



REPORT

Fulton Hogan Limited

Resource Consent Application to Establish 'Roydon Quarry', Templeton

Submitted to:

Canterbury Regional Council

PO Box 345, Christchurch 8140

Selwyn District Council

PO Box 90, Rolleston 7643

Submitted by:

Golder Associates (NZ) Limited

Level 1 214 Durham Street, Christchurch 8011

+64 9 486 8068

1781870-R-001-Rev0

November 2018

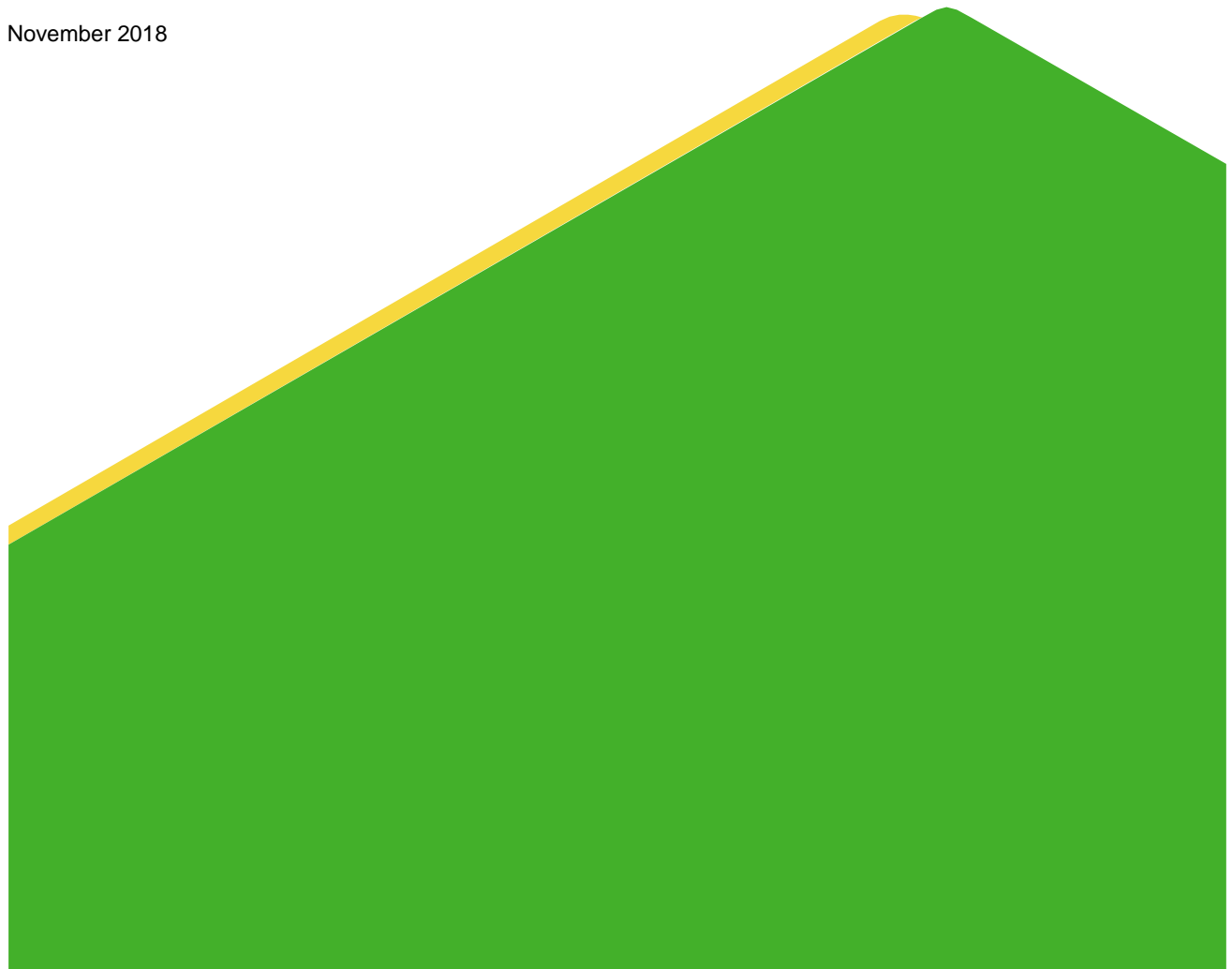


Table of Contents

PART A – RESOURCE CONSENT APPLICATION FORMS

PART B – SUPPORTING INFORMATION

1.0 INTRODUCTION	1
2.0 BACKGROUND	1
2.1 Need for this Site	1
2.2 Site Selection Process	3
2.3 Opportunities	4
3.0 SITE AND SURROUNDING AREA	4
3.1 Subject Site	4
3.2 Surrounding Land Uses	6
3.3 Zoning and Overlays	6
3.4 Roading and Rail Network	8
3.5 Geology and Soils	8
3.6 Groundwater	9
3.7 Ecological Values	13
3.8 Meteorology and Existing Air Quality	13
4.0 DESCRIPTION OF THE PROPOSAL	14
4.1 Introduction	14
4.2 Initial Site Preparation	15
4.2.1 Creation of pit	15
4.2.2 Site bunding and planting	15
4.2.3 Site access	15
4.3 Extraction	18
4.4 Processing Plant and Stockpiling	18
4.5 Water Management and Treatment	20
4.5.1 Water takes	20
4.5.2 Aggregate wash water	20
4.5.3 Truck washing	20
4.5.4 Stormwater	21

4.6	Site Buildings and Parking Areas.....	21
4.7	Cleanfilling.....	21
4.8	Storage of Hazardous Substances	22
4.9	Transportation, Roding, Design and Construction	22
4.9.1	Internal site operations.....	22
4.9.2	Establishment of site accesses	22
4.9.2.1	Heavy vehicle access.....	22
4.9.2.2	Light vehicle access	22
4.9.2.3	Roding improvements (including new roundabout)	24
4.9.3	Traffic movements.....	24
4.10	Site Security	25
4.11	Hours of Operation, Commencement and Duration.....	25
4.12	Rehabilitation, End Use and Activities on Balance of Site	26
5.0	ALTERNATIVES	26
5.1	Introduction.....	26
5.2	Discharge to Air.....	27
5.3	Discharges to Land	27
5.3.1	Aggregate wash water	27
5.3.2	Stormwater.....	28
5.3.3	Cleanfill and Existing Contaminated Soils	28
5.3.4	Truck wash.....	28
5.4	Conclusion.....	28
6.0	ASSESSMENT OF EFFECTS ON THE ENVIRONMENT	29
6.1	Introduction.....	29
6.2	Effects on Water Resources	29
6.2.1	Introduction	29
6.2.2	Effects on surface water	29
6.2.3	Effects on groundwater quality.....	30
6.2.3.1	Effects of Extraction	30
6.2.3.2	Hazardous Substance Storage and Use	30
6.2.3.3	Effects of Backfilling	31

6.2.3.4	Discharge of Aggregate Wash Water and Stormwater	32
6.2.3.5	Contaminated Land	32
6.2.3.6	Summary	33
6.2.4	Groundwater quantity	33
6.3	Effects on Soil Resources	33
6.3.1	Quarrying operations	33
6.3.2	Contaminated land remediation	34
6.4	Effects on Air Quality	35
6.4.1	Introduction	35
6.4.2	Potential nuisance effects	35
6.4.3	Potential health effects	37
6.4.4	Summary	37
6.5	Ecological Effects	37
6.6	Visual and Landscape Values	38
6.7	Noise Effects	38
6.7.1	Introduction	38
6.7.2	Existing noise environment	38
6.7.3	Assessment of noise effects	39
6.7.3.1	Construction Noise	39
6.7.4	Operational noise assessment	39
6.7.4.1	Development of Assessment Criteria	39
6.7.4.2	Predicted Noise Levels	41
6.7.4.3	Daytime Noise Effects	41
6.7.4.4	Evening and Night-time Noise Effects	41
6.7.4.5	Traffic Noise	42
6.7.5	Vibration	43
6.7.5.1	Site-generated Vibration	43
6.7.5.2	Traffic Vibration	43
6.7.6	Mitigation	43
6.7.7	Summary	44
6.8	Transportation Effects	44
6.8.1	Road network	44

6.8.2	Rail network	45
6.9	Effects on Amenity Values	46
6.10	Effects on Cultural Values.....	47
6.11	Positive Effects.....	47
6.12	Conclusion.....	48
7.0	CONSULTATION	48
7.1	Introduction.....	48
7.2	Consultation Themes	49
7.2.1	Vehicle movements.....	49
7.2.2	Air quality	50
7.2.3	Groundwater	50
7.2.4	Shading on Roads.....	50
7.2.5	Site Rehabilitation	50
7.3	Pre-application Meeting	51
7.4	Additional Consultation	51
8.0	REGULATORY/STATUTORY CONSIDERATIONS	51
8.1	Introduction.....	51
8.2	Notification.....	53
9.0	SUGGESTED MITIGATION MEASURES	53
10.0	CONCLUSION	59

TABLES

Table 1: Certificates of Title.....	6
Table 2: Local CRC monitoring bore details.....	11
Table 3: Hours of operations/activities.	25
Table 4: Comparison of noise assessment guidance.....	40
Table 5: Recommended Roydon Quarry noise limits.....	40
Table 6: Summary of rules and resource consents required from CRC under the LWRP and CARP.....	52
Table 7: Summary of land use consents for the quarry required from SDC under the SDP.....	53
Table 8: Contaminants and trigger concentrations.....	57

FIGURES

Figure 1: Site location plan.	2
Figure 2: Analysis of potential quarry sites.	5
Figure 3: Sensitive nearby receptors.	7
Figure 4: Groundwater observation and site wells.	10
Figure 5: Water level in bores M35/0142, M36/0202 and M36/0271 from 2008 to 2018.	11
Figure 6: Wind rose for the proposed Roydon Quarry site for 1 January 2006 to 31 December 2006 (generated using CALMET meteorological dataset developed by Golder).	13
Figure 7: Indicative staging plan.	16
Figure 8: Site access screening.	17
Figure 9: Processing plant setbacks.	19
Figure 10: Access points and proposed roundabout (indicative).	23

APPENDICES

APPENDIX A

Report Limitations

APPENDIX B

Certificates of Title

APPENDIX C

Integrated Transportation Assessment

APPENDIX D

Air Quality Assessment (and Draft Dust Management Plan)

APPENDIX E

Landscape and Visual Impact Assessment

APPENDIX F

Draft Cleanfill Management Plan

APPENDIX G

Draft Rehabilitation Management Plan

APPENDIX H

Combined PSI/DSI Contamination Report

APPENDIX I

Acoustic Assessment

APPENDIX J

Economic Assessment

APPENDIX K

Statutory Assessment

PART A – RESOURCE CONSENT APPLICATION FORMS

**APPLICATION FOR RESOURCE CONSENT
UNDER SECTION 88 OF THE
RESOURCE MANAGEMENT ACT 1991**

To: Canterbury Regional Council
PO Box 345
Christchurch 8140

1) We, Fulton Hogan Limited (Fulton Hogan) (PO Box 16064, Christchurch 8441) apply for the following type(s) of resource consents:

A land use consent for:

- a. extraction which does not meet condition (ii) of Rule 5.175, as a restricted discretionary activity pursuant to Rule 5.176 of the LWRP.
- b. the deposition of backfill over an unconfined or semi-confined aquifer (as part of site rehabilitation) which meets the relevant rule conditions, as a controlled activity pursuant to Rule 5.177 of the LWRP.

A discharge permit for:

- c. the discharge of contaminants into air, from an industrial or trade premise or process, where the proposed quarrying activity does not meet the relevant permitted activity conditions of Rules 7.35 and 7.36, and from the disposal of cleanfill which does not meet the relevant permitted activity conditions of Rule 7.49, as a discretionary activity pursuant to Rule 7.63 of the CARP.
- d. the discharge of contaminants which may enter water from an industrial or trade process within the Selwyn-Te Waihora sub-region where the proposed settling ponds meet the relevant conditions, and from water collected from the interceptor system which captures contaminants from the wash down of vehicles and machinery, and hard stand surfaces used for refuelling portable tankers and parking of machinery, as a discretionary activity pursuant to Rule 11.5.28, under the Selwyn Te Waihora Sub-Region (Section 11) of the LWRP.
- e. the discharge of stormwater into land where contaminants may enter groundwater, where the proposed stormwater from the site does not meet the relevant permitted activity conditions of Rule 5.96, as a discretionary activity pursuant to Rule 5.97 of the LWRP.
- f. the discharge to land associated with the deposition of cleanfill material for site rehabilitation, as a discretionary activity pursuant to Rule 5.100 of the LWRP.

Consent is also sought for any other resource consents that may be required by the CRC which may have been inadvertently omitted from this resource consent application.

An unlimited consent duration is sought from CRC for the land use consents, and a consent duration of 35 years is sought for the discharge permits.

2) The activity to which the application relates (the proposed activity) is as follows:

Fulton Hogan are proposing to establish a new quarry (to be known as 'Roydon Quarry') between Curraghs, Dawsons, Maddisons and Jones Road, approximately 700 m to the west of Templeton township within the Inner Plains zone of the Selwyn District Plan. A detailed description of the activity is contained in Part B of this report.

3) The site at which the proposed activity is to occur is as follows:

The location of the site is shown on Figure 1 included in Part B of this application. The legal description of the various blocks in set out in the table below. A copy of the Certificate of Titles for the site are contained in Appendix B.

Certificate of Title	Legal Description	Area in hectares
CB20F/554	Rural Section 6475 and Rural Section 6324	28.3279
CB291/71	Lot 1 Deposited Plan 4031	80.9953
CB39/215	Rural Section 6342	8.0937
815228	Section 7 Survey Office Plan 510345	16.4993
815227	Rural Section 5381 and Section 6 Survey Office Plan 510345	36.4188

4) There are no other activities that are part of the proposal to which this application relates.

5) The following additional resource consents are needed for the proposal to which this application relates and have been applied for:

Fulton Hogan also requires land use consent from Selwyn District Council to authorise the proposed activity. Additionally, Fulton Hogan needs to apply to CRC to change conditions of its existing water permit (CRC182422) as a discretionary activity pursuant to section 127(3)(a) of the RMA.

Both these applications are included within this application document to both Canterbury Regional Council and Selwyn District Council. The overall activity status of the resource consents being sought from both Canterbury Regional Council and Selwyn District Council by this application is discretionary.

- 6) We attach an assessment of the proposed activity's effect on the environment that–**
- a) Includes the information requested by clause 6 of Schedule 4 on the Resource Management Act 1991.
 - b) Addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991.
 - c) Includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.
- 7) We attach an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.**
- 8) We attach an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.**
- 9) We attach the following further information required to be included in this application by the district plan, the regional plan, the Resource Management Act 1991, or any regulations made under that Act:**

This application includes an assessment of the Resource Management Act 1991, National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011, the National Environmental Standards for Air Quality Regulations 2004, the National Policy Statement for Freshwater Management, the Canterbury Regional Policy Statement, the Canterbury Land and Water Regional Plan, the Canterbury Air Regional Plan, and the Selwyn District Plan.

Dated this 20th day of November 2018.

Signature:



Signature of the applicant (or person authorised to sign on behalf of the applicant)

Address for service:

Kevin Bligh
Golder Associates (NZ) Limited
PO Box 2281
Christchurch 8140

Telephone: 021 0250 6379
Email: kbligh@golder.co.nz

Address for fees/charges:

Don Chittock
Fulton Hogan Limited
PO Box 16064
Christchurch 8441

**APPLICATION FOR A CHANGE OF CONDITION ON A RESOURCE CONSENT
UNDER SECTION 127 OF THE
RESOURCE MANAGEMENT ACT 1991**

To: Canterbury Regional Council
PO Box 345
Christchurch 8140

1) **We, Fulton Hogan Limited (Fulton Hogan) (PO Box 16064, Christchurch 8441), apply for a change of conditions of a resource consent in accordance with section 127 of the RMA.**

2) **The application relates to the following resource consents:** A water permit to take and use groundwater for the irrigation of land (Council Reference No. **CRC182422**) (a copy of this consent is attached to this form).

3) **The application relates to the following specific conditions of the resource consent:**

Condition 3 – Use of groundwater

'Water taken for irrigation shall only be applied to the area of land shown on the accompanying plan CRC010516.'

Condition 5c - Practicable steps

'The consent holder shall take all practicable steps to:

...

- c. avoid the application of abstracted water onto non-productive land such as impermeable surfaces and river or stream riparian strips.'*

4) **The requested changes to the consent are as follows:**

The proposed changes are as follows (~~strike through~~ text for deletions and underline text for additions):

- Amend **Condition 3:** ~~Water taken for irrigation, shall only be applied to the area of land shown on the accompanying plan CRC010516.~~ Aggregate washing, dust suppression and other activities ancillary to quarrying occurring at the site shall only be applied to the area of land shown on the accompanying plan CRCXXXXXX (which shall be a plan encompassing the 170 ha application site)
- Amend **Condition 5:** *The consent holder shall take all practicable steps to:*
 - a. *ensure that the volume of water applied does not exceed that required for the soil to reach field capacity, except when used for purposes associated with quarrying such as dust suppression.*

b. ...

~~c. avoid the application of abstracted water onto non-productive land such as impermeable surfaces and river or stream riparian strips.~~

5) The activity to which the application to change conditions of consent relates (the proposal) is as follows:

Fulton Hogan are proposing to establish a new quarry (to be known as 'Roydon Quarry') between Curraghs, Dawsons, Maddisons and Jones Road, approximately 700 m to the west of the Templeton township and located within the Inner Plains zone of the Selwyn District Plan.

A change of conditions is proposed to allow for the existing water permit (CRC182422) held for the site, to also be used for dust suppression, aggregate washing and other purposes ancillary to quarrying. A detailed description of the activity is contained in Part B of this report.

6) The site at which the proposed activity is to occur is as follows:

The location of the site is shown on Figure 1 included in Part B of this application. The legal description of the various blocks in set out in the table below. A copy of the Certificate of Titles for the site are contained in Appendix B.

Certificate of Title	Legal Description	Area in hectares
CB20F/554	Rural Section 6475 and Rural Section 6324	28.3279
CB291/71	Lot 1 Deposited Plan 4031	80.9953
CB39/215	Rural Section 6342	8.0937
815228	Section 7 Survey Office Plan 510345	16.4993
815227	Rural Section 5381 and Section 6 Survey Office Plan 510345	36.4188

7) There are no other activities that are part of the proposal to which this application relates.

8) The following additional resource consents are needed for the proposal to which this application relates and have been applied for:

Fulton Hogan also requires land use consent from Selwyn District Council to authorise the proposed quarrying activity and associated operations and a number of new consents from Canterbury Regional Council. These applications are being made alongside this application.

9) We attach an assessment of the proposed activity's effect on the environment that—

- a) Includes the information requested by clause 6 of Schedule 4 on the Resource Management Act 1991.
- b) Addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991.
- c) Includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

10) We attach an assessment of the proposed change against the matters set out in Part 2 of the Resource Management Act (RMA) 1991.

11) We attach an assessment of the proposed change against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

12) We attach the following further information required to be included in this application by the district plan, the Resource Management Act 1991 or any regulations made under that Act:

This application includes an assessment of the Resource Management Act 1991, National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011, the National Environmental Standards for Air Quality Regulations 2004, the National Policy Statement for Freshwater Management, the Canterbury Regional Policy Statement, the Canterbury Land and Water Regional Plan, the Canterbury Air Regional Plan, and the Selwyn District Plan.

Dated this 20th day of November 2018.

Signature:



Signature of the applicant (or person authorised to sign on behalf of the applicant)

Address for service:

Kevin Bligh
Golder Associates (NZ) Limited
PO Box 2281
Christchurch 8140

Telephone: 021 0250 6379
Email: kbligh@golder.co.nz

Address for fees/charges:

Don Chittock
Fulton Hogan Limited
PO Box 16064
Christchurch 8441

RESOURCE CONSENT CRC182422

Pursuant to Section 104 of the Resource Management Act 1991

The Canterbury Regional Council (known as Environment Canterbury)

GRANTS TO: Fulton Hogan Limited

A WATER PERMIT (S14): to take and use groundwater.

COMMENCEMENT DATE: 06 Nov 2017

EXPIRY DATE: 01 Jul 2032

LOCATION: Jones Road, TEMPLETON

SUBJECT TO THE FOLLOWING CONDITIONS:

- 1 The rate at which water is taken from bore M36/0257, 200 millimetres diameter and 63.4 metres deep, at or about map reference NZMS 260 M26:6505-3830, shall not exceed 9.5 litres per second, with a volume not exceeding 6,772 cubic metres in any period of nine consecutive days.
- 2
 - a. The volume of water taken in terms of this permit from bore M35/0257 shall not exceed 4,515 cubic metres in any nine consecutive day period whenever the standing water level in bore M36/217 (at or about map reference NZMS 260 M36:628-369) is lower than 20.0 metres below ground level (33.08 metres above mean sea level).
 - b. The volume of water taken in terms of this permit from bore M35/0257 shall not exceed 2,257 cubic metres in any nine consecutive day period whenever the standing water level in bore M36/217 (at or about map reference NZMS 260 M36:628-369) is lower than 21.8 metres below ground level (31.28 metres above mean sea level). PROVIDED THAT Whenever the Canterbury Regional Council, in consultation with the Water Users Committee representing all water users who are subject to this condition, has determined upon a water sharing regime which limits the total daily abstraction from the resource in accordance with the limits set out in these conditions, then the taking of water in accordance with that determination shall be deemed to be in compliance with parts (a) and (b) of this condition.
 - c. The taking of water in terms of this permit from bore M35/0257 shall cease whenever the standing water level in bore M36/217 (at or about map reference NZMS 260 M36:628-369) is lower than 23.5 metres below ground level (29.58 metres above mean sea level).
- 3 Water taken for irrigation shall only be applied to the area of land shown on the accompanying plan CRC010516.
- 4 This consent shall not be exercised concurrently with consent CRC91624.
- 5 The consent holder shall take all practicable steps to:
 - a. ensure that the volume of water applied does not exceed that required for the soil to reach field capacity; and

- b. avoid leakage from pipes and structures forming part of the reticulation system associated with the abstraction; and
 - c. avoid the application of abstracted water onto non-productive land such as impermeable surfaces and river or stream riparian strips.
- 6 The consent holder shall, within twelve months of the commencement of this consent, install, or provide for the installation of:
 - a. an easily accessible straight pipe, of a length at least 15 times the diameter of the pipe, or
 - b. a water flow measurement device which will measure the rate at which water is taken to within an accuracy of 10 percent as part of the pump outlet plumbing or within the mainline distribution system.
- 7 When requested in writing by the Canterbury Regional Council, the rate at which water is taken shall be measured to within an accuracy of 10 percent, and the measurement and the hours during which water is taken shall be recorded. A copy of the records shall be provided to the Canterbury Regional Council in accordance with the request.
- 8 The Canterbury Regional Council may, on any of the last five working days of June each year, serve notice of its intention to review the conditions of this consent for the purpose of dealing with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage.

