

Hughes Developments Ltd

Bangor Road • Darfield

Erosion, Sediment and Dust Control Management Plan

21112

June 2026



DAVIE LOVELL-SMITH

PLANNING SURVEYING ENGINEERING



S h a p i n g t h e f u t u r e s i n c e 1 8 8 0

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Compiled by:	Jamie Verstappen		17/06/2026
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Disclaimer

This Erosion and Sediment Control Management Plan (ESCMP) provides the key design outline for the sediment and erosion control measures to be provided on site. It is not possible at initial design stage to anticipate and include all site-specific design details, as some detail can only be included on the basis of in situ monitoring and adjustments. In order to be effective on site the plan will need to be implemented by a contractor experienced in erosion and sediment control, who will be required to monitor its performance and make specific adjustments to its detail to respond to specific conditions on site and changes to those conditions. It is not suitable for unmonitored or unmanaged implementation or implementation by personnel who lack appropriate expertise and experience in erosion and sediment control. We require that the ESCMP be monitored by an on-site manager or contractor appropriately experienced in sediment and erosion control, who is to make such adjustments as are necessary to ensure its effective operation in view of the features, the condition or state of the site or changes to conditions on site.

EROSION & SEDIMENT CONTROL MANAGEMENT PLAN FOR THE BANGOR VILLAGE SUBDIVISION, DARFIELD

1.0 Introduction

This report describes the methods by which potentially sediment laden stormwater runoff is to be controlled during the construction of the Bangor Village residential subdivision for Hughes Developments Limited, as required by Environment Canterbury Guidelines.

The site is located to the northwest of the existing Darfield Township. The site is bounded by SH73 to the east, Bangor Road to the south, existing rural lifestyle blocks to the southeast and west, and rural land to the north. A block of land owned by the Selwyn District Council which accommodates a water extraction facility is also located on the northern boundary of the site. A site locality map can be seen in Appendix A, 'Erosion and Sediment Control Management Plan'.

There are 2 water races which enter the development area. One water race enters the north side of the site through lot 730 and traverses the site in a southerly direction to exit the site at lot 28. The other water race enters the eastern boundary of the site at lot 687 and heads along the southeastern boundary of the site, exiting the site at lot 554. Protection of the water races during construction will be a priority at all times. A map showing the location of the water races is attached as Appendix B.

Resource Consent is currently being sought to subdivide the two existing land parcels within the overall development site. The legal descriptions of these sites are: Section 2 SO 438579 and Lot 2 DP 81020.

The site is presently grazing and pastoral farmland with one existing dwelling and several farm sheds. There are also several well-established trees within the property. The dwelling, farm buildings, fences, trees and other vegetation will be removed progressively during construction of the subdivision. Areas of trees located within future reserves areas may remain. The topography of the site is relatively flat with a gentle fall of approximately 1 in 150 towards the south. During construction, stormwater emanating from the construction works area could potentially pose an erosion, sediment and dust control hazard.

The existing landform draining towards the south is to be maintained. The site will generally be shaped so that filling will occur over the lots, and the proposed new roads will be in cut. Following development, stormwater runoff from each residential lot will be discharged to ground through individual soakpits designed and installed as part of the Building Consent process for each proposed new dwelling. Stormwater runoff from roads will be discharged to ground through a series of soakpits located within the roads and local purpose reserves. These soakpits will be sized for the critical duration 1 in 50 year storm event. Overland flow paths for any additional runoff will be provided along the new road corridors and will connect to the existing road network discharging to natural flow channels south of the development area.

A geotechnical investigation was undertaken for the site in June 2026. This geotechnical investigation was undertaken by ENGEO and includes information regarding the soil profile beneath the site, groundwater levels and the anticipated seismic performance of the site. Information was gathered from the relevant available geotechnical databases and site investigations including both scala penetrometer testing and machine excavated test pits.

These geotechnical investigations conclude the soil profile beneath the site can be describes as: 0.2m to 0.3m of topsoil overlying 0.2m to 0.7m of silts and sands overlying natural medium dense to dense gravels to at least 265m depth. The ECan regional groundwater depth is interpreted to be present at 50m depth, however it may be significantly deeper than this. The site is generally considered to meet the 'Good Ground' classification as defined in NZS 3604:2011 and is deemed suitable for residential use.

A combined Preliminary and Detailed Site Investigation was undertaken by ENGEO for the 160 Bangor Road property in June 2026. This investigation concludes the site has been used for agricultural purposes since before 1940. A number of sites of interest within the site were identified, these include: offals pits, burn pits, fuel storage areas, livestock dips and buildings which may contain asbestos. These areas were tested for contaminants with results showing contamination above allowable residential thresholds in some locations. Options for disposal of these contaminated soils have been outlined within the Report, though further investigation is recommended to delineate the contaminated areas for removal under a Remedial Action Plan.

.2.0 Land Disturbing Activities

Construction of the proposed development will involve the following land disturbing activities:

- Stripping and stockpiling topsoil;
- Earthworks for roading;
- Cutting and filling to design levels over the site to create approximately 1268 new residential lots, commercial and apartment block and reserves
- Trenching for the installation of water, sewer, and stormwater services and structures, power and telecom services;
- Respreading of topsoil.

Construction of the development is expected to begin in 2027, subject to the granting of resource consents and Engineering Approvals, with an earthworks period of approximately 10 years, although this will be influenced by staging of the construction works and uptake of new lots created.

3.0 Erosion and Sediment Control Measures

In reference to the Environment Canterbury Erosion and Sediment Control Guidelines, erosion is to be controlled by sequencing operations to minimise the areas of bare earth exposed for the shortest possible time. The total area of disturbed land within the site is to be limited to 5 Ha at any given time.

Once areas are cut/filled and shaped to their final levels they are to be sown in grass, hydroseeded, paved or landscaped and mulched as applicable to minimise erosion potential. Areas will be stabilised as soon as practicable to minimise erosion potential. Ground slopes on site are low so runoff flow velocities will be minimal. Cut and fill depths will be minimised to reduce the volume of material to be stockpiled on site, however track rolling of stockpiles and other means to restrict runoff flow velocities where areas of bare earth are at steeper slopes will be employed.

It is proposed that there will be two main construction access locations, both from Bangor Road. Both site access points will be stabilised with rock aprons. Bunding and/or cut off drains will be installed along all development boundaries to capture and contain runoff as necessary for each construction stage. Cut-off drains will be excavated within the site to convey all captured flows to temporary soakage pits. All runoff will be discharged directly to ground.

