APPENDIX E

PDP Dust Impact Assessment

Aylesbury Quarry Expansion: Dust Impact Assessment

Prepared for

Southern Screenworks

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1.0 Introduction

1.1 Purpose of the Assessment of Environmental Effects

Southern Screenworks Limited (Southern Screenworks) are proposing to expand their Aylesbury Quarry (11.5 ha located at 50 Bealey Road, Aylesbury) into a further area of approximately 66 ha.

The quarry currently produces aggregate, which is used in civil infrastructure projects in the Canterbury Region.

The purpose of this report is to provide an air quality assessment prepared in accordance with the Ministry for the Environments Good Practice Guide for the Assessment and Management and Dust, and the Canterbury Air Regional Plan. This report supports Southern Screenworks' Canterbury Regional Council and Selwyn District Council resource consent applications, including applications to change the conditions of their existing consents to align these with changes to facilitate the expansion.

This assessment covers the potential dust impacts of the site expansion. The integration of the existing and proposed activities will require the removal of bunding and plantings from the eastern and western boundaries of the existing site which along with other minor changes, necessitates changes to conditions of the existing consents. The most notable of these from a dust perspective is an amendment to the maximum stockpiling volumes from 10,000 m^3 to 25,000 m^3. We have reviewed these changes and consider they will have negligible impact on the amount and type of dust emitted from the current site. These are therefore not considered further in detail in this assessment.

1.2 Site Location

Southern Screenworks propose to expand and operate a gravel quarry at 50 Bealey Road, Aylesbury into Lot 2 DP 596079 and Reserve 4005.

The quarry and proposed expansion are approximately 10 km to the north-west of Rolleston (Figure 1) and the site is surrounded by agricultural land on all sides.

Figure 1: Site Location

The current quarry (red outline) and the proposed expansion area (yellow outline) are shown in Figure 2.

Figure 2: Location and boundary of the current quarry and proposed expansion to the gravel extraction site (Source: Bligh).

2.0 Proposed Activities

2.1 Background

Southern Screenworks is proposing to quarry the entire 66 ha identified over an approximately 30-year period. The proposal is to quarry to a depth of 10 m below ground level. The area actively quarried in both the existing quarry and expansion area will not exceed 6 ha at any given time. The activities at the site expansion will be a continuation of the processes that have been used to develop the existing Aylesbury Quarry. PDP has assumed that the processes used in the expansion are identical to those used in the main quarry area, although cleanfilling is not proposed in the extension other than for final rehabilitation, and only the location of dust sources will change.

The quarrying operations are undertaken in stages as the quarry develops, with each stage consisting of a maximum operational area of one to two hectares. The stages will be set back a minimum of ten metres from the site expansion boundary. Maps of the current site and the proposed expansion, including the indicative staging, are shown in Section 3.0.

Aggregate extraction and processing rates are expected to remain generally consistent with current volumes and within the truck movements provided for by the existing extraction volume. Processing will be less than 100 tonnes per hour which is the capacity of Screenworks current processing plant and also the rate referred to by Rule 7.35 of the CARP.

Crushing will occur throughout the year between the hours of 7 am to 6 pm Monday to Friday.

2.2 Preparation of Extraction Area and Bunding

Prior to commencing quarrying within the expansion area, topsoil and subsoil overburden material will be removed progressively from each stage. The overburden material will be placed into onsite stockpiles for future use including site remediation.

Bunds already exist around the perimeter of the current site, and as such the existing bunds at the western and northern sides of the existing site will be removed to facilitate the site expansion, along with the plantings along these boundaries.

Temporary bunds will be established around the Stage 1 area of the site expansion. No additional bunds are planned for the remainder of the site expansion.

2.3 Extraction Process and Screening

Following the preparation works, and completion of works within the existing site, extraction of aggregates will commence from the site expansion area. All extraction, processing and stockpiling will occur on the pit floor.

The extraction of aggregate is expected to involve the use of standard quarry machinery. Due to the size of the quarry areas and the composition of the quarried material, which consists alluvial materials, blasting or explosives will not need to be used.

The digger extracted material will be taken from the pit face directly to on-site processing plant using the 20-tonne front end loader. The processing plant will be located between the pit face and the stockpiling area, on the pit floor and away from site expansion boundaries. In the early stages of the expansion, it is intended that the processing plant is likely to remain in the location it currently occupies within the existing quarry.

If the extraction face is closer than 250 m from the notional boundary of the nearest residential property, any mobile processing plant within the expansion area will be located away from the active quarry face to maintain a minimum separation of 250 m of the plant to the nearest residential dwelling in existence as at the date of consent being granted.

Material will be placed into the hopper of the crushing and screening plant and graded into different sizes depending on market conditions/customer demands. Aggregate that is too large will be crushed until the material is the right size to fall through the screens. The crushed and screened aggregate material will be placed into stockpiles adjacent to the processing plant. A photograph of the processing plant in use at the site is provided as Figure 3.

Figure 3: Mobile Aggregate Processing Plant at Southern Screenworks (Source: Southern Screenworks)

The crusher has fixed sprinklers to mitigate the generation of air-borne dust during crushing.

2.4 Stockpiling

The processed aggregate will be stockpiled into the stockpiling area within each stage area. The stockpile area will be located in the main working pit adjacent to the extraction face and mobile processing plant and will cover an area of up to 200 m x 200 m (or 4 hectares). Any stockpiling within the expansion area will be located so as to maintain a minimum separation distance of 250 m from the nearest residences in existence as at the date of consent being granted.

The maximum volume of material to be stockpiled on-site at any one time will be 25,000 m^3. There are natural fines within the material processed so there will be a proportion of material that is <3.5 mm as well as crusher dust, which is stockpiled on site and be a potential source of dust. This volume is expected to be below 1000 tonnes however, which is the threshold specified in Rule 7.36 of the CARP.

The stockpiles will be shaped to ensure they are stable and to minimise visual impact. The height of the stockpiles will not exceed the natural ground level and will be at least 2-3 m below the height of the overburden bunds.

Stockpiles will be watered or otherwise stabilised as required to minimise the potential for dust emissions.

2.5 Loading and Transportation

The number of heavy vehicle movements in to and out of the quarry pit is recorded by volume scanner or weighbridge.

Truck movements will be the same as those currently associated with the existing quarry, as the expansion will essentially replace the existing resource once it has been exhausted and there will be no increase in the scale or intensity of traffic effects because of this proposal.

The existing quarry has on average approximately 40 to 60 heavy vehicle movements per day, up to a maximum of 120 movements, as was proposed by the original consent applications for the quarry.