Issued at Christchurch on 9 November 2017

Canterbury Regional Council

**APPLICATION FOR RESOURCE CONSENT
UNDER SECTION 88 OF THE
RESOURCE MANAGEMENT ACT 1991**

To: Selwyn District Council
PO Box 90
Rolleston, 7643

1) We, Fulton Hogan Limited (Fulton Hogan) (PO Box 16064, Christchurch 8441) apply for the following type(s) of resource consents:

- A land use consent for gravel extraction and processing operation within the Inner Plains zone for the following rule infringements of the Selwyn District Plan:
 - A restricted discretionary activity for the removal of contaminated soil or earth from the site, pursuant to Rule 1.2.2 of the SDP.
 - A discretionary activity for earthworks which do not meet the relevant conditions under Rules 1.7.1.1, 1.7.1.2 and 1.7.1.3, pursuant to Rule 1.7 of the SDP.
 - A discretionary activity for bunds which will be constructed within the required building setbacks for the site, pursuant to Rule 3.13.6 of the SDP.
 - A discretionary activity for carriageway widths associated with the proposed road improvements exceeding the requirements in Appendix E10.3 of the SDP, which does not meet standard 4.4.1.2 of Rule 4.4.1, pursuant to Rule 4.4.2 of the SDP.
 - A restricted discretionary activity for the new heavy vehicle crossing exceeding the requirements of the relevant standard in Appendix E10.2 of the SDP, which does not meet condition 4.5.1.6 of Rule 4.5.1, pursuant to Rule 4.5.2 of the SDP.
 - A discretionary activity for signage exceeding the size requirements for the site, pursuant to Rule 6.1.2 of the SDP.
 - A restricted discretionary activity for signage along Strategic Roads, pursuant to Rule 6.4.2 of the SDP.
 - A discretionary activity for the storage of hazardous substances up to a maximum of 15,000 L, exceeding the quantity limit specified for the storage of diesel on site, pursuant to Rule 7.2.1 of the SDP.
 - A discretionary activity for the deposition of cleanfill for site rehabilitation, pursuant to Rule 8.1.6 of the SDP.
 - A discretionary activity for vehicle movements associated with the proposed quarrying activity exceeding the maximum of 30 ecm/d per site averaged over any one week period for Arterial Roads, and the maximum of 60 ecm/d per site averaged over any one week period for Local Roads, pursuant to Rule 9.13.2 of the SDP.

- A discretionary activity for the exceedance of the relevant maximum noise limits specified under Rule 9.16.1, pursuant to Rule 9.16.2 of the SDP.
- A discretionary activity for quarrying at the site pursuant to Rule 9.1.2 of the SDP.
- To change land use and to undertake soil disturbance for the purpose of remediation in accordance with Regulation 9 (controlled activity) pursuant to the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011; and
- Consent is also sought for any other rule infringements that may be required from the SDC which may have been inadvertently omitted from this resource consent application.

An unlimited consent duration is sought. The overall activity status of the applications to Selwyn District Council and Canterbury Regional Council being sought by this application are discretionary.

2) The activity to which the application relates (the proposed activity) is as follows:

Fulton Hogan are proposing to establish a new quarry between Curraghs, Dawsons, Maddisons and Jones Road, approximately 700 m to the west of Templeton township within the Inner Plains zone of the Selwyn District Plan. A detailed description of the activity is contained in Part B of this report.

3) The site at which the proposed activity is to occur is as follows:

The application site is located between Curraghs, Dawsons, Maddisons and Jones Road. The location of the site is shown on Figure 1 included in Part B of this application. The legal description of the various blocks is set out in the table below. A copy of the Certificate of Titles for the site are contained in Appendix B.

Certificate of Title	Legal Description	Area in hectares
CB20F/554	Rural Section 6475 and Rural Section 6324	28.3279
CB291/71	Lot 1 Deposited Plan 4031	80.9953
CB39/215	Rural Section 6342	8.0937
815228	Section 7 Survey Office Plan 510345	16.4993
815227	Rural Section 5381 and Section 6 Survey Office Plan 510345	36.4188

- 4) **There are no other activities that are part of the proposal to which this application relates.**
- 5) **The following additional resource consents are needed for the proposal to which this application relates and have been applied for:**
- Fulton Hogan also requires resource consents and an application for a change of conditions from Canterbury Regional Council to authorise the proposed activity. Both these applications to Canterbury Regional Council are included within this application document to both Canterbury Regional Council and Selwyn District Council.
- 6) **We attach an assessment of the proposed activity's effect on the environment that–**
- a) Includes the information requested by clause 6 of Schedule 4 on the Resource Management Act 1991.
 - b) Addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991.
 - c) Includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.
- 7) **We attach an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.**
- 8) **We attach an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.**
- 9) **We attach the following further information required to be included in this application by the district plan, the regional plan, the Resource Management Act 1991, or any regulations made under that Act:**

This application includes an assessment of the Resource Management Act 1991, National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011, the National Environmental Standards for Air Quality Regulations 2004, the National Policy Statement for Freshwater Management, the Canterbury Regional Policy Statement, the Canterbury Land and Water Regional Plan, the Canterbury Air Regional Plan, and the Selwyn District Plan.

Dated this 20th day of November 2018.

Signature:



Signature of the applicant (or person authorised to sign on behalf of the applicant)

Address for service:

Kevin Bligh
Golder Associates (NZ) Limited
PO Box 2281
Christchurch 8140

Telephone: 021 0250 6379
Email: kbligh@golder.co.nz

Address for fees/charges:

Don Chittock
Fulton Hogan Limited
PO Box 16064
Christchurch 8441

PART B – SUPPORTING INFORMATION

1.0 INTRODUCTION

Fulton Hogan Limited (Fulton Hogan) proposes to establish a gravel quarry at a site within a block of land bound by Curraghs Road, Dawsons Road, Maddisons Road, and Jones Road, Templeton. The site is located approximately 700 metres (m) to the west of the township of Templeton and is shown on Figure 1.

The proposed quarry is to be known as 'Roydon Quarry', named after the Roydon Lodge Stud which has occupied much of the site over the previous decades.

The proposed quarry will involve extraction of aggregate material to a depth of approximately 10 m below ground level (bgl) and rehabilitation of the site with cleanfill, overburden and topsoil material. From extraction areas, aggregate material will be transferred by field conveyors and dump trucks to on-site processing plant, which will involve crushing, screening and washing of aggregates. Other activities that will occur on site include stockpiling of aggregates, wash water ponds, workshops, staff amenity blocks and offices, along with management of adverse effects such as bunding and screen planting, as well as dust mitigation.

This document¹ is a resource consent application, including an Assessment of Effects on the Environment (AEE), seeking resource consents required from Canterbury Regional Council (CRC) and Selwyn District Council (SDC) to establish, operate and rehabilitate the quarry.

The application forms for the resource consents are contained in Part A (Resource Consent Application Forms) of this document. Copies of the certificates of title for the site are included as Appendix B.

Fulton Hogan has requested that all applications associated with the proposal be publicly notified.

2.0 BACKGROUND

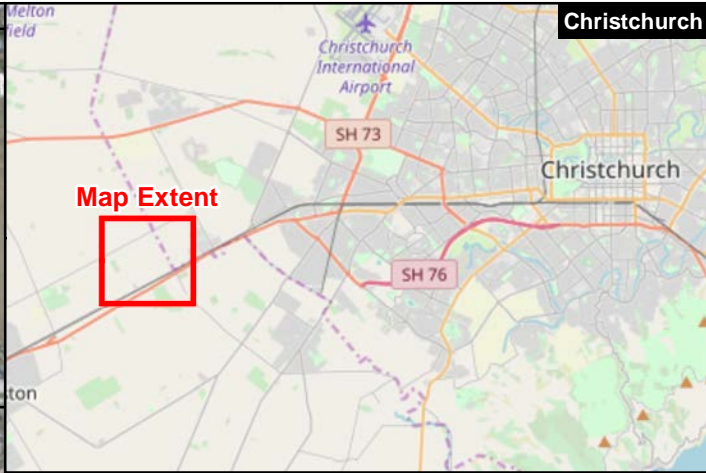
2.1 Need for this Site

Fulton Hogan operates three fixed aggregate and processing quarries within the Greater Christchurch area, located at Miners Road – Yaldhurst, Pound Road – Islington and McLeans Island. Fulton Hogan supplements these sites through smaller extraction only sites, such as the Barters Road Quarry at Templeton and Roberts Road Quarry at Islington. While Pound Road still operates as a processing site, it is noted that the site is now nearly exhausted of extractable aggregate resource.

Owing to the demand for aggregates generated by the Christchurch rebuild, aggregate resources within Christchurch have been depleted at a quicker rate than they otherwise would have been. Furthermore, while new quarries have been established post-earthquake, a number of these have been limited in either their size, depth and/or consent duration.

Aggregate demand going forward on a 'business as usual' basis is predicted to be significant, although aggregate resources currently consented for quarrying, particularly in the southwestern sector of Greater Christchurch, are limited. Additionally, the 'sustainable' volume of aggregate able to be extracted from rivers in proximity to Christchurch is declining and has reached or exceeds what CRC considers to be the sustainable maximum.

¹ Your attention is drawn to the document, "Report Limitations", as attached in Appendix A. The statements presented in that document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks to which this report relates which are associated with this project. The document is not intended to exclude or otherwise limit the obligations necessarily imposed by law on Golder Associates (NZ) Limited, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.



LEGEND

Site boundary

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
3. Schematic only, not to be interpreted as an engineering design or construction drawing.

COPYRIGHT

Information contained in this drawing is the copyright of Golder Associates (NZ) Ltd. Unauthorised use or reproduction of this plan either wholly or in part without written permission infringes copyright. © Golder Associates (NZ) Ltd.

0 200 400
METRES


REFERENCE SCALE: 1:10,000 (at A3)

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
FULTON HOGAN LIMITED

PROJECT
ROYDON QUARRY

TITLE
SITE LOCATION PLAN

	CONSULTANT	YYYY-MM-DD	NOVEMBER 2018
		PREPARED	RK
		REVIEW	KB
		APPROVED	KB

PROJECT NO. 1781870	REPORT 001	REV. 0	FIGURE 01
------------------------	---------------	-----------	---------------------

Path: K:\GIS\Projects\Dynamic\2017\4011781870_RC_Dawsons_Road\MapDocuments\1781870-001-R-F001-8-Rev0_A3L_GIS.mxd

25mm
THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN. THE SHEET SIZE HAS BEEN MODIFIED FROM A3

Evidence prepared for Fulton Hogan and Christchurch City Council (CCC) as part of the Christchurch District Plan (CDP) review in late 2015, predicted that there was a shortfall of approximately 45 million tonnes between consented supply and forecast demand. However, owing to resources not being evenly distributed across the city supply, reserves within the southwestern part of Christchurch was estimated to be around only five years.

The provision of high quality low-cost aggregates close to markets in Christchurch is necessary to ensure continuity of aggregate supply following the exhaustion of Pound Road Quarry and provide broad coverage for the Greater Christchurch market.

The proposed Roydon Quarry is well located to provide supply to southwest Christchurch where there is the shortage of material. Indicative destinations for gravel that would come from the proposed Roydon Quarry are indicated within the Integrated Transportation Assessment (ITA) prepared by Stantec and included as Appendix C.

2.2 Site Selection Process

Identification and consenting of quarries is typically a long and expensive process which even if successful, can take many years and millions of dollars, from site identification to the quarry becoming operational. In identifying the proposed Roydon Quarry site, Fulton Hogan has also invested substantial funds and resources into pursuing other potential quarry sites. Options considered include a 'land swap' with the Templeton Golf Course, CRC land at McLeans Island, and participation in the quarry "deepening" process.

The quarry deepening applications were declined, while the other two options discussed above are now considered unlikely to proceed. This is owing to the additional public and political processes required to enable the land swap of the golf course, and planning constraints around the land at McLeans Island.

These exercises are additional to extensive analysis of many other sites in the west of Christchurch, which have either been consented, such as the 'extraction only' quarries at Roberts Road and Barters Road, or which have not been pursued further. From undertaking this analysis over the preceding seven years, Fulton Hogan has found that there is limited potential to develop any additional 'extraction only' sites within a commercially viable proximity to Pound Road, Miners Road or McLeans Island.

While Fulton Hogan has recently been able to purchase a block of approximately 40 hectares (ha) adjoining its Miners Road site, this land was already zoned for quarrying and should therefore not be seen as increasing available supply estimates.

In searching for suitable sites, Fulton Hogan has looked extensively west of Christchurch. From a commercial viability perspective, a site with access to around 10 million tonnes of aggregate is required. This is to justify the investment for a standalone site, which would have a processing plant capable of producing a range of high quality aggregates with all other associated quarry infrastructure and to manage effects to a high level, while also allowing for a range of rehabilitation options.

The volume of material and rate at which resource can be extracted depends on many factors. These include requisite factors such as depth to groundwater, the nature of the road network and access to water. Constraints may include zoning and overlays, such as ecological and landscape values and the proximity to sensitive land uses. It is also generally accepted that it is difficult to gain approval to quarry publicly owned land.

Reflecting the above criteria, Fulton Hogan used the following parameters when undertaking mapping exercises to try and find a potential site:

- 1) At least 500 m from urban or 'future urban' zoned land.
- 2) Not in public or Crown entity ownership.
- 3) In excess of 40 ha, but preferably 80 ha, as a single title, or where this size could reasonably be obtained by combining multiple parcels in the same ownership.
- 4) Not zoned for conservation, recreation or open space and not having ecological or landscape overlays.
- 5) Not Christchurch International Airport owned or controlled land.
- 6) Not already zoned or consented for quarrying, or subject to resource consent applications for quarrying.

Taking a radius of 20 kilometres (km) from Christchurch, the above parameters identify the sites shown on Figure 2. Taking into consideration the very limited areas that exist within Christchurch, and having regard to resource quality, it becomes apparent that most new quarries of any magnitude will need to locate within Selwyn or Waimakariri districts.

Based on the above parameters, the proposed Roydon Quarry site is the closest identified site to Christchurch.

2.3 Opportunities

Of all the potential sites shown in Figure 2, the proposed Roydon Quarry site is the largest site underlain by suitable gravel material in close proximity to Christchurch. Fulton Hogan considers that this presents opportunities which would not be achievable on a smaller site including:

- The large site size provides an excellent opportunity to support a level of investment that allows Fulton Hogan to go 'beyond compliance' in terms of effects mitigation, while also showcasing best practice for quarry rehabilitation in Canterbury.
- Having a large site with expected seasonal high groundwater levels of around 11 m provides a substantial resource base which reduces the need for establishment of multiple smaller sites.

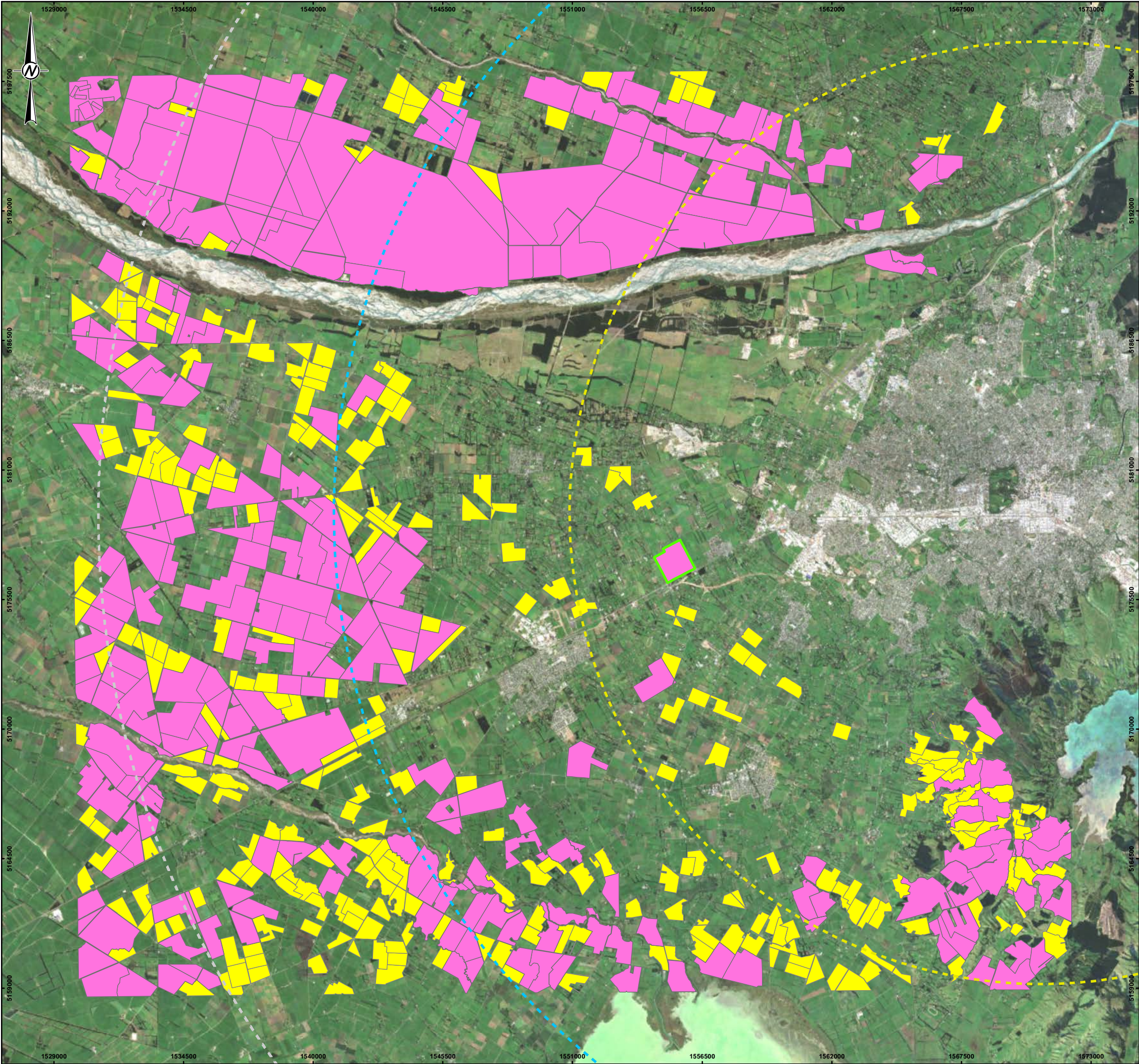
To help facilitate these outcomes, Fulton Hogan has committed to an extensive consultation exercise with the local community and other stakeholders to help it develop the quarry proposal including end use. This is discussed further in Section 7.0.

3.0 SITE AND SURROUNDING AREA

3.1 Subject Site

The site is located within a block of land bound by Curraghs Road, Dawsons Road, Maddisons Road and Jones Road, and comprises an area of approximately 170 ha, as shown on Figure 1.

The site is legally described in accordance with the Certificates of Title listed in Table 1 (and attached in Appendix B) and the physical addresses of the site are 107 Dawsons Road and 220 Jones Road.



LEGEND

- 40km buffer from CBD
- 30km buffer from CBD
- 20km buffer from CBD
- Dawson road site boundary
- Land available > 80 ha
- Land available > 40 ha

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
3. Schematic only, not to be interpreted as an engineering design or construction drawing.

COPYRIGHT

Information contained in this drawing is the copyright of Golder Associates (NZ) Ltd. Unauthorised use or reproduction of this plan either wholly or in part without written permission infringes copyright. © Golder Associates (NZ) Ltd.



REFERENCE SCALE: 1:160,000 (at A3)
PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
FULTON HOGAN LIMITED

PROJECT
ROYDON QUARRY

TITLE
ANALYSIS OF POTENTIAL QUARRY SITES

	CONSULTANT	YYYY-MM-DD	NOVEMBER 2018
		PREPARED	RK
		REVIEW	KB
		APPROVED	KB

PROJECT NO. 1781870 REPORT 001 REV. 0 FIGURE 02

Table 1: Certificates of Title.

Certificate of Title	Legal description	Area in hectares
CB20F/554	Rural Section 6475 and Rural Section 6324	28.3279
CB291/71	Lot 1 Deposited Plan 4031	80.9953
CB39/215	Rural Section 6342	8.0937
815228	Section 7 Survey Office Plan 510345	16.4993
815227	Rural Section 5381 and Section 6 Survey Office Plan 510345	36.4188

The site contains four existing dwellings and is otherwise largely in pasture with rows of shelter belts and other standard farm infrastructure such as access roads, fencing, irrigation, water races, and water troughs. Following acquisition of the site, Fulton Hogan established a community 'drop-in' centre on the site as part of the detailed consultation process it has been undertaking prior to lodging the consent applications.

Shelter belts exist along site boundaries including much of the northern boundary, part of the Dawsons Road boundary and along the entirety of the Curraghs Road boundary. Additional vegetation is located throughout the site, being of an exotic nature and for the most part located around the existing dwellings on the property.

There are two existing established site access points on Dawsons Road and Jones Road. The site is located just within the Selwyn District, with Dawsons Road forming the border with Christchurch City.

3.2 Surrounding Land Uses

The surrounding area is rural in nature, although a number of influences associated with the Christchurch urban area are evident, including the site being partially within the noise contours associated with the Christchurch International Airport and the construction of the Christchurch Southern Motorway (CSM2) extension taking place to the south of the site.

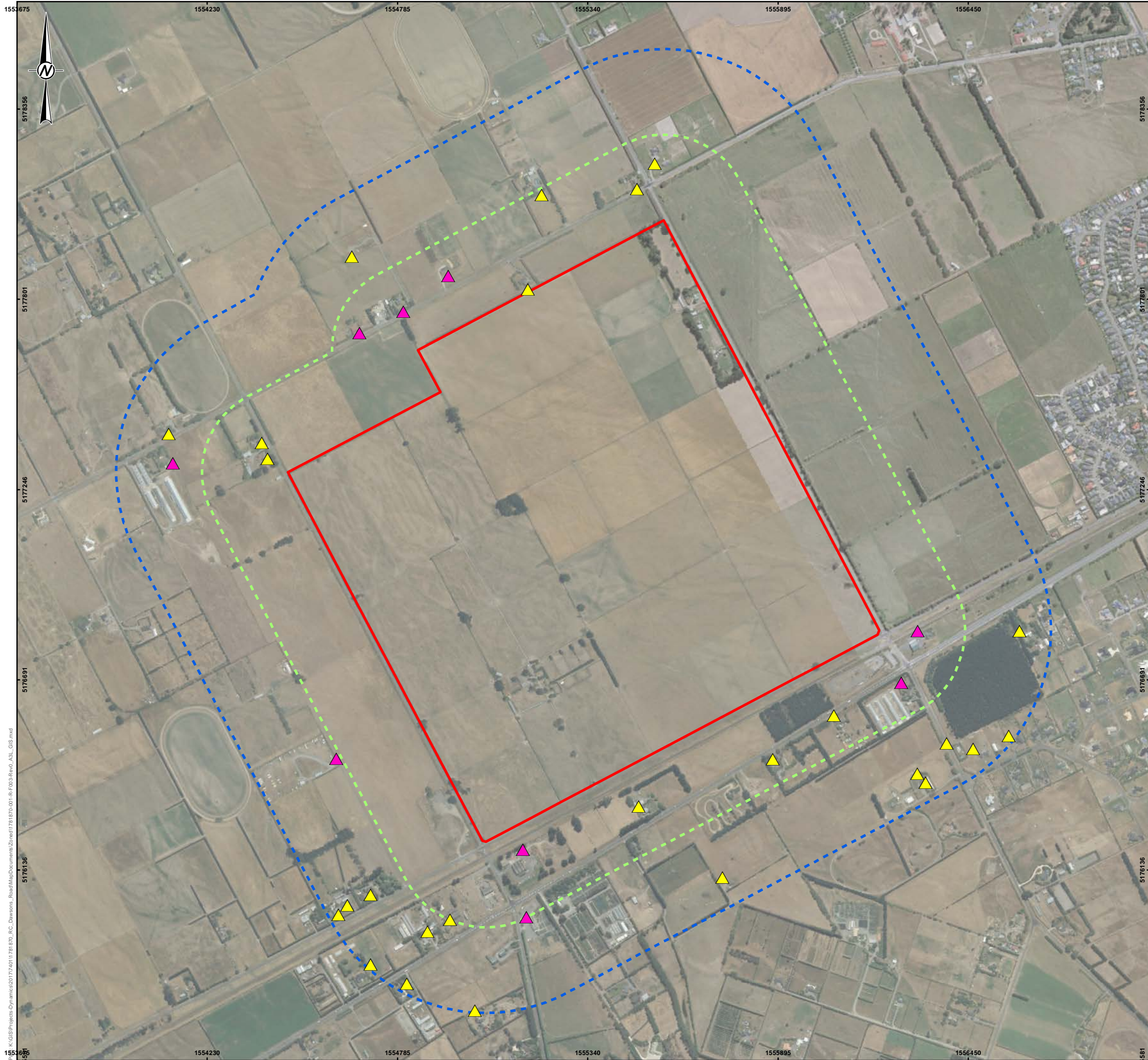
Rural activities within the immediate vicinity include farming (both intensive and pastoral), horse training facilities and some forestry, with these rural land uses often having a dwelling associated with them. Also present in the locality are some commercial and community facilities such as a Samadhi Buddhist Vihara facility, a caravan park, a farm machinery sales yard and a seed and plant breeding site.

