

# QUARRY REHABILITATION PLAN

SOL Quarries Ltd

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<b>on behalf of</b>	Lands and Survey (South) Ltd		

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## 1. Introduction

In June 2016 SOL Quarries Ltd commissioned a quarry in Yaldhurst, having obtained resource consents from Environment Canterbury Regional Council (ECan) and Christchurch City Council (CCC). The consents were granted in January 2016 and the company undertook 3-months of enabling works. The enabling works included:

- widening 3-kilometres of Christchurch City roads, specifically Savills Road, Guys Road and Ryans Road;
- the construction and vegetation of 3-metre high bunds surrounding approximately two-thirds of the property;
- the removal of contaminated waste dumped by the previous owner (a Site Validation Report was prepared and submitted to ECan Compliance Manager prior to operation of the Quarry in June 2016);
- the submission and certification of a Quarry Management Plan to both Councils;
- the construction of a controlled entry/exit on Guys Road, in accordance with Christchurch City Council approved engineering design plans; and
- the installation of requisite signage.

SOL Quarries Ltd directors and shareholders are Simon Apperley, Ben Dormer, Richie McCaw and Michael Watt. The Company directors and shareholders are committed to exceeding the compliance requirements associated with all Conditions of Consents authorising the Quarry operations, and ensuring a state-of-the-art quarry operation, which avoids, mitigates or eliminates all adverse effects on the environment.

The SOL Group of companies, including SOL Quarries Ltd, are committed to sustainable and environmentally responsible operational practices, while producing quality aggregate that meets the requisite standards, and ensuring that all staff and visitors to the Quarry are safe, at all times. SOL Quarries Ltd strives to achieve industry-best-practice regarding all aspects of the Quarry operations, including Site rehabilitation works.

SOL Quarries Ltd is a leading aggregate supplier in Canterbury, Kaikoura, Mackenzie District and Otago. The extension of the current SOL Quarry at 81 Conservators Road, Yaldhurst, through the recent purchase of a portion of the two (2) adjoining properties, provides an additional 8-year supply of premium quality aggregate from a Quarry located close to Christchurch.

This Draft Quarry Rehabilitation Plan has been prepared to accompany the joint resource consent applications to Environment Canterbury Regional Council and Christchurch City Council for the proposed extension of the existing SOL Quarry. The Draft Quarry Rehabilitation Plan has been developed in accordance with Activity Specific Standard 17.8.3.14 “Quarry Site Rehabilitation” of the Christchurch District Plan (CDP). This Rehabilitation Plan has also been prepared giving regard to that Standard, Policy 17.2.2.13 Policy - Quarry Site Rehabilitation, and the “Draft Quarry Rehabilitation Plan Guidance” document prepared by Christchurch City Council and dated August 2018.

## 1.1 Quarry Rehabilitation Objectives

Site rehabilitation will be implemented progressively as the excavation of gravel and backfilling with cleanfill is completed. Whilst the timing of the rehabilitation can adapt to fluctuations in aggregate demand and cleanfill material accepted by the Quarry, the sequence of extraction activity – from west to east across the Quarry Site in three (3) stages – forms the basis for the sequential rehabilitation of the Quarry. The rehabilitation objectives are:

- Progressive rehabilitation of the Site throughout the stages of extraction.
- Infilling the excavated Quarry Pit with cleanfill material, returning the Quarry to approximately natural ground-level.
- Stabilisation of any residual Quarry faces, ensuring a maximum 1:3 batter slope.
- Covering the cleanfill with a layer of clean topsoil (minimum of 300 – 400 mm) and grassing.
- Ensuring any areas where works have been completed are left in a safe and stable condition.
- Monitoring and controlling plant and animal pests during rehabilitation works.
- Ensuring that any areas where Quarry works have been completed have adequate soakage.
- To reduce the footprint of open, unconsolidated surface area as far as practical.
- The Quarry is rehabilitated in a manner which enables appropriate future land uses.
- To mitigate any potential environmental effects.