In this regard, the quarry expansion is a continuation of well-established quarry practices into additional areas as the resource is exhausted within the existing operation.

Heavy vehicles will enter and exit the quarry pit via a one-way circular road from the existing heavy vehicle access onto Bealey Road.

The internal haul roads are unsealed but are maintained with application of water for dust suppression on a regular basis and as needed. The total length of unsealed haul roads within the site is estimated to currently be at 800 metres. While this may increase as the expansion develops, the total open area including unsealed roads will not exceed 6 ha at any one time.

In the quarry, a 20-tonne front end loader is typically used for loading aggregate onto outbound vehicles. Vehicle loading occurs either adjacent to the pit face or the stockpile area, both of which are located on the pit floor 10 m below the normal ground level.

Truckloads of clean aggregate are checked for stability before the truck leaves the Site. This is carried out by visually inspecting the load.

All machinery, truck and trailer units and vehicle movements[1] will be limited to between 7 am and 6 pm, Monday to Friday and between 7 am and 1 pm on Saturdays. No work will occur on Sundays or public holidays.

It is not proposed to cleanfill the expansion area although cleanfilling will continue to occur as part of the consented rehabilitation of the existing Aylesbury Quarry.

[1] With the exception of two transporters which may depart the site between 6 am and 7am.

3.0 Site Layout and Staged Expansion

Figure 4 provides a map showing the existing Southern Screenworks site, highlighted in red.

Figure 4: Overview of Southern Screenworks Site

Figure 5 depicts the layout of the proposed site expansion, and the indicative order that the areas of the expansion will be quarried, from Stage 1 through to Stage 5.

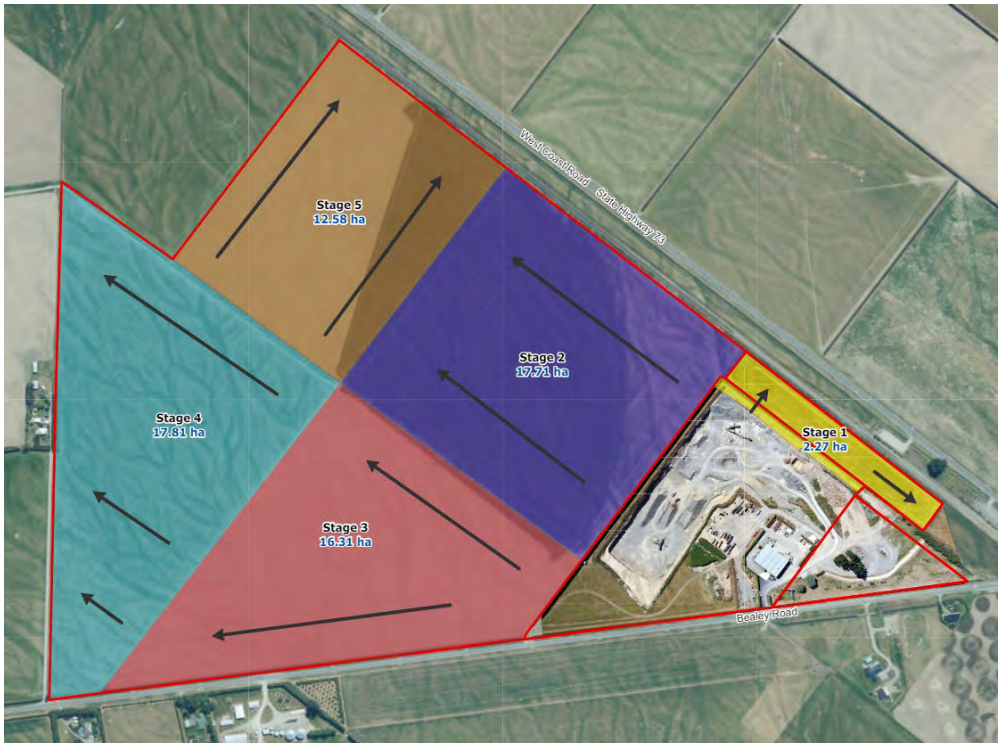

Figure 5: Indicative Staging Layout of Southern Screenworks Site Expansion (Source: Bligh)

A detailed site layout, including the locations of internal haul roads and stockpiles, should be provided as part of a Dust Management and Monitoring Plan (DMMP), described in Section 9.7.

4.0 Particulate Matter Discharges

4.1 Introduction

The key contaminants relevant to this application are:

- Coarse particulate matter (PM) > µm (dust); and
- Inhalable PM comprising particles with a diameter less than 10 µm (PM_{10})

4.2 Types of Particulate Matter

PM is generally categorised by particle size (defined by the aerodynamic diameter of particles) as follows:

- Deposited dust – PM of generally greater than 30 µm in diameter. This coarse size fraction falls out of suspension in the air relatively rapidly and deposits on exposed surfaces, generally within 100 m of the source. The bulk of dust emissions from handling and storage of gravel will be comprised of this fraction.

- Total suspended particulates (TSP) – PM of generally less than 30 µm in diameter. PM of this size fraction remains suspended in the air for a longer time and therefore has the potential to travel further than larger fractions. TSP (particularly the coarse fractions larger than 10 µm) have the potential to affect visibility.
- Fine inhalable or respirable fractions of TSP such as PM_{10} can penetrate the nose or mouth under normal breathing conditions. PM_{10} is currently the preferred indicator of the potential for health effects of PM in New Zealand.

While there will be combustion emissions from machinery operating on site, the number of vehicles and machines associated with the quarry are low compared to urban areas where ambient combustion contaminants levels may be elevated.

The surrounding rural environment means that background contaminant levels are also relatively low and that the cumulative effects of combustion emissions beyond the site will be very low compared to applicable standards and guidelines. Accordingly, no further consideration is given to combustion emissions.

4.3 Dispersion of Particulate Matter

Dust emissions at the site expansion will be predominantly fugitive in nature (i.e. from area sources as opposed to point sources) and can vary substantially from day-to-day, depending on the level of activity, the number of truck movements and the weather conditions. The scale (or magnitude) of potential dust impacts also depends on dust suppression and other mitigation measures applied by Southern Screenworks to control dust emissions on site. Five primary factors influence the potential for dust impacts:

- Wind speed across the surface. Dust emissions from exposed surfaces generally increase with increasing wind speed. However, dust pick up by winds is only significant at wind speeds above 5 m/s (11 knots or a Beaufort scale number of 3). Above wind speeds of 10 m/s (20 knots) dust pick up increases rapidly;
- Moisture content of the material. Moisture binds particles together, preventing them from being disturbed by winds or vehicle movements;
- The area of exposed surface. The larger the area of unstabilised surfaces the more potential there is for dust emission. Vegetated surfaces are less prone to wind erosion than bare surfaces;
- The percentage of fine particles in the exposed surface material. The smaller the particle size the more easily the particles are able to be picked up and entrained in the wind; and

- Disturbances such as traffic and loading and unloading of materials. Vehicles travelling over exposed surfaces tend to pulverise any surface particles. Particles are displaced from rolling wheels and the surface. Dustis also sucked into the turbulent wake created behind moving vehicles.