The neighbouring land to the east, adjacent to Dawsons Road, is owned by CCC and is in pasture. Fulton Hogan understands that CCC's indicative longer-term plan for that land may include future playing fields, greenspace and 60 ha proposed for a future cemetery.

Figure 3 shows the site in respect of nearby sensitive receptors with their various distances from the site shown.

3.3 Zoning and Overlays

The site is zoned Inner Plains under the Selwyn District Plan (SDP) and lies partially within the 50 A-weighted decibels (dBA) and 55 dBA Christchurch International Airport Noise Contours, as identified on the SDP planning maps.



LEGEND

- Commercial / Other
- Residential
- Site boundary
- 500m Buffer
- 250m Buffer

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
3. Schematic only, not to be interpreted as an engineering design or construction drawing.

COPYRIGHT

Information contained in this drawing is the copyright of Golder Associates (NZ) Ltd. Unauthorised use or reproduction of this plan either wholly or in part without written permission infringes copyright. © Golder Associates (NZ) Ltd.

0 200 400
METRES
REFERENCE SCALE: 1:10,957 (at A3)
PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
FULTON HOGAN LIMITED

PROJECT
ROYDON QUARRY

TITLE
SENSITIVE NEARBY RECEPTORS

	CONSULTANT	YYYY-MM-DD	NOVEMBER 2018
		PREPARED	RK
		REVIEW	KB
		APPROVED	KB

PROJECT NO. 1781870	REPORT 001	REV. 0	FIGURE 03
------------------------	---------------	-----------	--------------

P:\K\GIS\Projects\Dynamic\2017\4011781870_RC_Dawsons_Road\MapDocuments\20wed1781870-001-R\F035Rev0_A3L_GIS.mxd

25mm
THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN; THE SHEET SIZE HAS BEEN MODIFIED FROM A3

The surrounding land to the north, west and south is also zoned Inner Plains. The closest residential area is the township of Templeton, within Christchurch City, located over 700 m to the east of the site, although there is an Existing Development Area (Devine Acres) approximately 350 to 400 m to the southeast within Selwyn District, comprising 50 to 60 developed sites of approximately 5,000 m² in size.

The site sits on the border with Christchurch City and land immediately to the east is zoned Rural Urban Future under the CDP.

3.4 Rooding and Rail Network

State Highway 1 (SH1) is located to the south of the site and provides the primary connection to the south and to Christchurch City. State Highway 73 (SH73) is located further north of the proposed quarry site. A grid-based network of arterial, collector and local roads provide access to other major growth destinations in the area.

The Main South Line railway line is currently located parallel to Jones Road, to the south of the site.

The development of CSM2 is currently on track for completion by 2020. This will have implications for the roading network in the vicinity of the site. The key roading and rail features are set out in detail in the ITA attached as Appendix C.

3.5 Geology and Soils

The Geological Map of New Zealand² identifies the geology of the site and the surrounding area as Holocene river deposits, comprising grey river alluvial gravels with minor sands, silts and clays beneath plains or low-level terraces (identified as Q1a). Grey river alluvium is common across the Canterbury Plains and is being quarried at several locations within the Greater Christchurch area. Surficial sediments covering approximately one-fifth of the site are categorised as stabilised river sand dunes (Q1d). These river sands are common throughout the West Melton area, however no current quarry operations appear to intersect dune features in the Christchurch area. Davey (2006)³ has identified several geological units below the site which include:

- Springston Formation – gravels with some peat and clay from ground level to approximately 10 m bgl.
- Riccarton Gravel – gravels from approximately 10 m bgl to 35 m bgl.
- Bromley Formation – gravels with peat and clay from approximately 35 m bgl to 45 m bgl.
- Linwood Gravel – gravels from approximately 70 m bgl to 75 m bgl.
- Heathcote Formation – peat and clay from approximately 75 m bgl to 125 m bgl.
- Burwood Gravel – gravel with some clay below approximately 125 m bgl.

Information on the aggregate resource from existing quarries to the northeast and available bore log data (regional bores M36/0142 and M36/0202, site bores M26/0257 and BX23/0098)⁴ indicates that high quality gravels exist to significant depths in this area. Borelogs from the available nearby well records show that the Springston Formation extends to around 15 to 16 m bgl and may be separated from the Riccarton Gravel by a thin layer of clay-bound sandy gravel. Bx23/0098 is a backfilled geotechnical bore on the site which shows gravel and silty gravels extending to 19 m depth. The bore log for M36/0257, which is relatively central to the

² <http://www.gns.cri.nz/Home/Our-Science/Energy-Resources/Geological-Mapping/Geological-Maps/1-250-000-QMAP/QMAP-text-maps>

³ Definition of the Canterbury Plains Aquifers. Selwyn to Waimakariri Rivers Ares 11. ECan publication U06-10. Davey (April 2006).

⁴ <http://ecan.govt.nz/services/online-services/tools-calculators/pages/well-card.aspx>

site, shows the presence of tight gravels of the Springston Formation and Riccarton Gravel extending beyond the depth of quarrying. The gravel is overlain by a shallow layer of superficial soils, typically in the vicinity of 0.5 to 1.0 m depth. Recent borehole installations (BX23/0833 BX23/0084, BX23/0085 and BX23/0086) at the site to 21 m depth showed a soil profile comprising thin topsoil underlain by sand and sandy gravel subsoil. While there is some variability in overburden depth across the site, the site exhibits between 0.4 and 1.1 m of topsoil and sand across the site.

The Landcare Canterbury Soil Information database⁵ describes the soils as 'Templeton moderately deep silty loam' in the northwest part of the site and the 'Eyre shallow stony loam' in the southeast of the site.

The Canterbury Land and Water Regional Plan (LWRP) planning map (Map A-058) does not identify the site as being within a high soil erosion risk area.

3.6 Groundwater

The proposed quarry extraction site is located over what Davey (2006) describes as a distinct unconfined aquifer within the Springston Formation, below which sits Aquifer 1 formed by the Riccarton Gravels. The site is located within the Selwyn-Waihora zone of the Canterbury Water Management Strategy and in the Selwyn-Waimakariri Groundwater Allocation Zone but lies outside the Christchurch Groundwater Protection Zone 1 (CGPZ1), as identified by the LWRP Planning Map (Christchurch Map 11). The absence of a distinct clay-bound layer in the borelog for the site bore M36/0257 suggests that there is little hydraulic separation between the Riccarton Gravels and overlying Springston Formation gravels. Therefore, unconfined aquifer groundwater levels across the site area are considered representative of the top regional aquifer, Aquifer 1.

According to the CRC well database⁶ there are two active bores within the site (not including the four new monitoring bores installed on the site boundary), M36/0257 and M36/2743 with depths 63.4 and 24 m respectively. The resource consent for bore M36/0257, CRC182422 (Figure 4) to abstract groundwater up to 9.5 L/s was transferred to the applicant on 6 November 2017. The water level record is not available for either bore.

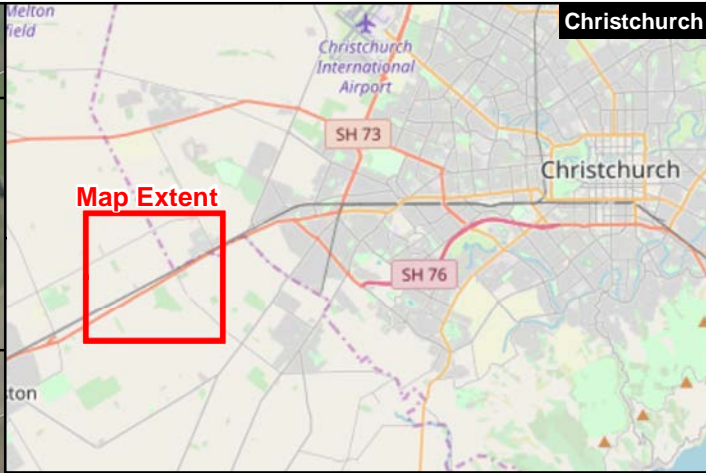
The well database contains records of 61 bores within 500 m of the site boundary, of which 36 are listed as active wells, and the remainder being disused, decommissioned or installed as piezometers. Excluding the deep New Zealand Transport Agency (NZTA) bore M36/3071 with a depth of 163 m, the average depth of the active wells is 38 m.

Long-term average groundwater levels in the surrounding area have been assessed from the available CRC well records (M36/0142, M36/0202 and M36/0271) between 13.2 and 15.5 m bgl (Figure 4). The maximum seasonal groundwater level at the site has been determined from a statistical analysis of the long-term data between 9.1 and 10.9 m bgl. The CRC wells considered in this analysis are somewhat distant from the site being between 1 and 2.5 km away and are situated to the south and southeast. Therefore, actual site conditions may differ from those determined from this information. For this reason, four new monitoring bores (DRBH1 to 4⁷, Figure 4) have been installed at the site to provide water level information specific to the site. The borelogs for these indicated that clean gravels extend to beyond 21 m depth and groundwater levels were recorded between 14 and 15 m depth. These new bores (DRBH1 to 4) have been fitted with continuous water level recording instrumentation to allow the seasonal levels to be correlated with the CRC regional monitoring information.

⁵ Landcare Research S-map. <http://smap.landcareresearch.co.nz>

⁶ CRC well database is available online: <https://mapviewer.canterburymaps.govt.nz> and was accessed by Golder on 14 June 2018.

⁷ BX23/0833, BX23/0836, BX23/0834, and BX23/0835 respectively.



LEGEND

- Canterbury Regional Council (CRC) Observation Wells
- Fulton Hogan Observation Wells and Site Well
- ▭ Site boundary
- ▭ Parcel boundary

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
3. Schematic only, not to be interpreted as an engineering design or construction drawing.

COPYRIGHT

Information contained in this drawing is the copyright of Golder Associates (NZ) Ltd. Unauthorised use or reproduction of this plan either wholly or in part without written permission infringes copyright. © Golder Associates (NZ) Ltd.

0 200 400 METRES		
REFERENCE SCALE: 1:15,000 (at A3)		
PROJECTION: NZGD 2000 New Zealand Transverse Mercator		
CLIENT		
FULTON HOGAN		
PROJECT		
RESOURCE CONSENT APPLICATION, 'ROYDON QUARRY', TEMPLETON		
TITLE		
GROUNDWATER OBSERVATION AND SITE WELLS		
CONSULTANT		YYYY-MM-DD 2018-11-20
		PREPARED RK
		REVIEW SK
		APPROVED KB
PROJECT NO.	REPORT	REV.
1781870	001	0
		FIGURE
		04

Path: K:\GIS\Projects\Dynamic\2017\4011781870_RC_Dawsons_Road\MapDocuments\Well\1781870-001-R-F01-Hewa_A3L_GIS.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3 25mm

According to the CRC LiDAR dataset⁸, the site has an elevation of between approximately 42.4 and 50.6 m above mean sea level (amsl). Regional piezometric contours developed by CRC⁹ indicated an expected shallow groundwater long-term average level of between approximately 38 and 28 m amsl across the site from northwest to southeast which equates to approximately 12.6 to 14.4 m bgl. The piezometric gradient across the site is 0.0056. Additional groundwater level information is obtained from three CRC monitoring bores (M36/0142, M36/0202 and M36/0271, Table 2) screened in the shallow uppermost aquifer near the site for which frequent water level records (mostly daily) for a prolonged length of time is available (Figure 5).

Table 2: Local CRC monitoring bore details.

Bore	M36/0142	M36/0202	M36/0271
Distance from site (approx.)	2.5 km south	1.5 km east (downgradient)	1.0 km southeast
Bore diameter (mm)	203	76	150
Total bore depth (m)	24.4	18.3	25.0
Screen depth (m)	18.3-24.4	12.3-18.3	Unknown
Record of observation	November 1984-May 2018 (399 readings)	July 1986-May 2018 (382 readings)	May 1990-July 2016 (200 readings)

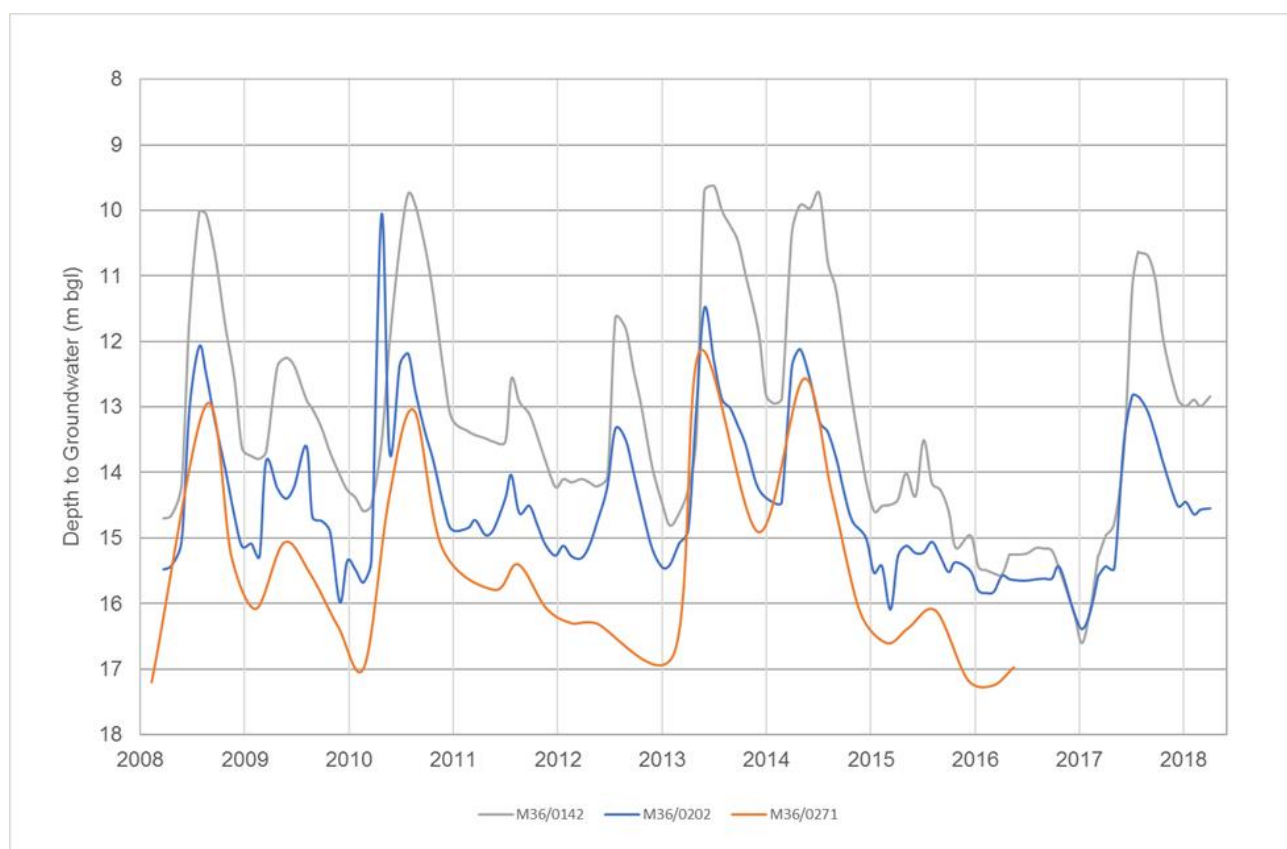


Figure 5: Water level in bores M35/0142, M36/0202 and M36/0271 from 2008 to 2018.

⁸ ECan LiDAR collections and LINZ national contour datasets.

⁹ Piezometric contours developed by CRC and shown as a GIS layers on their GIS mapping website <http://arcims.ecan.govt.nz/ecanmapping/> accessed by Golder on 27 May 2018.

The 10-year combined dataset from May 2008 to May 2018 captured sufficient long-term groundwater records to allow an analysis of seasonal groundwater levels to be made (Figure 5). The variability of maximum water levels from the median at the 95th percentile is between 2.4 and 3.5 m across the three bore records. The difference in water table fluctuations can be attributed to several factors such as variability in hydraulic characteristics of alluvial deposits, influences of nearby groundwater abstractions, differences in the interaction between surface water and groundwater and differences in responses to recharge events being observed within a relatively small area.

The 95th percentile of the groundwater level records from M36/0142 (3.5 m from median) was added to the regional piezometric level (38 to 28 m amsl across the site from northwest to southeast) to calculate a maximum expected groundwater level below the proposed quarry site of 41.5 to 31.5 m amsl. This correlates to the groundwater table reaching a minimum distance from the surface of between 10.9 and 9.1 m bgl.

According to the analysis of the regional groundwater level information, the proposed quarry can be excavated to a maximum depth of 9.9 m bgl in the northwest and 8.1 m bgl in the southeast. These excavation depths will ensure the required separation distance of the quarry floor of 1 m above the maximum seasonal high groundwater table.

A correlation was completed between the highest recorded groundwater levels over the course of winter 2018 from the four site bores with those recorded in the regional observational wells. By applying the difference in these observed water levels to the 10-year maximum levels recorded to account for the difference of location, the likely maximum levels at the site could be extrapolated. The average depth to water attributable to the 10-year maximum groundwater level at the site from this analysis is 10.9 m. This compares to the upper limit of minimum groundwater depths derived from the statistical analysis of the regional monitoring record above. The site monitoring bores are considered to better represent the groundwater levels applicable to the site than the remote regional monitoring bores. This confirms that the quarry floor could extend to 9.9 m bgl while retaining the required separation distance with seasonal maximum groundwater levels of 1 m.

Land-based groundwater recharge in this area is estimated to be 250 millimetres (mm) per year (CRC 2004)¹⁰, which amounts to 1,164 cubic metres (m³) per day or 425,000 m³ per year from the proposed site area of 170 ha. However, CRC (2002)¹¹ suggests most of the groundwater in Aquifer 1 will have infiltrated into the aquifer system from the Waimakariri River to the north of the site.

The Waimakariri River is located approximately 12 km north of the proposed quarry. This is a significant recharge source that is known to lose water to the regional groundwater system. However, it is considered to have a minimal influence on groundwater fluctuations below the site owing to its distance from the site.

There is a network of water races and stormwater channels in the area surrounding the proposed quarry site. The shallow groundwater levels are much lower (some 13.5 m deep on average) than the base of these water races and channels, thus no hydraulic connection exists. Water will infiltrate from the water races and channels to replenish groundwater, but no groundwater from Aquifer 1 will flow towards them.

Groundwater quality at the site has been established from the four installed monitoring wells and is typical to that of the Canterbury Plains unconfined aquifer.

¹⁰ Groundwater allocation Limits Land based recharge Estimates. ECan publication U04-97. Scott (September 2004).

¹¹ Age and Source of Canterbury Groundwater. ECan publication U04-97. Stewart et al (April 2002).

3.7 Ecological Values

The vegetation on the site is dominated by pasture grass, exotic planted trees and shelter belts. None of the trees are protected under the SDP and there are no ecological overlays on the site.

The only surface waterbodies that run through the site are man-made water races used for irrigation purposes and stock water supply purposes. Man-made drains are present along some of the site road boundaries which carry water following periods of heavy rainfall.

Overall, the ecological values of the site are considered low. Consequently, it is not considered necessary to commission a specialised ecological study of the site, for the purposes of this proposal.

3.8 Meteorology and Existing Air Quality

A detailed Air Quality Assessment (AQA) has been prepared by Golder and is included as Appendix D. This report discusses in detail modelled prevailing wind conditions for the site, rainfall data, as well as the results of recently completed air quality monitoring programmes addressing quarries within the Christchurch area and respirable crystalline silica (RCS) and PM₁₀ and PM_{2.5} levels. As this air quality monitoring programme included the proposed Roydon Quarry site, the information collected can be used to provide data on existing air quality at the Roydon site.

To provide representative wind data for the Roydon Quarry site, data was extracted from a CALMET meteorological dataset previously developed by Golder for the wider Christchurch area. A wind rose generated from this data for the location of the Roydon Quarry and as replicated below in Figure 6. A wind rose is a graphical tool used to show how wind direction and speed are typically distributed. The length of each petal shows the overall frequency of time that the wind blows from any given direction, while the different colours within the petals indicate the frequency of different wind speed ranges. The wind rose in Figure 6 shows the prevailing northeasterly winds, followed by winds from the north and southwest. This also illustrates that the northwesterly föhn wind occurs over Christchurch for a small percentage of time.

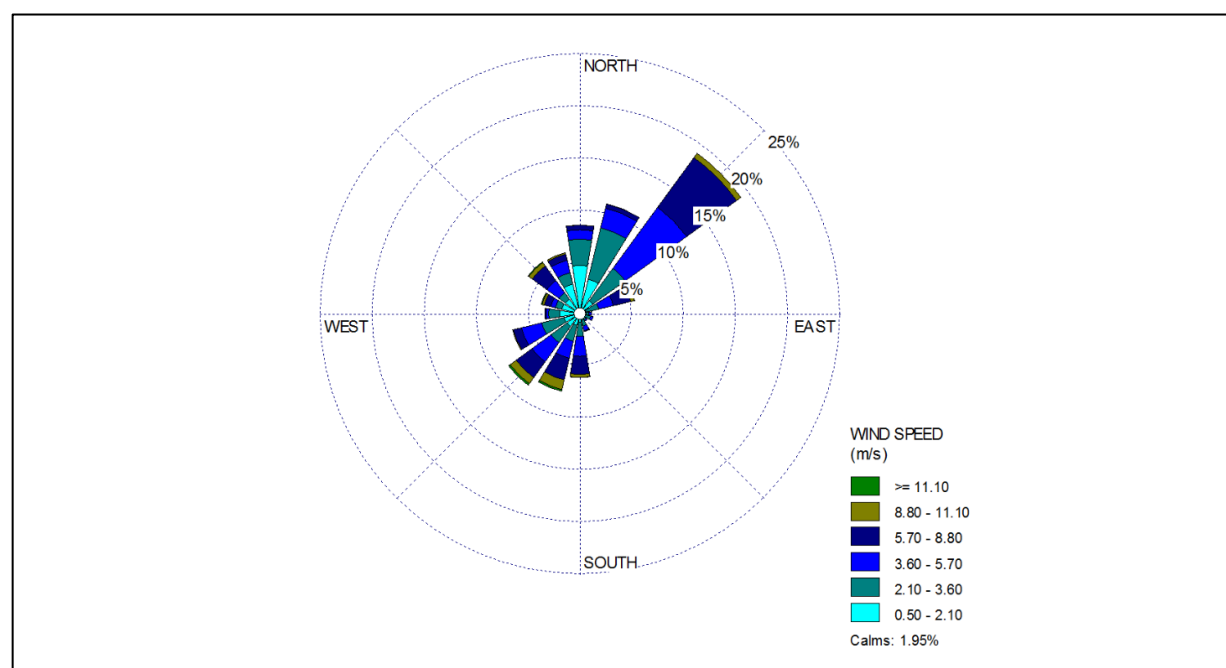


Figure 6: Wind rose for the proposed Roydon Quarry site for 1 January 2006 to 31 December 2006 (generated using CALMET meteorological dataset developed by Golder).