Any construction phase soakpits constructed on site will be sized to dispose to ground stormwater generated from their respective catchments for up to a 10% AEP event. Additional storage volume for events up to the 2% AEP is provided by flooding of roading and services excavations. Due to soil conditions on site, ponding of stormwater for more than 48 hours is not anticipated during the earthworks period as required by LWRP Rule 5.96.

The landform has been designed to drain all lots towards the road, and the road network provides overland flow paths through the development site towards the south. Cut off drains will be constructed to capture and divert and sediment laden flows towards the construction phase soakpits as necessary.

Once construction is completed, grass and landscaping established, roads sealed, and all areas stabilised, the construction phase soak pits will be removed. Other erosion and sediment control devices including bunding and cut off drains will also be removed at this time.

Further details of the proposed erosion and sediment control measures described above to be implemented during the construction of Bangor Village are shown on Appendix A, 'Erosion and Sediment Control Management Plan'.

4.0 Dust Control Measures

During the construction works there will be periods where significant areas of land are required to remain unconsolidated or unstabilised for periods of time up to the prescribed maximum limit of 5 Ha. During these periods, the control of dust will likely become a significant issue. It is noted that unconsolidated surfaces means an area of land which is not sealed to prevent dust from dispersing and may be formed from sand, loose gravel, silts or clay type soils.

Dust contamination will be actively managed to ensure that any dust discharges are minimised. All practicable measures shall be taken to minimise the frequency and severity of dust emissions. These measures include, but are not limited to the following:

- Having the appropriate number of water carts, full and available for use at all times for the application of water as necessary to ensure the moisture level of exposed surfaces do not drop below a level that allows nuisance dust to readily be generated.
- Washing and compacting exposed gravel surfaces to ensure the surface is bound and free of fine soil particles which may become airbourne.
- Applying water or other appropriate dust suppressants to relevant areas, roads, work areas and equipment, using sprinkler systems, tanker trucks or other means, especially during strong winds which may pick up and carry dust off-site.

- Irrigation systems such as k-lines will be installed on areas that will be static and require medium-long term management (e.g. building platforms and un-grassed areas).
- Topsoil will be re-spread, grassed and watered on the earthwork areas immediately and progressively upon completion of the operations.
- Seeding and watering each section of the perimeter bunds to promote grass cover as quickly as possible, and maintaining that cover.
- Grading and maintaining vehicle access roads with crushed gravel, crushed concrete or other suitable material to minimise track-out of dust-generating material from the site.
- Limiting drop heights from loaders onto trucks as much as is practicable and avoiding handling or loading loose material under gusty wind conditions.
- Vehicle speed within the site is to be restricted to 15km/h to minimise the amount of dust generated by vehicles.
- Check the forecasted wind conditions at the start of the day to ensure that measures are put in place early when required (e.g. north-westerly in the afternoon).

Water for the dust suppression will be provided by two primary sources. Water will be taken from onsite bores up to the permitted volume limits (100m³ of water per day or the use of more than 5L/s) as prescribed by Rule 5.114 in the Canterbury Land and Water Regional Plan. Additional water is available from the Selwyn District Council Bulk Water Extraction Point in Mathias Street, Darfield. A Temporary Bulk Water Extraction Permit will be sought from Council prior to any extraction.

A comprehensive Dust Management Plan has been compiled also and is attached in Appendix C. This plan provides further detail regarding the management of dust on site throughout the construction period.

5.0 Construction Sequence

Earthworked areas will require stabilisation in the form of paved or grassed surfaces or equivalent measures before the disturbed criteria can be abandoned. Grassed surfaces require 80% cover and a minimum height of 50mm to be deemed stabilised. The proposed construction sequence can be summarised as follows:

- Plan the methodology and timing of land disturbing activities to minimise erosion and sediment generation;
- Confirm the preferred location/s for site entrances and stabilise with rock aprons and shaker ramps;
- Construction of temporary soakage pits;
- Construction of bunds/channels as necessary to ensure potential runoff is directed into the soakpits;
- Consider where other control measures may be required on site;
- Strip and stockpile topsoil from the construction area;
- Bulk earthworks;
- Re-topsoiling and grassing of sites;
- Trenching and installation of buried services;
- Excavate and construct kerb and channel;

- Excavate and backfill pavement in roading areas;
- Form berms to required levels, re-spread topsoil and sow in grass;
- Irrigate newly sown areas if necessary to encourage prompt establishment;
- Seal paved areas;
- Progressively remove erosion and sediment control measures.

6.0 Monitoring

These sediment control measures will be continually reviewed on a day-to-day basis and amendments and additions will be made where necessary.

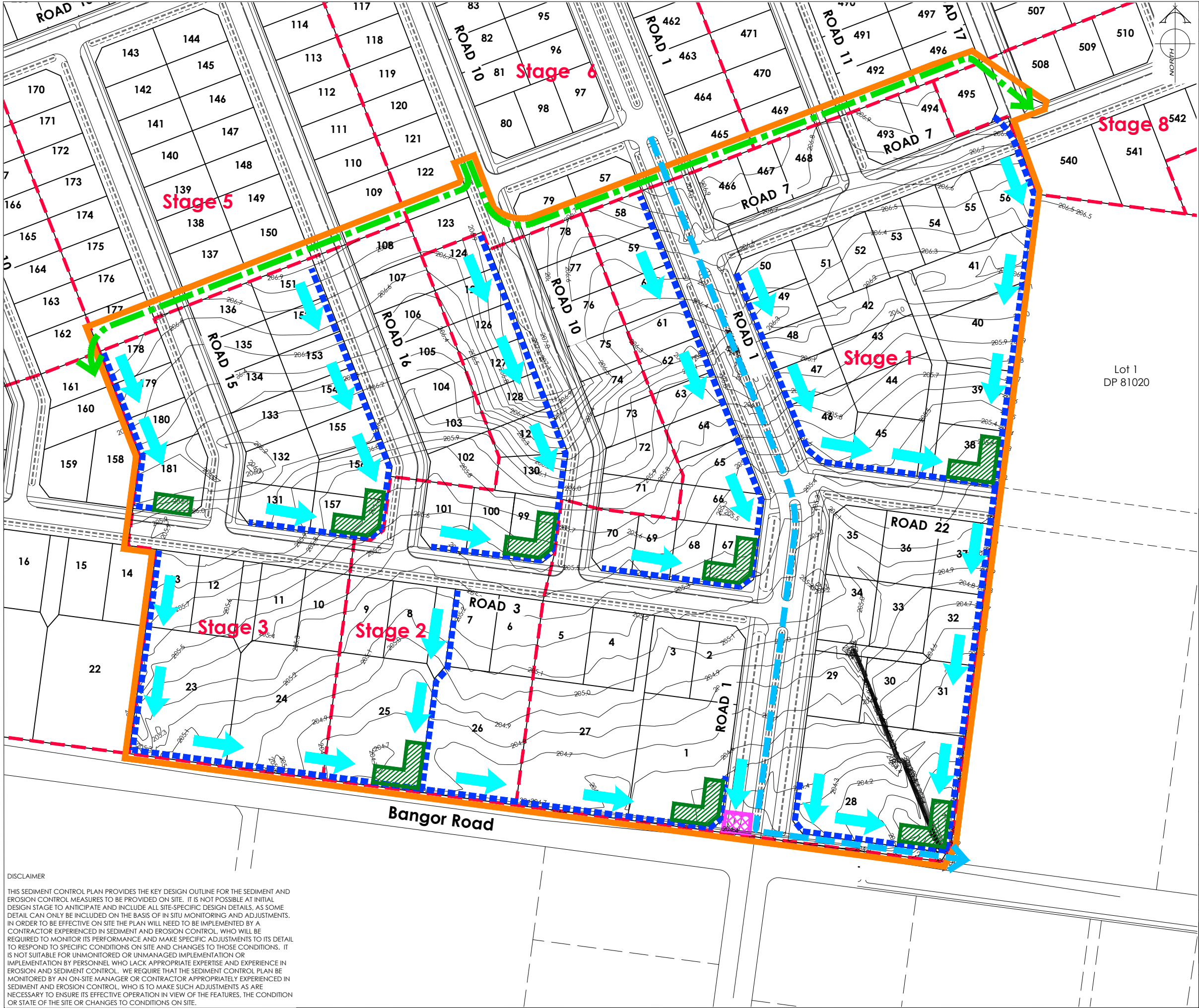
Sediment control facilities shall be inspected at least once a week and after each rainfall. A weekly on site record of each inspection will be kept. Any repairs required shall be carried out urgently. In addition, inspections of the facilities will be undertaken and recorded prior to forecasted rainfall events and regularly throughout rainfall events.