Impacts from dust are commonly assumed to be within 100 m of a source and this can include both large (>30 µm) and small dust particles. The greatest potential for high rates of dust deposition and elevated PM_{10} concentrations occurs within a distance 100 metres of a dust generating source. Intermediate-sized particles (10 to 30 µm) may travel up to 250 metres, with occasional elevated levels of dust deposition and PM_{10} possible. Particles less than 10 µm have the potential to persist beyond 250 metres but with minimal significance due to dispersion.

4.4 Source of Particulate Matter

A description of the Site's key dust sources of particulate matter, the type of dust discharged, and the relative size of the dust source are detailed in Table 1.

Table 1: Sources and characteristics of dust

Source	Description	Dust type	Relative size of dust source
Development of site	Removal and stockpiling of overburden. Construction of bunds	Soil dust Mainly deposited dust or TSP with a small component of PM_{10}.	Medium
Excavation of gravel	Disturbance of material being extracted from the ground will generate dust.	Grey gravel dust. Mainly deposited dust or TSP with a small component of PM_{10}.	Medium
Site access road and other unsealed surfaces.	Dust generated by vehicles traversing Site access road and moving over other unsealed surfaces.	Gray road dust. Mainly deposited dust or TSP with a small component of PM_{10}.	Large
Disturbing stockpiles	The deposition and removal of materials from stockpiles will generate dust.	Grey gravel dust. Mainly deposited dust or TSP with a small component of PM_{10}.	Medium

Table 1: Sources and characteristics of dust			
Source	**Description**	**Dust type**	**Relative size of dust source**
Stockpiles	Higher speed winds passing over stockpiles can generate dust.	Grey gravel dust. Mainly deposited dust or TSP with a small component of PM_{10}.	Small
Site rehabilitation	Disturbance of material being used for site rehabilitation will generate dust.	Soil dust Mainly deposited dust or TSP with a small component of PM10	Medium

5.0 Potential Impacts of Particulate Matter Discharges

5.1 Amenity

Particulate emissions have the potential to cause nuisance beyond the site boundary. Dust nuisance is caused where dust has impacts on amenity values. Annoyance to neighbours may occur from soiling of property such as windows, houses, cars, and washing hung out to dry. The degree of amenity effects tends to increase with darker colors of dust. For example, coal dust is considered more offensive than grey aggregate dust. For most people, the major effect of nuisance dust is the increased requirement for cleaning.

Dusty conditions can adversely affect people's ability to enjoy an outdoor environment. Airborne dust can have effects on visibility and is largely considered a matter of aesthetics. Visibility effects are usually only a concern in the immediate vicinity of the source. Extreme loss of visibility can also be a safety concern for road traffic and aircraft. Section 10.0 of this report provides an assessment of the amenity impact of dust on the nearest sensitive receptors to the site.

5.2 Health

Human health effects can occur from exposure to PM_{10} and smaller size fractions of particulate matter. Section 11.0 of this report provides an assessment of the potential human health impacts of dust on the nearest sensitive receptors to the site.

The gravels extracted from the site may contain trace amounts of crystalline quartz silica, which has been classified by IARC as (Group I) carcinogenic to humans when inhaled. Prolonged or repeated inhalation of respirable crystalline silica (RCS) can also cause a lung disorder, silicosis. While the gravels will contain crystalline quartz silica, most of the material is bound into larger particle of rock

which cannot be inhaled. RCS is sometimes considered in detail for large scale quarries or areas with multiple quarries, when they are crushing and screening large volumes of gravel which is not the case for the Screenworks Quarry.

The potential health impacts of RCS can occur from high short-term or lower long-term exposures. The people most likely to be exposed to concentrations of concern are the quarry employees.

6.0 Receiving Environment

6.1 Sensitivity of Receiving Environment

Southern Screenworks is located in a mixture of rural and lifestyle blocks with intensive agricultural activities. The site and surrounding area are zoned 'Rural Outer Plains' under the operative Selwyn District Plan and General Rural (GRUZ) under the Partially Operative Selwyn District Plan – Appeals Version (POSDP).

The site expansion is bordered by an SDC owned quarry that has been backfilled with cleanfill material and is leased to Southern Screenworks as part of its quarry operation. No extraction or cleanfilling occurs on this land parcel. Land use surrounding the site is primarily used as farmland. The Midland Railway line and State Highway 73 is beyond the northern site boundary while Bealey Road runs along the southern site boundary.

Sensitive receptors are defined as locations where people or surroundings may be particularly sensitive to the effects of air pollution. Sensitive receptors include:

- residential properties;
- hospitals;
- schools;
- libraries; and,
- public outdoor locations (*e.g.,* parks, reserves, beaches, sports fields).

Sensitive receptors identified from a desktop review are summarised in Table 2 and are shown in Figure 6.

Table 2: Location of Sensitive Receptors located close to the Southern Screenworks Site		
Address	**Description**	**Closest Distance to Site Expansion Boundary (m)**
23 Bealey Road	Residential	11
35 Bealey Road	Residential	202
137 Bealey Road	Residential	28
153 Bealey Road	Residential	24
158 Bealey Road	Residential	0
1062 Railway Road	Residential	345
1056 Railway Road	Residential	441
1066 Railway Road	Residential	527
10 & 18 Station Road	Residential/Commercial	412
62 Station Road	Residential	760
92 Station Road	Residential	890