The development of this Quarry Rehabilitation Plan has also been formulated taking into account the operational experience of SOL Quarries Ltd and SOL Screening & Crushing Ltd in rehabilitating the Quarry and a number of river Sites over the past 8-years.



Photo: SOL Quarry – Rehabilitated Area (Cleanfill & Grassed Area)

## 2 The SOL Quarry Extension – Site Description

The proposed Quarry extension (the Site) is located immediately adjacent to the existing SOL Quarry at 93-133 Conservators Road. The Site comprises approximately 28.335 hectares in total size. It is situated approximately 3-kilometres to the north-west of Christchurch International Airport, as illustrated by Figure 1. Figure 2 illustrates the location of the proposed quarry extension in relation to the existing SOL Quarry.



**Figure 1: Location Plan**

The Site comprises two land parcels immediately adjacent to the existing Quarry located at 81-83 Conservators Road, in Yaldhurst, Christchurch. The southern Lot is the result of a recent subdivision which amalgamated 20-hectares of a property immediately east of the existing Quarry with the existing SOL Quarry property. The northern Lot is currently subject to an application for a boundary adjustment subdivision, proposing to amalgamate approximately 8.335 hectares of the property, which is also located immediately east of the existing Quarry (Figure 2).



**Figure 2: Proposed Quarry Site – Proposed stages (red), southern lot (blue), northern lot (black).**

A proportion (20 ha) of the Site is currently used for the cultivation and harvesting of grass for a ready-lawn business. The remainder of the Site (8.335 ha) is current low-density grazing pasture. The Site does not have any known outstanding or significant landscape values. The property to the immediate west of the subject Site is owned by SOL Quarries Ltd. SOL Quarries Ltd operates a gravel quarry on this Site along with gravel processing activities.

The property to the immediate north of the Site is owned by Christchurch City Council and is grazed. There are no dwellings or sensitive land uses located on this property. To the south and west of the Site are properties that are owned by Environment Canterbury, which are also grazed. As with the land to the north, there are no sensitive land uses located on these properties.

To the south of the existing light vehicle access to the SOL Quarry at 93 Conservators Road (and to be used by the extended quarry Site) is a property (21 Conservators Road), owned by Harewood Gravels Limited. This property was the subject of an application to ECan and CCC to establish a Quarry in 2014. The applications were the subject of an Environment Court decision to decline the consents. The Environment Court decision was recently upheld by a High Court decision.

The remainder of the properties in the immediate vicinity of the subject Site, including those immediately opposite the subject Site on Conservators Road and Savills Road, are rural. It is noted that residential properties on Conservators Road are screened by mature vegetation in the form of shelter belts which stretch continuously for approximately 450m along the eastern side of Conservators Road.

### 3 Rehabilitation Programme

#### 3.1 Site Preparation and Quarrying Activities

Development of the Site will be an extension of the existing Quarry operations, following sequential stages from west to east. The Quarry operations comprising the following activities:

- The use of suitable on-Site material to create the perimeter bunds
- The realignment of a stockwater race, in accordance with an authorisation from Selwyn District Council.
- Development of the Quarry Pit area, extending from the existing Quarry, including the removal of topsoil and subsoil overburden material, and the development of a working pit.
- Construct and maintain Quarry Pit access roads.
- Extraction and processing of gravel in stages, working the Quarry from west to east.
- Maintaining gravel processing, stockpiling and the loading of trucks in the north-western section of the Site, a minimum of 350-metres from the north-eastern and south-eastern property boundaries.
- The rehabilitation of worked out areas, using cleanfill, covered with clean topsoil, battering all residual slopes and grassing.



**Note:** The Haul Road will drop into the 10 metre Quarry Pit. The exact route of the Haul Road will change as the Quarry progresses, however, it will always pass the Quarry Office and Weigh Bridge in both directions.

