

Factsheet – E1 Biosecurity

This factsheet covers:

- **What is biosecurity?**
- **Biosecurity Management Program**
- **Restrict property access**
- **Monitor and report biosecurity threats**
- **Further information**

What is biosecurity?

Biosecurity is the management of risks to the environment, the economy, and the community, of pests and diseases entering, emerging, establishing or spreading within Australia.

Biosecurity as referred to in the Freshcare Australian Wine Industry Standard of Sustainable Practice is focused on awareness and industry preparedness, to minimise and manage the risk and spread of pests and diseases on-farm.

Biosecurity Management Program

A Biosecurity Management Program should be established to identify any biosecurity threats (exotic pests or diseases) known to target the type of crops grown. Information on biosecurity threats to specific crops is released directly via industry updates and grower associations or can be accessed via the Plant Health Australia or farm biosecurity websites, see details under '**Further information**' in this factsheet for website links.

Once potential threats have been identified, strategies and practices to manage and minimise the risk of the threats occurring on your property should be documented in the Biosecurity Management Program, and implemented on-farm.

Dependant on the threats identified and crops grown, there may be pre-established industry guidelines; quarantine regulations or requirements that need to be followed. If specific guidelines are not available for the threats identified or crops grown, suggested focus areas within your business may include:

- production inputs and outputs;
- production practices;
- people, vehicles, equipment;
- feral animals, pests and weeds.

Examples of strategies and practices to minimise biosecurity threats may include:

- only sourcing seed, planting materials and nurse stock from certified suppliers;
- maintaining purchase records for all vegetative inputs, to enable traceability in the event of threats being identified;
- restricting access to growing sites and movement of vehicles on-farm;
- crop monitoring for unusual pests and diseases.

Evidence should also be kept in relation to strategies and practices outlined in your Biosecurity Management Program. Examples of evidence may include:

- certification records for suppliers of seed, planting materials or nursery stock;
- purchase records for all vegetative inputs (mulches, fertilisers, soil additives etc.);
- signage on-farm;
- worker training log;
- visitor sign-in or induction;
- crop monitoring records.

The Biosecurity Management Program should also identify workers who are primarily responsible for ensuring the practices are undertaken on-farm. The Program should be regularly reviewed and updated to include the latest industry information at least annually as per the Code requirements.

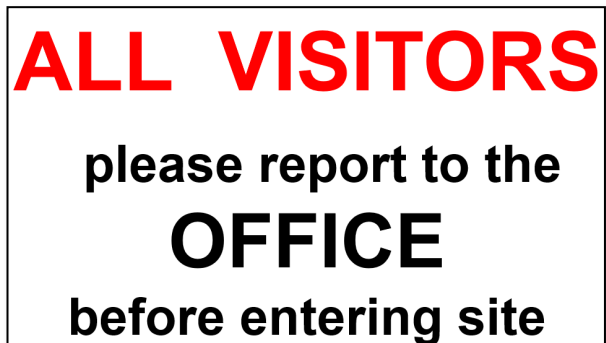
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Restrict property access

The Freshcare Code of Practice Environmental Edition 3, requires that access to the property and growing sites is restricted to authorised persons.

An authorised person is defined in the Code as *‘a person delegated the right to perform a task or access specific areas of a business; authorisation may be in consideration of training completed or position held.’*

Property signage (examples provided below) may also assist in restricting property access to authorised persons only.



Freshcare provides access to free sign templates, such as those provided above. Freshcare signs can be downloaded via the Resources section of the Freshcare eLearning website: www.freshcare.com.au/elearning.

Monitor and report biosecurity threats

The best defence against managing pests and diseases on-farm, is to implement a Biosecurity Management Program, and ensure vigilant monitoring is undertaken to identify anything exotic.

Any suspicious or unusual plant pest, disease or weed identified on your property should be reported immediately via the **Exotic Plant Pest Hotline – 1800 084 881**, or to your local department of agriculture.

The screenshot shows the Plant Health Australia website. At the top is the logo and navigation links: Industries, National programs, Strategies. The main heading is "Reporting suspect pests" with a printer icon. Below this, text states: "Any unusual plant pest should be reported immediately to the relevant state or territory agriculture agency through the Exotic Plant Pest Hotline (1800 084 881). Early reporting increases the chance of effective control and eradication." Another paragraph says: "Reporting an exotic plant pest should be done only via the Exotic Plant Pest Hotline. Careless use of information, particularly if a pest has not been confirmed, can result in extreme stress for individuals and communities, and possibly damaging and unwarranted trade restrictions." A bold heading reads: "If you suspect a new pest, call the Exotic Plant Pest Hotline". Below this is a red dashed box containing the text: "EXOTIC PLANT PEST HOTLINE 1800 084 881". At the bottom right, text says: "Calls to the Exotic Plant Pest Hotline will be forwarded to an experienced person in the department of agriculture from the state of origin of the call, who will ask some questions about what you have seen and may arrange to collect a sample. Every report will be taken seriously, checked out and treated confidentially."

For more information visit:

www.planthealthaustralia.com.au/biosecurity/emergency-plant-pests/reporting-suspect-pests.

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Further information

There are a number of biosecurity resources available online, providing industry and commodity specific resources to assist in managing biosecurity threats on-farm. Please see website details following:



Plant health Australia: www.planthealthaustralia.com.au



Farm biosecurity: www.farmbiosecurity.com.au

Factsheet – E2 Land, soil and nutrient management

This factsheet covers:

- Managing land and soil
- Fertilisers and soil additives
- Nutrient management
- Soil, plant tissue and sap testing
- Selecting nutrient types and amounts
- Nutrient budgeting
- Application of fertilisers and soil additives
- Storage of fertilisers and soil additives
- Record keeping
- Soil structure management and remediation
- Soil erosion management and remediation
- Salinity management and remediation
- Soil acidity management and remediation
- Soil alkalinity management and remediation
- Sodicity management and remediation
- Soil contamination
- Further information

Managing land and soil

Businesses need to consider their impact on land and soil as well as considering how to best manage and improve any areas already degraded or contaminated. Good agricultural practice for fertilisers and soil additives ensures that nutrients are managed to maintain the productive capacity of the soil while minimising environmental harm.

The key areas addressed in this factsheet include:

- Nutrient management, budgeting, plant tissue and sap testing
- Fertiliser and soil additive storage, application, use and record keeping
- Soil structure management and remediation
- Degradation management and remediation

The priorities for land and soil management and remediation will vary depending on soil type, topography of the land, surrounding environment, previous land use and climate.

Fertilisers and soil additives

Incorrectly applied fertilisers and soil additives may result in off-target (off-site) nutrient movement contributing to degradation of groundwater and watercourses (for example, algae and lyngbya blooms, reef degradation), increased soil acidity, salinity and sodicity problems and contaminated soil.

Fertilisers may be lost from production areas through:

- inaccurate application,
- leaching past the root zone and into groundwater,
- moving as dissolved nutrients in surface water leaving farm paddocks,
- attaching to soil sediments and within organic particles in surface water leaving farm paddocks,
- attaching to wind-eroded soil particles,
- volatilisation into the atmosphere.

Not only are these nutrients lost for crop production, such losses will potentially have downstream or off-farm environmental harm.

The nutrients most at risk of causing off-farm environmental harm are:

- **Nitrogen** – a highly soluble element that is easily leached from the soil profile, dissolved in run-off water or volatilised into the atmosphere.
- **Phosphorus** – which binds strongly to soil particles and so, can be lost by soil erosion through water and wind. Environmentally significant quantities of phosphorous can also be dissolved in run-off water when soil phosphorus levels are high.

To efficiently manage nutrient inputs and prevent environmental harm, it is necessary to determine the amount and type of nutrients to apply for each production site rather than using recipe-type application rates. This is done

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through soil and/or crop testing and using the testing results to determine the nutrient requirements of the crop.

Nutrient management

Good nutrient management includes:

- deciding what nutrients are needed, e.g. budget nutrients removed in the crop versus nutrients added in fertiliser applications,
- ensuring workers responsible for crop nutrition are competent to make recommendations relevant to the crops under their management,
- applying fertilisers in the right way,
- minimising nutrient leaching to groundwater, especially nitrogen, by applying lighter than normal irrigation after fertiliser application or fertigating with lighter irrigations than normal,
- ensuring any in-line fertiliser injection systems have back flow prevention measures,
- storing fertilisers properly,
- reducing possible harm to the environment by ensuring broadcast application of fertilisers leaves a buffer (no fertiliser) zone between the crop and sensitive areas such as watercourses and native vegetation,
- ensuring workers are trained in practices that minimise the risk of environmental contamination from fertilisers and soil additives.

The Standard requires that a Nutrient Management Program is documented in consideration of:

- the crop nutrient requirements
- fertilisers and soil additive budget
- application including justification and schedule

The following sections will provide further information on the areas that need to be considered when developing the Nutrient Management Program for your business.

Soil, plant tissue and sap testing

Soil testing objectively measures the nutrient status of soil. This is a valuable nutrient management tool when used before planting a crop or orchard. Ongoing soil testing also provides insights into longer-term trends in soil properties that may alert managers to crop nutrition or environmental issues. Soil organic carbon decline or the build-up of excess available phosphorus levels are examples of where soil testing can identify problems early.

Soil testing, plant tissue testing, sap testing and visual crop inspection can all be used post-planting to monitor nutrient availability and determine an appropriate post-planting fertiliser program.

Soil tests measure soil properties that influence nutrient availability to the crop. These include:

- pH
- electrical conductivity (a measure of salt content)
- organic carbon
- individual macro / micronutrients and other elements

Use a laboratory that is accredited to carry out the required tests - look for National Association of Testing Authorities (NATA) accreditation; a laboratory that uses NATA methods; or use a laboratory that participates in the Australian Soil and Plant Analysis Council (ASPAC) proficiency trials.

Soil test results and optimum soil nutrient levels should be discussed and interpreted with an appropriately qualified person, such as an agronomist or soil consultant. Consideration should be given to the soil type, cropping history, specific crop needs and agronomy when a written fertiliser recommendation is developed. This may include recommendations for adding lime, dolomite or gypsum. Many growers use fertiliser companies or other agribusinesses to do soil testing and provide advice on fertiliser requirements and soil management.

Soil testing and analysis needs to be completed early enough to allow nutrients and soil ameliorants to be applied in a timely manner.

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Sap or leaf testing can also be used to develop nutrient uptake graphs, so fertiliser applications can be timed to the appropriate growth stage of the crop. Samples for testing need to be collected carefully and samples need to be analysed by a suitably accredited laboratory.

