of hazardous goods or substances,
(i) The loss of a sense of amenity, security and companionship caused by non-residential activities are avoided, remedied or mitigated.

7.2.2 Amenity Values

To ensure that the amenity values of residential sites, including privacy and ability to access adequate daylight and sunlight, are not significantly compromised by the effects of adjoining development.

7.2.6 *Safety and Efficiency of Residential Roads*

To require appropriate access and on-site parking to ensure that the amenity of neighbouring properties and the safe and efficient operation of roads is maintained while acknowledging that these requirements may be relaxed where this will result in retention of a heritage item or site that would otherwise be lost.

The rules that give effect to these policies will remain unchanged, apart from minor modifications to accommodate NZTA's requirements for subdivision and development adjacent to a state highway and to ensure no direct access to Mutton Town Road and Sunderland Street. This will ensure compliance with Policy 7.2.6.

In summary, the Request complies with and gives effect to the District Plan's relevant objectives and policies.

5.0 Evaluation of the Request's Methods & Rules

Plan Provision/Rule	Discussion
7.3.6 (xii) (c) Acoustics Residential Resource Area in Lot 2 DP 189920 and Lot 2 DP 525753 **7.3.3(ii)** Addition to Rule 7.3.6(xii)(c) Breach of standards to provide that breach of above rule is a restricted discretionary activity	These rules are designed to address reverse sensitivity effects of residential subdivision and development adjacent to state highways and are based on NZTA's "Guide to the Management of effects on noise sensitive land near to the state highway network (Sept 2015 V1.0)". The rule balances the benefits of the operation of an effective, efficient and suitable land transport system against the cost of insulation incurred by home building within the site within 80m of the edge line of SH8.
7.3.6(vi) Access (h) **7.3.5 (vii)** providing that a breach of Rule 7.3.6(vi) is non-complying	These rules are designed to prevent direct access to SH8, Mutton Town Road and Sunderland Street. These are major roads which it is not desirable on traffic safety grounds to have multiple closely spaced entrances onto. Sunderland Street is also the main entrance into Clyde and the community has indicated that it wishes to maintain the clear, safe, uncluttered avenue feel of this entranceway. Provision that roading access to Lot 2 DP 18990 be only out to Sunderland Street is necessary to mitigate adverse effects on the SH8/Mutton Town Road intersection. Costs involved with this rule are a possible lessening of connectivity within Lot 2 DP 18890.
7.36(xiii) Screening **7.3.4(i)** Addition of Rule 7.3.6(xiii) to breach of standards to provide that a breach of the above rule is a discretionary activity	This rule provides for a landscaped buffer along SH8 to assist in mitigating reverse sensitivity effects, provide for beautification of the entrances to the District's urban areas, screen-built form from users of the highway and enhance the privacy and amenity of dwellings adjoining the highway. The benefits if this out-weigh the costs of a reduction in developable land.

7.3.5(vii) Subdivision and Development	This rule is designed to prevent subdivision and development of the site until it can be serviced by a reticulated waste water scheme. The cost and risk of not having this rule is that, if for some reason commissioning of the Clyde Wastewater Project is delayed, then the site would be able to be subdivided into 800m^2 lots, with each lot having on-site disposal of wastewater as per Rule 7.3.3(i)(b)

6.0 Evaluation of the Request under National Planning Instruments

6.1 National Policy Statements

The following National Policy Statements (NPS) are in effect:

- NPS on Urban Development Capacity
- NPS for Freshwater Management
- NPS for Renewal Electricity Generation
- NPS on Electricity Transmission
- NZ Coastal Policy Statement

With a population of just over 1,000 Clyde is not an "urban environment", as defined in the NES on Urban Development Capacity (2016) as "an area of land containing, or intended to contain, a concentrated settlement of 10,000 people or more and any associated business, land, irrespective of local authority and statistical boundaries".

Nevertheless the NES is of some peripheral relevance as it does reinforce Council's function under Sec 31(1) (aa) RMA91 for "*the establishment, implementation and review of objectives, policies and methods to ensure that there is sufficient development capacity in respect of housing and business land to meet the expected demands of the district*". (my underlining).

There is no other NPS relevant to this Request.

6.2 National Environmental Standards

The following National Environmental Standards (NES) are in effect:

- NES for Air Quality
- NES for Sources of Drinking Water
- NES for Telecommunication Facilities
- NES for Electricity Transmission Facilities
- NES for Assessing and Managing Contaminants in Soil to Protect Human Health
- NES for Plantation Forrest

The NES for Air Quality makes the Otago Regional Council responsible for managing air quality under the RMA91 and the Central Otago District Council responsible for issuing permits for qualifying solid fuel heaters in air sheds 1 & 2 under the Regional Plan: Air. The site is immediately adjacent to Air Zone (shed) 1 – Clyde. Rather than complicate the District Plan by introducing rules regulating solid fuel appliances within the Request area, it is suggested that it would be simpler and more efficient for the Otago Regional Council to extend the Clyde Air Zone 1 boundaries in Schedule 2 of the Regional Plan: Air to include the site of the Request. The whole purpose of the residential zoning of this site is to make it a permitted activity to establish a residential activity (dwelling) on any allotment created within

the site. Regulation of heating appliances should be through the Building Act process, not the Resource Consent process, as envisaged by the NES. The Requestors would support any such change to the Regional Plan: Air.

The NES for Assessing and Managing Contaminants in Soil to Protect Human Health has been dealt with under the Preliminary & Detailed Site Assessments at **Appendix 'H'**.

In summary, there will be no risk to human health from soil contamination by subdivision and development of the site.

There is no other NES relevant to this Request.

7.0 Evaluation of the Request under Regional Planning Instruments

7.1 Partially Operative Regional Policy Statement (RPS)

The non-revoked provisions (as of 14 January 2019) of the RPS relevant to this request are addressed as follows:

5.4 Land - Objectives	
5.4.1 To promote the sustainable management of Otago's land resources in order: **(a) To maintain and enhance the primary productive capacity and life-supporting capacity of land resources; and** **(b) to meet the present and reasonably foreseeable needs of Otago's people and communities.**	The land is not currently used for any productive purposes and has no access to suitable sources of irrigation to enable any productive potential to be effectively realised. The preferred option better provides for the present and reasonably foreseeable needs of Otago's people and community than if it remained as bare un-utilised land.
5.4.2 To avoid, remedy or mitigate degradation of Otago's natural and physical resources resulting from activities utilising the land resource.	The plan change utilises the land resource in an efficient manner that will not degrade its natural and physical resources. The site does not contain any outstanding natural features or landscapes.
5.4.3 To protect Otago's outstanding natural features and landscapes from inappropriate subdivision, use and development	
5.5 Land - Polices	
5.5.4 To promote the diversification and use of Otago's land resource to achieve sustainable land use and management systems for future generations.	The preferred option achieves diversification, by providing for a range of housing typologies. It represents a sustainable use of the land resource.
5.5.6 To recognise and provide for the protection of Otago's outstanding natural features and landscapes which: **(a) Are unique to or characteristic of the region; or** **(b) Are representative of a particular landform or land cover occurring in the Otago Region or of the collective characteristics which give Otago its particular character, or** **(c) Represent areas of cultural or historic significance in Otago; or**	The site is not within an outstanding natural landscape and does not contain any cultural and historical features, or any visually or scientifically geological features.

(d) Contain visually or scientifically significant geological features.	
6.4 Water	
6.4.2 To maintain and enhance the quality of Otago's water resources in order to meet the present and reasonably foreseeable needs of Otago's communities.	The site is not adjacent to any water body, and will connect to the reticulated wastewater supply network.
9.4 Built Environment – Objectives	
9.4.3 To avoid, remedy or mitigate the adverse effects of Otago's built environment on Otago's natural and physical resources.	The site is self-evidently the most logical one for the expansion of Clyde, being contiguous with the existing urban area. The site has no outstanding natural or physical resources that would make it unsuitable for residential development.
9.5 Built environment – Policies	
9.5.4 To minimise the adverse effects of urban development and settlement, including structures on Otago's environment through avoiding, remedying or mitigating: (a) Discharges of contaminants to Otago's air, water or land; and (b) Visual intrusion and a reduction in landscape qualities, and (c) Significant irreversible effects on (i) The natural character of water bodies and the coastal environment; or (ii) Habitats of indigenous fauna; or (iii) Amenity values; or (iv) Intrinsic values of ecosystems.	Discharge of wastewater is to Council's reticulated services. If the boundary of Air shed 1 is extended to cover the site, any future dwellings will be required to install modern heating appliances that will meet Otago Regional Council discharge requirements. The site will be viewed as a contiguous extension of the Clyde township, so there will be no perception of visual intrusion and reduction of landscape qualities. The site does not contain any water bodies, habitats of indigenous fauna or valuable eco systems.

7.2 Partially Operative Regional Policy Statement 2019 (PRPS)

The objectives and policies of the PRPS are addressed as follows:

Objectives and Policies	Comment/Analysis
2.1 to 2.2 (Kai Tahu values and interests)	The PRPS requires that Kai Tahu values and interests are recognised and kaitiakitaka is expressed. Preliminary consultation with Aukaha did not indicate any great issues of concern to Kai Tahu. Discovery protocols can best be put in place at the subsequent resource consent stage to develop the site. The site is not subject to any statutory acknowledgement in the Ngai Tahu Claims Settlement Act 1998. Kai Tahu ki Otago will be notified of the Plan Change and will have further opportunity to submit.
4.1 (Risk that natural hazards pose to Otago's communities are minimal)	The plan change contributes to the resilience of Clyde. A search of the Otago Regional Council's Natural Hazards Database shows that the site is not subject to any natural hazard. It enables increased development within a site that is not hazard prone and does not pose a risk to ecosystem values. It does not compromise the safety of the local road network. It contributes to Clyde's

	resilience by providing a range of housing options. The site is flat and not flood prone. The proposal does not increase the risk or the consequences of risk of natural hazards affecting human life, infrastructure and property.
4.3 (infrastructure managed and developed in a sustainable way)	The site will be connected to the Council water and wastewater reticulations
4.5 (urban growth and development is well designed, occurs in a strategic and co-ordinated way and integrates effectively with adjoining urban and rural environments)	The Plan Change enables development that can integrate effectively with the adjoining urban and rural environments, to ensure there is sufficient housing land development capacity. The proposed zoning is enabling and provides for a wide range of housing styles. All necessary infrastructure is, or will be, in place to enable residential development of the site. The site is underlain by a considerable depth of highly permeable glacial out wash gravels which will facilitate direct disposal of stormwater to ground, in compliance with low impact design principles.
4.6 Hazardous substances, contaminated land and waste materials do not harm human health or the quality of the environment in Otago.	A PSI & DSI have been provided with the Request and confirms the site is not subject to HAIL activity. As the proposed zone is for residential purposes only, there will be no potential for storage, use or transportation of hazardous substances.

8.0 Evaluation of the Request Against the Kai Tahu ki Otago Natural Resource Management Plan (2005)

Section 3 of the Operative District Plan puts in place the framework within which issues of concern to Kai Tahu ki Otago in the context of the Act are recognised and provided for in the Central Otago District. Policy 3.4.1 of the Operative District Plan explicitly recognises the 1995 version of the Iwi Management Plan as the principal resource management reference planning document for the Central Otago District.

To the extent that the Request is simply applying an existing zoning provision to the site, the District Plan already incorporates consideration of issues of concern to Kai Tahu on any subsequent subdivision development of the site.

Clyde is located within the Clutha-Mata-au Catchment, and this is described at Section 10.1 of the 2015 Management Plan as:

"The Clutha/mata-au Catchment centres on the Clutha/Mata-au River and includes all sub catchments within this main Catchment.

Wai Maori Issues:
Land Use:

- *Lack of reticulated community sewerage schemes.*
- *Existing sewage schemes are not effectively treating the waste and do not have the capacity to cope with the expanding population.*
- *Land use intensification, for example dairying in the Poumahaka Catchment.*
- *Increase in the lifestyle farm units is increasing the demand for water.*
- *Sedimentation of waterways from urban development.*

Policies:

Land use:

9. To encourage the adoption of sound environmental practices, adopted where land use intensification occurs.
10. To promote sustainable land use in the Clutha-Mata-au Catchment.
11. To encourage all consents related to subdivision and lifestyle blocks are applied for at the same time including, land use consents, water consents, and discharge consents.
12. To require reticulated community sewerage schemes that have the capacity to accommodate future population growth.

10.3 WAHI TAPU

10.3.1 Wahi Tapu in the Clutha/mata-au Catchments

There are a range of wähi tapu, but physical resources such as mountain tops, springs and vegetation remnants are other examples. Urupä and some significant sites of conflict are located all along the Clutha Mata-au River.

10.3.3 Wähi Tapu Policies in the Clutha/Mata-au Catchment

1. *To require that wähi tapu sites are protected from further loss or destruction*
2. *To require accidental discovery protocols for any earth disturbance activities.*

The Mata-au/Clutha River is also an area of statutory acknowledgement in schedule 11 RMA91 (Ngai Tahu claim Settlement Act 1998).
The site will connect to reticulated wastewater and water services that have the capacity to accommodate the growth. All stormwater will be disposed of direct to ground within the confines of the site and the site is not adjacent to the Mata-Au/Clutha River. No water consents or discharge consents will be required to subdivide and develop the site. There is no known waahi tapu associated with the site. An accidental discovery protocol can be imposed by resource consent conditions.
The Request therefore accords with the issues, objectives and policies of the Management Plan.

9.0 Evaluation of the Request Against the Clyde Community Plan 2011

Although not a statutory plan and thus having little weight in any consideration of the Request, the Clyde Community Plan is of some relevance. The "Development" (pg 16) section of the plan provides as follows:

> *"New development is important to maintaining the life and vibrancy of any township. However, it always needs to be balanced alongside the existing character and be in keeping with the collective lifestyle values of residents, something Clyde has grappled with as the town has both grown and attracted more visitors.*
>
> *It was identified that protection of the Sunderland Street avenue from having too many vehicle entrances (from the highway to Dunstan Street) was preferred. This will maintain the clean, safe, uncluttered avenue feel of this entranceway.*
>
> *There remains an interest in having a rest home or retirement village in the hospital area. However, approaches made to both Sunderland Estate and Dunstan Hospital following the 2006 plan found this was not currently of interest to either party.*

Objective

New development to be in keeping with the character and collective lifestyle values of the Clyde community"

The Request is consistent with these sentiments and objectives:

- The township existing zoning provisions are to be extended to the site, in keeping with the existing character of the township.
- No direct access into Sunderland Street (or Mutton Town Road) will be permitted.
- The zoning of the site does provide an opportunity of a suitably large enough site for a retirement village to be a possibility.

The Clyde community plan was developed prior to the commissioning of the Clyde Wastewater Project and prior to the completion of the Sunderland Estate development completely infilling any remaining Greenfields sites within the township. Therefore, comments by some participants in a survey that "*existing residential housing density controls should be retained for Clyde; and residential growth should be accommodated within the existing urban boundaries of Clyde*" have been overtaken by events in the 10 years since the community plan was formulated.

10.0 Conclusion

The above evaluation has assessed the Request under Section 32 of the Resource Management Act 1991. The conclusions from this evaluation can be summarised as follows:

- The objectives of the Request are necessary and are an appropriate way to achieve the purpose of the Resource Management Act.
- The Request complies with and gives effect to the objectives and policies of the District Plan and higher order planning instruments.
- The provisions of the Request will be efficient and effective in achieving the objectives of the Request, taking into account their costs and benefits.
- There is no risk of the activity, given that the provisions of the Request manage the effects of the activity or the wider environment and there is no uncertainty in or in sufficiency of information about these provisions. There is a risk of not acting because the land and infrastructure resource could be lost to inefficient land uses.

Clyde Residential Growth & Demand Analysis

Private Plan Change Economic Assessment

28 February 2020 – Final

m.e consulting

Clyde Residential Growth & Demand Assessment

Private Plan Change Economic Assessment

Prepared for

The Clyde Claim Ltd, Houlahan Enterprises Ltd, CF Foster, VAG Gillies and Ostex Corporation Ltd

Document reference: TCCL001.19/Clyde Residential Demand Assessment FINAL (February).docs

Date of this version: 28th February 2020

Report author: Natalie Hampson (Director)

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Figures

Executive Summary

The township of Clyde has experienced steady dwelling growth in recent years. Demand has primarily been driven from outside of the district in the form of retiree households, second homeowners and working households and families. These drivers of demand are expected to continue, and over the long term Clyde may expect an additional 274-289 urban households by 2048 assuming no constraints to growth.

However, the reliance on septic tanks and disposal fields in the Clyde township has constrained the density at which residential lots have been supplied in the past. It has also constrained the ability to intensify and further develop the commercial area to meet resident and visitor demand. With rising concerns about environmental effects associated with a large concentration of septic tanks, and new national policies put in place to manage effects on fresh water, further expansion of Clyde's urban area would have been inappropriate.

The effects of the imposed 'urban growth boundary' are now being felt. Capacity to accommodate projected dwelling growth, even in the short term, is not available. The current zoned urban area is largely developed, and no more zoned greenfield land remains to be subdivided. Dwelling growth has been slowing as the number of remaining vacant residential lots dwindles and is likely to cease altogether unless additional urban land is zoned (or consented for development). The consequences of high demand and insufficient capacity to grow are being felt in the form of steeply rising house and rental prices and these trends will continue if nothing is done to enable an increase in dwelling supply.

Council have now (2018) invested in a reticulated public wastewater network for Clyde and work is underway, albeit scheduled over a 25 year period. This infrastructure removes the impediment to urban expansion in Clyde and facilitates redevelopment and intensification in the existing urban area, although this is not expected to greatly increase the supply of dwellings in the long term.

In response to the opportunity now provided by the wastewater reticulation, The Clyde Claim Ltd, Houlahan Enterprises Ltd, CF Foster, VAG Gillies and Ostex Corporation Ltd are seeking to rezone their land on the urban boundary of Clyde to provide much needed greenfield expansion. M.E estimates that this new capacity would cater for projected growth over the next 10 years, or more, based on current data. The economic benefits of enabling future growth in this location are expected to outweigh any economic costs. The plan change will be effective in meeting demand growth in the short-medium term and is a more efficient use of the land than the current Rural Residential zoning. The plan change will also facilitate economic growth and opportunities for local and district wide employment.

1 Introduction

This report by Market Economics (M.E) provides a desktop assessment of future demand for residential dwellings/properties in the township of Clyde in Central Otago District (COD). This assessment provides the relevant context against which the economic cost and benefits of a proposed private plan change request by The Clyde Claim Ltd, Houlahan Enterprises Ltd, CF Foster, VAG Gillies and Ostex Corporation Ltd can be considered. This report is intended to contribute to the requestor's section 32 evaluation.

1.1 Objective and Scope

The Clyde Claim Ltd, Houlahan Enterprises Ltd, DF Foster, VAG Gillies and Ostex Corporation Ltd are owners of approximately 13ha of land currently zoned Rural Residential Resource Area in the operative COD District Plan. The land adjoins (across Sunderland Street) the current boundary of urban residential zoning and development in Clyde, which is a satellite community largely serviced by Alexandra 10km to the south. The land is also adjacent to the Dunstan Hospital and is in close proximity to recreation reserves and facilities (including the Clyde Golf Course). The land is bounded on three sides by State Highway 8, Sunderland Street and Mutton Town Road. Other adjacent land uses are rural and rural lifestyle properties, in keeping with the current zoning. This includes one lifestyle property in the south east corner of the proposed development site (Figure 1.1).

The purpose of the private plan change is to rezone the identified land to the operative Residential Resource Zone, thus providing a significant uplift in residential dwelling capacity and enabling the cohesive expansion of urban density residential land use within Clyde (Figure 1.2).

The objective of this report is to provide evidence that allows the economic costs and benefits of the plan change request to be evaluated. To do that, M.E has been tasked with analysing the current supply of, and future demand for, residential dwellings in the township of Clyde. This allows the rationale of the private plan change (to provide capacity for new residential development) to be tested and also allows the scale of the proposed additional capacity to be put in context. In particular, we address how much future demand the plan change provides for, and over what potential time frame. In this regard, we have adopted an indicative dwelling yield for the site of 150 dwellings[1].

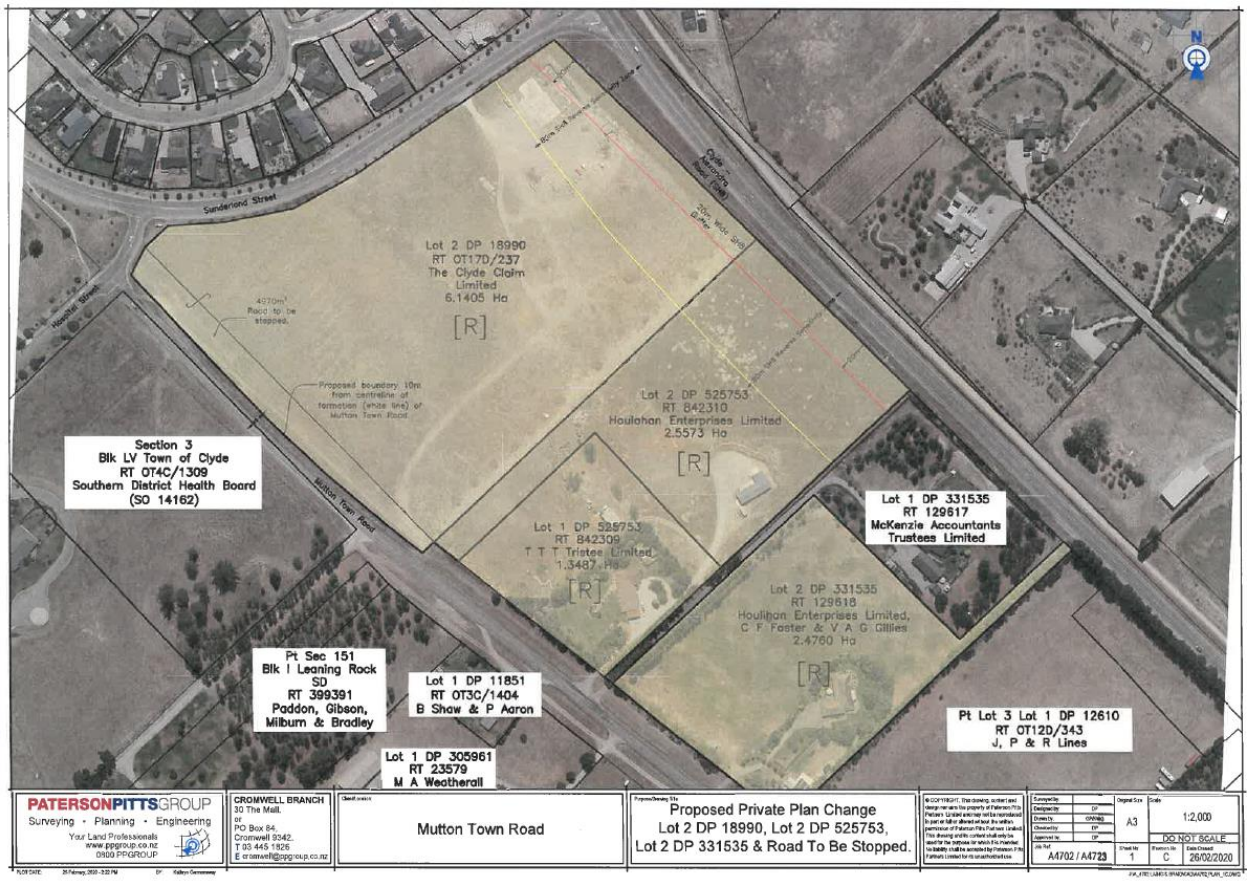
A detailed assessment of plan enabled and commercially feasible urban dwelling capacity within Clyde township is not addressed in the scope of this report. M.E has been advised by Patterson Pitts Group (planning, surveying and engineering advisors on the plan change) that the existing subdivided areas within the Residential Resource Area are largely developed (i.e. little or no vacant lots) and no greenfield sites remain within that zone.

Notwithstanding the current constraints on further infill subdivision due to the absence of reticulated wastewater (currently being addressed by Council and discussed in more detail later in this report), we

[1] Advised by Patterson Pitts Group.

have also been advised that potential for infill and redevelopment in the long term[2] (once that constraint is addressed) is unlikely to yield any material additional capacity for growth. For the purpose of this report, we accept the advice of Patterson Pitts Group (whom we understand have been directly involved in much of Clyde's past subdivision and development) on the issue of current capacity for urban growth. Their advice is consistent with our preliminary observations of the Clyde market and statements made within the Council's current Infrastructure Strategy report.

Figure 1.1 – Proposed Residential Resource Area Zone (Plan Change Area), Clyde

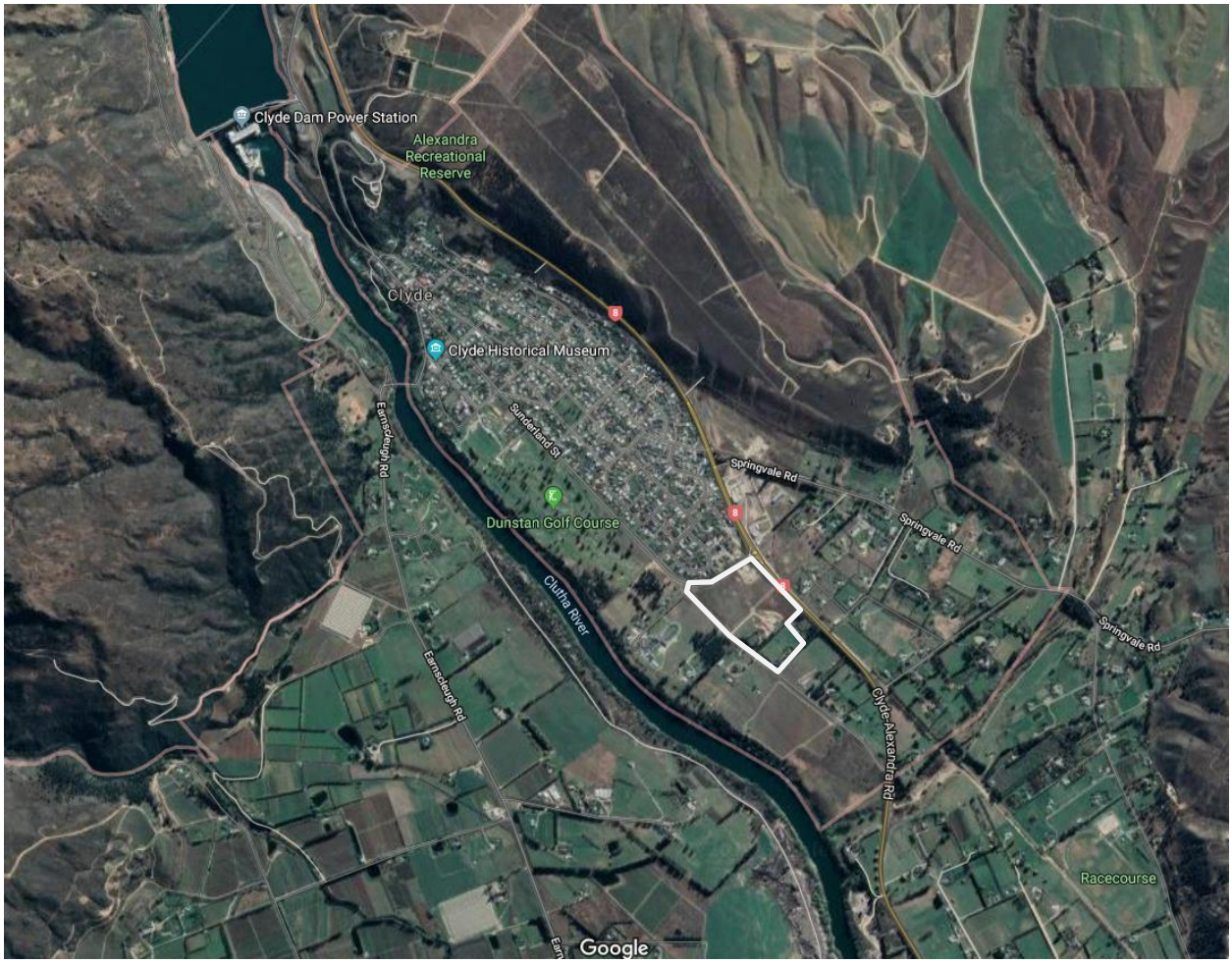


On that basis, this report broadly equates current supply with urban dwelling capacity in the Clyde township. At the outset, this determines that Clyde has effectively reached its limit for urban development and that the current zoning does not provide for further growth.

This report considers the validity of current demand projections for Clyde by examining recent trends in Clyde's residential property market and considering wider economic drivers of growth that will affect demand in this location.

[2] This report defines short term as a 3 year outlook, the medium term as a 10 year outlook and the long term as a 30 year outlook, in keeping with the approach in the NPS-UDC (2016).

Figure 1.2 – Plan Change Area in Wider Clyde Context



1.2 Assessment Approach and Report Structure

This report draws on a range of secondary data sources. Key sources of data include the 2013 Census, 2018 Census[3], Statistics New Zealand annual sub-national population estimates, Statistics New Zealand Business Directory time series, the Ministry for Business, Innovation and Employment (MBIE) Housing Market Indicators Dashboard[4] and the Central Otago District Council (CODC) growth projections.

Statistical boundaries change over time, often becoming more accurate or changing to reflect the shifting patterns of land use on the ground, including Council zoning. As a result of the range of data sources relied on in this report, there is some variation in the statistical (geographic) boundaries that the data relates to[5]. This has implications for consistency and comparability of data. The key variation is between:

- Census Area Units (CAUs) which are a common geographic boundary used in the 2013 Census, the MBIE Dashboard and the Council's current growth projections, and

[3] Only limited data has been released to date from the 2018 Census. As such, aspects of the analysis rely on the earlier 2013 Census.

[4] https://mbienz.shinyapps.io/urban-development-capacity/

[5] http://statsnz.maps.arcgis.com/apps/webappviewer/index.html?id=6f49867abe464f86ac7526552fe19787

- Statistical Area 2 (SA2) which are effectively the current equivalent of CAUs in that they apply at the broad suburb level, although in some locations boundaries have moved and areas that were once captured in one CAU are now split into one or more SA2. SA2 boundaries are used in the 2018 Census and now the Statistics New Zealand Business Directory[6].

The key relevance of this variation for this report is the definition of Clyde itself, being the focus of the analysis, although it also impacts on the definition of Cromwell and Alexandra for example. The total district boundary is consistent across all data sources. Appendix 1 shows the current SA2 boundaries for COD (and neighbouring districts (first map) and the second map highlights the boundary changes between CAU and SA2 for Clyde. For the most part, the area now excluded from the SA2 boundary is bare rural land and so would make little difference to demographic data. It does however capture an area of rural lifestyle properties, and this will contribute to some variation in dwelling and population counts as well as averages for housing market indicators. These variations are observed throughout the report but do not impact on the key findings of the assessment.

Section 2 of this report examines recent growth trends in Clyde. Section 3 summarises future growth projections for Clyde. Section 4 contains data on several housing market indicators for Clyde and discusses current constraints to growth. Section 5 evaluates the anticipated dwelling yield of the private plan change site relative to long term demand projections and provides a brief overview of key economic costs and benefits of the plan change.

[6] M.E has converted its Business Directory Time series to SA2 boundaries using a concordance of 2017 meshblocks and 2020 SA2s.

2 Recent Growth Trends

Understanding past growth trends and the current characteristics of the Clyde community is essential in determining the town's future growth potential. This section assesses a range of statistical and demographic datasets to demonstrate Clyde's role within the district, how it's changed in recent years and what it looks like today.

2.1 Dwellings

Based on the Census 2018 estimate, the Clyde township (defined by the SA2 boundary which closely relates to the urban extent, Appendix 1) contained 786 dwellings in June 2018. Nearly 71% of those dwellings were usually occupied homes, just under 29% were usually unoccupied or vacant dwellings and less than 1% (or 6) were under construction at the time (Figure 2.1).

The share of unoccupied dwellings in Clyde is well above the district average (at just over 19% for 2018) and is especially high relative to the national average share of unoccupied dwellings (10.4%). This demonstrates that COD is a popular location for holiday homes generally and Clyde is an especially popular location for holiday homes within the district. In 2018, Clyde accounted for 6.9% of total district dwellings and 10.2% of total district unoccupied dwellings.

Figure 2.1 – Mix of Dwellings by Category in Clyde Township 2006-2018

Clyde (SA2)	*Count*			*Share of Category*		
	2006	2013	2018	2006	2013	2018
Total Occupied Dwellings	402	453	555	63.8%	64.5%	70.6%
Total Unoccupied Dwellings *	219	246	225	34.8%	35.0%	28.6%
Dwellings Under Construction	9	3	6	1.4%	0.4%	0.8%
Total Dwellings	630	702	786	100.0%	100.0%	100.0%

*Source: Statistics NZ, Census 2018. * Based on private dwellings only for 2006 and 2013.*

In 2006, unoccupied homes totalled 219 and made up a much higher share of the total dwelling estate (just under 35%). The number of unoccupied homes grew by a further 27 to 2013, but the growth was consistent with total dwelling estate growth (i.e. the unoccupied share remained at 35% in 2013). Between 2013 and 2018, the number of unoccupied dwellings dropped by 21 despite total growth of 84 dwellings in that period (Figure 2.2).

This shows a shift in the market, likely driven by strong residential demand and rising property values meaning that a number of holiday homes transitioned into occupied dwellings (which includes long term rental properties). However, the net change in unoccupied dwellings in 2018 compared to 2006 is still positive (+6) and the current share of the dwellings that are unoccupied is still significant (28.6%). In future, M.E anticipates that unoccupied dwellings may continue to decline as a share of the total (moving closer to the district average over time).

Figure 2.2 shows that dwelling supply increased by 72 between 2006 and 2013 (growth of 11% or an annual average increase of 10 dwellings per year). The period between 2013 and 2018 showed an even stronger

rate of dwelling growth – a net increase of 84 dwellings (growth of 12% or an annual average increase of 17 dwellings per year).

Figure 2.2 – Recent Growth in Dwellings by Category in Clyde Township 2006-2018

Clyde (SA2)	Count			Net Change			Net Change %			Average Annual Change		
	2006	2013	2018	2006-2013	2013-2018	2006-2018	2006-2013	2013-2018	2006-2018	2006-2013	2013-2018	2006-2018
Total Occupied Dwellings	402	453	555	51	102	153	13%	23%	38%	7	20	13
Total Unoccupied Dwellings *	219	246	225	-27	-21	6	12%	-9%	3%	-4	-4	1
Dwellings Under Construction	9	3	6	-6	3	-3	-67%	100%	-33%	-1	1	0
Total Dwellings	630	702	786	72	84	156	11%	12%	25%	10	17	13

*Source: Statistics NZ, Census 2018. * Based on private dwellings only for 2006 and 2013.*

The dwelling estate of Clyde is typically that of standalone dwellings – the significant majority of which have occurred without redevelopment. This means that recent dwelling growth was enabled by the provision of new vacant residential lots. As the Residential Resource Area Zone is now fully subdivided (not including limited potential for further infill subdivision) and those lots are anecdotally almost fully developed with dwellings, the recent rate of dwelling growth observed within the Clyde SA2 defined area will not be sustainable going forward and urban growth is expected to come to a halt in the short term unless further capacity is provided/approved.

2.2 Usually Residential Population

The age profile of the usually resident population of the Clyde (SA2 defined) township has shown steady change over the last three censuses (Figure 2.3). The share of children and young adults is declining, and the share of retired adults is increasing. The number of residents aged 65 and over has doubled since 2006. When compared to the total district, the concentration of retired people (aged 65+) in Clyde is apparent (a 29% share of the total resident population compared to a 23% share for COD). Furthermore, the national average share is just 15% of the population aged 65+ in 2018. Clyde has proven popular as a destination for retirement living.

Figure 2.3 - Mix of Resident Population by Age Group in Clyde Township 2006-2018

Clyde (SA2)	Count			Share of Category		
	2006	2013	2018	2006	2013	2018
Under 15 years	159	159	165	18%	16%	14%
15-29 years	105	102	99	12%	10%	9%
30-64 years	471	492	558	52%	49%	48%
65-74 years	108	165	207	12%	17%	18%
75 years and older	63	81	132	7%	8%	11%
Total Resident Population	906	999	1,161	100%	100%	100%

Source: Statistics NZ, Census 2018.

Figure 2.4 shows the growth in the usually resident population between 2006 and 2018. According to the Census 2018, Clyde township reached a population of 1,161. As with the trend in dwelling growth, the rate of growth between 2006 and 2013 was 10% (93 additional people), but the following period (2013-2018) experienced faster growth (16% or an average annual increase of 32 residents). This growth was facilitated by both the increase in dwellings and the transition of some unoccupied dwellings to occupied dwellings.

With urban dwelling capacity in the township anecdotally nearly full, the resident population of the Residential Resource Area Zone is expected to stabilise or may experience more modest growth if further unoccupied dwellings become available for permanent residents.

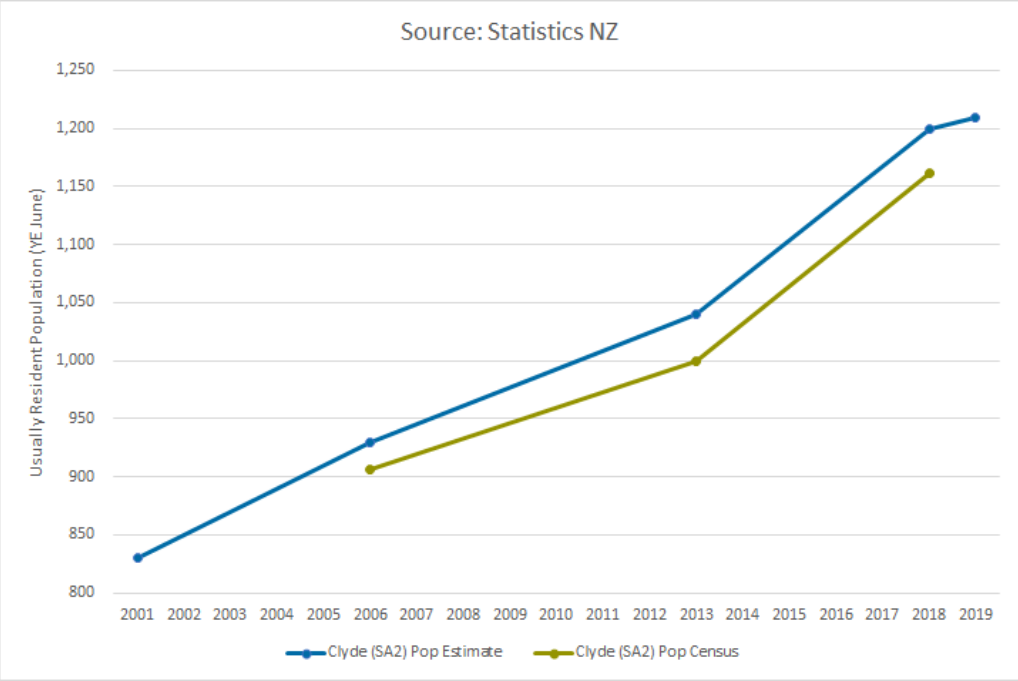
Figure 2.4 – Recent Growth in Resident Population by Age Group in Clyde Township 2006-2018

Clyde (SA2)	Count			Net Change			Net Change %			Average Annual Change		
	2006	2013	2018	2006-2013	2013-2018	2006-2018	2006-2013	2013-2018	2006-2018	2006-2013	2013-2018	2006-2018
Under 15 years	159	159	165	-	6	6	0%	4%	4%	-	1	1
15-29 years	105	102	99	- 3	- 3	- 6	-3%	-3%	-6%	- 0	- 1	- 1
30-64 years	471	492	558	21	66	87	4%	13%	18%	3	13	7
65-74 years	108	165	207	57	42	99	53%	25%	92%	8	8	8
75 years and older	63	81	132	18	51	69	29%	63%	110%	3	10	6
Total Resident Population	906	999	1,161	93	162	255	10%	16%	28%	13	32	21

Source: Statistics NZ, Census 2018.

An alternative source of population data is the year end June population estimates from Statistics New Zealand. These annual estimates are also reported for the same SA2 defined area for Clyde but show a slightly higher figure than Census counts (Figure 2.5). While subject to further revisions, the growth trend in these estimates is consistent with Census trends. Of key relevance, the provisional 2019 estimate shows a slowing of population growth – likely driven by the constraints on dwelling growth within the urban area.

Figure 2.5 – Comparison of Population Estimates and Census Population - Clyde



Statistics New Zealand have provided some detail on the components of change in the usually resident population estimated between June 2018 and June 2019 (provisional) for the total district. Key results include:

- 11% of the net increase was driven by natural increase (excess of births over deaths).
- 89% of the net increase was driven by net migration (excess of people moving in over people moving out).

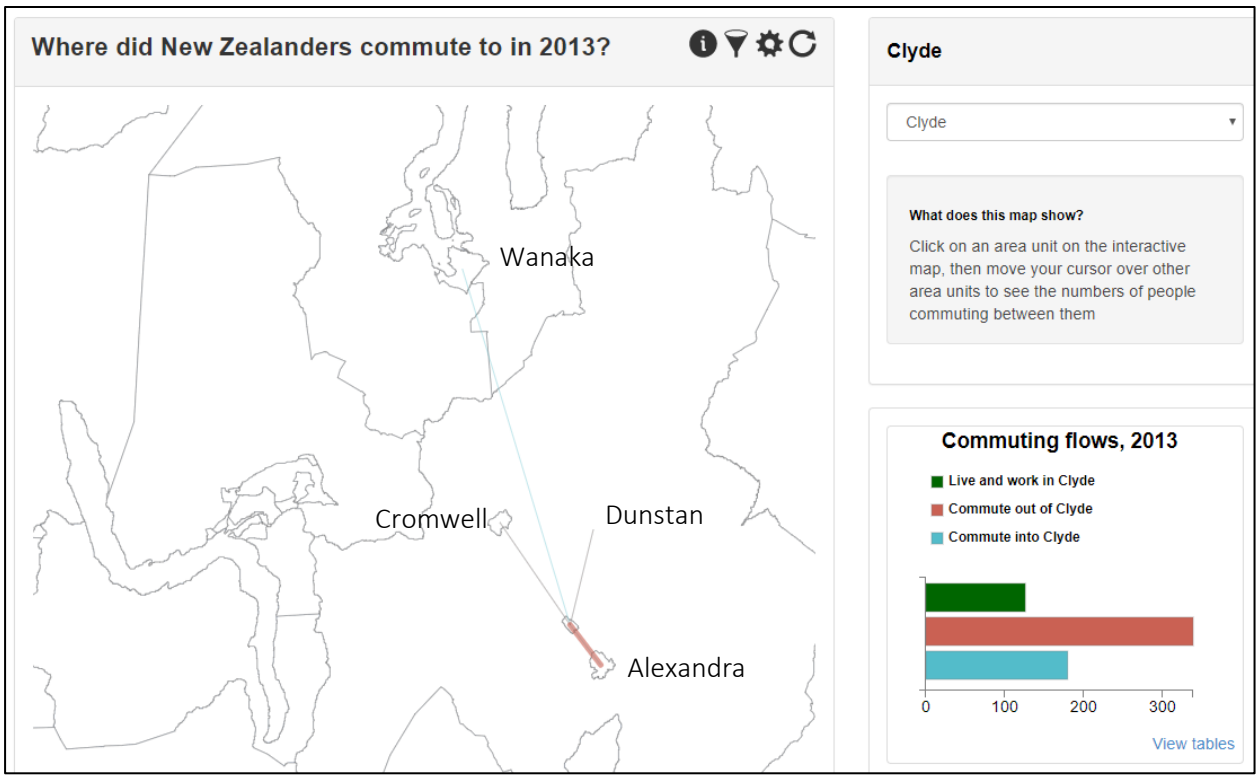
- Total district growth 2018-2019 equates to an estimated 1.2% of total New Zealand population growth. COD accounts for a below average share of total New Zealand natural increase growth (0.4%) and an above average share of total New Zealand net migration growth (1.6%).
- By comparison, while Queenstown Lakes District (QLD) experienced greater overall population growth (1,500) between 2018 and 2019, a higher share was driven by natural increase (20%) and a lower share was driven by net migration (80%) relative to COD.

While there is no data available at a sub-district level (i.e. for Clyde specifically), it is likely that recent population growth in Clyde township has been even more driven by net migration (i.e. people moving to the town) and less driven by natural increase compared with the district overall on account of the age profile of Clyde (a greater share of older cohorts and a lower share of young cohorts). The key implication of this is that demand growth for Clyde is heavily influenced by external factors - elsewhere in the district and elsewhere in New Zealand – particularly movement by retiring households.

2.3 Workplace Locations

Journey to work data from Statistics New Zealand[7] provides some insight on why working aged (non-retired) households may choose to live in Clyde, and in turn what may drive future demand for dwellings in Clyde township. This data is not yet available for 2018, and so 2013 data is the latest available.

Figure 2.6 – Visual Summary of 2013 Clyde CAU Journey to Work Data



[7] This data is summarised in the Statistics New Zealand experimental interactive mapping tool which can be found using this link: https://www.stats.govt.nz/tools/commuter-view.

Figure 2.6 and Figure 2.7 show the results for the Clyde CAU (refer Appendix 1 for geographic extent). It reveals both the estimated resident workforce of Clyde and also the count of people employed in Clyde.

Figure 2.7 – Summary of 2006-2013 Clyde CAU Journey to Work Data

Origin	Category	Count		People Employed in Clyde		Resident Clyde Workforce		Growth 2006-2013	
		2006	2013	Share 2006	Share 2013	Share 2006	Share 2013	Count	%
Resident Workforce	Live and Work in Clyde	108	126	46%	41%	30%	27%	18	17%
Non-Resident Workforce	Commute into Clyde	126	180	54%	59%			54	43%
Sub-Total People Employed in Clyde		234	306	100%	100%			72	31%
Resident Workforce	Commute out of Clyde	255	339			70%	73%	84	33%
Sub-Total Clyde Workforce		363	465			100%	100%	102	28%

Source: Statistics New Zealand, Commuter View

Key observations include:

- The 2013 resident workforce of Clyde was 465 people (indicatively 47% of the total resident population based on the Census population count).
- Of that workforce, 27% work within Clyde (down from 30% in 2006) and a significant 73% commute to work outside of Clyde (up from 70% in 2006). This is consistent with Clyde having a relatively small commercial centre (with fewer employment opportunities). Other key employers within the confines of the CAU are the primary school and the Dunstan Hospital.
- Local residents make up 41% of the people employed in Clyde, while 180 people who live elsewhere commute into Clyde for work and make up 59% of all people employed in the township in 2013. The majority of those that commute into Clyde live in Alexandra (approximately 47%), followed by those that live in Dunstan CAU[8] (39%), Cromwell (10%) and Wanaka (4%).
- Resident workers that commute outside of Clyde for work have grown by 33% between 2006 and 2013 (+84 people) while resident workers that work within Clyde have grown by just 17% (+18 people). This shows that total workforce population growth between 2006 and 2013 (+102) occurred at a faster rate than total employment growth in the township (+72). In short, many people do not live in or move to Clyde because of local employment opportunities. They see it as a place that they can commute from.
- The key locations[9] where the 339 resident Clyde workers (2013) commute to for work are Alexandra (approximately 68%), followed by Dunstan (21%) and Cromwell (11%). This shows that as employment opportunities increase in Alexandra or even Cromwell, more households may consider Clyde as a suitable place to live and commute from.

