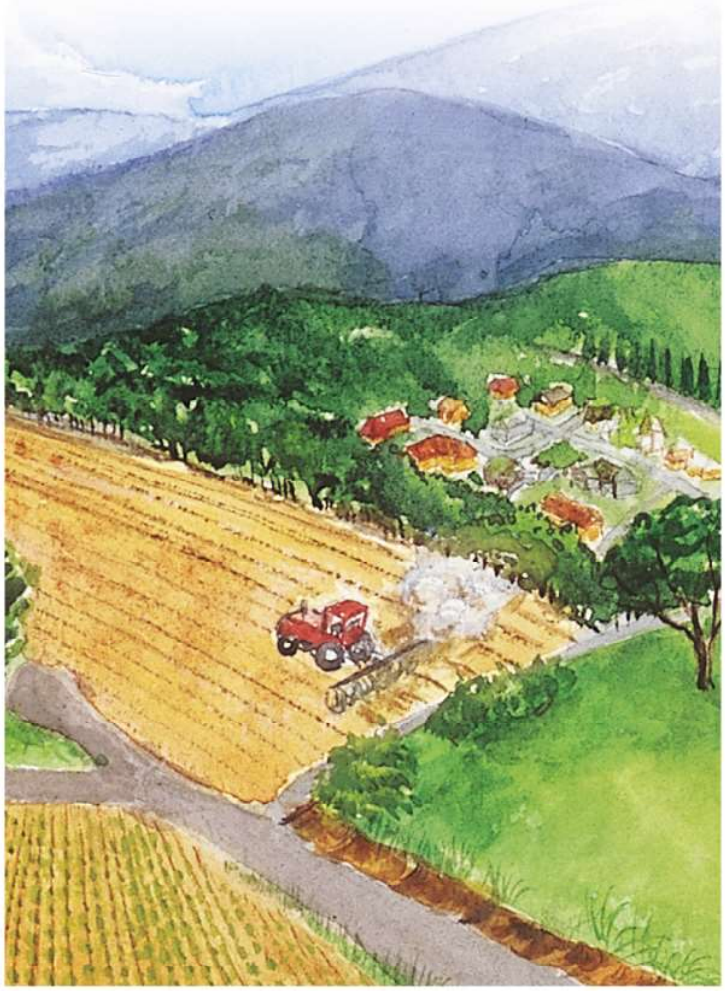
AIR MANAGEMENT



Section 4:
Air Management

The Expected Environmental Outcome for Air Quality Management states

All reasonable and practicable measures should be adopted, within the constraints of a sustainable agricultural system, to minimise release of contaminants impacting on the air quality of environmentally Sensitive Places (QFF 1998).

4.1 MINIMISE IMPACTS ON SENSITIVE PLACES

Under the EP Act sensitive places are referred to in the Environmental Protection Policies for air and noise. These are components of the environment that are more sensitive to the impact of human activities than other areas.

Examples include (QFF 1998),

- residences whether temporary or permanent
- retirement homes
- camping grounds, including caravan parks, and other approved temporary occupancy situations, hotel and motels
- residential marinas
- child care centres, kindergartens, schools, universities and other educational institutions
- medical centres, hospitals or convalescent homes
- World Heritage and other protected conservation areas, including marine parks and coastal sites identified in local management plans
- habitats of fish or amphibians including waterways and natural wetlands
- recreational areas such as parks and gardens
- neighbouring or nearby enterprises

World Heritage Areas are environmentally sensitive areas for which care should be taken to minimise impacts on air quality.

Some types of rural land use such as aquaculture and organic farming may be sensitive to activities on adjacent land, where cropping activities involve pesticide use.

Understand that sensitivity to noise, light and air pollutants may increase at night

Sensitivity may increase at night. Noise impacts increase as the background noise diminishes so that an acceptable noise during daytime (6am to 10pm) may be totally unacceptable at other times (QFF 1998).

4.2 BUFFER ZONES CAN HELP MINIMISE POTENTIAL IMPACTS ON AIR QUALITY

The Planning Guidelines - Separating Agricultural and Residential Land Uses, were written to provide technical advice and guidance on reducing the potential for conflict between farming activities and residential development in accordance with State Planning Policy 1/92 (QDNR and QDLGP 1997).