Sediment build-up in the base of construction phase soakpits and any other areas shall be monitored and removed when necessary.

The facilities will also be checked by the engineer and reported on at weekly site meetings.

It remains the contractor's responsibility to ensure that sediment is not discharged from the site as a result of their activities. Should it become evident that the control measures specified in this document are failing to prevent erosion or sediment discharge then the contractor shall take further action to remedy this. The contractor is to be fully conversant with the Environment Canterbury Erosion and Sediment Control Guidelines but may contact Davie Lovell-Smith if further advice with erosion and sediment control management planning is required.

Appendix A – Erosion & Sediment Control Management Plan Example - Stages 1-3



AMENDMENTS:

AMENDMENT	DATE	DESCRIPTION

NOTES:

E&SC MITIGATION MEASURES

- THE STABILISED ENTRANCEWAY MUST BE PLACED PRIOR TO ESTABLISHMENT ON SITE AND MUST BE MAINTAINED AND REPLACED AS REQUIRED TO ENSURE DIRT TRACKING OFF SITE IS MINIMAL.
- BOUNDARY SILT FENCES TO BE ESTABLISHED PRIOR TO THE COMMENCEMENT OF EARTHWORKS AND IS TO MAINTAIN IN PLACE UNTIL THE REMAINDER OF THE SITE HAS BEEN TOPSOILED AND SEED.
- EARTHWORKED AREAS ARE TO BE TOPSOILED AND SEED AS SOON AS PRACTICALLY POSSIBLE FOLLOWING RE-CONTOURING OF THE SITE.
- THE BASE OF THE CONSTRUCTION SOAKAGE PIT MUST EXTEND AT LEAST 0.5m INTO PERMEABLE SOILS.
- MEANS OF CONTROLLING DUST NUISANCE MUST BE AVAILABLE ON SITE FOR THE ENTIRETY OF THE EARTHWORKING PROCEDURE. SITE WORKS MUST HALT IF THE PRODUCTION OF DUST CANNOT BE CONTROLLED.
- TEMPORARY SOAKHOLE TO BE DECOMMISSIONED UPON COMPLETION OF EARTHWORKING AND REINSTATED IN ACCORDANCE WITH NZS4431:2011.
- Design CONTOUR INTERVAL: 0.1m MINOR. 1.0m MAJOR.

LEGEND:

EARTH BUND + CUT OFF DRAIN

CONSTRUCTION BOUNDARY

STAGE BOUNDARY

WATER RACE

CLEAN WATER DIVISION

DIRECTION OF DRAIN FLOW

SOAKPIT

BALLAST STABILISED SITE ENTRANCE

EXISTING SERVICES

PROPOSED SERVICES

KERB

KERB

CUT DOWN

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JOB TITLE:

Bangor Road, Darfield

SHEET TITLE:

Erosion & Sediment Control Plan Stages 1 - 3

DRAWING STATUS

For Information Purposes

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DRAWN: DG

DRAWING No: SHEET No: REVISION:

H21112 ESCMP01.0 R0

DISCLAIMER

THIS SEDIMENT CONTROL PLAN PROVIDES THE KEY DESIGN OUTLINE FOR THE SEDIMENT AND EROSION CONTROL MEASURES TO BE PROVIDED ON SITE. IT IS NOT POSSIBLE AT INITIAL DESIGN STAGE TO ANTICIPATE AND INCLUDE ALL SITE-SPECIFIC DESIGN DETAILS, AS SOME DETAIL CAN ONLY BE INCLUDED ON THE BASIS OF IN SITU MONITORING AND ADJUSTMENTS. IN ORDER TO BE EFFECTIVE ON SITE THE PLAN WILL NEED TO BE IMPLEMENTED BY A CONTRACTOR EXPERIENCED IN SEDIMENT AND EROSION CONTROL, WHO WILL BE REQUIRED TO MONITOR ITS PERFORMANCE AND MAKE SPECIFIC ADJUSTMENTS TO ITS DETAIL TO RESPOND TO SPECIFIC CONDITIONS ON SITE AND CHANGES TO THOSE CONDITIONS. IT IS NOT SUITABLE FOR UNMONITORED OR UNMANAGED IMPLEMENTATION OR IMPLEMENTATION BY PERSONNEL WHO LACK APPROPRIATE EXPERTISE AND EXPERIENCE IN EROSION AND SEDIMENT CONTROL. WE REQUIRE THAT THE SEDIMENT CONTROL PLAN BE MONITORED BY AN ON-SITE MANAGER OR CONTRACTOR APPROPRIATELY EXPERIENCED IN SEDIMENT AND EROSION CONTROL, WHO IS TO MAKE SUCH ADJUSTMENTS AS ARE NECESSARY TO ENSURE ITS EFFECTIVE OPERATION IN VIEW OF THE FEATURES, THE CONDITION OR STATE OF THE SITE OR CHANGES TO CONDITIONS ON SITE.