2.4 Employment Opportunities

Between 2013 and 2018 (i.e. the inter-census period following the journey to work data described above), employment tied to businesses registered within Clyde (SA2) township has grown by 173 jobs or an annual

[8] See Figure 2.6 for extent (potentially includes works living close and distant from Clyde).

[9] Locations with only a few commuters are not shown in the data to protect confidentiality. Percentages are calculated based on the locations listed in the data only.

average of 35 additional jobs per annum (34% of which is associated with growth in accommodation and food services, 18% is associated with growth in construction related tradesmen, 12% is associated with growth in health care and 36% is associated with growth in other sectors). This is total growth of 55% or an annual average of 35 jobs/per annum. We note that the construction jobs may or may not be tied to construction occurring in Clyde as sole trader construction workers (i.e. builders, electricians etc) typically register their business to their home address. This portion of growth may be driven by workers in the construction industry choosing to live in Clyde rather than employment opportunities in Clyde per se.

Even discounting the growth in construction jobs, in this period since 2013 it appears that the trend has switched and the number of jobs in Clyde township has grown faster than the estimated resident workforce[10]. That 2018 workforce does however still exceed the count of local jobs in real terms and further growth in the number of commuters leaving Clyde each day for work between 2013 and 2018 is anticipated (over and above the count in 2013) although has not been quantified. This cannot be validated until the Census 2018 journey to work data is released.

During that same period of 2013-2018:

- Employment tied to businesses registered within Alexandra North and South (SA2s) has grown by a combined 518 jobs (total growth of 13% or an annual average of 104 jobs/per annum);
- Employment tied to businesses registered within Cromwell East and West (SA2s) has grown by a combined 680 jobs (total growth of 25% or an annual average of 136 jobs/per annum);
- While further afield, employment tied to businesses registered within the southern half of QLD (Wakatipu and Arrowtown Wards) has grown by a combined 7,319 jobs (total growth of 47% or an annual average of 1,464 jobs/per annum); and
- Employment tied to businesses registered within the norther half of QLD (Wanaka Ward) has grown by a combined 2,576 jobs (total growth of 48% or an annual average of 515 jobs/per annum).

These trends show that destinations known to be within commuter distance of Clyde township have experienced continued growth in employment. To the extent that these recent growth trends are likely to carry on in the future, then Clyde can expect continued demand for households looking to reside in Clyde and commute to employment in surrounding employment areas.

2.5 Key Point Summary

- Clyde has grown steadily in recent years in terms of both total dwellings, resident population and job opportunities.
- The key drivers of recent growth include:
    - Holiday Homes – people purchasing dwellings for short duration stays (and may include short term rental).
    - Retirement Living – people moving to Clyde to retire.

[10] Typically considered the population between age 15 and 65 years (see Figure 2.4).

- Commuter Living – people moving to Clyde to live while working elsewhere.
- Local job opportunities – people living and working in Clyde.
- Natural increase and household formation (albeit that this is a minor contributor relative to the above drivers).

- If unconstrained, there is evidence that demand for dwellings in Clyde would continue.
- This is because (a) many of the key physical features and attractions of Clyde (i.e. the town's amenity and relative accessibility) are unlikely to change materially in the future and (b) the drivers of Clyde's residential demand are expected to grow over time (i.e. an ageing population and more job opportunities in locations like Cromwell and Alexandra and potentially locally).

3 Future Demand Growth

This section examines dwelling growth projections for Clyde township based on CODC's own projection dataset. These demand projections assume unconstrained capacity for growth and therefore reflect the growth potential of Clyde over the long term, should that capacity be provided. Consistent with the findings of Section 2, the projections indicate continued growth and demand for Clyde.

3.1 Population Growth Projections

The Council's 2018-2048 growth projections are prepared by Rationale Limited. These projections were last prepared in August 2016[11] and the next update is scheduled for 2020 (to incorporate the Census 2018 results). Before focussing on Council's dwelling projections for Clyde, which is directly relevant to the proposed private plan change, it is useful to examine the Council's usually resident population projections for the township against the latest data.

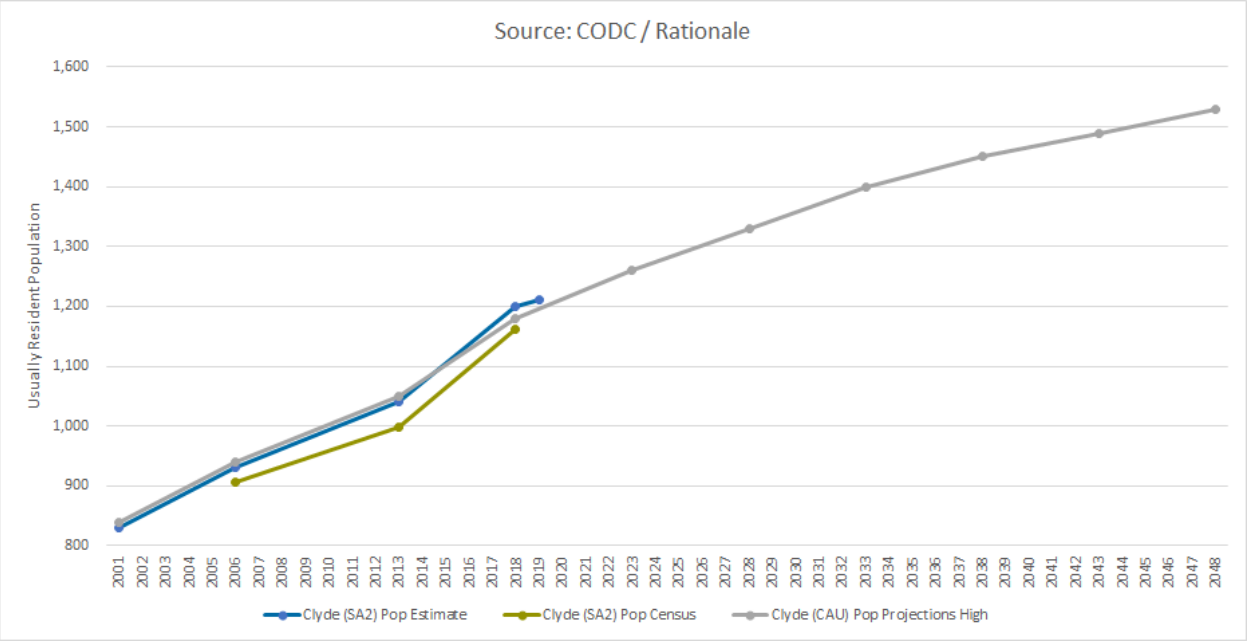
The CODC projections incorporate Statistics New Zealand low, medium and high growth projections across the district, and a recommended growth projection that takes into account local level growth trends. In the Clyde CAU, the recommended projection adopted the high growth outlook for the short and medium term and a medium growth outlook in the long term.

Elsewhere in the district, recent growth has eclipsed short term recommended growth projections (i.e. growth has been faster than projected). In Cromwell for example, Rationale has since advised Council[12] to revert to the high growth scenario for the purpose of long term planning until such time as the projections can be updated. In keeping with the approach recommended for Cromwell, we have considered the high growth projections for Clyde in this assessment for all three time periods.

Figure 3.1 overlays the high scenario usually resident population projections for the Clyde CAU to 2048 with the recent Census population counts and annual population estimates – albeit that these are for a slightly smaller (SA2 defined) geographic area. While there is some variation around the historical data points, M.E consider that the high growth scenario still appears broadly appropriate for application in Clyde but is potentially conservative because growth between 2013 and 2018 has tracked slightly faster (steeper). Only when the projections are updated will it become evident whether Rationale considers that Clyde's growth rate should be revised upwards. In the interim, we have adopted the existing high growth projections for population and dwellings for Clyde.

[11] CODC Growth Projections 2018 to 2048 – Resident Population, Visitors, Dwellings, Rating Units. Rationale Ltd, August 2016.
[12] Memo dated 20th September 2018 from Tom Lucas (Rationale) to Vivien Lightfoot (CODC).

Figure 3.1 – CODC Dwelling Growth Projections for Clyde CAU 2018-2048



3.2 Dwelling Growth Projections

Dwelling projections relate directly to capacity for residential lots[13] – which is the key purpose of the proposed private plan change (to supply additional urban density residential sections and therefore dwellings in Clyde). Further detail on Rationale's approach to dwelling projections can be found in section 5.3 of their 2016 report.

Figure 3.2 shows that residential dwellings in the Clyde (CAU defined) township are projected to increase from 781 in 2018 to 1,055 in 2048. This is a total increase of 274 additional dwellings (a long term annual growth rate of 9 dwellings per annum) or total growth of 35%.

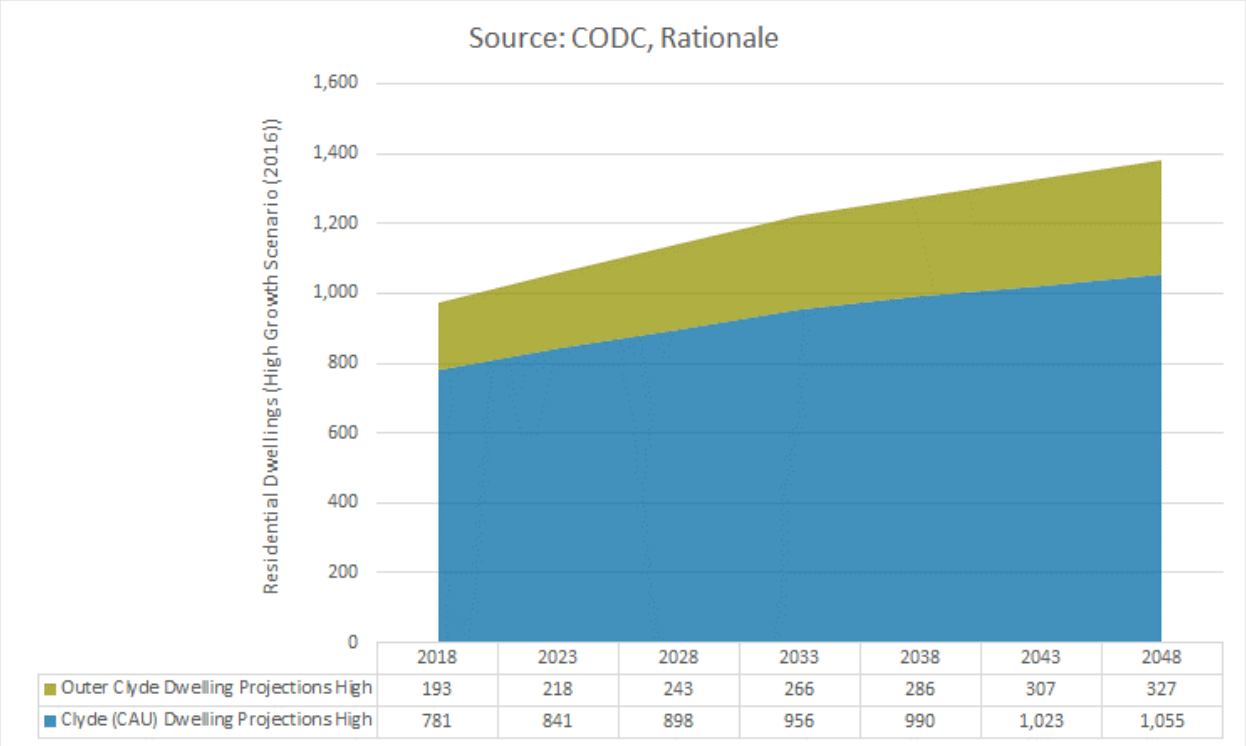
Potentially relevant, the surrounding rural environment of Clyde – defined as 'Outer Clyde' in the Rationale projections and mapped in Appendix 1 – is projected to grow by 134 additional dwellings between 2018 and 2048 (between 4 and 5 dwellings on average per annum or total growth of 70%). Such growth (if realised) would result in intensification of what is currently zoned Rural Residential or Rural Resource Area land.

Over the 2018-2048 time period, the same high projections show growth of only 51 'rating units' in Outer Clyde. This indicates that the major share of projected dwelling growth in this area is anticipated to be absorbed on existing rural or dairy farm properties with a smaller share (indicatively around 40%) created on new rural lifestyle properties[14].

[13] We note that there is not necessarily a 1:1 relationship between residential lots and residential dwellings where planning provisions allow for the development of minor dwellings. For the purpose of this assessment we have equated dwellings with lots.
[14] Based on M.E's understanding of Rationale's rating unit approach.

The proposed plan change site falls within the 'Outer Clyde' defined area. This means that there is strong demand to develop this site for rural lifestyle properties as well as potential to develop the site for urban residential expansion (i.e. to cater for a portion of the growth projected for the Clyde CAU/township). The most efficient use of the site (for these two potential outcomes) depends on the capacity of the current township to internalise projected growth. The capacity of the township to cater for further growth is discussed further in Section 5.

Figure 3.2 – Residential Dwelling Projections for Clyde and Surrounds (High) 2018-48



	2018	2023	2028	2033	2038	2043	2048
Outer Clyde Dwelling Projections High	193	218	243	266	286	307	327
Clyde (CAU) Dwelling Projections High	781	841	898	956	990	1,023	1,055

The Council's dwelling projections provide the context against which the intent and scale of the private plan change can be evaluated. M.E considers two scenarios for this assessment:

1. Scenario 1: Projected dwelling growth within the Clyde CAU – being demand for urban dwelling capacity '*in*' the Clyde township. As above, this is long term growth of 274 additional dwellings (to 2048). This forms our lower demand growth estimate.

2. Scenario 2: A portion of dwelling demand in Outer Clyde could (subject to market preferences) be satisfied through the provision of additional urban dwelling capacity instead of through additional (lower density) rural lifestyle capacity. The logical location of urban capacity within Outer Clyde would, in our view, be on the fringes of the Clyde township in order to maximise urban efficiency. Under this scenario, the urban component of projected dwelling growth in Outer Clyde would be additional to the projected urban dwelling growth within Clyde township (i.e. they would be combined). M.E has assumed indicatively that 30% of the 51 additional rating units projected for Outer Clyde could be satisfied through urban properties. This is 15 dwellings out of the total growth of 134 additional dwellings for Outer Clyde to 2048 (11% of the total). We have added these 15

residential dwellings to the township's dwelling growth of 274 to give an upper estimate of demand growth of 289 urban dwellings[15].

The relationship between the private plan change request and there two demand growth scenarios is discussed further in Section 5.

3.3 Key Point Summary

- Clyde township is projected (assuming no constraints to capacity) to grow by an additional 274 to 289 residential dwellings between 2018 and 2048 based on current Council data.
- This demand is for urban density dwellings within or adjacent to the existing urban area of Clyde.
- This projected future growth is broadly consistent with recent growth rates (i.e. is a continuation of past growth trends). It is considered realistic based on an understanding of the drivers of demand for residential dwellings in Clyde.
- Even the upper range of demand growth may prove to be conservative, although this will not be clear until Council updates their growth projections in 2020.

[15] Note, this upper estimate of urban dwelling demand growth (Scenario 2) does not account for the potential conservativism in the current council projections for Clyde.

4 Current Residential Market

This section takes a look at selected housing market indicators for the Clyde township (as defined by CAU boundaries). These indicators, supplied by MBIE in response to the National Policy Statement – Urban Development Capacity 2016, help to monitor the implications of demand, supply and capacity, and how these three factors interact in economic terms. They provide further insight on the potential relevance and effect of additional residential dwelling capacity in Clyde, as would be enabled through the proposed private plan change. This section also discusses the current constraints to Clyde's urban growth.

4.1 Housing Market Indicators

Figure 4.1 contains data on the count of dwellings for each CAU of COD as well as the COD average. The data is derived from building consents (lagged to allow for building completion). Clyde is represented by the light green line. The number of dwellings in Clyde is relatively small compared to the likes of Cromwell, Alexandra and the extensive Dunstan CAU (which contains a mix of rural, rural lifestyle and urban settings). As at March 2019, Clyde accounted for 8.2% of the district's dwelling estate according to this dataset. Compared to Cromwell and Dunstan which have increased dwellings by 8% each in the two years since March 2017, dwelling growth in Clyde has been modest at 6%.

Figure 4.1 – COD Count of Dwellings – Broken Down by CAU (MBIE)

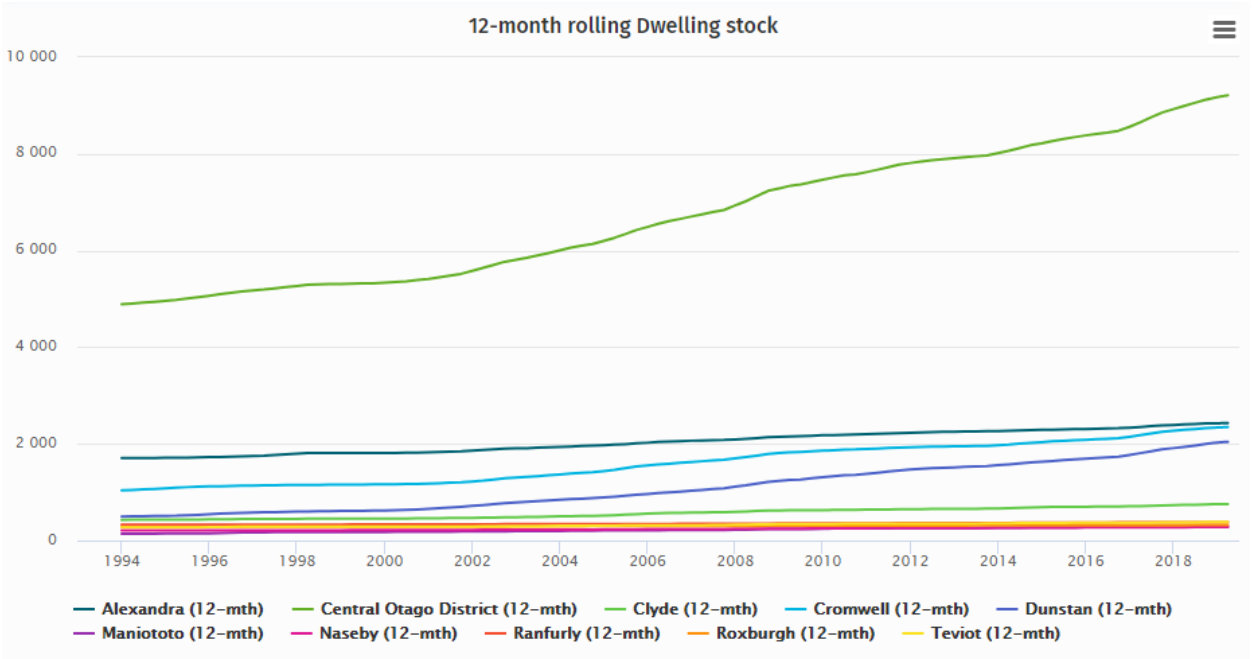


Figure 4.2 examines Clyde's quarterly dwelling change in more detail. It is an indicator of residential building activity in the township and correlates strongly with the supply of residential sections to the

market. Residential dwelling construction has ranged from a low of 1 new dwelling per quarter, to as many as 8 new dwellings a quarter. The peaks follow a release of one or more residential subdivisions and the troughs represent the diminishing availability of bare sections. Importantly, Figure 4.2 shows that growth has been slowing since September 2017 with only two dwellings added in the March 2019 quarter. More recent data is not provided on the MBIE website but M.E anticipate that the rate of growth has further diminished over the rest of 2019. In the absence of any new residential capacity, particularly greenfield land, Clyde will cease to grow despite increasing demand for dwellings.

Figure 4.2 – Clyde CAU Dwelling Stock Supply Trend

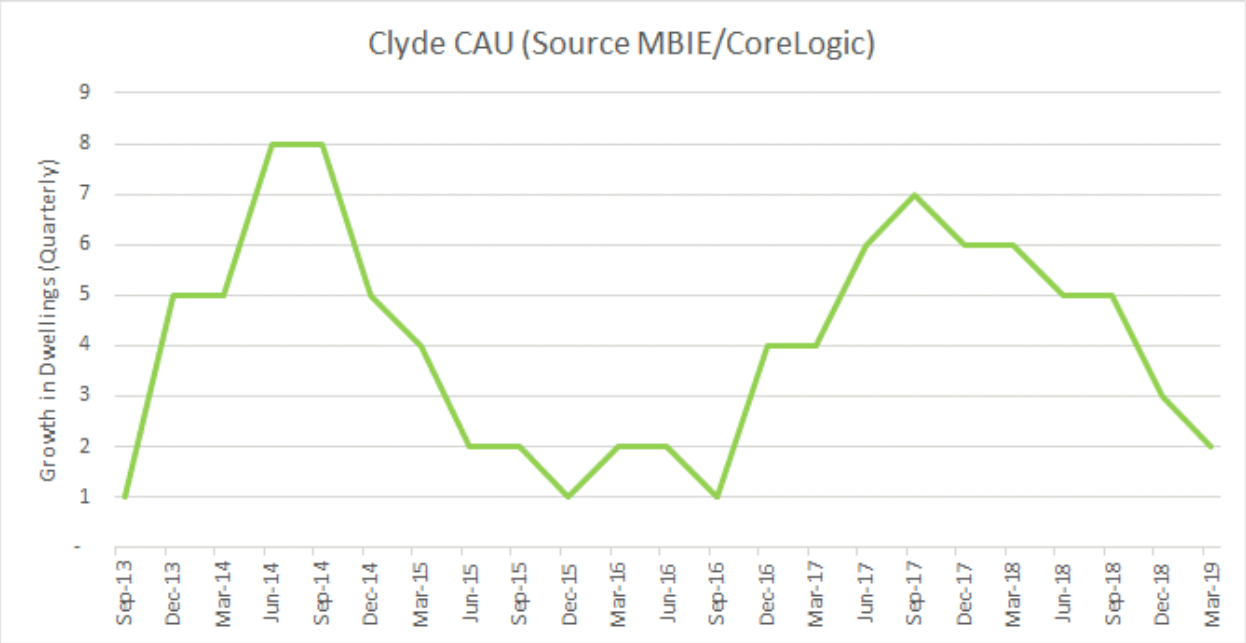


Figure 4.3 compares the median prices of residential dwellings sold in each quarter by CAU in COD. This median price series is not adjusted for size and quality of dwellings. Prices are presented in nominal terms; they have not been adjusted for general price inflation.

Sale prices are determined by the interaction of demand and supply, including for investment property. Across COD, there was little variation in house prices back in the early 2000s, but things are very different today where there is a broad range of values depending on the location. Between 2010 and 2015, Clyde had the second highest median house prices in the District (after Dunstan CAU which is strongly influenced by rural lifestyle properties but also satellite areas like Pisa Moorings and Bannockburn). During this period of slow but steady growth in dwellings, prices remained relatively stable. Prices in Clyde then decreased slightly to 2016 but have since accelerated rapidly and once again exceed median values in Cromwell.

Figure 4.3 – COD Dwelling Sales Prices – Broken down by CAU (MBIE)

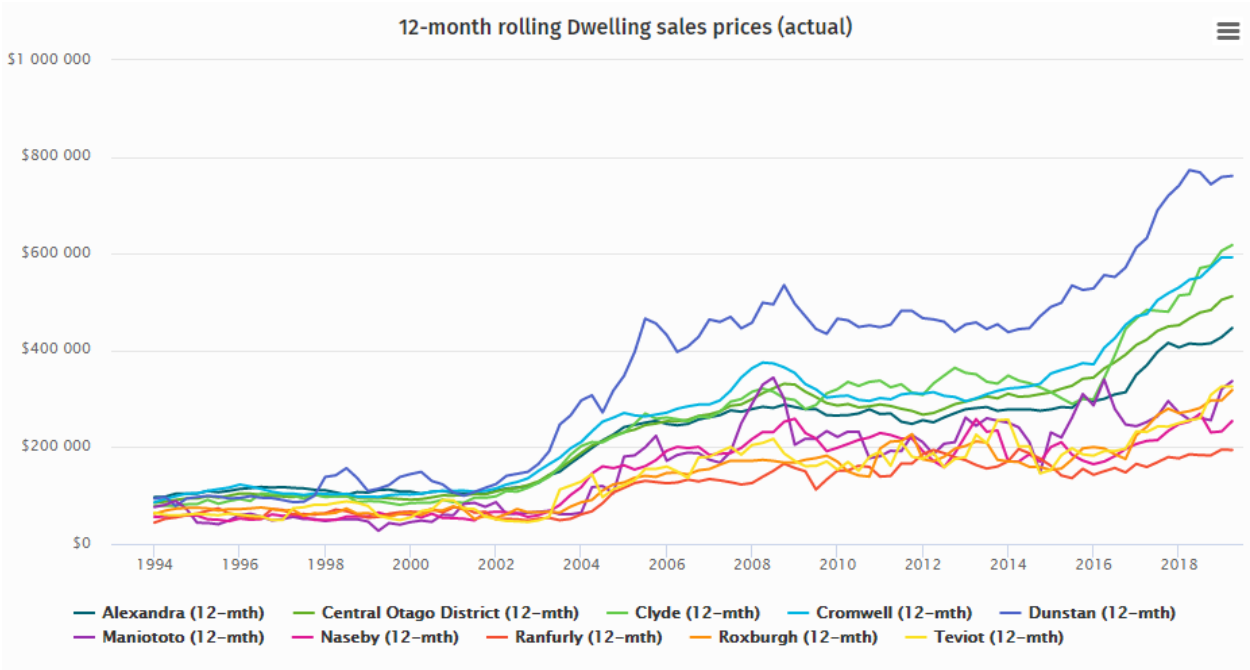


Figure 4.3 suggests a strong sellers' market in Clyde (high demand and limited supply). While typically satellite suburbs offer potential for lower house values as a trade-off for a commute to work for working households and families, it is likely that strong demand by the holiday home and (wealthy) retirement market has driven prices up[16] in conjunction with the constraints on further growth.

As supply is further constrained in Clyde township (due to the absence of expansion potential), prices can be expected to continue to rise in light of strong demand. This may further limit the affordability of Clyde for certain segments of the housing market.

Figure 4.4 reflects mean[17] rents as reported in new rental bonds lodged with MBIE by CAU across COD. Prices are presented in nominal terms; they have not been adjusted for general price inflation. The data is for private bonds only and so excludes any social housing. The data shows that at times, mean rent prices in Clyde have been among the most expensive in the district. Today, they are second only to Cromwell. Rent data for the March 2019 quarter is not yet included for Clyde, so it is not yet clear if rents have stayed stable or have risen again as was the case in Cromwell and Alexandra. If the supply of rental properties is further constrained in the light of strong demand growth, it is likely that landlords will be able to command higher and higher rents in Clyde and another step-change increase in mean rents (such as occurred in early 2017) may be likely.

[16] Loan servicing is less critical to these groups.

[17] The mean used is a geometric mean. The reason for using this mean is that rents cluster around round numbers and tend to plateau for months at a time (spiking up by say $10 or $20 at a time). This makes analysis of time series difficult and using the geometric mean is a way of removing this clustering effect.

Figure 4.4 – COD Dwelling Rent Prices – Broken down by CAU (MBIE)

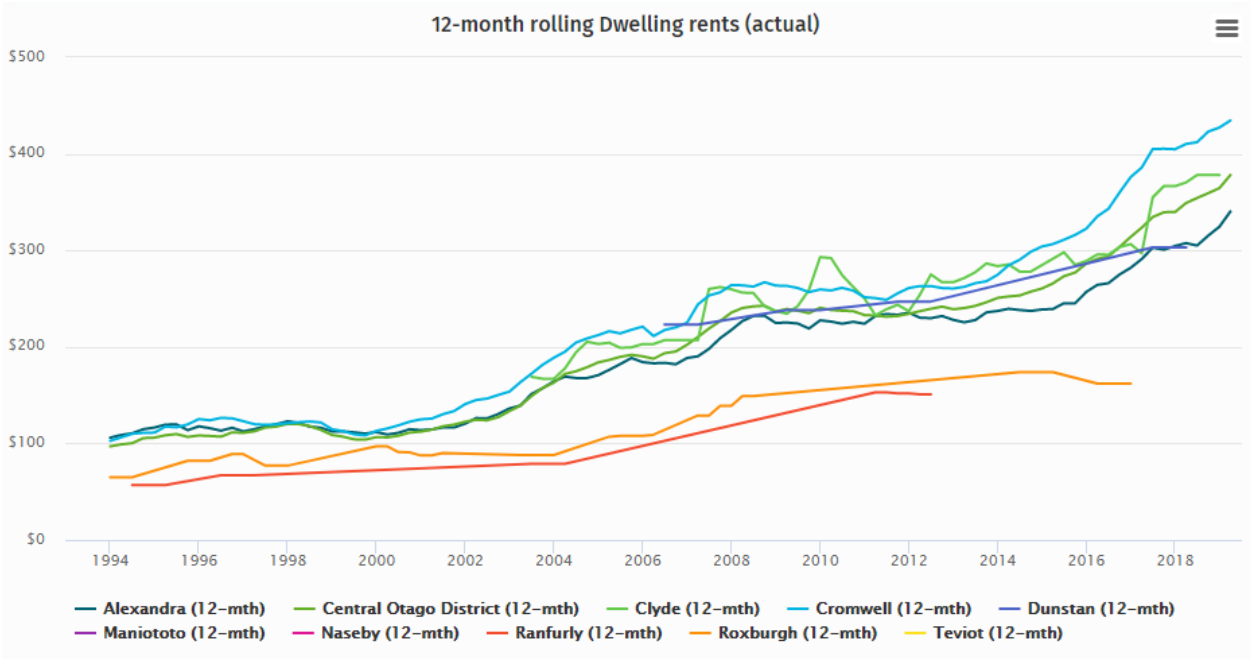


Figure 4.5 shows the mean land prices at each valuation period by CAU across COD. The mean is weighted by the number of dwellings in each component meshblock. The value of land in Clyde was relatively stable between 2008 and 2014. Elsewhere in the district, land values were decreasing during that period. Since 2014 (i.e. in the 2017 valuation), land values in Clyde increased, although this increase was felt in most of the district. Rising land values will have contributed to the rise in dwelling prices in Clyde in recent years to a minor degree. Land values are approaching those in Alexandra and may surpass Alexandra if the recent trends continue. Limited growth in supply (capacity) will further drive up land values.

Figure 4.6 shows the share of house values that are accounted for by land prices at each valuation period. A higher ratio indicates that land is more valuable relative to the buildings that occupy it. Compared to the high growth districts and aggregated areas, COD has a low percentage share (39.5% in 2016). In Auckland, land value in 2017 accounted for 70% of capital value (and is rising) and in QLD the share is 54%. COD is however similar to many other provincial districts and has a higher share than Dunedin and Invercargill cities.

Within COD, Clyde has one of the lowest ratios of land value to capital value at 35.2% - similar to Teviot and Maniototo CAUs. This shows that the value of property in Clyde is tied mostly to the presence of the dwellings. It is also an indicator that properties are relatively over-capitalised which makes redevelopment less likely. This is relevant when considering the potential for redevelopment to help cater for projected growth (i.e. through intensification/subdivision of existing developed lots). While this data presents only a high level average, it supports anecdotal evidence that infill and redevelopment opportunities cannot be relied upon to any significant degree to help cater for projected dwelling demand growth in Clyde township.

Figure 4.5 – COD Average Dwelling Land Value – Broken down by CAU (MBIE)

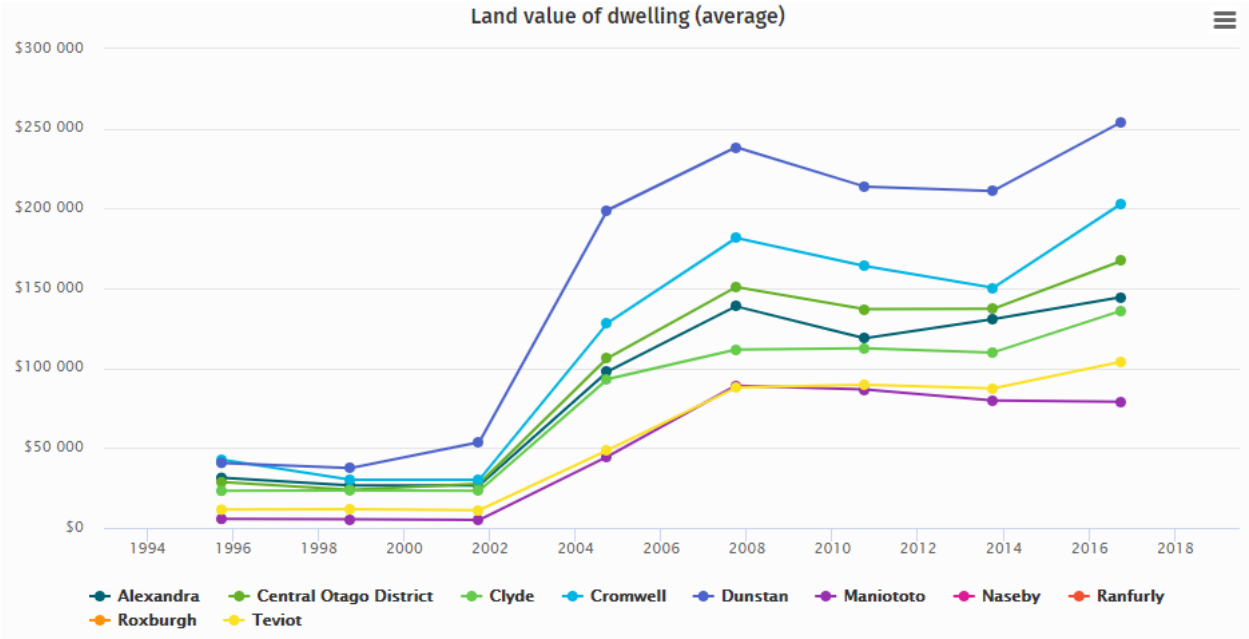
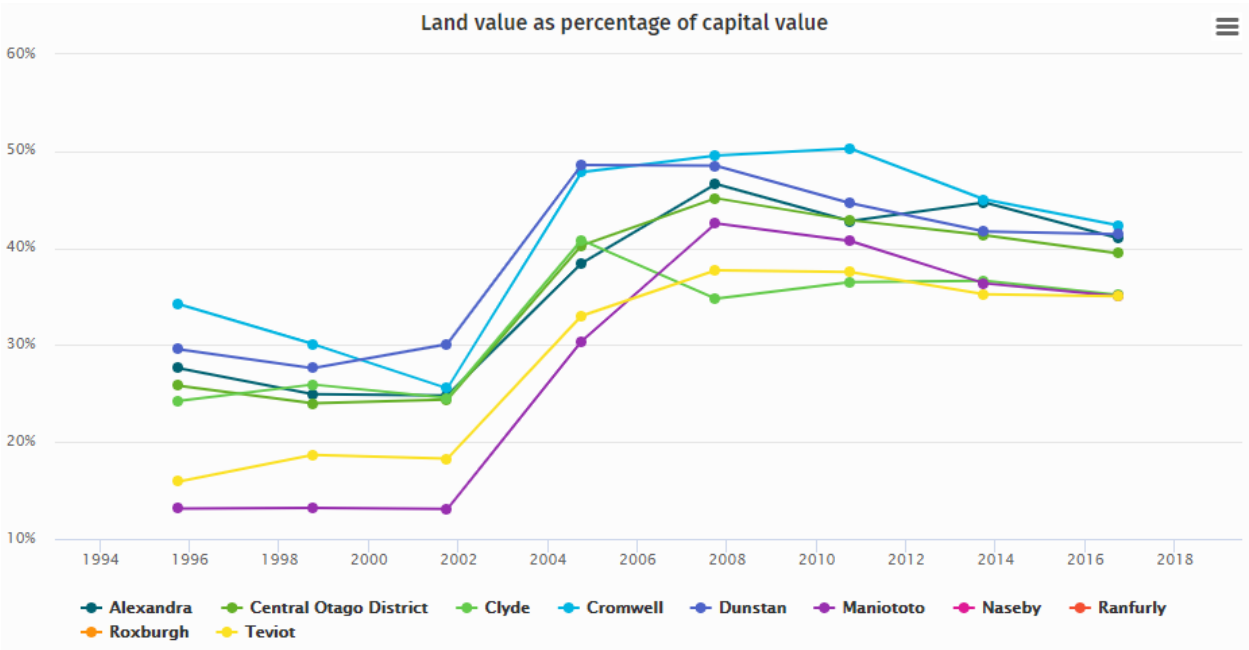


Figure 4.6 – COD Dwelling Land Value as a % of Capital Value – Broken down by CAU (MBIE)



4.2 Constraints to Clyde's Urban Growth

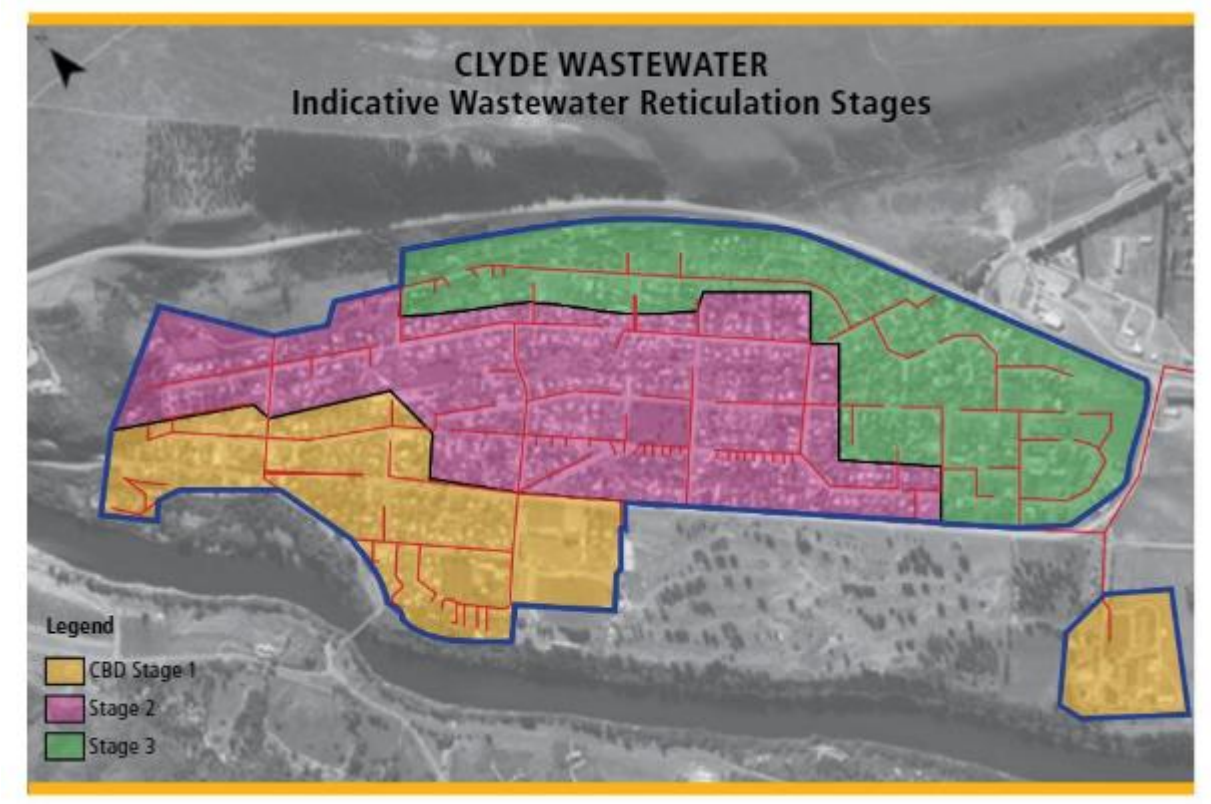
Residential and commercial properties in Clyde are reliant on individual septic tanks to manage wastewater. For this reason, further intensification of Clyde's existing urban area is constrained at a property level and further expansion of Clyde, which would increase the number of residential septic tanks and disposal fields increases the risk of adverse and cumulative environmental effects (contrary to the requirements of the

NPS on Freshwater Management). Managing tourist growth and economic development in the commercial centre is also potentially constrained by the ability to locate and service septic tanks.

It is M.E's understanding that until Clyde's wastewater management issues are addressed, the town's growth is limited to the current urban boundary. In response to growing demand pressure and environmental compliance requirements, CODC committed to the development of a reticulated wastewater network for Clyde in 2018. The new scheme will pipe wastewater to the existing treatment plant in Alexandra. "*Our third largest town can't remain reliant on septic tanks for environmental and economic reasons*" (2018 Long Term Plan, CODC, page 11).

This significant infrastructure project is already underway (with the main truck pipeline all but complete[18]). The reticulation will occur in three stages over a 25 year period, starting with the heritage and commercial precinct and all properties between Sunderland Street and the Clutha River[19] in Autumn 2020 (with funding allocated in the 2018 LTP). The staging allows the oldest septic tanks to transition to the new network first and the newest septic tanks to transition last (Figure 4.7).

Figure 4.7 – Indicative Staging of the Clyde Waste Water Reticulation Network



"*Installation of a public wastewater collection system removes the wastewater impediment to further subdivision in Clyde*" (2018 Long Term Plan, CODC, page 71). The Clyde wastewater project has now made further intensification and especially greenfield expansion of the township commercially feasible. The primary impediment now is zoned (or consented) capacity.

[18] https://newsletters-api.datacomsphere.co.nz/public/16/views/5393ac5b-d4ea-4547-a3aa-269f5578d021

[19] Includes the Dunstan Hospital and the Clyde camping ground.

4.3 Key Point Summary

- The lack of residential sections available for development in Clyde has significantly slowed dwelling growth. Dwelling growth is expected to cease unless additional capacity is provided.
- The absence of a wastewater infrastructure network has impeded the ability to plan or provide for growth.
- That impediment has now been removed.
- House and rental prices in Clyde have been rising strongly and are amongst the highest in the district.
- Strong demand growth and a lack of certainty about greenfield growth opportunities is likely to drive prices and rents higher still.

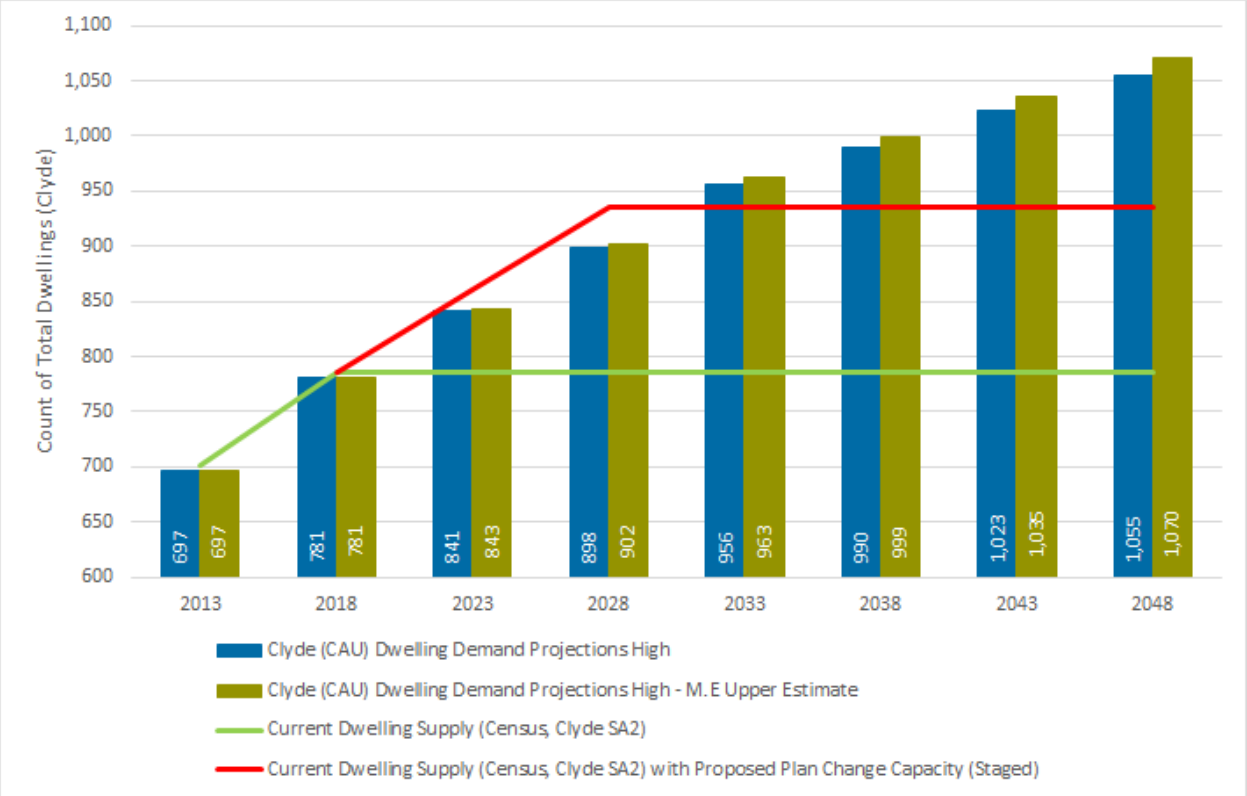
5 Conclusions

This section considers the proposed private plan change in the context of Clyde's projected dwelling growth and current residential capacity. It demonstrates the increasing shortfall of dwelling capacity in Clyde under the operative District Plan and the effectiveness of the proposed residential zoning to cater for demand growth over the medium term future.

5.1 Providing for Growth in Clyde

Current estimates of dwellings in Clyde township vary depending on the area considered (SA2 or CAU), the source of data (i.e. Statistics NZ Census or MBIE/CoreLogic) and the date of the data. Current (2018) demand for dwellings in the Clyde CAU is estimated at around 780 dwellings according to Council data, but this was a projection carried out in 2016 off a 2013 base. Broadly however, supply has been commensurate with demand as illustrated in Figure 5.1 for the period of 2013 and 2018.

