



# memorandum

TO Wooing Tree Property Development LP FROM Deborah Ryan & Andrew Curtis  
DATE 2 July 2021  
RE Wooing Tree – Air Quality Reverse Sensitivity Effects

## 1.0 Background

The Wooing Tree Property Development LP has applied under the Fast-Track Consenting process for a medium-to-high density residential development at 64 Shortcut Road, Cromwell.

The Panel considering the application has requested information in relation to the potential reverse sensitivity effects of the application. In particular, the Panel is seeking information on the “potential for air quality effects from nearby rural land uses, including dust, smoke, odour and spray drift over the application site, including consideration of any relevant industry standards.”

Pattle Delamore Partners Limited (PDP) has been engaged to advise on the potential reverse sensitivity from the residential development proposed, as it relates to air quality. PDP’s team of air quality professionals is experienced with reverse sensitivity effects relating to potential impacts on air quality from adjacent land uses to a proposed sensitive activity.

PDP has read the Minute request of the Panel, which is seeking information on air quality matters. This memorandum sets out PDP’s initial review of the available information relating to the neighbouring activities and proposed residential development at Wooing Tree; and our assessment and conclusions relating to reverse sensitivity effects and mitigation.

## 2.0 Location and Environment

### 2.1 Land Use

Tattico Limited has advised on the underlying zoning of the development site, which has been in use as a vineyard. Based on Tattico’s advice, PDP understands that the development site is already zoned residential, but the current proposal represents a higher intensity development than is currently allowed for under the district plan. Rural zoning has been retained in a buffer strip surrounding the development site within the Operative District Plan, and this buffer is being reduced to 15 metres in the project design.

Tattico also advised that the development site is identified as medium-to-high residential in the “Cromwell Spatial Framework Plan,” which was adopted in 2019 and the current proposal is consistent with this framework.

The development site is adjacent to the existing Cromwell commercial centre, which is to the south of the site; as such the development will have good connectivity using pedestrian access and cycleways.

New residential builds have already occurred to the north of the development site, Kowhai Place and Amber Close, although less intensive than the proposed development at Wooing Tree.

Figure 1 is a plan showing the proposed layout of the development with the 15 metre boundary strip, shown as plantings of grapes or shrubs. Tattico advised that the land triangle on the boundary with SH6 is the site of the existing Cromwell weather station. Tattico advised that the buffer strip plus the road gives a separation distance of between 40 and 55 metres from the residential area to the edge of the rural use, depending on the road width.



**Figure 1: Master Plan for Subdivision Proposal**

Nearby rural activities to the development site are effectively limited to the western boundary with SH6. Most of the neighbouring block is fruit growing operated by J. R. Webb & Sons Limited. A smaller area to the southwest is a vineyard. There are also some rural residential dwellings interspersed with the horticultural uses to the west, which appear to be integrated with the existing activities. In preparing this advice PDP has assumed that the dwellings are associated with the horticultural uses, rather than independent dwellings that would be considered as sensitive receptors for the growers' activities.

A covenant has been placed over the development site, which provides a defined "Area of Reverse Sensitivity" in relation to adjacent farming activities i.e. growing and harvesting of fruits on the land owned by J. R. Webb & Sons Limited, and Kevin Jackson Holdings Limited. Farming activities identified under the covenant include use of wind machines for frost control and orchard sprayers.

## 2.2 Existing Air Quality

The existing air quality in Cromwell is managed by the Otago Regional Council under the *Regional Plan Air for Otago*, updated to January 2009 (the Plan). Cromwell is specified as an Air Zone 1 airshed under the Plan. The boundary of the Air Zone 1 airshed runs to the west of the development site along SH6. The adjacent horticultural activities are in Air Zone 3 under the Plan.

## 2.3 Meteorology

PDP has prepared windroses for the Cromwell EWS, which is adjacent to the site. Appendix A presents the annual windrose for all winds for 2016 to 2020, and two windroses showing the daytime diurnal variation in wind speed and direction as 6 am to noon and noon to 6 pm.