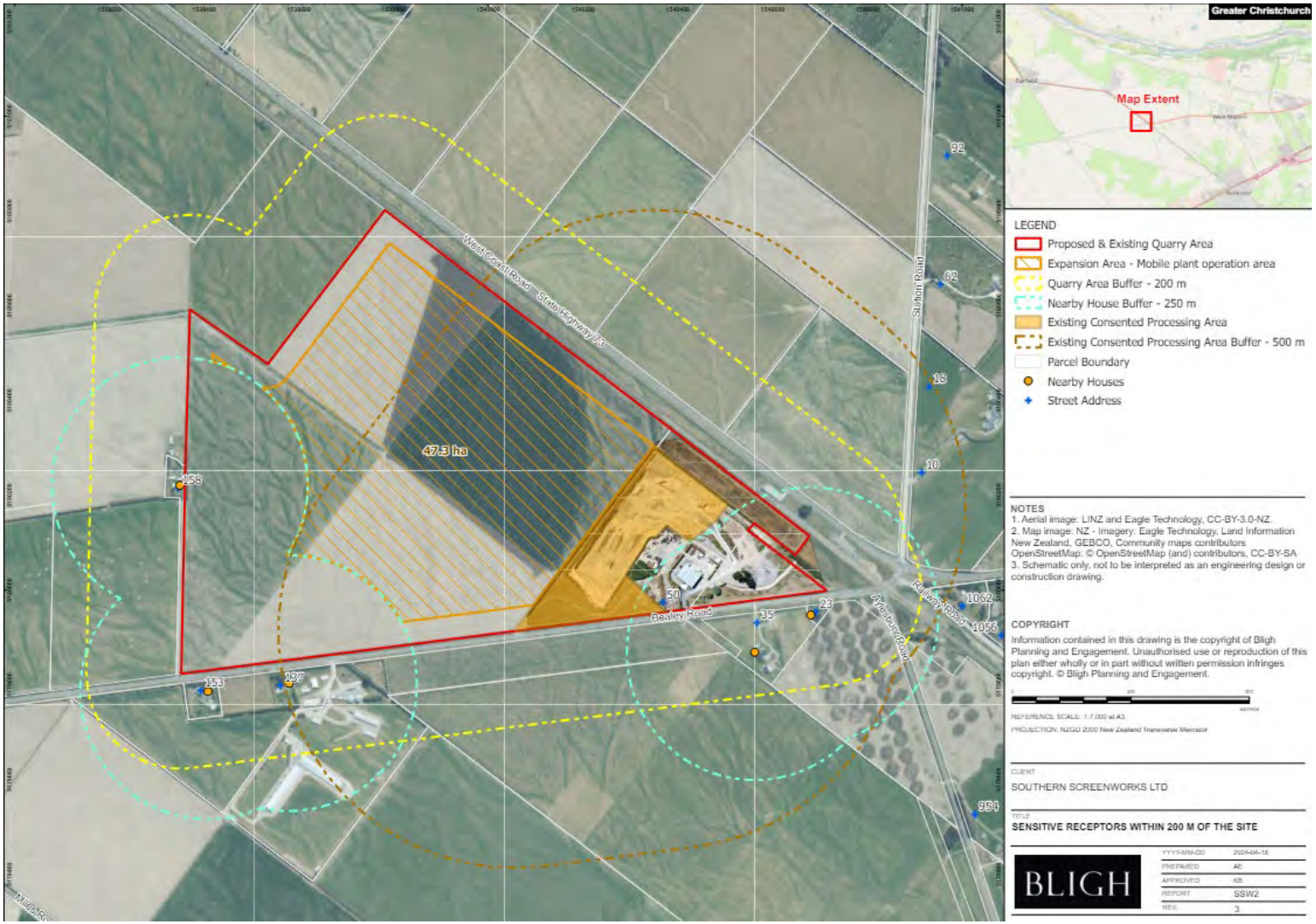

Figure 6: Location of Sensitive Receptors (Source: Bligh).

The IAQM *Guidance on the Assessment of Mineral Dust Impacts for Planning* (2016) provides guidance on the assessment of dust generating activities relevant to quarry sites. This document states that impacts from even high levels of dust generation will be confined to within 250 metres of the activities, and receptors at further distances are unlikely to be affected. PDP has identified all the nearby sensitive receptors within 1,000 metres of the site expansion boundary; however, this is a conservative distance to use to identify sensitive receptors as dust is not expected to travel more than 250 metres from the expanded quarry area.

The five residential properties at 23, 35, 137, 153 and 158 Bealey Road are, therefore, the only high-sensitivity receptors considered at risk of significant adverse dust effects from the quarry operations. It is noted however that 23 and 35 Bealey Road are only within 250 m of Stage 1 and are already closer to the existing quarry site.

All other sensitive receptors are sufficiently far removed from the activities with potential to generate dust that they are unlikely to experience adverse effects from dust.

State Highway 73 runs along the southern site expansion boundary and will be within ten to twenty metres of the quarry areas at the nearest point. The road itself is not considered a highly sensitive receptor, however, dust from the quarry activities has the potential to be blown onto the road if not appropriately managed.

6.2 Local Meteorology

6.2.1 Local Wind Conditions

Meteorological data has been obtained from the Darfield Weather Station, for the years 2011-2015. This station is located approximately 15 km to the north-northwest of the Aylesbury Quarry. There are no closer weather stations to the quarry. Due to the flat terrain between the proposed quarry and the Darfield Weather Station PDP consider this data is representative of the wind conditions experienced at the site. Average annual wind from 2011-2015 is shown as a wind rose in Figure 7, and a wind rose of strong (> 5 m/s) winds are shown in Figure 8.

The prevailing winds in the area are northeasterly and northwesterly, with strong winds (>5 m/s) prevail from the northwesterly direction.