Figure 5.1 – Proposed Plan Change Capacity Relative to Demand Growth



However, based on a combination of factual dwelling supply data and visual and anecdotal evidence, supply of vacant residential lots within the Clyde urban boundary has, or is about to, run out. There is no greenfield capacity to grow and the prospect of redevelopment and infill subdivision is relatively low, albeit more feasible once properties can connect to the public wastewater reticulation network in the years to come.

This indicates that dwelling supply will cease to keep pace with underlying dwelling demand – which is projected to be strong over the long term. Dwelling growth in Clyde will be severely constrained despite the impediment of wastewater management being addressed. Based on assumptions outlined in this report, the shortfall of capacity by 2028 could be in the order of 112-116 dwellings in the medium term (i.e. 2028), increasing to 269-284 dwellings in the long term (i.e. 2048) (Figure 5.1).

This analysis concludes that greenfield residential capacity is required if dwelling demand in Clyde is to be met. The timing of that additional capacity is urgent. Already prices and rents in Clyde are increasing at a rapid rate and this trend will be exacerbated if expansion is constrained and no certainty (confidence) for future growth is provided to the market.

The proposed private plan change indicatively provides additional capacity for 150 additional dwellings adjoining the current urban boundary of Clyde. For the purpose of Figure 5.1, M.E has staged the release of that capacity over a 10 year period (i.e. 75 lots by 2023 and a further 75 lots by 2028). This is indicative only. The key outcome however is that the proposed private plan change would provide capacity to meet demand growth over the next 10 years (and slightly beyond) based on current projections.

The private plan change would not meet all projected demand growth over the long term in Clyde and further zone capacity will be needed if this growth is to be met. This longer term shortfall is a matter that could be addressed as part of the current district plan review process[20].

5.2 Economic Costs and Benefits of Request

There are a number of economic benefits arising from the proposed private plan change. Care is however needed to distinguish the benefits of providing for growth *per se* from the benefits of providing for growth in this location. The reason for this is that COD may still achieve the same overall growth if demand for dwellings in Clyde is deflected elsewhere (i.e. to Alexandra or Cromwell) in the absence of any additional growth capacity.

It is not possible to predict if households migrating to COD (they key driver of growth) with a preference to settle in Clyde would still move to the district if suitable housing in Clyde was not available (or available at a price they could afford). It is however reasonable to expect that holiday home buyers have specific location attributes in mind and not all towns in COD would be a substitute for what Clyde offers. The same may apply for retirement living. This suggests that at least a small portion of projected growth in the district is contingent on further residential capacity being enabled in Clyde.

The key economic benefits arising from the proposed plan change include:

- Provides housing capacity in a location of strong market demand. Helps address a projected shortfall of dwelling capacity in the medium term.
- Provides a greater choice of housing for retirees, working households/families, renters and holiday homeowners within Clyde. This will facilitate greater churn in the local housing market, allowing households to shift within Clyde as their housing needs change with life stage.

[20] This could be in the form of a Future Urban Zone or a Deferred Growth Zone that provided certainty to the community and landowners on the future strategic growth direction for Clyde.

- Facilitates population growth, including growth of the local work force – supporting economic growth within Clyde businesses and businesses in Cromwell, Alexandra and the rural surrounds.
- The development of the land at urban densities (as opposed to rural residential densities) will have a direct impact on the COD economy (construction effects), helping to sustain the local and wider construction sectors over the short-medium term.
- Ongoing spend by new households (and users of holiday homes) within the proposed zone area creates demand for local goods and services, helping to sustain local businesses and investment.
- The location of the proposed residential zoning will result in a cohesive expansion of the existing urban area; this maximises the urban efficiency of Clyde as it expands to cater for growth, particularly in terms of trip making and provision of network infrastructure.
- Helps alleviate rising dwelling prices and rents driven by an imbalance between supply and demand.
- Provides greater opportunities for affordable housing options, including as a result of higher density development which was not otherwise feasible when septic tanks were required.

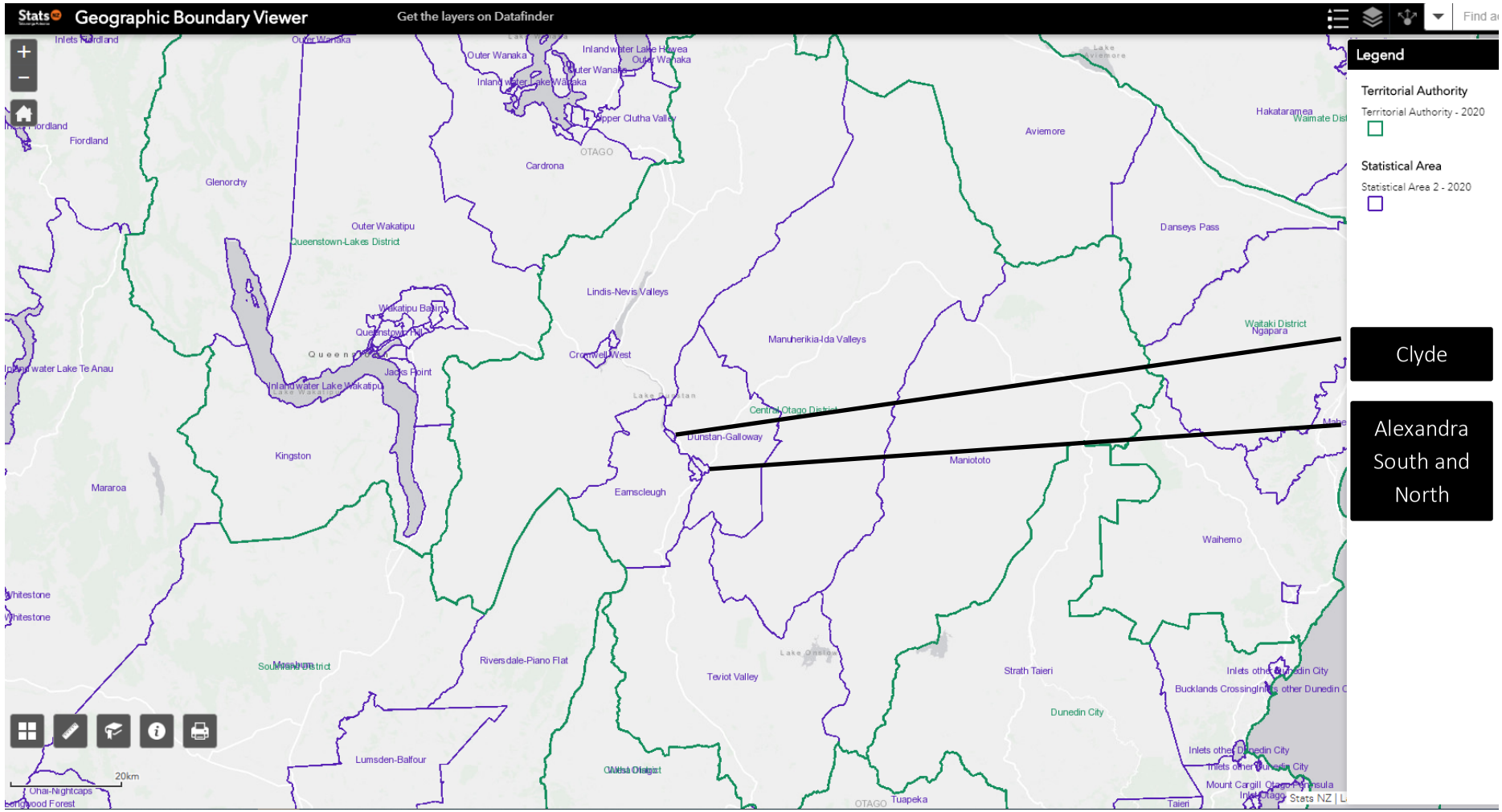
The potential economic costs of the private plan change are those typically associated with urban expansion (and are not unique to this location). This includes loss of capacity for rural residential dwellings on the fringe of Clyde, the potential opportunity cost of slower price rises for current Clyde dwelling owners and the additional pressure on local services, schools, roads, parking and infrastructure associated with additional households (including short term visitors). There is a cost associated with meeting this demand, although that cost depends on the ability of services and infrastructure to absorb further growth using current resources[21].

Overall, M.E considers that the economic benefits of the private plan change will outweigh the potential economic costs.

[21] I.e., the ability of the school to take additional enrolments without needing a new classroom.

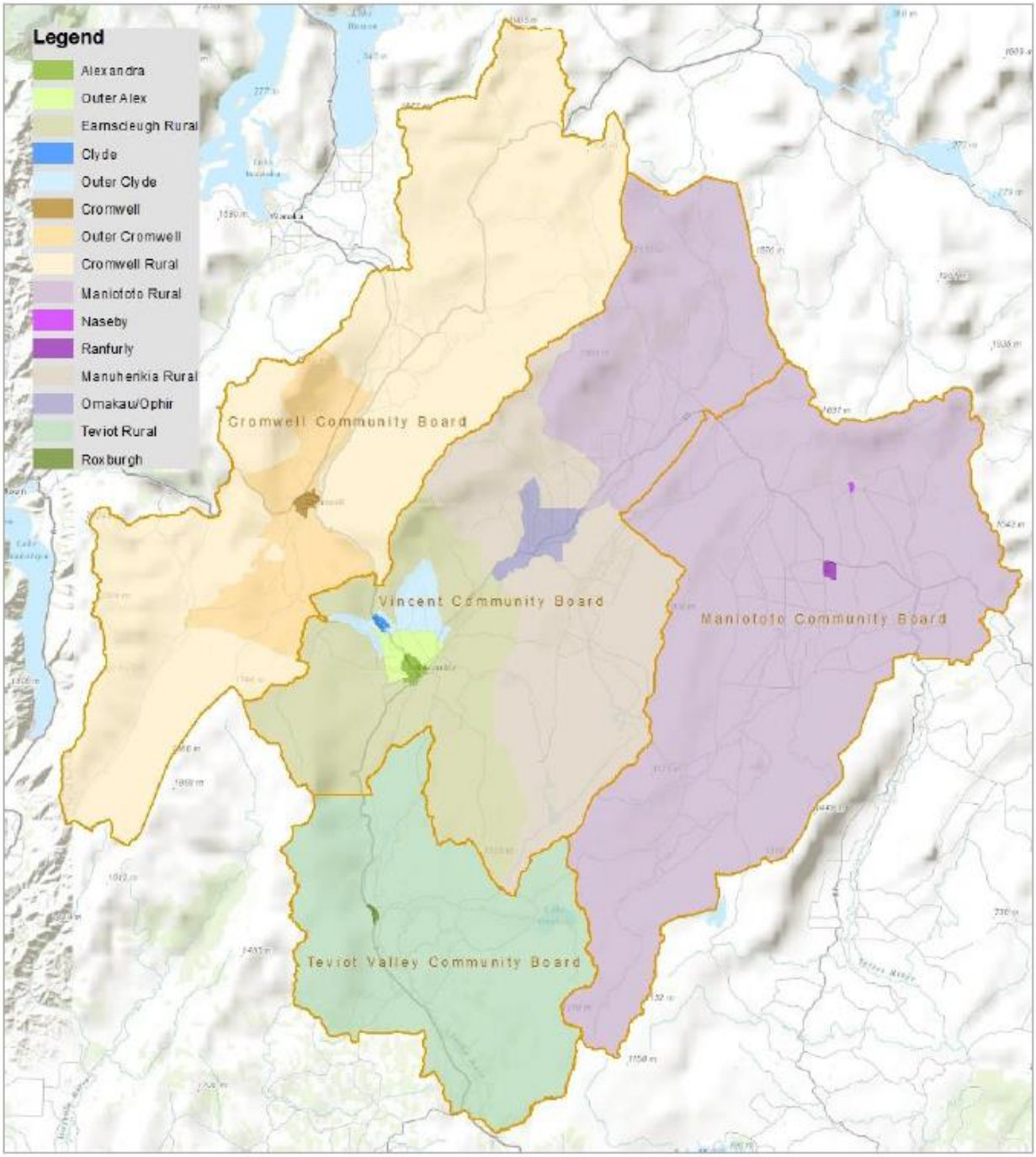
Appendix 1 – Statistical Geographies

Statistical Area 2 (2020) Boundaries – Central Otago District and Surrounds



Statistical Area 2 and Census Area Unit Boundary Changes - Clyde

CODC Growth Projections CAU Based Geographic Defined Areas



Project Number: 6-XZ581.00

Mutton Town Road

Integrated Transport Assessment

28 February 2020

wsp

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Disclaimers and Limitations

This report ('**Report**') has been prepared by WSP exclusively for Clyde Claim Ltd and Houlahan Enterprises Ltd ('**Client**') in relation to preparing an Integrated Transport Assessment for a proposed housing development in Clyde ('**Purpose**') and in accordance with the ACENZ Short Form Agreement with the Client dated 29th November 2019. The findings in this Report are based on and are subject to the assumptions specified in the Report. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

1 Introduction

This report documents an Integrated Transport Assessment undertaken for a proposed private plan change at Mutton Town Road in Clyde, Central Otago. The proposal is to rezone approximately 13ha of Rural Residential land to Residential Resource Area.

Included in the report is an assessment of existing conditions, relevant policies and plans, expected trip generation, positive and negative transport effects resulting from the development and potential mitigations against negative effects.

The process of developing the ITA is intended to align stakeholders, provide clarity on transport requirements for the developer and satisfy the Transport Agency that negative effects are suitably mitigatable, enabling them to support the developer's submission.

2 Existing Conditions

2.1 Site Location

The site is located as shown in Figure 1, adjacent to State Highway 8 connecting the nearest towns, Cromwell 25km to the north and Alexandra 7.5km to the south. The site is approximately 1.5km from the centre of Clyde, which has a small retail offering. Dunstan hospital, located just off Mutton Town Road, has a catchment that extends to Wanaka. Clyde Primary School is 1.5km from the proposed development and currently has a roll of approximately 150 students. Sports facilities in the town include lawn bowls and a golf club.

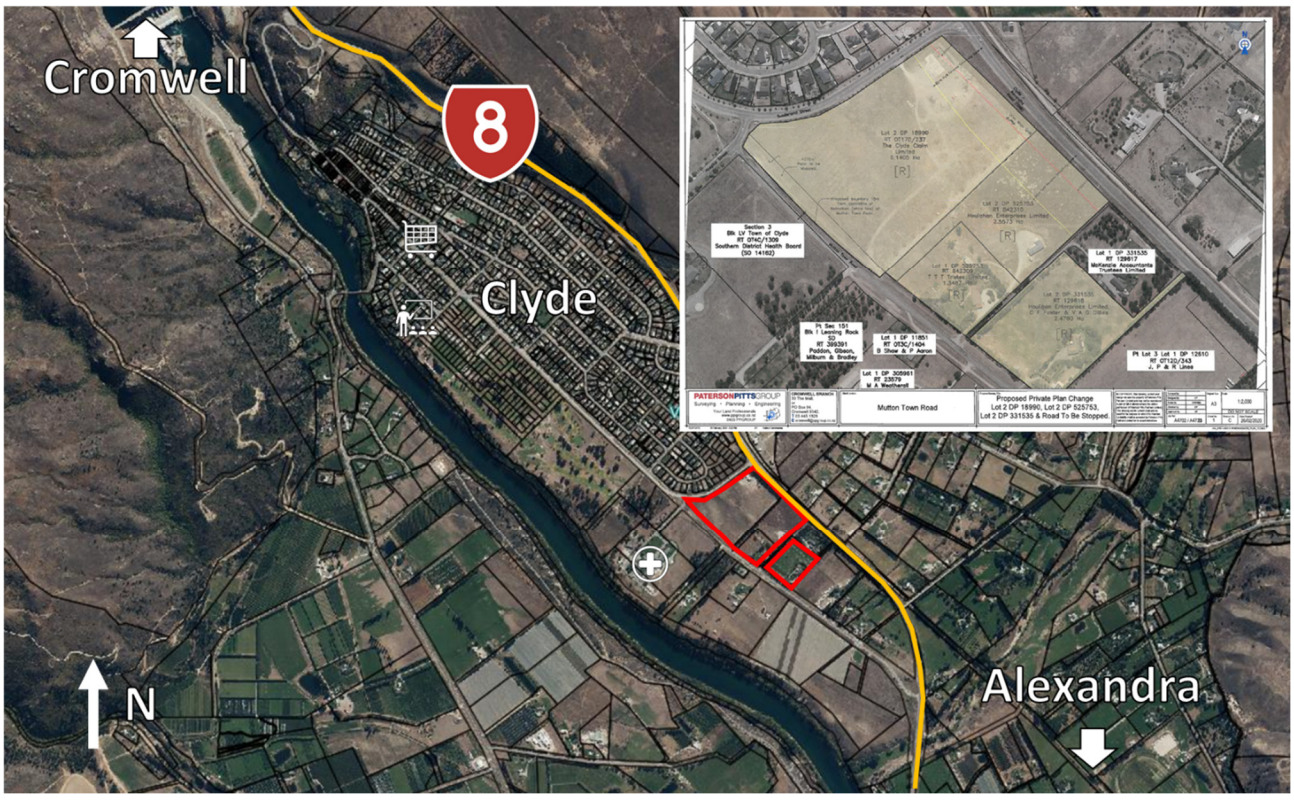


Figure 1 Proposed Development (red boundary) Site Location

2.2 Growth

The Otago region had one of the highest population growth rates in the country between the 2013 and 2018 censuses, largely driven by rapid growth in Queenstown Lakes District (Table 1). The population of Clyde itself grew by 16.2% in the same period, while Cromwell grew by 29.2% and Alexandra grew by 13.9%. By 2048, the population in Clyde and Alexandra is expected to have increased by 35% (Stats NZ).

Table 1 Population Growth in Surrounding Areas (Stats NZ Census 2018)

Otago Region	Queenstown Lakes District	Cromwell	Alexandra	Clyde
11.2%	38.7%	29.2%	13.9%	16.2%

The average age of Clyde residents has increased between the 2013 and 2018 censuses, with the number of people under 29 remaining constant at 264 and the number of people over 29 increasing by 165 to 900.

As demand for housing in Queenstown has increased, house prices there have increased by 77.9% between 2013 and 2018 (Queenstown Property Monthly Housing Statistics), and a larger proportion of the workforce now commute from further afield, including Cromwell and Wanaka. Queenstown commuters and families are increasingly likely to settle in Clyde, particularly as and when more affordable housing becomes available.

2.3 Road Network

The town of Clyde, including the proposed site, lies off State Highway 8. Access to the town is provided at Sunderland Street, Hazlett Street and the southern end of Mutton Town Road. This section describes the roads likely to be affected by development on Mutton Town Road.

2.3.1 State Highway 8

The State Highway runs along the north-eastern boundary of the site and provides the means for regional travel. The road is classified as an Arterial State Highway in the One Network Road Classification (ONRC).

The posted speed limit past the site is 100km/h, though the alignment is straight and an operating speed closer to 110km/h is assumed. A typical cross section of the road includes one 3.5m lane in each direction with 1.5m shoulders and no central median. Flush medians are provided at main intersections for right turns.

2.3.2 Sunderland Street

The road traverses the southern side of the town and connects with the western end of Mutton Town Road. It is classified as an Urban Arterial Road under the CODC District Plan and a Secondary Collector Local Road in the ONRC.

The posted speed limit is 70km/h from 210m west of SH8, where it changes to 100km/h, to 250m east of Dunstan Street, where it changes to 50km/h. The carriageway allows for wide lanes in both directions, between 4.0m and 5.5m, and a 1.5m wide footpath is provided on the northern side. There are no shoulders or central median.

2.3.3 Mutton Town Road

The road runs along the southern boundary of the development, from Hospital Street/ Sunderland Street to SH8, and is proposed to provide access to the site. It currently provides access to 12 properties, mainly farms and associated buildings, and is classified as a Rural Local Road in the CODC District Plan and a Secondary Collector in the ONRC.

The posted speed limit is 100km/h, dropping to 70km/h 30m before the intersection with Hospital Street. The road has one 4.0m lane in each direction with no shoulders, central median or footpaths.

2.3.4 Mutton Town Road / Hospital Street and Mutton Town Road / Sunderland Street Intersections

The intersections are give-way controlled and less than 50m apart. The current low traffic volumes in the area are unlikely to cause queuing or stacking issues. One non-injury and two minor-injury and crashes have occurred at the intersection in the last 5 years, two caused by vehicles turning out and one caused by a vehicle turning in to Sunderland Street.

2.3.5 Sunderland Street / State Highway 8 Intersection

The give-way controlled intersection is likely to be the primary access point for traffic from the proposed development. It is one of three main access point for Clyde traffic and signposted as the turn-off for Dunstan hospital. The northern approach has a 50m right turn bay, the southern approach has a 40m channelised deceleration and left turn lane, and the Sunderland Street approach has a 30m acceleration lane northbound onto the highway. Visibility of the intersection from the highway is good, in excess of 300m in both directions.

A gap has been added to the fence directly opposite and across the road from Sunderland Street to provide access to the Otago Rail Trail. However, no formal crossing is provided and a truck was observed using their horn to alert a crossing jogger during a site visit.

2.3.6 Mutton Town Road / State Highway 8 Intersection

The intersection is located on SH8 at the southern end of a curve, where the profile of the land obscures visibility between approaching drivers and the intersection to approximately 190m. The intersection is stop-controlled and flares from 8.0m to 35.0m at the throat. There is a driveway to two properties approximately 30m north of the intersection.

No right turn bay is provided on the highway, which led to a fatal crash in 2018 whereby a vehicle queuing to turn into Mutton Town Road was rear-ended. Three similar crashes occurred at the nearby intersection with Young Lane in the last 5 years. An additional non-injury crash occurred in 2017 when a driver failed to stop at the intersection and crashed into the bank opposite.

2.4 Accessibility

According to the 2013 Census, the majority of travel in Clyde is by car, and the Mutton Town Road development is unlikely to be different. However, a proportion of trips will be made by active modes, particularly if the option exists and is designed appropriately. The local terrain and existing facilities make active modes an attractive transport option.

2.4.1 Cars

The proposed site is well connected for private vehicles, being located less than 1km from the state highway that provides quick and efficient to employment, shopping and education in Alexandra, Cromwell and Queenstown. Connectivity is also good to smaller activities in Clyde, such as the supermarket, primary school and golf club.

In the 2013 census, 88.9% of Clyde residents stated they travel to work by car, highlighting the importance of car travel to residents.

2.4.2 Public Transport

There is no public transport currently operating in Clyde except school buses. Given the small population, it is unlikely that any services will operate in the near future, even with the high growth rates currently occurring. Intercity bus tickets are available at around $15 for a trip between Queenstown and Clyde.

2.4.3 Walking

Clyde town centre is approximately 2km from the proposed development, on the edge of a realistic walking catchment (approximately a 25-minute walk at an average walking speed). The 2013 census showed that 5% of Clyde residents said they walk to work.

Some walking facilities are available in the vicinity including a 1.5m wide footpath along the northern side of Sunderland Road. To access Mutton Town Road (and an existing footway on the north side of Hospital Street, pedestrians currently use a diagonal gravel track adjacent to Clyde Recreation Reserve, and cross Sunderland Street at an angle to reach the Sunderland Street footway within the 70km/h speed zone. The primary school is a 20-minute walk from the development, and there would be expected to be some generated walking trips for accompanied young children on this route.

No pedestrian footways are currently provided on Mutton Town Road.

2.4.4 Cycling

Clyde town centre is within an easy cycling distance of the proposed development. The town is increasingly becoming known as a cycling hub, with tourist numbers comparatively high for a town of its size. The development is likely to attract Airbnb-type accommodation for users of the cycle trails, people who will be unfamiliar with the local transport network looking for easy access to the Rail Trail. A crossing of SH8 is currently provided in the form of an underpass on Albert Drive, shown in Figure 2 (location is shown in Figure 1).

Figure 2 Albert Drive Active Mode Underpass

According to commuter census data, the majority of workers in Clyde commute to Alexandra. This is an easy 20-minute cycle on the Otago Rail Trail, an internationally-acclaimed cycling route. Dunstan High School is directly accessed by the trail, and may be attractive to students living in Clyde during warmer months, particularly those under driving age.

2.5 Traffic Volumes

A variety of data sources has been used to understand baseline traffic volumes in the vicinity of the site, including State Highway 8 and the Sunderland Street/SH8 intersection.

Waka Kotahi NZ Transport Agency's Traffic Monitoring System hosts hourly count records from stations on SH8 around Clyde, one in Cromwell Gorge to the north and one immediately before Alexandra to the south. Annual Average Daily Traffic at the sites are recorded as:

- Cromwell Gorge – 5,800
- Alexandra – 6,100

State highway traffic past the site is therefore likely to be approximately 6,000 vehicles per day.

Manual traffic counts were undertaken on 16th January 2020 at the Sunderland Street / SH8 intersection. Due to timeframe constraints, the counts occurred outside the bounds of a 'typical day'. Turning volumes have therefore been factored to represent average conditions using counts for January 2019 and the annual average from the Alexandra counting station in Waka Kotahi NZ Transport Agency's Traffic Monitoring System (TMS). Seasonality-adjusted counts are summarised in Figure 3.

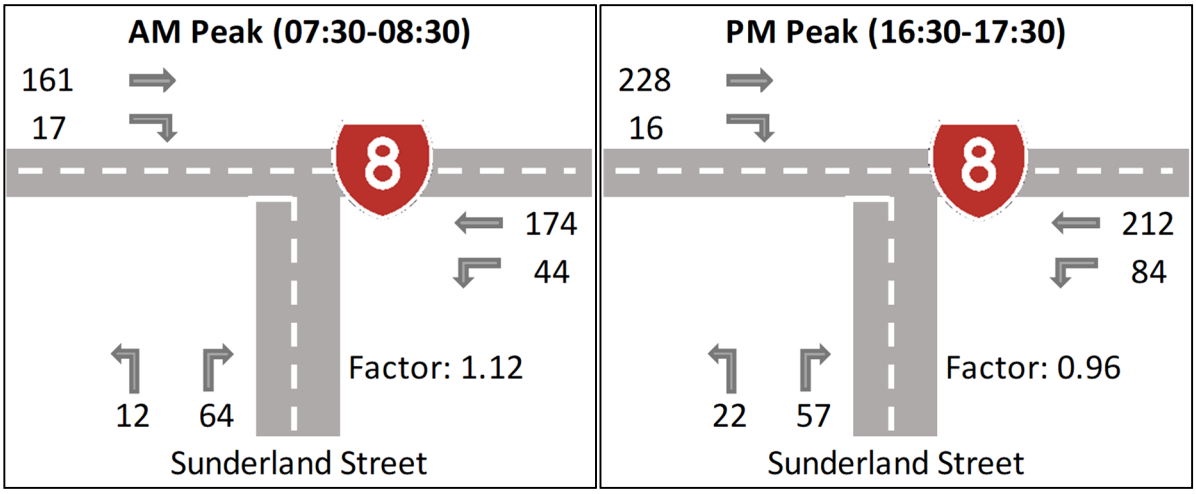


Figure 3 State Highway 8 / Sunderland Street Traffic Counts (2020, seasonality adjusted)

Based on information stored in Road Assessment and Maintenance Management (RAMM), Mutton Town Road has an Average Daily Traffic of approximately 330 vehicles and Sunderland Street approximately 1,050 vehicles.

Data from TMS shows a 10-year annual growth rate of 4.0% in Cromwell Gorge and 2.0% in Alexandra.

3 Policies and Plans

Although the Mutton Town Road development is comparatively minor, controlling authorities set out strategies to ensure development occurs in an appropriate manner that achieves long-term objectives. This section presents relevant parts of these plans and strategies.

3.1 Government Policy Statement on Land Transport

The 2018 GPS lays out strategic priorities and objectives for the Government's vision for the land transport system. The key priorities are:

- Safety – creating a safe system, free of death and serious injury. This includes an increase in funding for road safety and demand management. In practical terms this has led to NZ Transport Agency requiring a Safe Systems approach to transport design, including full protection for pedestrians at crossings and safer intersections such as roundabouts on high speed roads.
- Access – providing increased access to economic and social opportunities, enabling resilient transport choice. This builds on 'soft' transport planning themes in the strategy, including adopting mode-neutral planning in investment decisions and integrating land use with transport planning.

The NZ Transport Agency will require evidence that the increase in turning movements at intersections on SH8 caused by the proposed development will not result in an increased crash risk to satisfy the objective of creating a safe system.

3.2 Central Otago District Council 10-year Plan

Council have three Community Outcomes, a set of high level goals that frame what the Council aims to achieve:

- A Thriving Economy that is attractive to both businesses and residents alike
- A Sustainable Environment that provides a good quality of life. A community with a healthy balance between its natural and built environment
- A Safe & Healthy Community with a range of services and facilities, that values and celebrates its rich heritage

The plan acknowledges that infrastructure, particularly roading, has the potential to cause negative effects on the community and environment if not managed appropriately. Council's vision for roads and footpaths is *to ensure an efficient fully accessible, safe network*.

Also introduced in the plan is the Clyde Heritage Precinct Project, which seeks to address issues around parking demand, use of public spaces, increasing vehicle and cyclist volumes, road function and collaborative planning (Figure 4).

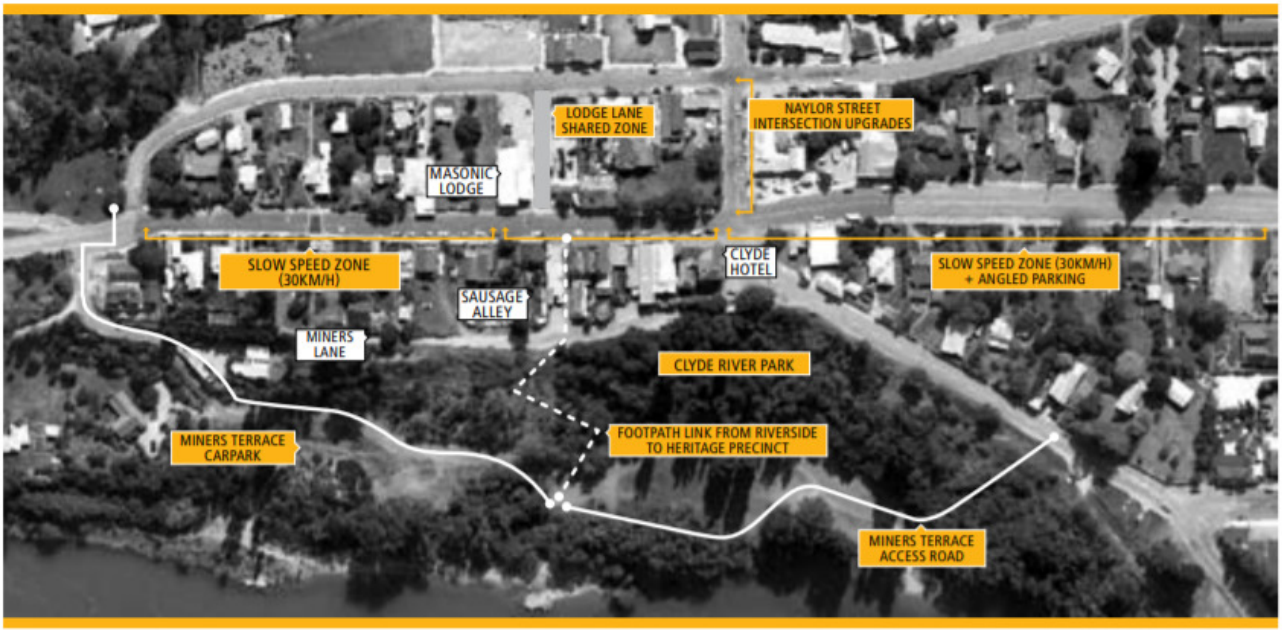


Figure 4 Cylde Heritage Precinct Project Plans

3.3 Central Otago District Council Activity Management Plan

A key focus of the activity management plan is the Otago Rail Trail, with planned improvements to local roads ensuring connecting infrastructure is safe and attractive to encourage maximum growth.

The plan also sets out minimum levels of service for residential streets, with a footpath required on one side of the road.

3.4 Otago Southland Regional Transport Plan

The plan sets out the vision of the 10 local authorities (plus NZTA) responsible for providing transport services and infrastructure in Otago and Southland. To achieve the intended long-term results, three factors are identified as being critical to success:

- Transport enables and supports economic activity and growth
- The transport system adequately meets social needs
- Transport helps to positively shape the future of Otago and Southland

Policies identified in the plan include:

- Minimising road trauma, which includes following the Safe System approach, focussing on vulnerable road users by allocating road space to walking and cycling, prioritising pedestrian safety and building separated cycleways/walkways in areas where active modes are at risk
- Ensuring community resilience by prompting a change in travel behaviour towards increased walking, cycling and public transport use and promoting multi-modal journeys
- Providing for mode choice including walking cycling and public transport to optimise existing systems
- Fostering integrated transport and land use planning by recognising how urban form and land use patterns influence the effectiveness and efficiency of transport and health

The plan recognises the vastly different demands for travel in the region while promoting the provision of cost-effective transport choices where possible, aligning land use planning with transport planning, all with an emphasis on safety for road users.

4 The Proposal

It is proposed to re-zone the site from Rural Resource Area to Residential Resource Area, consistent with zoning elsewhere in Clyde. There are anticipated to be 150 dwellings on the 13ha site, with lots ranging in size from 350m^2 to 650m^2.

A retirement village has also been proposed, though uncertainty remains about the form of the final proposal. No masterplan will be prepared for the proposal and there is no intention to deviate from the objectives, policies and rules of the District Plan.

The timing of development is intended to coincide with the commissioning of the Clyde reticulated wastewater scheme, currently earmarked for the 2020/2021 financial year.

Five access points are proposed, one on Sunderland Street and four on Mutton Town Road as indicated in Figure 5. It is recommended that the number of access points to the development be minimised to ensure consistency on the network and maintain the current movement function of Sunderland St and Mutton Town Road. Mitigations are provided in Section 7.

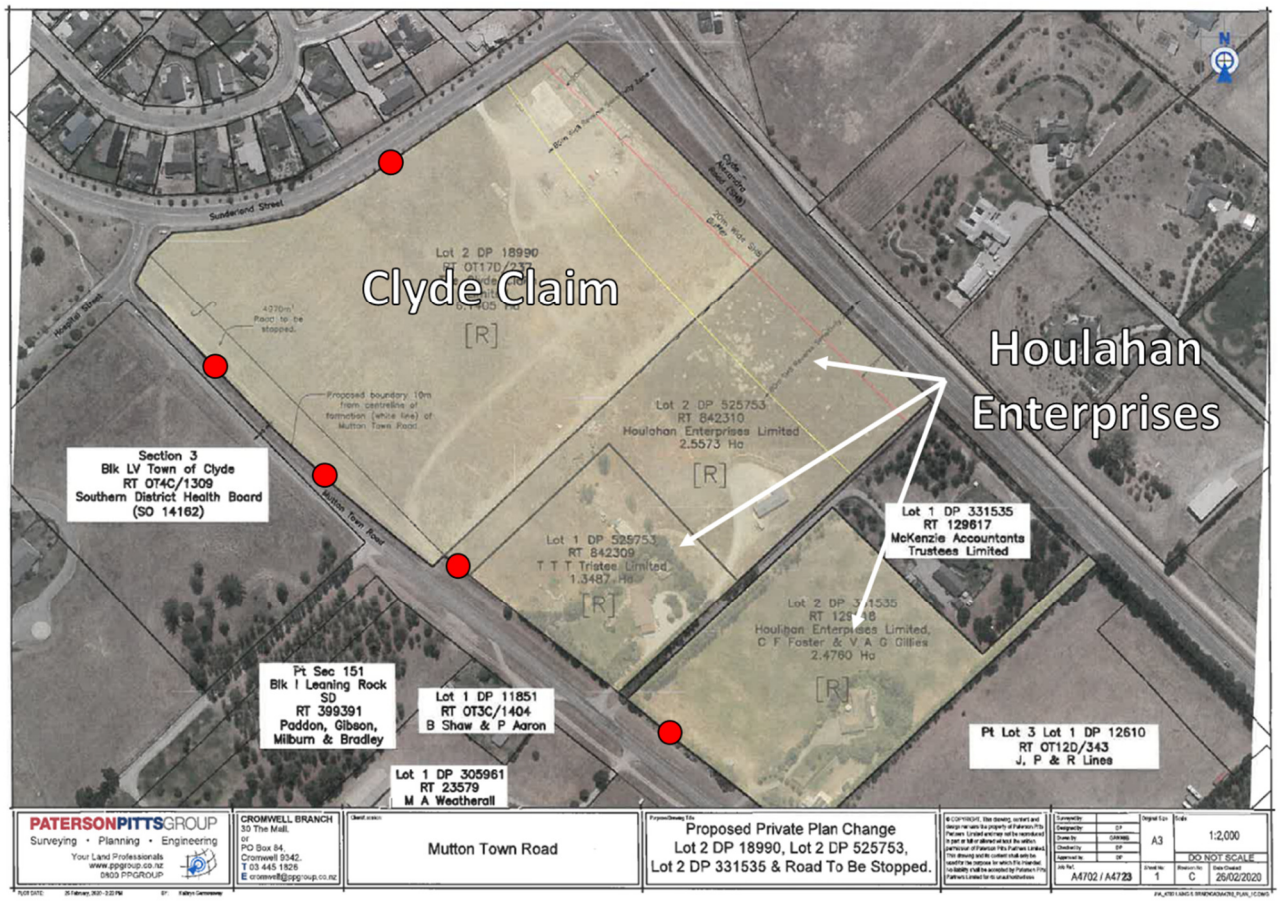


Figure 5 Proposed Mutton Town Road Plan Change Site

Plans are not currently available for the internal road network, which is therefore not assessed here. The design should complement the existing road hierarchy on the surrounding network, with collector roads providing movement through the site and local roads providing access to individual lots. This presents the opportunity to create variety and character through the development, with recognisable streetscapes reflecting the purpose of the road, in turn providing a clearly legible network with associated accessibility and safety benefits. Footpaths and cycle facilities should be included throughout the site to provide transport options to residents and ensure the safety of vulnerable road users.

5 Trip Generation

According to the 2013 census, car ownership per household is relatively high in Clyde (1.84) compared to the nationwide rate (1.63). While car ownership is not the sole factor in determining trip generation, houses with more cars available are likely to produce higher trip rates.

Waka Kotahi NZ Transport Agency research report 453 presents rates for relevant residential land use categories as shown in Table 2.

Table 2 Published Residential Trip Generation Rates

Category	15%ile Peak Hour	Average Peak Hour	85%ile Peak Hour
Dwelling (Outer Suburban)	5.4 per day	6.9 per day	0.9 per hour 8.2 per day
Dwelling (Rural)	0.9 per hour 6.9 per day	1.1 per hour 8.5 per day	1.4 per hour 10.1 per day

Surveys undertaken in 2017 at the Lake Hayes Estate and Shotover Country residential areas in Queenstown indicated trip generation rates of 0.74 trips/hh in the AM peak (74% outbound) and 0.77 trips/hh in the PM peak (61% inbound).

Given the rural nature of the site, absence of public transport and minimal employment in the immediate vicinity, an 85%ile Dwelling (Outer Suburban) rate of 0.9 trips per hour has been adopted for this assessment. For the anticipated 150 dwellings, this equates to 135 trips per peak hour and 1,230 trips per day (both directions). The inbound/outbound split is assumed to be consistent with those observed at residential areas in Queenstown.

Census data from 2013 (Table 3) shows that almost half of Clyde residents work in Alexandra, approximately a third work in Clyde itself and the remainder work in Cromwell and surrounding areas. Following the growth of the region since 2013, it is expected that a small proportion of residents now commute to Queenstown.

Table 3 Clyde Census Commuter Trip Distribution

Alexandra	Clyde	Cromwell	Dunstan
47%	31%	7%	15%

Assigning the trip generation with this distribution produces the expected traffic flows to and from the site shown in Figure 6.

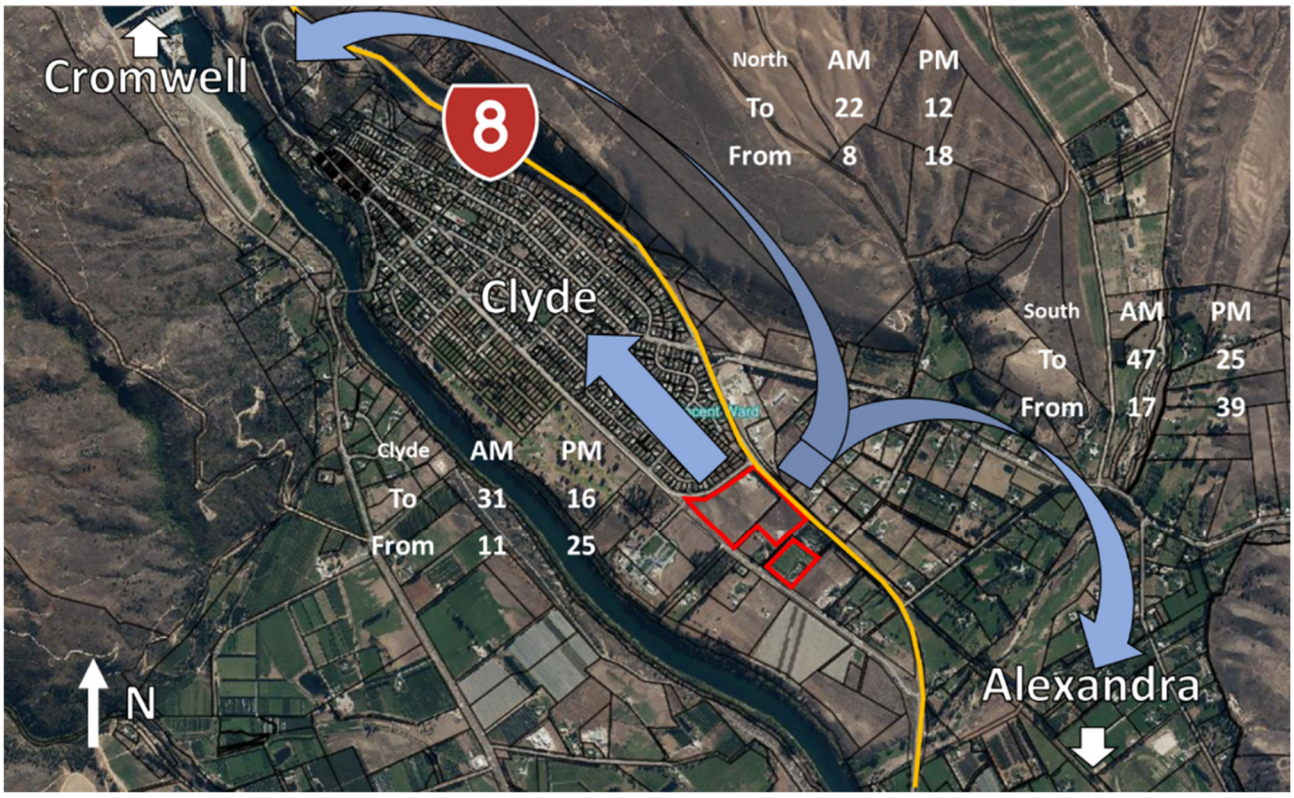


Figure 6 Calculated Trip Generation and Distribution

As expected, the census data also shows that the car is overwhelmingly the most used mode of transport for traveling to work for Clyde residents. The share for walking and cycling is marginally higher than the national average of 7.05% (combined) as shown in Table 4.

Table 4 Clyde Mode Share

Car	Walking	Cycling	Public Transport
89.5%	4.9%	5.6%	0.0%

6 Assessment of Transport Effects

This section provides evaluation of potential effects resulting from development of the site. To assess the likely impacts on the local road network, counted traffic volumes have been overlaid with expected trip generation rates and assignment from Section 5. Additional commentary is provided on opportunities relating to development of the site, including promotion of active modes through the Otago Rail Trail. Adopting a conservative approach, all calculations assume all development traffic uses the intersection being assessed.

6.1 Road Network Impacts

Although the increase in traffic on Sunderland Street represents an increase in peak hour volumes of 50%-70%, this is unlikely to have a significant effect on the road network, primarily due to low baseline volumes.

Combining the traffic counts in Figure 3 with the trip generation and assignment figures in Figure 6 produces the post-development traffic turning volumes at the SH8/Sunderland Street intersection shown in Figure 7. All southbound and northbound (i.e. everything but Clyde traffic) traffic generated by the site is assumed to use this intersection in this scenario.

Given the minimal remaining developable land accessed by Sunderland Street following the Mutton Town Road development, and assuming local housing density is unlikely to increase through infill, the values shown in Figure 7 represent expected long-term Sunderland Street volumes.