Figure 3: Proposed Quarry Access & Egress Route.

### 3.2 Cleanfill Operations

Cleanfill material brought to the Site will enable the infilling of the Quarry Pit and expedite the Site rehabilitation. Site preparation and ongoing development during operational phases will take into account cleanfilling requirements such as location of haul roads to the cleanfill tip head.

Cleanfill, will be brought to the Site from suitable locations within Christchurch and will be unloaded at the fill tip head/placement area prior to being spread across the cleanfill area by a loader. In wetter months, a bulldozer or tracked loader may be also be used.

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. SOL Quarries Ltd has developed operational procedures and protocols which are recognised as industry-best-practice and have, to date, been fully compliant with the Conditions of Resource Consents and the Conditions of the Cleanfill Licence issued by the Christchurch City Council.

Visual inspections of the quality of the fill material coming to the Site will assist in ensuring that the material is consistent with any resource consent requirements, and any unacceptable loads will be turned away from the Site. This will take place by inspecting all material once it is placed at the fill tip head. Should any unacceptable loads reach the tip head and be unloaded, it will be removed from the Site and transported to an appropriate landfill.

The deposition of cleanfill will be managed so that if the demand from the construction industry arose, concrete and aged cured asphalt waste from roading can be removed, recycled and reused. This presents a possibility in the future that some material could be extracted, crushed and processed.

The rate of rehabilitation and final contours will largely depend upon the rate of incoming cleanfill material.

### 3.3 Quarry Rehabilitation Works

The Quarry rehabilitation works to be undertaken after the completion of the extraction include:

- The removal of all fixed and mobile plant.
- The removal of all temporary and permanent structures unless required for an agreed future use.
- The levelling of bunds and overburden stockpiles
- The removal and appropriate disposal of all waste materials including hazardous materials.
- The deconstruction of all concrete structures, including the foundation slab for the Quarry Office and Weighbridge.
- Rehabilitation of surplus roads, office Sites, and hard standing areas.

After completion of the Site rehabilitation works, it may be appropriate to deny vehicular access to the Site by erecting gates, fences, and trenches as necessary to prevent unauthorised four-wheel drive or motor cycle access, which is likely be detrimental to regenerating vegetation.

### 3.4 Quarry Rehabilitation Procedure

Following completion of filling in an area, rehabilitation involves re-spreading and contouring of topsoil materials and stored overburden materials to a minimum depth of 300 mm (300 – 400 mm), stabilisation of battered slopes and grassing in completed and restored extraction areas to create a free draining and stable landform. Monitoring of revegetation will occur to ensure the success of the rehabilitation. Key principles of rehabilitation include:

- Reinstallation of topsoil to ensure the soil can be used for agricultural or other uses. This may require the topsoil to be mixed with organic material or a soil conditioner.
- Appropriate vegetation cover undertaken using appropriate low-seeding grass species. Topsoil and re-grassing should be undertaken during September to November or March to May.
- Development of a free draining stable landform.
- The removal of all quarry operating machinery, equipment and buildings at the conclusion of all extraction activities.
- Maintaining the Site through controlling weeds and grazing, as appropriate.
- Monitor and where necessary, maintain rehabilitated areas to ensure they are functioning appropriately post-rehabilitation for a period of 24 months.
- Rehabilitation planning that is integrated with extraction sequences will ensure rehabilitation can commence, in areas where extraction activity has concluded. This will ensure that vegetation can be established, or a return to other land use (e.g. pasture), as soon as possible rather than leaving a disused quarry area on part of the Site. It also ensures that rehabilitation effort is not wasted on areas which will be disturbed again later.
- Owing to the relatively small area of the Quarry, SOL Quarries Ltd sees the Site as providing the potential to be an exemplar in terms of Quarry rehabilitation. Additionally, as only part of the Site will ever be actively used for quarrying at one time, there are opportunities to re-establish stock grazing on the Site as stages of the Quarry are progressively rehabilitated.
- While the final use is unlikely to be determined until sometime in the future, SOL Quarries Ltd 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.