Figure 2 in Appendix A is the windrose for all winds and shows that winds predominate from the northerly quarter and the south-southwest. The strongest winds, greater than 7.5 m/s are from the north-northeast and the lightest winds less than 1 m/s are from the westerly quarter.

Figure 3 in Appendix A provides the comparison of the windroses for morning and afternoon. Winds in the morning follow the same general pattern as for all winds but tend to be lighter. Winds in the afternoon are stronger and dominate from the north-northeast quarter with some winds from the south-southeast; however, there is a considerably lower frequency of winds from the south-westerly quarter compared to mornings.

## 3.0 Potential Effects on Air Quality

The Panel requested information on the effects of neighbouring rural land uses on air quality, which may have reverse sensitivity implications as a result of the proposed residential development. Specifically, the Panel requested information relating to dust, smoke, odour and spray drift that could affect air quality within the residential development. PDP has considered each issue as set out below.

### 3.1 Dust

Rural activities to the west of the proposed residential development site are established horticultural fruit tree blocks and a vineyard. Both operations are predominantly grassed. Dust sources from this type of activity are expected to be negligible, and consequently PDP does not expect that there is any potential for reverse sensitivity impacts relating to dust discharges. In any event, if there were some form of dust discharge from the rural activities, the proposed mitigation discussed in Section 4 of this memo is considered more than adequate to avoid reverse sensitivity effects due to the proposal.

### 3.2 Smoke

PDP understands that horticultural activities may use frost pots for frost protection and/or burning for disposal of woody vegetation. Although PDP notes, from the covenant, that wind machines are identified as being used for frost protection, so burning devices may not be in use in this instance.

Rule 16.3.2.4 of the Plan permits discharges from outdoor burning on production land in Air Zone 3. The rule provides restrictions on materials that may be burnt, and under part (b) requires that:

*Any discharge of smoke, odour or particulate matter from burning waste is not offensive or objectionable at or beyond the boundary of the property.*

Rule 16.3.3.3 provides for burning waste oil in a frost pot as a discretionary activity, requiring consent, while Rule 16.3.13.1 provides for any smokeless heater frost-fighting device not using waste oil as a permitted activity subject to the same condition as above.

Schedule 5 of the Plan includes *Good Management Practices to Prevent or Minimise the Discharge of Smoke from Burning Vegetation*, these measures include:

- ∴ burning should be located as far away from roads and state highways as possible;
- ∴ burning should take place when wind will dissipate smoke away from roads and state highways;
- and

- ∴ the direction and strength of wind should be such that smoke is carried away from the areas most likely to be adversely affected.

Therefore, while the Plan allows activities that may result in smoke within the horticultural land to the west, the requirement that smoke *is not offensive or objectionable at or beyond the boundary of the property* must be met. Where land use change increases sensitivity around such discharges, this type of condition can become more difficult to comply with. Consequently, such land use change has the potential for reverse sensitivity effects. In this case, the proposal site is already zoned residential, therefore, while the proposed intensification of residential activity will increase the risk of people being present or exposed to a smoke incident, it does not fundamentally change the sensitivity of the receiving environment.

In addition, the horticultural land to the west is adjacent to the SH6. Because of this, the Schedule 5 good practice guidance already identifies the need to avoid or minimise the risk of smoke in the vicinity of the roadway. Accordingly, impacts on the development site across the road would also be avoided.

Given the above regulatory framework and guidance in relation to activities with potential for smoke discharges, PDP considers that there is a less than minor potential for a reverse sensitivity effect from the proposed intensification of residential use within the development site.

PDP considers that the proposed mitigation, as discussed in Section 4 of this memo, is more than adequate to avoid the potential for reverse sensitivity effects due to the proposal in relation to smoke from surrounding rural activities.

### 3.3 Odour

While rural activities can generate odour, such as from silage or animal manure, odour sources from horticultural activities are expected to be negligible. Consequently, PDP does not expect that any reverse sensitivity impacts relating to odour discharges are likely.