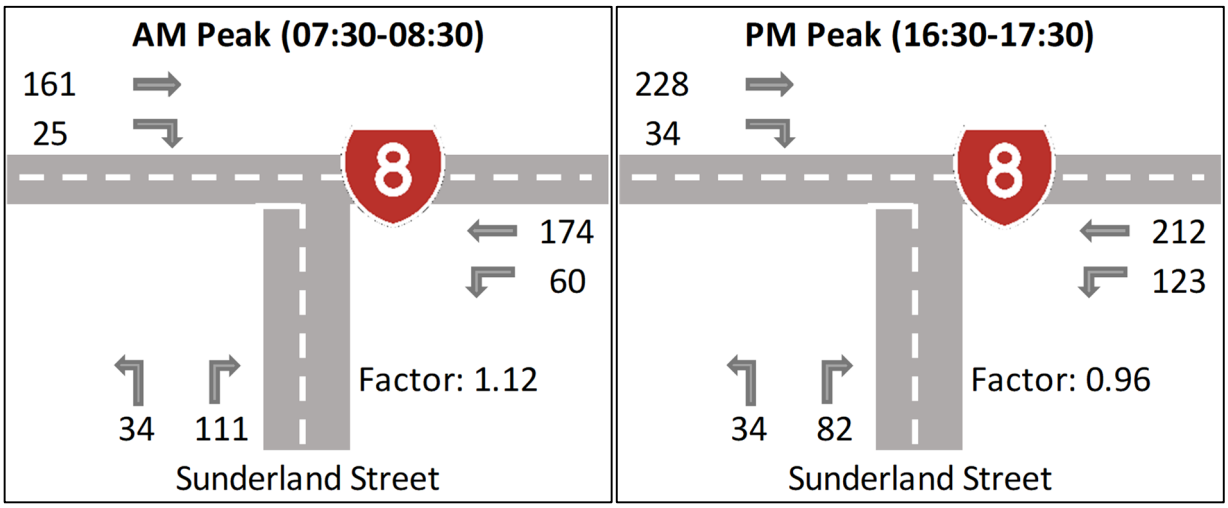


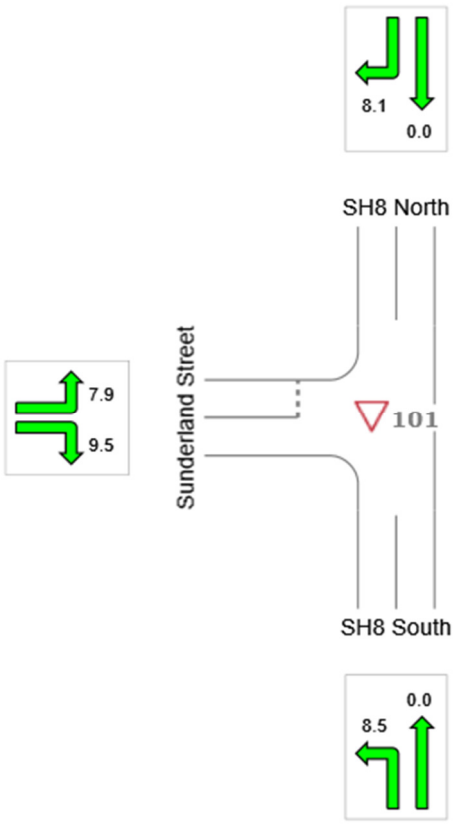
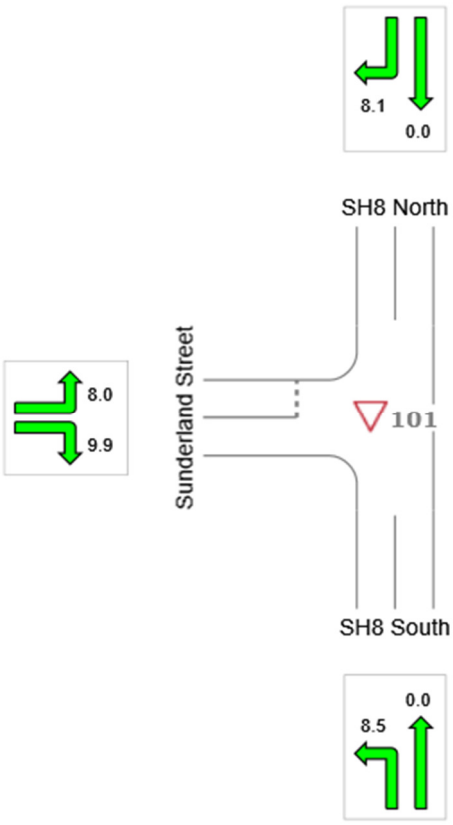
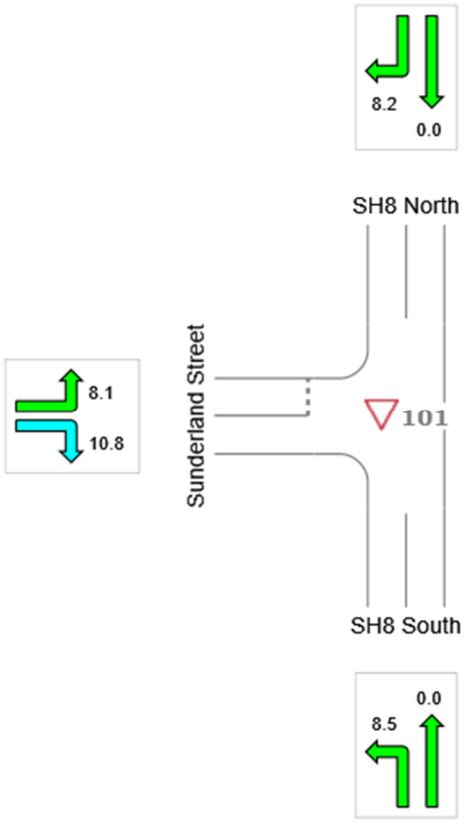
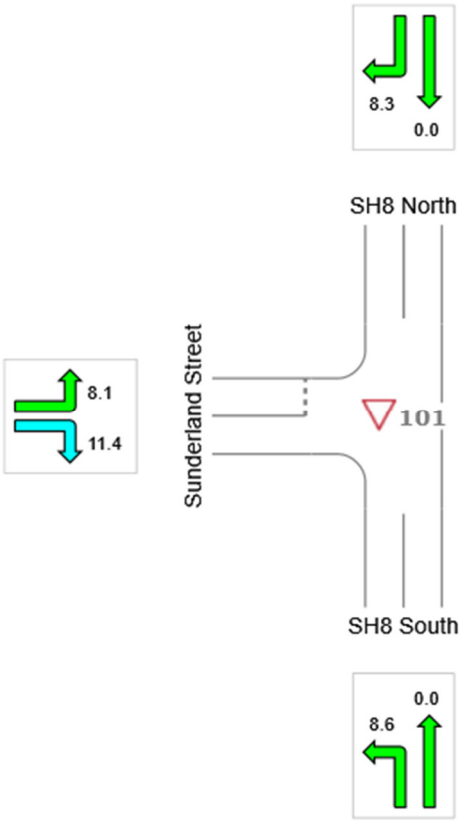
Figure 7 Post-development State Highway 8 / Sunderland Street Traffic Counts (2020)

To confirm the effect of traffic volume increases on the Sunderland Street intersection with State Highway 8, it was tested in SIDRA Intersection 8 traffic modelling software. Results shown in Table 5 indicate that there would be no discernible change to Level of Service (LOS), average delays or queueing as a result of traffic generated by the site. Sensitivity testing showed that there would be no discernible change in performance when accounting for traffic growth on SH8.

A roundabout option was tested and found to produce marginally higher total intersection delays than the existing layout. For the assessment, all development traffic was assumed to use the intersection tested. The colour of the arrows specifies Level of Service as per Figure 8.

Figure 8 SIDRA Level of Service Legend

Table 5 SIDRA Modelling Results for SH8/Sunderland Street (seconds average delay and LOS)

	Existing	Post Development
AM Peak		
PM Peak		

6.2 Road Safety

A preliminary crash analysis was undertaken for the wider Clyde area using Waka Kotahi's Crash Analysis System. The resulting Collision Diagram is shown in Figure 9, which includes 18 crashes over the past 5 years. Locations of interest are the State Highway intersections with Sunderland Street (centred) and Mutton Town Road (bottom right).

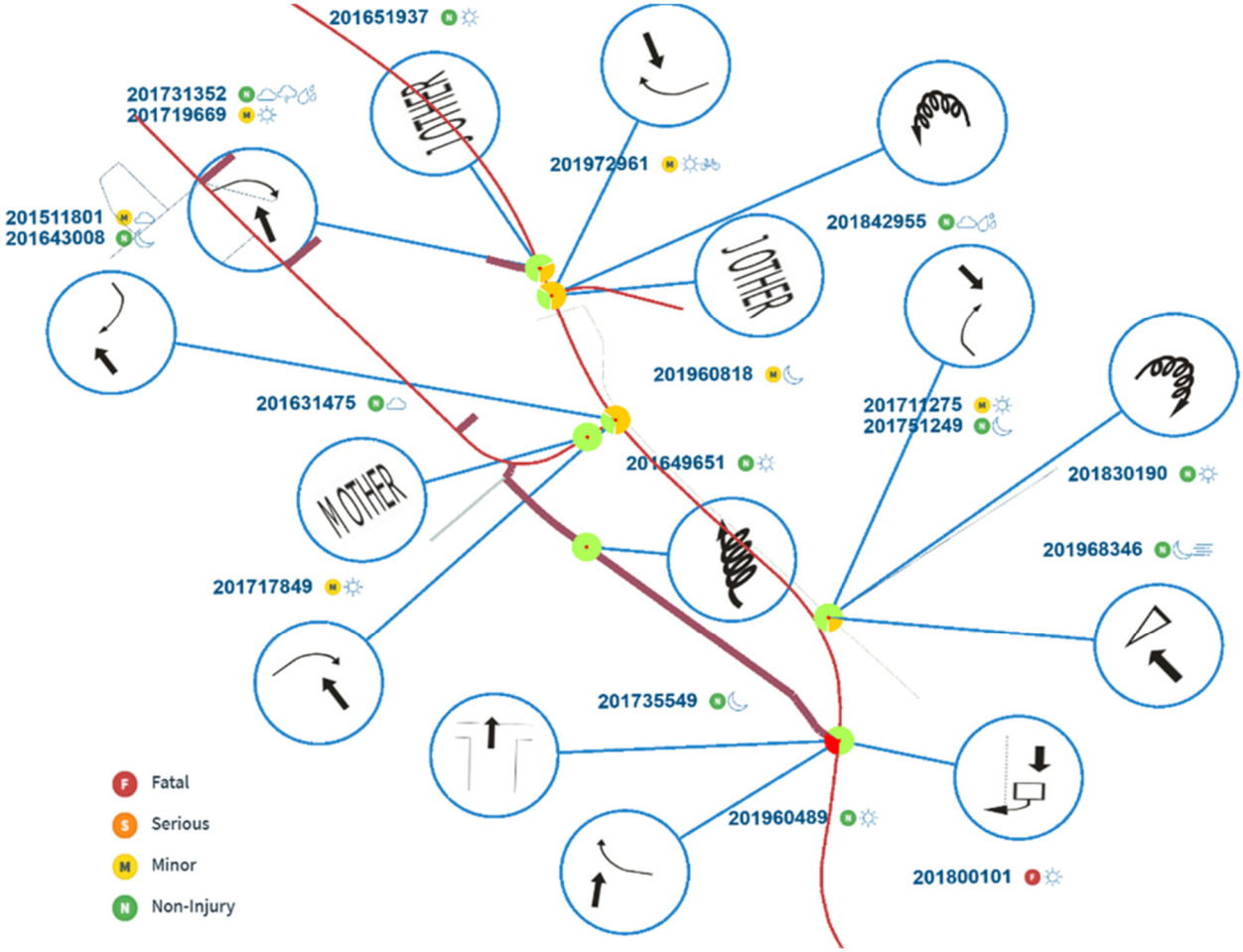


Figure 9 Collision Diagram for Crash History in Clyde 2015-2019

6.2.1 State Highway 8 / Sunderland Street

The analysis shows one non-injury and two minor injury crashes at the SH8/Sunderland Street intersection. However, inspection of the crash reports shows that both injury crashes have been geolocated incorrectly, and actually refer to the other SH8/Sunderland Street intersection at the northern end of the town. Therefore, there has been one non-injury crash at the intersection in the last 5 years, caused by a southbound vehicle failing to give way when turning into Sunderland Street.

The intersection has turning bays on all approaches and good visibility in all directions. However, the speed limit through the intersection is 100km/h, which is likely to lead to have high severity in the event of a crash. In this case, the high proportion of right turning vehicles, primarily commuters travelling from Clyde to Alexandra, and to a lesser extent, evening commuters returning from Cromwell, means that the *crossing – vehicle turning* crash type is at risk of increasing.

A crash model for the intersection was developed using the methods in Waka Kotahi's Crash Estimation Compendium, part of the Economic Evaluation Manual. Model 2 for the *crossing – vehicle turning* crash type at a high-speed rural T-junction was used to assess increased crash risk associated with traffic generated from the site, as per the equation below:

$$A_T = 4.39 \times 10^{-6} \times q1^{1.33} \times q5^{0.15} \times V_D^{0.33}$$

Where:

Parameter		Before Development	After Development
q5	Through vehicle flow along major road to right of minor road in veh/day	3,100	4,500 (accounting for SH growth)
q1	Right-turning flow from minor road in veh/day	410	700*
V_D	Sum of visibility deficiency	1	1
A_T	Modelled annual injury crash rate	0.04	0.09

*410 + 1,230 development trips/day x 50% outbound x 47% trips to Alexandra

Right turn flows (q1) were calculated using surveyed turning splits, census commute data and existing and future AADT on Sunderland Street. Due to the ample sight distance (Figure 10), and therefore zero visibility deficiency, the before and after annual injury crash rates for this crash type were calculated to be **0.04** and **0.09** respectively.

Figure 10 Visibility at Sunderland Street/SH8 Intersection (left - looking north; right - looking south)

Upgrading the intersection to a roundabout is unlikely to prove cost efficient given the low traffic volumes, adequate visibility and high improvement cost. A more cost-effective treatment to address the increased crash risk would be to separate the northbound left turn lane with a median to reduce the obscuring effect of turning vehicles on vehicles waiting on Sunderland Street.

6.2.2 State Highway 8 / Mutton Town Road

The SH8/Mutton Town Road intersection has seen one fatal and two non-injury crashes over the past 5 years. The fatal crash involved a car waiting to turn right into Mutton Town Road being hit from behind. It is unlikely that demand for this movement will increase given the time-saving and more direct route provided by Sunderland Street to the north.

The intersection has a posted speed limit of 100km/h and no turning bays. There is sufficient sight distance to the south, but insufficient sight distance to the north (measured to be 170m during a site visit (Figure 11)). The Safe Intersection Sight Distance (SISD), as defined in Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, is 300m, assuming an operating speed of 110km/h and reaction time of 2.5 seconds.

Figure 11 Visibility at Mutton Town Road/SH8 Intersection Looking North

Using the same crash model and equation defined in Section 6.2.1, and assuming all southbound traffic from the development uses the intersection, the annual crossing vehicle turning injury crash rate at the Mutton Town Road intersection is calculated to increase from **0.01** to **0.36.** Crash rates for other movements are unlikely to increase as a result of the development. It is important to investigate safety improvements to treat the visibility deficiency at this intersection prior to completion of the development. Potential mitigations are discussed in Section 7.

6.3 Active Modes

The Otago Rail Trail presents a good opportunity to promote active modes as a means of transport to future residents of the development, contributing to Waka Kotahi's strategic mode shift objectives. It is also expected that short-term visitor accommodation will be utilised at the site to cater to demand for the Rail Trail.

An underpass connecting the development directly to the trail would be optimal from a network connectivity perspective but may be excessive given the proximity to the existing underpass on Albert Drive, approximately 500m away (roughly a 4-minute ride from the site). Although the route is less convenient and may put people off using it, a new connection is unlikely to be economically viable. Mitigations for active mode components are presented in Section 7.

6.4 Parking

Planning in urban areas is beginning to focus on restricting the amount of parking provided in an effort to reduce car dependency and encourage mode shift. However, given the current lack of transport options available in Clyde, it is considered counterproductive to adopt this approach, to the point that a shortfall in car parking could lead to negative effects such as excessive roadside parking or parking on berms. When detailed design is undertaken, detailed consideration should be given to the likely number of vehicles per household to mitigate this risk.

7 Mitigations

Developing 150 houses on Mutton Town Road is likely to increase the crash risk at the SH8 / Mutton Town Road intersection, as explained in Section 6.2.2. A range of potential mitigations and associated benefits and constraints is presented in Table 6. Providing access to the Clyde Claim lot (Figure 5) via Sunderland Street only is considered to be the most cost-effective mitigation.

Table 6 Proposed Mitigations for Mutton Town Road/SH8 Intersection

Mitigation	Benefits	Constraints
Access to Clyde Claim lot (DP 18990) from Sunderland Street only	• Southbound traffic highly likely to use the safer Sunderland Street intersection to access SH8 due to lower travel time, reducing crash risk at Mutton Town Road intersection by 60%* • Cost-effective and avoids disproportionate capital works	• Houlahan Enterprises lots (DP525753 and DP331535) and the T T T Tristee lot (DP525753) do not share a boundary with Sunderland Street and must therefore retain access onto Mutton Town Road. Signage directing traffic to the highway via Sunderland Street should reduce the number of vehicles using the Mutton Town Road intersection
Close Intersection	• Removes crash risk at the intersection	• Reduces accessibility for current users • Some capital works and therefore cost
Upgrade to roundabout	• Reduces overall crash risk at the intersection	• Likely to require a large diameter roundabout, requiring property purchase and excessive costs for low traffic volumes • Adequate sight distance to the north difficult to achieve
Provide right turn bay on SH8	• Reduces crash risk for right turn movement from the highway • Treats the cause for the site's recent fatal crash	• Very low turning movement volume that typically would not require a turning bay • Does not treat visibility issue • Some capital works on the highway and therefore cost and disruption
Reduce speed limit to 70km/h through the intersection	• Results in adequate sight distance to the north, thus reducing overall crash risk at the intersection	• Does not align with the speed environment and compliance likely to be low
Cut out bund on north-west corner of intersection	• Results in adequate sight distance to the north, thus reducing overall crash risk at the intersection	• Earthworks on 3rd party land would be required
Increase conspicuousness of intersection	• Signs, lighting, advanced warning and rumble strips may improve compliance with Stop sign	• Does not treat visibility deficiency

*forecast annual injury crash rate down from 0.38 to 0.15 if southbound traffic from Clyde Claim lot uses Sunderland Street intersection rather than Mutton Town Road intersection

In addition to the traffic mitigations above, active mode improvements are recommended as part of the development. As a minimum, it is recommended that the route between the site and the existing underpass on Albert Drive be clearly signposted. Additionally, it is recommended that adequate walking and cycling facilities be provided on the northern side of Mutton Town Road, if access is not provided on Sunderland Street, for users to safely connect with the existing path on Sunderland Street. It is also recommended that the gap in the Rail Trail fence opposite Sunderland Street be closed to prevent unsafe crossing, with current users advised to instead use the formal crossing point at the underpass on Albert Drive. Figure 12 provides context.

Figure 12 Existing and Recommended Active Mode Connectivity

Additional improvements to safety could be made at the Sunderland Street/SH8 intersection by utilising available road reserve on the western edge to provide painted separation between the northbound through lane and the left turn lane. This provides better visibility to vehicles waiting on Sunderland Street of oncoming traffic that may be obscured by a left-turning vehicle. However, this is not considered critical to continued safe operation of the intersection.

8 Conclusions

The following conclusions can be drawn from this assessment:

- The amount of traffic generated by the site is unlikely to have a material effect on network performance due to the low baseline and forecast volumes. State Highway intersections with both Sunderland Street and Mutton Town Road have sufficient spare capacity to support background traffic growth and traffic expected from the development.
- At the time of writing, full plans for the development were not available, but the concept generally aligns with relevant transport policies and strategies. Opportunity exists to promote active modes through use of the nearby Otago Rail Trail, which would help contribute to local and national mode shift objectives.
- The site's proximity to the Otago Rail Trail will make cycling an attractive mode for travelling to Alexandra. It is recommended that this be taken advantage of by clearly signposting the route to the existing underpass on Albert Drive and providing adequate facilities to get to the route.
- The Sunderland Street / State Highway 8 intersection is in a 100km/h environment and thus has an inherent risk for high severity crashes. However, the intersection has turning bays on all approaches and ample sight distance in both directions. Limited crash history exists at the site and the calculated crash rate before and after development indicates that the existing layout is appropriate. Upgrading the intersection to a roundabout would be costly and provide limited benefits given the low existing crash risk and relatively low current and forecast traffic volumes.
- The crash risk at the Mutton Town Road / State Highway 8 intersection has been calculated to increase significantly, primarily due to poor visibility to the north, if used by all southbound traffic from the development. Several possible mitigations are presented in Section 7. The most cost-effective option is considered to be providing access to the Clyde Claim lot (DP18990) via Sunderland Street only. Additional signage should be provided at the Houlahan Enterprises and T T T Tristee lots, directing traffic to the highway via Sunderland Street.

wsp.com/nz

2 March 2020

Houlahan Enterprises Limited, Vicki Gillies and Colin Foster
c/- Patterson Pitts Group
PO Box 84
Cromwell 9342

Detailed Environmental Site Investigation for Private Plan Change at 74 Mutton Town Road, Clyde

Our Reference: 19057_1

1 Introduction

Peter Dymock of Patterson Pitts Group (PPG) requested, on behalf of Houlahan Enterprises Limited, Vicki Gillies and Colin Foster, that JKCM Ltd, trading as Insight Engineering (IE), undertake a detailed environmental site investigation (DSI) of the property at 74 Mutton Town Road, Clyde (herein referred to as "the site") as outlined in our Short Form Agreement (reference P19057, fully executed on 7 February 2020).

Figure 1 (under Appendix 1) indicates the location of the site, which we understand is part of a Private Plan Change application to rezone the site from Rural to Residential. A plan showing other properties involved in the plan change is provided by PPG is provided in Appendix 2.

A preliminary environmental site investigation (PSI) was undertaken (Appendix 3) for the four properties shown in the PPG plan. The site was identified to have a potential risk to human health resulting from the importation of soil from a former commercial orchard property in Earnscleugh. It is recommended that this report is to be read in conjunction with the PSI report as not all site history information is repeated within the body of this DSI report.

The purpose of this DSI was therefore to quantify the potential soil contamination impacts and thereby assess the suitability of the site for residential use, as required by the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations[1] (herein referred to as the NES). This investigation was undertaken in general accordance with the Ministry for the Environment (MfE) *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand* [2] and *Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils*[3].

2 Objectives of the Investigation

The objective was to determine whether potential soil contamination impacts at the site pose an unacceptable risk to human health if the land was to be used for standard residential purposes.

2.1 Approach

IE completed the following scope of work to satisfy the investigation objectives:

2.1.1 Intrusive Investigation

The following scope of work was undertaken upon completion of the review of site history information:

- Obtain seven (7) soil samples from 7 locations across the site where potential for contamination impacts had been identified;
- Obtain one (1) duplicate soil sample for QA / QC purposes;
- Visual and olfactory inspection of soil samples in the field;
- Submit eight (8) soil samples to Hill Laboratories for analysis of a suite of common heavy metals and organochlorine pesticides;
- Assess laboratory results for the soil samples against the adopted human health criteria for residential land use and maintenance / excavation activities; and
- Present a DSI report outlining our findings, the suitability of the site for residential development / use and recommendations to manage impacted areas (if any).

3 Site Description

Site information is summarised in Table 1.

Table 1: Site Information

Location	74 Mutton Town Road, Clyde
Legal Description	Lot 2 DP331535
Property Ownership	Houlahan Enterprises Limited, Vicki Gillies and Colin Foster
Current Site Use	Rural residential with agricultural use (grazing)
Proposed Site Use	Residential
Site Area	24,760 m² (2.4760 ha)
Territorial Authority	Central Otago District Council (CODC)
Zoning	RU (RR): Rural Resource Area and Rural Residential

The site setting is summarised in Table 2.

Table 2: Site Setting

Topography	The site slopes gently towards the south west from a relatively flat area in approximately the north eastern third of the site.
Local Setting	The site is located on the south eastern fringe of Clyde. The surrounding area consists generally of rural residential with the exception of horticultural land (viticulture) towards the south and commercial land towards the north.
Nearest Surface Water & Use	Waikerikeri Creek discharges to the Clutha River / *Mata-Au* approximately 800 m south of the site. The Clutha River / *Mata-Au* is used as a source of potable water as well as for recreational, electricity generation and irrigation purposes.
Geology	The GNS New Zealand Geology Webmap[4] indicates that the site straddles two geological units along a north west to south east axis: The eastern half

	of the site is located within the Late Pleistocene outwash deposits unit, described as "u*nweathered to slightly weathered, loose, sandy to silty, well rounded gravel usually on large outwash plains*". The western half of the site is located within the Late Pleistocene river deposits unit, described as "*generally unweathered, well sorted, loose, sandy to bouldery gravel forming large terraces and outwash plains*". The surface material observed during the site visit is broadly described as light brown sandy gravelly silt.
Hydrogeology	According to a report completed by ORC[5], the site is located within the unconfined Dunstan Flats Aquifer which consists of highly permeable sandy gravel. Under 'normal' conditions, groundwater is considered likely to flow towards the south west, but flow can be affected by high river levels which would result in groundwater flowing towards the east or south east for a relatively short time.

3.1 Current Site Conditions

Claude Midgley of IE completed a site walkover inspection as part of the PSI on 15 January 2020. Observations made at that time are summarised in Table 3.

Table 3: Current Site Conditions

Visible signs of contamination	A small stockpile of treated timber fence posts was observed adjacent to the driveway on the site.
Surface water appearance	No surface water was present at the time of the site walkover inspection.
Current surrounding land use	Mixed rural residential, horticultural and commercial land surrounds the property.
Local sensitive environments	No sensitive environments are located within 200 m of the site.
Visible signs of plant stress	Apart from evidence of dry, summer conditions, no visible signs of plant stress were noted.
Additional Observations	None noted.

3.2 Summary of Identified Hazardous Activities and Industries

The following activities noted on the MfE Hazardous Activities and Industries List[6] (HAIL) were identified at the site during review of the site history (Appendix 3):

Category A11 – Pest control including the premises of commercial pest control operators or any authorities that carry out pest control where bulk storage or preparation of pesticide occurs, including preparation of poisoned baits or filling or washing of tanks for pesticide application.

- This category is represented by the use of pesticides to control rabbits on various parts of the site. The risk to health from this source is considered to be very low because only ORC approved formulations have been used.

Category A17 – Storage tanks or drums for fuel, chemicals or liquid waste.

- This category is represented by the presence of small (~20L) containers of fuel. The risk to health from these sources is considered to be low.

Category A18 – Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside.

- This category is represented by the presence of small stockpile of treated timber posts on the southern property. The risk to health from this sources is considered to be low because of the limited scale of the potentially impacted area.

Category G5 – Waste disposal to land.

- This category is represented by the importation of 20 to 25 truckloads of soil from a property in Earnscleugh to the southern property. The risk to health from this source is unknown because, when IE reviewed historical aerial photographs of the source site for the soil, it was evident that it had been used as a commercial orchard between at least the 1950s and 1980s.

According to Regulation 5 of the NES, the Regulations apply if a HAIL activity has been undertaken, or currently is being undertaken on the property.

4 Intrusive Investigation

Under the NES, the proposed activity is considered to meet the definitions provided under Regulation 5(6) changing the use of a piece of land where a HAIL activity has been undertaken on it (Regulation 5(7)).

The application for a change of use could not be considered to qualify as a Permitted Activity under Regulation 8(4), because it is not highly unlikely that there will be a risk to human health if the activity is done to the piece of land.

Therefore, this detailed environmental investigation was undertaken to assess whether the identified hazardous activities have resulted in an unacceptable risk to human health.

Targeted discrete soil surface samples were collected from strategic locations. The samples were submitted to RJ Hill Laboratories (Hills) for analysis of the relevant contaminants at each location. Sample locations are displayed in Figure 2 (Appendix 1).

4.1 Methodology

The following was undertaken during the soil sampling works:

- Samples were given individual names that corresponded to specific locations recorded on a site plan (refer to Figure 2);
- Visual and olfactory inspection of each sample for indicators of contamination;
- Samples were compressed directly into laboratory supplied containers using a new pair of nitrile gloves for each sample. Prior to sampling, the equipment (hand trowel) was decontaminated using a triple wash procedure with potable water, Decon 90 solution and deionised water;
- Placement of samples into a chilly bin and transport, under standard IE chain of custody procedures, to RJ Hill Laboratories (Hills) for analysis;

- IE requested that Hills analyse samples for contaminants detailed in Table 4, consisting of a suite of heavy metals (As, Cd, Cr, Cu, Pb, Ni and Zn) and organochlorine pesticides (OCPs).

Table 4: Sample Names, Locations and Analytes

Sample Name	Location	Analytes
MT1	Beneath the stockpile of treated timber posts	Heavy metals and OCPs
MT2	Near to the south western corner of the site	
MT3	Centre of the paddock directly west of the dwelling	
MT4	Eastern side of the paddock north west of the dwelling	
MT5	Western side of the paddock north west of the dwelling	
MT6	Eastern side of the paddock north of the dwelling	
MT7	Western side of the paddock north of the dwelling	
MT8	Duplicate of sample MT5	

4.1.1 Quality Assurance / Quality Control

The quality assurance / quality control (QA / QC) procedures employed during the works included:

- Collection of a blind duplicate sample;
- Standard sample registers and chain of custody records have been kept for all samples;
- The use of Hills, accredited by International Accreditation New Zealand (IANZ), to conduct laboratory analyses; and
- During the site investigation every attempt was made to ensure that cross contamination did not occur through the use of the procedures outlined within this document.

4.2 Investigation Criteria

4.2.1 Soil Criteria

The investigation criteria referenced in this report have been selected from the NES to assess risks to human health. Where a soil contaminant standard (SCS) was not available, the hierarchy detailed in the MfE *Contaminated Land Management Guidelines No. 2: Hierarchy and Application in New Zealand of Environmental Guideline Values*[7] was used to select applicable criteria.

SCSs, or other appropriate criteria for residential land use, with an anticipated ingestion of 10% produce grown on the site, have been selected considering the potential end use of the site.

Criteria for commercial / industrial use have also been presented to assess the risks to human health during the disturbance of soil associated with installation of underground services and other construction works required as part of the site development.

Landcare Research produced a report[8] on naturally occurring (referred to as background) concentrations of heavy metals in New Zealand. Naturally occurring concentrations were correlated with geological units to enable estimation of the mean and 95% upper confidence limits (UCL) of selected heavy metals. Laboratory results below the 95% UCL estimates for the geological unit described as 'gravel' are considered to qualify as 'cleanfill' according to the MfE definition[9].

4.3 Results

4.3.1 Soil Encountered

Near surface soil encountered at the site was described as light brown sandy gravelly silt.

4.3.2 Laboratory Test Results

Table 5 compares soil contaminant concentrations in the samples with the adopted investigation criteria described in Section 4.2.1. The full analytical results are included in Appendix 4.

The results of field duplicate analyses collected for QA / QC purposes are summarised in Table 6. The relative percent difference (RPD) was calculated for these samples as shown below.

$$RPD = \frac{(Co - Cs)}{\left(\frac{Co + Cs}{2}\right)} x100$$

where: Co = concentration of the original sample

Cs = concentration of the duplicate sample

According to the MfE *Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils*[3], it is typically considered acceptable if an RPD range of less than 50% is achieved for soil samples.

Table 5: Laboratory Results Compared with Human Health Criteria

Analyte	Investigation Criteria			Investigation Results						
	Predicted Background Concentrations	Human Health SCSs [A]		MT1	MT2	MT3	MT4	MT5	MT6	MT7
Land Use		Residential (10% Produce Ingestion)	Commercial / Industrial and Maintenance / Excavation							
Heavy Metals										
Arsenic	12.06	20	70	**47**	5	5	6	7	8	7
Cadmium [C]	0.34	3	1,300	<0.10	<0.10	<0.10	<0.10	<0.10	0.12	0.12
Chromium [D]	80.15	460	6,300	33	6	5	6	7	8	7
Copper	42.85	>10,000	>10,000	35	9	8	10	12	31	20
Lead	44.34	160	3,300	15.7	17.0	16.2	17.4	17.8	17.1	14.8
Nickel	44.96	400 [B]	6,000 [B]	6	7	6	6	7	10	8
Zinc	182.8	7,400 [B]	400,000 [B]	33	28	27	28	35	48	44
Organochlorine Pesticides				Below Laboratory Limits of Detection						

Notes:

All values in mg/kg. Only detected analytes are presented. Full laboratory results are provided in Hill Laboratories Certificate.

Italics indicates concentration exceeds Commercial / Industrial and Maintenance / Excavation Criteria.

Bold text indicates concentration exceeds Residential Criteria

Underlined text indicates concentration exceeds the estimated background concentration (GRAVEL).

A The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health [1].

B Australian National Environmental Protection Council (NEPC) National Environmental Protection (Assessment of Site Contamination) Measure Schedule B(1): Guideline on the investigation levels for soil and groundwater [10]. Health Investigation Levels: HIL A (Residential with 10% produce ingestion) and HIL D (Commercial / Industrial).

C Assumes soil pH of 5.

D Criteria for Cr_6 presented as criteria for Cr_3 are non limiting.

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Table 6: QA / QC Results

Analyte / Sample Location	Investigation Results		
	MT5	MT8	RPD (%)
Arsenic	7	6	15
Cadmium	<0.10	<0.10	-
Chromium	7	6	15
Copper	12	11	9
Lead	17.8	16.6	7
Nickel	7	7	0
Zinc	35	28	22

- Indicates that the RPD could not be calculated

4.4 Discussion

4.4.1 Samples from Paddocks

No contaminants were found at concentrations that pose a risk to human health. Furthermore, the concentrations of all analytes were below the expected naturally occurring concentrations. Soil in those areas qualifies as cleanfill[9].

4.4.2 Stacked Treated Timber Area

The concentration of arsenic exceeds the residential SCS in a small (approximately 2 m by 2 m) and easily defined area, beneath the stack of treated timber posts.

4.4.3 Duplicate Sample

The field duplicate analyses demonstrated a maximum RPD of 22%, indicating that appropriate decontamination procedures were undertaken between sample locations.

Furthermore, it can be concluded that contaminant concentrations are distributed relatively uniformly within a particular depth, at each sample location.

5 Conceptual Site Model

A contamination conceptual site model, presented in Table 7, consists of three primary components to allow the potential for risk to be determined. These are:

- Source of contamination;
- Pathway to allow the contamination to mobilise; and
- Sensitive receptors which may be impacted by the contamination.

Table 7: Conceptual Site Model

Source	Pathway	Receptor
Heavy metals	Inhalation of dust Dermal absorption (direct contact) Ingestion of soil and / or produce grown in the soil	Maintenance / Excavation workers Site workers Current and future residents
Pesticides		
Acceptable risk to human health?	Residential Use and Earthworks Associated with Land Development in the Northern and Central Properties Yes: With the exception of a small area where treated timber is stored, the concentrations of contaminants are below the SCSs for residential land use.	

6 Conclusions

Information obtained as part of the PSI (refer to Appendix 3 and Section 3) indicates that the site has been used for residential and small-scale agricultural (grazing) purposes. A considerable volume of soil was imported to the property and review of historical aerial photographs of the source site confirms that the land had been used as a commercial orchard between at least the 1950s and 1980s. It was therefore possible that residual heavy metals and / or persistent pesticides could be present in the imported soil.

Evidence of three other HAIL activities (refer to Section 3.2) was found within the site boundary, but there was no evidence those HAIL activities could have resulted in contamination impacts that would pose a significant risk to human health at the site. One of these activities was storage of treated timber in a small stockpile, but the scale of the potentially impacted area was not considered sufficient to represent a significant risk to human health.

A soil sampling plan was designed to assess the potential impacts resulting from the importation of fill from a former commercial orchard property and the opportunity was taken to confirm the assumption regarding the level of impact from the storage of treated timber. A total of eight near surface samples were collected from relatively evenly spaced locations across the site (excluding the residential use area). One of the samples (MT1) was collected from beneath the treated timber storage area and one duplicate sample (MT8) was collected from the location of sample MT5, for QA / QC purposes.

The laboratory results (Refer to Table 5) confirm a minor impact in the timber storage area, where the arsenic concentration marginally exceeds the residential SCS in an area measuring approximately 2 m by 2 m. The relatively low concentration of arsenic in such a small area is not considered likely to present a risk to human health, however the surface soil from that area can be removed to an appropriate disposal facility as a Permitted Activity under NES Regulation 8(3). Alternatively, the impacted soil can be reused on site, in an area where future residents are unable to come into contact with it, such as beneath building foundations, pavements or roads.

Laboratory results for the remaining samples indicate that the imported soil qualifies as cleanfill, according to the MfE definition.

Based on the current contamination status of the site, given the potential sources identified, it is considered highly unlikely that there will be a risk to human health if the following activities are done to the piece of land:

- Developing the site for residential use; and
- Future occupation of the new residential dwellings.

7 Recommendations

It is recommended that the proposed change of land use be allowed as a Restricted Discretionary Activity under the NES[1], because the requirements of Regulation 10(2) have been met.

Future applications for subdivision / development / disturbance of the site should be assessed in terms of activities identified in this investigation and any potential new HAIL activities that could occur at any time after this report was written.

If any material showing signs of potential contamination (visual or olfactory) is unearthed during future soil disturbance events, work should stop immediately and a suitably qualified environmental practitioner should be engaged to assess the risk to human health prior to recommencing earthworks.

8 References

1. Ministry for the Environment 2012: Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health
2. Ministry for the Environment 2011: Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand
3. Ministry for the Environment 2011: Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils.
4. GNS Webmap Institute of Geological and Nuclear Sciences 2013: 1:250,000 Geology. Viewed at: http://data.gns.cri.nz/geology/
5. Otago Regional Council 2012: Alexandra Groundwater Basin Allocation Study.
6. Ministry for the Environment 2011: Ministry for the Environment Hazardous Activities and Industries List
7. Ministry for the Environment 2011: Contaminated Land Management Guidelines No.2 - Hierarchy and Application in New Zealand of Environmental Guideline Values.
8. Landcare Research New Zealand Limited and the Institute of Geological and Nuclear Sciences Limited 2015: Background Soil Concentrations of Selected Trace Elements and Organic Contaminants in New Zealand.
9. Ministry for the Environment 2002: A Guide to the Management of Cleanfills.
10. Australian National Environmental Protection Council 2013: National Environmental Protection (Assessment of Site Contamination) Measure Schedule B(1): Guideline on the investigation levels for soil and groundwater.

9 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Houlahan Enterprises Limited, Vicki Gillies, Colin Foster, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the IPENZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on 021 556 549 if you require any further information. The author is a Certified Environmental Practitioners (CEnvP) under the Environment Institute of Australia and New Zealand (EIANZ) accreditation system.

Report prepared by

Claude Midgley, CEnvP

Associate Environmental Scientist

APPENDIX 1

Figures

Description	Site Location Plan	**Figure Number**	1
Project	74 Mutton Town Road, Clyde	**Date**	Feb-20
Client	Houlahan Enterprises Limited, Vicki Gillies and Colin Foster	**Drawn by**	CM
Project Number	19057_1	**Approved by**	JK

Description	Sample Location Plan	**Figure Number**	2
Project	74 Mutton Town Road, Clyde	**Date**	Feb-20
Client	Houlahan Enterprises Limited, Vicki Gillies and Colin Foster	**Drawn by**	CM
Project Number	19057_1	**Approved by**	JK

APPENDIX 2

Proposed Private Plan Change Area

PATERSONPITTSGROUP
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CROMWELL BRANCH
30 The Mall.
or
PO Box 84,
Cromwell 9342.
T 03 445 1826
E cromwell@ppgroup.co.nz

Client/Location: Mutton Town Road

Purpose/Drawing Title: Proposed Private Plan Change
Lot 2 DP 18990, Lot 2 DP 525753,
Lot 2 DP 331535 & Road To Be Stopped.

Surveyed by:	
Designed by:	DP
Drawn by:	GR/KWG
Checked by:	DP
Approved by:	DP
Job Ref:	A4702 / A4723
Original Size:	A3
Scale:	1:2,000
	DO NOT SCALE
Sheet No:	1
Revision No:	C
Date Created:	26/02/2020

PLOT DATE: 26 February, 2020 - 2:22 PM BY: Kathryn Germossway

J:\A_4702 LAING S BRAID\CAD\A4702_PLAN_1C.DWG

APPENDIX 3

Preliminary Environmental Site Investigation Report

2 March 2020

Clyde Claim Limited, Houlahan Enterprises Limited,
Ostex Corporation Limited, Vicki Gillies and Colin Foster
c/- Patterson Pitts Group
PO Box 84
Cromwell 9342

Preliminary Environmental Site Investigation for Private Plan Change at Mutton Town Road, Clyde

Our Reference: 19057

1 Introduction

Peter Dymock of Patterson Pitts Group (PPG) requested, on behalf of Clyde Claim Limited, Houlahan Enterprises Limited, Ostex Corporation Limited, Vicki Gillies and Colin Foster, that JKCM Ltd, trading as Insight Engineering (IE), undertake a preliminary environmental site investigation (PSI) of four properties on Mutton Town Road, Clyde (herein referred to as "the site") as outlined in our Short Form Agreement (reference P19057, fully executed on 1 December 2019).

Figure 1 (under Appendix 1) indicates the location of the site, which we understand is proposed to be the subject of a Private Plan Change application to rezone the site from Rural to Residential. A plan provided by PPG is provided in Appendix 2.

The purpose of this PSI was to assess the suitability of the site for residential use, as required by the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations [1] (herein referred to as the NES). This investigation was undertaken in general accordance with the Ministry for the Environment (MfE) *Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand* [2].

2 Objectives of the Investigation

The objective was to determine if potentially contaminating historical activities pose an unacceptable risk to human health if the land was to be used for standard residential purposes.

2.1 Approach

IE completed the following scope of work to satisfy the investigation objectives:

2.1.1 Review of Site Information

Several sources were contacted for information relating to the sites past and present uses and to identify any other environmental issues which may be on record. This consisted of:

- Undertaking a walkover inspection of the site, as well as the immediate surrounding area, to describe current conditions and assess whether any visual or olfactory evidence of contamination is present at the site;
- Interviewing the current residents of the existing dwelling, staff at the existing commercial building and a neighbour who formerly owned the central property, to obtain information relating to potentially contaminating activities that may have been undertaken at the site and surrounding area;
- Review of publicly available data describing the local geology and hydrogeology;
- Review of a letter from Otago Regional Council (ORC) regarding any property specific records of hazardous activities or industries that are held in their database of potentially contaminated sites;
- Reviewing the CODC NES Records Search statement to determine whether any records of contamination at the site are held in their database;
- Reviewing the current and historical Certificates of Title; and
- Reviewing publicly available historical aerial photographs and maps of the site and surrounding area.

3 Site Description

Site information is summarised in Table 1.

Table 1: Site Information

Location	1. 11 Sunderland Street, Clyde 2. 98 Mutton Town Road, Clyde 3. 86 Mutton Town Road, Clyde 4. 74 Mutton Town Road, Clyde
Legal Description	1. Lot 2 DP18990 2. Lot 2 DP525753 3. Lot 1 DP525753 4. Lot 2 DP331535
Property Ownership	1. The Clyde Claim Limited 2. Houlahan Enterprises Limited 3. Ostex Corporation Limited 4. Houlahan Enterprises Limited, Vicki Gillies and Colin Foster
Current Site Use	1. Not used 2. Commercial (Downer yard and Scaffolding storage) 3. Rural Residential 4. Rural residential with agricultural use (grazing)
Proposed Site Use	Residential
Property Areas	1. 61,405 m^2 (6.1405 ha) 2. 25,573 m^2 (2.5573 ha) 3. 13,503 m^2 (1.3503 ha) 4. 24,760 m^2 (2.4760 ha)

Site Area	Approximately 125,241 m² (12.5241 ha)
Territorial Authority	Central Otago District Council (CODC)
Zoning	RU (RR): Rural Resource Area and Rural Residential

The site setting is summarised in Table 2.

Table 2: Site Setting

Topography	The site generally slopes gently towards the south west. An earth bund has been created by scraping near surface soil into an elongated stockpile north of the shed on the central property.
Local Setting	The site is located on the south eastern fringe of Clyde. The surrounding area consists generally of rural residential (south, east and north east), horticultural (viticulture) towards the south, standard residential (north west) and commercial (west).
Nearest Surface Water & Use	Waikerikeri Creek discharges to the Clutha River / *Mata-Au* approximately 800 m south of the site. The Clutha River / *Mata-Au* is used as a source of potable water as well as for recreational, electricity generation and irrigation purposes.
Geology	The GNS New Zealand Geology Webmap[3] indicates that the site straddles two geological units along a north west to south east axis: The north eastern half of the site is located within the Late Pleistocene outwash deposits unit, described as "u*nweathered to slightly weathered, loose, sandy to silty, well rounded gravel usually on large outwash plains*". The south western half of the site is located within the Late Pleistocene river deposits unit, described as "*generally unweathered, well sorted, loose, sandy to bouldery gravel forming large terraces and outwash plains*". The surface material observed during the site visit is broadly described as light brown sandy gravelly silt.
Hydrogeology	According to a report completed by ORC[4], the site is located within the unconfined Dunstan Flats Aquifer which consists of highly permeable sandy gravel. Under 'normal' conditions, groundwater is considered likely to flow towards the south west, but flow can be affected by high river levels which would result in groundwater flowing towards the east or south east for a relatively short time.
Groundwater Abstractions [5]	Although groundwater abstraction consents are not known to be active, the following permits, all located within 250 m of the site boundaries, were issued for the owners to construct bores for domestic and / or stock water abstraction: • Consent number RM18.198.01 was issued on 5 June 2018 for Hunter Alexander Clarke to construct a bore for the purpose of accessing groundwater approximately 420 metres south east of the intersection of Mutton Town Road and Sunderland Street. • Consent number 2007.384 was issued on 10 July 2007 for A.D. and C.D. Wagstaff to construct a bore for the purpose of taking groundwater located approximately 470 metres north of the intersection of Young Lane and Alexandra - Clyde Road (State Highway 6). • Consent number 2004.760 was issued on 9 September 2004 for

	N. A. and C. A. Nicolson to construct a bore for the purpose of single domestic supply and irrigation. Location: Approximately 1 kilometre east of Clyde and 155 metres from Springvale Road. • Consent number 2004.475 was issued on 9 July 2004 for Mark Allan Weatherall to construct a bore for single domestic supply on a property at Rapid Number 83, Mutton Town Road, Clyde. • Consent number 2004.378 was issued on 3 June 2004 for A.R. J. and C.A. Herbert to construct a bore for single domestic supply and landscape irrigation adjacent to State Highway 8 (Clyde-Alexandra Road), approximately 390 metres south east of the intersection of Sutherland Street and State Highway 8, Clyde. • Consent number 2002.684.V1 was issued on 29 November 2002 for J M Davie Private Trust and L H Davie Private Trust to take and use up to 7,000 cubic metres per month of groundwater at the maximum rate of 2.8 litres per second for the purpose of irrigation. • Consent number 2000.515 was issued on 14 November 2000 for John Weatherall to construct a bore at Muttontown Road, Clyde for the purpose of single domestic supply. • Consent number 99102 was issued on 31 August 1999 for W and I Tohill to construct a bore at Young Lane, Clyde for the purpose of single domestic and stockwater supply. • Consent number 98486 was issued on 24 December 1998 for Barry Eames to a bore along Muttontown Gully Road, Clyde for the purpose of single domestic supply. • Consent number 93228 was issued on 7 July 1993 for the Electricity Corporation - Clyde Power Project to replace and transfer an existing installation for domestic and irrigation purposes. • Consent number 93112 was issued on 5 April 1993 for the Electricity Corporation - Clyde Power Project to construct a bore for the purpose of domestic supply. • Consent number 93111 was issued on 5 April 1993 for the Electricity Corporation - Clyde Power Project to replace and transfer an existing installation for domestic use. • Consent number 93110 was issued on 5 April 1993 for the Electricity Corporation - Clyde Power Project to replace and transfer an existing installation for domestic use. • Consent number 93109 was issued on 5 April 1993 for the Electricity Corporation - Clyde Power Project to replace and transfer an existing installation for domestic supply. • Consent number 93075 was issued on 12 March 1993 for the Electricity Corporation - Clyde Power Project to replace and transfer an existing installation for domestic and irrigation purposes. • Consent number PU100144 was issued on 30 November 1992 for William Graham Roberts to construct a bore at No 1 R D, Alexandra for domestic supply.
Discharge Consents [5]	There are no current or historical discharge consents issued for properties located within 250 m of the site.