Selecting nutrient types and amounts

Objective methods such as soil testing, plant tissue testing and sap testing, combined with yield data and visual assessments of crop or tree health, provide the basis for good fertiliser selection and management. In some instances, recognised nutrition programs can be used. These should be based on sound information such as history with the particular soil type and crop and be developed by an experienced soil consultant or agronomist.

Fertiliser recommendations should be made by someone who understands crop nutrition. An understanding of the role of different nutrients in plant growth, the levels needed for good growth by particular crops and the cycles of key nutrients such as nitrogen is important. It is a good idea to either do formal training to learn to estimate the quantity and type of fertiliser to use, or to use the services of a soil consultant or agronomist to decide on the nutritional needs of crops. Both over- and under-application of fertiliser can create problems.

The Australian Fertilizer Industry has established the **Fertcare®** program to assist in the sustainable use of fertilisers. Fertcare® provides training and accreditation for agronomy, sales and logistics staff. Training options also exist for growers, depending on their particular needs.

Fertilisers should be applied accurately and efficiently, taking into account crop stage and seasonal conditions.

The relatively low cost of inorganic fertilisers compared to other production inputs means there is a temptation to apply excess quantities of fertiliser, rather than risk production losses. It is tempting to think of fertiliser as a 'cheap' form of crop insurance, relative to other costs.

Excessive inorganic fertiliser application increases the likelihood of nutrient losses off-farm or into groundwater. This in turn can lead to long-term environmental harm such as soil nutrient imbalances, degradation of sensitive environmental areas, algal blooms in watercourses and groundwater contamination, plus on-farm soil health impacts such as increased soil acidity, soil sodicity and soil salinity.

Inorganic fertilisers should be selected that have low levels of contaminants such as heavy metals (cadmium, lead or mercury). High levels in fertilisers may lead to accumulation in the soil.

The limits for heavy metal contaminants in fertilisers and soil additives are specified in Australian Standard AS4454 (2012) Composts, soil conditioners and mulches:

- Cadmium <1mg/kg (dry weight basis)
- Lead <150mg/kg (dry weight basis).

Inorganic fertilisers are only one method of supplying nutrients. Cover crops, fallow crop residues and animal manures not only add organic matter to the soil but also release significant amounts of nutrients as they break down. The gradual release of nutrients from organic sources can help to reduce the loss of nutrients off site. Manures should be tested for nutrient content, chlorine levels and presence of contaminants such as heavy metals before application.

While improving soil health, organic fertilisers can also be responsible for environmental harm from off-target nutrient movement when applied at excessive rates and not incorporated into the soil.

Similarly, soil additives such as lime and gypsum may improve soil structure and control soil health but they can also cause environmental harm when used excessively, or contain heavy metal contaminants.

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Nutrient budgeting

Nutrient budgeting can assist in a better understanding of the whole nutrient cycling and transformation system. This enables sustainable, integrated nutrition and cropping strategies.

A nutrient budget is like an accounting system for nutrients. It involves:

- estimating the amount of nutrients available from the soil (soil test results),
- obtaining uptake and removal figures for the target crop and the previous crop (to account for nutrients in crop residues, for example, consideration should also be given to the contribution of legumes to nitrogen availability) Figures should be in kg/tonne of crop grown (for uptake) and harvested (for removal),
- determining the target yield to calculate actual uptake and removal figures,
- calculating the amount of nutrients, especially nitrogen, that will be applied with irrigation water (50 ppm nitrate in irrigation water will add about 1kg N/ha with every 10mm of irrigation water applied),
- calculating the amount of nutrients already applied to a paddock,
- estimating the amount of nutrients that will be removed through harvested product,
- determining possible nutrient losses through leaching, volatilisation or soil erosion (deep soil nitrate testing can be an important tool in assessing leaching),
- replacing nutrients lost to the system through appropriate fertiliser applications.

Nitrogen, phosphorus and other major nutrients are the main elements considered in nutrient budgeting. Along with soil, leaf and sap testing and visual assessments, nutrient budgeting is another tool for fine-tuning the nutrient management program.

Application of fertilisers and soil additives

When applying fertilisers and soil additives, some general rules should be followed:

- avoid applying to saturated soil or when heavy rain is forecast,
- avoid applying during extended drought,
- avoid applying to steeply sloping ground,
- use contour drains to minimise run-off,
- monitor soil moisture to minimise leaching of nutrients past the plant root zone,
- maintain vegetation cover during periods when rainfall is historically high, to minimise run-off and leaching.

Type, timing and rates of application

Fertilisers need to be applied when they will do the most good for the crop. As a general rule, applying small amounts regularly is less likely to cause off-site losses from leaching and run-off.

Schedule fertiliser applications according to seasonal conditions, cropping cycle and periods of greatest demand by the crop.

Select the most suitable fertiliser type based upon the speed of availability of the nutrients in meeting crop demand and in consideration of the fertiliser's potential to contribute to increases in acidity, alkalinity or salinity.

Fertiliser placement

Accurate placement of fertilisers helps plants access the nutrients required. Choose the right equipment, correctly adjust settings and monitor applications to ensure fertiliser is placed in the target area to maximise crop utilisation while minimising an adverse impact on the environment.

Efficient fertiliser application techniques ensure the quantity demanded by the crop is placed nearest to the root zone of plants. Application methods suited to achieving this include:

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- fertigation using micro/trickle irrigation systems,
- banding or drilling fertiliser in beside plant rows.

Foliar application through spray equipment is a useful method for applying targeted amounts of micronutrients.

Be careful not to apply fertiliser to non-crop areas or adjacent to watercourses. Take steps to prevent contamination of water sources from pump backflow during fertigation.

Care and calibration of equipment

Brand new spreaders can have poor spread patterns, and with use and 'wear and tear' even a well-setup spreader can become inaccurate.

Equipment used to apply fertilisers and soil additives should be maintained and checked for effective operation before and during each use. Refer to the manufacturer's specifications when carrying out calibration on application equipment.

Storage of fertilisers and soil additives

All fertilisers including animal manures should be stored in such a way that prevents nutrients leaching into surface watercourses and groundwater. Inorganic fertilisers should be stored in a covered area away from watercourses. Manure heaps should also be covered to reduce leaching through rain.

Inorganic fertiliser storage areas should be:

- protected from direct sunlight and rain,
- well ventilated with fresh air to keep fertilisers dry,
- designed to minimise the chance of pest infestation, mould growth and damage,
- designed to confine any spillage and allow easy clean up.

Store fertiliser in a way that lowers the risk of seepage into groundwater. With the exception of fertilisers applied with agricultural chemicals, fertilisers should be stored separately from agricultural chemicals.

All liquid fertiliser storage should be bunded to eliminate the chance of run-off into watercourses. In the absence of any national or state legislation, the bund should be 125% of the largest container, plus 25% of total volume stored.

In addition to regulations regarding storage of dangerous goods, there are new regulations in place regarding "security sensitive" ammonium nitrate (SSAN) that cover how these products are supplied, handled and stored. Advice from the appropriate local authority should be sought.

Bulk animal manure and compost storage areas should be:

- located away from watercourses and flood-prone areas,
- bunded to prevent surface water running through the piles and to contain leachate surface flow,
- on an impervious base to prevent leachates entering ground water,
- covered where possible.

A current Safety Data Sheet (SDS) should be kept for fertilisers stored on the property. These should be located near to where the fertiliser is stored and easily accessible. SDS's can be obtained from the supplier of the fertiliser or sourced online.

Record keeping

An accurate record of all fertiliser and soil additive applications should be maintained, including foliar application and fertigation. This applies both to organic (e.g. sheep, cattle, chicken manure) and inorganic fertilisers (e.g. superphosphate). Fertiliser application records are essential for nutrient budgeting, and a requirement of the Freshcare Code of Practice Environmental.

Records of all fertiliser and soil additive applications must include:

- application date

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- location and crop
- product used
- rate of application
- wind speed and direction
- method of application/incorporation
- name and signature of the person applying the fertilisers and soil additives.

Equipment used to apply fertilisers and soil additives should be serviced and maintained in good working order and records of calibration kept to demonstrate accurate and efficient applications.

Soil structure management and remediation

Maintaining and improving good soil structure requires establishment of cover crops and increasing organic matter content in the soil.

Potential ways to manage or remediate soil structure are provided under the following sub-headings:

Increasing organic matter

Adding organic matter promotes good soil structure and increases soil resistance to erosion. Organic matter can either be left on the soil surface as a mulch or incorporated into the soil to improve soil organic matter levels, soil structure and soil fertility.

Organic matter can be increased by returning green manure crops, stubbles, crop residues and green-waste compost to the soil. Other organic amendments can be added to soils to boost organic matter levels. These include fowl manure, feedlot manure, fish emulsion, humic acid and composts.

A common method of amending soil fertility is through the application of fertilisers and soil additives.

Cultivation method

Machinery can cause compaction, and excess cultivation can degrade the soil. Consider the following points:

- Minimise the number of soil workings.
- Avoid overworking with powered implements.
- Minimise traffic in the paddock.
- Keep trucks to headlands.
- Use low weight spray rigs.

Cultivation timing

Avoid using machinery on production areas when the soil is too wet or too dry. Wet soil works like plasticine whereas soils that are too dry tend to shatter to dust. Ideal moisture levels depend on soil type and texture. Check by working some soil from the plough layer in your hands.

Remediation

If a hard pan or compaction layer is present, then additional cultivation may be needed depending on whether the cause is cultural or due to sodicity. If the condition is not due to sodicity, deep-ripping under the correct soil moisture levels will help to shatter the compaction layer, loosening and breaking clods that will break down further when exposed to the weather.

Soil erosion management and remediation

Soil erosion can occur when water or wind contacts exposed and/or unstable soils (soils with poor structure). Erosion can happen quickly as a consequence of high winds, heavy rain or excess irrigation, or when drainage water from paddocks, roadways and areas around sheds and buildings moves quickly across exposed or unstable soils.

The likelihood of soil erosion and the type of control measures needed depend on vegetation cover, soil type and texture, soil structure and the type of production or property activity.

Evidence of soil erosion caused by water may include:

- rills or gullies,
- turbid water in farm dams or leaving the property,

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- soil build up on fence lines or at the bottom of slopes.

Evidence of soil erosion caused by wind may include:

- dust,
- rills or gullies on light or sandy soils,
- exposed subsoil and rocks (rocks appear to be ‘rising to the top’ of the paddock),
- exposed roots of trees and shrubs (long-lived vegetation),
- soil and/or organic matter (such as twigs and grass) building up against the side of fences or hedges.