In any case, the proposed mitigation, as discussed in Section 4 of this memo, is considered more than adequate to avoid the potential for reverse sensitivity effects due to the proposal in relation to odour from adjacent horticultural activities.

### 3.4 Agrichemical Application

Schedule 4 of the Plan includes *Good Management Practices for Agrichemical Application*, which includes measures that are based on the New Zealand Standard 8409:1999: *Code of Practice for the Management of Agrichemicals*, August 1999. The current version of the standard is the *New Zealand Standard, Management of Agrichemicals* (NZS 8409:2004) (the Standard)<sup>1</sup>, which PDP understands is currently being updated. Appendix 2 of this memo provides Schedule 4 of the Plan.

Rule 16.3.9.2 of the Plan permits discharges from agrichemical application via aerial or ground based methods on production land in Air Zone 3. Specific conditions of the permitted activity are that:

- The agrichemical and any associated additive are authorised for use in New Zealand and are used in accordance with the authorisation; and*
- The discharge is carried out in accordance with the manufacturer's directions; and*
- The discharge does not exceed the quantity, concentration or rate required for the intended purpose; and*

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<sup>1</sup> New Zealand Standard, Management of Agrichemicals (NZS 8409:2004).

- d) (d) The application does not result in any ambient concentrations of contaminants at or beyond the boundary of the property that have noxious or dangerous effects.

As discussed above, the intensification of residential use will increase the risk of exposure to any event that has impacts on air quality. In the case of off-target spray drift, increased population exposure does increase the potential that part (d) of the permitted activity conditions may be breached. Therefore, PDP considers there is a reverse sensitivity effect from the proposal that is potentially more than minor.

In undertaking any horticultural spray activities, the growers would need to have reference to Schedule 4 of the Plan and provisions of the Standard.

Table 1 summarises relevant provisions from Schedule 4 as relating to the existing grower activities and the development site. PDP has assumed for this assessment, that aerial spray application is not used by the fruit growers, so application would be ground-based by spray boom as the worst case for considering any potential off-target spray incident.

| Table 1: Good Management Practices – Schedule 4 Regional Plan Assessment  |   |
|---|---|
| Good Practice Provision   | Impact of Residential Intensification         |
| Not spray up wind of sensitive areas unless adequate buffer distances are observed, or additional techniques for avoiding spray drift are used.                     | No impact on ability to meet this requirement |
| Not spray when wind direction is unpredictable or when there are high winds, or very low or no wind conditions. Some wind may assist in correct targeting of spray. | No impact on ability to meet this requirement |
| Make use of appropriate and effective buffer zones and/or shelter belts to minimise the risk of spray drifting to non-target areas.                                 | No impact on ability to meet this requirement |

Schedule 4 of the Plan also identifies risk factors for spraying that are taken from the Standard. Table 2 assesses these factors as they apply to the development site.

| Table 2: Relevant Risk Factors for Hazard from Spray Drift – Schedule 4 Regional Plan Assessment |  |                           |
|--|--|---------------------------|
| Factor   | Current/Baseline Environment/Zone  | Risk with Intensification |
| Sensitive area   | High risk associated with residential zone closer than 100 metres to potential spray activity  | Same as baseline          |
| Buffer zone  | Moderate risk buffer as less than 100 m  | Same as baseline          |
| Shelter belts  | High risk as there are no shelter belts  | Same as baseline          |
| Wind direction and speed   | Periods will exist where there will be low risk conditions when the wind is predictable and away from sensitive receptors. As per Figure 3 Appendix A, the morning time has an increased prevalence of light winds from the west-southwest through to the east-northeast that are suitable for spraying. | Same as baseline          |

The Standard essentially takes a risk-based approach to manage off-target drift and provides a matrix of measures that can be used to manage and reduce the potential for drift. PDP considers that the more intensive residential use does not alter the growers’ options for managing risk. Essentially the residential development does not change the ability of the growers to comply with the guidance and standards, although it does increase the potential for a consequence as an outcome of any off-target drift if it occurred within the development site.