Appendix B – Water Race Map



Appendix C – Dust Management Plan

Hughes Developments Ltd

Bangor Village – Darfield

Dust Management Plan

21112 R0

June 2026



Shaping the future since 1880

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Compiled by:	Jamie Verstappen		17/06/2026
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Disclaimer

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DUST MANAGEMENT PLAN FOR BANGOR VILLAGE, DARFIELD

1.0 Introduction

In accordance with Canterbury Regional Air Plan (CARP), this report describes the methods by which potential nuisance dust is to be controlled during the development of the Bangor Village residential development in Darfield.

The total area of works under this plan is approximately 130.4 ha. The site is currently held in two titles and is in use for rural purposes. The topography of the site falls towards the south at an average grade of approximately 1 in 150. It is proposed to subdivide the site into 741 residential lots, 18 local purpose reserves, 6 recreation reserves and associated roads. This equates to an overall development density of approximately 5.7lots/ha. Lots will vary in size between approximately 600m² and 1.1 Ha.

Given the proximity of adjacent residential dwellings there is a potential for fugitive dust to detrimentally affect the amenity of adjacent neighbouring properties, especially in the drier months of the year. Under the provisions of Environment Canterbury's, Canterbury Air Regional Plan (**CARP**), the Site Operator must ensure that any emissions of dust from the activities carried out on the site do not result in a nuisance to the developments residential and commercial neighbours. The Site Operator must also be able to provide an assurance to the community that any discharges of dust do not cause an objectionable or offensive effect beyond the property boundary.

This plan details the measures and procedures that will be implemented to avoid, remedy or mitigate any adverse effects which might be caused by the discharge of airborne particulates from the activities carried out by contractors and subcontractors on the premises at the Bangor Village development site. A copy of this management plan is kept on site and is available for use by the Site Operator's management and staff at all times.

The following dust management plan (DMP) has been prepared in accordance with the requirements of the CARP. The relevant pages of the CARP are referenced in Appendix C. The purpose of this document is to provide a framework for site operators and visiting contractors to minimise potential nuisance dust emissions from the site activities. These activities must be undertaken in a manner that will minimise the risk of nuisance dust effects beyond the boundary of the site during the hours of operation. Site personnel and contractors will be required to conform to the requirements of this DMP. Specific controls are proposed to limit after hour emissions, these controls are to be applied at the end of the day and prior to any extended break in works (i.e. holiday periods).

The ultimate goal is that by following the procedures outlined in this plan, the site-based activities will not result in the production of offensive or objectionable nuisance dust effects beyond the boundary of the site.

It is intended that this document will be a 'living' document, which will be regularly referred to by site staff and management. It will also be updated to meet changing conditions on the site.

2.0 Description of Potential Emissions

The subdivision of the Bangor Village site into lots, roads and accessways will require significant earthworks which may result in nuisance dust being carried from the site in high wind conditions.

The dust discharged from the proposed subdivision development will be biologically inert, and it is mostly nuisance dust with small amounts of particulate smaller than 10 µm (**PM₁₀**). It will range in colour from a light grey/brown to a darker brown dependent on the source of the dust.

Nuisance dust refers to dust of larger particle sizes (generally greater than 30 µm in diameter) otherwise known as Total Suspended Particulate (**TSP**). Generally, TSP does not travel further than 250 m from the discharge source in high wind conditions (considered to be greater than 10 m/s). Individual particles become visible at approximately 50 µm and particulate discharges in this size range (greater than 50 µm) are generally associated with nuisance effects rather than health effects. Nuisance dust effects often relate to dust clouds obscuring visibility and soiling of clean surfaces such as cars, washing, outdoor furniture, etc. At times nuisance effects can extend to the contamination of rainwater collection systems and increased dust deposition inside houses (particularly when windows are left open in summer). These effects lead to additional cleaning requirements, reduced ability to enjoy outdoor living areas, and overall reduced amenity values.

PM₁₀ has the ability to enter the alveoli in the lungs and cause respiratory health effects. However, it is expected that given the dust control measures described below that the PM₁₀ levels will be well below the relevant regulatory criteria (National Environmental Standards for Air Quality).

The dust discharged from this site is not considered to be particularly offensive in low quantities due to its natural origin, however when visible clouds or deposited dust are observed off-site this can lead to complaints from neighbours.

3.0 Description of the Operation

The development of the site will require significant earthworks. The total area of disturbed land within the site is to be limited to 5 Ha at any given time. The construction of the development will involve the following land disturbing activities:

- Construction of erosion and sediment control measures
- Stripping and stockpiling topsoil
- Earthworking and filling of lots
- Stripping and excavating road corridors
- Trenching for the installation of buried drainage pipelines and structures, power and telecommunications
- Respreading of topsoil
- Dust control measures e.g. watering & sowing of grass

The timing of construction of the development is due to begin in 2027, subject to the granting of resource consents and engineering approvals.

This fill material is to be transported from within the development site by trucks loaded by an excavator or loader. The soil is to be deposited by the trucks and then the lots shaped with a dozer, grader or excavator. If soil conditions are suitable, motor scrapers may also be utilized for bulk earthworks.

Potential dust emissions can occur from the site primarily during operational hours due to specific site activities (listed in **Section 5**), however there is potential for after hour emissions from exposed surfaces. In general, dust emissions do not occur constantly and are activity specific. The Site Operator is required to identify the critical discharge points and implement appropriate mitigation measures to reduce the frequency, intensity and duration of any discharges. These are outlined in this DMP.

4.0 Environmental Setting

This section provides site staff with the land uses beyond the boundary of the development such that they can be aware of the potential for their actions to effect off-site receptors. Also discussed are the predominant weather conditions such that staff can be aware of how wind patterns across the site may influence the potential for off-site effects.

4.1 Site Description

The existing dwelling and farm buildings across the site are expected to be demolished during construction. There are several shelter belts and wooded areas within the site which will be progressively removed during construction across the site where not located within future reserve areas. The site topography is generally level in nature with a gradual fall towards the south. The site is currently well vegetated and fenced for stock grazing.

4.2 Meteorology

The prevailing wind direction is likely to be from the west. It is also noted that although less frequent, strong winds from the north and east can occur and can contribute to dust issues.

Westerly and northerly wind directions could blow potential dust emissions towards nearby receptors, these being the residential properties located to the east and south of the site. As such, site staff are to be vigilant in adopting good practice dust control measures on-site as outlined in this DMP.