The AQA notes conditions in winter are dominated by winds from the southwest, which are interspersed with periods of calm stable weather conditions where air movement is dominated by topography driven drainage flows. There are more northeast and northwest conditions during summer.

The AQA notes that rainfall in the Christchurch area is generally low, with the mean monthly rainfall ranging from 38 mm (January) to 68 mm (July), and a mean yearly rainfall of approximately 618 mm.

The monitoring data for Roydon Quarry, which is currently a rural location with no nearby operating quarries, indicates that background PM₁₀ concentrations vary. They can be elevated occasionally, with levels approaching the National Environment Standard for PM₁₀ of 50 micrograms per cubic metre (µg/m³) (24-hour average). However, PM_{2.5} concentrations^[2] remain comparatively low and are less than half of the World Health Organisation (WHO) guideline of 25 µg/m³ (24-hour average). One-hour average PM₁₀ concentrations recorded at Site 4 are shown in Figure 9. Although none of the concentrations go above the Ministry for the Environment (MfE) dust nuisance trigger value of 150 µg/m³, there are frequently periods when 1-hour averages (19 µg/m³) are elevated for this background monitoring site.

4.0 DESCRIPTION OF THE PROPOSAL

4.1 Introduction

This section provides an overview of the proposed quarry development including site preparation, the extraction operation, and machinery to be used on site, site access, hours of operation and rehabilitation measures.

It is proposed to quarry the entire site, except for boundary setbacks. Extraction activities are proposed to be undertaken in stages with an active working quarry area of no more than 40 ha at one time. For the purposes of this open area, the active working quarry area shall comprise the following:

- Working extraction faces and adjacent operational areas.
- Stockpiling and load out areas.
- Quarry Haul Roads (excluding paved areas).
- Areas where aggregate processing takes place.

It shall not include other areas which shall be additional to the 40 ha, such as:

- Quarry wash water ponds.
- Conveyors and an adjacent 'loader lane'.
- Site offices, amenity blocks, workshops and surrounding areas.
- Areas where refuelling takes place.
- Storage areas for quarry plant and machinery.
- Any areas where backfilling or rehabilitation is occurring.
- Any paved, bunded or planted areas.

^[2] Indicative only due to the nephelometer monitoring method.

4.2 Initial Site Preparation

4.2.1 Creation of pit

Prior to quarrying commencing, topsoil and subsoil overburden material will be removed from the initial part of the site to be extracted as shown on Figure 7. This will enable Fulton Hogan to create a quarry pit for site operations, which within some months of establishment will include the fixed plant processing area. This area will be located near the middle of the site, so the fixed quarry processing plant can be established in excess of 500 from, and as far away from the site boundaries as possible.

The initial focus will be on establishing extraction, processing and stockpiling areas, followed by the establishment of other site facilities such as a workshop and offices. As the site develops, areas will be set aside for cleanfilling and rehabilitation.

4.2.2 Site bunding and planting

Removal of overburden material will be undertaken using an excavator and either dump trucks or road trucks, in combination with a loader, which will be used to progressively develop on-site bunds around the perimeter of the site.

Owing to the large amount of material that will be required to bund the site, imported topsoil is likely to be brought to the site to help with enabling the establishment of the bunds.

Planting will be established on the outer side of the bunds. An indicative design of this planting is shown below and discussed in more detail in the Landscape and Visual Impact Assessment (LVIA) prepared by DCM Urban and contained as Appendix E.

The site is already partially screened by established evergreen shelter belts along the majority of Curraghs Road, part of Dawsons Road (primarily around the house at 107 Dawsons Road) and along the majority of the site's common boundary with the property at 319 Maddisons Road.

The existing perimeter vegetation is proposed to be retained and will be enhanced with new vegetation where there may be gaps or the vegetation, where it is dying or in poor condition, and to provide additional planting where required. Earth bunding will be set back from the boundary to accommodate existing and any new vegetation as shown in the edge treatment representations included with the LVIA. As shown in the figures accompanying the LVIA, Fulton Hogan is committed to incorporating native vegetation where practicable into screening and has nurseries and gardening staff to achieve this.

While new vegetation will take some years to attain maturity, it is expected that within five years of being planted, new areas of vegetation will provide substantial screening to a height of 5 m. Vegetation will be maintained to ensure the road is not adversely impacted by shading during winter months. Irrigation will be established along the site boundaries to help establish this screening.

4.2.3 Site access

The site vehicle access will be screened by layout design and plantings. The visual representations in the LVIA (Appendix E) provides a design for screening around the site entrance. Designing the access with a curve into the site also prevents expansive views from public locations directly into the quarry pit (refer Figure 8).



LEGEND

Dwellings

Staging direction

Area to be extracted only with written approval

Fixed processing plant (6.8 ha)

Site boundary

Stage 1

Stage 2

Stage 3

Stage 4

Stage 5

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.

2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence

3. Schematic only, not to be interpreted as an engineering design or construction drawing.

COPYRIGHT

Information contained in this drawing is the copyright of Golder Associates (NZ) Ltd. Unauthorised use or reproduction of this plan either wholly or in part without written permission infringes copyright. © Golder Associates (NZ) Ltd.

0200400

METRES

REFERENCE SCALE: 1:10,000 (at A3)

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT

FULTON HOGAN LIMITED

PROJECT

ROYDON QUARRY

TITLE

INDICATIVE STAGING PLAN

CONSULTANT	YYYY-MM-DD	2018-11-20
	PREPARED	RK
	REVIEW	KB
	APPROVED	KB



- A** 3m high grass bund and planting is to be established around the entire site as part of Stage 1, including around the entrance.
- B** Trees will be maintained at 5m along Jones road to avoid adverse shading of the road by trees
- C** Retention of farm fences
- D** Plant equipment is located in the middle of the quarry, away from property boundaries
- E** Excavation works are staged with the site being rehabilitated as work progresses

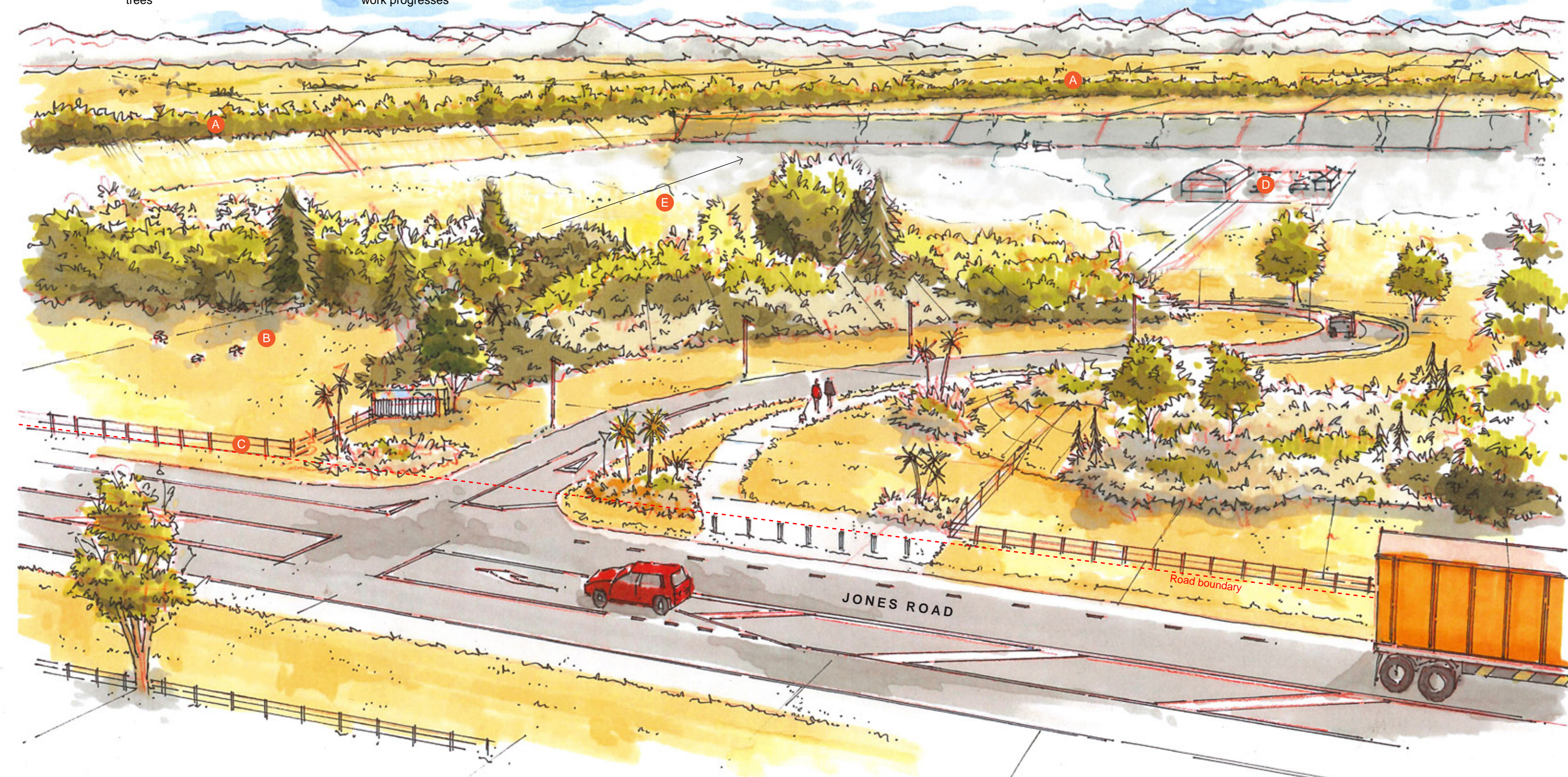


Figure 8: Site access screening.

4.3 Extraction

Following pit establishment, quarrying operations will move generally in stages as the quarry develops. An indicative staging diagram is shown in Figure 7.

Extraction of the aggregate resource will involve the use of standard quarry machinery, such as excavators, loaders, field conveyors, dump trucks, road truck and trailer units and other machinery as required for the efficient extraction of the resource. Owing to the size and composition of the alluvial materials, blasting is not required at this site, nor will this method of extraction be used.

Once the resource has been extracted it will be transported to fixed or mobile processing plant located within the quarry floor where it will be fed through the processing plant to produce a range of aggregate products, stockpiled and sold via the weigh bridge.

It is intended that large amounts of the extracted resource will be transported to the processing plant by way of field conveyors. Fulton Hogan uses conveyors with success at the Miners Road quarry and the benefits these offer in terms of efficiency, health and safety performance and effects management make these a sensible choice for the proposed Roydon Quarry site.

Over the life of the quarry, is anticipated that approximately 12 to 15 million bank cubic metres (BCM¹²) of gravel will be available to be quarried from the site. This volume has been determined by assuming an average extraction depth of up to 9.9 m across the site, allowing for overburden to be removed and at least a 1 m freeboard to be retained between the quarry pit floor and anticipated seasonal high groundwater levels across the site, while retaining a buffer of at least 20 m off all site boundaries for bunding and screen planting and batter slopes against this.

Proposed annual extraction volumes will differ with demand but the expected life of this quarry is likely to be in excess of 30 to 40 years. Demand is likely to fluctuate, although is projected to on average with time, increase.

4.4 Processing Plant and Stockpiling

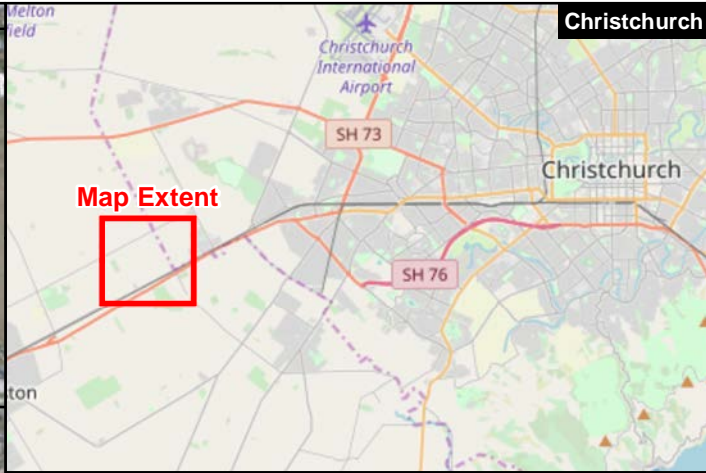
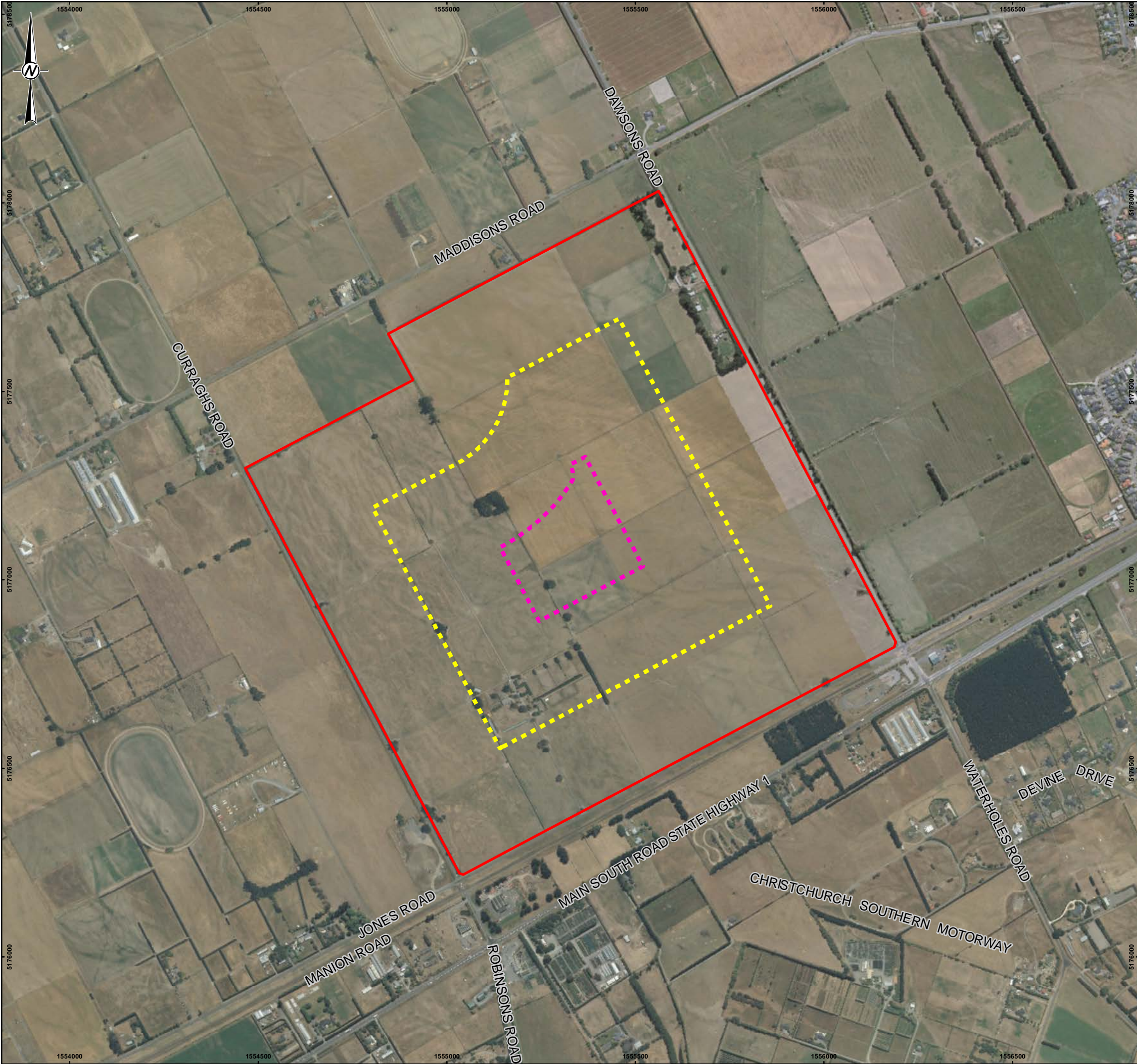
It is proposed to establish both fixed and mobile processing plants at the quarry site.

The fixed processing operation will involve the washing, crushing, screening, conveyance and stockpiling of processed materials. Processed products will be removed from the processing plant area on an as required basis and stockpiled awaiting sale/distribution to customers.

The total number of fixed processing plants will be dependent on the needs of Fulton Hogan but will be located within the middle of the site - within the area identified in Figure 9. This will achieve a minimum setback distance for fixed plant (excluding conveyors) of 500 m from the site boundary.

The fixed processing plant will be capable of washing aggregate products and producing a range of product grades. From time-to-time, the fixed processing plant may be complemented by mobile processing plants which can be brought to and from the site as demand dictates. Any mobile processing plant will be located at least 250 m from the site boundary. In addition, all processing plant will be fitted with dust suppressant systems and will be no higher than the top of the bunds. Figure 9 shows the areas in which the fixed and mobile processing plant could be established on the site.

¹² BCM represents the contents of a cubic metre of rock in place, prior to extraction.



LEGEND

- Fixed processing plant - 500m from site boundary
- Mobile processing plant - 250m from site boundary
- Site boundary

NOTES

- Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
- Map image: © OpenStreetMap (and) contributors, CC-BY-SA Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
- Schematic only, not to be interpreted as an engineering design or construction drawing.

COPYRIGHT

Information contained in this drawing is the copyright of Golder Associates (NZ) Ltd. Unauthorised use or reproduction of this plan either wholly or in part without written permission infringes copyright. © Golder Associates (NZ) Ltd.

0 200 400 METRES
REFERENCE SCALE: 1:10,000 (at A3)
PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
FULTON HOGAN LIMITED

PROJECT
ROYDON QUARRY

TITLE
PROCESSING PLANT SETBACKS

	CONSULTANT	YYYY-MM-DD	2018-11-20
		PREPARED	RK
		REVIEW	KB
		APPROVED	KB

Path: K:\GIS\Projects\Dynamic\2017\74011781870_RC_Dawsons_Road\MapDocuments\Zone\1781870-001_R-F009-Rev0_A3L_GIS.mxd

THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN. THE SHEET SIZE HAS BEEN MODIFIED FROM A3

The processed aggregate products will be stockpiled by grade within the quarry floor area to enable ease of access for loading of road truck and trailer units prior to dispatch. It is proposed that stockpile volumes will have a maximum total volume of 200,000 m³ at any one time and will be located below the height of the level of the bunds following establishment of the quarry pit. All stockpiling associated with fixed plant will be set back at least 400 m from site boundaries although smaller stockpiles associated with mobile plant (processed at least 250 m from the site boundary) may be up to 100 m from the site boundary.

4.5 Water Management and Treatment

4.5.1 Water takes

It is proposed to take water for aggregate washing, dust suppression and for irrigating rehabilitated areas and establishing screen planting. The water is to be supplied from an existing water permit currently held by Fulton Hogan to take and use groundwater at the site (ref. CRC182422, Jones Road, Templeton), and from water permitted to be abstracted from SDC water races which end within the site. An application to change the conditions of CRC182422 to provide for water to be used for quarrying purposes is included as part of this proposal, and the effects of this activity, have been assessed in Section 6.2.4.

4.5.2 Aggregate wash water

Water that is used for gravel processing will be discharged to land via ponds. Water entering these ponds will be recycled although there will be losses through the washing processing by way of evaporation and some natural leakage to ground. This water will be silt laden but is expected to be otherwise free of contaminants. The primary method of treatment will be settlement followed by filtration through the underlying soil layer. This involves the establishment of appropriately sized settling ponds close to the aggregate processing plant.

Such ponds are common at the alluvial quarries within the Christchurch area and also provide a means of recycling water for aggregate washing. From time-to-time, the wash water ponds need to be cleared out to remove settled sediment, with this material being disposed of at an appropriate location within the quarry site as clean rehabilitation material. Sediment treatment ponds are typically sized and resized to meet a quarry's needs as circumstances require, however it is anticipated the settlement ponds are likely to total approximately around a hectare for each processing plant which involves aggregate washing.

It is likely that wash water ponds may not be established for initial aggregate processing, but may instead be developed at a later stage as quarry operations progress.

4.5.3 Truck washing

It is proposed that washing of trucks will take place on the site. Truck washing comprises the washing of truck trays and the washing of truck bodies using a high-pressure hose. Some biodegradable degreasers and detergents may also be used in the process. While the washing of trays involves water becoming contaminated with sediment, washing the exterior of trucks can result in contaminants, such as hydrocarbons, becoming entrained in the wash water.

A concrete and bunded truck wash pad will be constructed close to the site workshop. The water from the washdown process will be collected into a holding tank with a water-oil separator to remove hydrocarbons prior to the discharge of the water to ground.

Sediments collected from the sump of the washdown pad will be periodically excavated and disposed of off-site to landfill.

4.5.4 Stormwater

Stormwater will be generated from impervious surfaces on the site, such as buildings and sealed roadways.

Stormwater run-off will occur through infiltration to ground. Where large volumes exceed the natural infiltration capacity of the ground, the water will naturally drain to the lowest point of the site and then percolate through the gravels ensuring effective drainage of the site. Following periods of prolonged heavy rainfall, there may be times when ponding occurs in the pit, although these will be limited in their extent and duration. With the exception of works required to periodically de-silt settling ponds, no works will occur in standing surface water.

Detention areas will be designed to detain high flow volumes where necessary (thereby reducing run-off volumes and providing stormwater detention). This may include the use of detention tanks or swales if required. Fulton Hogan may also look to implement retention tanks or ponds which store water to be used for irrigation or dust suppression on the site.

Site rehabilitation will also progressively restore groundcover across the worked-out areas and will form a further element of attenuation of stormwater and run-off discharges.

At this stage, any such retention structures would either need to comply with relevant permitted activity standards, or resource consent will need to be sought accordingly.

4.6 Site Buildings and Parking Areas

Buildings will be erected on the quarry site as it develops, including a weighbridge, offices, staff amenity blocks as well as a loader shed and associated workshop. Where practicable, existing buildings may be retained on the site to fulfil some of the above functions.