According to the Standard, mitigation to minimise the risk, and therefore the consequence of off target drift, can be achieved by the growers undertaking spray activities in light winds that are blowing away from the residential development site. Also, by using spray application methods and droplet sizes that reduce the likely extent of drift if winds were to change.

For spray applications where the drift hazard is high, and alternative methods of application or formulation do not provide acceptable reduction of hazard, the Standard requires the agrichemicals shall not be applied.

At this stage PDP does not have access to information about what agrichemical spraying activity may be undertaken by the growers. Assuming that it is practical for growers to spray under conditions where winds are light and generally from the south-southwest through to the east-northeast (as can occur during the morning periods), then the residential development should not unreasonably impact the ability of the growers to undertake spray operations while maintaining compliance with the Standard.

Table G2 of the Standard includes buffer zones where no spraying is allowed. The buffer zones are defined as a suggested minimum distance between the downwind edge of the target area and the sensitive area<sup>2</sup> i.e. the buffer applies only along the downwind boundary for a particular spray event, not all boundaries. Table 3 reproduces the buffer zones set in Table G2 of the Standard.

| Table 3: Buffer Zones - Table G2 of the Standard |                   |                 |
|--|-------------------|-----------------|
| Application Method                               | Distance (metres) |                 |
|  | With Shelter      | Without Shelter |
| Boom sprayer                                     | 2                 | 10              |
| Air blast sprayer                                | 10                | 30              |
| Aerial application                               | 100               | 300             |

Therefore, assuming no aerial application, the proposal complies with the minimum buffer distances (without shelter), and no further mitigation beyond that discussed in Section 4 is considered necessary for managing reverse sensitivity effects.

#### 4.0 Mitigation

Given the land use to the west of the development site, PDP understands that the potential for reverse sensitivity effects were considered when the Woong Tree property was initially rezoned for residential use. PDP understands that the mitigation included with the rezoning provided a buffer strip around the perimeter of the site boundary, which has been described by Tattico. While this buffer is proposed to be reduced with the development, the minimum separation distance is maintained at 40 metres.

<sup>2</sup> Page 106, NZS 8409:2004.

In addition, proposed condition 81 for the Fast-Track consents, provides for a consent notice advising of an existing covenant relating to no objections (i.e. complaints). The proposed condition includes reference to a “Reverse Sensitivity Area” over much of the development site starting from the boundary with SH6.

Tattico advised that it was unclear what basis had been used to develop the Reverse Sensitivity Area but, at its minimum extent from the property boundary, the area extends over the development site for a distance of around 160 metres to the land that is in horticultural use.

The consent notice is proposed to contain the following advice:

*“The subject sites are located adjacent to working horticultural sites on the western side of State Highway 6. These sites include normal horticultural practices including frost management of wind machines, sprayers and helicopters. The covenant states that property owners will not object to use of the adjacent two vineyards for complying horticultural practices including spraying, and frost management operations.”*

The notice has broad application beyond air quality related reverse sensitivity effects. The notice indicates that objections are not allowable if the horticultural practices are “complying.” The notice is non-specific about what the horticultural operations need to comply with, but the covenant (Form 26) sets out references to:

- ∴ Provisions of the Operative District Plan
- ∴ Conditions of any resource consent granted to Covenantee (i.e. the fruit growers)
- ∴ Industry code for spraying (NZS8409:2004 or updates)

It is unclear whether the permitted activities under the Plan would be considered as compliance requirements under the covenant, except where there is overlap with the agrichemicals industry code. PDP has, however, considered the relevant permitted activity standards and any impact that the residential development proposal could have on the ability of the grower activities to comply.

PDP considers that the residential development does not significantly impact on the growers’ ability to comply with the relevant requirements discussed in Section 3 above. While the no complaints covenant should avoid growers receiving complaints about occasional amenity impacts on air quality, albeit the incidence of odour, smoke or dust impacts within the residential development have been assessed as unlikely.

## 5.0 Summary

Based on consideration of potential smoke, dust, odour and spray activities, PDP considers that the proposal to intensify the residential development will have a less than minor potential for reverse sensitivity effects on the growers. PDP considers that the mitigation already provided by the project design, and the covenant on objections to fruit growing activities to the west, are appropriate to address the scale of the reverse sensitivity impacts of the proposal.