3.1 Current Site Conditions

Claude Midgley of IE completed a site walkover inspection on 15 January 2020 and on . Observations made at that time are summarised in Table 3 and photographs are presented in Appendix 3.

Table 3: Current Site Conditions

Visible signs of contamination	Remnants of burned tree stumps, in the form of small amounts of charcoal, were observed in several locations along the north western site boundary and along the boundary between the northern and central properties. A small stockpile of treated timber fence posts was observed adjacent to the driveway on the southern property. Stockpiles of imported gravel, containing a few asphalt pieces, were observed in the Downer yard on the northern central property. No other indicators of contamination were evident within the site boundaries.
Surface water appearance	No surface water was present at the time of the site walkover inspection.
Current surrounding land use	Mixed rural residential, standard residential, horticultural and commercial land surrounds the property.
Local sensitive environments	No sensitive environments are located within 200 m of the site.
Visible signs of plant stress	Apart from evidence of dry, summer conditions, no visible signs of plant stress were noted.
Additional Observations	An above-ground fuel storage tank, waste engine oil containers, an antique car and an antique pesticide sprayer were observed on the southern central property.

3.2 Interview with Current Residents, Owners and Neighbours

Lew Davie (*pers. comm.*), a resident and former owner of the southern property, provided the following information:

- Mr Davie purchased the land in 2010 and recently sold it to Pat Houlahan. The previous owner, Dave Harvey, moved to the property from Balclutha upon his retirement.
- Mr Davie indicated that the dwelling was constructed in 1991.
- An underground water storage tank, for livestock supply, is located south of the dwelling.
- The paddocks surrounding the dwelling were irrigated with bore water and low numbers of horses, cattle had been raised on the property. Alpacas had been the preferred livestock kept on the property during the last 6 years.
- Mr Davie confirmed that approximately 20 to 25 truck loads of topsoil had been shifted to the property from another property owned by Mr Davie (Lot 6, Padgets Lane, Earnscleugh) because the topsoil in Clyde was of poor quality. Mr Davie also indicated that fertilisers had been applied to the paddocks 3 or 4 times since he has owned the land.
- Mr Davie used to control rabbits by shooting. As the surrounding area has become more developed, he has opted to use Magtoxin which is dropped into rabbit warrens.

- Mr Davie confirmed that trees which had been visible in aerial photographs prior to 2011 were not an orchard but were fir trees. Two rows of the trees remain along that property boundary, but the remainder were cleared to provide additional paddock space.
- The shipping container on the south western side of the property belongs to Pat Houlahan. Mr Davie indicated that spare building materials are stored in the shipping container.
- The only hazardous substances kept on the property are small volumes of petrol and diesel (no more than 40 L total at any given time).

Hunter Clarke (*pers. comm.*), former owner of the two central properties, provided the following information:

- Mr Clarke had owned the central property for approximately 15 years (since approximately 2005) and had established a coffee equipment refurbishing business in the shed that he constructed (now used by Downer). The shed was extended in 2008 / 2009.
- Mr Clarke used a biodegradable detergent and a product named Lime Away, which is a phosphoric acid descaling agent, to service commercial coffee making equipment. The wastewater was discharged to ground via a septic tank system.
- A waste incineration pit, used to burn green waste and minor amounts of other domestic waste, had been located near to the boundary between the northern and central properties. The waste was excavated by Ray Harvey of Clyde Cartage and Excavation Limited in 2018. Mr Clarke was not aware of the location where the waste had then been disposed of, but the pit was backfilled with uncompacted soil that had been excavated from the building footprint of the shed at the time of its extension.
- Mr Clarke had used fencing to control rabbits, but has more recently switched to using Pindone as recommended by ORC.
- Mr Clarke works on antique cars in the workshop that he constructed adjacent to his dwelling. Waste engine oil is collected and disposed of off-site.
- Stockpiles of soil, located towards the north west of the workshop consist of excess spoil generated during the foundation excavations when constructing the new workshop building.

Mark Laing (*pers. comm.*) current owner of the northern property, provided the following information:

- Mr Laing stored building materials (timber, stone, etc.) in a shed that had been located in the northern corner of the property. The building materials were used during the construction of several commercial buildings on Holloway Street in the centre of Clyde township. Stockpiles of gravel and concrete had also been stored in the area surrounding the shed.
- The shed was demolished in 2018.
- Rabbits are not currently controlled on the property.
- A shipping container, located near to the northern corner of the property, is used to store fencing gear.

Pat Houlahan (*pers. comm.*) current owner of the central and southern properties, provided the following information:

- Mr Houlahans family had owned the northern property and land located north west of that property. The northern property had been used for poultry farming purposes until approximately 1987.

- Chickens were raised using free-range techniques and small shelters had been constructed in rows using waratahs and concrete.

3.3 Certificates of Title

Historical Certificates of Title (Appendix 4), provided by PPG, indicate the following:

The northern property consisted of two separate lots, labelled as '9' and '10', prior to 1983 when Sunderland Street was extended towards the north east along its current path. That action resulted in a small portion of the property labelled '9' being merged with the property labelled '10' to create the extents of the current northern property. Furthermore, the central and southern properties were one large property, labelled '46'. Ownership records indicate the following:

1963: Frederick William Holdom, a farmer from Clyde, owned the northern property.
1964: The central and southern properties were owned by Thomas James Young, a farmer from Clyde.
1967: The central and southern properties were sold to Thomas Andrew Brown and Joan Mary Brown, famers from Clyde.
1970: Michael James Houlahan and Nuala Margaret Ann Houlahan purchased the northern property.
1972: The central property was subdivided from the southern property and was sold to James Henderson McGill, a Clyde Hospital Board employee.
1975: Christopher William Clements, a depot manager from Alexandra and his wife Felicia Maria Clements, purchased the central property.
1989: Stephen Ronald Gregory, a builder from Queenstown and his wife Angela Dawn Gregory, purchased the central property.
1998: Hunter Alexander Clarke and Elaine May Clarke purchased the central properties.

3.4 ORC Property Database

Jessie Callaghan, Environmental Officer of the ORC, searched the property database on 16 December 2019. The search confirmed that property is not currently on the ORC database, however, rural properties / farms can be associated with activities such as use, storage, formulation, and disposal of pesticides, offal pits, landfills, animal dips, and fuel tanks, which have the potential to contaminated land. The absence of information within the ORC database is stated to not necessarily mean that no contamination impacts are present at the property (Appendix 5).

The ORC Hazardous Activities, Industries and Bores search website[6] contained no records of hazardous activities or industries at 86 Mutton Town Road when the database was accessed on 2 March 2020.

3.5 CODC NES Records Search

The NES Records Search (Appendix 5) completed by Adam Vincent, Planning Officer - Consents, on 12 and 13 December 2019 as well as on 28 February 2020. The following information was provided:

Northern property

A Building Consent was issued in 2006 for the construction of a new storage and implement shed.

A Resource Consent for an eight-lot subdivision was processed in 2012. Information provided in support of the application indicated that a shed was located on the site and that materials were stored outdoors. Those activities can be associated with the storage of fuel in drums, bulk storage of treated timber outside or landfills, which may trigger NES requirements.

The NES Records Search also confirms that no preliminary or detailed site investigations could be found on the property file.

Aerial photos reviewed by Council confirm the location of the former shed in the northern corner of the property. Outdoor storage of materials was visible in the photographs.

Northern Central Property

Relevant Resource Consents include a retrospective land use consent to operate a commercial storage and distribution company in 2008, and a 2019 land use consent for commercial activity in the Rural Residential Resource Area.

Building consents indicate that a new storage building was approved in 2001 and additions to an existing shed were approved in 2008.

The NES Records Search also confirms that no preliminary or detailed site investigations could be found on the property file.

Aerial photos reviewed by Council did not include evidence of potentially contaminating activities.

Southern Central Property

Building consents indicate that an implement shed was constructed in 1994. The shed could be associated with storage tanks or drums of fuel or chemicals, or landfill.

Southern Property

Relevant Resource Consents include a two lot subdivision in 1986, planning consent to construct a dwelling in 1990 and a two lot non-complying subdivision in 2018. Evidence provided in support of the subdivision application indicates that the site as been used for the disposal and treatment of wastewater in a septic system, which may trigger NES requirements.

Other relevant consents / permits include a building permit to construct a new garage / workshop in 1986 and a dwelling in 1990. These activities are associated with storage of chemicals, fuel or chemical tanks, landfill and wastewater disposal / treatment.

The NES Records Search also confirms that no preliminary or detailed site investigations could be found on the property file.

Aerial photos reviewed by Council did not include evidence of potentially contaminating activities.

3.6 Review of Historical Aerial Photographs and Maps

Photographs in the Crown Collection[7] and Google Earth[8], as well as topomaps on the MapsPast[9] website, have been reviewed to obtain information on the past uses of the site. Aerial photographs taken between 1958 and 2019, as well as maps created between 1929 and 2009, have been reviewed. Table 4 summarises the features visible in each image.

Table 4: Historical Aerial Photographs

1929 [9]	The site straddles the town belt, which is indicated by a dark black line broken intermittently by single black dots. The central and southern properties are one lot, labelled ‘46’ and ’17,0,3’. A railway line is located adjacent to the north eastern site boundary. A creek towards the south east is labelled “Mutton Town Gully”. No significant features are visible at the site or in the surrounding area.
1939 [9]	Apart from the property labelled as ‘46’ now being labelled with ’21,3,38’ instead of

	’17,0,3’, no significant changes are apparent at the site or in the surrounding area.
1949 [9]	The railway line, that had extended further south east from the southern property’s north eastern corner, now terminates at the north eastern corner of the southern property. The property on the opposite side of the railway appears to have been incorporated into the property labelled as ‘46’, which is now also labelled with ’27,2,03’. No significant features are visible at the site or in the surrounding area.
1958 [7]	The site is undeveloped and appears to be vegetated with turf. A trench, which is considered likely to be a water race, is visible in the northern and northern central properties. The trench extends along a north west / south east axis through the centre of the northern property and then arcs towards the east through the northern central property. Relatively evenly spaced linear features extend towards the south west from the trench to the boundary of the northern property. The features may represent border dykes for irrigation purposes. In the surrounding land, an orchard is visible towards the north west approximately 200 m beyond the north western corner of the site. Another orchard is visible approximately 130 m east of the south eastern corner of the site. A road is visible along the south western site boundary and the railway line is visible as a narrow light-coloured track extending along the north eastern site boundary. The remainder of the surrounding area appears to be used for large scale agricultural purposes (grazing). With the exception of a large complex of buildings in the location of the Clyde Hospital, approximately 240 m south west of the north western site boundary, only a few other small buildings are visible in the surrounding land and they are relatively widely distributed. There are no other significant features at the site or in the surrounding area.
1962 [7]	There are no significant changes at the site or in the surrounding area.
1966 [7]	Only the north western edge of the site is visible and no changes are apparent in that area. However, new features are visible in the paddocks further towards the north west. Two rows of light coloured squares are considered likely to represent shelters for birds on the poultry farm known to have operated in that area. No other significant features are visible at the site or in the surrounding area.
1968 [7]	A row of poultry shelters and a narrow trench measuring approximately 55 m is visible near to the northern corner of the site. A light-coloured line extends from beyond the northern corner of the site, along the site boundary towards the south east. The line turns 90 degrees and extends towards the south west along the boundary between the northern and central properties. The line turns 90 degrees again near to the boundary of the central properties and the southern corner of the northern property, where it extends towards the north west and terminates approximately 60 m from the north western corner of the site. Another similar line extends through the centre of the northern property and into the paddocks beyond towards the north west. A roughly circular area of disturbed ground is visible on the northern central property, just south of the intersection of the central north west / south east line and the north east / south west line. No other significant features are visible at the site or in the surrounding area.
1969 [9]	The railway line is marked along the north eastern site boundary and it extends towards the south east again, which is in contrast to the 1949 map. A water race, which extends through the site from the north west towards the south east, is marked as a blue line with intermittent arrowheads pointing towards the south east. No other significant features are visible at the site or in the surrounding area.
1973 [7]	The row of poultry shelters has been shifted to an area near to the north western

	corner of the northern property. The lines extending along the property boundaries and through the centre of the northern property appear to have been planted with trees to create shelter belts. Three new buildings are visible on properties south of the site. No other significant changes are apparent at the site or in the surrounding area.
1974 [7]	The row of poultry shelters has been removed from the site. No other significant changes are apparent at the site or in the surrounding area.
1976 [7]	No significant changes are apparent at the site or in the surrounding area.
1977 [7]	A row of poultry shelters is visible on the central property. A building has been constructed on the southern central property and the surface has been stripped over a large area surrounding the building. A track extends from the building towards the shelter belt along the southern boundary of the northern property. Another square shaped object which appears to be similar to the poultry shelters, as well as several other unidentifiable objects and what appears to be a residential vegetable garden, is visible adjacent to the shelter belt. No other significant changes are apparent at the site or in the surrounding area.
1978 [7]	The row of poultry shelters has been shifted towards the south west and now straddles the boundary between the northern property and the southern central property. No other significant changes are apparent at the site or in the surrounding area.
1979 [7]	No significant changes are apparent at the site or in the surrounding area.
1979 [9]	Apart from the realignment of Sunderland Street towards the north east, along the north western site boundary and a new road between the site boundary and the railway line, there only other significant change is a black square which indicates the presence of a building on the southern property.
1981 [7]	The poultry shelters are no longer visible on the site. The small vegetable garden, with several narrow linear features has been extended towards the building on the southern central property. Square objects that could represent garden sheds are visible at the southern extent of the vegetable garden. In the surrounding land, Sunderland Street is visible on its realigned path along the north western sit boundary. State Highway 8 appears to be under construction along the north eastern site boundary. No other significant changes are apparent at the site or in the surrounding area.
1982 [7]	The image resolution is relatively poor, but the site and surrounding area appears to have remained unchanged.
1984 [7]	No significant changes are apparent at the site or in the surrounding area.
1985 [7]	No significant changes are apparent at the site or in the surrounding area.
1989 [9]	There are no significant changes compared with the 1979 map.
1999 [9]	There are no black squares on the site but three green lines, indicating shelter belts, are visible along a north west / south east axis on the northern property. No other significant changes are apparent at the site or in the surrounding area.
2005 [8]	The northern property remains relatively unchanged, apart from the shelter belts being significantly taller than in the previous photographs. A new building is visible on the northern central property. The building is surrounded by a gravel paved area and a track leads towards Mutton Town Road, along the boundary with the southern property. The southern property has also been developed with a dwelling and a shed near to the southern corner. Several rows of trees, resembling an orchard, are visible

	along the north western boundary of the southern property and onto the neighbouring property towards the north east, where a new dwelling has also been constructed. In the surrounding land, a new subdivision is visible beyond the north western site boundary, as new roads have been constructed north of Sunderland Street. A vineyard has been established south of the site and new lifestyle properties (medium / low density residential) are visible on the opposite side of State Highway 8, towards the north east. No other significant changes are apparent at the site or in the surrounding area.
2007 [8]	A shed has been constructed near to the northern corner of the site. A few unidentifiable objects are visible east of the shed, adjacent to the shelter belt. A stockpile of unidentifiable material, measuring approximately 12 m x 8 m, is also visible in that area. The central shelter belt has been removed and a track extends in an arc from the new shed, past the shelter belt along the south eastern boundary of the northern property to a strip of lighter coloured ground, which may have been mowed, east of the western shelter belt. New dwellings are visible in the land north west of the site. No other significant changes are apparent at the site or in the surrounding area.
2009 [9]	Apart from two additional shelter belts, orientated along a north east / south west axis on the northern and southern properties, there are no significant changes compared with the 1999 map.
2010 [8]	Several unidentifiable objects are visible on the south eastern and north eastern sides of the shed at the northern corner of the site. The stockpile of unidentifiable material, now measuring approximately 64 m x 18 m, is significantly larger than in the previous photograph. The shelter belt along the western edge of the northern property has been removed and regularly spaced circular areas are visible adjacent to where the shelter belt had been present. The building on the northern central property has been extended towards the north east and a bund appears to have been constructed in an arc bordering the gravel yard adjacent to the building. A triangular area of lighter ground is visible between the building and the shelter belt towards the north west. Apart from additional new dwellings in the land north west of the site, no other significant changes are apparent at the site or in the surrounding area.
2011 [8]	Apart from the removal of several rows of trees from the north western boundary of the southern property, no significant changes are apparent at the site or in the surrounding area.
2012 [8]	No significant changes are apparent at the site or in the surrounding area.
2015 [8]	The stockpile near to the shed in the northern corner of the site has been removed. No other significant changes are apparent at the site or in the surrounding area.
2017 [8]	The remaining shelter belts have been removed from the northern property and an earth bund has been constructed along the north eastern boundary of that property. Remnants of the shelter belt that separated the northern and central properties are visible and appear to be being prepared for burning in several stockpiles near to the property boundary. Four other stockpiles appear to have been burnt in the land towards the shed in the northern corner of the site. A possible waste pit containing light-coloured objects and green waste is visible near to the centre of the south eastern boundary of the northern property. Apart from additional new dwellings in the land north west of the site, no other significant changes are apparent at the site or in the surrounding area.
2019 [8]	The shed in the northern corner of the site has been removed and several

	unidentifiable objects are visible on and around the former building footprint. A yellowy-orange, irregular shaped area measuring approximately 20 m x 10 m is visible south west of the former shed. A new gravel track has been formed from the southern corner of the northern property to the building on the central property. The yard surrounding that building has been extended towards the west and a yellow rectangular shaped object resembling a shipping container, as well as several other unidentifiable objects, is visible in that area. An earth bund appears to have been constructed in an arc surrounding the yard. An area of bare land, measuring approximately 25 m x 10 m, is visible north west of the yellow object adjacent to the northern side of the access track. A new building has been constructed in the location of the workshop on the southern central property. Apart from additional new dwellings in the land north west of the site, no other significant changes are apparent at the site or in the surrounding area.

3.7 Summary of Identified Hazardous Activities and Industries

The following activities noted on the MfE Hazardous Activities and Industries List [10] (HAIL) have been identified at the site during review of the site history:

Category A11 – Pest control including the premises of commercial pest control operators or any authorities that carry out pest control where bulk storage or preparation of pesticide occurs, including preparation of poisoned baits or filling or washing of tanks for pesticide application.

- This category is represented by the use of pesticides to control rabbits on various parts of the site. The risk to health from this source is considered to be very low because only ORC approved formulations have been used.
- This category is also represented by the presence of an antique pesticide sprayer on the southern central property. Given the age of the unit and the likelihood that it has not been used at the property, the risk to health from this source is considered to be very low.

Category A17 – Storage tanks or drums for fuel, chemicals or liquid waste.

- This category is represented by the presence of small (~20L) containers of fuel, as well as an above-ground fuel storage tank. The risk to health from these sources is considered to be low.

Category A18 – Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside.

- This category is represented by the presence of small stockpile of treated timber posts on the southern property. The risk to health from this source is considered to be low because of the limited scale of the potentially impacted area.

Category F3 – Engine reconditioning workshops and Category F4 – Motor vehicle workshops.

- These categories are represented by the vehicle workshop on the southern central property. Given the fact that waste engine oil is disposed of off-site and the building is constructed with a concrete floor showing no evidence of chemical spills, the risk to health from this source is considered to be very low.

Category G3 – Landfill Sites.

- This category is represented by a former waste disposal and incineration area near to the centre of the south eastern boundary of the northern property. The risk to health from this source is considered to be low as the waste was excavated and removed from the site.

Category G5 – Waste disposal to land.

- This category is represented by the importation of 20 to 25 truckloads of soil from a property in Earnscleugh to the southern property. The risk to health from this source is unknown because, when IE reviewed historical aerial photographs of the source site for the soil, it was evident that it had been used as a commercial orchard between at least the 1950s and 1980s.

According to Regulation 5 of the NES, the Regulations apply if a HAIL activity has been undertaken, or currently is being undertaken on the property.

4 Conceptual Site Model

A contamination conceptual site model, presented in Table 5, consists of three primary components to allow the potential for risk to be determined. These are:

- Source of contamination;
- Pathway to allow the contamination to mobilise; and
- Sensitive receptors which may be impacted by the contamination.

Table 5: Conceptual Site Model

Source	Pathway	Receptor
Heavy metals	Inhalation of dust Dermal absorption (direct contact) Ingestion of soil and / or produce grown in the soil	Maintenance / Excavation workers Site workers Current and future residents
Pesticides		
Acceptable risk to human health?	Residential Use and Earthworks Associated with Land Development in the Northern and Central Properties Yes: The potential risk to health in that area (a former landfill) was excavated and disposed of by Clyde Cartage and Excavation Limited in 2018. Residential Use and Earthworks Associated with Land Development in the Southern Property Unknown: The potential risk to health in that area (imported soil from a former commercial orchard site) has not been quantified.	

5 Conclusions

Information obtained as part of this investigation (refer to Section 3) indicates that the site has undergone minor development throughout the known history. A former shed in the northern corner was used to store construction equipment and materials. Another shed on the northern central

property was used to recondition commercial coffee making equipment, but is now used as office space for Downer who store miscellaneous equipment in the gravel-paved yard surrounding the shed. Although small amounts of asphalt were observed in a few small gravel stockpiles in that area, the materials are considered to be relatively inert and are unlikely to result in significant contamination impacts in that part of the site. A recently constructed vehicle workshop building and an above-ground fuel storage tank on the southern central property showed no evidence of contamination impacts.

A former landfill was recently (2018) excavated and the waste disposed of off-site by Clyde Cartage and excavation. The area was backfilled with uncompacted soil that had been excavated from the building footprint of the new vehicle workshop building.

The southern property has been used for residential and small-scale agricultural (grazing) purposes. A considerable volume of soil was imported to that property and review of historical aerial photographs of the source site confirm that the land had been used as a commercial orchard between at least the 1950s and 1980s. It is therefore possible that residual heavy metals and / or persistent pesticides are present in the imported soil. A small stockpile of treated timber posts was also observed on the southern property, but the scale of the potentially impacted area is not considered sufficient to represent a significant risk to human health.

Evidence was found that seven HAIL activities have occurred within the site boundary, but there was no evidence that six of the HAIL activities could have resulted in contamination impacts that would pose a significant risk to human health at the site.

Based on the current contamination status of the site, given the potential sources identified, it is considered highly unlikely that there will be a risk to human health on the northern and central properties, if the following activities are done to the piece of land:

- Developing the site for residential use; and
- Future occupation of the new residential dwellings.

It is not known whether a risk to human health exists on the southern property, in the area where imported soil has been placed.

6 Recommendations

It is recommended that, for the northern and central properties, the proposed change of land use be allowed as a Permitted Activity under the NES[1], because the requirements of Regulation 8(4) have been met. Future applications for subdivision / development / disturbance of those properties should be assessed in terms of activities identified in this investigation and any potential new HAIL activities that could occur at any time after this report was written.

Furthermore, it is recommended that a detailed site investigation (DSI) is undertaken on the southern property, according to Regulation 8(6), because it cannot be concluded that it is highly unlikely that there will be a risk to human health if the proposed plan change is approved for that area. It is recommended that, as part of the DSI, a suitably qualified environmental practitioner collects an appropriate number of soil samples and that an IANZ accredited laboratory measures the concentrations of a suite of heavy metals (As, Cd, Cu, Cr, Pb, Ni and Zn) as well as a suite of organochlorine pesticides (OCPs).

7 References

1. Ministry for the Environment 2012: Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health

2. Ministry for the Environment 2011: Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand

3. GNS Webmap Institute of Geological and Nuclear Sciences 2013: 1:250,000 Geology. Viewed at: http://data.gns.cri.nz/geology/

4. Otago Regional Council 2012: Alexandra Groundwater Basin Allocation Study.

5. Otago Regional Council 2017: Otago Regional Council Resource Consent Database. Viewed at: http://data.orc.govt.nz/

6. Otago Regional Council 2020: Otago Regional Council – Mapping Resource. Hazardous Activities, Industries and Bores Search. Viewed at: https://maps.orc.govt.nz/portal/apps/MapSeries/index.html?appid=052ba04547d74dc4bf070e8d97fd6819

7. Local Government Geospatial Alliance 2017: Retrolens - Historical Image Resource Project. Viewed at: http://retrolens.nz

8. Google Earth v7.3.2.5776. Clyde, Central Otago, New Zealand. -45.199699° lon, 169.336868° lat, Eye alt 1.77 km. DigitalGlobe 2020. http://www.earth.google.com. [February 2020]

9. Mapspast 2017: Current and Historical Topographic Maps (Topomaps) of New Zealand. Viewed at: http://www.mapspast.org.nz/

10. Ministry for the Environment 2011: Ministry for the Environment Hazardous Activities and Industries List

8 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Clyde Claim Limited, Houlahan Enterprises Limited, Ostex Corporation Limited, Vicki Gillies, Colin Foster, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the IPENZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on 021 556 549 if you require any further information. The author is a Certified Environmental Practitioners (CEnvP) under the Environment Institute of Australia and New Zealand (EIANZ) accreditation system.

Report prepared by

Claude Midgley, CEnvP

Associate Environmental Scientist

APPENDIX 1

Figures

Note: Map and aerial photograph courtesy of Google

Description	Site Location Plan	**Figure Number**	1
Project	Mutton Town Road, Clyde	**Date**	Mar-20
Client	Clyde Claim Limited, Houlahan Enterprises Limited, Ostex Corporation Limited, Vicki Gillies and Colin Foster	**Drawn by**	CM
Project Number	19057	**Approved by**	JK

APPENDIX 2

Proposed Private Plan Change Area

PATERSONPITTSGROUP
Surveying • Planning • Engineering
Your Land Professionals
www.ppgroup.co.nz
0800 PPGROUP

CROMWELL BRANCH
30 The Mall.
or
PO Box 84,
Cromwell 9342.
T 03 445 1826
E cromwell@ppgroup.co.nz

Client/Location: Mutton Town Road

Purpose/Drawing Title: Proposed Private Plan Change
Lot 2 DP 18990, Lot 2 DP 525753,
Lot 2 DP 331535 & Road To Be Stopped.

Surveyed by:	
Designed by:	DP
Drawn by:	GR/KWG
Checked by:	DP
Approved by:	DP
Job Ref:	A4702 / A4723
Original Size:	A3
Scale:	1:2,000
	DO NOT SCALE
Sheet No:	1
Revision No:	C
Date Created:	26/02/2020

PLOT DATE: 26 February, 2020 - 2:22 PM BY: Kathryn Germossway

J:\A_4702 LAING S BRAIDNOA\A4702_PLAN_1C.DWG

APPENDIX 3

Site Photographs

Photo 1: View towards the north west, from the earth bund near to the centre of the site.

Photo 2: View towards the north, from the earth bund near to the centre of the site.

Photo 3: View towards the north east, from the earth bund near to the centre of the site.

Photo 4: Miscellaneous stockpiles of gravel and ashpalt south west of the Downer shed.

Photo 5: Scaffolding equipment and a shipping container in the Downer yard.

Photo 6: Assorted metal and plastic objects adjacent to the shipping container.

Description	Site Photographs	**Photos**	1 to 6
Project	Mutton Town Road, Clyde	**Date Taken**	15/01/20
Client	Clyde Claim Limited, Houlahan Enterprises Limited, Ostex Corporation Limited, Vicki Gillies and Colin Foster	**Taken by**	CM
Project Number	19057	**Approved by**	JK

Photo 7: Former waste pit / incineration area near to the centre of the site.

Photo 8: Small amounts of residual charcoal in former green waste incineration areas.

Photo 9: Former builders yard in the northern corner of the site.

Photo 10: Miscellaneous objects and equipment stored north east of the Downer shed.

Photo 11: Miscellaneous objects and equipment stored in the Downer yard.

Photo 12: Building materials stored along the property boundary east of the Downer shed.

Description	Site Photographs	**Photos**	7 to 12
Project	Mutton Town Road, Clyde	**Date Taken**	15/01/20
Client	Clyde Claim Limited, Houlahan Enterprises Limited, Ostex Corporation Limited, Vicki Gillies and Colin Foster	**Taken by**	CM
Project Number	19057	**Approved by**	JK

Photo 13: Vehicle workshop building on the southern central property.

Photo 14: Waste oil containers on the southern central property.

Photo 15: Antique vehicle on the southern central property.

Photo 16: Above-ground fuel storage tank on the southern central property.

Photo 17: Antique pesticide sprayer on the southern central property.

Photo 18: Signwriting on the antique pesticide sprayer reading "Turbo-Mist" and "Fruitgrowers Chemical Co Ltd Nelson N.Z.".

Description	Site Photographs	**Photos**	13 to 18
Project	Mutton Town Road, Clyde	**Date Taken**	28/02/20
Client	Clyde Claim Limited, Houlahan Enterprises Limited, Ostex Corporation Limited, Vicki Gillies and Colin Foster	**Taken by**	CM
Project Number	19057	**Approved by**	JK

Photo 19: Northern paddock of the southern property, viewed from the south facing north.

Photo 20: Northern paddock of the southern property, viewed from the south facing north east.

Photo 21: Underground water storage tank, south of the dwelling on the southern property.

Photo 22: Stockpile of treated timber fence posts adjacent to the driveway on the southern property.

Photo 23: Paddocks west of the dwelling on the southern property.

Photo 24: South western paddock of the southern property.

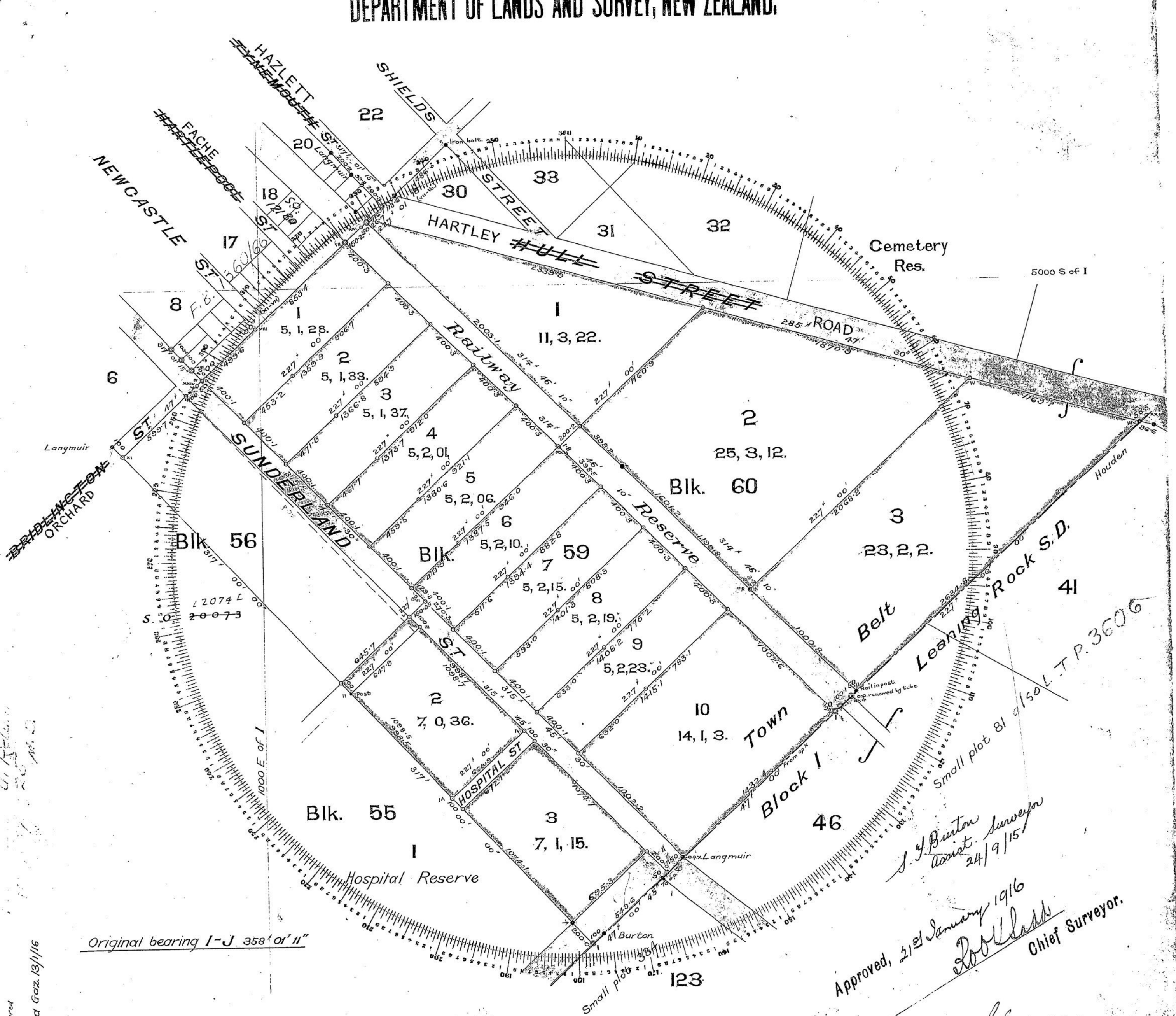
Description	Site Photographs	**Photos**	19 to 24
Project	Mutton Town Road, Clyde	**Date Taken**	15/01/20
Client	Clyde Claim Limited, Houlahan Enterprises Limited, Ostex Corporation Limited, Vicki Gillies and Colin Foster	**Taken by**	CM
Project Number	19057	**Approved by**	JK

APPENDIX 4

Historical Certificates of Title

Lands 227.

DEPARTMENT OF LANDS AND SURVEY, NEW ZEALAND.



Instructions No.:	Date:
Field-book No. — 748, 740	Pages 17-24, 13-9
Traverse Reduction-book: 38	Page: 24-26
Map received: 26/8/15	Examined: S.B.S. 18/9/15

334 Rly. Pl. 134, 135, Langmuir's Bks LIV, LV Clyde, Block Plan 81 Rd. pl. C131

Index No 9379 File 111/230

Plan of Subdiv. Blks. 55, 59, 60. Town of Clyde

Surveyed for Settlement

By S T Burton Assist. Surveyor **Licensed Surveyor.**

Date: — April 1915

SCALE: — 5 Chains to an Inch.

7649

Files 4398, 4985

CERTIFICATE.

I hereby certify that this plan has been made from surveys executed by me [or under my own personal supervision, inspection, and field check]; that both plan and survey are correct, and that all the rules and regulations with respect to the survey of Crown or Native lands have been strictly complied with.

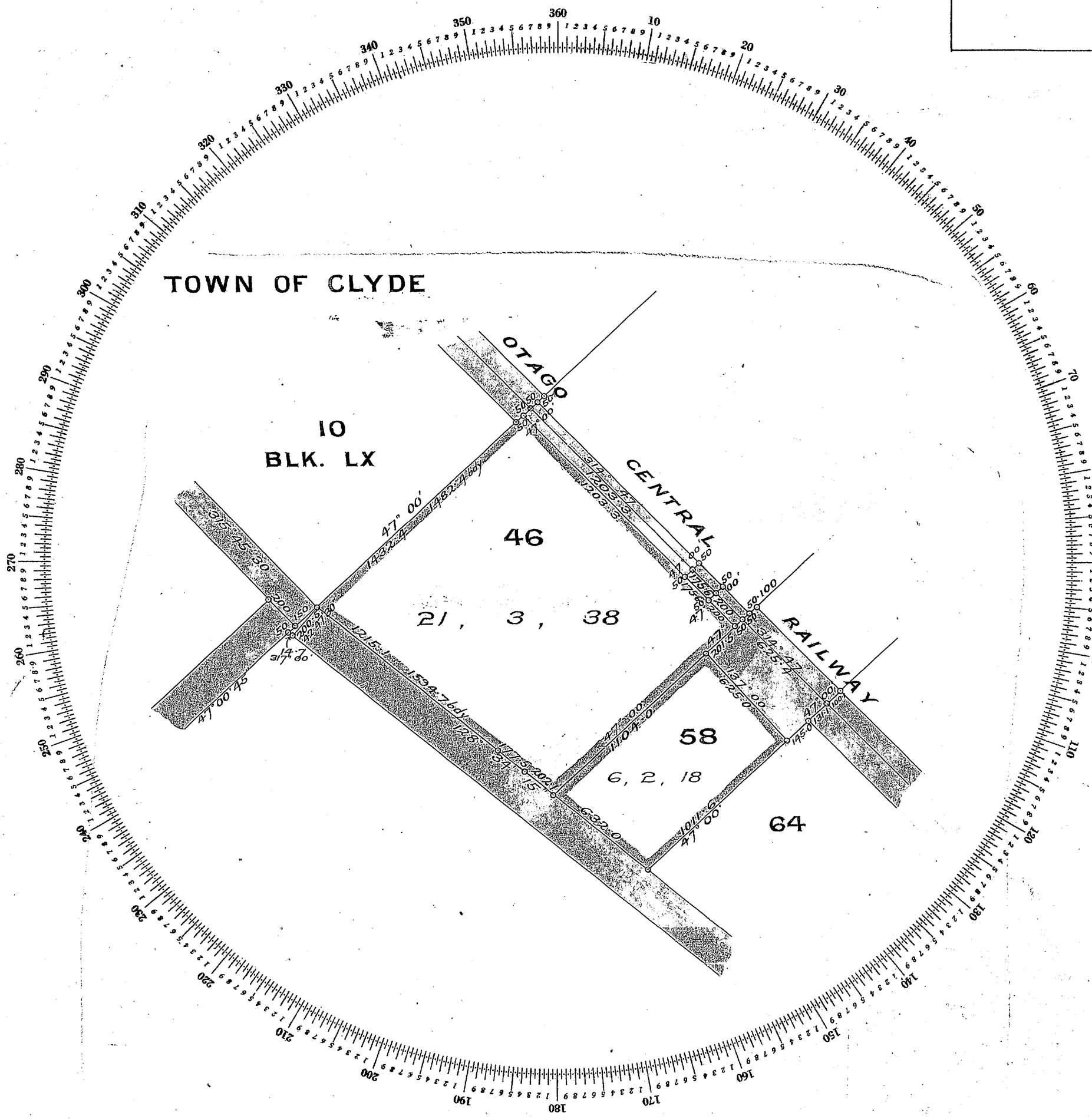
Dated at ...., this .... day of .... 19....

14162

Licensed Surveyor.

LAND DISTRICT

N.L.C. DISTRICT



Tracing sent with Return for November, 1929

L.C. advised 17/12/29

FILE: R.L. 147°

AUTHORITY:

PARENT PLAN: 4 L.T. 3606

REF. PLANS: S.P. 81,334, 162Tn, R/y 134

Received: 17-12-29 No. 10550

Fieldbook:

Traverse-book: Folio:

Examined: 17/12/29 S. Whitmore

Recorded: 16-7-30 M.B.

Plan in order and ready for approval:

PLAN OF Secs 46, 58, Bk. I, Leaning Rock S.D.

~~Surveyed for~~ Compiled in Office

M. V. Wilkinson, applicant

Date: December 1929

SCALE: 5 CHAINS TO AN INCH.

I, ... of .....

Licensed Surveyor, hereby certify that this plan has been made from surveys executed by me; that both plan and survey are correct, and have been made in accordance with the regulations of the Surveyor's Board, dated the 20th day of March, 1923.

Dated at ....., this ..... day of ....., 19

Licensed Surveyor.

BY AUTHORITY: JOHN MACKAY, GOVERNMENT PRINTER.

Approved

H. C. Kensington
Chief Surveyor.
18/12/29

Plan No.

LAND SURVEY 17 DEC. 1929 DUNEDIN.

53555

Reference:
Certificate No. 265811

P.R. Vol. Folio
Transfer No.

DUPLICATE DESTROYED 17/3/1971

CANCELLED

Land and Deeds 72

REGISTER

No. B2/1382

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 27th day of November one thousand nine hundred and sixtythree under the seal of the District Land Registrar of the Land Registration District of O T A G O being a Certificate in lieu of Grant, **WITNESSETH** that FREDERICK WILLIAM HOLDOM, the younger of Cldye Farmer

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorials underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, which said land was originally acquired by the said Frederick William Holdom the younger

as from the 1st day of January one thousand nine hundred and sixtytwo under Section 122 of the Land Act 1948
that is to say: All that parcel of land containing 86 acres 3 roods 1 perch more or less being Sections 8, 9 and 10 Block LIX and Sections 1, 2 and 3 Block LX TOWN OF CLYDE.

This Certificate is affected by the following interests at the date of issue:

Subject to the reservations and conditions imposed by Section 59 of the Land Act 1948.

DISTRICT LAND REGISTRAR

DISTRICT LAND REGISTRAR OTAGO N.Z.

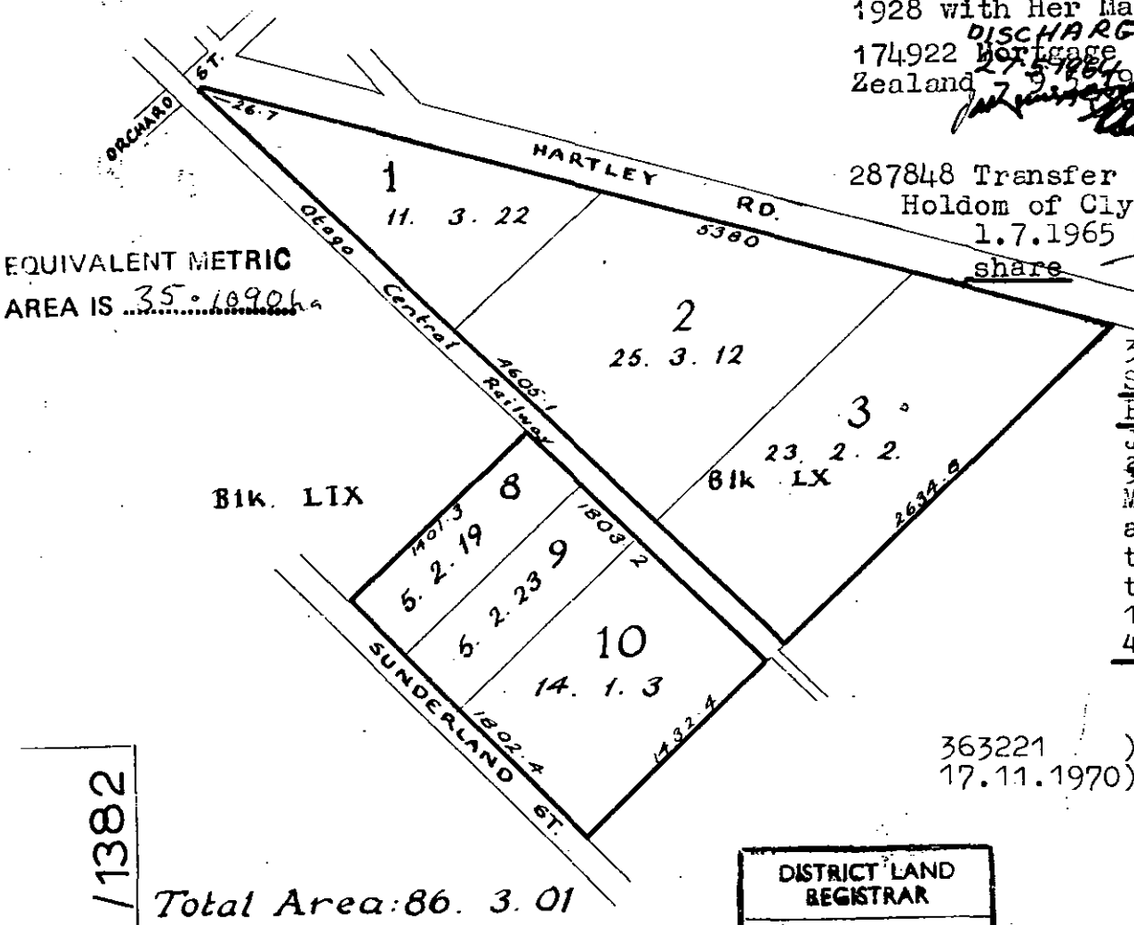
X.14090 Irrigation Agreement under part XI of the Public Works Act 1928 with Her Majesty the Queen.

174922 Mortgage to Bank of New Zealand 27.5.1964 at 2.pm. DISCHARGED 27.5.1964 D.L.R.

287848 Transfer to Gwenyth Florence Holdom of Clyde Married Woman - 1.7.1965 at 11.20 am. of one half share A.L.R.

363221 Transfer of Sections 8, 9 and 10 Block LIX to Michael James Houlahan as to 1/3rd share and Nuala Margaret Ann Houlahan as to 1/3rd share as tenants in common in the said shares - 17.11.1970 at 11 am 4C/359 D.L.R.

363221 17.11.1970) Cancelled as to balance and new C.T. 4C/360 issued D.L.R.



EQUIVALENT METRIC AREA IS 35.10906 ha

Total Area: 86. 3. 01

S. O. 14162

Scale: 1 inch = 10 Chains

DISTRICT LAND REGISTRAR
CANCELLED
OTAGO NEW ZEALAND

No. B2/1382

Register copy for L. & S. 5,000/3/63-269497 W

Reference:
Certificate No. 271835

P.R. Vol. Folio
Transfer No.

CANCELLED

DUPLICATE DESTROYED
29 | 6 | 1972

Land and Deeds 72

REGISTER

No. 1C/638

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 18th day of May one thousand nine hundred and sixty four under the seal of the District Land Registrar of the Land Registration District of O T A G O being a Certificate in lieu of Grant, **WITNESSETH** that THOMAS JAMES YOUNG of Clyde Farmer

New Plan 12610

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorials underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, which said land was originally acquired by the said Thomas James Young

as from the 17th day of April one thousand nine hundred and sixty four under Section 122 of the Land Act 1948 that is to say: All that parcel of land containing 28 acres 2 roods 16 perches more or less being Sections 46 and 58 Block I LEANING ROCK DISTRICT.