5.0 Potential Sources of Nuisance Dust

There are several sources and activities that occur on site which have the potential to generate dust, these include:

- Overburden/topsoil stripping and earthworks development;
- Soil excavation works;
- Loading and unloading trucks;
- Vehicle movements (predominantly on the haul route);
- Dust from the replacement of topsoil, formation of final level and rehabilitation works;
- Dust from exposed unconsolidated surfaces; and

The major factors that influence dust emissions from surfaces are:

- Wind speeds across the site; the critical wind speed for pickup of dust from surfaces is 7 m/s.
- The proportion of fine particles in the material.
- Moisture content of the material.
- The area of exposed surfaces.
- Disturbances such as vehicle movements, materials handling activities, etc.

- The height of the dust source above the surrounding ground level.

6.0 Dust Mitigation and Site Procedures

Presented in this section are details on the activities that have the potential to generate dust, and mitigation techniques to minimise the potential for effects to occur. Mitigation measures are intended to be practicable such that effective controls can be easily worked into the day-to-day operation of the site.

Particular care needs to be taken during hot dry days with strong wind conditions (greater than 7 m/s). These conditions lead to an elevated potential for nuisance dust emissions.

There are several site-wide and activity specific mitigation measures outlined below which will need to be implemented by all site staff and visiting contractors. These measures will be effective in reducing the potential for dust emission from the above sources to very low levels. As a backup measure, visual monitoring by key site staff is proposed to ensure the effectiveness of the proposed mitigation. Primarily, mitigation measures are triggered by visual monitoring, however some are triggered by meteorological conditions as observed on the MetService website.

A responsibility chart is included in **Section 8**, outlining specific responsibilities for key site staff.

Activity specific mitigation is staged to ensure that an appropriate level of mitigation is applied to the activity, and backup measures are available. At a minimum, Level 1 mitigation is to be applied; should Level 1 mitigation not be effective at containing visible dust emissions, then Level 2 mitigation is to be implemented; finally, if Level 2 is still not effective, Level 3 is to be applied. Note that Level 3 mitigation often involves a high level of capital cost or stop work conditions thus wherever possible site staff are to be vigilant at ensuring Level 1 and Level 2 controls are applied effectively and efficiently.

Visual monitoring is applied at the source, the aim is to ensure that no, or minimal, visible dust emissions occur from any activity on-site. This provides a level of redundancy/buffer, as dust emissions will dissipate between the emission source and the site boundary/nearest off-site receptors.

Effective controls at the source are the key to maintaining a compliant operation.

6.1 Site Wide Activities

Site staff are to undertake dust mitigation methods from site wide activities as required to minimise the overall dust emissions from the site.

Mitigation Measures to be Applied

Level 1

- The site is monitored during the operational hours and steps are taken to ensure that dust nuisance does not occur, such as:
- Operating the watercart to reduce/eliminate dust emissions from high traffic areas.
- Ensuring site vehicles are traveling at speeds less than 15 km/hr and per 'Vehicle Movements' procedures (see section below).
- Undertake the daily visual dust monitoring programme (**Appendix B**).

- Regular monitoring of the MetService website's weather data. Undertake associated mitigation measures when Level 1 or Level 2 wind triggers are exceeded.
- Good housekeeping, which includes; regular maintenance of site roads, cleaning the site access points, watering down exposed surfaces, and regular maintenance of critical site equipment (i.e. water carts).
- The site operator will maintain the existing and proposed perimeter bunds and fencing to reduce surface wind speeds across the site and form a partial barrier to any residual dust emitted from the site.
- Site staff are to be aware of the forecast weather conditions and discuss these at staff meetings. Where possible dusty activities near the downwind boundary are to be minimised or have elevated levels of mitigation applied, to minimise visible dust emissions crossing the boundary.
- Dust control procedures and responsibilities are to be included in site induction training for all new staff/regular contractors on-site.
- Records are to be kept of site activities, dust control measures implemented, daily visual inspections, any checklists that include dust mitigation measures implemented by site staff. These records can be used to investigate and/or defend off-site complaints.

Level 2

- In the event that visible dust is observed traveling beyond the boundary of the site by site staff or contractors, the activity generating the emissions is to cease immediately. It is the responsibility of every employee and contractor on the site to immediately notify the site manager so that dust mitigation measures can be implemented prior to the offending activity recommencing.

Level 3

- Install boundary real time dust monitoring with real time dust concentration triggers to alert site management to increase mitigation measures, or instigate stop work conditions.
- A number of mitigation measures below are triggered by wind speed trigger levels, the definition of wind trigger Level 1 and Level 2 is defined below for your reference:

Wind trigger Level 1: wind speed over 7 m/s, no rain within 24 hours, and wind directions from the North & West.

Wind trigger Level 2: wind speed over 10 m/s, no rain within 24 hours, and wind directions from the North & West.

6.2 Vehicle Movements

Poorly maintained internal roads can have a high dust generation potential. The factors affecting dust generation from vehicle movements are; the particle size distribution on the surface of the road, the moisture content of the road base, and the speed of the vehicle.

The distance of the vehicle movement from the site boundary will have a direct bearing on the potential for nuisance dust to leave the site, due to dust settling and dispersion.

Most vehicle movements will be confined to designated and maintained site roads. The main heavy vehicle route to and from the site is of primary concern.

Regular maintenance and watering of the internal roads is required and key to reducing potential emissions

from vehicle movements.

Site staff are to undertake dust mitigation methods as required to minimise the overall dust emissions from the site.

Mitigation Measures to be Applied

Level 1

- There will be a strict speed limit of 15km/hr for all vehicles on-site and on main haul roads. The water cart will be operated on all haul roads as a minimum during Level 1 wind conditions.
- It is important that vehicle operators monitor and report any dust emissions occurring from internal roads. Where visible dust is observed the site manager is to be notified such that additional controls can be implemented immediately.
- Internal roads are to be maintained regularly by applying coarse material to the surface or an alternate non-dusty surface material (i.e. waste sealing chip or recycled asphalt). This activity is to be assigned to a designated staff member by the site manager.
- Where the surface material is dry, it is to be wet down by the water cart such that the material is damp prior to disturbance.
- The application of dust suppressant polymer to unconsolidated surfaces.

Level 2

- If dust plumes become visible as a result of vehicles travelling around the site, water will be immediately applied to the road surfaces.
- Vehicles are to travel slower than 15 km/hr to limit dust emissions from the road surface.

Level 3

If Level 2 mitigation is still not sufficient to control dust emissions from this source, the following mitigation measures are to be investigated/implemented.

- Suspend traffic movements until emissions cease.
- Resurface roads such that surface fines are reduced.
- Investigate sealing the internal haul roads.

6.3 Product excavation works

Excavation is to be staged to minimise the amount of unconsolidated surface at any one time and reduce the working area and excavation face. Generally, the material is damp when it is excavated and therefore has a lower dust generation potential.