### 3.5 Rehabilitation Timescale

Time frames for rehabilitation of the Site will be driven largely by the rate of extraction and will occur progressively over the Site in conjunction with the completed stages. It is anticipated, that rehabilitation of each worked-out stage will be completed within twelve months of the stage being finished (i.e. within a year of filling concluding).

An indicative timeframe for rehabilitation is set out in the Table below.

Rehabilitation Stage	Area (ha)	Date of Completion (Indicative only)
Existing Quarry – Stage 1	8.5 ha	End 2019
Existing Quarry – Stage 2	8.5 ha	End 2024
Existing Quarry – Stage 3	8.5 ha	End 2029 (includes transition)
Quarry Extension – Stage 1	9.45 ha	End 2032
Quarry Extension – Stage 2	9.45 ha	End 2035
Quarry Extension – Stage 3	9.45 ha	End 2039

### 3.6 Surface Sub-surface Drainage

The Canterbury region mainly consists of fast draining soils allowing for effective soakage of surface storm water. The following measures are proposed, to enhance the performance of natural stormwater drainage on the Site:

- Cleanfill materials will be deposited in a manner that encourages free draining of stormwater runoff into the permeable ground.
- When backfilling extraction areas to achieve the final rehabilitated ground level, an appropriate mix of cleanfill and adequate layers of permeable and subsoil and healthy productive topsoil will be used to achieve the finished ground levels.
- Topsoil will not be compacted when being used to raise the quarry floor. It will be loosely placed and spread by appropriate machinery e.g. grading to address high and low points. In the event that compaction of the topsoil occurs, SOL Quarries Ltd plans to rip the soil to maintain a friable soil state which promotes normal soil infiltration and good pasture establishment and growth.

Owing to the high infiltration rates (>5,000 mm/hr for the deeper gravels and >100 mm/hr for the top soils) and minimal rainfall, subsoil drains are not considered necessary; however, the Quarry will undergo regular monitoring for drainage performance, particularly in the Quarry Pit.

### 3.7 Proposed Final Landform

The volume and infill rate of cleanfill will guide the final land form of the rehabilitated Site. The minimum finished floor level for the Site, following operational rehabilitation and cleanfill activities, is expected to be at least 7.0 – 11.0 metres (this includes a minimum topsoil of 300 mm) above highest recorded ground water levels in the vicinity of the Site, at the time of backfilling occurring. This would result in an irregular contoured depth of 1.0 – 4.0 metres below natural ground level.

The final internal slopes of the Quarry will 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.

### 3.8 Land Use Following Quarry Operations

As noted above while the final use is unlikely to be determined until sometime in the future, SOL Quarries Ltd 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 will also enable other activities should the zoning change over time with the growth of Christchurch.

SOL Quarries Ltd has undertaken a Site-specific assessment of a range of possible land uses. The Table below identifies several possible land-uses and their respective advantages, constraints and requirements in terms of bringing these forward. It is implicit that other consenting projects for these may be required.

	Concept / Advantages	Constraints	Requirements
Peri-urban Development	Divide Site into 4 ha rural residential lifestyle blocks. Proximity to the City roading highway network and Airport.	Finished ground levels would have to be suitable for living. A pit is susceptible to winter fog, summer heat & drainage issues. Lack of reticulated infrastructure. Sub-surface compaction for building foundations.	Resource consent – addressing the effects (including reverse sensitivity – Airport noise).  Services – infrastructure.
Agricultural / Horticultural / Equine / Animal Boarding	Low-density sheep farming and dairy support. Equestrian or bloodstock centre.	High-density agricultural activities, such as a large-scale poultry farming operation, could generate controversy.	Resource consent – addressing the effects (including reverse sensitivity – Airport noise).  Lack of reticulated infrastructure. Sub-surface compaction for building foundations.
Commercial / Industrial	Proximity to roading highway network and Airport.	Underlying zoning & RPS would not support (non-complying activity). Sensitivity of the local community to commercial and/or industrial land-uses	Resource consent – addressing the effects (including reverse sensitivity – Airport noise).  Lack of reticulated infrastructure. Sub-surface compaction for building foundations.
Ecological Restoration	Ecological restoration would need to consider the proximity of the Airport and the need to avoid the attraction of bird life (bird-strike).	Ecological restoration would need to consider the proximity of the Airport and the need to avoid the attraction of bird life (bird-strike).	Potential resource consent and approval from Christchurch International Airport.