This Certificate is affected by the following interests at the date of issue:

Subject to the reservation to the Crown of the right at any time and from time to time without being deemed to commit a trespass and without payment of compensation to enter upon the said land and thereon to take, lay, construct, maintain, inspect, repair, or reconstruct water-races, drains, and all other works which the Minister of Works deems necessary for the supply of water to the said land or to any other land and subject also the owner of the said land being required to take water from races provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or break-away of any race or channel.

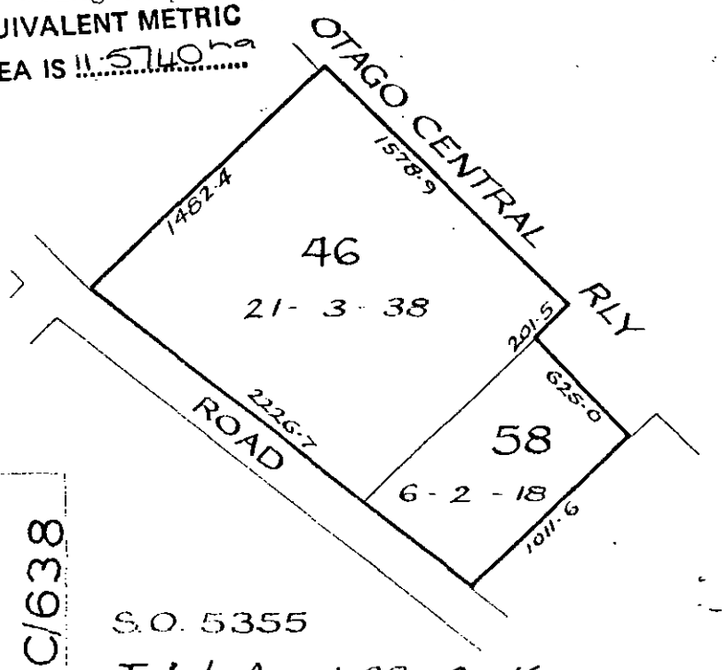
DISTRICT LAND REGISTRAR

DISTRICT LAND REGISTRAR OTAGO, N.Z.

Subject to the reservations and conditions imposed by Section 58 of the Land Act 1948.

D.L.R.

EQUIVALENT METRIC AREA IS 11.5740 ha



S.O. 5355

Total Area: 28 - 2 - 16

Scale: 1 inch = 8 chains

1C/638

311185 Transfer to Thomas Andrew Brown and Joan Mary Brown both of Clyde, Farmers as tenants in common in equal shares - 24.2.1967 at 2.16pm.

D.L.R.

311187 Mortgage to The Trustees Executors and Agency Company of New Zealand Limited - 24.2.1967 at 2.29pm.

D.L.R.

OVER

C.T. 10/638

383072)Cancelled and new Cs.T.
14.3.1972)issued for Lots 1,2 and 3
D.P.12610

Lot 1 4D/1399
Lot 2 4D/1400
Lot 3 4D/1401

D.L.R.

DISTRICT LAND REGISTRAR
CANCELLED
OTAGO
NEW ZEALAND

References
Prior C/T. 171/4

Transfer No. 311185
N/C. Order No.

DUPLICATE DESTROYED
29 | 6 | 1972

Land and Deeds 69

CANCELLED REGISTER

No. 3A/133

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT
LIMITED AS TO PARCELS

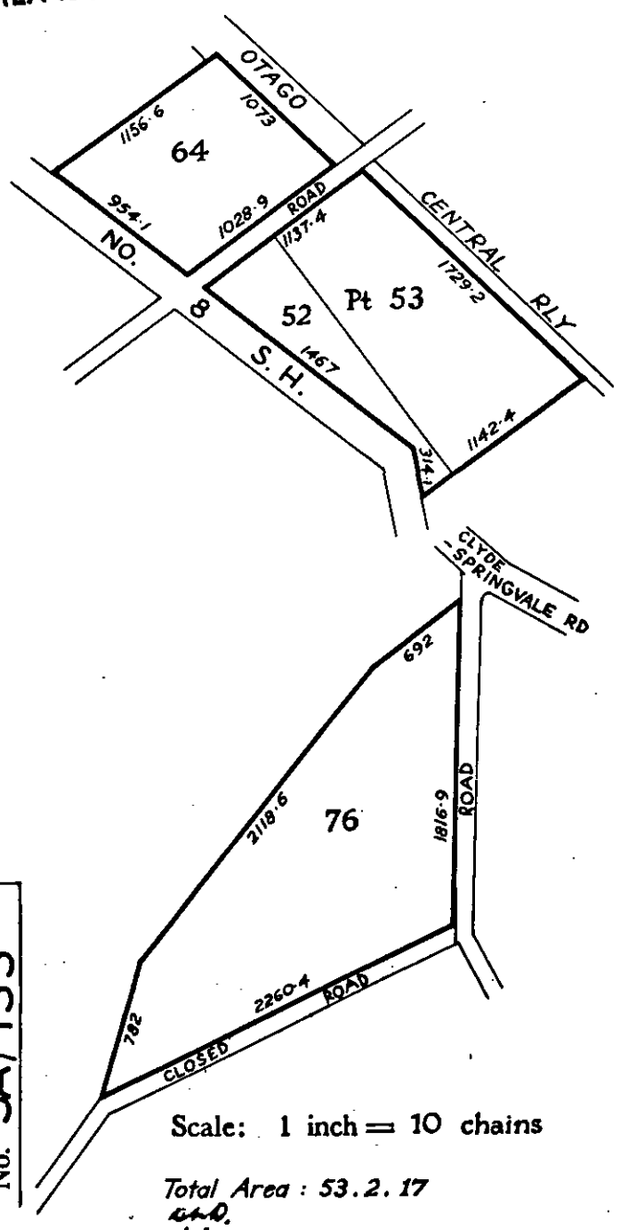
This Certificate dated the 24th day of February one thousand nine hundred and sixty-seven under the seal of the District Land Registrar of the Land Registration District of OTAGO

WITNESSETH that THOMAS ANDREW BROWN and JOAN MARY BROWN both of Clyde, Farmers are as tenants in common in equal shares

New Plan 12610

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All ~~that~~ parcels of land containing together 53 Acres 2 Roods 17 Perches more or less being Sections 52,64 and 76 and part Section 53 Block I LEANING ROCK DISTRICT. Together with such parts of the mines of coal and other minerals (if any) under the surface of another part of Section 53 as are not taken by Proclamation 2004 but are excepted thereout by Law.

EQUIVALENT METRIC AREA IS 21.6937 ha



Scale: 1 inch = 10 chains

Total Area : 53.2.17

DISTRICT LAND REGISTRAR

DISTRICT LAND REGISTRAR OTAGO N.Z.

X13991 Irrigation Agreement under Part XI of the Public Works Act 1928 with Her Majesty The Queen - 4.3.1952 at 11 am

D.L.R.

311187 Mortgage to The Trustees Executors and Agency Company of New Zealand Limited - 24.2.1967 at 2.29 pm

D.L.R.

383072) New C/s.T. issued for Lots
14.3.1972) 3 and 4 D.P.12610

pt Lot 3 4D/1401
Lot 4 4D/1402

D.L.R.

Partially cancelled.

384191) Cancelled as to balance
11.4.1972) and new C.T. 5A/41 issued

D.L.R.

DISTRICT LAND REGISTRAR
CANCELLED
OTAGO NEW ZEALAND

No. 3A/133

30,000/8/65—9040 W

Register copy for L. & D. 69, 71, 72

References
Prior C/T B2/1382

Transfer No. 363221
N/C. Order No.

Land and Deeds 69

No. 4C/359

CANCELLED

REGISTER

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 17th day of November one thousand nine hundred and seventy under the seal of the District Land Registrar of the Land Registration District of OTAGO

WITNESSETH that MICHAEL JAMES HOULAHAN of Clyde, Farmer (2/3rds share) and NUALA MARGARET ANN HOULAHAN his wife (1/3rd share) are as tenants in common in the said shares

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 25 Acres 2 Roods 5 Perches more or less being Sections 8, 9 and 10 Block LIX TOWN OF CLYDE.

Interests at date of issue:

Subject to the Reservations and Conditions imposed by Section 59 of the Land Act 1948

X14090 Irrigation Agreement under Part XI of the Public Works Act 1928 with Her Majesty the Queen

DISCHARGED 8 Sept 1995 A.L.R.

363222 Mortgage to Bank of New Zealand Savings Bank Limited 17.11.1970 at 11.2 am

DISCHARGED A.L.R.

363223 Mortgage to Frederick William Holdom and Gwenyth Florence Holdom in shares - 17.11.1970 at 11.3 am

DISCHARGED A.L.R.

D.L.R.

DISTRICT LAND REGISTRAR

379478 Mortgage to The State Advances Corporation of New Zealand - 7.12.1973 at 10.7 am

DISCHARGED 13 MAY 1980 A.L.R.

A.L.R.

Variation of Mortgage 379478 - 23.8.1974 at 11.40 am.

A.L.R.

428461 Mortgage to Her Majesty The Queen pursuant to Subsection (2) of Section 11 of the Post Office Act 1959.

DISCHARGED 16 Oct 1980 A.L.R.

A.L.R.

440764 Gazette Notice declaring a portion of No. 8 State Highway (Clyde-Alexandra) fronting the within land to be a limited access road produced 26.5.1975 at 1.53 pm

A.L.R.

507964 Mortgage to Hilda Sheddon - 1.12.1978 at 11.3 am

DISCHARGED 13 MAY 1980 A.L.R.

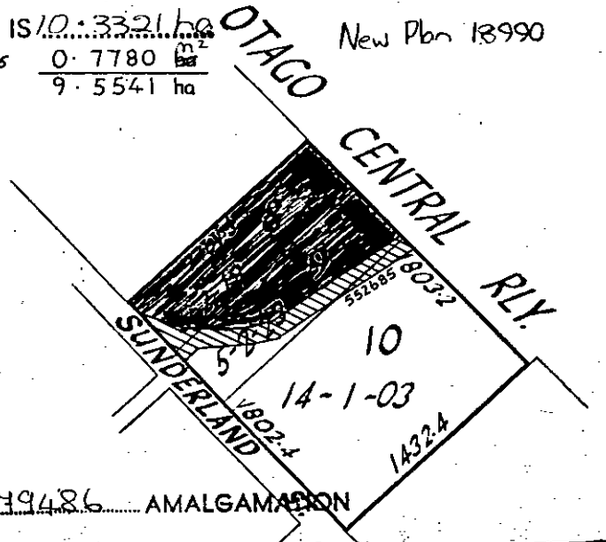
A.L.R.

EQUIVALENT METRIC AREA IS 10.3321 ha

552685 0·7780 ha

9·5541 ha

New Plan 18990



S 19486 AMALGAMATION

APPLICATION LODGED 19/5/83

CANCELLED AS TO PART COLOURED

Scale: 1 inch = 10 chains

Total Area: 25a. 2r. 05p

S.O. 14462

No. 4C/359

-OVER-

40/359

532537 Compensation Certificate pursuant to Section 17 of the Public Works Amendment Act 1948 - 3.4.1980 at 10.49am (affects part - 7500 m²)

A.L.R.

534544/1 Certificate vesting Mortgage 379478 in the Rural Banking and Finance Corporation of New Zealand - 13.5.1980 at 12.11 pm

A.L.R.

552685 Gazette Notice hereby declaring part of the within land (7780 m²) shown hatched black on the diagram hereon, to be taken for road from and after the 2nd April 1981 - 14.4.1981 at 1.53 pm

A.L.R.

DISCHARGE OF MORTGAGE
10 MAR 1983

592053/1 Mortgage to Richard Paul La Hood and Michael Perniske - 23.3.1983 at 10.51 am

A.L.R.

DISCHARGE OF MORTGAGE
24 JAN 1992

592053/2 Mortgage to Bank of New Zealand - 23.3.1983 at 10.51 am

A.L.R.

614040 Gazette Notice declaring a portion of State Highway No. 8 fronting the within land to be a limited access road - 4.5.1984 at 10.30 am

A.L.R.

796535/1) New CT 14A/781 issued for Lot
24.1.1992) 1 D.P. 18990 herein

A.L.R.

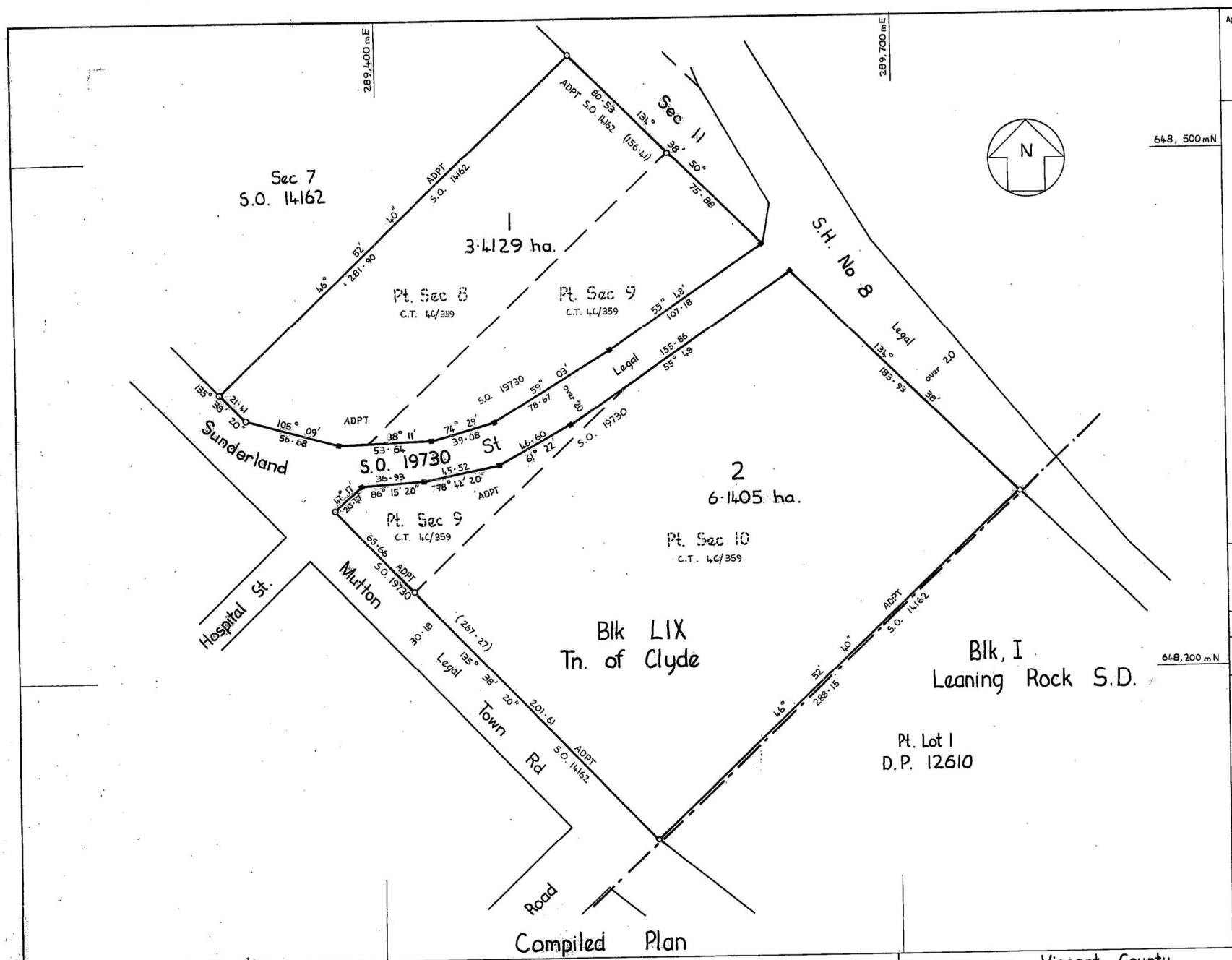
THE ESTATE OF THE FREEHOLD IN THE TITLE HEREUNDER IS NOW VESTED IN THE LAND REGISTRY OFFICE
PART CANCELED

912781) Cancelled and new CT 17D/237
25.7.1996) issued for Lot 2 DP 18990 herein

A.L.R.

DISTRICT LAND REGISTRAR
Cancelled
OTAGO NEW ZEALAND

DUPLICATE DESTROYED
3 / 8 / 1996



Compiled Plan

Approvals. Approved

M. A. Haulahan

Registered Proprietor

The Vincent County Council certifies that:
(1) This plan of subdivision is approved pursuant to Section 305(1) of the Local Government Act 1974 by a resolution of the said Council passed on the 27th day of SEPTEMBER 1984 subject to such conditions as are set out in paragraph (3) hereof;
(2) This plan is in accordance with the requirements and provisions of the said Council's operative district planning scheme at that date; and that
(3) The conditions referred to in paragraph (1) hereof are:—

Nil conditions hereon

IN WITNESS whereof the Common Seal of the said Council was hereunto affixed in the presence of:—

Chairman

County Clerk

In the matter of Section 270(1)(b) of the Local Government Act 1974

I do hereby certify that all conditions shown on or referred to on the approved scheme plan of the within subdivision have been complied with to the satisfaction of the Vincent County Council.

Dated this 27th day of September 1984

Principal Officer of the Vincent County Council.

Datum : Geodetic 1949
Lindis Peak Circuit
Coordinates from false Origin
700,000 mN 300,000 mE

Total Area 9·5534 ha.

Comprised in C.T. 4C/359

I, GEORGE ROBERTSON ELDER of ALEXANDRA registered surveyor and holder of an annual practising certificate (or who may act as a registered surveyor pursuant to the proviso to section 33 (2) of the Surveyors Act 1966) hereby certify that this plan has been made from [redacted] in accordance with the Survey Regulations 1972.

Dated at Alexandra this 12th day of November 1983 Signature

Field Book p. Traverse Book p.

Reference Plans DP's 12265, 12610
SO's 14162, 19730, 19964

Examined J.A. Willems Correct

Approved as to Survey

30/11/84 Chief Surveyor

Deposited this 6th day of December 1984

District Land Registrar

File 2305
Received 30.11.84
Instructions

D.P. 18990

LAND DISTRICT OTAGO RM.G42/13-07
SURVEY BLK.& DIST. LIX, Tn. of Clyde
NZMS 261 SHEET No. G 42

Plan of Lots 1 & 2 being Subdivision of Pt. Sec's 8,9 & 10

LOCAL AUTHORITY Vincent County
Surveyed by McGEORGE & ELDER
Scale 1:1500 Date Nov 1983

Surveyor-General, Department of Lands and Survey, Wellington

L&S FORM N 93

PACIFIC SURVEY FORM N93

176

PART - CANCELLED
PART TAKEN BY GAZETTE NOTICE

Land and Deeds 69

REGISTER

No. 4D/1399

Image Quality due to Condition of Original

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate of the 14th day of March one thousand nine hundred and seventytwo under the seal of the District Land Registrar of the Land Registration District of OTAGO

WITNESSETH that THOMAS ANDREW BROWN and JOAN MARY BROWN both of Clyde, Farmers are as tenants in common in equal shares

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 10 acres more or less being Lot 1 Deposited Plan 12610 and being part Section 46 Block I MANUHERIKIA SURVEY DISTRICT

OTAGO DISTRICT LAND REGISTRAR NEW ZEALAND

DISTRICT LAND REGISTRAR

Interests at date of issue:

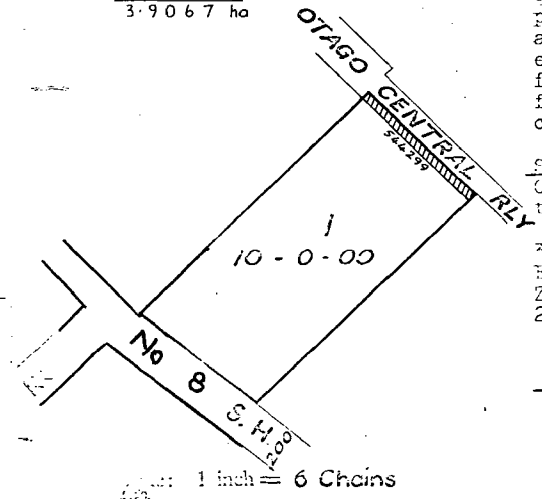
Subject to the reservation to the Crown of the right at any time, and from time to time without being deemed to commit a trespass and without payment of compensation to enter upon the said land and thereon to take, lay, construct, maintain inspect, repair or reconstruct waterraces, drains and all other works which the Minister of Work deems necessary for the supply of water to the said land or to any other land and subject also the owner of the said land being required to take water from races provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or break-away of any race or channel.

Subject to the Reservations and Conditions imposed by Section 59 of the Land Act 1948.

311187 Mortgage to The Trustees Executors and Agency Company of New Zealand Limited - 14.2.1967 at 2.29 pm.

D.L.R.

EQUIVALENT METRIC AREA IS 4.0469 ha
0·1402 544299
3·9067 ha



OVER

C.T. 4D/1399

386934 Transfer to James Henderson McGill of Clyde Hospital Board Employee - 8.6.1972 at 11.34 am

OBSOLETE

A.L.R.

440764 Gazette Notice declaring a portion of No: 8 State Highway (Clyde-Alexandra) fronting the within land to be a limited access road produced 26.5.1975 at 1.53 pm

A.L.R.

443045 Transfer to Christopher William Clements of Alexandra, Depot Manager and Felicity Maria Clements his wife - 9.7.1975 at 12.09 pm

OBSOLETE

for A.L.R.

462301 Mortgage to Bank of New Zealand Savings Bank Limited - 14.7.1976 at 9.45 am

DISCHARGED 1989 A.L.R.

A.L.R.

483128 Proclamation defining the middle line of a portion of State Highway No: 8 (Timaru-Milton) fronting the within land -15.8.1977 at 9.39 am

A.L.R.

485428 Compensation Certificate pursuant to Section 17 Public Works Amendment Act 1948 - 27.9.1977 at 10.49 am

A.L.R.

486818 Mortgage to Bank of New Zealand 21.10.1977 at 9.39 am

WITHDRAWN FROM REGISTRATION

A.L.R.

544299 Gazette Notice declaring part of the within land (1402 m²) shown hatched black on the diagram hereon is taken for road from and after the 23rd day of October 1980 - 4.11.1980 at 11.41 am

A.L.R.

614040 Gazette Notice declaring a portion of State Highway No.8 fronting the within land to be a limited access road - 4.5.1984 at 10.30 am

A.L.R.

649934/3 Mortgage to Bodkins Solicitors Nominee Company Limited - 24.1.1986 at 1.34 pm.

DISCHARGED 1989 2 NOV A.L.R.

A.L.R.

649934/4 Mortgage to Bank of New Zealand - 24.1.1986 at 1.34 pm.

DISCHARGED 1989 A.L.R.

A.L.R.

726258 Variation of Mortgage 649934/3 - 13.4.1989 at 9.58am

OBSOLETE

LSP 13/10/89

A.L.R

743704/3 Transfer to Stephen Ronald Gregory of Queenstown Builder and Angela Dawn Gregory his wife - 4.12.1989 at 9.24am

OBSOLETE

DISCHARGE OF MORTGAGE 31 AUG 1993 A.L.R

A.L.R

743704/4 Mortgage to Southland Bank Southland Limited - 4.12.1989 at 9.24am

DISCHARGE OF MORTGAGE 31 AUG 1993 A.L.R

A.L.R

743704/5 Mortgage to Housing Corporation of New Zealand - 4.12.1989 at 9.24am

DISCHARGED 17 JUN 1996 A.L.R

A.L.R

743704/6 Mortgage to Bank of New Zealand - 4.12.1989 at 9.24am

A.L.R

949489.2 Transfer to Hunter Alexander Clarke and Elaine May Clarke 17.6.1998 at 9.12

for DLR

951844.1 Mortgage to Westpac Banking Corporation 29.7.1998 at 9.08

for DLR

COMPUTER FREEHOLD REGISTER
UNDER LAND TRANSFER ACT 1952
Historical Search Copy

R.W. Muir
Registrar-General
of Land

Identifier OT4D/1399
Land Registration District Otago
Date Issued 14 March 1972

Cancelled

Prior References
OT1C/638

Estate	Fee Simple
Area	4.0469 hectares more or less
Legal Description	Lot 1 Deposited Plan 12610

Original Proprietors
Hunter Alexander Clarke and Elaine May Clarke

Interests

Subject to the reservation to the Crown of the right at any time and from time to time without being deemed to commit a trespass and without payment of compensation to enter upon the said land and to take, lay, construct, maintain, inspect, repair or re-construct water-races, drains and all other works which the Minister of Works deems necessary for the supply of water to the said land or to any other land and subject also to the owner of the said land being required to take water from races so provided for irrigation purposes at a price to be fixed by the Crown and excepting the Crown from liability for any damage caused by any overflow or breakaway of any race or channel.

Subject to Section 59 Land Act 1948

440764 Gazette Notice declaring a portion of No: 8 State Highway (Clyde-Alexandra) fronting the within land to be a limited access road - 26.5.1975 at 1.53 pm

483128 Proclamation defining the middle line of a portion of State Highway No: 8 (Timaru-Milton) fronting the within land - 15.8.1977 at 9.39 am

485428 Compensation Certificate pursuant to Section 17 Public Works Amendment Act 1948 - 27.9.1977 at 10.49 am

544299 Gazette Notice declaring part of the within land (1402m^2) shown hatched black on the diagram hereon is taken for road from and after the 23rd day of October 1980 - 4.11.1980 at 11.41 am

614040 Gazette Notice declaring a portion of State Highway No. 8 fronting the within land to be a limited access road - 4.5.1984 at 10.30 am

951844.1 Mortgage to Westpac Banking Corporation - 29.7.1998 at 9.08 am

5273732.1 Variation of Mortgage 951844.1 - 5.7.2002 at 9:00 am

7095691.1 Application pursuant to Section 99A Land Transfer Act 1952 vesting Mortgage 951844.1 in Westpac New Zealand Limited - 2.11.2006 at 9:00 am

7700454.1 Variation of Mortgage 951844.1 - 4.2.2008 at 9:00 am

10378268.1 Discharge of Mortgage 951844.1 - 9.8.2016 at 9:27 am

10378268.2 Transfer to Hunter Alexander Clarke, Elaine May Clarke and Clarke Family Trustee Company Limited - 9.8.2016 at 9:27 am

11128009.1 Transfer to Hunter Alexander Clarke, Elaine May Clarke and T T T Trustee Limited - 13.6.2018 at 12:57 pm

Identifier **OT4D/1399**

11120436.1 Certificate pursuant to Section 223 Resource Management Act 1991(affects DP 525753) - 30.8.2018 at 11:07 am

11120436.2 Certificate pursuant to Section 224(c) Resource Management Act 1991 (affects DP 525753) - 30.8.2018 at 11:07 am

11120436.3 CTs issued - 30.8.2018 at 11:07 am

Legal Description	**Title**
Lot 1 Deposited Plan 525753	842309
Lot 2 Deposited Plan 525753	842310

CANCELLED

APPENDIX 5

ORC Contaminated Land Enquiry and CODC NES Records Search

16 December 2019

Dear Claude Midgley,

Thank you for your enquiry regarding information that the Otago Regional Council may hold regarding potential soil contamination at the properties indicated below:

Address	Valuation Number / Legal Description	
-		
-	28461/40802	Lot 2 DP 18990
-		Lot 2 DP 525753
-	28462/37300	Lot 2 DP 331535

The Otago Regional Council maintains a database of properties where information is held regarding current or past land-uses that have the potential to contaminated land. Land-uses that have the potential to contaminate land are outlined in the Ministry for the Environment's Hazardous Activities and Industries List (HAIL).

Where investigation has been completed, results have been compared to relevant soil guideline values. The database is continually under development, and should not be regarded as a complete record of all properties in Otago. The absence of available information does not necessarily mean that the property is uncontaminated; rather no information exists on the database. You may also wish to examine the property file at the relevant City or District Council to check if there is any evidence that activities occurring on the HAIL have taken place.

I can confirm that:

The above land does not currently appear on the database.

If your enquiry relates to a rural property, please note that many current and past activities undertaken on farms may not be listed on the database, as they can be more difficult to identify. Activities such as use, storage, formulation, and disposal of pesticides, offal pits, landfills, animal dips, and fuel tanks have the potential to contaminated land.

Similarly, the long-term use of lead-based paints on buildings can, in some cases, cases cause soil contamination. The use of lead-based paint is generally not recorded on the database.

Please feel free to contact me if you have any other enquires, or you would like to discuss the matter further,

Regards,

Jessie Callaghan
Environmental Officer

The enclosed/attached information is derived from the Otago Regional contaminated land register and is being disclosed to you pursuant to the Local Government Official Information and Meetings Act 1987. This information reflects the Otago Regional Council's current understanding of this site, which is based solely on the information obtained by the Council and held on record. It is disclosed only as a copy of those records and is not intended to provide a full, complete or entirely accurate assessment of the site. Accordingly, the Otago Regional Council is not in a position to warrant that the information is complete or without error and accepts no liability for any inaccuracy in, or omission from, this information. Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

HAIL Status	
Verified HAIL	Information has been provided confirming, more likely than not, that an activity or industry described in the HAIL is being or has been undertaken on the site.
Unverified HAIL	Information has been provided that suggests an activity or industry described in the HAIL is or has been undertaken on the site; however, this information has not been verified.
Verified non-HAIL – more likely than not	It has been established, more likely than not, that an activity or industry described in the HAIL has not been undertaken on the site at the time of listing.

Contamination Status	
Contaminated for <Context>	The site has been investigated and results demonstrate that there are hazardous substances in or on the land at the site that have, or are reasonably likely to have significant adverse effects on the environment. <Context> refers to the current or proposed site use and/or on/off-site ecological receptors.
Managed for <Context>	The site has been investigated and results demonstrate that there are hazardous substances present at the site that have the potential to pose risks to human health or the environment. However, those risks are considered managed for <context> because - The nature of the use of the site prevents human and/or ecological exposure to the hazard; and/or - The land has been altered in some way and/or restrictions have been placed on the way it used to prevent human and/or ecological exposure to the hazard.
Acceptable for <Context>	The site has been investigated and results demonstrate that there are hazardous substances present at the site, but assessment indicates that any adverse effects or risks to human health are considered to be so low as to be acceptable for <context>.
At or Below Background Concentrations	The site has been investigated or remediated. The investigation or post-remediation validation results confirm that there are no hazardous substances above local background concentrations. Local background concentrations are those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterize the site.
Partially investigated	The site has been partially investigated. Investigations have been conducted that – - Demonstrate there are hazardous substances present; however, there is insufficient information to quantify any adverse effects or risks to human health or the environment; or,

	- Do not adequately verify the presence or absence of contamination associated with all HAIL activities that have been undertaken on the site.
Not Investigated	The soils at the site have not been subject to investigation. Contamination may have occurred but should not be assumed to have occurred.
New Information	New information has been received. This information is currently being assessed prior to assigning a site status.

NES RECORD SEARCH

Application

JKCM Limited PO Box 456, Cromwell 9342	Number NES190079 Application date 2/12/19 Phone Mobile 021 202 1747 Email jana@insighteng.co.nz

Property

Valuation No.	2846140802
Location	11 Sunderland Street, Clyde
Legal Description	Lot 2 DP 18990
Area (hectares)	6.1493

Resource consents

Resource Area: RURAL RESIDENTIAL RESOURCE AREA

Consents:

30/08/2012 RC 120183: Eight lot subdivision plus one lot to vest as road

THIS RECORD WAS INCOMPLETE ON THE FILE. SOME INFORMATION PERTAINING TO HAIL ACTIVITIES MAY BE MISSING FROM THIS RECORD

Information provided in support of this application indicates a shed on the site, with associated outdoor storage of materials. Activities on the HAIL associated with these activities can include the storage of fuel or chemicals in drums (Item A17), bulk storage of treated timber outside (Item A18) or landfill (Item G3). The presence of these activities may trigger NES requirements.

Building

Consents/Permits/Compliance Schedules:

09/01/2006 BC 050883: Erect new storage and implement shed

No information in regards to HAIL activity could be found on this record.

Preliminary Site Investigations and Detailed Site Investigations

No information in regards to the above could be found on the property file.

Aerial Photographs

Council's aerial photographs date back to 2003. Aerial photos confirm the location of a previous shed in the northern corner of the site, with associated outdoor storage of materials. Activities on the HAIL associated with these activities can include the storage of fuel or chemicals in drums (Item A17), bulk storage of treated timber outside (Item A18) or landfill (Item G3). The presence of these activities may trigger NES requirements.

Disclaimer: The Council does not hold records directly relating to activities on the Hazardous Activities and Industries List (HAIL). In the event some information is available it cannot be guaranteed as correct or complete and therefore may not satisfy your request. We therefore recommend you undertake further investigation to determine whether any HAIL activities exist on the site.

Adam Vincent
Planning Officer - Consents

Date: 13 December 2019

NES RECORD SEARCH

Application

JKCM Limited PO Box 456, Cromwell 9342	Number NES190081 Application date 2/12/19 Phone Mobile 021 202 1747 Email jana@insighteng.co.nz

Property

Valuation No.	2846237202
Location	98 Mutton Town Road, Clyde
Legal Description	Lot 2 DP 525753
Area (hectares)	2.5605

Resource consents

Resource Area: RURAL RESIDENTIAL RESOURCE AREA

Consents:

01/05/2019	RC 190172: Land use consent for commercial activity in the Rural Residential Resource Area
	No information in regards to HAIL activity could be found on this file.
26/02/2019	RC 190072: Land use consent to convert a shed into a dwelling for workers accommodation
	Information provided in support of this application indicates that the site has been used for the disposal and treatment of wastewater in a septic system. Wastewater disposal and treatment are items G5 and G6 on the HAIL and may trigger NES requirements.
20/02/2019	RC 190057: Land use consent to convert existing dwelling into residential activity and workers accommodation
	Information provided in support of this application indicates that the site has been used for the disposal and treatment of wastewater in a septic system. Wastewater disposal and treatment are items G5 and G6 on the HAIL and may trigger NES requirements.
05/04/2018	RC 180120: Two lot subdivision with an average allotment size of 1.935 hectares
	Information provided in support of this application indicates that the site has been used for the disposal and treatment of wastewater in a septic system. Wastewater disposal and treatment are items G5 and G6 on the HAIL and may trigger NES requirements.
02/12/2008	RC 080427: Retrospective land use consent to operate commercial storage and distribution company
	No information in regards to HAIL activity could be found on this file.

Building

Consents/Permits/Compliance Schedules:

15/10/2008	BC 080375: Additions to existing shed
	Information provided in support of this application indicates that the site has been used for the disposal and treatment of wastewater in a septic system. Wastewater disposal and treatment are items G5 and G6 on the HAIL and may trigger NES requirements.
21/12/2001	BC 010758: Erect new storage building
	No information in regards to HAIL activity could be found on this file.

Preliminary Site Investigations and Detailed Site Investigations

No information in regards to the above could be found on the property file.

Aerial Photographs

Council's aerial photographs date back to 2006. No evidence of any HAIL activity was observed on this record.

Disclaimer: The Council does not hold records directly relating to activities on the Hazardous Activities and Industries List (HAIL). In the event some information is available it cannot be guaranteed as correct or complete and therefore may not satisfy your request. We therefore recommend you undertake further investigation to determine whether any HAIL activities exist on the site.

Adam Vincent
Planning Officer - Consents

Date: 12 December 2019

NES RECORD SEARCH

Application

JKCM Limited PO Box 456, Cromwell 9342	Number NES190080 Application date 2/12/19 Phone Mobile 021 202 1747 Email jana@insighteng.co.nz

Property

Valuation No.	2846237300
Location	74 Mutton Town Road, Clyde
Legal Description	Lot 2 DP 331535
Area (hectares)	2.4760

Resource consents

Resource Area: RURAL RESIDENTIAL RESOURCE AREA

Consents:

19/04/2018	RC 180156: Two lot non-complying subdivision
	Information provided in support of this application indicates that the site has been used for the disposal and treatment of wastewater in a septic system. Wastewater disposal and treatment are items G5 and G6 on the HAIL and may trigger NES requirements.
14/01/2003	RC 030004: Two lot subdivision and land use consent for a dwelling on Lot 1
	Information provided in support of this application indicates that the site has been used for the disposal and treatment of wastewater in a septic system. Wastewater disposal and treatment are items G5 and G6 on the HAIL and may trigger NES requirements.
31/10/1990	Planning Consent: Erect a dwelling in the Rural 1 Zone
	No information in regards to HAIL activity could be found on this record
26/06/1986	Planning Consent 408: Two lot subdivision and land use consent to erect a dwelling on each lot
	No information in regards to HAIL activity could be found on this record
21/12/1982	Planning Consent 287: Erect a dwelling in a rural zone
	No information in regards to HAIL activity could be found on this record

Building

Consents/Permits/Compliance Schedules:

09/05/2019	BC 190278: Install a wet-floor shower in existing bathroom
	Information provided in support of this application indicates that the site has been used for the disposal and treatment of wastewater in a septic system. Wastewater disposal and treatment are items G5 and G6 on the HAIL and may trigger NES requirements.
06/12/2006	BC 160906: Internal alterations to existing dwelling
	No information in regards to HAIL activity could be found on this record
30/09/2016	BC 160831: Replace existing shower with wet-floor shower
	Information provided in support of this application indicates that the site has been used for the disposal and treatment of wastewater in a septic system. Wastewater disposal and treatment are items G5 and G6 on the HAIL and may trigger NES requirements.
28/01/2016	BC 160035: Install a new Masport built-in fire
	No information in regards to HAIL activity could be found on this record

30/09/2011	BC 110699: Install an Ecomax pellet boiler
	No information in regards to HAIL activity could be found on this record.
15/11/1994	BC 941261: Erect an implement shed
	Activities associated with rural implement sheds can include the storage of chemicals (Item A2), fuel or chemical tanks (Item A17) and landfill (G3). If any of these activities have been present on the site it may trigger NES requirements.
24/12/1990	BP H044997: Erect a new dwelling
	Information provided in support of this application indicates that the site has been used for the disposal and treatment of wastewater in a septic system. Wastewater disposal and treatment are items G5 and G6 on the HAIL and may trigger NES requirements.
25/07/1986	BP D049735: Erect a new garage/workshop
	Activities associated with rural implement sheds can include the storage of chemicals (Item A2), fuel or chemical tanks (Item A17) and landfill (G3). If any of these activities have been present on the site it may trigger NES requirements.

Preliminary Site Investigations and Detailed Site Investigations

No information in regards to the above could be found on the property file.

Aerial Photographs

Council's aerial photographs date back to 2006. No information in regards to HAIL activity was noted on this record.

Disclaimer: The Council does not hold records directly relating to activities on the Hazardous Activities and Industries List (HAIL). In the event some information is available it cannot be guaranteed as correct or complete and therefore may not satisfy your request. We therefore recommend you undertake further investigation to determine whether any HAIL activities exist on the site.

Adam Vincent
Planning Officer - Consents

Date: 12 December 2019

NES RECORD SEARCH

Application

JKCM Limited PO Box 456, Cromwell 9342	Number NES200007 Application date 27/02/20 Phone Mobile 021 556 549 Email claude@insighteng.co.nz

Property

Valuation No.	2846237201
Location	86 Mutton Town Road, Clyde
Legal Description	Lot 1 DP 525753
Area (hectares)	1.3503

Resource consents

Resource Area: RURAL RESIDENTIAL RESOURCE AREA

Consents:

05/04/2018	RC 180210: Two lot subdivision with an average allotment area of 1.935 hectares
	No information in respect of HAIL activity could be found on this record
14/05/1976	PC 78: Erect a dwelling in a rural zone
	No information in respect of HAIL activity could be found on this record
01/12/1971	Planning Consent: Four lot rural subdivision
	No information in respect of HAIL activity could be found on this record

Building

Consents/Permits/Compliance Schedules:

3/12/2014	BC 140747: Additions & alterations to existing dwelling
	No information in respect of HAIL activity could be found on this record
1/07/2004	BC 040582: Install a new fire appliance
	No information in respect of HAIL activity could be found on this record.
16/04/1997	BC 970182: Installation of fire appliance
	No information in respect of HAIL activity could be found on this record.
24/02/1994	BC 940745: Implement shed
	Activities associated with rural sheds can include storage tanks or drums for fuel or chemicals (Item A17) or landfill (item G3). If any of these activities have occurred on the site it may trigger NES requirements.
12/08/1993	BC 930437: Additions to dwelling
	No information in respect of HAIL activity could be found on this record.
28/06/1984	BP B88145: Erect shelter shed
	No information in respect of HAIL activity could be found on this record.
30/12/1983	BP B69060: Erect new swimming pool
	No information in respect of HAIL activity could be found on this record.
29/07/1976	BP H13373: Erect a new dwelling.
	No information in respect of HAIL activity could be found on this record.

29/07/1976	BP 1110: Plumbing and drainage permit *No information in respect of HAIL activity could be found on this record.*

Preliminary Site Investigations and Detailed Site Investigations

No information in regards to the above could be found on the property file.

Aerial Photographs

Council's aerial photographs date back to 2006. No information in regards to HAIL activity could be found on this record.

Disclaimer: The Council does not hold records directly relating to activities on the Hazardous Activities and Industries List (HAIL). In the event some information is available it cannot be guaranteed as correct or complete and therefore may not satisfy your request. We therefore recommend you undertake further investigation to determine whether any HAIL activities exist on the site.

Adam Vincent
Planning Officer

Date: 28 February 2020

APPENDIX 4

Laboratory Results Certificate and Chain of Custody Documentation

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:	Insight Engineering	**Lab No:**	2320065 SPv1
Contact:	Claude Midgley	**Date Received:**	11-Feb-2020
	C/- Insight Engineering	**Date Reported:**	14-Feb-2020
	PO Box 456	**Quote No:**	100740
	Cromwell 9384	**Order No:**	19057
		Client Reference:	19057
		Submitted By:	Claude Midgley

Sample Type: Soil

Sample Name:		MT1 09-Feb-2020	MT2 09-Feb-2020	MT3 09-Feb-2020	MT4 09-Feb-2020	MT5 09-Feb-2020
Lab Number:		2320065.1	2320065.2	2320065.3	2320065.4	2320065.5
Individual Tests						
Dry Matter	g/100g as rcvd	91	76	79	75	65
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	47	5	5	6	7
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	33	6	5	6	7
Total Recoverable Copper	mg/kg dry wt	35	9	8	10	12
Total Recoverable Lead	mg/kg dry wt	15.7	17.0	16.2	17.4	17.8
Total Recoverable Nickel	mg/kg dry wt	6	7	6	6	7
Total Recoverable Zinc	mg/kg dry wt	33	28	27	28	35
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
alpha-BHC	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
beta-BHC	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
delta-BHC	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
gamma-BHC (Lindane)	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
cis-Chlordane	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
trans-Chlordane	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
2,4'-DDD	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
4,4'-DDD	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
2,4'-DDE	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
4,4'-DDE	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
2,4'-DDT	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
4,4'-DDT	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.08	< 0.08	< 0.08	< 0.09
Dieldrin	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Endosulfan I	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Endosulfan II	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Endosulfan sulphate	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Endrin	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Endrin aldehyde	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Endrin ketone	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Heptachlor	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Heptachlor epoxide	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Hexachlorobenzene	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015
Methoxychlor	mg/kg dry wt	< 0.011	< 0.013	< 0.013	< 0.013	< 0.015

Sample Type: Soil						
	Sample Name:	MT6 09-Feb-2020	MT7 09-Feb-2020	MT8 09-Feb-2020		
	Lab Number:	2320065.6	2320065.7	2320065.8		
Individual Tests						
Dry Matter	g/100g as rcvd	80	70	83	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	7	6	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.12	0.12	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	8	7	6	-	-
Total Recoverable Copper	mg/kg dry wt	31	20	11	-	-
Total Recoverable Lead	mg/kg dry wt	17.1	14.8	16.6	-	-
Total Recoverable Nickel	mg/kg dry wt	10	8	7	-	-
Total Recoverable Zinc	mg/kg dry wt	48	44	28	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
alpha-BHC	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
beta-BHC	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
delta-BHC	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
cis-Chlordane	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
trans-Chlordane	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	< 0.04	< 0.04	-	-
2,4'-DDD	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
4,4'-DDD	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
2,4'-DDE	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
4,4'-DDE	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
2,4'-DDT	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
4,4'-DDT	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.09	< 0.08	-	-
Dieldrin	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Endosulfan I	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Endosulfan II	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Endrin	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Endrin aldehyde	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Endrin ketone	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Heptachlor	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-
Methoxychlor	mg/kg dry wt	< 0.013	< 0.014	< 0.012	-	-

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 simple 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. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-8
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-8
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	1-8
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-8

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

Dates of testing are available on request. Please contact the laboratory for more information.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental

ENVIRONMENTAL Analysis Request Form

Job No: 232 0065 Date Recv: 11-Feb-20 11:14

Hill Lab

R J Hill Laboratories Limite

Accre

Received by: Jess Phillips

3123200655

1 Clyde Street, T

Private Bag 3205,

Hill Laboratories office use only:

Date In *Job #* *No. of Samples*

CLIENT

Name **Insight Engineering** [229068]

PO Box 456

Cromwell 9342

Phone: 021 556 549 *Fax:*

Client Reference: 19057 *(Project Code)*

Quote Number: ***Order No:*** 19057 *(Cost Centre)*

Submitted By **Claude Midgley** [228982]

Charge To: **Insight Engineering** [229068]

RESULTS TO

☐ *Mail Client* ☐ *Mail Submitter*

☐ *Fax Results*

X *Email Results* claude@insighteng.co.nz

✠ C.O.C & coversheet to be scanned and emailed back

Additional Information

Chain of Custody Record

Delivered to Hill Laboratories (Depatched by)	Date & Time: 10/02/2020 14:30 Name: Claude Midgley Signature:	
Received at Hill Laboratories	Date & Time: Name: Signature:	
Condition	☐ Ambient Temp	☐ Chilled ____ °C

PRIORITY ☐ **Normal** (up to 10 days) ✠ **High** (approx 5 days) ☐ **Urgent** (MUST be pre-arranged)

Results required by: .....