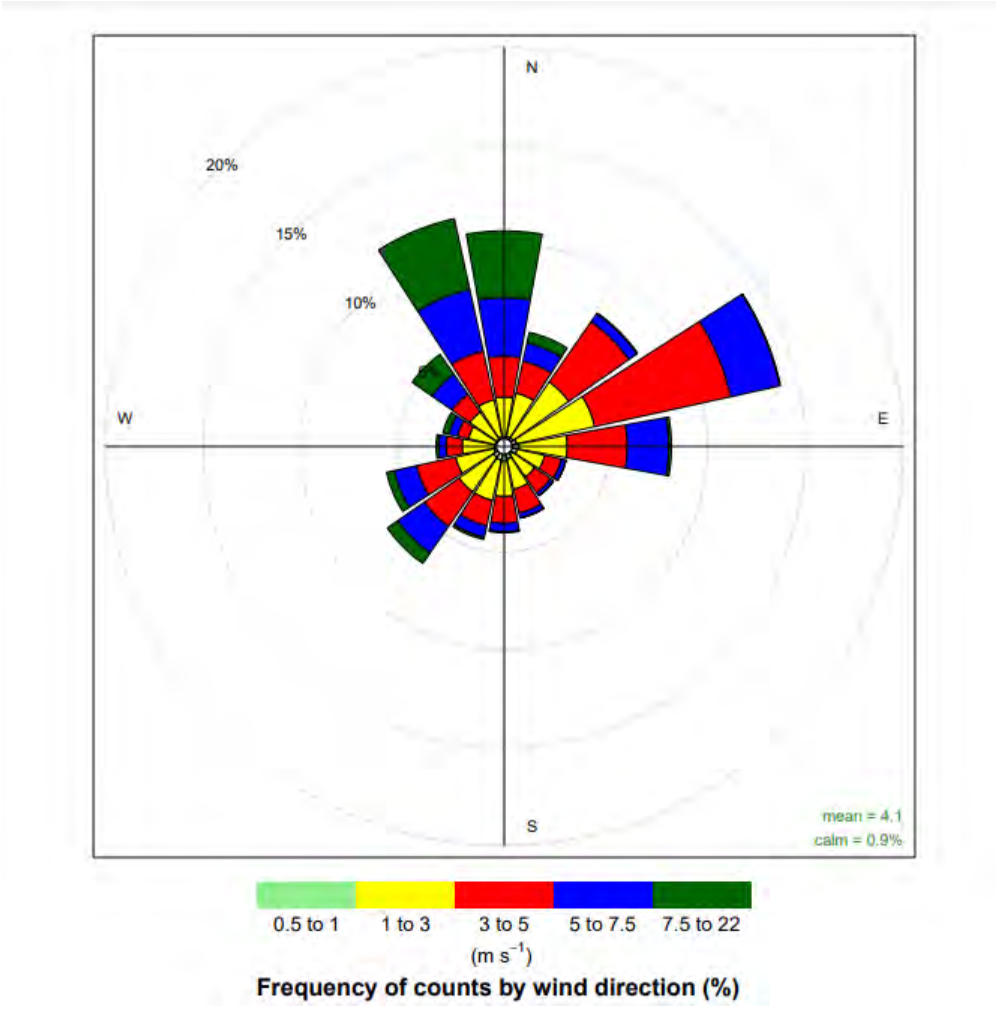

Figure 7: Darfield Weather Station, 2011-2015

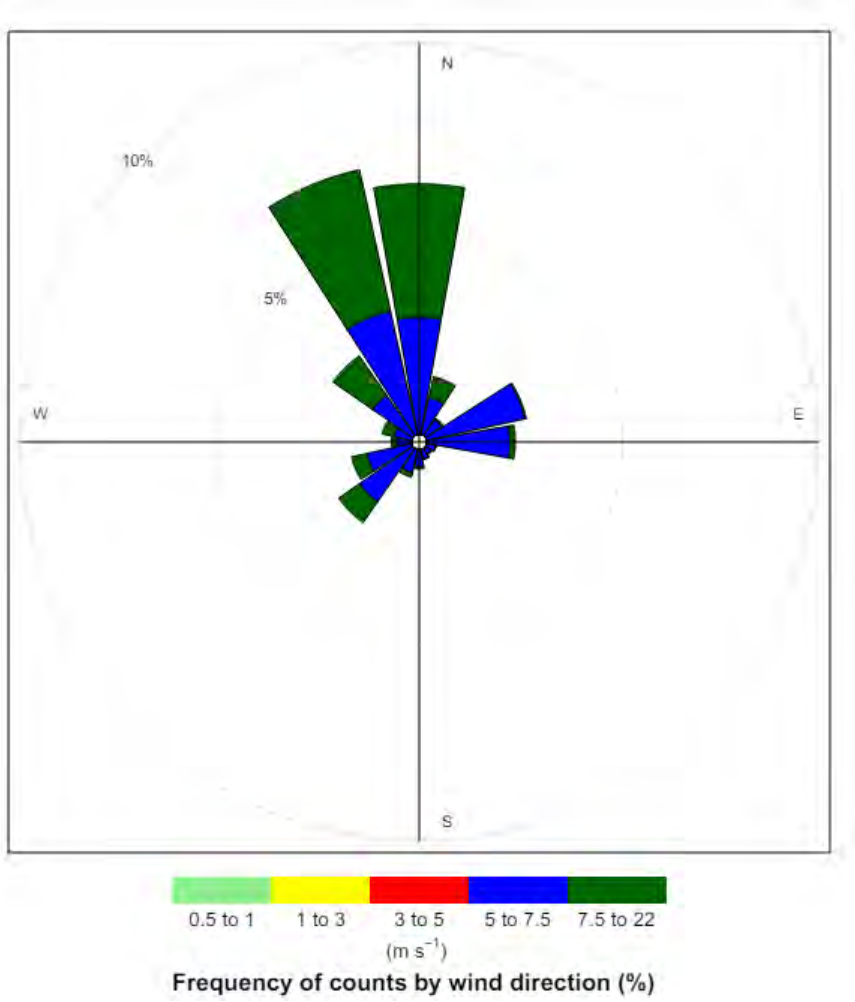

Figure 8: Strong Winds (> 5 m/s) at Darfield Weather Station, 2011-2015

6.2.2 High risk dust conditions

In some situations, dust can be mobilised when windspeeds are over 5 m/s. High-risk dust conditions occur when windspeeds are over 7.5 m/s. At the Darfield Weather Station site, windspeeds over 5 m/s occur 28.9% of the time, and windspeeds over 7.5 m/s occur 10.4% of the time. These winds are primarily from the northerly to north-westerly direction.

6.3 Existing Air Quality

Background concentrations of contaminants will vary depending on local activities and seasonal variations. Activities in the area surrounding the Site will consist of rural and rural residential activities.

There are no other significant sources of dust in the area surrounding the site expansion, with the exception of the already existing Aylesbury Quarry site. The

only other activity PDP is aware of requiring an air discharge consent within one kilometre of the site expansion is for odour discharges from a pig farm which is approximately 100 m to the southwest of the site expansion.

Background concentrations of dust are likely to be elevated when windspeeds are above 7.5 m/s, due to background dust from surrounding agricultural land and natural dust sources such as nearby riverbeds.

Mote reported on an air quality monitoring campaign undertaken at locations in and around the Yaldhurst Quarry zone (Mote, 2018). The purpose of this monitoring was to characterise the nature of particulate by measuring short-term and long-term particulate levels at multiple locations. The report found that PM_{10} concentrations measured at a distance of greater than 160 m from the quarry boundary show very little impact from the quarry compared to data collected at a background site. The existing background air quality is expected to be relatively good with respect to particulate matter consistent with the rural environment.

7.0 Dust Assessment Criteria

7.1 Amenity Effects

The relevant criterion for amenity dust effects is set out in the *Good Practice Guide for Assessing and Managing Dust* (MfE, 2016):

> *There shall be no discharge of particulate matter that is objectionable to the extent that it causes an adverse effect at or beyond the boundary of the subject property.*

While wording may vary from council-to-council the assessment criteria is widely accepted for use across New Zealand. While this is a qualitative assessment criterion, the Dust GPG provides recommendations on how to undertake an objective and robust assessment against this qualitative assessment criteria.