Potential ways to manage or remediate soil erosion are provided under the following sub-headings:

Soil cover

Soil cover protects the soil from erosion by reducing the movement of soil particles by water or wind. Different types of cover can provide a physical barrier to soil movement, slowing the movement of water across the site, and sheltering the soil surface from wind. The root systems of groundcover vegetation can also bind soils and improve their resistance to erosion.

Types of soil cover include:

- grassed drainage and sump areas,
- inter-row groundcovers in vineyards
- organic mulches, plastic, slashed inter-row material or crop residues spread over the exposed soil.

Controlling run-off water

Controlling the direction of flow, volume and speed of run-off water onsite can minimise soil erosion. Long, gentle slopes are just as prone to erosion as short, steep slopes. Good planning and drainage design before planting can prevent problems occurring.

Control measures may include:

- using the natural contour lines (natural topography) of the property, where possible,
- establishing cut-off drains or banks (also known as diversion banks/drains) to divert and prevent water from other areas coming onto the site or flowing over vulnerable areas,
- establishing contour drains/moulds/bunds to collect and slow run-off from site,
- establishing diversion drains to control excess water flow on and around exposed sites,
- establishing v-drains in inter-row areas to divert water to grassed drains and away from exposed areas,
- establishing grassed irrigator runs and drainage areas to control run-off water collected by contour banks, diversion banks and roads,
- interrupting long slopes with a cut-off drain or grassed/mulched rip lines,
- establishing in-paddock structures such as sediment basins and sumps along drainage pathways,
- positioning access roads on ridge lines or on the contour on relatively flat ground,
- constructing access roads so they are higher than surrounding cultivated land,
- ensuring control and remediation measures work with natural waterways within and adjacent to the area being managed,
- considering the likelihood of excess rain or potential flooding events,
- managing or avoiding associated run-off when establishing new horticultural sites, particularly where major ground works are concerned.

Lightly eroded areas can be remediated by:

- filling in rills and eroded channels to form a shallow basin and vegetating the area,
- diverting water away from the area until vegetation is established,
- preventing traffic and activity in the area until vegetation is established.

Badly eroded areas may require more drastic action such as earthworks, structures and tree planting. Professional advice is recommended.

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Salinity management and remediation

Salinity reduces the diversity of native plants and animals and is linked to environmental degradation such as soil erosion, deteriorating water quality in streams, rivers and groundwater and loss of riparian vegetation. Salinity can dramatically reduce agricultural productivity, as high salt levels can limit crop growth and even kill plants as it makes it more difficult for plants to extract water from the soil. Salinity also has impacts beyond agriculture as it can affect infrastructure such as roads and buildings.

Salinity refers to the presence of soluble salts in soil or water. These salts may be naturally occurring (primary salinity), coming from the parent material from which the soil was formed. Other sources of salt can be rainfall, overuse of mineral fertilisers or poultry manure, or the use of saline irrigation water. Secondary salinity is the result of human activity. Only secondary salinity can be managed through good agricultural practices.

Saline irrigation water may result from salts percolating out of naturally salty soil into watercourses or groundwater, or from seawater intrusion into coastal groundwater. Seawater intrusion is usually a result of excessive groundwater drawdown from irrigation, or lack of groundwater recharge due to drought.

The development and progress of salinity tends to be highly complex. Water table levels and potential salinity problems and discharge points may vary considerably, as this depends on site conditions, groundwater processes and land management practices.

Rising water tables are one of the major causes of salinity. Crop and annual pasture plants use less water than perennial native vegetation, therefore allowing more water to travel down past the root zone and into the groundwater. This extra water makes the water table rise. As the water rises it dissolves the salts that are naturally in the soil, so the rising water becomes salty, contaminating soil and water. Rising water tables can also bring salt into the root zone, which may not be leached out of the soils by rainfall or irrigation. Evaporation from water

tables within two metres of the soil surface also causes salt accumulation in the root zone and can dramatically affect crop productivity.

To manage salinity it is important to understand whether it is caused by rising groundwater, irrigating with saline water or saline soils. Property sites at risk need to be identified, the level of risk assessed and control measures put in place where needed. There are a number of key strategies in relation to managing salinity including:

- careful site selection,
- understanding the source/cause of salinity,
- monitoring salt levels in irrigation water,
- adjusting irrigation strategies,
- minimising rising water tables through appropriate drainage and/or use of vegetation.

Potential ways to manage or remediate salinity are provided under the following sub-headings:

Groundwater salinity

To minimise the chances of salinity problems, the water table should be kept two metres or more below the soil surface. If the water table is rising or is already within two metres of the surface, artificial subsurface drainage may be needed.

Soil salinity

Salinity levels in the soil are measured in a 1:5 soil solution (1 part soil to 5 parts water). These are called EC 1:5 readings (EC stands for Electrical Conductivity). A reading of <0.2dS/m (deci Siemen/metre) is usually safe for horticultural crops. The heavier the soil texture (e.g. clay) the more sensitive the crop is.

Sometimes high soil salinity can be found when the water table is low and the salinity of the irrigation water is also low. In these situations, check the leaching efficiency of the irrigation system and your fertiliser program, as certain fertilisers such as muriate of potash can have a strong influence on soil salinity.

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Improving drainage

Improve drainage in saline areas, particularly if salinity problems are associated with a rising water table and saline groundwater. If soils are waterlogged, removing excess water can help leach salt from the root zone to lower levels in the soil profile. Consideration must be given to management of the drainage water – releasing saline water into a watercourse or disposing of saline water on land can create further problems.

Irrigation management

In areas affected or at risk of being affected by salinity, irrigation requires careful management. It is a good idea to seek professional advice before developing an irrigation system in these situations.

In some cases, applying a 'leaching fraction' when irrigating may be necessary to flush salts through the soil profile. For leaching to be effective, good drainage is needed and a plan for safe disposal of the saline drainage water must also be in place.

Vegetation cover

Vegetation can assist in preventing and managing salinity, particularly salinity associated with rising water tables. Deep-rooted plants can assist in preventing rising water tables, by utilising water deep in the soil profile.

Maintaining vigorous plants will help use rainfall, preventing excess water soaking through the soil surface. If salinity problems already exist, salt-tolerant tree species can be established to assist with water utilisation and gradual lowering of the water table.

Soil acidity management and remediation

Soils can be naturally acid or alkaline. Soil pH may also change with irrigation, fertiliser and crop management practices. As soil pH changes, the availability of soil nutrients may also change. Therefore it is important to monitor soil pH changes over time.

Soil acidification is a major land degradation issue, which can lead to reduced availability of nutrients, lower yields and fewer crop options. Soil acidity can be naturally occurring and can be increased by continued heavy use of nitrogen fertilisers like Sulphate of Ammonia and Monoammonium Phosphate (MAP). It can also be increased by the removal of alkaline materials.

The speed with which soils may become acidic depends on many factors including:

- soil type and texture (sandy soils become acidic more easily),
- organic matter,
- cation exchange capacity,
- the amount of crop product removed,
- type of fertiliser used.

Potential ways to manage or remediate soil acidity are provided under the following sub-headings:

Monitoring pH

A check of the soil pH is an ideal way of monitoring the change in acidity of soils over time. It is important that pH is determined in soil samples taken at root zone depth (at least 60-80cm).

Agricultural lime or dolomite lime are the soil additives usually added to maintain soil pH within the optimum range and can reverse the acidifying process in surface soils. Soil testing can help determine the correct rate of lime to apply. It is usually easier to apply lime before planting. Cultivating the lime into the soil improves results, although incorporating lime into subsoil layers is difficult. Surface lime applications often only increase pH to the depth that lime was incorporated. Care needs to be taken to ensure that root systems are not damaged when lime is incorporated.

Nitrogen leaching is a common form of soil acidification. Reducing the quantity of nitrogen fertiliser used, reducing leaching or using less acidifying forms of nitrogen can assist in reducing soil acidification caused by nitrogen. In some fertilisers, the process that converts nitrogen from the applied form to one the

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plant can take up, can acidify the soil. The acidification potential of different fertilisers is:

- severely acidifying – ammonium sulphate and monoammonium phosphate (MAP),
- moderately acidifying – diammonium phosphate (DAP),
- slightly acidifying – urea and ammonium nitrate,
- non-acidifying – potassium nitrate, calcium nitrate and composted poultry manure.

Efficient nitrogen application includes applying smaller amounts of fertiliser more often. Fertigation (applying fertilisers through irrigation systems) is one technique that can help match fertiliser application more effectively with crop demand and also allows for use of soluble fertilisers like potassium nitrate and calcium nitrate. Increasing organic matter can help to buffer the soil from pH changes.

Acid sulphate soils

Acid sulphate soils are formed when seawater or sulphate-rich water mixes, in the absence of oxygen, with land sediments containing iron oxide and organic matter. Acid sulphate soils are commonly found less than 5m above sea level.

Mangroves, salt marshes, floodplains, swamps, wetlands, estuaries and brackish or tidal lakes are ideal areas for acid sulphate soil formation.

The presence of acid sulphate soil may not be obvious on the soil surface as it is often buried beneath layers of more recently deposited soils and sediment.

When exposed to air due to drainage or disturbance, these soils produce sulphuric acid which in turn can release toxic quantities of iron, aluminium and heavy metals.

Potential ways to manage or remediate acid sulphate soils

Acid sulphate soils can be associated with areas that are poorly drained or scalded and should not be drained, cleared or exposed without first consulting your local agriculture department. Draining, clearing or exposing the soils in these areas will prevent mobilising the acids and toxic elements in the profile.

Management strategies can only be successful if based on adequate mapping of the sulphide contents. Soil reactivity and depths to which sulphuric and sulphidic horizons occur, may include:

- re-flooding trials utilizing existing freshwater, tidal and saline ponds in constructed wetlands and brackish water in a ponding basin,
- bioremediation trial to re-establish reducing conditions to stop pyrite oxidation by the addition of sulphate-reducing bacteria and various organic wastes,
- slotting trials using soda lime by-product to treat acidic discharging meteoric water or groundwater leachate.

Soil alkalinity management and remediation

Alkaline soils have a pH greater than 7.5 or a high sodium content, or both.

Alkaline soils may be deficient in zinc, copper, boron and manganese. Soils with an extremely alkaline pH, (>9) are likely to have high levels of sodium.

Some soils in the semi-arid and arid regions have naturally high pH caused by significant quantities of free calcium carbonate. Irrigated well or bore water may also contain significant quantities of calcium carbonate.