Sample types

GW	Bore/well	**TW**	Trade waste	**S**	Saline water	**ES**	Soil/Solid	**Pl**	Plant
SW	Surface water	**E**	Effluent	**O**	Oil	**Sed**	Sediment	**BM**	Fish/shellfish/Biota
P	Potable/DI	**L**	Leachate	**Sl**	Sludge	**BS**	Biosolid	**M**	Misc (Specify)

Site ID	Sample type	Tests required	Comments
MT1	ES	MSHMs + OCPsc	
MT2	ES	MSHMs + OCPsc	
MT3	ES	MSHMs + OCPsc	
MT4	ES	MSHMs + OCPsc	
MT5	ES	MSHMs + OCPsc	
MT6	ES	MSHMs + OCPsc	
MT7	ES	MSHMs + OCPsc	
MT8	ES	MSHMs + OCPsc	

KB Item: Version: 1

Appendix 'I'

Infrastructure Assessment

PATERSONPITTSGROUP
Surveying • Planning • Engineering
Your Land Professionals
www.ppgroup.co.nz
0800 PPGROUP

THE CLYDE CLAIM LIMITED, HOULAHAN ENTERPRISES LTD, COLIN FOSTER, VICKI GILLIES & OSTEX CORPORATION LTD

REQUEST FOR A CHANGE TO THE OPERATIVE CENTRAL OTAGO DISTRICT PLAN INFRASTRUCTURE REPORT

PROJECT:	Mutton Town Road, Clyde, Request for a Change to the Operative Central Otago District Plan
PRINCIPAL:	The Clyde Claim Ltd, Houlahan Enterprises Ltd, Colin Foster, Vicki Gillies & Ostex Corporation Ltd
OUR REF:	A4702, A4723
DATE:	February 2020

DUNEDIN: P.O. Box 5933, Dunedin 9058. T 03 477 3245
CHRISTCHURCH: P.O. Box 160094, Christchurch 8441. T 03 928 1533
ALEXANDRA: P.O. Box 103, Alexandra 9340. T 03 448 8775
CROMWELL: P.O. Box 84, Cromwell 9342. T 03 445 1826
QUEENSTOWN: P.O. Box 2645, Queenstown 9349. T 03 441 4715
WANAKA: P.O. Box 283, Wanaka 9305. T 03 443 0110

REVISION / APPROVAL PANEL

Rev:	Date:	Prepared By:	Reviewed By:	Comments:
0	1 Feb 2020	MG	PLD	Initial Draft
1	27.Feb 2020			Final

Prepared by:
Paterson Pitts Limited Partnership
(Cromwell Office)
30 The Mall
P O Box 84
Cromwell 9342
Telephone: +64 3 445 1826
Email: cromell@pgroup.co.nz
Web: www.ppgroup.co.nz

Job No:	A4702 & A703
Date	27 February 2020
Report Prepared For	The Clyde Claim Ltd Houlahan Enterprises Ltd Colin Foster, Vicki Gillies & Ostex Corporation Ltd

Contents

1. Scope

Paterson Pitts Limited Partnership (PPLP) has been engaged by The Clyde Claim Ltd, Houlahan Enterprises Ltd, Colin Foster, Vicki Gillies & Ostex Corporation Ltd to provide an infrastructure report to support a private plan change request that seeks to re-zone 13ha of land at Mutton Town Road , Clyde from Rural Residential Resource Area to Residential Resource Area

A total of approximately 150 dwelling units is planned, with the opportunity for a possible retirement village.

This report covers the availability of the following infrastructure elements.

- Wastewater
- Stormwater
- Water Supply – Potable, Firefighting and Irrigation
- Network Utility Services (electricity and telecommunications)
- Road construction

2. Executive Summary

2.1 Stormwater

The site is underlain by a considerable depth of glacial out wash gravels, with depths to groundwater varying from 10-15 metres below ground level. Soakage tests have shown these gravels to be highly permeable. No issues are anticipated with the discharge of stormwater from roading, hand stand and roof-run off direct to ground via suitably designed soak pits, as is the norm for all land development within the Clyde – Alexandra area.

2.2 Wastewater

The Clyde Wastewater Project has been designed to be capable of servicing the site

2.3 Water Supply

Computer modelling of the Clyde water reticulation by Mott MacDonald NZ Ltd shows that the site can be adequately serviced from the existing Clyde town supply.

It is unlikely that any necessary public space irrigation requirements can economically be met by on site groundwater sources (i.e. bore supplies).

2.4 Network Utility Services

Chorus New Zealand Ltd have confirmed that a suitable telecommunications (fibre) supply can be made available to the proposed development of the site.

Aurora Energy Ltd have advised that a suitable power supply can be made available to serve the proposed development of the site

2.5 Road Construction

All roads will be constructed on sand and gravels. Bearing capacity tests on likely road subgrades were well in excess of the minimum requirements. No issues are expected with designing and constructing road pavements in compliance with the procedures of "Austroads" and the subdivisional pavement design standards of the Central Otago District Council. Road cross-section designs and geometry are anticipated to be in accordance with "Austroads" and NZS 4404:2010.

3. Stormwater

There is no reticulated stormwater system in the Clyde area.

Analysis of drill hole logs in the locality show that the site is underlain by a considerable depth of glacial outwash sand and gravel with depth to groundwater between 10-15 metres below the ground surface. Test pitting by Paterson Pitts shows near surface topology to be 0.2m of topsoil over outwash sands and gravel, down to the 5.0m depth of all test pits.

A location plan and test pit logs are attached in **Appendix (A).** Test pitting did not include Lot 1 DP525753 & Lot 2 DP 331535 because, at the time, the Requestors had not taken possession of the property. However, it is unlikely that ground conditions will differ in any material way from Lot 2 DP 525753 and Lot 2 DP 18990, albeit that there is a thin layer of imported topsoil over Lot 2 DP 331535 (see appended PSI/DSI)

Soakage tests were carried out on TP's 1, 3, 6 & 10. Infiltration rates of 5182mm/hr (1.44 litres/sec/m^2), 3069mm/hr (0.85 litres/sec/m^2), 6130mm/hr (1.75 litres/sec/m^2) & 3695mm/hr (1.03 litres/sec/m^2) respectively were recorded. This equates to an average soakage rate of a "Cauldwell" type soak pit of 25 litres/sec.

The NIWA HIRDS program was used to calculate a 2% Annual Exceeding Probability (AEP) short duration rainfall event of 56mm/hr using a 2 deg temperature risk factor to allow for climate change. This means that every 200m of an 8m wide road carriageway will be able to be drained by a single "Caudwell" type soak pit.

This is a very conservative assessment as Council's Engineering Standards require a pair of sumps to drain each 90m length of road. Soakage tests, infiltration calculations and rainfall intensity calculations are attached in **Appendix (B)**

Direct discharge to ground for stormwater from roading, impermeable surfaces and roof run-off will therefore be possible. The standard solution acceptable to Council is a "Cauldwell type" soak pit, one per sump outlet. This method of stormwater disposal is universally used for land development over glacial outwash gravels in Cromwell, Alexandra and Clyde. See Fig 1.

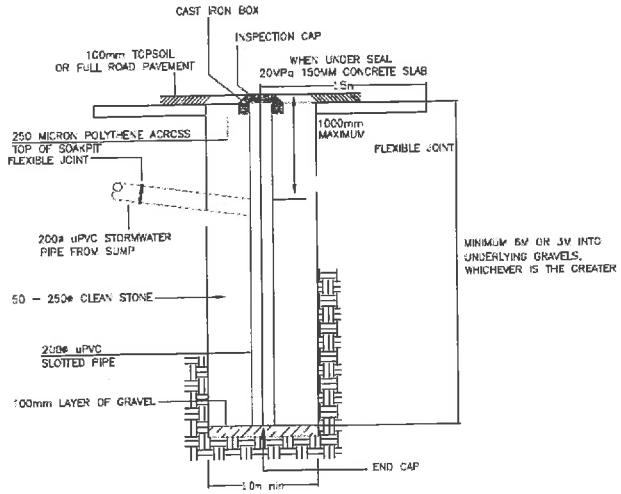


Fig 1

In order to comply with the Regional Water Plan rules, a silt and debris trap is required before discharge of stormwater to a soak pit. This will be provided by a "inverted syphon" type mud tank. See Fig 2.

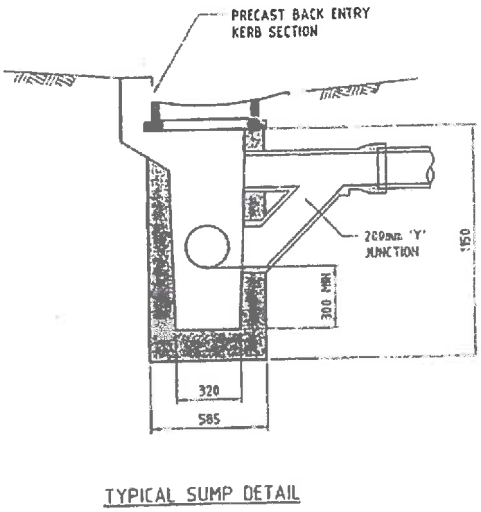


Fig 2

Where road swales are used, these provide a measure of pre-treatment of stormwater before discharge into mud tanks. There is a depth of at least 10m of gravel and sand below each soak pit, which will further filter stormwater before it is eventually discharged to groundwater. The inverted siphon mud tank/Caudwell soak pit system effectively provides for 3 stage treatment of stormwater. The mud tank (which is periodically sucked out by Council) removes silt, trash and gross pollutants, while the Caudwell soak pit (also periodically sucked out by Council) provides secondary treatment by removing finer silt and debris, with the 10m of sand and gravel below the soak pit providing tertiary filtration

For roof-run off, Council has a "rule of thumb" that 1m3 of soak pit is required for every 50m2 of roof area draining into the soak pit.

The site is relatively flat. This means there will be a lack of secondary flow paths. From a stormwater/road design aspect this means that most roads will need to be cut into the surrounding terrain by a least 150-300 mm in order to provide longitudinal road drainage and for dwellings to be able to comply with Building Code requirements (E1/AS1) for minimum floor levels above the road crown. See Fig 3

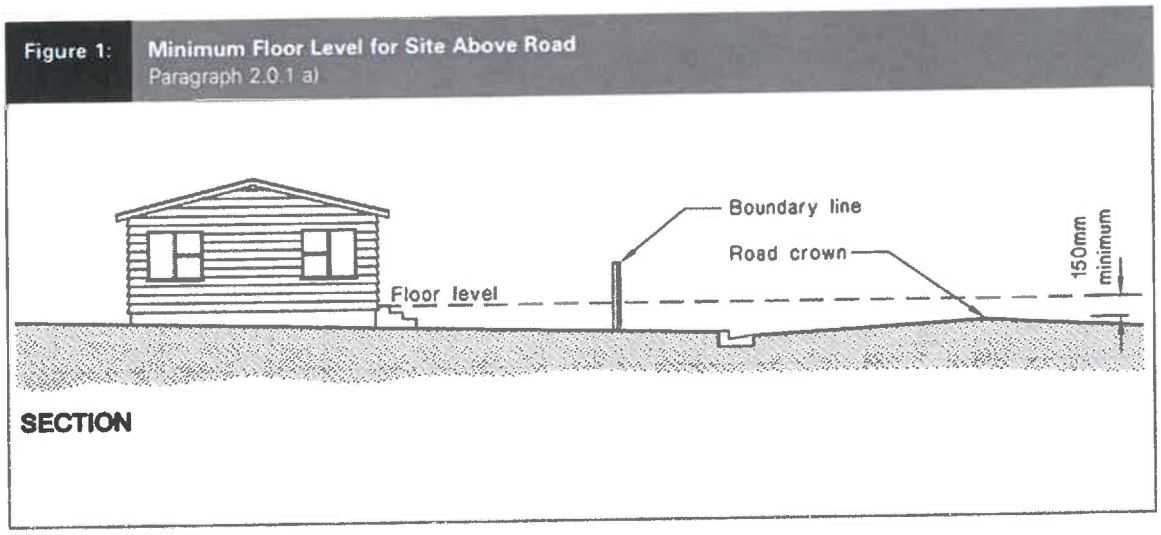


Figure 3

Essentially the roads act as temporary overflow ponding areas in the event of exceptional rain events and/or occasional blockage of mud tanks.

4. Wastewater

Council has confirmed that the Clyde Wastewater Project is being designed to serve future development along Muttontown Road with a connection available in the vicinity of Annan St / Sunderland St . See attached letter at **Appendix 'C'**

5. Water Supply

5.1 Irrigation

From the Otago Regional Council's "grow Otago" data base:

- "Dry summer rainfall" is 61-80mm for the Alexandra – Clyde Basin
- "Median potential evapotranspiration" (Jan-Feb) is 206-210mm for the Basin

Irrigation will therefore be essential to establish and maintain all landscaping within the development. This is particularly so given the very low Plant Available Water (PAW) of the site, due to its light sandy/gravelly soils.

The requirements for public open space landscape (road berms, walkway linkages SH8 buffer etc) irrigation over the site will be in the order of 5000m3/season (Oct-March). The Council's preferred option is that open public space irrigation be supplied from an independent bore, rather than the town reticulation.

The site is underlain by the Dunstan Flat Aquifer, so groundwater is a potential source of an irrigation and construction water supply. A maximum allocation limit has not been set for this aquifer in schedule 4A of the Regional Plan: Water. The ORC's study "Groundwater Allocation of the Alexandra Basin (Oct 2005 1 -877265-07-1)" found that the aquifer was likely to be over-allocated and relies heavily on extra water from irrigation losses . With a progressive switch to spray irrigation and to more efficient delivery systems, aquifer re-charge from irrigation losses will likely decrease in future. The study also found that water levels were declining in the aquifer, in addition to the decline caused by the deepening of the Clyde Dam tailrace in the early 1900s. A subsequent study by the ORC "Alexandra Groundwater Basin Allocation Study (Sept 2012)" found that it was possible that a small amount of water in the Dunstan Flat Aquifer could be available for allocation (0.4Mm3/yr), but that there were considerable uncertainties with this.

However, the economics of constructing, running and maintaining a bore , plus a duplicate reticulation system for a water application of only 0.005Mm3/yr are highly problematic.

In summary, the use a groundwater supply for public open space landscape irrigation does not appear to be a viable option.

Peak irrigation requirements for lawn and garden irrigation within private allotments will typically be in the order of 0.5-0.7m^3/day (Jan-Feb) with a metered supply. Experience in Central Otago (Cromwell/Clyde/Alexandra) is that this can only practicably be met out of the town reticulation. The demand factors considered in the below analysis factor in a suitable domestic irrigation allowance. Storage and recycling of roof run-off is not a particularly viable option, because of the very low and irregular rainfall (350mm-440mm/year). An on-site storage reserve in the order of 30-40m^3 would be required to get through the Jan/Feb peak irrigation period. Given the likely size of the proposed lots (300-650m^2), provision of this amount of storage within the lots is not practical.

5.2 Domestic and Firefighting

A Water Impact Assessment has been commissioned by Council from Mott MacDonald NZ Ltd, see **Appendix D**. Computer Modelling of the Clyde Township reticulation shows that the site can be adequately serviced , subject to duplicating the existing Sunderland Street main with a 200mm main from Annan Street to the site

6. Network Utility Services

6.1 Telecommunications

Chorus New Zealand Ltd have confirmed that a suitable Air Blown Fibre (ABF) reticulation can be supplied to the proposed development. See **Appendix E**

Individual home owners will also have the alternative option of the cellular network and several wi-fi providers for their telecommunications and computer media service

6.2 Electricity

Aurora Energy Ltd have confirmed that a suitable power supply can be made3 available to service development of the site See **Appendix F**

7. Road Construction

No difficulty is expected in designing and constructing suitable road pavements within the site, in compliance with "Austroads" and the subdivision engineering design standards of the Central Otago District Council.

All roads will be formed on sand and gravel. Laboratory Soaked California Bearing Ratio (CBR) tests were taken at the likely road subgrade at all test pits. See **Appendix G**. Soaked CBR's varied from 15%-40%, well above the normal minimum requirement of 7% for road pavement design in terms of the "Austroads" standard.

Council's current subdivisional roading engineering design standard is NZ 4404:2004 and its July 2008 amendments thereto. It is proposed that road designs on any subsequent subdivision and development of the site be in accordance with the updated version of this standard, being NZS 4404:2010. This updated version of the standard provides for a more innovative and flexible approach to road layout designs, in accordance with the contemporary urban design concepts proposed for this development. To quote from the forward to NZS 4404:2010:

- *Aims to encourage good urban design and remove road blocks to liveability and economic development in communities.*
- *Road design needs to allow 'context' or 'place' to be given significant emphasis, and to require roads to achieve safe (slower) operating speeds;*
- *Innovative subdivision has been discouraged to some extent under the 2004 version of NZS 4404.*
- *The review committee therefore challenged itself to produce a new Standard that:*
  - *Encourages sustainable and modern design;*
  - *Provides some certainty for designers and LAs; and*
  - *Prevents the outcomes that can arise when the sole focus is cost minimisation, and adherence to minimum standards.*

and from the outcome statement

- *This Standard provides local authorities, developers, and their professional advisors with standards for design and construction of land development and subdivision infrastructure. NZS 4404:2010 encourages sustainable development and modern design that emphasises liveability and environmental quality. It will also provide as much consistency as possible on*

land development and subdivision infrastructure while still allowing flexibility for local variations to suit local circumstances.

This is a matter that is best addressed at the subsequent resource consent and detailed engineering design stages , rather than at this initial plan change stage which simply seeks a "global" re-zoning of the site , instead of a detailed " master-planned" approach.

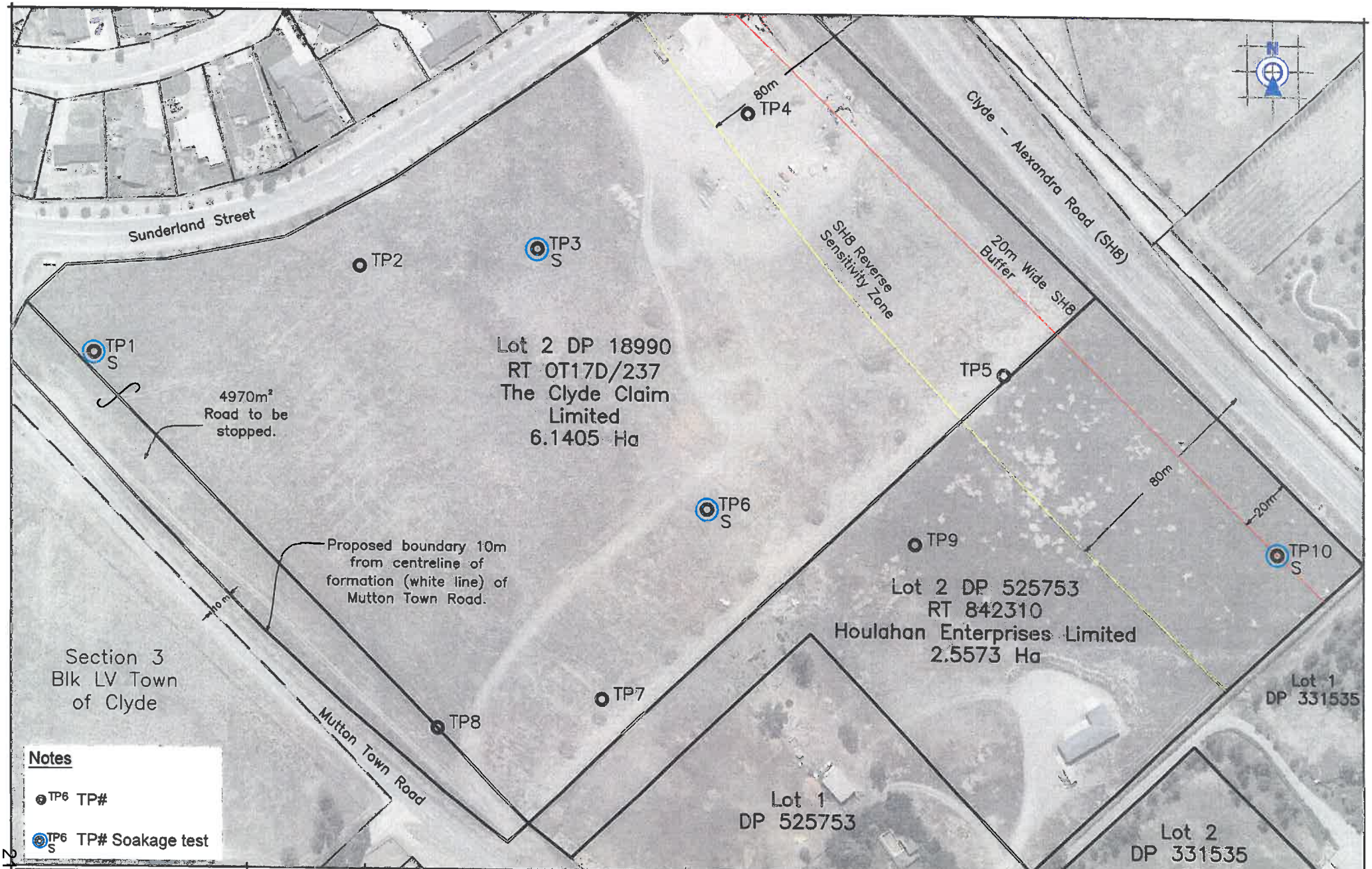
8. Conclusion

Suitable provision can be made for roading, stormwater, wastewater, water supply and network utility services to the proposed development.

Myles Garmonsway
Principal, B.Sc, Dip Mgt, R.P. Surv, MNZIS, CSNZ
Paterson Pitts Limited Partnership (Cromwell)

APPENDIX A

Location Plan of Test Pits & Test Pit Logs



2

1

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T 03 445 1826
E cromwell@ppgroup.co.nz

Client/Location: Mutton Town Road

Purpose/Drawing Title: Test Pit Locations

Surveyed by:	MG	Original Size:	Scale:
Designed by:		A3	1:1250
Drawn by:	KWG		DO NOT SCALE
Checked by:	MG		
Approved by	MG		
Job Ref: A4702_PLAN		Sheet No: 2	Revision No: A
			Date Created: 04/02/2020

PLOT DATE: 04 February, 2020 - 2:41 PM BY: Kathryn Germonway

J:\A_4702 LAING & BRADICADA\4702_PLAN_2A_TP.DWG

TEST PIT 1

Ground	0.00	
		Sandy topsoil
	-0.20	
		Compact, brown gravels. Fine to 100mm. Some erratics to 400mm
	-1.30	
		Clean, grey sandy gravels. Compact
	-1.70	

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
7E+05	389425	4988404	1311981	TP 1

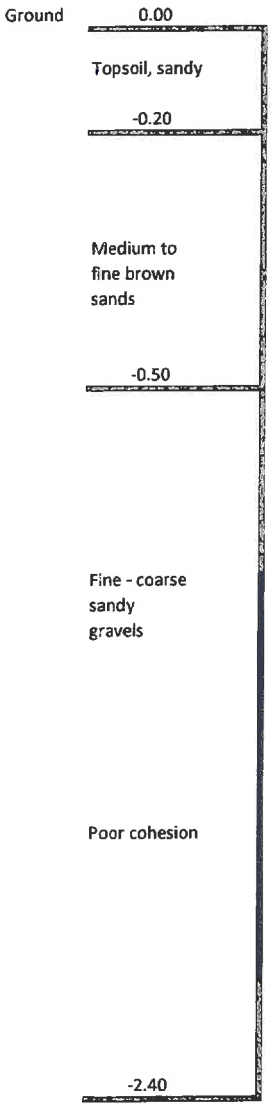
TEST PIT 2

Ground	0.00	
		Topsoil
	-0.20	
		Sandy gravels
	-0.40	
		Brown, weathered coarse sands and fine gravels
	-1.30	
		Medium to coarse brown, weathered gravels.
	-2.20	

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
748362	389864	4988353	1312422	TP 2

TEST PIT 3



LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
748362	389864	4988353	1312422	TP 3

TEST PIT 4

Ground	0.00
gravel cap / topsoil	
	-0.10
Coarse sands and free-flowing fine gravels	
minor sand lenses	
	-2.30

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
7E+05	389668	4988505	1312219	TP 4

TEST PIT 5

Ground 0.00

Sandy topsoil with old roots

-0.30

Meduim to fine sandy gravels Some old tree roots

-0.70

Coarse sands & fine gravels.

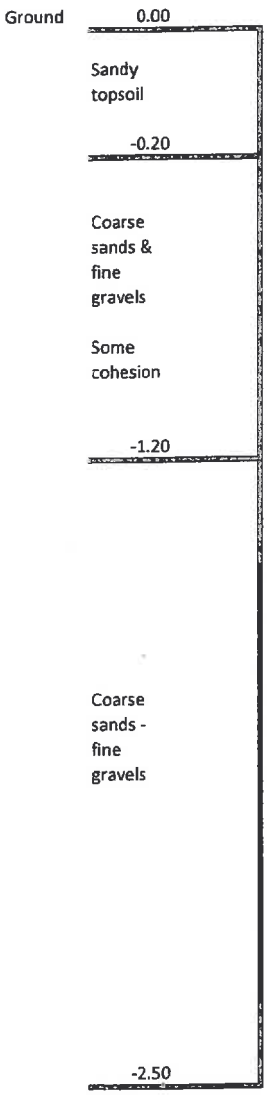
Poor cohesion

-2.00

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
	748362	389864	4988353	1312422

TEST PIT 6



LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
748362	389864	4988353	1312422	TP 6

TEST PIT 7

Ground 0.00

Topsoil

-0.20

Brown, fine gravels

Some old roots

Cobbles to 250mm

-1.30

Medium - coarse grey sandy gravels

Poor cohesion

-2.70

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
748362	389864	4988353	1312422	TP 7

TEST PIT 8

Ground	0.00	
		Sandy topsoil
	-0.20	
		Compact fine gravels. Old roots
	-0.60	
		Coarse, compact gravels
	-1.40	
		Grey medium - coarse gravels in coarse sands Some erratices to 400mm
	-2.60	

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
748362	389864	4988353	1312422	TP 8

TEST PIT 9

Ground	0.00
Topsoil	
	-0.15
Loose, brown peg gravels.	
	-0.40
Fine gravels in coarse sands. Poor cohesion. Sloping	
	-1.0 -to -1.3
Grey medium to coarse gravels and sands. Poor cohesion	
	-2.90

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
748362	389864	4988353	1312422	TP 9

TEST PIT 10

Ground 0.00

Topsoil

-0.20

Sandy fine gravels. Some weathering

-0.70

Fine grey gravels in coarse sands

Poor cohesion

-2.50

LOCATION:

LINDIS PEAK 2000		NZTM		
mN	mE	mN	mE	NAME
748362	389864	4988353	1312422	TP 10

APPENDIX B

Soakage Tests, Infiltration Calculations & Rainfall Intensity Calculations

Pit Dimensions			Area		Test Pit	1			A4702								
Length	3		3.3						Clyde								
Width	1.1																
Time (s)	Depth	dVolume	dTime (s)		Soakage (l/s)		l/s/m²										
0	0	-0.165	30		-5.5		-1.7										
30	0.05	-0.165	30		-5.5		-1.7										
60	0.1	-0.165	30		-5.5		-1.7										
90	0.15	-0.099	30		-3.3		-1.0										
120	0.18	-0.099	30		-3.3		-1.0										
150	0.21			Average	-4.62		-1.40				Soaking	Infiltration Rate			5040	mm/hr	
		0.693	150		4.6		1.4	For time period									
Note:	3000l poured in over 10 minutes to get to water depth of 0.35m																
	Soakage over 10 min = 2850			litres													
		=	4.75	(l/s)													
		=	1.44	l/s/m²							Filling	Infiltration Rate			5182	mm/hr	
														total volume			
	1 in 20 (RCP4.5)										area m2	2207.167		17.657333	m3		
	10	mm in 10 minutes		60.3 mm/hr		Q=2.78CiA					runoff	0.8		rate per second			
						A = Q/2.78iC		0.220717	ha		depth	10		29.4	l/s		
								2207.167			seconds	600					
													runoff per m2 per s		0.013333	l/s/m2	
Soakpit Base =			0.785398	m2							Soakage Capacity		2061.67	m2			
Effective soakage @ 2m deep			19.63495	m2	45 deg angle influence						metres of road		103.0835	206.16702	two sided		
			27.48894		Soakage Rate	l/s					(20m carriageway)						

Pit Dimensions			Area		Test Pit	3			A4702								
Length	3.1		3.41						Clyde								
Width	1.1																
Time (s)	Depth	dVolume	dTime (s)		Soakage (l/s)		l/s/m²										
0	0	-0.3069	30		-10.2		-3.0										
30	0.09	-0.1705	30		-5.7		-1.7										
60	0.14	-0.1364	30		-4.5		-1.3										
90	0.18	-0.1364	30		-4.5		-1.3										
120	0.22			Average	-6.25		-1.83										
		0.7502	120		6.3		1.8	For time period									
Note:	3000l poured in over 9 minutes to get to water depth of 0.42m																
	Soakage over 9 min =		1570	litres													
		=	2.91	(l/s)													
		=	0.85	l/s/m²													
	1 in 20 (RCP4.5)																
	10	mm in 10 minutes		60.3 mm/hr		Q=2.78CiA											
						A = Q/2.78iC		0.134418	ha								
								1344.184									
Soakpit Base =			0.785398	m2													
Effective soakage @ 2m deep			19.63495	m2	45 deg angle influence												
			16.741		Soakage Rate	l/s											
					Adjusted for soakage during filling												

Soaking	Infiltration Rate		6600	mm/hr	
Filling	Infiltration Rate		3069	mm/hr	
			total volume		
area m2	1344.184		10.753469	m3	
runoff	0.8		rate per second		
depth	10		17.9	l/s	
seconds	600				
		runoff per m2 per s		0.013333	l/s/m2
Soakage Capacity		1255.575	m2		
metres of road		62.77875	125.5575	two sided	
(20m carriageway)					

Pit Dimensions			Area		Test Pit	6			A4702							
Length	3		3.3						Clyde							
Width	1.1															
Time (s)	Depth	dVolume	dTime (s)		Soakage (l/s)		l/s/m²									
0	0	-0.33	30		-11.0		-3.3									
30	0.1			Average	-11.00		-3.33				Soaking	Infiltration Rate		12000	mm/hr	
		0.33	30		11.0		3.3	For time period								
Note:	3300l poured in over 8.5 minutes to get to water depth of 0.1m															
	Soakage over 8.5 min		2950	litres												
		=	5.78	(l/s)												
		=	1.75	l/s/m²							Filling	Infiltration Rate		6310	mm/hr	
	1 in 20 (RCP4.5)													total volume		
	10	mm in 10 minutes		60.3 mm/hr		Q=2.78CiA					area m2	2763.408		22.107262	m3	
						A = Q/2.78iC		0.276341	ha		runoff	0.8		rate per second		
								2763.408			depth	10		36.8	l/s	
											seconds	600				
													runoff per m2 per s		0.013333	l/s/m2
Soakpit Base =			0.785398	m2												
Effective soakage @ 2m deep			19.63495	m2	45 deg angle influence						Soakage Capacity		2581.244	m2		
			34.41659		Soakage Rate	l/s					metres of road		129.0622	258.1244	two sided	
					Adjusted for soakage during filling						(20m carriageway)					

Pit Dimensions			Area		Test Pit	10			A4702								
Length	3.1		3.41						Clyde								
Width	1.1																
Time (s)	Depth	dVolume	dTime (s)		Soakage (l/s)		l/s/m²										
0	0	-0.682	30		-22.7		-6.7										
30	0.2	-0.341	30		-11.4		-3.3										
60	0.3			Average	-17.05		-5.00										
		1.023	60		17.1		5.0	For time period									
Note:	3000l poured in over 7 minutes to get to water depth of 0.45m																
	Soakage over 7 min =		1470	litres													
		=	3.50	(l/s)													
		=	1.03	l/s/m²													
	1 in 20 (RCP4.5)																
	10	mm in 10 minutes		60.3 mm/hr		Q=2.78CiA											
						A = Q/2.78iC		0.161816	ha								
								1618.157									
Soakpit Base =			0.785398	m2													
Effective soakage @ 2m deep			19.63495	m2	45 deg angle influence												
			20.15318		Soakage Rate	l/s											

Soaking	Infiltration Rate		18000	mm/hr	
Filling	Infiltration Rate		3695	mm/hr	
			total volume		
area m2	1618.157		12.945259	m3	
runoff	0.8		rate per second		
depth	10		21.6	l/s	
seconds	600				
		runoff per m2 per s		0.013333	l/s/m2
Soakage Capacity		1511.488	m2		
metres of road		75.57442	151.14884	two sided	
(20m carriageway)					

HIRDS V4 Depth-Duration-Frequency Results
Sitename: Custom Location
Coordinate system: WGS84
Longitude: 169.3364
Latitude: -45.1998

DDF Mode Parameter	c	d	e	f	g	h	i
Values:	-0.0202	0.475516	0.010093	-0.0065	0.328352	-0.00963	1.997551

Example:	Duration (h	ARI (yrs)	x	y	Rainfall Depth (mm)
	24	100	3.178054	4.600149	82.55506

Rainfall depths (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	3.37	4.46	5.33	7.37	10.3	17.2	23.1
2	0.5	3.85	5.07	6.04	8.3	11.5	19.1	25.6
5	0.2	5.7	7.39	8.73	11.8	16.1	26.1	34.4
10	0.1	7.29	9.36	11	14.7	19.9	31.6	41.2
20	0.05	9.14	11.6	13.6	18	24	37.6	48.6
30	0.033	10.4	13.1	15.2	20.1	26.7	41.4	53.1
40	0.025	11.3	14.2	16.5	21.6	28.7	44.2	56.5
50	0.02	12.1	15.1	17.5	22.9	30.3	46.4	59.2
60	0.017	12.7	15.9	18.4	24	31.6	48.3	61.4
80	0.012	13.8	17.2	19.9	25.8	33.8	51.3	65
100	0.01	14.7	18.3	21	27.2	35.6	53.8	67.9
250	0.004	18.8	23	26.3	33.7	43.4	64.3	80.1

Depth standard error (mm) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	0.51	0.6	0.68	0.83	1.2	1.6	3.6
2	0.5	0.57	0.67	0.76	0.9	1.3	1.8	4
5	0.2	0.91	1.1	1.2	1.3	1.9	2.4	5.4
10	0.1	1.3	1.6	1.8	1.8	2.7	3	6.6
20	0.05	1.9	2.3	2.6	2.5	3.8	4	8.1
30	0.033	2.3	2.8	3.2	3.1	4.7	4.7	9.1
40	0.025	2.7	3.3	3.8	3.6	5.4	5.2	9.9
50	0.02	3	3.7	4.3	4	6.1	5.7	11
60	0.017	3.4	4.1	4.8	4.4	6.7	6.1	11
80	0.012	3.9	4.8	5.6	5.1	7.8	6.9	12
100	0.01	4.4	5.4	6.4	5.7	8.8	7.5	13
250	0.004	7.3	8.9	11	9.3	14	11	17

Rainfall depths (mm) :: RCP2.6 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	3.61	4.77	5.71	7.88	10.9	18.1	24.2
2	0.5	4.13	5.43	6.48	8.9	12.3	20.2	26.9
5	0.2	6.13	7.95	9.39	12.7	17.3	27.7	36.2
10	0.1	7.86	10.1	11.8	15.8	21.3	33.6	43.5
20	0.05	9.86	12.5	14.6	19.4	25.8	40.1	51.3
30	0.033	11.2	14.1	16.4	21.6	28.7	44.1	56.2
40	0.025	12.2	15.3	17.8	23.4	30.8	47.1	59.8
50	0.02	13	16.3	18.9	24.8	32.6	49.5	62.6
60	0.017	13.7	17.2	19.9	25.9	34	51.6	65
80	0.012	14.9	18.6	21.5	27.9	36.4	54.8	68.8

100	0.01	15.9	19.7	22.7	29.4	38.3	57.4	71.9
250	0.004	20.3	24.9	28.5	36.4	46.8	68.7	84.9

Rainfall depths (mm) :: RCP2.6 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	3.61	4.77	5.71	7.88	10.9	18.1	24.2
2	0.5	4.13	5.43	6.48	8.9	12.3	20.2	26.9
5	0.2	6.13	7.95	9.39	12.7	17.3	27.7	36.2
10	0.1	7.86	10.1	11.8	15.8	21.3	33.6	43.5
20	0.05	9.86	12.5	14.6	19.4	25.8	40.1	51.3
30	0.033	11.2	14.1	16.4	21.6	28.7	44.1	56.2
40	0.025	12.2	15.3	17.8	23.4	30.8	47.1	59.8
50	0.02	13	16.3	18.9	24.8	32.6	49.5	62.6
60	0.017	13.7	17.2	19.9	25.9	34	51.6	65
80	0.012	14.9	18.6	21.5	27.9	36.4	54.8	68.8
100	0.01	15.9	19.7	22.7	29.4	38.3	57.4	71.9
250	0.004	20.3	24.9	28.5	36.4	46.8	68.7	84.9

Rainfall depths (mm) :: RCP4.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	3.67	4.85	5.8	8.01	11.1	18.4	24.5
2	0.5	4.2	5.53	6.59	9.05	12.5	20.5	27.2
5	0.2	6.24	8.09	9.56	12.9	17.6	28.1	36.7
10	0.1	8	10.3	12.1	16.1	21.7	34.1	44.1
20	0.05	10	12.8	14.9	19.7	26.3	40.7	52.1
30	0.033	11.4	14.4	16.7	22	29.2	44.8	57
40	0.025	12.4	15.6	18.1	23.8	31.4	47.9	60.6
50	0.02	13.3	16.7	19.3	25.2	33.2	50.3	63.5
60	0.017	14	17.5	20.3	26.4	34.7	52.4	66
80	0.012	15.2	18.9	21.9	28.4	37.1	55.7	69.8
100	0.01	16.2	20.1	23.2	30	39	58.4	72.9
250	0.004	20.7	25.4	29	37.1	47.7	69.8	86.1

Rainfall depths (mm) :: RCP4.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	3.85	5.1	6.1	8.43	11.7	19.1	25.4
2	0.5	4.42	5.82	6.94	9.53	13.1	21.4	28.2
5	0.2	6.58	8.53	10.1	13.6	18.5	29.4	38.2
10	0.1	8.45	10.8	12.7	17	22.9	35.7	46
20	0.05	10.6	13.5	15.7	20.8	27.7	42.7	54.3
30	0.033	12.1	15.2	17.7	23.3	30.8	47	59.4
40	0.025	13.1	16.5	19.2	25.1	33.1	50.2	63.3
50	0.02	14	17.6	20.4	26.7	35	52.8	66.3
60	0.017	14.8	18.5	21.4	27.9	36.6	55	68.8
80	0.012	16.1	20	23.1	30	39.2	58.4	72.9
100	0.01	17.1	21.3	24.5	31.7	41.2	61.3	76.2
250	0.004	21.9	26.8	30.7	39.2	50.3	73.3	89.9

Rainfall depths (mm) :: RCP6.0 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	3.64	4.82	5.77	7.96	11.1	18.3	24.4
2	0.5	4.17	5.49	6.55	8.99	12.4	20.4	27.1
5	0.2	6.2	8.03	9.49	12.8	17.5	27.9	36.5
10	0.1	7.94	10.2	12	16	21.6	33.9	43.9

20	0.05	9.97	12.7	14.8	19.6	26.1	40.5	51.8
30	0.033	11.3	14.3	16.6	21.9	29	44.5	56.7
40	0.025	12.3	15.5	18	23.6	31.2	47.6	60.3
50	0.02	13.2	16.5	19.1	25	32.9	50	63.2
60	0.017	13.9	17.4	20.1	26.2	34.4	52.1	65.6
80	0.012	15.1	18.8	21.7	28.2	36.8	55.3	69.4
100	0.01	16.1	20	23	29.7	38.8	58	72.5
250	0.004	20.5	25.2	28.8	36.8	47.3	69.3	85.6

Rainfall depths (mm) :: RCP6.0 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	
1.58	0.633	4.02	5.33	6.37	8.79	12.1	19.8	26.1	
2	0.5	4.61	6.08	7.25	9.95	13.7	22.2	29.1	
5	0.2	6.89	8.93	10.6	14.3	19.3	30.5	39.5	
10	0.1	8.85	11.4	13.3	17.8	23.9	37.2	47.6	
20	0.05	11.1	14.1	16.5	21.8	29	44.4	56.2	
30	0.033	12.6	16	18.6	24.4	32.3	48.9	61.6	
40	0.025	13.8	17.3	20.1	26.4	34.7	52.3	65.6	
50	0.02	14.7	18.5	21.4	28	36.7	55	68.7	
60	0.017	15.5	19.4	22.5	29.3	38.3	57.3	71.4	
80	0.012	16.9	21	24.3	31.5	41	60.9	75.6	
100	0.01	18	22.3	25.7	33.3	43.2	63.9	79	
250	0.004	23	28.2	32.2	41.1	52.7	76.4	93.3	

Rainfall depths (mm) :: RCP8.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	
1.58	0.633	3.71	4.91	5.87	8.11	11.2	18.6	24.7	
2	0.5	4.25	5.59	6.67	9.16	12.7	20.7	27.4	
5	0.2	6.32	8.19	9.68	13.1	17.8	28.4	37.1	
10	0.1	8.11	10.4	12.2	16.3	22	34.5	44.5	
20	0.05	10.2	12.9	15.1	20	26.6	41.2	52.6	
30	0.033	11.6	14.6	17	22.3	29.6	45.3	57.6	
40	0.025	12.6	15.8	18.4	24.1	31.8	48.4	61.3	
50	0.02	13.5	16.9	19.5	25.6	33.6	50.9	64.2	
60	0.017	14.2	17.7	20.5	26.8	35.1	53	66.6	
80	0.012	15.4	19.2	22.2	28.8	37.6	56.3	70.5	
100	0.01	16.4	20.4	23.5	30.4	39.6	59	73.7	
250	0.004	21	25.7	29.4	37.6	48.3	70.6	87	

Rainfall depths (mm) :: RCP8.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h	
1.58	0.633	4.4	5.83	6.97	9.63	13.2	21.4	27.9	
2	0.5	5.06	6.66	7.95	10.9	15	23.9	31.2	
5	0.2	7.58	9.83	11.6	15.7	21.2	33.1	42.5	
10	0.1	9.76	12.5	14.7	19.7	26.3	40.4	51.3	
20	0.05	12.3	15.6	18.2	24.1	31.9	48.4	60.7	
30	0.033	14	17.6	20.5	27	35.5	53.4	66.6	
40	0.025	15.2	19.1	22.2	29.1	38.2	57.1	70.9	
50	0.02	16.3	20.4	23.6	30.9	40.4	60	74.3	
60	0.017	17.2	21.5	24.8	32.4	42.2	62.5	77.3	
80	0.012	18.7	23.2	26.8	34.8	45.2	66.5	81.8	
100	0.01	19.9	24.7	28.4	36.8	47.6	69.7	85.6	
250	0.004	25.4	31.1	35.6	45.5	58.1	83.4	101	

24h	48h	72h	96h	120h
30	37	40.7	42.9	44.3
33	40.6	44.5	46.8	48.2
43.7	52.8	57.3	59.9	61.4
51.8	62	66.9	69.6	71.1
60.4	71.6	76.8	79.6	81.1
65.7	77.4	82.8	85.5	87
69.6	81.6	87.1	89.9	91.2
72.7	84.9	90.5	93.2	94.6
75.2	87.7	93.2	96	97.3
79.3	92.1	97.7	100	102
82.6	95.5	101	104	105
96.2	110	116	118	119

24h	48h	72h	96h	120h
1.8	0.85	1.4	0.94	2.3
1.9	0.83	1.5	0.93	2.5
2.8	1.7	2.6	2	3.7
3.8	2.9	3.8	3.3	4.9
5.1	4.4	5.4	4.9	6.5
6	5.4	6.5	6.1	7.7
6.8	6.3	7.4	7.1	8.6
7.4	7	8.1	7.8	9.4
8	7.6	8.8	8.5	10
9	8.7	9.9	9.7	11
9.8	9.5	11	11	12
14	14	15	15	17

24h	48h	72h	96h	120h
31.2	38.3	41.9	44.1	45.5
34.4	42	45.9	48.2	49.6
45.7	54.9	59.4	61.9	63.4
54.3	64.5	69.5	72.1	73.5
63.4	74.6	79.8	82.5	83.8
69	80.7	86	88.7	90
73.1	85.1	90.6	93.2	94.5
76.3	88.7	94.1	96.7	97.9
79	91.5	97	99.6	101
83.3	96.2	102	104	105

86.7	99.8	105	108	109
101	115	120	122	123

24h	48h	72h	96h	120h
31.2	38.3	41.9	44.1	45.5
34.4	42	45.9	48.2	49.6
45.7	54.9	59.4	61.9	63.4
54.3	64.5	69.5	72.1	73.5
63.4	74.6	79.8	82.5	83.8
69	80.7	86	88.7	90
73.1	85.1	90.6	93.2	94.5
76.3	88.7	94.1	96.7	97.9
79	91.5	97	99.6	101
83.3	96.2	102	104	105
86.7	99.8	105	108	109
101	115	120	122	123

24h	48h	72h	96h	120h
31.6	38.6	42.3	44.4	45.8
34.8	42.4	46.3	48.5	49.9
46.2	55.4	59.9	62.4	63.9
54.9	65.2	70.1	72.7	74.1
64.1	75.4	80.5	83.2	84.5
69.8	81.6	86.9	89.5	90.8
73.9	86	91.5	94	95.3
77.2	89.6	95	97.6	98.8
80	92.5	98	101	102
84.3	97.2	103	105	106
87.8	101	106	109	110
102	116	121	124	124

24h	48h	72h	96h	120h
32.6	39.6	43.2	45.4	46.7
35.9	43.6	47.4	49.7	51
47.8	57.1	61.6	64	65.4
56.9	67.2	72.2	74.7	76
66.4	77.8	82.9	85.5	86.8
72.3	84.2	89.5	92.1	93.2
76.7	88.8	94.2	96.7	97.9
80.1	92.6	97.9	100	101
83	95.5	101	103	104
87.5	100	106	108	109
91.1	104	110	112	113
106	120	125	127	128

24h	48h	72h	96h	120h
31.4	38.5	42.1	44.3	45.7
34.7	42.2	46.1	48.4	49.8
46	55.2	59.7	62.2	63.7
54.7	64.9	69.8	72.4	73.9

63.8	75.1	80.2	82.9	84.3
69.5	81.2	86.5	89.2	90.5
73.6	85.7	91.1	93.7	95
76.8	89.2	94.6	97.3	98.4
79.6	92.1	97.6	100	101
83.9	96.8	102	105	106
87.4	100	106	108	109
102	116	121	123	124

24h	48h	72h	96h	120h
33.4	40.5	44.1	46.2	47.6
36.9	44.6	48.5	50.7	52
49.2	58.5	63.1	65.5	66.8
58.7	69	74	76.4	77.8
68.5	80	85.1	87.6	88.7
74.6	86.6	91.8	94.3	95.4
79.2	91.3	96.7	99.1	100
82.6	95.2	100	103	104
85.7	98.3	104	106	107
90.3	103	109	111	112
94.1	107	113	115	115
110	123	129	130	131