7.2 Buffer Distance

The potential amenity impact of any dust source is highly dependent on the distance between the source and receptor. A receptor that is 250 m or greater from any dust source is highly unlikely to experience a detrimental effect on amenity values. The recommended buffer distance for a quarry without blasting is 250 m (EPA Victoria, 2013). A receptor between 250 m and 100 m from a dust source employing good practice dust suppression measures is unlikely to experience a detrimental effect on amenity values. Any receptor that is less than 100 m from a dust emitting site could potentially experience a detrimental effect on amenity values. However, this risk can be mitigated by proactively using best practice dust mitigation and monitoring methods. PDP notes that Southern Screenworks is proposing to not quarry within 100 m of the notional boundary of

any dwelling in existence as at the date of consent being granted, unless written approval has been obtained from the owners and occupiers of that dwelling.

7.3 Health Effects

The relevant guidelines for assessing the off-site health effects of PM_{10} are defined in the NESAQ (Ministry for the Environment, 2004) and ambient air quality guidelines AAQG (Ministry for the Environment, 2002) as follows:

- 50 µg/m³ PM_{10} as a 24-hour average, allowing one exceedance in a 12-month period (NESAQ); and
- 20 µg/m³ PM_{10} as an annual average (AAQG).

The NESAQ does not specify guideline values for $PM_{2.5}$, however the World Health Organization recommends $PM_{2.5}$ guideline value of 20 µg/m³ as a 24-hour average.

8.0 Qualitative Method for Assessment of Dust Impacts (FIDOL)

The nuisance effects of dust emissions are influenced by the nature of the source, sensitivity of the receiving environment and on individual perception. For example, the level of tolerance to dust deposition can vary significantly between individuals. Individual responses can also be affected by the perceived value of the activity producing the dust.

The Ministry for the Environment's (MfE) Good Practice Guide to Assessing and Managing the Impacts of Dust (Ministry for the Environment, 2016) and CARP recommends that the nuisance effect of dust emissions may be assessed by using FIDOL factors to take into account the nature of the source in the context of receiving environment. These factors are described in Table 3.

Table 3: Description of the FIDOL Factors

Frequency	How often an individual is exposed to the dust
Intensity	The concentration of the dust
Duration	The length of exposure
Offensiveness/character	The type of dust
Location	The type of land use and nature of human activities in the vicinity of the dust source

Different combinations of these factors can result in adverse effects. Location is particularly important as this relates to sensitivity of the receiving environment.

Depending on the severity of the dust event, one single occurrence may be sufficient to consider that a significant adverse effect has occurred. In other situations, however, the event may be short enough, and the impact on neighbours sufficiently minor, that the events would need to be happening more frequently for an adverse effect to be deemed to have occurred.

Other factors that may determine whether an offensive or objectionable effect from dust emissions is likely to occur are the presence of background sources of dust. Cultural matters such as the presence of marae, mahinga kai, wāhi tapu, churches, mosques, theatres, art galleries and sporting or recreational areas and venues may also need consideration.

The FIDOL assessment method considers each of these factors in a qualitative manner.

9.0 Dust Mitigation and Monitoring

To ensure that the actual impacts of discharged dust are minimised, the effective control of quarry activities using appropriate dust mitigation measures is recommended in accordance with good practice and as appropriate to the scale and nature of the potential effects. The recommended mitigation measures have been developed in accordance with good practice for dust management based on PDP's experience with similar quarry sites and the MfE (2016) Good Practice Guide.

To ensure the dust mitigation is effective the site will also have an environmental monitoring programme.

9.1 Dust Mitigation – Site Establishment

There is the potential for dust to be generated by earthworks activities associated with establishing the quarry extraction areas, in particular removing topsoil and operating vehicles over unsealed surfaces.

While the location of the site expansion is such that dust is unlikely to result in off-site effects when taking into account the setbacks proposed for processing and extraction, the following mitigation measures will be used:

- Restricting vehicle speeds at the Site to 15 kph or less;
- Avoiding earthworks activities during periods when strong winds (>10 m/s as a 10-minute average) occur from the north and northwest. On-site monitoring of winds and automatic SMS alerts will provide notification to staff of these periods;
- Seeding bunds with grass as soon as practicable to stabilise the bund material and reduce opportunity for wind erosion; and,

- Use of water spray suppression or dust suppressants to keep haul roads and other exposed surfaces damp.

These mitigation measures will need particular attention when activities are undertaken near the southern and eastern quarry areas which are nearest to residential properties.

9.2 Dust Mitigation – Site Operation

As with site establishment, the operational activities are unlikely to have offsite effects due to the distance to sensitive receptors. Mitigation measures will, however, be used to ensure that the potential for adverse effects offsite are minimised. Mitigation could include the following:

- Undertaking extraction in sub-stages of no more than 2 ha and keeping active working quarry area to no more than 6 ha at any time;
- Limiting areas requiring dust suppression to a maximum of 2 ha.
- Retaining the established shelterbelts along the boundary of Bealey Road and extending plantings in accordance with the LVIA Mitigation Plans;
- Not extracting within the site expansion within 100 m of a nearby dwelling existing as at the date of consent being granted, without written approval from the owner and occupier of that property;
- Not processing within the site expansion within 250 m of an offsite dwelling existing as at the date of consent being granted;
- Minimising drop heights when depositing any material as part of the site preparation, loading of haul trucks, excavation, or rehabilitation;
- Inspection of loads to ensure they are not dusty;
- Covering and/or dampening of dusty loads;
- Dampening dusty loads during placement in the quarry and managed fill areas;
- Use of water spray suppression or dust suppressants on haul roads as needed to reduce dust generation;
- Restricting vehicle activities to speeds of less than 15 kph;
- Rehabilitation of completed sections of the quarry as soon as practicable to minimise the potential for dust; and,
- Sealing of entrances and exits to the site.

9.3 Water Availability and Use

Southern Screenworks uses water for dust suppression. The site has four 30,000 litre-capacity rainwater storage tanks, and a fifth 30,000 litre-capacity

tank for storage of town supply water. Southern Screen works takes up to 2,000 litres per day from the town water supply.

A 10,000-litre water truck is used to apply water for dust suppression across the quarry. Most days the gravel roads will have water applied twice a day. On hot dry days water application may occur up to six times a day. The 10,000 L water truck was purpose built for the quarry and can dampen the whole active area within 20 minutes. The water cart will typically operate between the working hours of 7 am to 6 pm Monday to Friday. Water suppression may also be required for dust suppression outside normal operating hours during dry and windy conditions to prevent dust generation from exposed surfaces.