Site staff are to undertake product excavation mitigation as follows:

Mitigation Measures to be Applied

Level 1

- Product excavation works are to be conducted below natural ground level and after planned perimeter bunding is formed and grassed;
- Site staff are to minimise the drop heights for all excavator/loader bucket loads; and
- Limit the open earthworks area to 5 hectares.

Level 2

- Use water carts to wet down working area and product as required during Level 1 wind conditions.

Level 3

- Should effective dust control still not be achieved by the above control measures, suspend product excavation works during Level 2 wind conditions.

6.4 Loading and unloading trucks

The type of material being loaded/unloaded will have a direct bearing on its ability to generate nuisance dust i.e. the particle size distribution and moisture content. For example, dry friable topsoil or silts will have a much higher dust emission potential than damp aggregates.

Trucks or loaders are used to convey material around the site and raw product to and from the site. This process has the potential for dust emissions. It is important for plant operators to be aware of the level of risk associated with the type of material they are loading or unloading (i.e. its moisture content and the proportion of fines in the product).

Site staff are to undertake loading and unloading mitigation as follows:

Mitigation Measures to be Applied

Level 1

- Limiting drop heights for loaders/excavators loading trucks.
- Where possible loading and unloading of trucks is to occur in the pit where wind speeds are reduced (relative to those at ground level).

Level 2

- Wetting-down truckloads with a higher proportion of fines, as necessary.
- Restrict fine material loading and unloading during Level 1 wind conditions.

Level 3

- Stop all loading/unloading activities during Level 2 wind conditions.

6.5 Dust from exposed and unconsolidated surfaces

Fine unconsolidated particulates on the surface of the ground can become airborne during high wind conditions.

As a minimum requirement an 8,000-litre water cart (or similar) will be available on-site at all times. This water cart must have the ability to apply water at a rate of one litre per square metre to approximately 15,000 square metres per hour. Water is to be sourced from onsite bore or metered hydrants within the development site. The water cart operator is to be aware of the location of nearby water sources and the procedure for operating the water cart during dry windy conditions to ensure the water application rate matches the site requirements.

Site staff are to undertake staged mitigation as follows to reduce the potential for fugitive discharges from unconsolidated surfaces:

Mitigation Measures to be Applied

Level 1

- Traffic access to exposed areas is to be limited to the practical minimum, isolation bunds are to be used where applicable to prevent vehicle access to exposed areas. Exposed areas with no or low traffic access

will be watered to form a crust over the surface and limit the amount of fines on the surface.

- The water cart operator is to prioritise watering and dust suppression measures to areas with high traffic movements.
- Limit open earthworks areas to 5Ha throughout construction.

Level 2

- Operate the water cart during Level 1 wind conditions.
- To limit after hour emissions from exposed surfaces, where necessary the water cart is to be operated at the end of day to form a crust on any exposed unconsolidated surfaces, this will limit after hour emissions from these sources.
- Progressive rehabilitation and re-grassing of mined and backfilled areas of the site are to occur as soon as practically possible to limit the amount of exposed surfaces.

Level 3

- Where the above is not sufficient to control dust emissions from unconsolidated surfaces, use dust suppressing polymer to cap the emitting exposed surfaces.
- Further restrict the amount of open ground.

7.0 Complaints

Complaints may be received by site staff or by one or more of the regulatory authorities. It is the responsibility of the Site Manager to respond to and follow up all complaints relating to dust. The Site Manager is responsible for ensuring suitably qualified personnel are available to respond to complaints at all times.

7.1 Actions to be taken as soon as possible by the Site Manager

If any complaint is received by The Site Operator regarding dust, Environment Canterbury will be notified of the complaint as soon as practicable and no longer than 24 hours after the complaint was received.

The initial action to be undertaken by The Site Operator following a complaint is to investigate the likely source and if possible, implement immediate corrective action to prevent this from continuing or occurring again.

Formal procedures are required when a complaint regarding objectionable dust is received by the Site Operator. A complaint log shall be filled out by the Site Manager to record the following details:

- (i). Time of complaint;
- (ii). Name and address of complainant (if available);
- (iii). Location from which the complaint arose;
- (vi). Wind direction and speed at the time of the complaint;
- (vii). The likely cause of the complaint;
- (viii). The response made by The Site Operator; and
- (ix). Action taken or proposed as a result of the complaint.

7.2 Follow Up Actions

- Advise Environment Canterbury and site management as soon as practical that a complaint has been received, what the findings of the investigation were, and any remedial actions taken.

- Advise site staff and contactors that a complaint has been received, what the findings of the investigation were, and the remedial actions to be taken. Change standard operating procedures as necessary to prevent reoccurrence of complaints.

8.0 Responsibilities

The Site Operator operates the site and has the ultimate responsibility of ensuring that all site activities are carried out consistently with this DMP and in a way that does not result in off-site effects.

The Site Manager will have overall responsibility for the following:

- Overall responsibility at the site for ensuring that the dust control and mitigation measures and procedures outlined in this DMP are implemented effectively.
- Responsibility to ensure that complaints are received and investigated as outlined in **Section 7** of this DMP.
- Responsibility for ensuring all staff and sub-contractors on site are adequately trained regarding the dust control methods used on site and are aware of the requirements of the DMP.
- Overall responsibility to ensure that dust emissions are avoided and investigated as far as is practicable.
- Responsibility to ensure the DMP is current and revised where site activities change.
- Instigating a site stop work condition where excessive dust emissions are travelling beyond the boundary.

All contractors and staff working on site are to ensure that their activities comply with the requirements of the DMP.

The Site Manager may delegate responsibility for some tasks as shown in **Table 3**.

Table 3 Responsibility Chart (to be completed by The Site Operator)

Task	Person Responsible	Alternative	Contact Number
Site Manager			
Internal road maintenance			
Equipment Maintenance			
Complaints Investigation			
Water Cart Operation			
Dust Management Training and Induction			
Visual Monitoring and Dust Alerts			

9.0 Training

The Site Operator will ensure that appropriate site staff are trained in dust management techniques. This includes the following monitoring and mitigation techniques:

- How to recognise Level 1 or Level 2 weather conditions that could generate dust emissions. This may be via an app on mobile phones or automatic emails/text messages.
- What site operations have greater potential to generate dust.
- How to operate the dust control systems.
- Site restrictions, e.g. vehicle speeds, placement of fine materials, loading and unloading of fine materials, Level 1 and Level 2 wind triggers.

Designated staff should also be aware of and able to carry out the daily visual dust monitoring programme (**Appendix B**).