The Planning Guidelines are intended to assist local governments, developers, landholders and consultants. In particular, the Planning Guidelines contain provisions which local governments should consider including in their planning schemes or adopting as local planning policies.

The Planning Guidelines consider that buffer areas to separate land uses can 'ensure long term protection of both areas impacted upon and areas used for the conflict generating activity (QDNR and QDLGP 1997).'

☞ ***Main Principles in the Planning Guidelines (QDNR and QDLGP 1997)***

1. Provided agricultural practices are legally practised according to existing codes of practice, **it is unreasonable for new adjacent users to demand a modification of these practices** to an extent which threatens efficient agricultural operations.

2. When preparing planning schemes, local governments **should avoid, as far as practicable, locating residential development in close proximity to agricultural** land. Where this is not possible, mechanisms such as buffer areas should be used to minimise conflicts.

3. Buffer areas should be determined on the basis of the sustainable agricultural land use with the potential to have the most impact on adjacent land uses and which is reasonably likely to be practised, regardless of current use.

4. Buffer areas should be located within **the site being developed for residential purposes and be provided/ funded by the proponent of that development.** This principle protects the prior rights of agricultural producers to practice agriculture on rural land.

5. Where conflicts already exist between agricultural and residential land uses, mechanisms including mediation, source controls and public education should be encouraged.

☞ ***Local Government and Plans for Subdivision***

Section 2 of the Planning Guidelines provides advice on forward planning by local government to prevent and/or minimise conflicts. This includes strategic planning, assessment provisions for new development, appropriate development and consideration where land is to be sub-divided.

Particular attention is given to sub-division of land, including single residential allotments.

2.38 The creation of residential allotments in productive rural areas often fragments farmland and may lead to land use conflict, particularly when the occupants of the new dwelling have no direct connection with the surrounding agricultural activities. Where possible therefore, single residential allotments (such as 'concessional lots' or 'family excisions') should not be located on or adjacent to good quality agricultural land.

2.39 Local governments are encouraged to review and amend any subdivision provisions that permit residential allotments in rural areas to ensure the appropriate buffer areas are required adjacent to good quality agricultural land.

In the following sections, consideration is given to how **buffer zones can be used by the proponent of residential development** to help minimise the specific potential air impacts dealt with.

4.3 MINIMISE OFF-TARGET CHEMICAL APPLICATION

Off target spray deposition may occur through spray drift, volatilisation, unstable atmospheric conditions, inaccurate placement, or using the incorrect equipment, product or rate. Impacts can be minimised by managing risks associated with the release of chemicals into the air.

Spray drift can occur in the form of droplets, vapour or a combination of both (Whitehead and Pyke 1994).

Droplet or vapour spray drift can occur when wind, relative humidity and atmospheric conditions change. Vapour drift occurs when volatile compounds move in air currents after spraying.

Manage risks associated with the release of chemicals into the air.

The best way to cut down the chance of off-target spraying is to ensure the efficient and careful application of chemicals. More detail on the different factors which affect the behaviour of spray droplets can be found in Section 4 (p23) of the *Pesticide Application* manual (Banks et al. 1990) or *Pesticide drift: Description, cause and remedies* (Broadley et al. 1986).

The use of non-chemical insect pest management (see section 7 on 'Integrated crop management') and the presence of buffer zones will also help.

4.3.1 Communicate with others

4.3.2 Know what's on the label and MSDS

4.3.3 Calibrate and maintain spray machinery

4.3.4 Understand the effect of weather

4.3.6 Use a suitable spraying height and direction

4.3.7 Keep records

4.3.8 Buffer zones can help reduce the potential impacts of spray drift

4.3.1 Communicate with others

Communication with neighbours is important. It helps the grower to know where susceptible crops or sensitive living areas are and helps the neighbours know when and where spraying is happening.

Regular contact with commercial operators enables clear communication about any risks, what chemical products to use and the suitability of weather conditions.

4.3.2 Know what's on the label and MSDS

Before spraying choose the product wisely. Do not use volatile products when non-volatile options exist. If possible, select products with low toxicity that do not harm non-target organisms.

Containers are labelled for easy identification and correct use. Registered labels in Queensland show the following information (Rural Chemicals Code 1994).