While the final location of the site buildings to be erected is yet to be determined, the buildings will be located a minimum of 30 m from the external site boundaries, close to the centre of the site, and will comply with the building height limits specified for the Rural Rules (Rule 3.12.1 'Buildings', Part C) of the SDP.

Parking areas for staff and visitor vehicles will be located close to these buildings and will be designed in accordance with the requirements of the SDP. Parking for machinery will be on hard stand areas within the quarry pit.

4.7 Cleanfilling

It is proposed to use worked out areas for cleanfilling once suitably sized areas become available within the quarry pit floor. Cleanfill material will form a key component of site rehabilitation. All material to be used in the backfilling and rehabilitation of the site is to be inert cleanfill material meeting the definition of cleanfill under the LWRP and will be in accordance with a Cleanfill Management Plan prepared for the site. A copy of the Cleanfill Management Plan is included as Appendix F.

Cleanfill material will be brought to the site from locations within Christchurch and the Selwyn District; it will be unloaded at a cleanfill 'tip head' and spread across the working cleanfill area. Visual inspections of the quality of the cleanfill coming in will assist in ensuring that the material meets the definition of cleanfill, with any unacceptable loads being turned away from the site. Should an unacceptable load reach the tip head and be unloaded, it will be removed from the cleanfill area for transportation to landfill.

It is not proposed that the entire site will be backfilled to original ground level, but it is anticipated that the final finished site level will be higher than the base of pit excavations across most of the pit.

4.8 Storage of Hazardous Substances

The only hazardous substances planned to be stored on the site will be fuel and lubricants for quarry plant and machinery. It is proposed that a total maximum volume of 15,000 litres (L) of diesel will be stored on site in a double skinned tank, with any other hazardous substances likely to be limited to lubricants, such as engine oils, which will be stored within the workshop in small quantities totalling approximately 250 kilograms (kg). From time-to-time portable tankers may be used on site, although refuelling with such tankers will take place well above the bottom of the pit floor.

All storage of hazardous substances will be in accordance with the requirements of relevant legislation, including being stored on impervious surfaces with secondary containment. Oils and lubricants will be securely stored within the workshop on site.

It is likely that the fixed diesel tank will be installed within two years of commencement of quarry operations until which time refuelling will be via mobile tankers. The dispenser on the fixed diesel tank will be covered to shelter it from rain and will contain a self-bunded area (similar to a drip-tray) with refuelling to occur adjacent to this tank on a covered concrete refuelling pad. This could be in the form of a drive through area which could also be used for vehicle servicing if need be and could also be used by mobile tankers prior to a fixed tanker being installed. An interceptor system will support the area.

A Spill Management Plan for the site will be developed and will incorporate the management and inspection of the fuel tank (including fuel reconciliation, spill management and containment, and visual inspection of the tank).

4.9 Transportation, Ridding, Design and Construction

4.9.1 Internal site operations

Material will be transported from the working extraction area to processing plant primarily using field conveyors and when required by dump trucks. From the processing plant, material will be dispensed into stockpiles using a conveyor system. From here, road trucks will be loaded from the stockpiling area. A single point of controlled heavy vehicle access, as discussed below, will service the site throughout its operational life, from which road trucks will also exit the site to their destination.

4.9.2 Establishment of site accesses

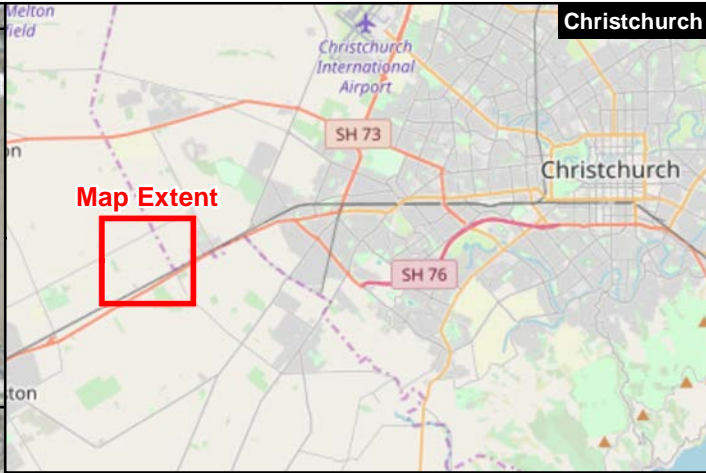
4.9.2.1 Heavy vehicle access

Fulton Hogan intends to develop a new dedicated heavy vehicle access to the site from Jones Road. The proposed access point is to be located approximately 350 to 550 m to the west of the existing Dawsons and Jones Road intersection.

As discussed in the ITA (Appendix C), owing to the large number of heavy vehicle movements this access will accommodate, Fulton Hogan proposes to include all design features typical of a side road intersection carrying higher heavy traffic volumes for this access.

4.9.2.2 Light vehicle access

Fulton Hogan proposes to use the existing access off Jones Road, which serves the Roydon Stud Lodge, as a dedicated light vehicle access to the site. On Stantec's recommendation, Fulton Hogan is proposing that this access will be upgraded to a commercial access standard as set out in the SDP. These access points are shown in Figure 10 below and discussed in detail in the ITA included as Appendix C.



LEGEND

— Roading Improvements

□ Site boundary

- NOTES**
1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
 2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 3.0 New Zealand licence
 3. Schematic only, not to be interpreted as an engineering design or construction drawing.
 4. Figure is replicated from Stantec 2018.

COPYRIGHT

Information contained in this drawing is the copyright of Golder Associates (NZ) Ltd. Unauthorised use or reproduction of this plan either wholly or in part without written permission infringes copyright. © Golder Associates (NZ) Ltd.

0 200 400 METRES

REFERENCE SCALE: 1:10,000 (at A3)

PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
FULTON HOGAN LIMITED

PROJECT
ROYDON QUARRY

TITLE
INDICATIVE SITE ACCESS POINTS AND ROADING IMPROVEMENTS

	CONSULTANT	YYYY-MM-DD	2018-11-20
		PREPARED	RK
		REVIEW	KB
		APPROVED	KB

Path: K:\GIS\Projects\Dynamic\2017\4011781870_RC_Dawsons_RoadMapDocuments\2017\4011781870-01-R-Fin\05Rev0_A3L_GIS.mxd

25mm
THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN. THE SHEET SIZE HAS BEEN MODIFIED FROM A3

4.9.2.3 *Roading improvements (including new roundabout)*

Additional roading improvements including seal widening, will be made to Jones Road to enable the efficient and safe functioning of the access points and Jones Road, in accordance with the requirements of the SDP.

Fulton Hogan is proposing a roundabout near the intersection of Dawsons and Jones Roads. The current intersection has an extensive history of accidents and the roundabout is proposed to safely provide for both traffic associated with the quarry, but also to improve safety for all vehicle movements occurring at this intersection.

As discussed in the ITA, a roundabout control will reduce high speed vehicle conflicts, and is consistent with the Arterial/Collector Road function of these two roads. The development of a roundabout will also create space between the intersection and the existing railway line, to overcome issues that currently exist with vehicle 'stacking' between the railway line and the Dawsons/Jones intersection.

Fulton Hogan is seeking resource consent for two design options for the proposed roundabout. In simple terms, the first option is a four-arm roundabout, and the second is a three-arm roundabout. The first option involves the use of CCC land immediately to the east of Dawsons Road. This option is dependent on Fulton Hogan obtaining approval from CCC for the use of that land and as such an approval is uncertain. The second option does not involve any CCC land and can be undertaken by Fulton Hogan independently of CCC.

The accesses and roundabout designs have been designed by Stantec in consultation with both SDC, CCC, KiwiRail and the NZTA. These are presented in detail in the ITA in Appendix C.

4.9.3 *Traffic movements*

Fulton Hogan proposes a maximum of 1,500 heavy vehicle movements per day associated with the proposed quarry and this is detailed further in the ITA included as Appendix C. Using data from Fulton Hogan's Pound Road quarry traffic patterns, Stantec has modelled an average number of movements of approximately 1,050 heavy vehicles per day for a median operational day. Additional light vehicle movements are expected to be in the vicinity of 150 per day.

Upon leaving the site, the Stantec modelling predicts at least 90 % of heavy vehicle movements from the site would access SH1 via the Dawsons Road roundabout. Stantec has calculated indicative distribution for heavy vehicle traffic using the quarry that shows the estimates of maximum and forecast average daily movements onto the roading network. This is summarised in section 11 of the ITA.

It is proposed that any truck movements through Templeton will be restricted to those visits and deliveries involving projects in Templeton only. The Stantec analysis predicts approximately 3 to 5 heavy traffic movements per day on Jones Road towards Templeton, and this is only predicted to occur during times when there are local destinations requiring quarried material.

While it is predicted that very few heavy vehicles would travel through Templeton, Fulton Hogan is committed to minimising vehicle movements through Templeton as far as practicable. Accordingly, the following actions are proposed:

- Fulton Hogan controlled trucks will only travel into or through Templeton if a delivery is in the immediate vicinity of Templeton.
- Fulton Hogan will require any non FH-controlled truck drivers accessing the site to sign on to a code of practice committing to the same.
- A sign will be established inside the quarry gate reminding drivers not to travel through Templeton unless a delivery is in the immediate vicinity.

4.10 Site Security

The site will be fully fenced and signage will be erected stating that unauthorised access is prohibited. The quarry will be locked outside of operating hours preventing access and security cameras will be installed to monitor for any unauthorised access. On-site buildings and offices will be alarmed and monitored to prevent unauthorised access.

4.11 Hours of Operation, Commencement and Duration

The hours of operation for full site operations are 6:00 am to 6:00 pm, Monday to Saturday. Outside of these hours it is proposed that limited processing operations and load out of trucks may occur detailed in Table 3.

Table 3: Hours of operations/activities.

Hours	Duration	Range of activities
6:00 pm to 10:00 pm	150 days per annum (between Monday and Saturday)	Full range of quarry activities within the exception of processing using mobile plant, subject to compliance with an evening noise limit of 50 dB L _{Aeq} .
10:00 pm to 6:00 am	150 days per annum	Load out of trucks and truck movements, and ancillary activities such as operation of weighbridge and site offices. Light maintenance.
Sunday and public holidays	At all times	Truck load out and truck movements (on up to 15 days of the year). At all times, dust suppression, office activities, site security and light maintenance as required.

Allowing for operations outside of standard working hours provides flexibility to undertake work that requires night delivery (e.g., the Riccarton Road project Fulton Hogan has recently completed and for which the next phase of tendering has commenced) and to spread out vehicle movements at times of peak demand.

Subject to obtaining the necessary resource consents, it is anticipated that quarrying activities may commence sometime in 2020.

Other than the application for a change of conditions (to CRC182422 for groundwater take), an unlimited consent duration is sought from CRC and SDC for the land use consents, and a consent duration of 35 years is sought from CRC for the discharge permits. The total life of the quarry is directly tied to market demand for aggregate products from the site but is expected to be in excess of 30 to 40 years. This is influenced by the availability of supply from other aggregate sources in the vicinity, and by the time taken to backfill the site and undertake rehabilitation activities.

4.12 Rehabilitation, End Use and Activities on Balance of Site

Owing to the large size of the site, combined with community interest in future land uses and the potential to actively invest in the site over a long period of time, Fulton Hogan sees the Roydon site as providing the potential to be an exemplar in terms of site rehabilitation.

Additionally, as only part of the site will ever be actively used for quarrying at one time, there are opportunities to continue with traditional farming and productive activities on the site both prior to quarrying commencing and as stages of the quarry are progressively rehabilitated.

While the final use is unlikely to be determined until sometime in the future, Fulton Hogan will restore the site to a form in that it can be used for a variety of activities. These range from farming, to animal boarding, recreation and other uses provided for within the Rural zones. The final landform may also enable other activities should the zoning change over time with the growth of Templeton and Christchurch.

With this in mind, a draft Rehabilitation Management Plan has been prepared and is attached as Appendix G. This plan has been prepared in line with the requirements of the Christchurch City Plan Rule standard 17.8.3.14, and the CCC Rehabilitation Plan Guidance document¹³. The rehabilitation plan has been developed with the input of Reefside Limited who have been involved in the preparation of many of these plans and are suitably qualified person to prepare such plans. DCM Urban have also provided input into this plan and checked for consistency with the recommendations in the LVIA.

It is envisaged that the rehabilitation plan will be updated in time following consultation with the community and other stakeholders, with a view to future end uses that reflect both the aspirations of the community and Fulton Hogan.

The rehabilitation plan outlines progressive rehabilitation measures that will be taken once areas of extraction and backfilling are completed. This will primarily involve re-spreading and contouring of stored overburden materials, stabilisation of quarry faces and grassing of completed and restored extraction areas. It shall create a free draining and stable landform with batter slope on completion of rehabilitation no steeper than 1 vertical (v):3 horizontal (h).

Topsoil and subsoil materials which have been stored following site preparation may be used in the site rehabilitation by providing a final topsoil layer or may be retained along with established plantings to assist in biodiversity outcomes. Fulton Hogan will also bring in clean top soil from off site for the purpose of rehabilitation.

5.0 ALTERNATIVES

5.1 Introduction

An assessment of alternative methods of discharge, including discharging into any other receiving environment, is required under section 105 of the Resource Management Act 1991 (RMA) for any application seeking to discharge contaminants. An assessment of alternatives is also necessary for activities likely to have significant adverse effects.

¹³ Quarry Rehabilitation Plan Guidance – Christchurch City Council, August 2018.

Having regard to the AEE contained within Section 6.0 of this report and the supporting technical assessments, it is not considered that this proposal will have significant adverse effects. Therefore, an assessment of alternatives has been completed in respect of the applications for the discharge of contaminants. Additionally, Section 2.0 outlines the applicant's reasons and process for selecting the proposed site.

5.2 Discharge to Air

With respect to the discharge of contaminants to air, this discharge is a reflection of the location of the quarry site, the type of material to be extracted, extraction and processing activities, access roads, and the direction and strength of wind. Consequently, it is only through the adoption of appropriate dust mitigation "methods" of discharge that the effects of such can be controlled and thus minimised.

A detailed AQA is included in Appendix D. As discussed in Appendix D, the receiving environment for dust emissions from the proposed quarry to the east is not considered to be particularly sensitive as the land is held primarily as CCC farm. However, the presence of rural dwellings and commercial activities in other directions, particularly to the north of the site, means these areas are more sensitive. In recognition of this, proposed mitigation measures, which include specific operational controls relative to wind speed and direction to minimise effects on the nearby sensitive receivers, are proposed.

It is considered that the suite of mitigation measures proposed in the AQA and reflected in the draft Dust Management Plan (DMP) included with the AQA, will ensure that potential dust effects can be managed to an acceptable level. Other emissions, such as those generated by the operation of on-site machinery, are considered to be negligible.

Overall, it is concluded that the proposed method of discharge (for contaminants to air) is the only practicable method and with the quarry operational design and effects mitigation measures proposed is considered to represent best practice within the local aggregate industry. The use of conveyors together with substantial setback distances for processing plant and stockpiling from all boundaries will play a key role in limiting dust emissions in proximity to sensitive receivers. Targeted mitigation measures will provide specific protection for the closest rural residential properties.

5.3 Discharges to Land

5.3.1 Aggregate wash water

The discharge of sediment laden wash water to land is considered to have negligible adverse effects.

The proposed methods of discharge and treatment are the primary form of wash water treatment within the alluvial quarries in the Greater Christchurch area. Considering that the only contaminant expected to be entrained in the water is silt, the discharge to ponds and subsequent infiltration to ground provides an appropriate form of treatment. Options such as spraying wash water to land without the need for ponds was considered, however the silt-laden water would quickly clog the equipment needed for such disposal and this option prevents recycling of 'clean' water once the silt has settled for re-use in the quarry processing plant. Disposal of the wash water to a reticulated network is not possible as there is no reticulated wastewater network in the area, while in any case the loading of such a network with silt laden water would not represent sustainable use of resources.

5.3.2 Stormwater

Discharging stormwater to land in the manner proposed provides an effective means of stormwater treatment and disposal. As with the wash water, stormwater will contain silt. However, it is expected to be otherwise free of contaminants. There is no reticulated stormwater system present for the disposal of stormwater from the site meaning the discharge to ground is the only practicable option for the disposal of stormwater.

5.3.3 Cleanfill and Existing Contaminated Soils

When disposing cleanfill to land, there is the potential for contaminants within cleanfill to become saturated and seep into the ground. Notwithstanding this, the effects of this occurring from cleanfill is considered to have less than minor adverse environmental effects as discussed in Sections 6.2 and 6.3. Additionally, a metre of natural material is to be retained between any cleanfill and the seasonal high groundwater levels below the site to further mitigate this risk. A draft Cleanfill Management Plan (CMP) has been prepared for the site and is included in Appendix F.

It is noted that while contaminated material currently present on the site is considered appropriate for retaining in the context of quarrying operations (as discussed in the PSI/DSI prepared for the site by Golder and included as Appendix H), as the end land use may be lifestyle, rural or recreation, Fulton Hogan is proposing that contaminated material on the site will be excavated and removed from the site prior to any such areas being quarried and as such, contaminants within this material will not be discharged in backfill.

5.3.4 Truck wash

As discussed in Section 4.5.3, sediments collected from the sump of the washdown pad will be periodically excavated and appropriately disposed of off-site and will not be discharged to land. As discussed in Section 6.2.3, water discharged to a holding tank, having passed through an interceptor system, will be free of contaminants prior to draining to ground.

5.4 Conclusion

Overall it is concluded that there are very few alternatives to the methods of discharge proposed. Fulton Hogan has made the decision to remove contaminated material from the site prior to any such areas being quarried, and any truck wash materials not meeting the definition of cleanfill will also be disposed of to landfill. While the proposal could be undertaken differently in terms of layout and design, the mitigation measures proposed will help internalise adverse effects and the impacts of any discharges. This includes locating key parts of the operations in the middle of the site, farthest away from site boundaries, and keeping extraction at least 100 m clear of any nearby dwelling.

Overall it is considered that the measures proposed to avoid, remedy or mitigate adverse effects and the controls proposed for the management of contaminants are considered to be best practice within the local aggregate and fill disposal industry.

6.0 ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

6.1 Introduction

The potential effects associated with the proposed quarry are assessed below and in the supporting technical assessments. The means of avoiding, remedying or mitigating adverse effects are also discussed where relevant.

The following potential effects have been identified:

- Effects on water resources.
- Effects on soil resources.
- Effects on air quality.
- Ecological effects.
- Visual and landscape values.
- Transportation effects.
- Noise effects.
- Effects on amenity values.
- Effects on cultural values.
- Positive effects.

6.2 Effects on Water Resources

6.2.1 Introduction

Potential effects on water quality and quantity from the proposed quarry operation include the presence of vehicles and hazardous substances on site, the potential presence of contaminants in material used to backfill the site, from contamination present on the site, and from take and discharges associated with the proposed quarry operations. It is noted that CRC's Listed Land Use Register (LLUR) for the proposed quarry identifies that the site is listed on the Hazardous Activities and Industries List (HAIL).

A range of mitigation measures have been incorporated into the proposal to ensure these potential effects are avoided, remedied or mitigated.

6.2.2 Effects on surface water

In some instances, gravel extraction has the potential to impact surface waterways. This may occur if there is a waterbody near the site, or if the quarry affects groundwater which is hydraulically connected to a surface waterbody.

The only waterways on the site are water races, which end within the site by soaking to ground. The extraction operation will intercept these races and the flow that would have been lost to ground soakage will be used to supplement the water demand for the operation.

The closest natural waterbody to the site is the Waimakariri River, which is approximately 12.5 km north of the site. It is hydraulically connected to the regional groundwater system, however due to the significant flow volumes and quarrying only occurring above the groundwater table, on-site extraction will not have any influence on the Waimakariri River.

No stormwater from neighbouring properties will flow into the quarry pit as the current stormwater system in the area will be unaffected by the proposed quarry operations. While direct rainfall will fall into the quarry pit, it is not considered to have any adverse effects as this will simply infiltrate to the groundwater system as it currently does (albeit faster than pre-quarrying due to the decreased depth of the vadose zone).

Owing to the absence of natural surface water bodies on or near the site and given that there will be negligible adverse effects on groundwater, there are not considered to be any adverse effects on surface water resulting from the proposed quarry.

6.2.3 Effects on groundwater quality

6.2.3.1 Effects of Extraction

If extraction operations are not managed appropriately, there is the potential for contamination of groundwater resources. While past experience and relevant case law¹⁴ recognises that the act of quarrying itself has very little potential to contaminate groundwater, other activities taking place within a quarry, such as the management of hazardous substances and backfilling of excavations, can pose an increased risk to groundwater.

The analysis of groundwater levels at the site completed in Section 3.6 demonstrates that the maximum seasonal high groundwater level is unlikely to exceed 10.9 m bgl. The applicant is proposing to excavate up to 9.9 m bgl in the deepest part of the site so that groundwater is not intercepted and there will be a separation distance of 1 m between the quarry pit floor and expected maximum seasonal high groundwater levels.

Machinery will be well maintained to limit the potential for any hydraulic fluid spills and machinery operators and site staff will be trained in spill avoidance techniques. However, in the event of a hydraulic oil or fuel leak, appropriate contingency measures including spill kits, a spill management plan and staff training will be in place to manage such an event. All spill events will be recorded, including the volume of spill and the clean-up action taken. Any contaminated soil will be appropriately disposed of to an authorised off-site facility.

In conclusion, any adverse effects on groundwater quality from the extraction activities themselves are considered to be less than minor given the nature of the proposed quarry operation, operational controls such as securing the site and maintenance of machinery, and proposed mitigation measures.

6.2.3.2 Hazardous Substance Storage and Use

The only hazardous substances to be stored on the site will be fuel and lubricants for quarry plant and machinery. It is proposed that a total maximum volume of 15,000 L of diesel will be stored on site, with any other hazardous substances limited to small quantities of lubricants such as engine oils.

All storage of hazardous substances will be in accordance with the requirements Health and Safety at Work (Hazardous Substances) Regulations. Diesel will be stored within a double skinned tank and securely locked when not in use, while all other oils and lubricants will be stored within the on-site workshop on an impervious hard stand surface.

¹⁴ Road Metals Company Ltd v CCC Environment Court decision C163/05.

As noted previously, it is likely that the fixed diesel tank will be installed within two years of commencement of quarry operations until which time refuelling will be via mobile tankers. Therefore, from time-to-time portable tankers may be used on site including up until such a time as a permanent tank is erected on site. The site procedure for refuelling with such tankers will be that it takes place on either a hard stand or compacted surface well away from the working quarry floor.

The dispenser on the fixed diesel tank will be covered to shelter from rain and will contain a self-bunded area (similar to a drip-tray) with refuelling to occur adjacent to this tank on a covered concrete refuelling pad. As noted previously, the refuelling area could be in the form of a drive through area which could also be used for vehicle servicing if need be and called also be used by mobile tankers prior to a fixed tanker being installed. An interceptor system will support the area.

A spill management plan for the site will be developed and will incorporate the management and inspection of the fuel tank (including fuel reconciliation, spill management and containment and visual inspection of the tank).

Machinery will be regularly inspected and well maintained to limit the potential for hydraulic or fuel leaks, and all spill events will be recorded, including the volume of any spill and a record of any clean up action taken, with any contaminated soil being appropriately disposed of to an authorised off-site facility. As discussed previously, machinery operators and site staff will be trained in spill avoidance techniques, and a spill kit will be kept on site and staff trained in its use in the case of a hydraulic or fuel leak from a piece of mobile quarry machinery.