APPENDIX A – Daily Visual Dust Monitoring Program

Dust Monitoring Plan

The overall approach to dust control is based on visual monitoring in combination with good management of the operations, and a rapid response to any complaints received. Good practice is focused on pre-emptive measures to ensure that off-site dust effects are minimised.

Visual Inspection and Monitoring Methods

General visual monitoring of the site should be undertaken on a daily basis or potentially more frequently, if conditions change. Should visual observations detect off-site dust the control measures described in **Section 6** of the DMP should be implemented. The Table below can be used to demonstrate compliance with the monitoring programme.

Table A-1 Daily Visual Dust Monitoring Programme

Date:	Employee Name:		
Monitoring Activity	Frequency	Completed	Comments
Site Wide Activities			
Check weather forecasts for strong winds and rainfall to plan dust management response (e.g. hot, sunny and strong wind speeds).	Daily	☐	Forecast wind direction: Forecast wind speed: Forecast Rainfall:
Inspect land adjacent to the site and at site exits for the presence of dust deposition/tracking.	Daily	☐ ☐	
Regularly monitor MetService website data for exceedances of the Level 1 or Level 2 trigger points.	Daily and as conditions change	☐ ☐ ☐	Have wind limits been triggered? Y ☐ / N ☐ Has it rained in previous 24 hrs? Y ☐ / N ☐
Inspect watering cart to ensure it is maintained and functioning effectively.	Weekly	☐	
Monitor dust generating activities from exposed surfaces when wind limits are triggered.	In winds over 7 m/s	☐ ☐ ☐	Is dust being picked up from exposed surfaces? Y ☐ / N ☐
Vehicle Activities			
Check if dust is being generated by vehicle movements.	Twice daily	☐ ☐	Has water cart been deployed? Y ☐ / N ☐
Truck Loading/unloading			
Check if dust is being generated by truck loading/unloading activities.	Daily	☐	Are plant operators minimising drop heights? Y ☐ / N ☐
Boundary monitoring			
Undertake a walk around of the site boundary to monitor if any visible dust is crossing the boundary.	Daily and as conditions change	☐ ☐ ☐	Is any visible dust present? Y ☐ / N ☐ If so what corrective actions have been applied?

APPENDIX B – Excerpts from the Canterbury Air Regional Plan (CARP)

The purpose of this Plan

“The Air Plan seeks to manage discharges to air in the best practicable manner. Its principal purpose is to maintain air quality where it provides for people’s health and cultural wellbeing, or to improve it if it does not, whilst recognising the investment in, and significant contribution to the economy and social wellbeing of Canterbury of industrial and trade activities that discharge into air.”

Types of Contaminants

“At the other end of the spectrum are contaminants that predominantly affect wellbeing rather than physical health. The main ones are smoke and dust discharges. The Air Plan imposes controls upon these discharges by reference to the so-called FIDOL factors: the frequency, intensity, duration, offensiveness and location of the discharge.”

Policies

- 6.4 *Reduce adverse effects of discharges on people where ambient air quality does not meet the value set in a national ambient air quality standard or guideline.*
- 6.5 *Minimise adverse effects on people where ambient air quality is degraded when assessed against a national ambient air quality standard or guideline.*
- 6.6 *Maintain ambient air quality in locations where the quality is acceptable when assessed against an ambient air quality standard set in a national ambient air quality standard or guideline.*
- 6.7 *In Clean Air Zones, reduce overall concentrations of PM_{2.5} so that by 2030 those concentrations do not exceed 25µg/m³ (24-hour average) and 10µg/m³ (annual average).*
- 6.8 *Offensive and objectionable effects are unacceptable and actively managed by plan provisions and the implementation of management plans.*
- 6.9 *Discharges into air from new activities are appropriately located and adequately separated from sensitive activities, taking into account land use anticipated by a proposed or operative district plan and the sensitivity of the receiving environment.*

Rules applying to all activities

- 7.3 ***The discharge of odour, dust or smoke into air that is not managed by any other rule in this Plan is a permitted activity provided the following conditions are met:***
 - 1. *The discharge does not cause or is not likely to cause an adverse effect beyond the boundary of the property of origin; and*
 - 2. *The discharge does not cause an offensive or objectionable effect beyond the boundary of the **property** of origin when assessed in accordance with Schedule 2.*
- 7.4 ***The discharge of odour, dust or smoke into air that is not managed by any other rule in this Plan and that does not meet condition 1 of Rule 7.3 is a restricted discretionary activity.***

The exercise of discretion is restricted to the following matters:

1. *The content of the management plan to be implemented; and*
2. *The frequency of the effects of the discharge; and*
3. *The intensity of the effects of the discharge; and*
4. *The duration of the effects of the discharge; and*
5. *The offensiveness of the discharge; and*
6. *The location of the effects of the discharge; and*
7. *The matters set out in Rule 7.2; and*
8. *Mitigation methods available to minimise any actual or potential environmental effects on the efficacy of the package of conditions.*

7.5 *The discharge of odour, dust or smoke into air that does not meet condition 2 of Rule 7.3 is a non-complying activity.*

Rules - Dust generating activities

7.32 *The discharge of dust to air beyond the boundary of the property of origin from the construction of buildings, land development activities, unsealed surfaces or unconsolidated land, is a permitted activity provided the following conditions, where applicable, are met:*

1. *The building to be constructed is less than 3 stories in height, or where the building is greater than 3 stories in height, a dust management plan is prepared in accordance with Schedule 2 and implemented by the person responsible for the discharge into air; and*
2. *The area of unsealed surface or unconsolidated land is less than 1000m², or where the area of unsealed surface or unconsolidated land is greater than 1000m² a dust management plan is prepared in accordance with Schedule 2 and implemented by the person responsible for the discharge into air; and*
3. *The discharge does not cause an offensive or objectionable effect beyond the boundary of the property of origin, when assessed in accordance with Schedule 2.*

7.33 *The discharge of dust, beyond the boundary of the property of origin, from the construction of buildings, land development activities, unsealed surfaces or unconsolidated land that does not meet condition 1 or 2 of Rule 7.32 is a restricted discretionary activity.*

The exercise of discretion is restricted to the following matters:

1. *The content of the management plan to be implemented; and*
2. *The frequency of the effects of the discharge; and*
3. *The intensity of the effects of the discharge; and*
4. *The duration of the effects of the discharge; and*
5. *The offensiveness of the discharge; and*
6. *The location of the effects of the discharge; and*
7. *The matters set out in Rule 7.2; and*
8. *Any effect on the environment of not meeting the condition or conditions of the particular rule contravened; and*
9. *Whether the conditions of the rule, when considered as a package, remain effective; and*
10. *Mitigation methods available to minimise any actual or potential environmental effects on*

the efficacy of the package of conditions.