## 6.0 Limitations

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) for Woong Tree Property Development LP as part of a statutory regulatory process under the COVID-19 Recovery (Fast-track Consenting) Act 2020. In preparing this memorandum PDP has relied on the information provided by Tattico Limited. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

Apart from this specific statutory process in relation to Woong Tree Property Development LP, PDP accepts no liability if the memorandum is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Prepared by



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Appendix A: Cromwell Windroses

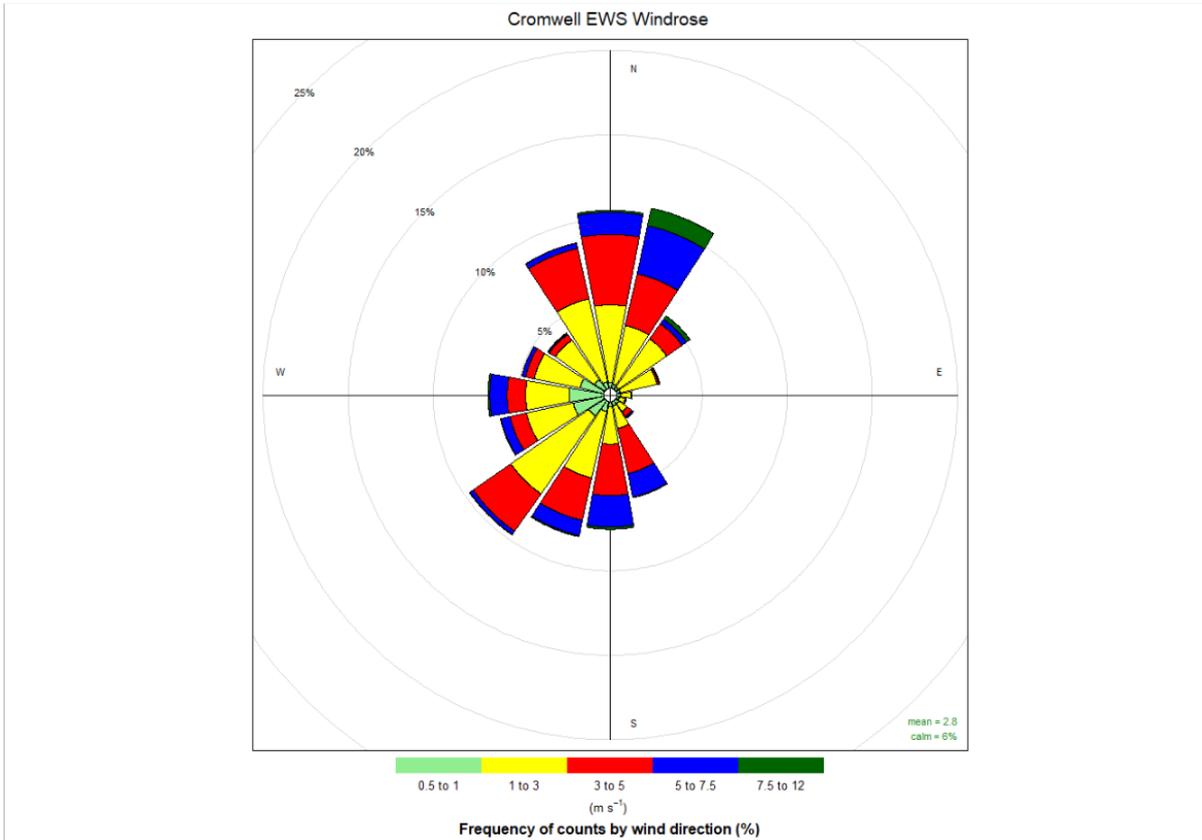


Figure 2: Annual Windrose Cromwell (2016 – 2020)