- the identity and amount of the active constituent and any other poisonous substance
- the poisons schedule, any cautionary statements, safety directions and first aid instructions
- the pests controlled by the chemical, and crops, and animals or other host situations for which it is registered
- the application rates for the chemical
- any restriction on methods of application
- the withholding period
- directions for storage
- batch number and manufacture or expiry dates
- mixing instructions

The label is a legal document and users of the product are required to have read and understood it. Safety directions include the correct Personal Protection Equipment (PPE) to wear when using the chemical.

The Material Safety Data Sheet (MSDS) has more information than the label. It provides physical and chemical information about the product, the dangers associated with accidental exposure to the product (health effects, routes of absorption, toxicological information) and how to proceed in the event of an accident.

4.3.3 Calibrate and maintain spray machinery

Well-calibrated machinery will produce sufficient droplets of the correct size and deposit these droplets evenly over the target.

Regular calibration confirms the correct rate of output. Checking nozzles regularly will make sure that they are clear and spraying uniformly and that the right nozzle for the job is being used. Nozzles that are worn will give faulty application rates and should be replaced.

4.3.4 Understand the effect of weather on droplets

Weather has a big influence on the effectiveness of chemical applications. Spraying during thermals or inversions will reduce spray effectiveness. Four weather factors need special consideration. Temperature, relative humidity, wind (direction and speed) and atmospheric stability (Whitehead and Pyke 1994).

- ***Spray at the right temperatures and relative humidity.***

High temperatures heat the ground quickly, causing air currents to rise. These carry spray mists up high and disperse them widely.

Low relative humidity can rapidly evaporate droplets, especially when water is the carrier. The general rule of thumb is to spray when temperatures are less than 32(C and when relative humidity is high (Whitehead and Pyke 1994).

- ***Avoid extremes of wind speed when spraying***

Off-target spray drift can be significant when the wind is going the wrong way, or there is not a consistent cross wind or volatile products are being used (Hughes 1991).

Extremes of wind speed should be avoided (Whitehead and Pyke 1994). Winds greater than 15km/hr can move droplets over large distances. On the other hand, when winds are still or low (less than 4km/hr) small, changing, gusty wind conditions can transport fine sized droplets over long distances. Wind socks and smoke generators give a good indication of wind speed and direction.

- ***Avoid extremes of atmospheric condition***

Highly unstable atmospheric conditions lift small droplets away from the target. The other extreme is the strongly stable atmosphere where droplets may drift away on the top of a temperature inversion. Cold air trapped below warm air cannot rise and causes spray to float indefinitely.

4.3.5 Use the right droplet size

Droplet size is important in spray application. It influences crop canopy penetration, evaporation risk, drift potential, coverage and gravity effects.

In general, as droplet size increases, sideways movement decreases (Whitehead and Pyke 1994). Chemicals need different sized droplets depending on product

formulation, the size of the target and the volume of product needed. As droplet size increases spray volume must be increased to maintain coverage.

Droplets that are 100µm and smaller fall significantly slower (sedimentation velocity) than those bigger than 100µm (Harden and Woods 1991). This means they can be exposed for a long time to conditions that can carry them from the target area. The trade-off is that droplets less than 100µm are the most effective and efficient for spraying into crop canopies under turbulent conditions created by wind interaction with the crop canopy.

4.3.6 Use a suitable spraying height and direction

The greater the release height of a pesticide the greater the risk of drift (Hughes 1991). The lower release height of ground based spraying machinery means the level of risk is less. In aerial spraying the pilot should switch the spray off before climbing and not switch it back on until the plane has levelled out.

Spraying upwards or into a wind increases the risk of drift. Under light wind conditions the direction is often variable and may result in off-target movement.

With constant crosswind, the spray swath will be predictable. Ideal windspeed is between 7km/hr to 15km/hr (Hughes 1991). No susceptible crops in the upwind direction will be contaminated if spraying occurs at these windspeeds.

4.3.7 Keep records

Records can help pinpoint errors, plan ahead and provide protection

When errors in application occur it can be difficult to pinpoint the fault. Records provide a trace-back system with enough information to find the problem. Details of product performance can be used to fine-tune application for better results next time.

Reliable records of past season chemical use can help to forward plan next season's purchases, avoid shortages and avoid carryover of unused product.

Records provide proof that a grower has followed acceptable and recognised practice. This will assist compensation claims or provide a defence if any challenge is made against a grower's duty of care.