Potential ways to manage or remediate soil alkalinity include:

Check the soil pH to monitor the change in acidity of soils over time. It is important that pH is determined in soil samples taken at root zone depth (at least 60-80cm).

Use fertilisers such as crushed sulphur and some ammonium-based nitrogen fertilisers to reduce alkalinity of soils.

Sodicity management and remediation

Sodic soils are those where the amount of sodium held on to the clay particles is 6% or more of the total cation exchange capacity. They have an unstable structure and are poor places for plants to grow.

Factsheet – E2 Land, soil and nutrient management

Soil sodicity and soil salinity are often related because both involve sodium – a metal element widespread in Australian soils. Sodicity may be the more obscure problem, but it is a more widespread form of land degradation. It affects nearly a third of all soils in Australia (including one-third of all agricultural soils) and can cause poor water infiltration, low water storage, toxicity, surface crusting or sealing and waterlogging.

Following rain or irrigation with fresh water, clay particles in sodic soils force each other away, because of the sodium bound to the clay. This causes the soil to disperse, leaving a cloudy suspension.

Potential ways to manage or remediate sodic soils includes:

Improving sodic soils is not simple. Good soil management practices will generate as much benefit as high-input, costly remedial action, especially if the soil is in reasonable condition. Practices such as minimising tillage and compaction, returning large amounts of organic matter to the soil and improving surface drainage should be the first consideration before undertaking specific remedial action.

Once basic good soil management practices are adopted then attention can be turned to the sodicity problem itself. If sodic soils are identified or suspected, growers should seek professional advice.

Calcium in the form of gypsum can be added to sodic soils to improve their structure. Gypsum may also be applied to the soil via the subsurface drip irrigation system.

Gypsum improves soils in two ways. The first is a short-term benefit. The calcium salts in the gypsum increase the salt level in the soil solution around the clay particles. This prevents dispersion of sodic clays and promotes aggregation.

The second gypsum effect is a longer-term one. Sodium ions held on the clay particles are swapped with the calcium ions from the gypsum. This helps reclaim the soil and allows the displaced sodium ions to be leached out below the root zone.

Soil contamination

Persistent chemicals

Soils can be contaminated by the application of chemicals and fertilisers. Persistent chemicals belonging to the organochlorine (OC) and organophosphate (OP) groups may be present on farms due to past use, dumping or spillage. As well as application to previous crops, 'hot spots' such as old dip sites, disposal or dumping areas, remnant building sites and areas near power poles may have persistent chemical residues present. How long chemicals remain in the soil will depend on soil type, climatic conditions and how they were used (e.g. cover spray, dip, dump site).

Examples of some persistent chemicals used in agriculture include DDT, Lindane, Chlordane, Aldrin, Endrin, BHC, Heptachlor, Methoxychlor, Hexachlorobenzene and Toxaphene.

Areas used to dip or treat livestock or grow sugar cane, sweet corn, some vegetable crops and orchard crops have the highest risk of being contaminated.

In Australia, a common example of a persistent chemical is dieldrin. Dieldrin is an insecticide that belongs to the organochlorine group. Although dieldrin has been banned from use since the 1980s (along with all organochlorine and organophosphate pesticides), it was once applied routinely as an agricultural, industrial and domestic insecticide for the control of termites (white ants), household pests, ants and soil insects.

Heavy metals

Heavy metals are the group of metals with a specific gravity of five or higher, meaning they are five or more times heavier than water. Examples are cadmium, lead and mercury. Heavy metals may occur naturally in soil or they can be introduced in small amounts through the use of fertilisers (especially phosphate) and soil additives (such as gypsum and animal manure), and from industrial uses (either past or present).

Factsheet – E2 Land, soil and nutrient management

Cadmium is the heavy metal of most concern to fresh produce. Most cadmium (Cd) occurring naturally in the soil is present at levels of 0.1-1.0 mg Cd/kg of soil, and is in an insoluble form, so uptake by plants is low. Cadmium is mobilised and uptake increases where soils are very sandy, saline or acidic, low in zinc or organic matter and if irrigation water is salty.

Lead can contaminate the site as a result of fumes from nearby heavy vehicle traffic, dumping of old paint or weathering of paint from buildings, and from previous use for storage or discharging of firearms (e.g. rifle range).

Other contaminants

Other soil contaminants include hydraulic fluids, oils and fuel from storage areas and machinery. Ensure oils, fuels and hydraulic fluids are stored so as to prevent contamination of soil or groundwater. Regularly maintain machinery and check hydraulic, oil and fuel lines for leakage.

Managing off-site movement

Soil testing in paddocks or areas assessed as being a risk, can be undertaken to determine whether residues are present or not.

Disturbance of affected sites can lead to erosion and off-site movement of contaminated soils, affecting the surrounding environment and wildlife. Property managers should aim to minimise soil movement off contaminated sites by:

- maintaining groundcover on contaminated sites,
- implementing effective soil erosion control strategies for larger cultivated sites (see the section on 'Soil Erosion' for erosion control strategies),
- fencing off or preventing access or disturbance to smaller 'hotspot' sites,
- if the contamination is significant, affected soils may need to be removed from the site and disposed of at an appropriate facility.

Further information

The following resources may assist with land and soil management priorities:

- Australian Soil Resource Information System: www.asris.csiro.au
Providing access to key sets of Australian soil information.
- Australian Collaborative Land Evaluation System: www.clw.csiro.au/aclep/
Providing information on soil and land resources.
- Bureau of Meteorology: www.bom.gov.au
Providing climate information.

Remediation activities for areas identified on-farm as being highly degraded, eroded or contaminated should be documented in your Sustainability Action Plan (SAP), for more information refer to *Factsheet M2: Sustainability action planning*.

Factsheet – E3 Pest and disease management

This factsheet covers:

- Managing chemical use
- Integrated pest management (IPM)
- Pest and disease control strategies
- Crop monitoring
- External agency pest and disease alerts
- Preventative pest and disease control programs
- Phytosanitary requirements
- Obtaining chemicals
- Storing chemicals
- Farm chemical user training
- Chemical handling and application
- Avoid spray drift
- Disposal of chemicals and chemical containers

Managing chemical use

Agricultural chemicals can have an adverse impact on the environment. All aspects of chemical use therefore need to be carefully managed to minimise environmental harm.

Agricultural chemicals are only one possible strategy for controlling pests, diseases and weeds. There are others strategies such as Integrated Pest Management (IPM), which utilise mechanical, biological and cultural control methods.

Wherever possible, an integrated approach to pest, disease and weed control should be considered, to minimise harm to the environment.

Where a chemical control method is chosen, consideration should be given to the impact of the chemical on non-target organisms and beneficial organisms, such as ladybirds and bees.

AWRI – Agrochemicals Booklet ('DOG BOOK') and Mobile App

Information about agrochemicals is published annually by the AWRI in a booklet titled ***Agrochemicals registered for use in Australian viticulture***, commonly known as the 'Dog book'.

If you are a member of the Australian wine industry and would like to receive a copy of the 'Dog book', please contact the AWRI on 08 8313 6600 or email: helpdesk@awri.com.au

A PDF version can be downloaded from www.awri.com.au/wp-content/uploads/agrochemical_booklet.pdf

Integrated pest management (IPM)

Integrated Pest Management (IPM) involves devising control strategies that use multiple control methods.

IPM is a philosophy of pest control founded on the principles of ecology. In practice, it involves using several control tactics based on knowledge of the crop, pests and associated natural enemies to avoid crop loss and minimise harmful effects on the environment.

Implementing IPM requires an understanding not only of insect and mite biology and ecology but also of the entire crop production system. This includes the plants and animals that comprise the crop production area/community, as well as consideration of contributions from the surrounding habitat. The production system also takes into account financial, physical and human aspects of operations. More simply, **IPM involves evaluating your pest problems and then applying the most appropriate solution.**

Integrated pest management involves a number of components:

- Prevention of pest infestation – many problems can be avoided by making the crop production area an inhospitable place for pests and diseases.
- Monitoring pest presence and numbers – systematically inspect the crop production area to determine if pests are present and whether they are in sufficient numbers to cause problems.

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- Appropriate action – where unacceptable damage is likely, take action early to reduce pest numbers, whilst considering the off-target impact of this action.
- Monitoring and measurement of effectiveness – continue to monitor pest numbers and damage to crop after action is taken to see if it has been effective.
- Keeping good records – records should be sufficiently detailed to allow an honest evaluation of whether the best control options have been used.
- Continual improvement – reject bad options, try new techniques, innovate and improve.

IPM requires a more tolerant approach to pest control than traditional insecticide-based programs, as eliminating all insects and mites from the crop production area is not the objective of IPM. Natural enemies are to be conserved as much as possible and some damage, especially to foliage is tolerated.

Pest and disease control strategies

Pest and disease control strategies should be selected to minimise harm to the environment. There are a number of pest and disease control methods that can be used as standalone management practices or in combination for effective pest and disease control. Some pest and disease control strategies, including examples for each method is provided following:

Biological practices

- Promoting beneficial insects and natural predators.
- Using biological insecticides such as those derived from *Bacillus thuringiensis*.
- Fly and insect trapping.
- Pheromones.

Chemical controls

- Utilising insect growth regulators.
- Only using chemicals if pest numbers exceed threshold numbers.
- Using environmentally friendly chemicals such as oils and soaps.
- Using narrow-spectrum chemicals instead of broad-spectrum.

- Spot applications of chemical instead of blanket sprays.
- Strategic application when the pest or disease is most vulnerable.
- Resistance minimisation strategies.

Cultural practices

- Using plants selected for specific traits or resistance.
- Maintaining good soil health, including open, well aerated structure, high in organic matter and a diverse and active soil biology, which in turn promotes healthy crops which are more resistant to pest and disease.
- Having a targeted all-year-round weed management program in place, both in and around the growing area as specific weeds can harbour pests and diseases and act as a constant source of reinfestation. Certain weeds may also be a refuge for natural predators highlighting the need to understand the particular pests to be controlled.
- Practising good hygiene to limit risk of disease.
- Crop management practices, such as crop rotations.

Mechanical practices

- Tillage, or flame weeders to control weeds.
- Hand-weeding.
- Using traps for pest control.

Technological practices

- Drone use for pest and disease monitoring.
- Laser scanning of crops to assess plant health, pest monitoring, crop yields.
- Microwave, ultrasound and high pressure processing used for postharvest pest and disease treatments.

Crop monitoring

Pests and diseases need to be monitored to determine the need for the use of farm chemicals and to assess the effectiveness of treatments applied. This prevents unnecessary spraying and minimises the amount of chemicals used, minimising the potential for environmental harm.