Therefore, any adverse effects on groundwater quality as a result of the storage and use of hazardous substances are considered unlikely.

6.2.3.3 *Effects of Backfilling*

Backfilling has the potential to result in the contamination of groundwater through the leaching of contaminants from inappropriate fill material which is dry, and through leaching occurring as a result of backfill material becoming saturated once it has been placed in the quarry. Material used for backfilling may include quarry overburden and subsoils, process fines, unsaleable product or imported fill material.

Of the materials to be used in the backfilling of the proposed quarry, it is considered that cleanfill material imported from off site has the greatest potential to result in contamination of groundwater resources underlying the site. Accordingly, material sourced from off site will be subject to a cleanfill tracking system with the following requirements:

- The name of the company that delivered the cleanfill to the site.
- The date of deposition.
- The source of the cleanfill.
- A description of the cleanfill.
- The approximate quantity of cleanfill.

For the Roydon Quarry, all material to be imported to the site will meet the CRC definition of cleanfill as outlined in the LWRP. Additionally, any contractor responsible for excavation of the cleanfill at its source and/or for its transportation to the site will not deposit cleanfill at the site without having signed a formal agreement with Fulton Hogan that the deposited cleanfill will meet the acceptance criteria specified above. The deposited cleanfill shall be inspected by quarry site staff before it is placed in its final position on site.

In addition to these mitigation measures, Fulton Hogan will maintain a separation distance of at least 1 m between the quarry pit floor and seasonal high groundwater levels at the site. This separation distance will provide a buffer between the base of any fill material and the groundwater table, thereby mitigating the potential for fill material to become inundated by the groundwater table. Additionally, backfilling increases the buffer between the final rehabilitated ground level and the underlying groundwater table.

In summary, given the quarry floor will be above expected seasonal high groundwater levels, the material is only cleanfill, and given the mitigation measures proposed and adherence to the CMP contained in Appendix F, it is considered that any potential effects on groundwater from backfilling activities will be less than minor.

6.2.3.4 Discharge of Aggregate Wash Water and Stormwater

Water that is used for washing of gravel products will be discharged to land via infiltration through settlement ponds. This water will be silt-laden but is expected to be otherwise essentially free of contaminants. The primary method of treatment is through settlement followed by filtration through the underlying soil layer. This involves the establishment of appropriately sized settling ponds close to the aggregate processing plant. Such ponds are common at the alluvial quarries within the Christchurch area and also provide a means of recycling water for aggregate washing. From time-to-time, the wash water ponds need to be cleared out to remove settled sediment, with this material being disposed of as cleanfill at an appropriate location within the quarry site to assist in site rehabilitation.

Stormwater run-off from the site will occur through infiltration to ground. Where large volumes exceed the natural infiltration capacity of the ground, the water will naturally drain to the lowest point of the site and then percolate through the gravels in due course ensuring effective drainage of the site. Following periods of prolonged heavy rainfall, there may be times when ponding occurs in the pit, although these will be limited in their extent and duration.

As both of these discharge sources will only contain sediment, it is not envisaged that there will be any adverse effects on groundwater quality as a result.

In terms of the proposed truck wash, sediment from the sump of the washdown pad be excavated and disposed of to an approved off site facility. Water discharged to a holding tank, having passed through an interceptor system, will be free of contaminants prior to draining to ground.

6.2.3.5 Contaminated Land

The depth to groundwater beneath the site is approximately 11 m bgl. At this depth, it is unlikely that existing petroleum hydrocarbon contamination in surface soil, related to small volume spills, would result in significant contaminant migration into groundwater. However, the protection of groundwater quality has been considered based on the presence of active groundwater abstraction bores down hydraulic gradient from the site and screened within the shallow aquifer.

The results of the soil quality assessment indicated that petroleum hydrocarbon concentrations in soil were below the MfE 'Tier 1 all pathway' acceptance criteria. Domestic use bores were identified to be down hydraulic gradient from the site, the closest being 50 m from the southeast corner of the site. Given that the risk to shallow groundwater from petroleum hydrocarbons beneath the areas of interest is low, any associated risk to down hydraulic gradient boreholes is also low.

The risk to down hydraulic gradient groundwater quality (potable water supply) from leaching of localised metals (lead, copper and zinc) in soil is considered low, given the depth to groundwater and distance to the domestic supply boreholes (>800 m) from the source of contamination.

Fulton Hogan is proposing to remove any contaminated soil from the site prior to undertaking any works in these areas which will remove the risk for any ongoing contamination from this land. Validation of areas that have been remediated will also be undertaken to determine compliance with a rural-residential land use to reflect that the end use of the site is unlikely to be of a commercial/industrial nature.

Any potential effects on groundwater quality associated with the remediation of contaminated soils are therefore considered to be less than minor.

6.2.3.6 Summary

In relation to any other risks to groundwater quality, the site will be securely locked when works are not taking place, with security cameras operating, to limit the potential for unauthorised access which could increase the potential for some form of contamination to occur on the site.

Monitoring of bores which Fulton Hogan has already installed at the site will occur to ensure groundwater in the vicinity of the site is not being contaminated as a result of quarry operations.

In conclusion, any potential adverse effects on groundwater quality from the proposal are considered to be less than minor.

6.2.4 Groundwater quantity

It is proposed that water will be supplied to the site for aggregate washing, dust suppression, irrigation and other ancillary activities through a change the conditions of the existing water permit (CRC182422) for the site and through abstracting water from the SDC stock supply and irrigation water races on the site, subject to authorisation from SDC.

As the existing groundwater water take will simply be changed to allow a different use of water, with no increase in volumes, and for uses which is primarily non-consumptive in nature, it is considered that there will be essentially no difference in effects from the change of conditions sought to this consent. Conditions of the consent already prescribe actions to be taken by the consent holder during periods of low groundwater levels, and no changes are being sought to these conditions.

If required, additional water may be obtained from the irrigation and stock water races that terminate in the centre of the site (subject to SDC approval) or potentially captured from stormwater runoff and stored in tanks.

6.3 Effects on Soil Resources

6.3.1 Quarrying operations

Overall it is considered that the proposal will not have adverse effects on soil quality. Machinery will be well maintained to limit the potential for any hydraulic fluid spills and a spill management plan shall be developed for the site. This will detail appropriate contingency measures in the form of operational practices, spill kits and staff training that will be in place to manage any hydraulic oil or fuel leak. All spill events will be recorded, including the volume of any spill and a record of any clean up action taken, with any contaminated soil being appropriately disposed of to an authorised off-site facility. Additionally, any incident that occurs is placed into a formal record for review by senior managers at Fulton Hogan on a monthly basis, along with standard reporting procedures to CRC.

Hazardous substances stored on site will be managed so as to not adversely impact soil resources as discussed in relation to water quality.

Topsoil and subsoils removed prior to excavation will be appropriately stored to prevent degradation and erosion losses, prior to being used in site rehabilitation.

While the development of the site for quarrying will temporarily remove the area from productive use, it is intended that the site will be progressively rehabilitated, and the original topsoil used as a final layer on the rehabilitated site. Any extra soil that is brought to the site to create bunds in the initial stages of site preparation, or to facilitate progressive grassing of completed areas, will be of a high standard, meeting the definition of cleanfill, and will be re-used on the site in future rehabilitation. On completion of rehabilitation, the site will be returned to its pastoral state or used for another appropriate activity. In this respect, the loss of the site from productive use will be temporary, with overall adverse effects on the soil resource considered to be less than minor.

In addition, contaminated soil will be removed from the site prior to excavation taking place in identified areas, thereby improving the overall quality of the soil resource on the site.

6.3.2 Contaminated land remediation

As documented in the combined Preliminary Site Investigation (PSI)/Detailed Site Investigation (DSI) report contained in Appendix H, parts of the site have been used for HAIL activities, specifically livestock dipping and spraying activities, chemical use/storage, waste disposal and potential asbestos products within dwellings.

Soil samples collected from the areas of HAIL activity were submitted to a chemical laboratory for analyses of contaminants of concern associated with the identified HAIL activities. The analyses comprised metals/metalloids, organochlorine pesticides (OCP), volatile organic compounds (VOC) and total petroleum hydrocarbons (TPH). All analysis results were below the assessment criteria (commercial/industrial land use) for the respective contaminants of concern. The results of the laboratory analyses indicate that the investigated soils are suitable for commercial/industrial land use and remediation or management of the soils is not required.

As the final land use for the site is yet to be determined however and may include rural, lifestyle or recreational uses, it is considered better to remove any such material from the site prior to it being quarried should excavation occur in these areas. This approach would also apply to any material removed from the 'waste dump' around 107 Dawsons Road, which would be removed the site should it be disturbed in the future.

Additionally, it is proposed that prior to demolition of the dwellings at 107 Dawsons Road and 220 Jones Road, asbestos surveys should be undertaken, and any identified or suspected asbestos-containing material (ACM) removed in accordance with the relevant regulations, and when dwellings have been vacated, investigation of lead-based paint in soils (around the periphery of the dwellings) should be undertaken.

Fulton Hogan is proposing to remove any contaminated soil from the site prior to undertaking any works in these areas which will remove the risk for any ongoing contamination from this land. Validation of areas that have been remediated will also be undertaken to determine compliance with a rural-residential land use to reflect that the end use of the site is unlikely to be of a commercial/industrial nature.

An unexpected discovery protocol (applicable to the whole development) will also be prepared to address the potential for uncovering of contaminated soil/materials during earthworks and extraction.

Overall, it is considered that any effects associated with the handling and remediation of contaminated areas on the site will be less than minor and will result in an overall improvement in soil quality on the site.

6.4 Effects on Air Quality

6.4.1 Introduction

An assessment of the potential air discharge effects associated with the proposed quarry is provided in the AQA included in Appendix D. The assessment discusses the potential adverse effects of dust discharges, including health effects, into air from the full range of quarry operations and includes a draft DMP.

6.4.2 Potential nuisance effects

The air assessment identified 15 sensitive receptors located at distances of less than 250 m, and 35 sensitive receptors within 500 m from the extraction area. Residences beyond 250 m from the proposed quarry extraction area are not expected to experience any significant dust impacts resulting from the proposed quarry. However, a distance of 500 m has been applied due to public interest in the air quality effects of quarrying in Canterbury.

Of these, two receptors (identified as R3 and R11) are less than 100 m from the edge of the proposed extraction area, and R3 is 19 m from the extraction area. These receptors are downwind of the proposed quarry extraction area when the wind is from the east-northeast through to the south-southeast (R11) and to the west-southwest (R3). Therefore, winds from these directions are likely to be the most significant when considering any incremental effects from the proposed quarry on the surrounding rural area.

Receptors to the southwest of the site (R13 to R24) and the nearest receptors (R3 and R11) are considered to have moderate to high risks of being impacted by high dust impacts from the proposed quarry development, assuming no mitigation or monitoring of impacts. Receptors to the north (R1 to R8, except R3) and southeast (R25 to R35) of the site are expected to have a moderate risk of being impacted by nuisance dust impacts from the proposed site.

The other sensitive receptors located to the northeast of the site (R9, R10, R12) along with the Templeton School are exposed to much lower frequencies, and therefore dust nuisance from the proposed site on these receptors is not expected to be significant. Accordingly, it is considered that standard dust management practices and mitigation measures are likely to be sufficient for controlling dust to acceptable levels at these receptors.

The air assessment includes general dust management and mitigation measures, targeted management and mitigation measures and monitoring requirements. This is considered necessary to ensure potential dust impacts on the nearest sensitive receptors and those most exposed to being downwind, and during adverse weather conditions, are acceptable. Section 7.0 of the AQA outlines dust mitigation requirements for three identified receptors.

To limit dust emissions from the quarry site, the following mitigation measures are proposed:

- Not quarrying within 100 m of an occupied dwelling existing on the properties at 319 Maddisons Road or 153 Curraghs Road as at November 2018 without written approval of the dwelling owner.
- Vehicle movements on unpaved surfaces are the primary source of dust emissions. Fogging systems as a primary measure and water carts as a back-up will be used for dust suppression during dry weather so that working areas, haul roads and stockpiles are kept damp. Water will be available for dust suppression from an existing bore on the site.
- Vehicle speeds will be kept below 15 km an hour on the site during dry or windy conditions.
- Maintaining haul roads so that they are comprised of an aggregate base, with surfaces that are generally graded and free of pot holes.

- Using field conveyors as the primary form of material transport within the site as this significantly minimises the potential for dust generation compared with the transport of aggregate by haul trucks.
- Minimising drop heights when loading trucks and conveyor hoppers.
- Pre-dampening soil prior to removing overburden.
- Minimising open areas to no more than 40 ha of 'active working area' at any one time.
- Locating fixed plant in the centre of the site and below ground level.
- Only using portable processing plant with the use of water dust suppression (either sprays or high-pressure fogging system) fixed to the plant. Additionally, where they are located within 250 m of off-site sensitive locations, they should only be operated when the wind is blowing from the direction of the sensitive location.
- All stockpiled aggregates will be located within the quarry floor and set back 100 m from site boundaries.
- Maintaining, establishing and enhancing shelter belt plants around the site boundaries.
- Measures will be taken to ensure trucks leaving the site are appropriately loaded to reduce the potential for material to be windblown from vehicles when leaving the site.
- Overburden stockpiles and bunds are to be re-vegetated or planted.
- The site will be rehabilitated as soon as practicable to limit potential for dust generation by minimising exposed surfaces.
- The use of appropriate surface treatments for exposed surfaces, such as pea gravel or chemical dust suppressants.
- Sections of the internal site access road will be sealed and used in conjunction with a rumble strip to assist in removing muddy material from vehicle wheels before exiting the site.
- Quarrying activities within 250 m of any nearby dwelling will cease when:
 - the wind is greater than 7 metres per second (m/s) (hourly average); and
 - during dry weather conditions; and
 - the wind is blowing from the following directions:
 - when site activities are occurring within 250 m from receptor locations along the southeastern boundary and when winds are from the northwest to northeast (310°N to 50°N); or
 - when site activities are occurring within 250 m from receptor locations along the northwestern boundary and when winds are from the south to southwest (170°N to 230°N)

Wind speed and direction will be monitored continuously on site by equipment fitted with an alarm system to advise site personnel when the above triggers are exceeded.

- Continuous dust monitoring of PM₁₀ when operating close to sensitive locations including within 250 m of residences along the southeastern or northwestern site boundary. When operating within 250 m of either Receptors 3 or 11, an additional monitor should be situated at the site boundary nearest to each receptor. The continuous dust monitoring equipment should be fitted with an alarm system that, when PM₁₀ concentrations exceed the specified trigger levels, sends a warning to the Quarry Manager or other nominated person. These trigger levels initially require actions to investigate and reduce dust emissions, and if the higher trigger level is reached then for all dust generating activities.
- Adherence to a Dust Management Plan.

6.4.3 Potential health effects

The AQA has considered the potential health effects from the proposed site, which would be associated with the potential PM₁₀, PM_{2.5} and Respirable Crystalline Silica (RCS) fractions of dust emissions. PM₁₀, PM_{2.5} and RCS emissions will be minimised to low levels provided the proposed dust mitigation measures are implemented and followed.

The AQA compared the potential health effects of the proposed Roydon Quarry with the operations undertaken by the group of Yaldhurst quarries as they are considered to have a greater potential for generating dust and fine particulate emissions. It considered the air quality programme undertaken for ECan by air monitoring firm MOTE from December 2017 to April 2018. The Yaldhurst quarries cover an exposed area of approximately 200 ha with multiple operations each having a fixed and portable processing plants. Cleanfilling is also generally undertaken on each of the sites.

The Yaldhurst Air Quality Monitoring Programme (Mote 2018) generally concluded that RCS concentrations were very low and well within the applicable guideline. Regarding RCS, the Medical Officer of Health, Dr Ramon Pink, reviewed the results of the monitoring programme and advised¹⁵ that *“Overall, the results show there is no serious public health risk to Yaldhurst residents from airborne dust”. “Nuisance dust levels will not cause long-term health effects, but we know it can cause irritation and symptoms of concern in some people...”*. Given the comparison between the Yaldhurst quarries and the proposed Roydon quarry, the risk for residences adjacent to the proposed Roydon Quarry is expected lower still.

PM_{2.5} concentrations were also low, typically less than half of the 24-hour average WHO guideline. PM₁₀ concentrations, where measured using an NES reference method, approached but did not exceed the NES. Consequently, it is not expected that PM₁₀, PM_{2.5} and RCS ambient off-site concentrations resulting from the proposal will approach or exceed the relevant health-based guidelines and standards for PM₁₀, PM_{2.5} and RCS.

6.4.4 Summary

In conclusion, the discharges of dust from the proposed Roydon Quarry are not expected to result in a significant dust nuisance or health effects relative to applicable air quality guidelines and standards. This is based on the proposed mitigation and monitoring methods being implemented to control dust to an acceptable level (i.e., one that is not offensive or objectionable beyond the site boundary). This includes extensive continuous PM₁₀ monitoring and wind monitoring, linked to trigger requirements for ceasing dust generating activities.

6.5 Ecological Effects

The terrestrial vegetation on the site predominantly consists of exotic species, being shelter belts and pasture, none of which are protected under the relevant planning documents. Owing to the modified nature of the environment at the site, resulting from many years of farming, any effects on terrestrial ecology values from quarrying are considered to be negligible. It is considered that as a result of the plantings (including natives) that Fulton Hogan is proposing to establish as part of this proposal as outlined in the LVIA included as Appendix E, there is likely to be a net gain in terrestrial ecological values.

As there are no adverse effects on surface water quality with only artificial water races within the site, and all discharges to be contained within the site, it is considered that there will not be any adverse effects on aquatic ecology as a result of the proposed activity.

¹⁵ <https://ecan.govt.nz/get-involved/news-and-events/2017/working-together-to-resolve-quarry-dust-issues/>

6.6 Visual and Landscape Values

The visual effects associated with alluvial gravel pits are typically much less than those associated with hard rock quarries and are typically easier to manage through mitigation measures. The proposed quarry will cover an area of approximately 170 ha, with material being excavated to a depth of up to 9.9 m. The site and surrounding sites have a flat topography and can be viewed from several vantage points in the receiving environment, including residents located to the north and west of the proposal. The site is located within the Inner Plains zone and has a distinctly rural character however the receiving environment is undergoing some degree of change with the development of major roading infrastructure, commercial activity and rural/residential development.

A detailed LVIA has been prepared by DCM Urban is included as Appendix E. The LVIA considers the proposal will result in the alteration of the landscape, which includes the loss of groundcover and existing vegetation within the site, the alteration of the topography of the otherwise flat land form (creation of irregular internal slopes), and a lowered ground level. Residential dwellings and viewpoints on the roading network that may be affected by the proposal will experience a low magnitude of change. This is owing to the proposed mitigation measures and existing vegetation, or other landscape features that hinder the view of the site. Some views will be able to be obtained from elevated viewpoints such as the CSM2 flyover although these will be of a short duration as vehicles would travel over this section of road at higher speeds.

The applicant proposes to develop earth bunding and vegetative screening along the site boundaries prior to quarrying commencing. Vegetation will be retained along the road boundaries of Curraghs Road and the property boundary with 319 Maddisons Road. Bunding will be sown with grass or hydro-seeded to achieve swift grass cover and will be regularly maintained after establishment. Rehabilitation of the site will also be undertaken progressively as quarrying develops. The existing dwellings, associated infrastructure and associated vegetation adjacent to Dawsons Road will be retained in the short to mid-term, which will continue to give the feeling of rural occupation of the dwelling.

Overall, the LVIA concludes that any potential adverse effects on landscape and visual amenity values will be less than minor.

6.7 Noise Effects

6.7.1 Introduction

Noise generation from the proposed quarry operations will originate from several sources including construction noise associated with establishment and closure of the quarry, and noise associated with the day to day functioning of the operational quarry. A detailed Acoustic Assessment has been prepared by Marshall Day Acoustics (MDA) and is included as Appendix I to this report. Noise sources include the removal of overburden material, construction of bunds, extraction of aggregate, mobile quarry machinery, mobile and fixed processing plant, crushing and stockpiling, importation of backfill, spreading and re-contouring of materials as part of site rehabilitation and road truck and trailer movements.

6.7.2 Existing noise environment

The MDA report assessed the existing noise environment through a programme of noise measurements. To quantify the existing levels of noise in the environment, the assessment includes a comparison to establish any variation in noise levels at particular receiver locations, between both long-term unattended monitoring and shorter attended surveys. The comparison determines how the ambient noise level (level of noise present from existing sources in the absence of any proposed quarrying noise) varies over time, with differing weather conditions, and distance from roads. The findings are used as a basis for assessing noise generated from the establishment, operation and closure of the proposed Roydon Quarry.

Sections 3.0 to 3.4 of the MDA report (Appendix I) conclude that the existing ambient noise environment primarily comprises road traffic and aircraft activity. Therefore the ambient noise level is most influenced by the intensity of road and air traffic, while the analysis demonstrates that wind direction is not especially critical to the noise levels experienced in the area. This is supported by the short-term attended survey positions chosen to consider the variation in road traffic noise levels with distance, where the data shows that meteorological variations are less influential than traffic conditions. MDA considers that the long-term monitoring data better represent ambient noise levels experienced in the area for the purpose of assessing noise effects. Overall, given the correlation between ambient noise and road traffic activity, the analysis shows the distance between roads and any given receiver is a critical factor.

Given that the proposed site is situated around 10 km from Christchurch International Airport, new buildings and alterations to existing buildings associated with sensitive activities located within the associated airport noise contours are subject to providing a minimum level of façade sound insulation performance to mitigate any aircraft noise effects inside these buildings. Other common sources of noise from existing activities in the vicinity of the proposed quarry site are also provided in section 3.0 of the MDA report, which gives consideration to the future noise environment. It is noted that the proposed site and surrounding area is near to the CSM2 which is currently under construction and scheduled for completion in 2020. The MDA report contains calculations to predict the ambient noise environment upon completion of the CSM2. The results indicate that the ambient noise from road traffic will not change appreciably once the motorway is operational.

6.7.3 Assessment of noise effects

6.7.3.1 Construction Noise

MDA discusses how site establishment works such as construction of earth bunds, initial topsoil stripping, and rehabilitation activities are assessed as “construction noise”. Such works are typically short-term activity, with long-term benefits, and are consistent with noise generated from rural activities that would otherwise be permitted on the site. In terms of this part of the works, the greatest potential effects on surrounding properties is the construction of bunds. The highest predicted noise level being 71 dB L_{Aeq} at 319 Maddisons Road, which is approximately 20 m to the north of the site.

While this will still comply with the relevant construction noise standards (NZS 6803:1999), MDA consider that liaison between Fulton Hogan and neighbouring landowners (and in particular 319 Maddisons Road) regarding construction timeframes and mitigation measures would be appropriate to further to reduce any potential effects.

6.7.4 Operational noise assessment

6.7.4.1 Development of Assessment Criteria

Guidance from sources, such as international and national legislation, documents, and noise standards enabled MDA to prepare noise assessment criteria tailored for the proposal, as outlined in sections 4.4 to 4.5 of the MDA report. Developing the assessment criteria provides recommended noise limits for the proposed Roydon Quarry which includes the initial construction works and for when the quarry becomes operational.