7.34 *The discharge of dust into air beyond the boundary of the property of origin, from the construction of buildings, land development activities, unsealed land or unconsolidated surfaces that does not meet condition 3 of Rule 7.32 is a non-complying activity.*

7.35 *The discharge of contaminants into air from the handling of bulk solid materials is a permitted activity provided the following conditions are met:*

1. *The discharge of dust does not cause an offensive or objectionable effect beyond the boundary of the property of origin, when assessed in accordance with Schedule 2; and*
2. *The handling occurs indoors, or where the handling occurs outdoors the rate of handling does not exceed 100t per hour; or*
3. *Where handling occurs outdoors on less than 21 days per calendar year, the rate of handling does not exceed 250t per hour; and*
4. *Where the handling occurs outdoors and the rate of handling exceeds 20t per hour, a dust management plan is prepared in accordance with Schedule 2 and implemented by the person responsible for the discharge into air; and*
5. *The dust management plan is supplied to the CRC on request; and*
6. *The discharge does not occur within 200m of a sensitive activity, wāhi tapu, wāhi taonga or place of significance to Ngāi Tahu that is identified in an Iwi Management Plan; and*
7. *Notwithstanding condition 6, where the discharge is from production blasting at a quarry site the discharge does not occur within 500m of a sensitive activity wāhi tapu, wāhi taonga or a place of significance to Ngāi Tahu that is identified in an Iwi Management Plan.*

7.36 *The discharge of contaminants into air from the outdoor storage of bulk solid materials is a permitted activity provided the following conditions are met:*

1. *The discharge of dust does not cause an offensive or objectionable effect beyond the boundary of the property of origin, when assessed in accordance with Schedule 2; and*
2. *The amount of material stored does not exceed 1000t when it has an average particle size of less than 3.5mm; and*
3. *Where the storage exceeds 200t, a dust management plan is prepared in accordance with Schedule 2 and implemented by the person responsible for the discharge into air; and*
4. *The dust management plan is supplied to the CRC on request; and*
5. *The discharge does not occur within 100m of a sensitive activity, wāhi tapu, wāhi taonga or place of significance to Ngāi Tahu that is identified in an Iwi Management Plan.*

Schedule 2: Assessment of offensive and objectionable effects

Criteria for assessing offensive or objectionable dust

The Canterbury Regional Council, for the purposes of assessing compliance with permitted activity conditions, resource consent conditions, or sections 17(3)(a), 314(1)(a)(ii) or 322(1)(a)(ii) of the RMA, and resource consent applicants carrying out assessments pursuant to this Schedule, will have regard to the following matters when determining whether or not a dust discharge has caused an objectionable or offensive effect:

- 1. The frequency of dust events; and*
- 2. The intensity of dust events, as indicated by dust quantity and the degree of effect; and*
- 3. The duration of each dust event; and*
- 4. The offensiveness of the discharge having regard to the nature of the dust, including soiling of materials or structures and any potential health effects; and*
- 5. The location of the dust, having regard to the sensitivity of the receiving environment, including taking into account the relevant zone(s) and provisions in the relevant District Plan.*

Content of dust, odour and smoke management plans

“Management plans, for dust, smoke and odour must describe the practices and actions, or targets where required, that the person responsible for the discharge of contaminants into air will take to ensure that the overall effect of the frequency, intensity, duration, offensiveness and location of the discharge is not offensive or objectionable.”

The level of detail required for the odour, smoke or dust management plan is relative to the scale of the discharge and the likelihood of the effect being offensive or objectionable.

The following is to be included in the Dust Management Plan:

- 1. A description of the activity that will result in the discharge of contaminants into air; and*
- 2. A description of how often the contaminants will be discharged - e.g. constant, daily, between 10am and 2pm on weekdays, only on windy days, once a month; and*
- 3. A description of the intensity and character of the discharge - e.g. is the odour very pungent or light, is there likely to be a lot of dust or just a small amount and is it fine or coarse, is the smoke light or dark?; and*
- 4. A description of the maximum duration of the effect of the discharge - e.g. What is the prevailing wind and how often will sensitive activities or neighbours be affected by the discharge? Will the effect occur during times neighbours would be more or less effected?; and*
- 5. A description of the offensiveness of the discharge - e.g. what are the characteristics of the odour? Is it an unpleasant odour such as sewage, or is it something that is often considered pleasant such as the smell of baking bread? Is the dust a particular colour that will make property appear dirty, or does it contain corrosive elements? Is the dust very fine? Is the smoke thick and acrid?; and*
- 6. A description of the location of the discharge, including a description of the activities that occur on neighbouring properties and location of any sensitive activities that may be affected. A sketch plan should be prepared showing the location of the discharge and the location of sensitive receptors (such as dwellings, schools, meeting places, retail premises) and the separation distance between these*

receptors and the discharge; and

7. *An explanation as to how any adverse effects on sites that are sensitive to Ngāi Tahu, such as statutory acknowledgement areas, silent file areas or wāhi tapu or wāhi taonga are to be managed; and⁽²⁾*
8. *A description of the management practices being implemented to minimise the discharge or the effects of the discharge of contaminants - e.g. filters replaced regularly, equipment cleaned regularly, input types, limiting discharges to certain times or conditions (wind direction etc), effluent management system (design features, maintenance etc), filter types, design of stacks and vents, process features (stock numbers, feed type, type of detergent/ ink/ oil/chemical used), methods for dampening down dust, oiling roads, flocculent use, establishment of vegetation etc. Reference should be made to controls recommended in any relevant good practice guides for the activity.*

Schedule 4: Contaminants

The main air quality contaminants of interest in the Canterbury Region are discussed below.

PM10 can get deep within our lungs and cause wide ranging health and respiratory problems. The main source of PM10 in urban areas is home heating, but industry and transportation also emit PM10. There is no safe level of PM10 exposure. Acceptable levels of PM10 have been set nationally by the NESAQ, based on the World Health Organisation Guideline for PM. This is a limit of fifty micrograms of PM per cubic metre (50µg/m³) averaged over a 24-hour period. One exceedance of this standard is allowed each year and targets for compliance with this health-based standard are set for each polluted airshed.

PM2.5 is a component of PM10 consisting of particles of 2.5 microns and smaller. Due to their smaller size they can get deeper within our lungs. PM2.5 emission sources include home heating, transport and industry. There are no national guidance values for PM2.5, but the World Health Organisation recommends a limit of 25 micrograms of PM2.5 per cubic metre (25µg/m³) averaged over a 24-hour period.

It is likely the World Health Organisation guidance values for PM2.5 are regularly exceeded in all of Canterbury's polluted airsheds. Monitoring shows these values are regularly exceeded in Christchurch and Timaru.