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Crop monitoring involves one or more trained individuals (grower, worker, consultant or IPM scout) conducting regular crop inspections to assess the level of pest and disease pressure.

Records of the activity and its findings are useful to determine what and when to spray and for analysing pest and disease patterns.

External agency pest and disease alerts

In some regions, 'external' industry or government agencies provide an alert service to growers that is usually based on monitoring the weather for conditions likely to result in crop damage from specific diseases or pests. These alerts are broadcast by means such as radio, TV or email and they warn growers of the potential risk. Growers may use this information and decide to spray their crop as a protective measure until the conditions pass.

Preventative pest and disease control programs

Preventive pest and disease control programs are used to prevent pest and disease outbreaks. These pest and disease outbreaks may result from a combination of seasonal or environmental conditions or cause significant damage at important stages of crop development, such as flowering. Preventive spray programs protect the crop throughout these environmental conditions or stages of development. Preventive spray programs need to be justified on the basis of up-to-date industry publications or be documented and assessed for appropriateness.

Phytosanitary requirements

Produce transported inter-regionally, interstate or exported from Australia may need to conform to phytosanitary specifications of the importing region or country. These specifications may include the requirement for produce to have chemical treatments applied in the field before harvest or postharvest treatments. Use of a chemical treatments for market access need to be justified

by reference to up-to-date phytosanitary specifications for the produce destination.

Obtaining chemicals

Agricultural chemicals must be purchased from approved suppliers to demonstrate that the suppliers are meeting the minimum requirements for supply, as outlined in the Freshcare Code of Practice Environmental Edition 3.

Approved suppliers for chemical purchases can be demonstrated by:

- AgSafe accreditation.
- Supplier listed as a Freshcare Recognised Supplier* found on the Freshcare website: www.freshcare.com.au.
- Establishing a supplier agreement that ensures:
 - all chemicals provided are adequately labelled and in acceptable condition
 - all chemicals provided are within Use By dates.

* The Freshcare Recognised Supplier list is managed by Freshcare via a registration process to determine businesses meet the applicable Freshcare Code requirements for supply of specified materials and services.

Agsafe

Agsafe accreditation and training supports the safe storage, handling, transport and sale of agricultural and veterinary chemicals for rural merchandise businesses. The program trains and accredits staff and businesses in handling and providing responsible advice in the safe and effective use of agvet chemicals.

The aim of this program is to ensure that there is responsibility and compliance with government regulations and industry standards throughout the supply chain.

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Chemical inventory

Keep a record of all chemicals purchased in a chemical inventory, or equivalent record. The record must include:

- date received
- place of purchase
- name of chemical
- batch number (where available)
- expiry date or date of manufacture
- quantity.

Form – E3 Chemical inventory has been provided to capture this information, however the required information could also be kept on purchase/delivery receipts or via other purchase recording systems.

Annual check

An annual check of chemicals in storage will ensure they have current approval, that they are still within their expiry date and that containers are intact with readable labels. This will avoid illegal use/MRLs being unknowingly exceeded; ensure chemicals are still effective; and ensure containers can be safely handled.

Stored chemicals are checked to identify and segregate chemicals for disposal that have:

- exceeded the label expiry date
- exceeded the permit expiry date
- had their registration withdrawn
- containers that are leaking, corroded or have illegible labels.

A record of the check must be kept. This can be recorded on the Form – E3 Chemical inventory.

Storing chemicals

Incorrect and careless storage and handling of chemicals can lead to environmental harm.

For safe and effective chemical storage:

- Locate the shed where it will not be flooded or where chemical spills might contaminate the growing site, produce and packaging materials or watercourses.
- Use a structurally sound, adequately lit, well ventilated shed that protects chemicals from direct sunlight and weather exposure. The storage area can be inside the packing shed provided it is segregated from packing, storage and handling areas.
- Use an impervious floor (e.g. concrete), preferably with a bund to contain any spills or leaks and to prevent water entering.
- Keep the shed locked to ensure children and others (not trained in safe handling of chemicals and authorised for entry) are kept out.
- Store chemicals in their original containers with labels intact.
- Separate chemicals into category types (i.e. fungicides, herbicides, insecticides and chemicals awaiting disposal).
- Separate and securely store containers of chemicals awaiting disposal so they are not accidentally used.
- A current Material Safety Data Sheet (MSDS) is kept for all chemicals stored in the chemical storage area, these can be obtained from the chemical supplier or manufacturer with some available online.
- Keep a spill kit handy. Spill kits should include:
 - a shovel,
 - dustless absorbent material, such as kitty litter, activated charcoal, vermiculite, hydrated lime, clay, earth or dry sand. Avoid using sawdust and other combustible materials,
 - a container to hold the absorbent material or other leaking containers.

A check of the contents of the chemical store should take place at least annually to identify any chemicals requiring disposal. These chemicals include those that

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are old, de-registered, unidentifiable (i.e. label missing or illegible) or unwanted. The check should also ensure that these chemicals are:

- appropriately stored and identified to prevent misuse,
- in containers that do not leak.

Farm chemical user training

Freshcare requires that the person responsible for chemical application on farm has completed recognised farm chemical user training and is able to show ongoing competency.

A number of organisations deliver these training courses for groups and online.

Freshcare requires the following national competencies are included in all farm chemical user training qualifications:

- AHCCHM303 – Prepare and apply chemicals
- AHCCHM304 – Transport and store chemicals.

In some States, such as New South Wales, government regulations require that all workers who use chemicals are required to complete recognised farm chemical user training.

Workers involved with storage, handling, application, and/or disposal of chemicals must be trained in practices that minimise the risk of environmental contamination from chemicals and in the actions to be taken in the event of chemical spills, leakage or spray drift.

A register of workers authorised to store, handle, apply and/or dispose of chemicals must be established and displayed in the chemical storage area.

Chemical handling and application

Incorrect or careless use of chemicals can result in environmental contamination.

Correct application practices include:

- Only using trained and authorised workers.
- Only using registered chemicals or chemicals with an 'off label permit' issued by the Australian Pesticides and Veterinary Medicines Authority (APVMA).
- Applying chemicals in accordance with the label or 'off-label permit' or in accordance with relevant state legislation for 'off-label' use.
- Correct mixing.
- Correct calibration of equipment.
- Minimising the risk of spray drift by being aware of weather conditions.
- Maintaining records of chemical application.
- Correct disposal practices for excess chemical, chemical rinsate and chemical containers.

Mixing and preparation of chemical solutions

Places where chemicals are mixed and spray equipment is filled are at risk of environmental contamination. To minimise this risk, implement the following strategies:

- Locate and/or construct the mixing and wash down area away from water sources, drains and streams.
- The mixing area should be constructed to contain spills.
- Never leave a spray unit unattended while filling.
- Use a specifically designed drum pourer to minimise spillage from chemical drums that are difficult to pour.
- Triple rinse empty chemical containers and measuring equipment and add rinsate to the spray tank.

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Maintenance and calibration of equipment

Calibration and maintenance of spray equipment must be undertaken regularly to ensure accuracy of chemical application. While different equipment has different calibration procedures, the principles remain the same – to check that the desired amount of chemical is directed onto the target. Poorly calibrated equipment can result in failure to control the target pest, crop damage, increased application costs and environmental contamination.

Maintenance of equipment includes:

- checking spray nozzles for wear,
- checking hoses and joins for leaks,
- checking spray rig tyre pressures and speed.

Withholding period (WHP)

The withholding period is the time elapsed between the last treatment with a chemical and the harvest of a crop. Withholding periods are specified on product labels to ensure that any chemical residues on produce are below the Maximum Residue Limit (MRL).

The MRLs for harvested fresh produce are established by FSANZ and published in Food Standards Australia New Zealand (FSANZ) Food Standards Code – Section 1.4.2 Agvet chemicals and associated Schedules – Schedule 20 and 21, this document is available on their website: www.foodstandards.gov.au.

For produce that is exported, check the importing country regulations governing the application of chemicals and MRLs.

Produce chemical residue test results are checked against the MRL of the chemical for the specific crop.

Application and record keeping

Only approved chemicals shall be used and withholding periods for the harvesting and release of produce observed. Chemical application records must be maintained, refer to Form – E3 Chemical application record

Infopest

Is a comprehensive Agvet chemical database of all chemicals registered and approved by the APVMA.

Information on chemical active constituents, permits, Safety Data Sheets (SDS) and label images, is available on the website: www.infopest.com.au.

Records of all preharvest chemical applications are kept and must include:

- application date
- start and finish times
- location and crop
- chemical used (including batch number if available)
- rate of application and quantity applied
- equipment and/or method used to apply the chemical
- wind speed and direction
- withholding period (WHP) or earliest harvest date (EHD)
- method of disposal of leftover chemical solutions
- name and signature of the person who applied the chemical.

Avoid spray drift

Spray drift is the movement of agricultural chemicals away from the target area during or after ground or aerial spraying (in the form of droplets, particles or vapour). Agricultural chemicals can drift long distances under certain weather conditions.

Spray drift or overspray can be a possible source of environmental contamination. One of the main causes of this may be from spraying chemicals in unsuitable weather conditions. *Table 1* opposite, provides a guideline based on visual descriptions for assessing wind speeds suitable for spraying.

The Australian Pesticides and Veterinary Medicines Authority (APVMA) is increasingly requiring chemical label directions to include relevant weather information to minimise the occurrence of spray drift for the protection of crops, natives and other non-target plants.

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Ensure label information on the suitability of weather conditions required for use of each chemical is checked prior to chemical use.

The visual wind speed indicators in *Table 1* do not provide a complete assessment of the weather conditions affecting the likelihood of spray drift. Other weather conditions impacting on the likelihood for spray drift include temperature, humidity, evaporation rate and droplet lifetime. The use of weather monitoring devices should be used to provide more specific weather information including temperature, relative humidity, wind speed and direction.