In developing the assessment criteria, the MDA report assesses the proposal against the provisions of both the SDP and the CDP and considers that the two districts’ approaches to assessing environmental noise are not compatible due to the following:

- The noise limits differ, in terms of both level and assessment parameter.
- The times of application outlined within the criteria (day vs night) differ.

- The CDP refers to the more recent 2008 version of the noise standards, NZS 6801 and 6802.
- There is no provision for a special audible characteristic adjustment in Christchurch.

While the SDP is the relevant planning document, MDA notes that the CDP is a more recent planning document and the levels within this document are more appropriate with a lower daytime noise level. Fulton Hogan considers it good practice to use levels consistent with updated guidelines and therefore is proposing compliance with the levels proposed by MDA.

Key international guidance is provided by the WHO's Guidelines for Community Noise and is used within New Zealand as a basis for assessing environmental noise exposure. This document focusses on critical health effects such as sleep disturbances, annoyance, and speech interference. The guidance provides exposure levels that represent the onset of the effect for the general population.

Based on the data from the sources outlined above, a summary of the numerical values has been stipulated as per Table 4 below. These results develop the assessment criteria for the project in determining the noise levels for the proposed quarry.

Table 4: Comparison of noise assessment guidance.

Time	Parameter	Selwyn District Plan		Christchurch District Plan		NZS 6802 (Dwelling)	WHO (Dwelling)
		Living	Rural	Living	Rural		
Day	Average	55 dB L _{A10}	60 dB L _{A10}	50 dB L _{Aeq}	55 dB L _{Aeq}	55 dB L _{Aeq}	50-55 dB L _{Aeq}
	Maximum	85 dB L _{Amax}	85 dB L _{Amax}	-	-	-	-
Night	Average	40 dB L _{A10}	45 dB L _{A10}	40 dB L _{Aeq}	45 dB L _{Aeq}	45 dB L _{Aeq}	45 dB L _{Aeq}
	Maximum	70 dB L _{Amax}	70 dB L _{Amax}	65 dB L _{Amax}	70 dB L _{Amax}	75 dB L _{Amax}	60 dB L _{Amax}

As a result, MDA has recommended the following noise limits in Table 5 for the proposed quarry, to be assessed at or beyond the site boundary and are discussed in detail below.

Table 5: Recommended Roydon Quarry noise limits.

Time period	Hours	Site boundary noise limit	
		dB L _{Aeq}	dB L _{Amax}
Daytime	0600-1800	55	-
Evening	1800-2200	50	-
Night-time	2200-0600	45	70

During the daytime, the area is subject to noise from a range of sources, including air, road and rail traffic and agricultural activities. A daytime noise limit of **55 dB L_{Aeq}** is considered appropriate for the surrounding rural area. This proposed limit is notably below that in the SDP, which recognises the rural zone as a principally business, rather than residential (Policy B3.4.1).

A lower level of quarry activity is proposed during the evening, from 1800 to 2200 hours, and this will not occur every day. Ambient noise levels in the area begin to decline after 1800 hours and greater sensitivity to noise in residential environments increase as more residents are occupying their dwellings. As such, an evening noise limit of **50 dB L_{Aeq}** is recommended and this aligns well with Fulton Hogan's reduced level of site activity during this period.

As discussed by MDA, during night time periods, the noise environment is significantly influenced by road traffic. Traffic noise begins to increase from 0400 hours, which suggests higher noise limits would be appropriate during the early morning period, compared with the remainder of the night. The quarry's proposed 0600 hours start time is therefore acceptable in the context of the ambient environment.

Otherwise, a night-time noise limit of **45 dB L_{Aeq}** is recommended as this is typical for a rural area and broadly consistent with the provisions in the SDP. A maximum noise limit of **70 dB L_{Amax}** is consistent with the Selwyn District Plan and generally in the middle of the guidance summarised in Table 4.

6.7.4.2 Predicted Noise Levels

MDA has predicted the typical-case and worst-case (i.e., fully exhausted pit at Stage 5) scenarios at each receiver location using computer noise modelling software. Section 5.0 and Table 13 of the MDA report outline the operational noise assessment calculation scenarios.

These tables demonstrate that compliance can be achieved at all nearby receivers for the limits recommended by MDA.

6.7.4.3 Daytime Noise Effects

MDA considers that for the main daytime period, noise effects associated with the activity will be acceptable in the local environment. The following items are noted:

- The recommended assessment criteria of 55 dB L_{Aeq} is achieved at the site boundary;
- Noise levels will remain comfortably below Selwyn District's 60 dB L_{A10} daytime noise limit (i.e. between 0730 and 2000);
- Calculated noise levels are similar with the existing daytime ambient noise levels;
- Receivers to the north are in keeping with the scale of existing noise environment. The predicted operational noise levels are mostly between 45 and 50 dB L_{Aeq} , and potentially up to 55 dB L_{Aeq} during peak hours with mobile processing plant operating nearby.
- Southern receivers fall within the vicinity of SH1 which is dominated by road traffic noise, and generally exceeds 65 dB L_{Aeq} . Therefore, calculated noise levels are unlikely to be discernible at these receivers, as the predicted noise level of 54 dB L_{Aeq} is still 10 dB below ambient noise.

Overall, the calculations achieve the recommended noise limits and remain comfortably below the SDP noise limits and as such the potential adverse effects are considered to be less than minor.

6.7.4.4 Evening and Night-time Noise Effects

Section 7.4 of the MDA report considers evening and night-time noise effects to be less than minor as limited quarry activity will occur outside of normal daily operating hours. This ensures that noise emissions will remain below the recommended project criteria of 50 dB L_{Aeq} during the evening and 45 dB L_{Aeq} at night.

For receivers considered around the perimeter of the site, night time operation of the quarry will result in acceptable noise effects for nearby residents because:

- Noise levels received within dwellings will be low, even allowing for partially open bedroom windows for ventilation;
- Maximum noise levels received within bedrooms will be sufficiently low as to not result in sleep disturbance;
- Receivers around SH1 are already subject to intermittent high noise levels from road and rail activity;
- Noise effects for receivers, such as those in Templeton or south of SH1 are considered negligible due to the additional distance from the site.

6.7.4.5 Traffic Noise

During the day, levels of traffic on both SH1 and local roads, compared with the proposed quarry traffic, is sufficiently high that there will not be any perceptible increase in road traffic noise levels. Despite minimal change in daily traffic noise levels, the most sensitive periods for nearby receivers are likely to be during the early morning, evening and night.

It is estimated that there will be relatively low numbers of heavy vehicles outside of normal daytime operating hours, and all night-time traffic will occur on SH1 as heavy vehicles are prohibited from using smaller local roads at night.

Section 10 of the MDA report includes calculations of the worst-case change in noise level for properties that are considered to be most affected by night-time noise. This is summarised below:

- 4 Dawsons Road will receive approximately 50 dB $L_{Aeq}(1hr)$ from existing traffic, and 54 dB $L_{Aeq}(1hr)$ with quarry traffic.
- Houses on Jones Road will receive approximately 53 dB $L_{Aeq}(1hr)$ from existing traffic, and 55 dB $L_{Aeq}(1hr)$ with quarry traffic.
- 153 Curraghs Road will receive approximately 56 dB $L_{Aeq}(1hr)$ from existing traffic, and 57 dB $L_{Aeq}(1hr)$ with quarry traffic.

Section 10.3 of the MDA report states that for road traffic noise received at dwellings during the night, the maximum (L_{max}) noise levels are the critical factor, as averaging could potentially disguise noise effects in cases with low traffic volumes. Maximum noise levels from a passing truck associated with the proposed quarry is indistinguishable from other heavy traffic on the road. MDA generally anticipates that maximum noise levels from trucks will be below 70 dB L_{Amax} beyond a distance of around 20 metres from the road.

Overall, daytime traffic from the proposed quarry traffic will not increase noise levels as traffic on both SH1 local roads are currently relatively high. Night calculations also demonstrate little increase in traffic noise when assessed during the worst hour (i.e., quietest hour during the night). Therefore, it is considered that based on the analysis undertaken by MDA (summarised above), it is considered any adverse effects associated with traffic noise will be negligible.

6.7.5 Vibration

6.7.5.1 Site-generated Vibration

Section 9 of the MDA report considers that there are no likely significant vibration sources associated with the proposal (noting that there is no blasting required). Vibration-generating activities that will occur close to sensitive receivers include boundary bund construction, using excavators and trucks; and aggregate extraction by loaders at the edge of the quarry pit. However, MDA considers that aggregate extraction results in very little vibration outside of the site, while bund construction has the most potential to generate vibration effects due to its proximity to receivers.

The assessment against relevant legislation and standards indicate that the most conservative (highest) estimations of vibration generated are comfortably below the residential building damage criterion of 5 mm/s. The closest receiver distance of 20 m may periodically experience vibration within the dwelling from excavator use on the boundary for bund construction. However, the highest estimates are still far below the intolerable threshold (BS 5228).

Overall, it is considered that vibration from other activities received at the closest dwelling, will be minimal. Vibration received at any other property from all activities (including bund construction) is not likely to be perceptible within dwellings.

6.7.5.2 Traffic Vibration

Vibration from quarry trucks are similar to all other road traffic and do not result in any different level of effects to traffic otherwise using those roads. Most vehicle movements associated with the proposed quarry will travel via SH1, with few movements occurring on smaller local roads. MDA have undertaken a series of measurements (as outlined in section 11.0 of the MDA report) to determine the typical levels generated by heavy vehicles and quarry trucks; and existing levels of vibration present in the environment around the application site.

The calculations indicated that the bulk of vibration events measured from all types of vehicles in all locations fall below 0.3 millimetres per second (mm/s), which is notable as the typical threshold of perceptibility for vibration in residential environments given in BS 5228-2. Some vibration events from heavy vehicles were measured up to a maximum of 0.6 mm/s, which is comfortably below the 1 mm/s value that BS 5228-2 suggests may cause complaints. Single storey dwellings will typically also incur a reduction in vibration transfer from the ground to the foundation and then a further decrease from the foundation in to the remainder of the building.

Where any quarry traffic does utilise local roads and pass close to dwellings, the vibration generated will be indistinguishable from that generated by any other heavy traffic, as reflected in the calculations (section 11.1 of the MDA report).

6.7.6 Mitigation

In addition to the assessment above, section 16 of the RMA establishes a duty to avoid unreasonable noise by adopting the best practicable option to ensure that the emission of noise does not exceed a reasonable level. To achieve this, MDA have recommended a number of mitigation measures including the following:

- Establishing noise control bunds around the site perimeter prior to quarrying activity;
- Not utilising tonal reversing or movement alarms on their plant or equipment (instead employing broadband sound or visual-only alternatives);

- Favouring the use of electric conveyor systems over vehicle-based transport wherever practical; and
- Undertake liaison with local stakeholders during construction and operation of the quarry

6.7.7 Summary

The MDA assessment concludes that noise and vibration emissions associated with the quarry will be acceptable in the local environment, and that no significant adverse effects will occur. Having regard to the mitigation measures proposed including the noise levels to be complied with, it is considered that the noise effects associated with the proposal will be minor.

6.8 Transportation Effects

6.8.1 Roothing network

The proposed site access points (for heavy and light vehicles), road upgrades and vehicle movements are set out in Section 4.9 and a detailed ITA included in Appendix C.

In the case of this proposal, truck and trailer units will leave the site and travel along Jones Road to their destination. The Stantec report has analysed the anticipated destinations for trucks leaving the site, based on the current distribution of movements from Fulton Hogan's Pound Road quarry.

Stantec concludes that in terms of a traffic engineering perspective including traffic safety and efficiency of the roading network, the traffic related effects of the proposed quarry will be no more than minor subject to the following mitigation measures:

- Limit the daily heavy traffic volume to a maximum of 1,500 heavy vehicle movements per day, on any one day.
- Access is to be to and from Jones Road, located 350 m to 500 m west of Dawsons Road.
- The site access road is to be formed with a traffic lane in each direction at least 3.5 m wide, and a sealed shoulder 1.0 m wide, over at least the first 100 m of the road. That is to minimise the likelihood of transfer of debris onto Jones Road.
- Within the site, ensure there are truck waiting areas on entry and exit to avoid the need for trucks to wait on Jones Road to enter the site, or to park on the road while exiting (e.g., for paperwork).
- The access to Jones Road is to be formed to a full intersection standard, including provision for a channelised left turn lane from the west, and right turn bay from the east, and an acceleration lane for traffic exiting to the east.
- Jones Road is to be widened between the site access intersection and Dawsons Road to a 9.0 m sealed carriageway width, including 3.5 m traffic lanes, 1.0 m wide shoulders, and painted edge lines.
- The Jones Road/Dawsons Road intersection is to be upgraded to address the vehicle short stacking issue between the railway and Jones Road. The preferred method is to relocate the intersection and provide a roundabout control as indicated by either of the two intersection concept drawings assessed in this report. It is anticipated some queue warning provision may be required at both the Jones Road/ Dawsons Road intersection, and the Main South Road/Dawsons Road intersection.

All of these upgrades will be of a high standard, consistent with a “safe system” response. The improvements at the Jones Road/Dawsons Road intersection in the vicinity of the site will lead to a significant improvement in road safety compared to the existing situation.

The ITA concludes that the site is well positioned relative to the strategic road network. Approximately 90 % of the generated heavy traffic will only have to travel over a short distance of 450 m to 600 m on the District Council road network before utilising Main South Road to access the locations in the greater Christchurch area that will be serviced by the quarry. The access to Main South Road will be safe and efficient with the roundabout at Dawsons Road/Main South Road to be constructed as part of CSM2 works.

The remaining 10 % of generated traffic will spread across various Council roads such that the additional volume on any one road will remain low. The roads utilised include Jones Road to the west to service the Rolleston Industrial area, and Waterholes Road/Hamptons Road to service Prebbleton and Lincoln. Only very low volumes are expected to use Jones Road east of Dawsons Road, Dawsons Road north of Jones Road, and Curraghs Road.

Having considered the road classifications, existing and future traffic volumes, it is considered that effects of the quarry do not warrant the applicant undertaking additional road improvements beyond those proposed in the ITA.

In addition to traffic engineering effects, adverse effects of truck movements such as noise, vibration and spillage of material on roads can be a source of nuisance to nearby residents. As noted above, 90 % of the generated heavy traffic will only have to travel over a short distance of 450 m to 600 m on the District Council road network before utilising Main South Road and use of this road is consistent with its High Volume State Highway/Major Arterial Road function. The remaining 10 % of movements will be spread across the network and while the movements may be noticeable by nearby residents, heavy vehicle movements are consistent with many rural activities such as quarrying, farming and forestry. The movements are not at a level that is considered to be out of character with the surrounding rural environment.

Additionally, vehicles leaving the site will be well maintained, thereby minimising noise and exhaust emissions. Quarry staff will be trained on how to load road trucks to avoid spillage, and all laden trucks leaving the quarry will be visually inspected to reduce the risk of quarry products being spilled on public roads.

Cumulative effects arising from the traffic movements associated with the quarry and existing movements will be readily accommodated by the surrounding road network.

6.8.2 Rail network

The Dawsons Road railway level crossing is being upgraded as part of the CSM2 project. At the request of KiwiRail, Fulton Hogan commissioned a Level Crossing Safety Impact Assessment (LCSIA) to assess the change in safety risk with the expected change in traffic volumes. The assessment was undertaken by Stantec, and is attached to the ITA in Appendix C.

Representatives from KiwiRail, SDC and CCC attended the site visit to review the level crossing. The methodology was in accordance with the KiwiRail Level Crossing Risk Assessment Guide. The purpose of the assessment was to investigate the impact the change of use would have on the railway level crossing and identify the effectiveness of the proposed mitigation measures. An output of the LCSIA is a Level Crossing Safety Score (LCSS), and identification of the risk band in which each scenario is placed. This then enabled Fulton Hogan and KiwiRail to further refine the understanding of the impacts of the quarry on the crossing.

The assessment addressed the level of risk for the existing level crossing with the CSM2 upgrades to the crossing and adjacent intersections and with the two options for a roundabout as proposed by Fulton Hogan.

The findings of the assessment are that both roundabout design options improve the LCSS in the short-term, even with the increase in heavy traffic. In the future the LCSS of Option 1 stays lower than existing, and the LCSS of Option 2 increases slightly. In all cases the risk band is Medium-Low which satisfies a key criterion of KiwiRail for an upgraded level crossing - of the upgraded crossing being a Medium-Low risk following the change of use.

6.9 Effects on Amenity Values

Section 2 of the RMA defines amenity values as “*those natural or physical qualities and characteristics of an area that contribute to people’s appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes.*”

Potential effects on amenity values typically associated with quarry operations include dust, noise, visual and landscape and traffic effects. These matters have all been assessed within this application document and the appendices, which conclude that any adverse effects of the proposal on the amenity values of the area can be appropriately avoided, remedied or mitigated.

The LVIA considers that the receiving environment has a rural, open character but is undergoing a significant level of change owing to the variety of activities in the area and infrastructure construction. It considers that any effects can be successfully mitigated by the proposed bunds and screening, retention of existing shelter belts and eventual rehabilitation of the quarry pit.

The assessment has also analysed the natural and physical qualities relating to pleasantness. Attributes of the locality which contribute to amenity values include a greenery and low density of buildings, along with the opportunities this affords in terms of providing a rural outlook. In terms of visual amenity, the landscape and visual assessment concludes that the proposed site can be seen from a number of vantage points in the receiving environment, including residents located to the north and west of the proposal. Given the proposed mitigation measures, any adverse effects are considered to range from less than minor to indiscernible.

Additionally, while the quarry is being expanded, Fulton Hogan will be progressively rehabilitating parts of the quarry and so despite the overall size of the site being 170 ha, only part of the site will ever be actively quarried at one time. It is noted that the surrounding area has a diverse range of land uses, primarily rural in nature, which also has included quarrying in the past (on the corner of Jones and Curraghs Road).

In respect of traffic effects, heavy vehicles will access the site from Jones Road with a light vehicle access positioned in the location of the existing access to the Roydon Stud Lodge. This access point has been designed to be located where it will minimise effects on nearby sensitive receivers through vehicles being able to access State Highway 1 while passing as few dwellings as possible and making the State Highway the easiest and most logical road for these vehicles to access and travel from. Additionally, Fulton Hogan is proposing measures to limit truck movements through Templeton to being only those movements which are destined for the immediate vicinity.

Only limited numbers of vehicle movements will occur on local roads in the vicinity of the site. It is considered values experienced by persons living alongside these roads and utilising these roads for recreational purposes (walking, horse riding) will experience less than minor effects, with traffic volumes remaining consistent with those expected in a rural location.

In terms of dust effects, as noted above, the proposed Roydon Quarry is not expected to result in a significant dust nuisance subject to the mitigation and monitoring methods proposed being implemented.

The noise levels predicted for the proposed quarry operation are such that amenity values will be protected, particularly in the context of the existing noise environment in the vicinity of the site, while noise and vibration from traffic movements are considered by MDA to be negligible.

Overall, any adverse effects on amenity values are considered to be less than minor.

6.10 Effects on Cultural Values

There are no known waahi tapu sites or other sites of significance on the proposed quarry site. Furthermore, there are no proposed discharges to water and no disturbance of significant indigenous flora and fauna, and no identified areas of ecological significance on the site.

A key cultural concern in relation to these types of activities is effects on water. There are no surface water ways in close proximity to the site, other than SDC owned water races which end within the site. The potential effects on groundwater resources have been assessed as less than minor with no excavation to take place within 1 m of the seasonal high ground water levels at the site. The mitigation measures proposed for the storage and use of hazardous substances, vehicle maintenance, and compliance with cleanfill standards will help avoid adverse effects on water resource. There are also no heritage structures or sites identified on the site. Consequently, the proposal is not considered to have any potential adverse effects on cultural values. It is, however, considered appropriate that a condition is imposed to address accidental discovery of Koiwi Tangata or taonga.

Discussions between Mahaanui Kurataiao (MKT) and Fulton Hogan determined that a Cultural Impact Assessment was not necessary for this proposal, however engagement with MKT and Taumutu Rūnanga and Ngāi Tūāhuriri Rūnanga is ongoing.

6.11 Positive Effects

The proposed activity will result in a number of positive effects. An Economic Assessment prepared by Brown Copeland & Co Limited, and discussing the economic benefits of the proposal is included as Appendix J. Aggregate is an important component in the construction and maintenance of housing, commercial and industrial buildings and community infrastructure with local authorities and central government being significant users of aggregate. The quarry is projected to have a lifespan in excess of 30 to 40 years with its annual production expected to average around 600,000 to 700,000 tonnes. Over its life, total production of around 10 million tonnes is anticipated thus contributing to the 45 million tonne shortfall aggregate predicted for Christchurch City for the period 2014-2041.

The proposed quarry would also accept quantities of cleanfill which are projected by Fulton Hogan to average around 100,000 to 200,000 tonnes per annum. This will assist in meeting the demand placed on the aggregates industry and help ensure consistency of supply.

As noted in Section 2.1, a number of quarry sites across the Greater Christchurch area have been exhausted or are nearing completion. Providing for the supply of aggregates close to the areas of greatest demand, reduces economic, environmental and social costs that would be increased should new quarries have to be established at greater distances. Aggregate is a low value; high volume product and its delivered cost is particularly sensitive to its transport costs. Without the proposed quarry, aggregate would need to be supplied from more distant sources of supply, and significant transport costs would be incurred.

The proposed quarrying activity will also continue to generate direct employment for on-site staff and indirect employment for numerous other workers within the construction and roading industries including truck drivers, administrative staff and contractors.

Upon completion of the quarry, the site can accommodate additional activities, as quarrying is a temporary activity and a range of other activities can establish on a site once quarrying has ceased which may include a return to other rural activities such as farming.

Overall, the new quarry promotes community economic wellbeing and the efficient use and development of resources.

Additional positive effects include safety improvements to the Dawsons/Jones Road intersection and the overall improvement in soil quality owing to the remediation of contaminated soil present on the site.

6.12 Conclusion

Overall, it is considered that the potential adverse effects of this proposal on the environment will be minor, subject to the proposed mitigation measures to be implemented. These include the daytime hours of operation, visual and acoustic mitigation measures including bund and screen planting, site access and public road upgrading, dust suppression measures and progressive site rehabilitation.

7.0 CONSULTATION

7.1 Introduction

An extensive consultation process has been undertaken by Fulton Hogan through the course of formulating the quarry site design and preparing these resource consent applications.

A consultation plan was formulated in accordance with International Association for Public Participation (IAP2) guidelines and methods for public participation. In preparing the consultation plan it was recognised that there is a high level of public interest in this proposal and accordingly it was appropriate to conduct public participation at an 'involve' level: which means to work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.

The consultation phase of the project has followed a three-stage process, albeit with some overlap, with Stage 1 being to inform the public and share information, Stage 2 seeking feedback and Stage 3 communicating how feedback has been used.

Fulton Hogan believes that meaningful public participation leads to decisions that reflect the interests and concerns of those who may be affected by a quarry proposal, which contributes to commercially responsible and beneficial outcomes for both Fulton Hogan and the communities in which it operates. This enables the community to have a say in decisions about actions that might affect them and lets participants know how their input affected the decision.