Recreational Purposes	Proximity to roading highway network and Airport.  Could support bike track or related recreational facilities.	Compatibility with rural lifestyle residences.  Traffic, numbers of visitors and noise.	Potential resource consent  Approval from Christchurch International Airport.
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It is also possible that the Site may be used for a combination of the above activities. All internal Site infrastructure will be decommissioned when there is no further requirement for processing and the Site has been rehabilitated.

## **4 Environmental Management**

### **4.1 Site Management**

The overall management of Site rehabilitation will be the responsibility of the SOL Quarry Manager or by delegated authority. Responsibilities include:

- Managing daily quarry operations – extraction and manufacturing of aggregates to supply orders.
- Ensuring constant compliance with the Conditions of all Resource Consents pertaining to the Site.
- Communicating resource consent requirements to staff, contractors and all other relevant parties.
- Overseeing implementation of the Site Rehabilitation Plan and other management plans.

### **4.2 Site Access**

The heavy vehicle access and egress is on Guys Road, with a set of restrictions specified in the Conditions of Resource Consent (Christchurch City Council).

After Site remediation works are complete, it may be appropriate to deny vehicular access to the Site by erecting gates, fences, and trenches as necessary to prevent unauthorised four-wheel drive or motor cycle access, which is likely be detrimental to regenerating vegetation.

### **4.3 Management of Potential Environmental Effects**

Potential environmental effects, such as dust and noise, that could emerge from major rehabilitation will be addressed through the procedures and practices specified in the Quarry Environmental Management Plan, the Site-Specific Dust Management Plan, compliance with the Conditions of Resource Consents (ECan and CCC), and compliance with the industry-best-practice operations.

## 5 Process for Review

In order to maintain the currency of the Site Rehabilitation Plan and the works specified therein, SOL Quarries Ltd proposes to report on progress and issues associated with the rehabilitation-related activities on an annual basis. This includes covering circumstances arising during the gradual Site rehabilitation and Quarry operations on the existing Quarry and the proposed Quarry extension which may alter the timing and staging of rehabilitation works. It is expected that the Conditions of Consents for the Quarry will include a requirement to review all Quarry Plans, including the Site Rehabilitation Plan. In some years it may not be necessary to alter the contents of the Plan if there are no unexpected occurrences; however, in other years SOL Quarries Ltd may wish to adjust their strategy. As a minimum for the Quarry Rehabilitation Plan, SOL Quarries Ltd proposes to conduct a more thorough revision on a five-yearly basis. Should any of the following circumstances occur, this will trigger an unscheduled update (out of annual review timeframe):

- When there is a fundamental shift in operational activities (e.g. unscheduled move to a new area).
- Following significant environmental incidents (e.g. flooding on the Site, causing damage to assets).

In a scheduled review of the Site Rehabilitation Plan, it is proposed that the following matters be considered. This is in terms of suitability of existing content and whether new information is required:

- Outlining rehabilitation activities undertaken during the reporting period.
- Areas of the Site to be quarried (extraction) over the next 12 months.
- Plans for earthworks, including overburden stripping and disposal, over the next 12 months.
- Areas of vegetation removed, and areas planted during the reporting period.



**Photo: SOL Quarry – Rehabilitated Area (bunds have yet to be deconstructed).**