Dust suppression water availability is discussed in Section 3.2 of the applicant's statutory and planning assessment[2]. The key points relevant to this assessment are:

> *It is noted that Rule 5.114 of the LWRP provides for:*
>
> *The taking and using of less than 5 L/s and more than 10 m3 but less than 100 m3 per property per day of groundwater on a property more than 20ha in area is a permitted activity, provided the following conditions are*
>
> 1. *The bore is located more than 20 m from the property boundary or any surface waterbody.*
>
> *On approval, the expansion area would be over 20 ha.*
>
> *While Screenworks is not currently proposing to take groundwater, as it has access to rainwater and dust suppressants, it could in the future look to utilise this rule if needed for operations on site such as the washing of aggregates or dust suppression, subject to compliance with condition 1 of the rule, and complying with any relevant discharge rules that might be relevant to an activity. Any such use of the permitted activity rule may be required to occur with a partial surrender of an existing irrigation permit over the expansion area.*

9.4 Meteorological Monitoring

A meteorological station that will measure wind direction, wind speed, temperature and relative humidity has been set up on site recently. The location of the equipment and location of the meteorological station location has, to our knowledge and as far as practical, been set up consistent with the AS/NZS 3580.1.1:2016.

The meteorological station provides real time data to the site staff. This information will be used to assist with the dust management of the site expansion. The meteorological system is set up to send email and SMS text

[2] Application for Resource Consent and Assessment of Effects on the Environment Screenworks Alyesbury Quarry. Bligh Planning and Engagement Limited. May 2024. Report Number BPE-2024_R-SSL-001.

alerts to site staff. An alert is sent when 1-hour average windspeeds exceed 5 m/s that is used to prompt site staff to carefully monitor dust sources and implement additional mitigation measures if required. An alert is sent when 1-hour average windspeeds exceed 7.5 m/s that is used to prompt site staff to stop work on dust generating activities.

The meteorological data will be archived and be available for reviewing and responding to any dust and odour complaints received by the site staff.

9.5 Dust Monitoring - Visual

Visual monitoring of dust can be an effective measure of ensuring that appropriate dust control measures are applied to minimise the potential for offsite effects from dust. Visual monitoring measure may include daily site inspections to visually assess dust, recording inspection results, and making the log available to Environment Canterbury on request.

9.6 Dust monitoring - Instrumental

It is not proposed that instrumental monitoring be undertaken at the site as part of the initial monitoring programme. However, should complaints arise and the proposed mitigation and monitoring programme be demonstrated to be ineffective, the DMMP will require the consideration of instrumental dust monitoring.

9.7 Dust Mitigation and Environmental Monitoring Plan

A Quarry Site Management Plan (QMP/SMP) exists for the Aylesbury Quarry site which outlines dust control measures on the site and effectively serves as a Dust Management and Monitoring Plan (DMMP).

This will be updated should consent be granted and will outline in more comprehensive detail the various dust management procedures, assign responsibility for dust management to an individual staff member with a plan to train other staff covering matters such as the importance of effective dust control, and communications with the local community.

The structure and content of the DMMP is likely to reflect the following table of contents:

Document Control

1.0 Introduction

- 1.1 Purpose
- 1.2 Background Information
- 1.3 Description of Activity and dust sources

10.0 Assessment of Amenity Effects from Dust

The following sections present the findings of the FIDOL assessment.

10.1 Frequency

The frequency of potential dust discharges is impacted by weather conditions, such as the frequency of strong winds, and the frequency of dust-generating activities.

10.1.1 Frequency of Dust Emissions

The quarry will operate between the hours of 0700 to 1800, Monday to Friday and 0700 to 1300 on Saturday. No works will occur on Sundays or public holidays.

The only activity to occur prior to 7am being the occasional departure from the site of two Southern Screenworks owned transporters which may need to leave the site between 6 am and 7 am on weekday mornings to travel across town within legal requirements.

10.1.2 Frequency of High-risk Wind Events

23, 35, 137, 153 and 158 Bealey are all located within 250 m of the site expansion areas and would be downwind of quarry activities during northwesterly to south-easterly winds. Strong winds from these directions occur 22% of the time. This represents a moderate risk to these receptors when quarry activities at the site expansion occur within 250 m.

All of the receptors located between 250 m and 1000 m are also to the east (northwest through southwest) of the site expansion and are at distances beyond which the effects of dust from the site expansion are expected to be negligible. Strong winds greater than 5 m/s blowing toward these directions occur less than 5% of the time. Given these factors, PDP considers that there is negligible potential for offsite dust nuisance effects the locations greater than 250 m in separation from the site expansion.

10.1.3 Overall dust risk frequency

Combining the impacts of dust emissions and high-risk wind events PDP consider the frequency of dust impacts likely to be moderate to low.

10.2 Intensity

Intensity relates to the concentration of dust that is likely to be experienced at any potential receptor outside the site boundary. Suspended dust levels will disperse and dilute with increased distance from the emission source, and larger particles will deposit closest to the source. The intensity is therefore determined both by the source characteristics and by the separation distance to sensitive receptors when downwind.

The nearest sensitive receptors beyond the site expansion boundary are at 23, 35 137, 153 and 158 Bealey Road to the south and west of the site expansion and will be exposed to the greatest intensity of any potential discharges from the site expansion. The dwellings on these properties are located 80 m, 190 m, 50 m, 50 m, and 20 m respectively from the nearest areas proposed to be quarried. At these distances, the level of effects from dust are expected to be high. 23 and 35 Bealey Road are adjacent to the existing site and are only within 250 m of the

Stage 1 area of the site expansion. Following the quarrying of the Stage 1 area, these two receptors will be more than 250 m from any quarrying activities and effects will therefore be temporary.

10.3 Duration

The duration of potential dust impacts associated with the site expansion will be associated with the overall duration of the site activities, and the duration of strong wind events during which dust may be transported offsite.

The overall lifetime of the quarry is expected to be at least 30 years. Dependant on the demand for aggregate, this could take longer.

The duration of dust discharges would be limited to periods of strong winds during dry periods, or periods of unmitigated dust-generating activities at the site, and any effects will be limited to near the site activities. As described previously, the frequency of strong winds greater than 5 m/s blowing towards the nearest sensitive receptors beyond the site boundary occur 9% of the time, and the duration of these events will be similarly limited. Based on duration of high-risk wind events, PDP considers the risk of dust events lasting more than one hour to the five nearest residences is moderate without mitigation.