Table 1. Visually assessing wind speed

Approx. air speed at boom height	Description	Visual indicators	Suitability for spraying
0 – 2 km/h	Calm	Smoke rises vertically	Spraying inadvisable
2 – 3.3 km/h	Light air	Smoke drifts in direction	Avoid spraying
3.3 – 6.5 km/h	Slight breeze	Wind felt on face, leaves rustle	Optimum spraying conditions
6.5 – 9.6 km/h	Gentle breeze	Leaves and twigs in constant motion	Use low drift nozzles (medium to coarse droplets)
9.9 – 14.5 km/h	Moderate breeze	Small branches moved and raises dust or loose paper	Increased risk of spray drift - use air induction nozzles (coarse droplets)
14.5 + km/h	Fresh breeze +	Small trees in leaf begin to sway	Spraying inadvisable

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A number of other strategies that can minimise or prevent the chances of spray drift occurring include:

- Avoid spraying on hot days (>30°C) or dry days (<40% relative humidity) as these conditions can increase the rate of evaporation of water based sprays and may subsequently increase spray drift.
- Spray when winds are most consistent, generally early morning, early evening or night.
- Select the right combination of spray unit, nozzle type and size, and pressure.
- Use the largest droplet size (except if using Controlled Droplet Application (CDA) equipment).
- When using a boom spray - keep the boom as low as possible, consistent with an even spray pattern at the correct target height. Check spray angles and adjust the height accordingly. Reduce the operating pressure and forward speed but maintain the dose, volume and spray quality within recommendations on the label.
- Consider not treating a boom-width or part of the boom-width closest to the boundary.
- Modify spray equipment to help minimise spray drift - modifications may include low drift nozzles, shielded and covered spray booms and air-assisted spray equipment.
- For air-blast sprayers pay particular attention to weather conditions, good set-up and maintenance of equipment and barriers/buffer distances.
- For aerial spraying, ensure the spray contractor is aware of sensitive areas, neighbours and of their responsibility for any off-target application or spray drift.
- Erect or plant barriers to catch possible spray drift, and establish buffer zones between production areas and neighbours or sensitive natural areas such as wetlands and waterways.

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Buffer zones

Buffer zones are a very good way to reduce the risk of spray drift. Buffer zones can be established by planting trees and shrubs downwind of a production area. Vegetation that is tall, rough and thin is better at catching droplets than vegetation that is short, smooth and thick.

A droplet-catching barrier should be less than 50% porous, with a height about 1.5 times the height of spray release. Use multiple vegetation layers as a screen rather than a single layer. Intercrop buffers such as rye corn or sweet corn can also act as barriers.

Disposal of chemicals and chemical containers

Unwanted chemicals can be disposed of through ChemClear® or through a certified or approved chemical waste contractor.

For more information regarding disposal of unwanted chemicals and chemical containers, contact ChemClear®, drumMUSTER®, your local council or State Environment Protection Authority (EPA).

Disposal of surplus spray and washings

Avoid having any leftover chemical by carefully calculating how much is needed for the area to be sprayed.

Do not allow leftover spray, rinsings from a spray tank or from empty chemical containers to enter watercourses or drainage from the property.

Make sure that the disposal method used is safe for your chemical waste, location and circumstances, as incorrect disposal can result in prosecution. Check your local laws regarding use and management of farm chemicals.

Disposal methods include:

- Flowing the disposal method recommended on the chemical label.
- Dilute rinsate/surplus spray and spray on to target crop in a manner that will not exceed label rates or wash off chemical previously applied.

- Spray leftover chemicals and washings from rinsing after spraying on to an area of ground or disposal pit, away from crops, where people will be and from drains, low drainage areas, watercourses and water storages (follow label guidelines).
- Empty into a lime-filled pit (obtain advice as to quantities of lime and appropriate sites before using this method).

Post-harvest dips may also be treated with lime to deactivate the agricultural chemical. Again specific advice should be sought regarding the most appropriate disposal practices. Information may be available on the chemical label and this should be checked first.

Spray equipment should be filled and washed in an area chosen and established for that purpose. Spillages should not be able to escape from the area. Ensure the area is well away from watercourses and dams.

ChemClear®

ChemClear® is the industry-funded program for the collection and disposal of unwanted, currently-registered agvet chemicals. The aim of this service is to minimise the potentially dangerous build-up of unwanted agvet chemicals on farms, which may create risks to the environment, public health and trade. A web-based booking system is available for users, as well as a free call number.

More information about the program can be found on the ChemClear® website: www.chemclear.com.au.

Disposal of chemical containers

Under various State regulations, businesses are required to dispose of empty chemical containers safely. When purchasing, ask if used chemical containers can be reused, returned, refilled or recycled.

Unrinsed containers can hold as much as 3% of product concentrate. This means they can present a hazard to people who handle them and have potential to contaminate the environment.

Used containers that cannot be returned or recycled should be triple rinsed or pressure rinsed immediately after emptying the container as residues are more

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difficult to remove when they are dry. This is done by filling the container with clean water to approximately a quarter of capacity, replacing the cap, shaking and then adding the wastewater to the spray tank. This is repeated three times (triple rinse process). Other disposal methods (e.g. pumping to sump or limed disposal pit) are not acceptable.

Puncture steel containers after rinsing so that they cannot be re-used. Pass a steel rod or crowbar through the opening and out of the base of the container. Do not puncture plastic containers included in reconditioning/reuse programs.

Empty chemical containers must be stored in a designated, secure area (preferably locked), and disposed of either through a controlled approved disposal scheme, such as drumMUSTER®, or according to a documented procedure that meets state or territory regulations. Access to the storage area must be restricted for both people and animals.

drumMUSTER®

drumMUSTER® is the industry-funded national program for the collection and recycling of empty, pre-cleaned, crop protection and animal health chemical containers.

More information about the program including details of collection days and locations can be found on the drumMUSTER® website: www.drummuster.com.au.

Factsheet – E4 Water

This factsheet covers:

- **Water Management Program**
- **Farm water budget**
- **Water supply**
- **Efficient management of irrigation**
- **Managing water quality to minimise environmental harm**
- **Suggested practices to protect water quality**
- **Contingency plans if water is unavailable**

Water Management Program

A Water Management Program details how the business manages water resources with the aim of maximising irrigation efficiency. Water management considers both the crop water demands and the amount of water available. The Water Management Program includes an analysis of the water available, the production aims and the water resources needed to meet these aims. It also describes the irrigation methods used and how irrigation is scheduled.

By developing the Water Management Program, the business is required to consider their water needs and also contingency plans if access to expected water resources does not eventuate.

The Water Management Program should be regularly reviewed and updated. Ideally this should occur as part of production planning and should include consideration of the accuracy and assumptions made in developing previous Programs.

Aspects to consider when developing a Water Management Program are provided in the following sections of this factsheet.

Farm water budget

A farm water budget is about making sure enough water is available to meet the property goals. Water budgeting helps determine the amount of water expected to be used over the season and attempts to match this with intended irrigated crop area so that the business can check that planned irrigation needs are within water entitlements.

Water requirements need to be budgeted using measurements of crop water demand at different times of the year, the irrigation system and knowledge of the soil water holding capacity. Individual farm data is best, but in some districts average crop water demands have been calculated and are available from agronomists and irrigation specialists.

Water supply

Understanding your crop water requirements and the reliability of your water supply is critical.

The availability of water will affect your irrigation management strategy.

Check with your state water agency to ensure the necessary licences/permits are obtained. In some districts with water allocation schemes, delays between ordering and then receiving water may limit your ability to adopt these practices. On-farm storage will reduce this problem; however, it is advisable to check whether licences/permits are required to construct dams or other infrastructure. Interference with a watercourse or obstruction of flow may require a licence/permit.

Comparing your crop water requirements against the quantity of water supply available will determine if you have sufficient water. Water may be limiting on an annual basis or sometimes in peak demand periods. If water supplies are limiting or uncertain, more efficient irrigation techniques and drought management strategies need to be considered.

Factsheet – E4 Water

Efficient management of irrigation

Efficient irrigation management ensures a supply of sufficient water to meet crop and soil leaching needs while minimising wastage. Improved irrigation efficiency achieves water savings, production gains and improves farm sustainability.

Irrigation efficiency is determined by irrigation management factors such as:

- Maintaining pump condition for efficient power conversion and system pressure.
- Ensuring irrigation systems are operating to design specification and applying water as evenly as possible.
- Ability to time, or schedule irrigation, based upon assessments of crop water needs.
- A clear understanding of water holding, infiltration and drainage capacity of soils.
- Know your water supply/supplies.
- Implement strategies to manage nutrient input and salinity.
- Check irrigation system performance - monitor, record and evaluate performance.

Managing water quality to minimise environmental harm

There are two aspects of water quality that need to be considered. The first is to make sure that the quality of water being used is suitable for the intended purpose (e.g. irrigation, agricultural sprays, packing sheds), and the second is to make sure that your operation is protecting the quality of water so it does not negatively impact the environment on or off-farm.

If you are sourcing water from rivers or streams then upstream farms and businesses may impact on you.

Water quality suitable for intended use

Problems caused by using poor quality water on-farm include:

- Salinity (high total soluble salt content).
- Sodicity (high sodium content).
- Toxicity (high concentration of specific salts in the soil).
- Blue-green algae, which may be toxic.
- Clogging of irrigation equipment.
- Corrosion of pipes and other equipment.

One of the factors that need to be considered is the proportion of dissolved minerals and salts in irrigation water.

All groundwater and stream waters contain dissolved minerals. When irrigation water is used, the mineral salts are taken up by the crop, left in the soil after the crop has used the water, leached down past the root zone, or washed out with run-off. Most of these salts are beneficial, but in some cases they may be harmful to crops and to the long-term sustainability of the property.

Other chemical contaminants of water may include heavy metals, and agricultural or industrial chemicals.

Water quality on and off-farm

The potential impact of poor quality water includes:

- Harm to aquatic species in watercourses from water eutrophication (due to nutrient and organic matter pollution) and from chemical pollution.
- Sedimentation of watercourses and marine environments, causing disruption and damage to these ecosystems.
- High nutrient levels in watercourses contributing to blue-green algae outbreaks and impacts on aquatic life.

Factsheet – E4 Water

Suggested practices to protect water quality

Check water source quality

This should be a priority when considering new enterprises. Good data is often available from your water supply authority/company/State government agency.

Where use of saline water is unavoidable, regularly check salinity to plan suitable irrigation management options.

It is important to remember that water quality can change from month to month and summer flows in a river system can have quite different water quality to winter/spring periods.

Check quality of water leaving the farm

It is also worth checking the drainage and run-off water leaving your own property. How does it compare with the water upstream or your neighbours? If the water is high in nutrients and turbidity (water cloudiness) then you should consider how fertiliser management, soil erosion, protecting watercourses and agricultural chemical management could be improved. Your water authority, local catchment authority or Landcare group can usually provide access to water testing laboratories and information on run-off water quality targets.

Protect water quality

Water quality is impacted by activities both on and off-farm. It is important to be aware of on-farm activities that can negatively affect water quality as this may impact the suitability of the water for use on the farm as well as having significant environmental impacts. Farm activities may affect water quality by increasing levels of salts, nutrients, suspended sediment, chemicals or organic matter.