WOONG TREE – AIR QUALITY REVERSE SENSITIVITY EFFECTS

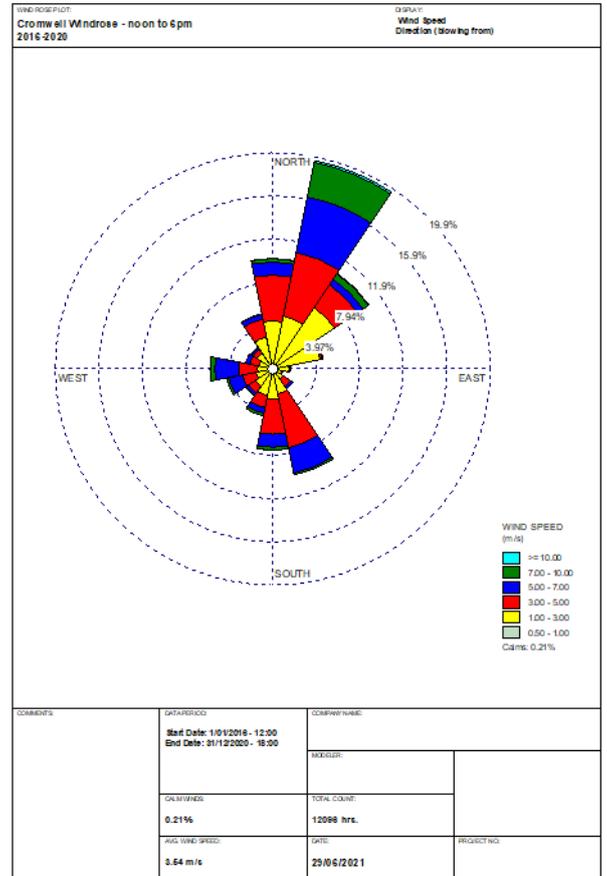
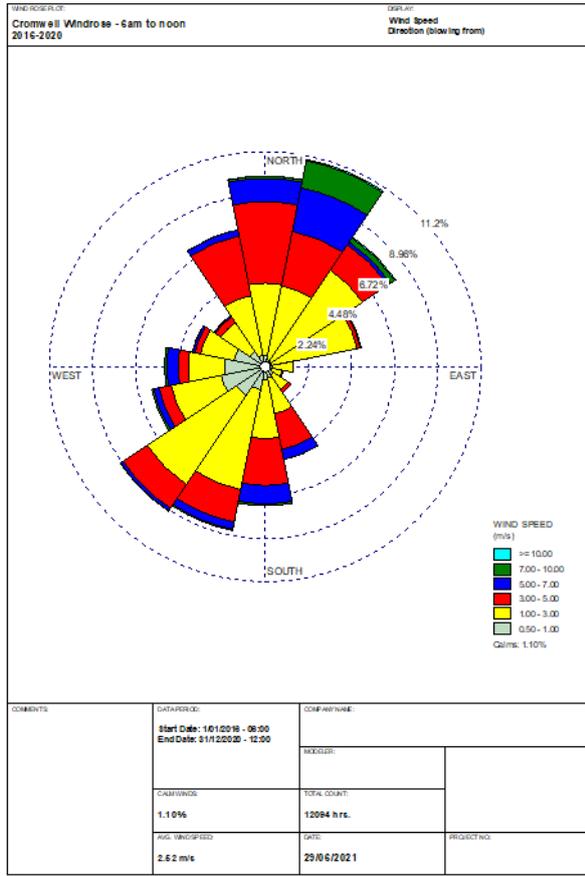


Figure 3: Daytime Windroses - Mornings and Afternoons at Cromwell (2016 to 2020)

## Appendix B: Regional Plan Schedule 4

## Schedule 4 Good Management Practices for Agrichemical Application

This schedule is based on the information contained in the New Zealand Standard 8409:1999: *Code of Practice for the Management of Agrichemicals*, August 1999, developed by the New Zealand Agrichemical Education Trust. It has been included in the Plan in a simple and convenient form for general public information and education purposes. The information contained in this Schedule also provides general guidance on the best practice for avoiding or minimising adverse effects on the environment from agrichemical application. This information may be useful for those carrying out discharges of agrichemicals into air under rules in 16.3.9, but it does not negate the conditions in any such rule.