Records should detail (Rural Chemicals Code 1994),

- the date and time of application
- the chemical used and at what rate
- the crop pest and area sprayed
- weather conditions (temperature, humidity, wind speed and direction, rain)
- the equipment used and operating condition
- the operator

4.3.8 Buffer zones can help reduce the potential impacts of spray drift

All spray droplets travel with wind currents until they are caught by a target (Whitehead and Pyke 1994).

When spray is deposited, most of it is close to the centre line of application with a tapering downwind tail. How much pesticide goes downwind depends on wind speed, release height, droplet size and the catching efficiency of the surface. Downwind buffer areas can help to catch off-target droplets.

Selecting and growing suitable vegetation as a biological buffer can help catch spray droplets (Harden and Woods 1991). Vegetation that is tall rough and thin

is better at catching droplets than that which is short, smooth and thick (Harden and Woods 1991).

A droplet catching barrier is preferably less than 50% porous, with a height about 1.5 times the height of spray release and uses multiple vegetation layers as a screen rather than a single layer (Harden and Woods 1991).

Further information on designing a vegetated buffer can be found in Appendix 2 of the Planning Guidelines - Separating Agricultural and Residential Land Uses (QDNR and QDLGP 1997).

☞ ***Buffer Zones and New Residential Development***

The Planning Guidelines - Separating Agricultural and Residential Land Uses (QDNR and QDLGP 1997) have adopted minimum effective separation distances between farming activities and new residential development to ensure negligible spray drift.

These are a minimum width of 300m where open ground conditions apply; and a minimum width of 40m where a vegetative buffer element can be satisfactorily implemented and maintained (QDNR and QDLGP 1997). These dimensions may vary according to local topographic or climatic conditions or as further knowledge is obtained.

It is the responsibility of the proponent of the new residential development adjacent to good quality agricultural land to comply with the Planning Guidelines.

The Planning Guidelines do acknowledge the difficulty of settling on a single distance for a buffer zone and cite a Federal Government report, which acknowledges that; 'buffer zones need to be chemical/formulation specific, based on supporting data.' (CSIRO 1993)

However the minimum separation distance for open ground was adopted on the basis of research and modelling which indicated that negligible chemical drift occurred at a range 300m downwind from the release point of a chemical spray application (Spillman 1988).

Similarly, the minimum separation distance for a vegetated buffer was based on research that indicated that they can catch up to 80% of pesticide spray drift from an application upwind of a single row of trees (Harden 1992).

Section 4 of the Planning Guidelines covers issues relating to ownership and maintenance of buffer areas (QDNR and QDLGP 1997).

4.4 MINIMISE IMPACTS FROM PLASTIC DISPOSAL

Plastic is used in fruit and vegetable production as mulch for row crops and bunch covers for banana bunches.

Using plastic mulch to grow melons helps control weeds, keep fruit clean and reduce fruit rots (Lovatt et al. 1997).

Banana bunch covers protect the fruit against the cold, the wind, bird markings and insect pests. If bird damage is a potential problem the early use of bunch covers offers a quick and suitable way to manage the problem.

Plastic twine is used on farm to tie on bunch covers and prop up banana trees. There are twine products that are biodegradable. These should be used where possible.

Growers must not dispose of plastic in a way that causes impacts on 'sensitive places' (as defined by the EP Act). Where there is a facility or program provided

by a local government or a commercial waste management business for collection / transfer / disposal / recycling or composting, growers are encouraged to access these services.

Where no such reasonable alternatives exist, growers may consider burning. If this needs to occur, it is essential that burning be carried out in such a way that no impact occurs on sensitive places. A rapid, high intensity burn of dry, well-aerated plastic is most likely to achieve this outcome.

The Planning Guidelines - Separating Agricultural and Residential Land Uses recommend a separation distance of 150m where dust, smoke or ash from agricultural activities has been identified as a potential nuisance (QDNR and QDLGP 1997).

The vegetated buffer designed for spray drift may also help in reducing potential impacts from dust, smoke and ash (see Section 4.3.8). **It is the responsibility of the proponent of new residential development adjacent to good quality agricultural land to comply with the Planning Guidelines.**

☞ ***Trials with alternative means of disposal***

Several alternative methods for disposal were trialed (Halpin 1996), including baling of plastic for incineration at Bowen Coke Works. However, inadequate machinery to compact the plastic and the high level of soil and vegetation contamination in the plastic meant that it could not be fed into the furnace easily. The special effort needed to feed in the plastic had a detrimental effect on the efficiency of the coke works.