Protect watercourses

Watercourses such as rivers, creeks and streams as well as their riparian areas (areas on or near creek and riverbanks) should be protected. Areas that have significant protected riparian zones have the ability to capture and filter soil sediment and soluble nutrients, improving water quality before it leaves the farm. A strip of undisturbed vegetation should be left to protect watercourses.

In known drainage lines or areas where run-off enters watercourses, filter strips or buffer strips could be installed to minimise sediment and nutrient entering watercourses. Seek information regarding design of the buffer strips, particularly in relation to the most appropriate vegetation and width of strip. Fencing watercourses to keep stock out and providing off-stream drinking points also help protect watercourses.

Financial assistance may be available to fence riparian zones.

Contact local Landcare, Catchment Management Authority or government representatives.

Control soil erosion

Soil erosion is an important issue for both soil protection and water quality protection. High turbidity of run-off indicates soil loss is occurring. This is most common after intense rainfall events, particularly following a dry spell. Buffer zones or grassed areas can be established to filter run-off and storm water. Nutrients (especially phosphorus) and farm chemicals are often carried in run-off, attached to soil particles. Controlling soil erosion will help to retain nutrients and reduce nutrient pollution downstream.

Nutrient management

Nutrient management is important to ensure that the nutrients applied are either used by the crop (some of which will be exported off-farm in the harvested product) or safely stored in the soil for the next crop.

All nutrient sources from fertilisers and soil additives applied directly to growing sites or the application of nutrient rich water (e.g. recycled water can have significant concentrations of nitrogen and phosphorus) should be considered when deciding crop nutrient requirements (nutrient budgeting).

Inaccurate or over-application of fertilisers and soil additives can contaminate ground and surface water. This can result in the enrichment of water with nitrogen or phosphorus (eutrophication), causing rapid growth of algae and aquatic plants. This disturbs the balance of organisms present in water and the quality of the water within watercourses. Nitrogen leaching can also cause soil acidity problems.

Factsheet – E4 Water

Underlying most of the best practices for good nutrient management, is the need to keep nutrients in the plant root zone and to manage water to minimise irrigation runoff via the surface or into the groundwater.

Agricultural chemical management

Agricultural chemicals can contaminate watercourses through inappropriate application and storage.

Agricultural chemicals should not be applied where they could drift onto water, unless they are specifically approved for use in or near water. Make sure there is a margin between where the spray falls and the bank of any watercourse. For some chemicals, a minimum width for the no-spray zone is specified on the label.

Storage of agricultural chemicals, disposal of waste agricultural chemicals and empty containers must be undertaken with care and away from water sources.

Prevent pollution from fuels and oils

Oil and fuel spills can pollute watercourses and soils, and are a major threat to flora and fauna. State legislation and environmental protection authorities treat the matter very seriously. Theft, vandalism and accidental damage by moving vehicles can cause fuel and oil spills and should be guarded against.

Diesel pumps located on or near dams and watercourses should be bunded to avoid contamination of the water supply in the event of a spill.

Packing shed water

Some packing sheds use large amounts of water as part of the packing process. Steps should be taken to ensure used water is safe to release back into watercourses. This can be achieved through regular monitoring and, if necessary, filtering or treating water to remove organic materials and chemicals. Suspended organic material in runoff affects the amount of available oxygen in water and can have a significant impact on fish and other aquatic life.

Organic matter

Septic tanks, manure storage and waste produce dumping areas should be located well away from watercourses and other water sources such as bores and dams. Run-off containing leachates from manure storage heaps and dumped piles of waste produce should be contained to prevent entry into watercourses.

Ensure sewerage and septic systems are regularly maintained to prevent leakages into surface or groundwater.

Contingency plans if water is unavailable

It is important to establish preparedness for times of drought or changes to water allocations that can occur in certain regions of Australia.

A contingency plan will help you identify options for how to manage your crop/s if changes to water allocation occurs.

Your contingency plans need to consider all options that are available to you within a viable budget.

Questions to be considered when establishing your contingency plans may include:

- Can water be purchased locally?
- What are the costs and available sources of water?
- Is purchasing water a viable option to sustain your crop or varieties?
- How long can the business be sustained if water purchasing is required long term or expenses increase?
- Are the current crop varieties grown sustainable if water availability is significantly reduced?
- Are there options for other varieties (with lesser water demand) to be grown, if limited water supply continued?

Factsheet – E5 Biodiversity

This factsheet covers:

- **Biodiversity**
- **Biodiversity Management Program**
- **Regional biodiversity priorities**
- **Biodiversity on-farm**
- **Reducing threatening processes**
- **Monitor, record and review**
- **Biodiversity resources**

Biodiversity

Biodiversity is the variety of all life forms; the different plants, animals, fish, birds, insects and micro-organisms, and the ecosystems of which they are a part. Biodiversity is increasingly recognised for its contribution to farm sustainability and productivity.

Native biodiversity refers to the biodiversity found in a particular locality. It is restricted to the local ecosystems and their components, be they native plants, animals or micro-organisms. If native biodiversity and ecosystems deteriorate, the quality of the soil, water, air and ultimately agricultural productivity will also decline. Property activities can have a significant impact on the level of biodiversity on farm.

To manage biodiversity effectively a number of management practices need to be considered, starting with an understanding of biodiversity present on the property. Although biodiversity is normally discussed in terms of animals and plants, **micro-scale biodiversity** is equally important and valuable. For example, healthy and diverse populations of insects, worms, bacteria and other micro-fauna in the soil are very important to soil fertility.

Biodiversity Management Program

A Biodiversity Management Program details the strategies and practices established to protect areas of biodiversity and native vegetation identified on the property, reduce threatening processes and manage feral animals, invasive species, pests, environmental weeds and diseases on the property. The Program should be regularly reviewed and updated at least annually. The information contained in this factsheet provides details on aspects to consider when developing a Biodiversity Management Program.

Regional biodiversity priorities

Regional biodiversity priorities are generally set by Catchment Management Authorities (CMA) or Natural Resource Management (NRM) committees. The regional biodiversity priorities are established using a variety of methods including assessing risks to the regions environmental assets, identifying the regions' major environmental issues and consulting and collaborating with other local groups. The regional priorities are reviewed on a regular basis to allow for new knowledge.

Identifying the regional priorities will assist in developing strategies and practices for managing biodiversity by helping to identify local issues and assets. There may be some management strategies and practices already developed by the local CMA or NRM. Regional biodiversity priorities can be accessed from the local CMA or NRM website, or by contacting the local branch office. Producers can then use this information to identify and manage biodiversity values on their farm.

Common biodiversity priorities include maintaining native vegetation along watercourses and around wetlands, protecting any threatened plants and animals found on the farm, and maintaining blocks or corridors of native vegetation on farm to provide habitat for native animals and allow them to move through the landscape.

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Biodiversity on-farm

Identification of vegetation

Although valuable biodiversity can be found in healthy soils and grassy orchard floors, the presence of native trees and shrubs is often used as a 'surrogate' indicator of biodiversity on the property – therefore the more native trees and shrubs, the greater potential for biodiversity.

An initial assessment should identify any remnant native vegetation on the property (exclude plantations and vegetation planted for commercial purposes). It is also a good idea to consider native vegetation adjacent to the property as farming activities may impact these areas.

Individual State or Territory conservation, natural resources or sustainability departments may have maps or lists of the native vegetation types likely to be present and can provide advice regarding management of native plants and animals that may be on a property. Other people who may be able to help with identification include:

- field naturalists
- Greening Australia
- local Catchment Management Authorities (CMA) or regional Natural Resource Management (NRM) groups
- Bushcare and Landcare groups
- local or State herbarium

Assess special importance

Native vegetation is more valuable if it is:

- remnant vegetation (has never been cleared or has regrown to a mature state),
- in wide blocks instead of narrow strips,
- close to other blocks of native vegetation.

The Government has developed lists of plants that are considered important because they are rare, particularly subject to threats, or support other significant features (e.g. as a drought refuge for native animals).

Contact the local government department, regional CMA or NRM committee for information about any important or significant vegetation that may be in your region.

Species listed as critically endangered, endangered or vulnerable may carry specific legislative responsibilities that landholders are required to undertake.

Current lists of these species can be found at:

www.environment.gov.au/biodiversity.

Assess off-farm impacts and threats

The impact of property activity on adjacent areas also needs to be considered. Some properties may have little or nil remnant native vegetation on them but may be adjacent to a neighbour's bushland area, a National Park, State Forest, wildlife corridor or other conservation or sensitive area. It is important to mark these adjacent areas on the property map, assess property activities that may cause environmental harm to them and implement control measures to minimise any chance of environmental harm occurring.

As native animals travel between farms, there are biodiversity benefits in cooperating with your neighbours to, where possible, connect your remnant bushland areas with theirs.

Management of vegetation

Once native plants are identified on a property (including their significance), actions to manage and protect them may include:

- Fencing off areas to exclude vehicles, people and stock. Select fence types that enable native animals to have access to natural drinking water sources and to move between habitats.
- Leaving dead trees standing and logs, branches, twigs and rocks on the ground as homes for birds, insects and other animals.

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- Not clearing or cleaning up places with native vegetation. By not tidying up understorey grasses, shrubs and fallen trees, birds and beneficial native animals will have places to hide from introduced predators or competitors or as a food source.

State biodiversity or environmental officers can provide advice or assistance on priorities for management.

Depending on the jurisdiction, it may be possible to enter into a voluntary conservation agreement or similar agreement with the relevant State agency to formalise protection of wildlife and significant habitat on part of a landholder's property.

Site development or redevelopment work needs to be assessed for potential impact on the existing vegetation on the property.

Increase on-farm native vegetation

Windbreaks and shelterbelts using local native species can be planted.

Shelterbelts and windbreaks may be best placed on the property boundaries and developed with consideration of establishing interconnecting wildlife corridors.

Identify areas that will not be used for production where it would be possible to begin a restoration project. It is a good idea to choose areas such as steep slopes, riparian areas near the sides of rivers, creeks and dams, saline areas and wetlands.

Select a mix of native plants, including trees, shrubs and grasses, preferably native to your local area (known as provenance species). Plantings should copy nature and not be as regular as a crop. It may be useful to use a consultant to ensure that the species you are planting will attract favourable native animals and not ones which will be considered a nuisance to your farming activities.

Dams and watercourses also significantly contribute to increasing biodiversity by providing a habitat for native animals, birds, frogs, insects, fish, invertebrates and plants. Wetlands, bogs and marshy areas can be turned from unprofitable areas to rehabilitated areas of great biodiversity significance by fencing out animals and revegetating with suitable fauna.