24h	48h	72h	96h	120h
31.8	38.9	42.5	44.6	46
35.1	42.7	46.5	48.8	50.2
46.6	55.8	60.3	62.8	64.3
55.4	65.7	70.6	73.2	74.6
64.7	75.9	81.1	83.8	85.1
70.4	82.2	87.5	90.1	91.4
74.6	86.7	92.1	94.7	95.9
77.9	90.3	95.7	98.3	99.4
80.7	93.2	98.7	101	102
85.1	98	103	106	107
88.6	102	107	110	110
103	117	122	124	125

24h	48h	72h	96h	120h
35.4	42.6	46.1	48.1	49.5
39.2	46.9	50.8	52.9	54.2
52.5	61.9	66.5	68.7	70
62.6	73.2	78.1	80.4	81.6
73.2	84.9	89.9	92.3	93.2
79.8	92	97.1	99.5	100
84.7	97	102	104	105
88.4	101	106	109	109
91.7	104	110	112	112
96.7	110	115	117	118
101	114	119	121	122
118	131	136	138	137

HIRDS V4 Intensity-Duration-Frequency Results
Sitename: Custom Location
Coordinate system: WGS84
Longitude: 169.3364
Latitude: -45.1998

DDF Mode Parameter	c	d	e	f	g	h	i
Values:	-0.0202	0.475516	0.010093	-0.0065	0.328352	-0.00963	1.997551

Example:	Duration (h	ARI (yrs)	x	y	Rainfall Rate (mm/hr)
	24	100	3.178054	4.600149	3.439794

Rainfall intensities (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	20.2	13.4	10.7	7.37	5.13	2.86	1.93
2	0.5	23.1	15.2	12.1	8.3	5.76	3.19	2.13
5	0.2	34.2	22.2	17.5	11.8	8.06	4.35	2.86
10	0.1	43.8	28.1	22	14.7	9.93	5.27	3.44
20	0.05	54.9	34.8	27.1	18	12	6.27	4.05
30	0.033	62.2	39.3	30.5	20.1	13.3	6.9	4.43
40	0.025	67.8	42.7	33	21.6	14.3	7.37	4.71
50	0.02	72.5	45.4	35.1	22.9	15.1	7.74	4.93
60	0.017	76.4	47.8	36.8	24	15.8	8.05	5.12
80	0.012	82.9	51.6	39.7	25.8	16.9	8.56	5.42
100	0.01	88.3	54.8	42.1	27.2	17.8	8.96	5.66
250	0.004	113	69.1	52.7	33.7	21.7	10.7	6.68

Intensity standard error (mm/hr) :: Historical Data

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	3	1.9	1.3	0.86	0.59	0.26	0.29
2	0.5	3.4	2.1	1.5	0.94	0.64	0.28	0.32
5	0.2	5.3	3.3	2.5	1.4	0.94	0.4	0.43
10	0.1	7.4	4.8	3.6	1.8	1.3	0.53	0.53
20	0.05	10	6.9	5.4	2.5	1.9	0.71	0.64
30	0.033	13	8.7	6.7	3.1	2.3	0.84	0.72
40	0.025	15	10	7.9	3.5	2.7	0.94	0.79
50	0.02	17	12	9	3.9	3	1	0.84
60	0.017	18	13	10	4.3	3.3	1.1	0.89
80	0.012	21	15	12	4.9	3.8	1.2	0.97
100	0.01	24	17	13	5.5	4.3	1.4	1
250	0.004	38	28	22	8.6	6.9	1.9	1.4

Rainfall intensities (mm/hr) :: RCP2.6 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	21.6	14.3	11.4	7.88	5.47	3.02	2.02
2	0.5	24.8	16.3	13	8.9	6.16	3.37	2.24
5	0.2	36.8	23.8	18.8	12.7	8.64	4.62	3.02
10	0.1	47.1	30.2	23.7	15.8	10.7	5.6	3.63
20	0.05	59.2	37.6	29.2	19.4	12.9	6.68	4.28
30	0.033	67.1	42.4	32.9	21.6	14.3	7.35	4.68
40	0.025	73.2	46	35.6	23.4	15.4	7.86	4.98
50	0.02	78.2	49	37.9	24.8	16.3	8.25	5.22
60	0.017	82.5	51.6	39.8	25.9	17	8.59	5.42
80	0.012	89.6	55.8	42.9	27.9	18.2	9.13	5.74

100	0.01	95.4	59.2	45.4	29.4	19.2	9.57	5.99
250	0.004	122	74.7	56.9	36.4	23.4	11.4	7.08

Rainfall intensities (mm/hr) :: RCP2.6 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	21.6	14.3	11.4	7.88	5.47	3.02	2.02
2	0.5	24.8	16.3	13	8.9	6.16	3.37	2.24
5	0.2	36.8	23.8	18.8	12.7	8.64	4.62	3.02
10	0.1	47.1	30.2	23.7	15.8	10.7	5.6	3.63
20	0.05	59.2	37.6	29.2	19.4	12.9	6.68	4.28
30	0.033	67.1	42.4	32.9	21.6	14.3	7.35	4.68
40	0.025	73.2	46	35.6	23.4	15.4	7.86	4.98
50	0.02	78.2	49	37.9	24.8	16.3	8.25	5.22
60	0.017	82.5	51.6	39.8	25.9	17	8.59	5.42
80	0.012	89.6	55.8	42.9	27.9	18.2	9.13	5.74
100	0.01	95.4	59.2	45.4	29.4	19.2	9.57	5.99
250	0.004	122	74.7	56.9	36.4	23.4	11.4	7.08

Rainfall intensities (mm/hr) :: RCP4.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	22	14.6	11.6	8.01	5.56	3.06	2.04
2	0.5	25.2	16.6	13.2	9.05	6.26	3.42	2.27
5	0.2	37.4	24.3	19.1	12.9	8.79	4.68	3.06
10	0.1	48	30.8	24.1	16.1	10.9	5.69	3.68
20	0.05	60.3	38.3	29.8	19.7	13.1	6.78	4.34
30	0.033	68.4	43.2	33.5	22	14.6	7.47	4.75
40	0.025	74.6	46.9	36.3	23.8	15.7	7.98	5.05
50	0.02	79.7	50	38.6	25.2	16.6	8.39	5.29
60	0.017	84	52.5	40.5	26.4	17.3	8.73	5.5
80	0.012	91.3	56.8	43.7	28.4	18.5	9.28	5.82
100	0.01	97.2	60.3	46.3	30	19.5	9.73	6.08
250	0.004	124	76.1	58	37.1	23.8	11.6	7.18

Rainfall intensities (mm/hr) :: RCP4.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	23.1	15.3	12.2	8.43	5.83	3.19	2.11
2	0.5	26.5	17.5	13.9	9.53	6.57	3.56	2.35
5	0.2	39.5	25.6	20.2	13.6	9.26	4.9	3.18
10	0.1	50.7	32.5	25.5	17	11.4	5.96	3.83
20	0.05	63.7	40.4	31.5	20.8	13.9	7.11	4.52
30	0.033	72.3	45.6	35.4	23.3	15.4	7.83	4.95
40	0.025	78.8	49.6	38.4	25.1	16.6	8.37	5.27
50	0.02	84.3	52.8	40.8	26.7	17.5	8.8	5.52
60	0.017	88.9	55.6	42.8	27.9	18.3	9.16	5.74
80	0.012	96.6	60.1	46.3	30	19.6	9.74	6.07
100	0.01	103	63.8	49	31.7	20.6	10.2	6.35
250	0.004	131	80.5	61.4	39.2	25.2	12.2	7.49

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	21.8	14.5	11.5	7.96	5.53	3.05	2.03
2	0.5	25	16.5	13.1	8.99	6.22	3.4	2.26
5	0.2	37.2	24.1	19	12.8	8.73	4.66	3.04
10	0.1	47.7	30.6	23.9	16	10.8	5.65	3.66

20	0.05	59.8	38	29.6	19.6	13.1	6.74	4.31
30	0.033	67.9	42.9	33.2	21.9	14.5	7.42	4.72
40	0.025	74	46.5	36	23.6	15.6	7.93	5.03
50	0.02	79.1	49.6	38.3	25	16.5	8.33	5.26
60	0.017	83.4	52.1	40.2	26.2	17.2	8.68	5.47
80	0.012	90.6	56.4	43.4	28.2	18.4	9.22	5.79
100	0.01	96.4	59.9	46	29.7	19.4	9.66	6.04
250	0.004	123	75.5	57.6	36.8	23.7	11.6	7.14

Rainfall intensities (mm/hr) :: RCP6.0 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	24.1	16	12.7	8.79	6.07	3.3	2.18
2	0.5	27.7	18.2	14.5	9.95	6.86	3.69	2.43
5	0.2	41.3	26.8	21.1	14.3	9.67	5.09	3.29
10	0.1	53.1	34.1	26.7	17.8	12	6.19	3.97
20	0.05	66.8	42.4	33	21.8	14.5	7.4	4.69
30	0.033	75.8	47.9	37.1	24.4	16.1	8.16	5.14
40	0.025	82.7	52	40.2	26.4	17.3	8.72	5.47
50	0.02	88.4	55.4	42.8	28	18.3	9.16	5.73
60	0.017	93.2	58.3	44.9	29.3	19.2	9.55	5.95
80	0.012	101	63.1	48.5	31.5	20.5	10.1	6.3
100	0.01	108	66.9	51.4	33.3	21.6	10.6	6.59
250	0.004	138	84.5	64.4	41.1	26.4	12.7	7.78

Rainfall intensities (mm/hr) :: RCP8.5 for the period 2031-2050

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	22.3	14.7	11.7	8.11	5.62	3.09	2.06
2	0.5	25.5	16.8	13.3	9.16	6.33	3.45	2.29
5	0.2	37.9	24.6	19.4	13.1	8.9	4.73	3.09
10	0.1	48.6	31.2	24.4	16.3	11	5.75	3.71
20	0.05	61.1	38.8	30.2	20	13.3	6.86	4.38
30	0.033	69.3	43.8	33.9	22.3	14.8	7.56	4.8
40	0.025	75.6	47.5	36.8	24.1	15.9	8.07	5.1
50	0.02	80.8	50.6	39.1	25.6	16.8	8.48	5.35
60	0.017	85.2	53.2	41.1	26.8	17.6	8.83	5.55
80	0.012	92.5	57.6	44.3	28.8	18.8	9.39	5.88
100	0.01	98.5	61.1	46.9	30.4	19.8	9.84	6.14
250	0.004	126	77.1	58.8	37.6	24.1	11.8	7.25

Rainfall intensities (mm/hr) :: RCP8.5 for the period 2081-2100

ARI	AEP	10m	20m	30m	1h	2h	6h	12h
1.58	0.633	26.4	17.5	13.9	9.63	6.62	3.56	2.33
2	0.5	30.4	20	15.9	10.9	7.5	3.99	2.6
5	0.2	45.5	29.5	23.2	15.7	10.6	5.52	3.54
10	0.1	58.5	37.6	29.4	19.7	13.2	6.73	4.28
20	0.05	73.7	46.8	36.4	24.1	16	8.06	5.06
30	0.033	83.7	52.9	41	27	17.8	8.89	5.55
40	0.025	91.3	57.4	44.4	29.1	19.1	9.51	5.91
50	0.02	97.7	61.2	47.3	30.9	20.2	9.99	6.19
60	0.017	103	64.4	49.7	32.4	21.1	10.4	6.44
80	0.012	112	69.7	53.7	34.8	22.6	11.1	6.82
100	0.01	119	74	56.8	36.8	23.8	11.6	7.13
250	0.004	152	93.4	71.2	45.5	29.1	13.9	8.42

24h	48h	72h	96h	120h
1.25	0.772	0.566	0.447	0.369
1.38	0.845	0.618	0.487	0.402
1.82	1.1	0.796	0.624	0.512
2.16	1.29	0.929	0.725	0.593
2.52	1.49	1.07	0.829	0.676
2.74	1.61	1.15	0.891	0.725
2.9	1.7	1.21	0.936	0.76
3.03	1.77	1.26	0.971	0.788
3.13	1.83	1.3	1	0.811
3.31	1.92	1.36	1.05	0.847
3.44	1.99	1.4	1.08	0.875
4.01	2.29	1.6	1.23	0.99

24h	48h	72h	96h	120h
0.073	0.018	0.019	0.0096	0.02
0.08	0.018	0.02	0.0094	0.022
0.12	0.037	0.034	0.021	0.033
0.16	0.06	0.051	0.034	0.044
0.21	0.091	0.074	0.052	0.059
0.25	0.11	0.09	0.065	0.07
0.28	0.13	0.1	0.074	0.078
0.3	0.14	0.11	0.083	0.085
0.32	0.16	0.12	0.09	0.091
0.36	0.18	0.14	0.1	0.1
0.39	0.2	0.15	0.11	0.11
0.54	0.28	0.22	0.16	0.15

24h	48h	72h	96h	120h
1.3	0.798	0.583	0.46	0.379
1.43	0.876	0.638	0.502	0.413
1.9	1.14	0.825	0.645	0.528
2.26	1.34	0.965	0.751	0.613
2.64	1.55	1.11	0.859	0.699
2.87	1.68	1.19	0.924	0.75
3.04	1.77	1.26	0.971	0.787
3.18	1.85	1.31	1.01	0.816
3.29	1.91	1.35	1.04	0.84
3.47	2	1.41	1.09	0.877

3.61	2.08	1.46	1.12	0.907
4.21	2.39	1.67	1.28	1.03

24h	48h	72h	96h	120h
1.3	0.798	0.583	0.46	0.379
1.43	0.876	0.638	0.502	0.413
1.9	1.14	0.825	0.645	0.528
2.26	1.34	0.965	0.751	0.613
2.64	1.55	1.11	0.859	0.699
2.87	1.68	1.19	0.924	0.75
3.04	1.77	1.26	0.971	0.787
3.18	1.85	1.31	1.01	0.816
3.29	1.91	1.35	1.04	0.84
3.47	2	1.41	1.09	0.877
3.61	2.08	1.46	1.12	0.907
4.21	2.39	1.67	1.28	1.03

24h	48h	72h	96h	120h
1.32	0.805	0.587	0.463	0.382
1.45	0.883	0.643	0.506	0.416
1.92	1.15	0.833	0.65	0.532
2.29	1.36	0.974	0.757	0.618
2.67	1.57	1.12	0.867	0.705
2.91	1.7	1.21	0.933	0.757
3.08	1.79	1.27	0.98	0.794
3.22	1.87	1.32	1.02	0.823
3.33	1.93	1.36	1.05	0.847
3.51	2.03	1.43	1.1	0.885
3.66	2.1	1.48	1.13	0.915
4.26	2.42	1.69	1.29	1.03

24h	48h	72h	96h	120h
1.36	0.826	0.601	0.473	0.39
1.5	0.907	0.659	0.517	0.425
1.99	1.19	0.856	0.667	0.545
2.37	1.4	1	0.778	0.634
2.77	1.62	1.15	0.891	0.723
3.01	1.75	1.24	0.959	0.777
3.2	1.85	1.31	1.01	0.816
3.34	1.93	1.36	1.05	0.845
3.46	1.99	1.4	1.08	0.87
3.65	2.09	1.47	1.13	0.909
3.8	2.17	1.52	1.17	0.94
4.43	2.5	1.74	1.33	1.06

24h	48h	72h	96h	120h
1.31	0.802	0.585	0.462	0.381
1.44	0.88	0.641	0.504	0.415
1.92	1.15	0.83	0.648	0.531
2.28	1.35	0.97	0.755	0.616

2.66	1.56	1.11	0.864	0.702
2.89	1.69	1.2	0.929	0.754
3.07	1.78	1.27	0.976	0.791
3.2	1.86	1.31	1.01	0.82
3.32	1.92	1.36	1.04	0.844
3.5	2.02	1.42	1.09	0.882
3.64	2.09	1.47	1.13	0.911
4.24	2.41	1.68	1.28	1.03

24h	48h	72h	96h	120h
1.39	0.845	0.613	0.481	0.397
1.54	0.929	0.673	0.528	0.433
2.05	1.22	0.877	0.682	0.557
2.44	1.44	1.03	0.796	0.648
2.86	1.67	1.18	0.913	0.739
3.11	1.8	1.27	0.983	0.795
3.3	1.9	1.34	1.03	0.835
3.44	1.98	1.4	1.07	0.865
3.57	2.05	1.44	1.1	0.89
3.76	2.15	1.51	1.15	0.931
3.92	2.23	1.56	1.2	0.962
4.57	2.57	1.79	1.36	1.09

24h	48h	72h	96h	120h
1.32	0.81	0.59	0.465	0.384
1.46	0.889	0.646	0.508	0.418
1.94	1.16	0.838	0.654	0.535
2.31	1.37	0.98	0.762	0.622
2.69	1.58	1.13	0.873	0.709
2.93	1.71	1.21	0.939	0.761
3.11	1.81	1.28	0.986	0.799
3.24	1.88	1.33	1.02	0.828
3.36	1.94	1.37	1.05	0.852
3.54	2.04	1.44	1.1	0.891
3.69	2.12	1.49	1.14	0.92
4.3	2.44	1.7	1.3	1.04

24h	48h	72h	96h	120h
1.48	0.887	0.64	0.501	0.412
1.63	0.978	0.705	0.551	0.452
2.19	1.29	0.923	0.716	0.583
2.61	1.52	1.08	0.837	0.68
3.05	1.77	1.25	0.961	0.777
3.33	1.92	1.35	1.04	0.835
3.53	2.02	1.42	1.09	0.878
3.69	2.11	1.48	1.13	0.91
3.82	2.18	1.53	1.17	0.936
4.03	2.29	1.6	1.22	0.98
4.2	2.38	1.66	1.26	1.01
4.9	2.73	1.89	1.43	1.15

APPENDIX C

Wastewater Impact Assessment

Doc ID: 438096
VAL: 2846140802

CENTRAL OTAGO DISTRICT COUNCIL

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10/02/2020

Houlahan Enterprises Ltd
Clyde Claim Ltd
c/- Peter Dymock
Paterson Pitts Group
30 The Mall
Cromwell 9342

Dear Peter,

Please find attached the memo for the water modelling assessment carried out for the proposed development by Houlahan Enterprise and Clyde Claim Ltd at 11 Sunderland Street - Mutton Town Road Clyde.

Please note this is a high-level modelling assessment done only for the proposed re-zoning of the land and for 150 residential units as described in the modelling request.

Assessment report concludes that;

> *The system performance in the remainder of the network has been verified. It is predicted that the additional demand will cause pressure to drop by a maximum of 3.5m at the connection point. Properties serviced by the 40mm main connected to the 150mm main along Sunderland Street are currently receiving low pressure and will be affected by the pressure drop caused by the proposed development.*
>
> *Pipe head losses are predicted to deteriorate along Sunderland Street, increasing from 0.7m/km to 5.1 m/km, which is marginally higher than the recommended levels of service.*

The report also provides mitigating options for the above-mentioned pressure drops and head losses, however this would require further investigation in detail if required.

Additional you have also requested to confirm that Clyde Wastewater Project design will accommodate future growth along Mutton Town road.

Council can confirm that the Clyde Wastewater reticulation design will have allowance for the future population growth of Clyde. Details of pipe size, location or depth cannot be confirmed at this time as this work is still in detailed design phase. However, the reticulation will include provisions to enable the connection of future reticulation in the proximity of Annan St.

Regards

Quentin Adams

Water Services Manager

APPENDIX D

Water Impact Assessment

MOTT MACDONALD

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Mutton Town Road Development– Water Impact Assessment

10/02/2020

This letter summarises the results of the assessment undertaken for the proposed residential development consisting of 150 residential lots. The residential blocks are located on a site adjacent to Sunderland Street, Mutton Town Road and Clyde-Alexandra Road. The development is to be serviced by the Clyde water network.

1 Background

Mott MacDonald has been commissioned by Central Otago District Council (CODC) to assess the system performance in terms of Level of Service (LOS) and firefighting capacity for the proposed development zone. The impact of this development on the remaining network has also been investigated. The results of the evaluation are detailed in this letter report.

2 Assumptions

The proposed development will be serviced via a 150mm diameter pipe reaching the end of the development extent off Hospital St/Sunderland St. The development location is shown in the figure below.

Figure 1- Development Location

Mott MacDonald New Zealand
Limited Registered in New Zealand
no. 3338812

MOTT MACDONALD

2.1 Demand Calculations

The development consists of 150 residential lots. The demand for the development has been calculated based on the CODC addendum to NZS4404-2004, considering the following:

- Daily consumption of 500l/person/day
- Peak hour factor of 5 (residential)
- Density: 3 people per lot

Based on these assumptions, the following demand has been considered in the proposed development:

Table 1 - Demand Calculations

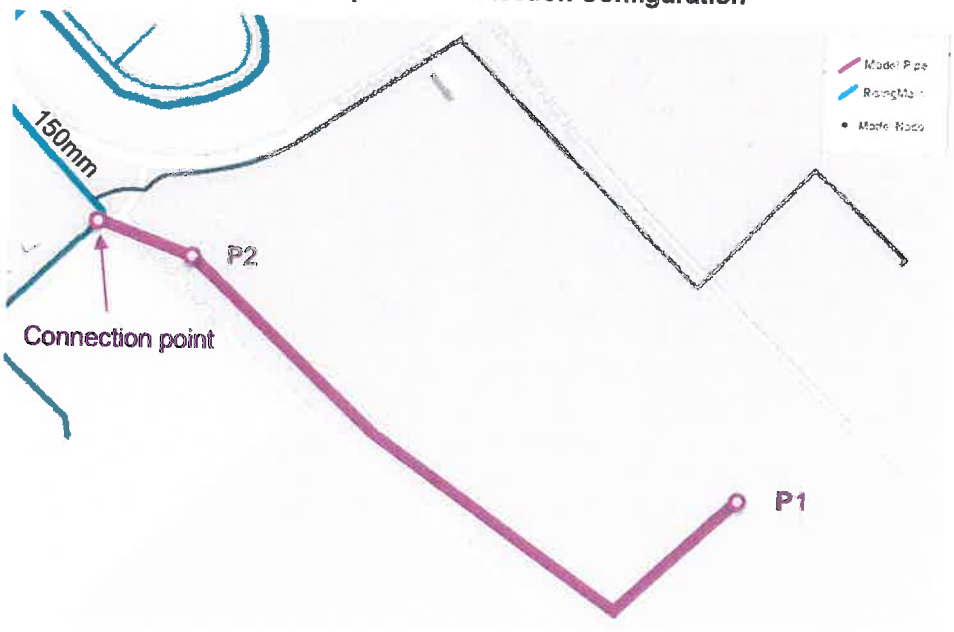
Development Stage	Average Daily Flow (l/s)	Peak Hour Flow (l/s)	Average Daily Flow (MLD)
Mutton Road Residential	2.6	13.0	0.225

2.2 Connection Point

The development elevation was derived from the contour (Appendix A) information provided by the CODC. The maximum elevation considered in this development was 167m.

It was assumed that the proposed development would be serviced from the 150mm diameter pipe off Hospital St/Sunderland St, as shown in Figure 2 below. A 150mm ID water main was modelled within the proposed development. The total residential demand was allocated to the point P1 (see Figure 2), which was placed the furthest from the connection point and given the highest elevation found within the development (167mRL). Minimum pressure was assessed at P1 and maximum pressure at P2 (the lowest elevation within the development).

Figure 2 – Proposed Development Connection Configuration



2.3 Scenarios Investigated

The scenario investigated was based on the Existing (2018) peak week scenario (Lake Dunstan model). The levels of service achieved in the proposed residential development were assessed in terms of pressure and fire flow. The impact of the proposed development was verified in terms of pressure and pipe head losses in the remaining of the network.

Fire flow was based on the NZ Fire Service Code of Practice (SNZ PAS 4509:2008).

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3 Model Results

3.1 System Performance Analysis in the Proposed Development

Results have been analysed to verify whether levels of service can be met in the proposed development without any network modification. The table below summarises the results in terms of minimum and maximum pressure, maximum head losses in the proposed network (150mm ID pipe) and fire flow capacity.

Table 2 - System Performance Results in Proposed Development

Demand	Node	Minimum Pressure (m)	Maximum Pressure (m)	Maximum Head Losses (m/km)	Fire Flow
Current Peak	P1	59.9	67.7	3.3	Can provide FW2 fire flow
	P2	68.8	74.7		

The design pressure set by NZS4404:2004 is 25 to 80m. As shown in the table above, minimum and maximum pressures in the proposed development are predicted to meet the recommended LOS for the current scenarios. FW2 was verified at the furthest point in the proposed development and FW2 can be provided with a residual pressure of 42.5m.

Maximum head losses are predicted to remain within the recommended LOS in the proposed development (generally 3 m/km for new pipes with a maximum of 5 m/km for existing pipes).

3.2 System Performance in the Remaining of the Network

Results have been analysed to verify that levels of service can be met in the Clyde network with the addition of the proposed development. Table 3 below summarises the minimum pressure forecasted at the supply point and maximum head losses along Sunderland St with and without the development; further illustrated in Figure 3 and Figure 4.

Table 3 System Performance Results in Clyde Network

	Minimum Pressure (m)		Maximum Head Losses (m/km)	
	Before	After	Before	After
Connection Point Hospital Street	72.0	68.5	0.7	5.1

The proposed development is predicted to have an impact on the existing Clyde network for current conditions, with a maximum forecast pressure drop of approximately 3.5m at the connection point. Pressure within the Clyde network are predicted to remain above 50m throughout most of the network. However, properties serviced by the 40mm line, connected to the 150mm water main on Sunderland St, currently receive low pressures, and will be affected by the pressure drop caused by the proposed development's additional demand. Any additional demand at the proposed development location will exacerbate the low-pressure issue along the 40mm watermain.

Peak head losses are predicted to increase to 5.1m/km directly upstream of the connection point along the 150mm pipe, near Sunderland Street. This is marginally higher than the recommended levels of service. Head losses are also affected further upstream in the network but remain within the recommended LOS.

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Figure 3: Existing Peak Day - Before Mutton Town Road Development

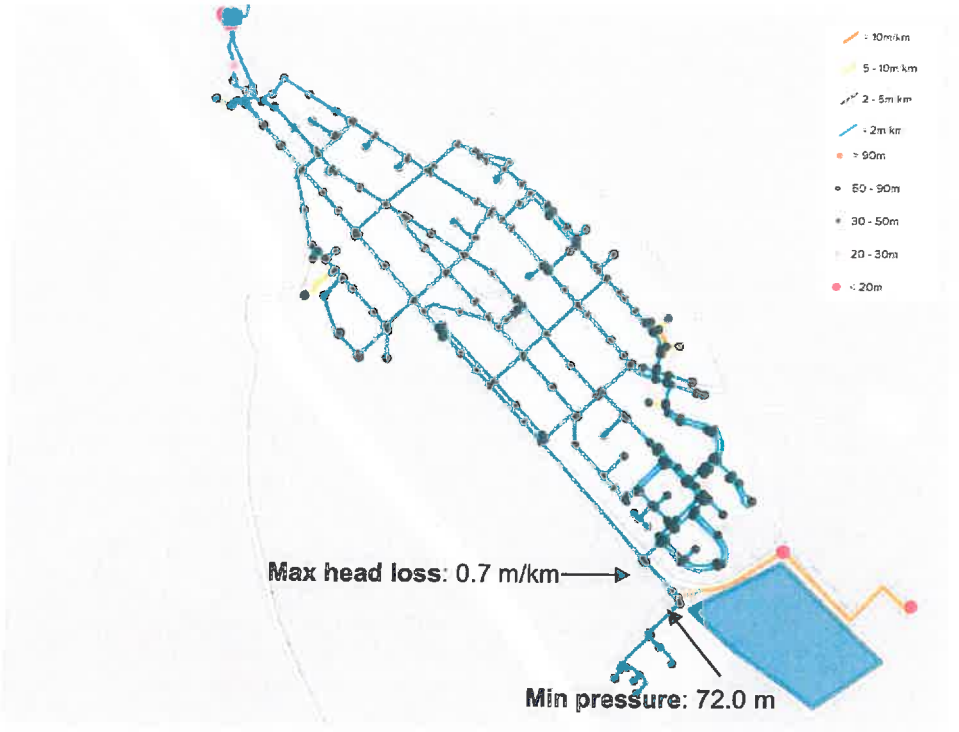
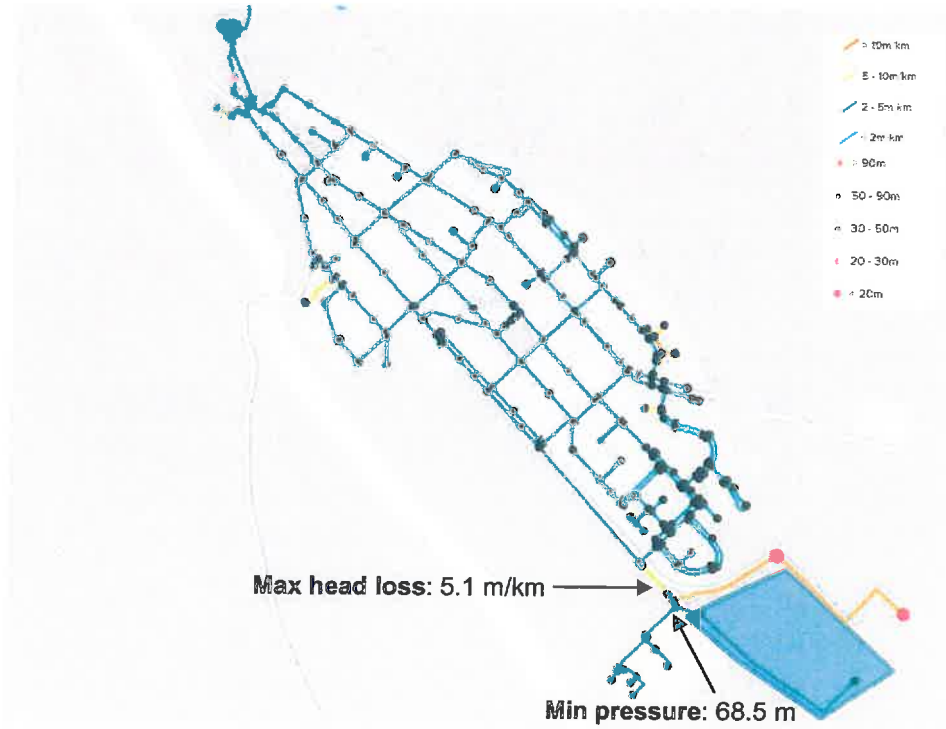
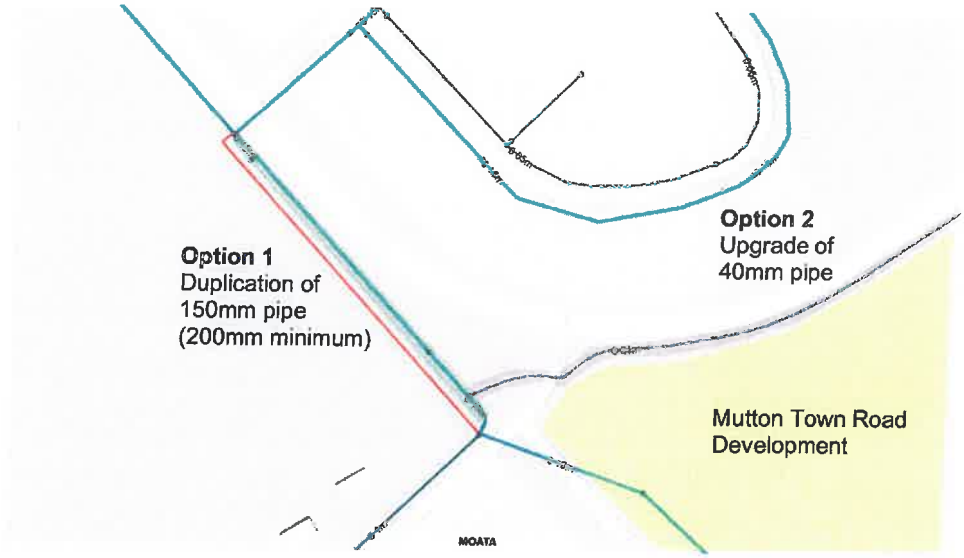


Figure 4 - Existing Peak Day - After Mutton Town Road Development



To mitigate the impact of the proposed development on the properties serviced by the 40mm main, an option consists in duplicating the 150mm line along Sunderland Street with a pipe no smaller than 200mm (see Option 1 in Figure 5 below). Alternatively, the 40mm pipe running parallel to the north-eastern boundary of the development could be upgraded to provide an equal measure of betterment (see Option 2 in Figure 5).

Figure 5: Options Along Sunderland Street



Only high level optioneering has been undertaken as part of this study and further investigation is recommended with regards to providing the level of service required in the low-pressure area surrounding the development.

4 Conclusions and Recommendations

Demand from the proposed residential development has been added to the network for current peak conditions. The proposed development network was modelled to determine if suitable levels of service could be maintained.

Levels of service are expected to be met in terms of minimum pressure and head losses, whilst residential fire flow is available in the proposed development.

The system performance in the remainder of the network has been verified. It is predicted that the additional demand will cause pressure to drop by a maximum of 3.5m at the connection point. Properties serviced by the 40mm main connected to the 150mm main along Sunderland Street are currently receiving low pressure and will be affected by the pressure drop caused by the proposed development.

Pipe head losses are predicted to deteriorate along Sunderland Street, increasing from 0.7m/km to 5.1 m/km, which is marginally higher than the recommended levels of service.

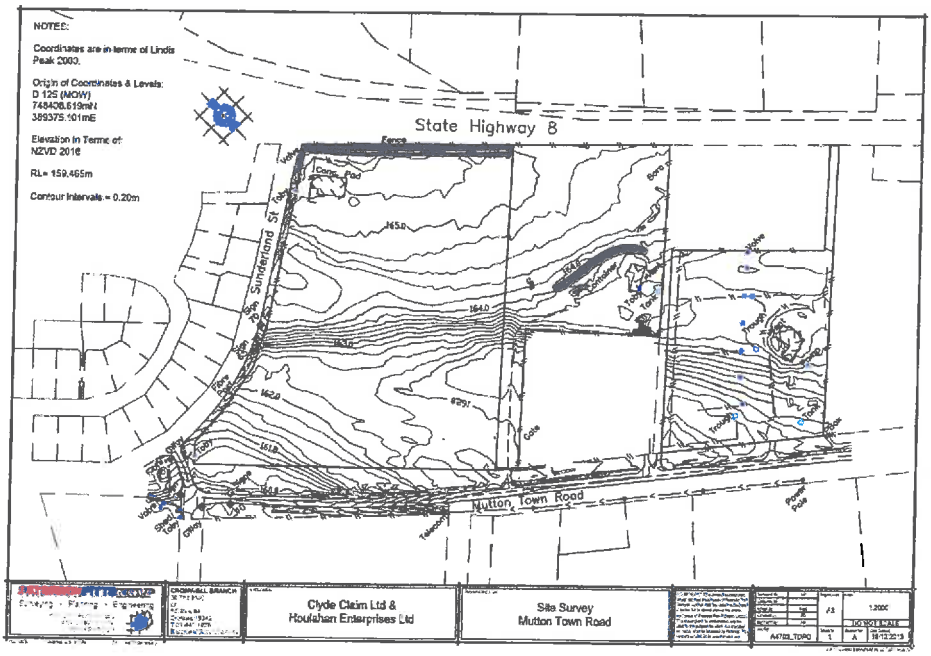
To mitigate the impact of the proposed development on the Clyde water supply network, it is recommended that the two options shown in Figure 5 above be investigated further (150mm main duplication or 40mm watermain upgrade).

The modelling results from this assessment are valid only for the information provided (150 residential lots and site contours). Any change to the type of utilisation, number of lots or fire flow category will require re-modelling.

Giulio Pozzuto
Hydraulic Modeller
giulio.pozzuto@mottmac.com

Revision	Date	Originator	Checker	Approver	Description
A	05/02/2020	David Burton	Tom Lecomte	Julie Plessis	Draft for client review
B	07/02/2020	Giulio Pozzuto	Tom Lecomte	Julie Plessis	Amendments to Section 3 and 4

Appendix A Contour map



APPENDIX E

Confirmation of Telecom Supply

Chorus Property Development Team
PO Box 9405
Waikato Mail Centre
Hamilton 3200
Telephone: 0800 782 386
Email: develop@chorus.co.nz

5 December 2019

Chorus Ref #: CYD55290
Your Ref #:

The Clyde Claim Ltd

Attention: **Peter Dymock**
Dear Sir / Madam

Property Development – CYD: Mutton Town Road, Clyde. 150 Lots - 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 property development. In order to complete this reticulation, we require a contribution from you to Chorus' total costs of reticulating the development. 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 $207,000.00 (including GST).

We note that (i) the contribution required from you towards reticulation of the development, 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 property development, you will need to contact Chorus (see the contact details for Chorus Property Development Team 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 property development; and

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

Yours faithfully

Rata Miller
Property Development Coordinator

APPENDIX F

Confirmation of Power Supply

AURORA ENERGY LIMITED
PO Box 5140, Dunedin 9058
PH 0800 22 00 05
WEB www.auroraenergy.co.nz

25 November 2019

Peter Dymock
Paterson Pitts Group

Sent via email only: peter.dymock@ppgroup.co.nz

Dear Peter,

ELECTRICITY SUPPLY AVAILABILITY FOR A PROPOSED 150 LOT SUBDIVISION.
MUTTON TOWN ROAD, CLYDE. LOT 2 DP 18990, LOT 2 DP 525753 AND LOT 2 DP331535.

Thank you for your inquiry outlining the above proposed development.

Subject to technical, legal and commercial requirements, Aurora Energy can make a Point of Supply[1] (PoS) available for this development.

Disclaimer

This letter confirms that a PoS **can** be made available. This letter **does not** imply that a PoS is available now, or that Aurora Energy will make a PoS available at its cost.

Next Steps

To arrange an electricity connection to the Aurora Energy network, a connection application will be required. General and technical requirements for electricity connections are contained in Aurora Energy's Network Connection Standard. Connection application forms and the Network Connection Standard are available from www.auroraenergy.co.nz.

Yours sincerely

NA Frear.

Niel Frear
CUSTOMER INITIATED WORKS MANAGER

[1] Point of Supply is defined in section 2(3) of the Electricity Act 1993.

APPENDIX G

CBR TESTS

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 19/3963

Date: 24 January 2020

TEST REPORT - LABORATORY SOAKED CBR'S

Client Details:	Paterson Pitts Partners Ltd, 30 The Mall, Cromwell	Attention:	M. Garmonsway
Job Description:	The Clyde Claim / Braid / Houlahan Development, Mutton Town Road, Clyde		
Sample Description:	Subgrade – See Below	Client Order No:	N/A
Sample Source:	Insitu – See Locations Page 3	Sample Label No:	53678
Date & Time Sampled:	12-Dec-19 @ 1.43pm to 2.40pm	Sampled By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Received:	12-Dec-19
Test Method:	NZS 4402:1986, Test 6.1.1		

LABORATORY SOAKED CBR RESULTS					
Sample Source:	Test Pit 1	Test Pit 2	Test Pit 3	Test Pit 4	Test Pit 5
Sample Depth: (mm)	500 - 800	550 - 850	550 - 850	550 - 850	650 - 950
Sample Description:	Sandy GRAVEL with trace of silt	SAND with minor / some gravel & trace of / minor silt	Sandy GRAVEL with trace of silt	Sandy GRAVEL with trace of silt	Sandy GRAVEL with trace of silt
Condition of Sample:	Soaked	Soaked	Soaked	Soaked	Soaked
Surcharge Mass: (kg)	4.0	4.0	4.0	4.0	4.0
Time Soaked:	7 days	7 days	7 days	7 days	7 days
Swell: (%)	-0.2	0.2	0.0	0.0	0.0
Water Content as Compacted: (%)	3.0	8.9	4.1	3.9	4.6
Water Content From Under Plunger: (%)	5.1	13.2	9.5	6.5	10.7
Dry Density As Compacted: (t/m^3)	2.00	1.88	1.95	1.79	1.81
CBR Value @ 2.5 mm Penetration:	20	15	18	14	17
CBR Value @ 5.0 mm Penetration:	30	14	25	18	17
Reported CBR Value:	30	15	25	18	17

Notes:

- *The material was received in a natural state.*
- *The material tested was the fraction passing the 19.0mm test sieve.*
- *The sample was compacted to NZ Standard Compaction at the water content as received.*
- *The rate of penetration was 1.10 mm / min.*
- *Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
- *This report may not be reproduced except in full.*

Tested By: L.T. Smith **Date:** 16 to 24-Jan-20

Checked By:

Tests indicated as Not Accredited are outside the scope of the laboratory's accreditation

IANZ ACCREDITED LABORATORY Accreditation No: 434

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
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Sample Method:	NZS 4407:2015, Test 2.4.2	Date Received:	12-Dec-19
Test Method:	NZS 4402:1986, Test 6.1.1		

LABORATORY SOAKED CBR RESULTS					
Sample Source:	Test Pit 6	Test Pit 7	Test Pit 8	Test Pit 9	Test Pit 10
Sample Depth: (mm)	600 - 900	550 - 850	650 - 950	700 - 1000	600 - 900
Sample Description:	Gravelly SAND with trace of silt	Sandy GRAVEL with trace of silt	Gravelly SAND with trace of silt	Gravelly SAND with trace of silt	Gravelly SAND with minor / trace of silt
Condition of Sample:	Soaked	Soaked	Soaked	Soaked	Soaked
Surcharge Mass: (kg)	4.0	4.0	4.0	4.0	4.0
Time Soaked:	6 days	6 days	6 days	6 days	6 days
Swell: (%)	0.0	0.0	0.0	0.0	0.0
Water Content as Compacted: (%)	4.5	3.6	3.9	4.5	3.0
Water Content From Under Plunger: (%)	7.5	4.6	9.0	10.5	11.9
Dry Density As Compacted: (t/m^3)	1.85	1.87	2.02	1.91	1.78
CBR Value @ 2.5 mm Penetration:	14	12	25	25	40
CBR Value @ 5.0 mm Penetration:	16	18	25	25	30
Reported CBR Value:	16	18	25	25	40

Notes:

- *The material was received in a natural state.*
- *The material tested was the fraction passing the 19.0mm test sieve.*
- *The sample was compacted to NZ Standard Compaction at the water content as received.*
- *The rate of penetration was 1.10 mm / min.*
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Tested By: L.T. Smith Date: 16 to 24-Jan-20

Checked By:

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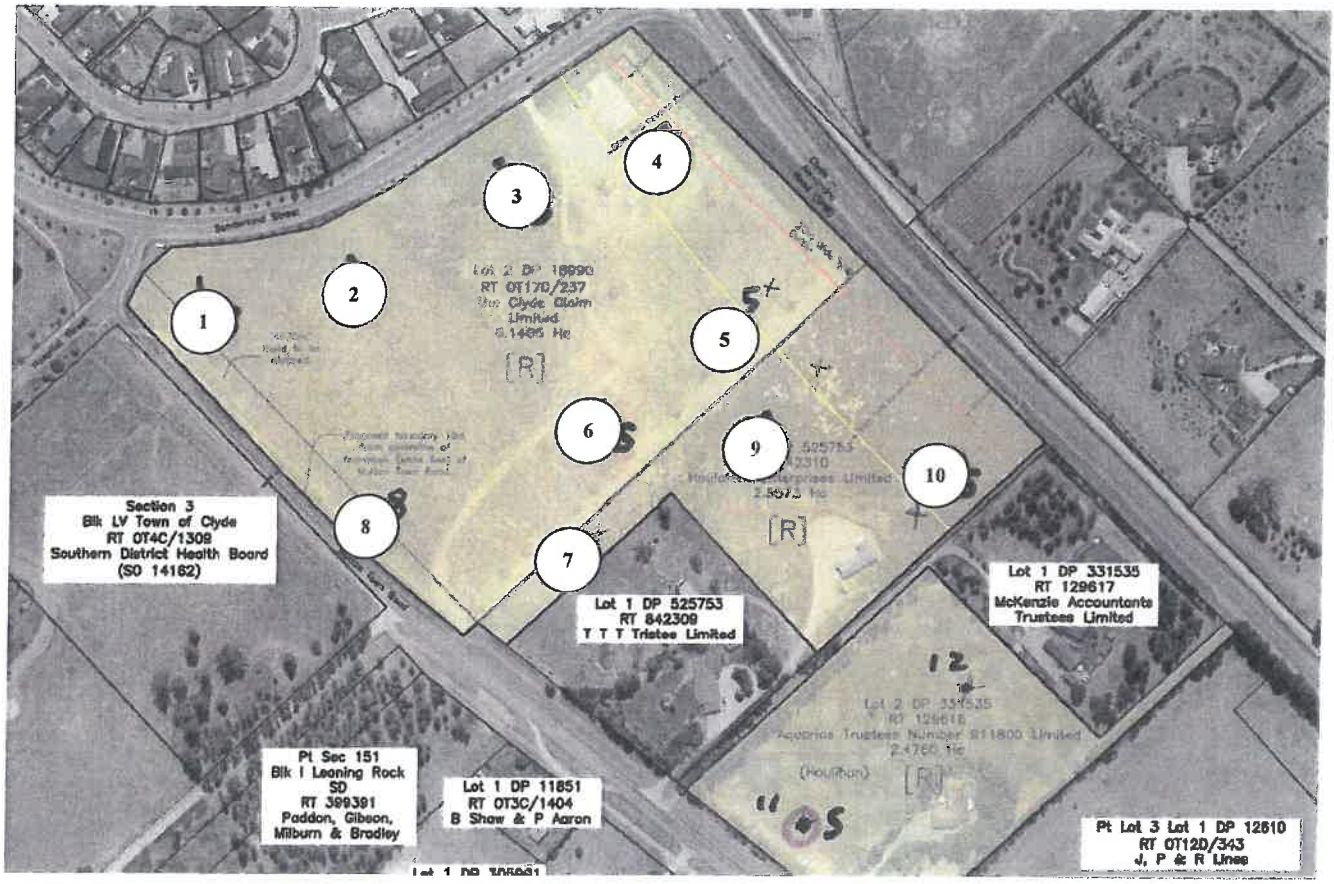

Tested By: L.T. Smith **Date:** 16 to 24-Jan-20

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

Tests indicated as Not Accredited are outside the scope of the laboratory's accreditation

IANZ ACCREDITED LABORATORY Accreditation No: 434