Reducing the level of residual soil and vegetative matter cuts down the total volume of the plastic mulch bale. In Bundaberg a mulch-lifting machine can roll the plastic under tension, using a cutter bar to lift the plastic after the crop has been slashed. This has allowed the volume of the bales to be reduced by about 50% for a given weight of plastic (Halpin 1996).

QFVG, HRDC and the QDPI funded a project proposal to design and construct a prototype compactor for agricultural plastic film. The compactor provides a robust, simple and inexpensive way of efficiently handling waste plastic (Halpin 1996).

The prototype compactor is now complete (HRDC Project 634, "Agricultural Plastic Compactor") and has been demonstrated to growers at South Johnstone, Ayr, Bowen, Bundaberg, Nambour and Gatton. The machine is commercially available from Homan Industries Pty Ltd, Toowoomba. (Phone: 076 343544 or Fax: 076 331694).

☞ ***Future research directions for alternatives to plastic mulch***

Currently there is no suitable long-term alternative to using plastic mulch. The QDPI is investigating alternative mulches of living and non-living materials.

The living mulch treatments consist of a variety of legume and grass species grown on raised beds using standard industry practice for vegetable crops (Olsen and Gouder 1998). The living mulches are regularly assessed for vigour, tolerance to pests and diseases and response to cultural practices like herbicide application and slashing (Olsen and Gouder 1998).

Non-living mulches being tested include sawdust (with and without urea), cane trash, paper mulch (a product from the UK called Growmulch®), starch-based polymers and the bitumen-based 'Terralas' (Olsen and Gouder 1998).

All alternative mulches will be compared with plastic mulch and bare-soil control plots.

Whatever the proposed alternative, its minimum requirement should be the equivalent environmental and agronomic benefits offered by plastic mulch as well as cost effectiveness.

4.5 MINIMISE IMPACTS FROM ODOURS

Some odour problems can arise from the use of stockpiled animal manure. Spreading and incorporation of animal manure may also allow odours to be transferred downwind. Care should be taken to minimise the time that manures are stockpiled and when making stockpiles, consider the influence that wind direction and local topography has on odours.

With chemical use, the presence of an odour is a warning that chemicals have been used nearby. The odour is a form of marker added to the active ingredient to make detection easier. The presence of odour will not automatically mean that there are toxic levels of the active ingredient.

Forming an opinion on an odour complaint

Part 4 of the Environmental Protection Policy for Air outlines the process that an administering authority must follow when forming an opinion on the release of an atmospheric contaminant (including odour, dust, smoke or other) complaint.

In summary, a person may make a complaint about an unreasonable release of a contaminant in writing to the administering authority. The administering authority will investigate the complaint unless the authority believes that the complaint is vexatious or that it would be more appropriately dealt with under another law (eg a local law).

To investigate the complaint the administering authority may issue a "show cause notice" to the person responsible for the release of the contaminant. The person responsible then has the opportunity to make a written response to the administering authority, by a specified time, stating why the person considers that the release of contaminant is not an unreasonable release of contaminant.

Alternatively, the administering authority may issue an "abatement notice" if it is satisfied that the release of contaminant is an unreasonable release of contaminant. Any person in receipt of an abatement notice is entitled to make an application for a review of the decision and appeal under chapter 6, part 3 of the Environmental Protection Act 1994.

4.6 MINIMISE IMPACTS FROM DUST

Work light soils in low wind conditions to avoid impacts from dust.

Care should be taken when working dry light soils. Try to work these kinds of soils in low wind conditions. The use of crops for groundcover on bare paddocks (section 1.2.3 Minimise bare ground to reduce erosion from raindrop impact) will help minimise impacts of dust carried away in windy conditions.

The Planning Guidelines - Separating Agricultural and Residential Land Uses recommend a separation distance of 150m where dust, smoke or ash from agricultural activities has been identified as a potential nuisance (QDNR and QDLGP 1997).

The vegetated buffer designed for spray drift may also help in reducing potential impacts from dust, smoke and ash (see Section 4.3.8). **It is the responsibility of the proponent of new residential development adjacent to good quality agricultural land to comply with the Planning Guidelines.**