10.4 Offensiveness

The dust from quarry materials will for the most part be light in colour and inert in nature, consistent with that experience naturally in the area, and therefore in itself is considered of low offensiveness. The dust will only potentially cause a nuisance effect if it settles on surface and this adverse effect will be limited distance from the proposed activity to the site boundary as well as by mitigation measure proposed for the site.

10.5 Location

The receiving environment has been discussed previously in Section 6.0. Using the MfE (2016) classifications, the site is located in a Rural receiving environment, which is classified as a low sensitivity environment for rural activities and moderate or high for other activities. Residential dwellings are expected to have a moderate to high sensitivity to effects from dust, and the 5 residential receptors to the south and west of the site expansion are within 250 m of the quarry are considered to be of high sensitivity.

10.6 Overall Finding of Dust Assessment

Table 4 provides a summary of the assessment of the FIDOL factors relevant to the five closest sensitive receptors to the south and west at Bealey Road.

Table 4: Summary of FIDOL Assessment

Factor	Discussion	Assessment
Frequency	The nearest offsite receptors from the site expansion lie to the south and west. The wind conditions with the potential for offsite dust effects on these receptors (strong winds >5m/s from the north and northwest) occur 22% of the time.	Low to Moderate
Intensity	The distance of the nearest receptors to the dust-generating activities at the site expansion are less than 250 m, which may not provide adequate dispersion to the concentrations of any emitted particulate matter. As such, concentrations of particulate matter have the potential to be moderate to high at the five nearest receptors.	High
Duration	The duration of events when wind conditions could give rise to dust travelling in the direction of sensitive receptors is typically short but may at times be sustained for several hours. The overall duration of the project is expected to be approximately 30 years.	Moderate
Offensiveness	The light colour character of the dust from soil and fil material has low offensiveness from deposition.	Low
Location	The environment is rural and generally considered of low sensitivity. The nearest sensitive receptors are less than 250 m or greater from the quarry and have the potential to be affected by deposited dust or elevated fine particulate matter from the site expansion if the emissions are not adequately mitigated and controlled. All other receptors are at distances greater than 250 metres and are unlikely to be affected by dust given this level of separation. State Highway 73 has the potential to be affected by dust from the site activities due to the proximity of the road to the quarry.	High for 23, 35, 137, 153 and 158 Bealey Road. Low everywhere else.

Considering the FIDOL factors above, PDP considers that the risk of any noxious, dangerous, objectionable, or offensive effects from the proposed activities at or beyond the boundary of the site expansion is moderate to high at the five residences to the south and west of the site and will be negligible at all other locations.

Dust effects will be minimised by the mitigation and monitoring methods as set out in the Section 7 of this report. A comprehensive Dust Management Plan (DMP) will also be developed for the site which outlines procedures for mitigation and monitoring of potential dust emissions from the Site. Provided these measures are implemented the amenity effects of the site expansion activities on the surrounding environment will be less than minor.

Mitigation measures will include limited operations during strong winds and use of water spray suppression and dust suppressants as needed to reduce the risk of adverse effects during dry weather periods, as well as maintaining buffer distances of 250 m and 100 m from processing and extraction, respectively. Furthermore, progressive rehabilitation of the site expansion will be undertaken, such that a maximum of 6 ha of the site expansion is open at any time, with only 2 ha requiring dust suppression.

10.7 Complaints

PDP understands that there have been no complaints related to the site since it has been in operation. The absence of any complaints suggests that the current activities at the site, which are similar in nature to the proposed expansion, have been appropriately managed so as to prevent adverse offsite effects.

11.0 Assessment of Potential Health Impacts

The dust discharged from excavation of gravels and vehicles travelling over unsealed haul roads from unconsolidated surfaces contains a small amount of PM_{10}, which can penetrate into human lungs and cause adverse health effects. The NESAQ for PM_{10} (50 µg/m³ as a 24-hour average) has been set to protect the general population from adverse health effects (MfE, 2004). Given the site's processes, the sources of dust and proposed dust mitigation measures, the amount of PM_{10} discharged from the site is expected to be small and is not likely to cause a large increase in ground level concentrations of PM_{10} at or beyond the site boundary.

Dust effects will be minimised by the mitigation and monitoring methods as set out in the Section 7 of this report. A comprehensive Dust Management and Monitoring Report (DMMP) will also be developed for the site which outlines procedures for mitigation and monitoring of potential dust emissions from the Site. Provided these measures are implemented the effects of the site expansion activities on human health will be less than minor.

Furthermore, monitoring of the Yaldhurst Quarry zone, in the same region, did not find RCS concentrations at concentrations of concern for human health. The vast majority of RCS measurements taken were below the limit of detection of the chemical analysis. PDP expects that this will also be the case for the Southern Screenworks site expansion given the considerably smaller scale of the operations compared to Yaldhurst.

12.0 Assessment Summary and Conclusions

Southern Screenworks operates a quarry at 50 Bealey Road and is proposing to expand quarrying operations into an area of 66 ha to the north and west of the current site and amend some of the conditions relating to the current quarrying operation.

The potential adverse effects of dust discharges into air from the site expansion have been assessed using consideration of the FIDOL factors. The assessment methodology considers the sensitivity and location together with the likelihood of the activities to generate dust and the frequency of winds with increased potential to result in offsite dust.

The sensitivity of the receiving environment is considered to be generally low given the rural nature of the receiving environment. Five residences to the south and west of the site expansion have been identified as being most at risk of potential dust issues originating from the site expansion, being within 250 metres of the quarry, and downwind of the prevailing northerly to northeasterly winds.

The risk of adverse effects of dust from the site expansion have been assessed as being moderate to high at the five residences and are assessed to be negligible to low everywhere else.

Neighbouring land immediately to the south of the site expansion is most at risk from dust deposition due to the higher frequency of strong winds occurring from the north and northwest, whereas properties in other directions from the site will be at a significantly lower risk of experiencing windblown dust, both due to separation distance and the prevailing wind directions.

A number of best practice mitigation measures have been recommended in this report to control dust emissions at the site expansion. Providing that the mitigation measures recommended in this report in conjunction with the implementation of the Dust Management and Monitoring Report (DMMP) are effectively implemented by Southern Screenworks, dust emissions will be minimal.

The key dust mitigation measures recommended are:

- Maintaining a distance of 100 m between existing adjacent residences and aggregate extraction unless written approval is obtained;

- Maintaining a distance of 250 m between adjacent residences and aggregate processing; and
- Progressive rehabilitation of the site expansion such that a maximum of 6 ha is actively quarried, and a maximum of 2 ha is actively generating dust and requiring dust suppression.

With the recommended mitigation measures, the discharges of dust from the proposal have been assessed as having less than minor amenity and human health impacts.