The implementation of the consultation plan has been undertaken through the following:

- Establishment of a project site website with frequently asked questions (FAQ) and information about the proposal;
- Newsletter drops;
- Formation of a Community Advisory Group (CAG) which met regularly;
- A Miners Road Quarry Family Open Day;
- A community drop in centre on the site;
- Meetings with local resident associations;
- Meetings with Councils, Iwi Groups, Road and Rail Controlling Authorities; and
- Technical Expert presentations and question and answer sessions held in November 2018, at the drop in centre (1 evening) and within a marquee adjoining the Templeton Community Centre (3 evenings).

7.2 Consultation Themes

7.2.1 Introduction

A number of key themes or items have been identified throughout the consultation process including:

- Vehicle movements
- Air quality
- Groundwater
- Shading on Roads
- Site Rehabilitation

The sections below address the specific concerns in relation to the key themes identified in the bullet points above, including the steps and measures which Fulton Hogan are proposing to take to mitigate those concerns as far as practicable.

7.2.2 Vehicle movements

Vehicle movements have been a key concern particularly in respect of heavy vehicles using local roads and associated safety and amenity issues for road users and neighbours. A key concern of consultation participants has been where truck movements would travel once leaving the quarry site, including whether they would travel through Templeton township.

Fulton Hogan has in response to these concerns proposed a detailed series of access and road upgrades to accommodate the vehicle movements from the site which facilitates the vast majority (90%) of movements to leave the site and head to Main South Road. Additionally, to specifically address intersection limitations and improve safety at the Dawsons/Jones Road intersection, Fulton Hogan has proposed a roundabout which will not only facilitate quarry traffic but improve on the current performance of this intersection.

Fulton Hogan is also proposing, as part of the overall mitigation package to not have trucks travel through Templeton unless they have a delivery in the immediate area. This is offered despite it being modelled that only very limited numbers of trucks per day would be likely to travel through Templeton in any event.

7.2.3 Air quality

Key concerns raised by stakeholder in respect of air quality were health effects that could arise from dust exposure, including those from Respirable Crystalline Silica (RCS).

Fulton Hogan are proposing to implement both general and targeted dust control measures to ensure dust is controlled and adverse effects on amenity and health effects are acceptable. These are listed in detail in the AQA and DMP included in Appendix D.

Key measures which are to be used on this site in addition to those found on other sites include the use of field conveyors for aggregate transport on the site thereby limiting vehicle movements and maintaining buffers from site boundaries - a 500 m buffer for fixed aggregate processing plant and 250 for any mobile aggregate processing plant. All aggregate processing plant will also be fitted with dust suppression systems.

7.2.4 Groundwater

Down gradient bore users have expressed concern that water they use for drinking and stock supply could be affected by quarry operations and associated backfilling.

Fulton Hogan is committed to not extracting below 1 m above the seasonal high groundwater level on this site and ensuring all backfill is cleanfill only. Water quality assessment has been ongoing for the previous few months and will continue once operations commence on site to assess any changes in water quality which may be caused by operations on the site. A monitoring programme is proposed in Section 9.0.

Additionally, concerns were raised about drawdown effects on other bore users if Fulton Hogan sought to transfer other water permits to this site. In response to this, Fulton Hogan has chosen not to transfer water takes to this site and instead rely on an existing take for the site which currently provides for irrigation and which it has sought to amend (by way of a change of conditions) to accommodate quarry operations. Additionally, capturing stormwater and taking water from water races may be options for additional water sources in the future (should additional water be required).

7.2.5 Shading on Roads

Shading on roads from shelter belts associated with the proposed quarry has been identified by road users and neighbouring property owners alike. Where Fulton Hogan intends to establish additional planting, this will be maintained at levels which do not shade the road to a level beyond that permitted by the SDP, or larger plantings will be setback from the road with smaller trees and shrubs closer to the road. This is reflected in the images included in the LVIA included in Appendix E.

7.2.6 Site Rehabilitation

Site rehabilitation was raised a concern throughout the stakeholder engagement process, specifically what the final land form may look like and in respect of how large amounts of open quarried areas have been rehabilitated slowly elsewhere.

In response to these concerns, Fulton Hogan are proposing to rehabilitate the site progressively, limiting the amount of active open working area to no more than 40 ha at any one time which will be in accordance with the draft Rehabilitation Management Plan as included in Appendix G.

More recent feedback has also suggested potential for a walking track on the outside of the site which is something Fulton Hogan is investigating as a potential option.

7.3 Pre-application Meeting

An initial pre-application discussion was held with both SDC and CRC on 30 January 2018, followed by a formal joint pre-application meeting on Friday 14 September 2018, at CRC's Tuam Street offices.

Key issues identified by SDC at this meeting were the need to address the potential noise, traffic and dust effects associated with the proposal and the need to prepare a rehabilitation plan for the quarry site. The key issues identified by CRC included air discharges and the take and use of water.

Fulton Hogan reiterated its intention to seek public notification of the application and discussed a lodgement date for the application, being mid-November. At this meeting, it was noted that all the required resource consents would be by way of a joint application to both CRC and SDC.

7.4 Additional Consultation

In addition to the consultation methods identified above, a range of organised and informal communications have been held with local residents and interested parties. As consultation is still ongoing, a full summary will be provided at the hearing on the application.

8.0 REGULATORY/STATUTORY CONSIDERATIONS

8.1 Introduction

This section provides a brief overview of the relevant provisions of the RMA and associated statutory plans governing the resource consents required to construct, operate and close the Roydon Quarry. A full assessment of the relevant resource management decision framework that applies to the resource consents being sought for the proposed quarry is provided in the Statutory Assessment, included as Appendix K, of this application document.

The statutory planning documents under the RMA relevant to this application are:

- National Policy Statement for Freshwater Management 2014 (NPS Freshwater)
- National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES Contaminated Land)
- Resource Management (National Environmental Standards for Air Quality) (NESAQ)
- Resource Management (Measurement and Reporting of Water Takes) Regulations 2010
- The Canterbury Regional Policy Statement (CRPS)

- The Canterbury Land and Water Regional Plan (LWRP)
- The Canterbury Air Regional Plan (CARP)
- The Selwyn District Plan (SDP)

Other strategies and plans relevant to the application for approvals for the proposed quarry include a number of Iwi Management Plans.

An assessment of the relevant rules that trigger the need to seek resource consents from the CRC and SDC are summarised in Table 6 and Table 7 below.

Table 6: Summary of rules and resource consents required from CRC under the LWRP and CARP.

Activity	Rule
Rules for activities requiring land use consent (section 9 of the RMA)	
Excavation of material over an aquifer	LWRP Rule 5.176 – Restricted Discretionary Activity
Deposition of material into an excavation	LWRP Rule 5.177 – Controlled Activity
NES Contaminated Land	Controlled activity for the Disturbance of soil.
Rules for activities requiring water permits (section 14 of the RMA)	
Application under section 127 to change the conditions of CRC182422	
Rules for activities requiring discharge permits (section 15 of the RMA)	
Discharge of contaminants which may enter water from an industrial or trade process, including aggregate wash water and discharges from the wash down of vehicles and machinery and hard stand surfaces used for refuelling portable tankers and parking of machinery, following treatment by an interceptor system which captures contaminants.	LWRP Rule 11.5.28 under the Selwyn Te Waihora Sub-Region (Section 11) – Discretionary Activity
Discharge of stormwater to land	LWRP 5.97 – Discretionary Activity
Deposition of cleanfill (and associated discharge of contaminants)	LWRP 5.100 – Discretionary Activity
Discharge of contaminants into air from an industrial or trade premise or process, where the proposed quarrying activity does not meet the relevant permitted activity conditions of Rules 7.35 and 7.36, and the discharge of cleanfill does not meet rule 7.47.	CARP Rule 7.63 – Discretionary Activity

Additionally, resource consent is also required from CRC as a discretionary activity pursuant to section 127(3)(a) of the RMA, to change conditions of Fulton Hogan's existing water permit (CRC182422), to take and use groundwater from the site for dust suppression and other activities associated with the proposed Roydon Quarry.

Table 7: Summary of land use consents for the quarry required from SDC under the SDP

Activity
Discretionary Activity Land Use Consent to establish, operate and rehabilitate a quarry.

The Statutory Assessment concludes that the proposed quarry complies with the relevant standards of the relevant NES documents, and is consistent with the relevant objectives and policies of the CRPS, LWRP, CARP and SDP.

The Statutory Assessment (Appendix K) concludes that given the location and design of the proposed quarry together with the range of mitigation measures and management techniques proposed for the site operations, the proposal is consistent with the policy framework of the RPS, LWRP, CARP and the SDP. In addition, the proposal has been assessed under Part 2 of the RMA. It is similarly concluded that granting consent would be consistent with the purpose of the RMA and its principles. As such, there is no conflict between the outcome of a Part 2 assessment and the outcomes of an assessment of the relevant planning instruments.

8.2 Notification

Sections 95 to 95F of the RMA set out the requirements in relation to the public and limited notification of resource consent applications. The steps in Section 95A relate to whether public notification should be given.

Fulton Hogan has requested that these applications be publicly notified in accordance with section 95A(3)(a). Therefore, pursuant to section 95A(2)(a), both consent authorities are required to **publicly notify** the applications. As such, there is no further discussion of the notification requirements under the RMA.

9.0 SUGGESTED MITIGATION MEASURES

A summary of mitigation measures that have been proposed throughout this application and the supporting technical assessments are set out below. This list is not intended to be an exhaustive list of design and mitigation measures, but rather a list of the primary mitigation measures. These measures reflect proposed avoidance, remediation and mitigation measures specifically developed for the proposed Roydon Quarry, while having regard to conditions of consent granted recently for similar activities.

General

- No excavation is proposed below 1 m above seasonal high groundwater level as at the date of this consent being granted.
- Access to the quarry excavation areas shall be secured by fencing and lockable gates.

- Warning notices that can be read from a distance of five metres shall be erected and maintained at all entrances to the quarry excavation site. These notices shall state: (a) the name of the site; (b) the name of the quarry operator; and (c) groundwater in this area is vulnerable to contamination and is a source of drinking water.
- All fixed processing plant shall be located at least 500 m from the site boundaries and all mobile processing plant shall be at least 250 m from the site boundaries.
- No extraction shall occur within 100 m of any dwelling existing at November 2018 being 151 Curraghs Road and 319 Maddisons Road, without the prior written consent of the owners and occupiers of these dwellings.

Visual

- 3 m high earth bunds with a 1 m wide flat top shall be constructed around the site. The bunds shall have a slope of at least 1:3 (one vertical to three horizontal) on the outer side.
- An additional bunding is proposed to screen views into the site at the entrance to prevent views into the site for the road users of Jones Road.
- Any plantings along the Jones Road boundary will be maintained at a height of 5 m or less to limit shading of the road carriageway.
- The final internal slopes of the quarry should be formed to provide an irregular form to the edge of the quarry but at gradients which allow for the placement of topsoil and grass growth. The slope gradient should vary between 1 in 3 and 1 in 6 with an irregular form to negate a linear, uniform appearance of the slopes to create a more natural appearance.

Rehabilitation

- All rehabilitation shall be undertaken generally in accordance with the draft Rehabilitation Management Plan submitted with the application.
- Following completion of quarry works, in a staged approach, a 300 mm layer of topsoil should be applied over the finished surface level and sown with a suitable grass species.

Transport

- Heavy vehicle movements shall not exceed a maximum of 1,500 movements per day.
- Separate vehicle accesses shall be provided on Jones Road, between Curraghs and Dawsons Road, for light and heavy vehicles. These access points shall be designed and constructed/upgraded in accordance with the recommendations of the Stantec ITA.
- Roothing upgrades shall be undertaken in accordance with the Stantec ITA. This shall include provision of a roundabout on Dawsons Road and roading upgrades on Jones Road.
- While it is predicted that very few heavy vehicles would travel through Templeton, Fulton Hogan is committed to minimising vehicle movements through Templeton as far as practicable. Accordingly, the following actions are proposed:
 - Fulton Hogan controlled trucks will only travel into or through Templeton if a delivery is in the immediate vicinity of Templeton.
 - Fulton Hogan will require any non FH-controlled truck drivers accessing the site to sign on to a code of practice committing to the same.
 - A sign will be established inside the quarry gate reminding drivers not to travel through Templeton unless a delivery is in the immediate vicinity.

Noise

- Fulton is proposing that all activities on the site, measured in accordance with the provisions of NZS 6801:2008 “Acoustics – Measurement of environmental sound”, and assessed in accordance with NZS 6802:2008 “Acoustics – Environmental Noise”, shall not exceed the following noise limits beyond the boundary of the site, during the following times:
 - Daytime 0600 to 1800 hrs 55 dB L_{Aeq}
 - Evening 1800 to 2200 hrs 50 dB L_{Aeq}
 - Night 2200 to 0600 hrs 45 dB L_{Aeq} and 70 dB L_{Amax}
- In order to permit vehicle access onto the site, the noise limits above shall not apply within 300 metres of any site entrance.
- Construction activities including topsoil stripping, bund construction and site rehabilitation, shall be conducted in accordance with NZS 6803: 1999 “Acoustics - Construction Noise”, and shall comply with the “typical duration” noise limits contained within Table 2 of that Standard.
- Should vehicle reversing alarms be required, only broadband noise alarms are to be used on quarry-based equipment. Tonal reversing alarms are not permitted.

Air Quality

- Vehicle movements on unpaved surfaces are the primary source of dust emissions. Fogging systems as a primary measure and water carts as a back-up will be used for dust suppression during dry weather so that working areas, haul roads and stockpiles are kept damp. Water will be available for dust suppression from an existing bore on the site.
- Vehicle speeds will be kept below 15 km an hour on the site during dry or windy conditions.
- Maintaining haul roads so that they are comprised of an aggregate base, with surfaces that are generally graded and free of pot holes.
- Using field conveyors as the primary form of material transport within the site as this significantly minimises the potential for dust generation compared with the transport of aggregate by haul trucks.
- Minimising drop heights when loading trucks and conveyor hoppers.
- Pre-dampening soil prior to removing overburden.
- Minimising open areas to no more than 40 ha of ‘active working area’ at any one time.
- Locating fixed plant in the centre of the site and below ground level.
- Only using portable processing plant with the use of water dust suppression (either sprays or high-pressure fogging system) fixed to the plant. Additionally, where they are located within 250 m of off-site sensitive locations, they should only be operated when the wind is blowing from the direction of the sensitive location.
- All stockpiled aggregates will be located within the quarry floor and set back 100 m from site boundaries.
- Maintaining, establishing and enhancing shelter belt plants around the site boundaries.

- Measures will be taken to ensure trucks leaving the site are appropriately loaded to reduce the potential for material to be windblown from vehicles when leaving the site.
- Overburden stockpiles and bunds are to be re-vegetated or planted.
- The site will be rehabilitated as soon as practicable to limit potential for dust generation by minimising exposed surfaces.
- The use of pea gravel and chemical dust suppressants as appropriate on exposed surfaces.
- Sections of the internal site access road will be sealed and used in conjunction with a rumble strip to assist in removing muddy material from vehicle wheels before entering and exiting the site.
- Quarrying activities within 250 m of any nearby dwelling will cease when:
 - the wind is greater than 7 metres per second (m/s) (hourly average); and
 - during dry weather conditions; and
 - the wind is blowing from the following directions:
 - when site activities are occurring within 250 m from receptor locations along the southeastern boundary and when winds are from the northwest to northeast (310°N to 50°N); or
 - when site activities are occurring within 250 m from receptor locations along the northwestern boundary and when winds are from the south to southwest (170°N to 230°N); and

Wind speed and direction will be monitored continuously on site by equipment fitted with an alarm system to advise site personnel when the above triggers are exceeded.

- Continuous dust monitoring of PM₁₀ when operating close to sensitive locations including within 250 m of residences along the southeastern or northwestern site boundary. When operating within 250 m of either Receptors 3 or 11, an additional monitor should be situated at the site boundary nearest to each receptor. The continuous dust monitoring equipment should be fitted with an alarm system that, when PM₁₀ concentrations exceed the specified trigger levels, sends a warning to the Quarry Manager or other nominated person.
- Adherence to a Dust Management Plan.

Groundwater Monitoring

Groundwater level monitoring

Fulton Hogan is proposing to monitor groundwater levels in the following bores:

Downgradient

- a) BX23/0835 (Bore ID DRBH4). Located at or about map reference: NZTM X and Y 1556077 - 5177047
- b) BX23/0834 (Bore ID DRBH3). Located at or about map reference: NZTM X and Y 1555397 - 5176416

Upgradient

- c) BX23/0833 (Bore ID DRBH1). Located at or about map reference: NZTM X and Y 1554612 - 5177022
- d) BX23/0836 (Bore ID DRBH2). Located at or about map reference: NZTM X and Y 1554914 - 5177686

as shown on plan CRCXXXXXX, which forms part of this consent.

Groundwater quality monitoring

The following groundwater sampling regime is proposed:

- Representative samples of groundwater shall be taken at six monthly intervals, for a period of two years and thereafter at a 12-monthly interval, from the upgradient and all downgradient bores;
- Samples shall be taken after adequate purging to remove all stagnant water from the bores or by using a low-flow sampling technique to ensure that fresh groundwater is drawn through the bore screens; and
- All samples shall be taken by a suitably qualified practitioner and analysed by an accredited laboratory.

Groundwater samples shall be analysed for the contaminants shown in Table 8.

Table 8: Contaminants and trigger concentrations.

Contaminant	Property or trigger value
Acidity	12 g/m ³ as CaCO ₃
Alkalinity	50 g/m ³ as CaCO ₃
Ammoniacal Nitrogen	1.2 g/m ³ as N
Chloride	125 g/m ³
Electrical Conductivity	50 mS/m at 25 °C
E.coli bacteria	1 MPN/100 ml
Hardness (Calcium + Magnesium)	100 g/m ³ as CaCO ₃
Dissolved Iron	0.1 mg/L
pH	<6.5 or >8.5
Dissolved Zinc	1.5 mg/L
Total Petroleum Hydrocarbons	Any detection >0.1 g/m ³
Dissolved Aluminium	0.1 g/m ³
Dissolved Arsenic	0.01 g/m ³
Dissolved Boron	0.5 g/m ³
Dissolved Cadmium	0.003 g/m ³
Dissolved Chromium	0.05 g/m ³
Dissolved Copper	1 g/m ³
Dissolved Lead	0.01 g/m ³
Dissolved Manganese	0.04 g/m ³
Dissolved Nickel	0.08 g/m ³
Nitrate-Nitrogen	11.3 g/m ³ as NO ₃
Dissolved Sodium	200 g/m ³
Sulphate	250 g/m ³

Management Plans

A number of management plans are proposed to ensure that all operational methods and criteria set out in conditions of consent are complied with. While threshold limits will generally be set by consent conditions, the management plans will address how adverse effects associated with the quarrying activity will be monitored and managed, allowing for changes to these methods to be made as and when required.

The site will operate in accordance with the following management plans:

- Rehabilitation Management Plan.
- Dust Management Plan.
- Cleanfill Management Plan.
- Spill Management Plan.

Consultation

- Fulton Hogan is proposing to establish a Community Liaison Group (CLG) which shall meet on a quarterly basis. Representatives shall be invited from the Templeton Residents Association (TRA), Weedon's Residents Association (WRA), SDC and CRC. A process shall be put in place as to the frequency, layout and membership of these meetings.

Accidental Discovery Protocol

- It is proposed that in the event of any disturbance of Koiwi Tangata (human bones) or taonga (treasured artefacts), Fulton Hogan will:
 - a. Immediately cease earthmoving operations in the affected area; and
 - i. Mark off the affected area until earthmoving operations recommence;
 - ii. Advise the Team Leader of the Resource Consents Team, Selwyn District Council, of the disturbance; and
 - iii. Advise the Upoko Runanga of Tuahuriri, or their representative (contact information can be obtained from the Selwyn District Council) and the New Zealand Historic Places Trust, of the disturbance; and
 - b. Not recommence earthmoving operations until either:
 - i. a certificate is provided in writing to the Team Leader, Selwyn District Council Compliance and Investigations Team, Regulatory Compliance Unit, signed by Upoko Runanga of Tuahuriri, or their representative(s), stating that appropriate action has been undertaken in relation to the discovered culturally sensitive material; or
 - ii. After five working days after advising Tuahuriri Runanga, a certificate signed by an archaeologist (i.e., a person with a post graduate degree in archaeology and who is a member of the New Zealand Archaeological Association) is provided to the Team Leader, Selwyn District Council Compliance and Investigations Team, Regulatory Compliance Unit, that states that in the archaeologist's professional opinion appropriate action has been undertaken in relation to the discovered culturally sensitive material. That certificate shall detail the action that has been undertaken by Fulton Hogan. A copy of the archaeologist's qualifications shall also be provided with any such certificate.

Reporting and Review

- Fulton Hogan will maintain a complaints register.
- The Selwyn District Council and Canterbury Regional Council may, once per year, on any of the last five working days of May or November, serve notice of its intention to review the conditions of this consent for the purpose of:
 - a. Dealing with any adverse effect on the environment which may arise from the exercise of this consent including.
 - b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment.

10.0 CONCLUSION

Fulton Hogan is seeking resource consents from CRC and SDC to establish the Roydon Quarry, at Jones Road Templeton.

The potential effects associated with the proposed quarrying activity at the site are assessed in Section 6.0 of this document and supported by the expert assessments appended to this report. The assessment identifies that although there is the potential for adverse effects to be generated, subject to the mitigation measures proposed, it is considered that the adverse effects of the proposal will be minor.

The proposed activity will have considerable positive effects including increased production and transportation of aggregate products to meet demand within Greater Christchurch, while providing for effective site rehabilitation.

The proposed activity is consistent with Part 2 of the RMA and the applicable policy framework of the relevant planning documents as assessed in Appendix K and Section 8.0. In addition, there are no barriers to granting the resource consents being sought, including pursuant to sections 104B, 105 and 127 of the RMA.

Therefore, it is considered the applications can be granted subject to appropriate conditions.

APPENDIX A

Report Limitations

Report Limitations

This Report/Document has been provided by Golder Associates (NZ) Limited ("Golder") subject to the following limitations:

- i) This Report/Document has been prepared for the particular purpose outlined in Golder's proposal and no responsibility is accepted for the use of this Report/Document, in whole or in part, in other contexts or for any other purpose.
- ii) The scope and the period of Golder's Services are as described in Golder's proposal, and are subject to restrictions and limitations. Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Report/Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Golder in regards to it.
- iii) Conditions may exist which were undetectable given the limited nature of the enquiry Golder was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Report/Document. Accordingly, if information in addition to that contained in this report is sought, additional studies and actions may be required.
- iv) The passage of time affects the information and assessment provided in this Report/Document. Golder's opinions are based upon information that existed at the time of the production of the Report/Document. The Services provided allowed Golder to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- v) Any assessments, designs and advice made in this Report/Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Report/Document.
- vi) Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by Golder for incomplete or inaccurate data supplied by others.
- vii) The Client acknowledges that Golder may have retained subconsultants affiliated with Golder to provide Services for the benefit of Golder. Golder will be fully responsible to the Client for the Services and work done by all of its subconsultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from Golder and not Golder's affiliated companies. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any legal recourse, and waives any expense, loss, claim, demand, or cause of action, against Golder's affiliated companies, and their employees, officers and directors.
- viii) This Report/Document is provided for sole use by the Client and is confidential to it. No responsibility whatsoever for the contents of this Report/Document will be accepted to any person other than the Client. Any use which a third party makes of this Report/Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Report/Document.



golder.com