This information caters for a wide range of purposes for spraying. Some, not all, will be applicable depending on the purpose and scale of spraying.

For further, more detailed information reference should be made to the Code of Practice itself. This document can be obtained from Standards New Zealand (Private Bag 2439, Wellington, Ph (04) 498 5990 or Fax (04) 498 5990), e-mail: [snz@standards.co.nz](mailto:snz@standards.co.nz), website: [www.standards.co.nz](http://www.standards.co.nz), or can be viewed at the Otago Regional Council's Dunedin Office.

**To achieve the Plan's objectives, any person discharging agrichemical sprays is requested to observe the following, in conjunction with the accompanying chart. All such persons should:**

- (a) Not spray upwind of the sensitive areas (listed in the explanation to Policy 12.1.1), unless adequate buffer distances are observed, or additional techniques for avoiding spray drift are used.
- (b) Not spray when wind direction is unpredictable or when there are high winds, or very low or no wind conditions. Some wind may assist in correct targeting of spray.
- (c) Not spray during inversion conditions.
- (d) Make use of appropriate and effective buffer zones and/or shelter belts to minimise the risk of spray drifting to non-target areas.
- (e) Have particular regard to the selection of nozzle size and pressure from the spray unit, in order to minimise the risk of spray drift. (*Use equipment generating a droplet size of at least 50 microns in diameter and preferably greater than 250 microns.*)
- (f) In the case of ground application methods, apply spray at a height preferably less than 0.5 metres above, but no greater than 1.5 metres above the target.
- (g) In the case of aerial application methods, be a person who holds a Growsafe Pilots' Agrichemical Rating Certificate of Qualification.
- (h) Comply with the manufacturer's instructions, as stated on the container label or in information sheets.
- (i) Preferably use spray formulations of low volatility and toxicity.
- (j) Dispose of surplus spray solution and spray containers according to the *Code of Practice for the Management of Agrichemicals*, 1999 and the recommendations of the manufacturer or supplier, as stated in the directions on the product container label.
- (k) Keep specific records of the type of each spray and any additive applied, the pest species targeted, the volume of spray, the volume of product, concentrations used, the time, date and locality, identification of any sensitive area (see (a) above), the meeting of any notification requirements, and equipment calibration details, as well as a specific inventory of the types and volumes of any chemicals in storage.

- (l) Use only those agrichemicals currently authorised for use in New Zealand.
- (m) Also take into account the information provided on the following chart to minimise the risk of drift hazard:

|                   |                           | Conditions that cause potential hazard from spray drift to be:                            |   |
|-------------------|---------------------------|---|---|
|                   |                           | High  | Low   |
|                   | Factor                    |   |   |
| Site factors      | Sensitive area            | Close (less than 100 m away)  | More than 1 km distant away   |
|                   | Buffer Zone               | None  | Yes (>100 m)  |
|                   | Shelter Belts             | No shelter  | Live shelter >3 m high and 1 m thick  |
|                   | Wind Direction            | Unpredictable   | Predictable, and away from sensitive areas  |
|                   | Wind Speed                | Zero / very low (less than 1 m/s) or greater than 6 m/s                                   | Steady (1 - 3 m/s)  |
|                   | Humidity                  | Low (delta T > 8°C)   | High (delta T < 4°C)  |
|                   | Atmospheric stability     | Inversion layer present   | No inversion layer present  |
| Technique factors | Particle (droplet size)   | Less than 50 microns diameter   | Greater than 250 microns diameter   |
|                   | Maximum height of release | Greater than 1.5 m above the target   | Less than 0.5 m above the target  |
| Material factors  | Volatility                | High (vapour pressure > 10 mPa)   | Low (vapour pressure < 0.1 mPa)   |
|                   | Toxicity                  | Substance is classed as a 'Poison' in terms of Section 2 of the Toxic Substances Act 1979 | No substance used is classed as a 'Poison' in terms of Section 2 of the Toxic Substances Act 1979 |