Some local authorities and organisations will provide advice and support to landholders undertaking revegetation activities. Flora, fauna and bush regeneration consultants are also available to assist in design of restoration projects.

Living with native birds and animals

There are many benefits to having native animals on or near agricultural land. For example, many native birds eat pests, pollinate plants and disperse native seed. However, problems may arise when native birds and animals eat or cause damage to crops. Where growers are faced with 'problem' native animals, specialised advice must always be sought from State conservation departments to avoid implementing illegal control methods.

Options for responding to problem native animal management will include how to mitigate the problem and live with them. As standard practice, always consider non-lethal management options. These may include:

- netting
- fencing
- sound or light based systems (sirens, gas cannons)
- encouraging predators (e.g. hawks)
- providing alternative habitat

If growers have sought advice and trialled applicable non-lethal management options without success, lethal management options may have to be considered as a last resort.

It is important to check whether wildlife is protected and be aware of any licensing requirements before undertaking lethal management options. Lethal management options must be carried out in a humane manner.

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Reducing threatening processes

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the identification and listing of key threatening processes, these can be found here:

<http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>.

Feral animals and invasive species control

Invasive species include feral animals, pests, weeds, non-native insects and other invertebrates, and diseases and parasites. Invasive species can be native or exotic. They may reduce farm and forestry productivity, threaten native species and contribute to land degradation.

Feral animals, invasive species and other pest animals may damage vegetation and soils, foul water and compete with native animals for habitat and food. Animals such as rabbits, foxes, feral pigs, dogs and cats need to be controlled.

Check local regulations and laws about the control of feral animals and invasive species in your area, before you begin any control program.

Environmental weed management

Exotic plants may require specific management. Problem exotic or native plants can be escapees from commercial operations, such as escaped olive trees or native species introduced from another region in Australia. In the right place these plants are not a problem, but once they start replacing native vegetation, intervention is required. The landowner must take all reasonable measures to prevent the land being infested with an environmental weed and prevent the spread of these weeds to adjacent areas or properties.

Weeds need to be controlled to reduce the potential for the harbouring of pests and increase the chance of native vegetation surviving. An example is Bridal Creeper (*Asparagus asparagoides*), a Weed of National Significance (WONS) that causes losses by shading citrus and avocado trees and interfering with fruit picking. It is considered the most important weed threat to biodiversity at this time.

Environmental weeds are different to declared weeds, also known as noxious weeds. Declared weeds pose a greater threat to natural and agricultural systems and must be controlled by law. Contact the local council or CMA or NRM committee for a list of declared weeds in your region.

Before undertaking weed control, contact your local agricultural department. In some areas the local agricultural department may assist in developing a weed management strategy, and even undertake the first few sprayings. For more specific information on threats and control methods for individual weeds refer to www.weeds.gov.au or your local agricultural department.

Fire management

Management of vegetation areas needs to consider fire control and the role of fire in maintaining the diversity of plants that make up the bush. Much of Australia's flora has evolved in an environment where fires periodically occur, with many plants requiring fire/smoke to assist in seed activation and regeneration.

Considerable care is required to manage fires and local fire authorities should be consulted and alerted before burning. Neighbours may be affected by smoke and should also be notified.

The following points should be considered:

- check whether permits are needed to carry out a burn,
- choose a fire regime to suit the desired outcome (if you are burning to reduce fuel loads then fires will need to be more frequent than if you were burning to promote tree regeneration),
- if you have native or threatened species, choose a fire regime that suits their needs,
- time burning to suit the plants' lifecycles, these will vary depending on where you are in Australia, but generally autumn burns are best,
- fireproof buildings and ensure sufficient fire breaks around production areas, boundaries and other areas that must not be burnt,
- burn only dry materials, as green materials produce more smoke,
- do not burn 'controlled' or 'prescribed' wastes (see Factsheet E8 Waste),

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- only burn on days where the weather conditions are favourable.

Disease management

Disease management is the practice of minimising disease in wine grapes to increase quantity or quality of yield. Disease occurs due to weather conditions and as a result of contamination from equipment and / or people.

Control measures are important to ensure that contractors and visitors visiting the property are not a source of contamination. Such control measures may include:

- not allowing visitors on farm without knowledge of where they have been previously,
- ensuring contractors thoroughly clean down equipment between properties,
- only purchasing plant materials and / or produce from suppliers who can prove the goods are free from disease,
- keeping up to date with external agency disease alerts.

Checks may need to be done to ensure that plants and plant materials being transported inter- and intra-state comply with quarantine requirements.

Monitor, record and review

A vegetation assessment is a good way to understand current on-farm biodiversity and establish a benchmark for your property. Repeated over time, a vegetation assessment can monitor and measure changes. Some guidance may be available from government environment departments and regional CMA or NRM groups.

In the absence of better information, applying the general principle of trying to maintain the current condition of natural areas and taking some steps to improve them will benefit the environment and demonstrate good environmental stewardship.

A property map and photos can be used to demonstrate revegetation of local native species and future plans. Property managers may find it helpful to record

sightings of rare or unusual animals along with vegetation maps and assessment documentation.

Strategies for control of problem native animals, feral animals and environmental weeds can be documented and kept along with any licences required. These strategies need to be reviewed annually to ensure they continue to be relevant, and comply with relevant legislation

Biodiversity resources

The Australian Government developed a number of Biodiversity publications and resources, which can be found here:

www.environment.gov.au/biodiversity/publications

The Biodiversity publications and resources contain information on:

- the main national and state level legislative requirements including a brief description and follow up contacts,
- the main national and state level policy objectives that are relevant to landholders,
- a listing of available biodiversity resources, information and contacts,
- a listing of biodiversity support services available,
- a listing of sectoral and policy Codes of Practice and best management practice guidelines relevant to landholders and biodiversity which includes a brief description, contacts and references for these.

Factsheet – E6 Waste

This factsheet covers:

- Waste Management Program
- Avoid
- Reduce
- Reuse
- Recycle
- Recover
- Dispose
- Waste collection programs

Waste Management Program

By identifying and assessing the types of waste streams, and waste generated by your business; strategies to eliminate, reduce, reuse or recycle wastes can be investigated.

Documenting a Waste Management Program will assist you in identifying waste types, their location on-farm or within your business, how the wastes are managed, and help instruct workers in their roles to manage waste.

The Waste Management Program should be reviewed and updated at least annually in consideration of improvement strategies for better waste management and reduction.

Items that cannot be implemented or undertaken immediately to improve air quality, should be included in the businesses Sustainability Action Plan to allow for future improvements to be planned out and undertaken.

See Factsheet: M2 Sustainability Action Planning

Information within this factsheet, provides guidance on aspects to consider in developing a Waste Management Program, based on the **waste management hierarchy (Image 1)** of avoid, reduce, reuse, recycle, recover, treat, dispose.

Image 1. Waste management hierarchy



The waste management hierarchy pictured, was taken from the Zero Waste SA website, for more information visit: <http://www.zerowaste.sa.gov.au>

Avoid

Managing wastes can be expensive and time consuming. Minimising waste streams can have a positive financial impact for your business. Look closely at what gets purchased and then ends up as waste and how processes may be reorganised to minimise the creation of waste.

Consider waste disposal issues and costs when choosing/purchasing products, and look for materials that are reusable or biodegradable. Wherever possible, choose methods and equipment that offer extended life and eliminate or minimise waste for disposal.

Reduce

One option to minimise waste is to reduce packaging by opting for bulk supplies of inputs where appropriate. The exception is chemicals and fertilisers, where it is good practice to keep stored supplies to a minimum.

A review of the businesses raw material inputs should be undertaken at least annually to identify areas for waste reduction. The review of input materials should take into consideration the size, quantity/weight, the potential for reuse or recycling, and the residual waste product.

Factsheet – E6 Waste

Businesses should also focus on the reduction of plastic wastes wherever possible with a priority on reducing plastic inputs to the business and plastic waste products derived from supplier packaging.

Reuse

Materials that can be reused within the operation or sent for recycling. For example, wooden bins can be repaired rather than sent to waste. Storage areas can be established for materials such as timber and steel.

When donating waste materials to outside groups or organisations, ensure they are safe before releasing them. Consider distributing out-of-specification produce that is safe to be consumed to charity organisations. Some of these organisations will collect from the farm.

Consider composting waste vegetation and produce. The composted product can be returned to production areas as a soil ameliorant. Waste produce can also be returned uncomposted to fallow areas. If recycling waste produce as feed for livestock, ensure it does not contain unacceptable chemical residues.

Ensure waste produce composting or dumping areas are well away from packing and handling facilities (to avoid re-contamination of harvested produce with disease and to avoid attracting vermin to the packing facility) and well away from neighbours if it is likely to give off a strong odour. Consider the environmental impacts of compost sites, such as nutrient rich run-off and the potential for contamination of watercourses (surface and groundwater).

Take advantage of returnable packaging systems, for example returnable bulk fertiliser bags.

Consider reusing plastic materials. If an item can be used several times before it becomes unserviceable, the quantity of material that needs to be disposed of will be greatly reduced. To maximise recycling, take care when handling and using plastics.

Recycle

Materials being sent for recycling (for example paper, oil, glass, timber, steel) need to be collected and separated into dedicated recycling containers or areas for pickup. Local councils may have recycling facilities in conjunction with their waste management facilities, or a local charity may collect materials for recycling.

Some manufacturers provide their own recycling service that has extended from office based supplies such as print cartridges to manufacturers of on-farm materials such as 'Netafim' drip irrigation supplies, which will take used drip tape back and recycle it.

Consider recycling substrates, particularly peat-based products, as not all sources of peat are environmentally sustainable.

Recover

Waste oil from farming activities may be contaminated with substances such as metal particles from engine wear, fuel from incomplete combustion, rust, dirt, carbon, heavy metals and water. If not dealt with effectively, waste oil can lead to pollution of the environment and may be a potential risk to public health and safety. Wherever practicable, waste oil should be recovered for treatment where it can then be reused.

Waste oil should be stored in a leak-proof container in a bunded area awaiting collection by a reputable recovery business or delivered to a recognised disposal facility such as a local government collection depot or service station. Waste oil must never be applied to roadways as a dust mitigation strategy.

Where possible, use waste collection recovery programs. Such programs are available in some regions to collect a range of items including batteries, tyres, oil, cardboard and paper for recycling. Use a licensed waste contractor in preference to unlicensed operators.

Dispose

Disposal of waste materials should be the last resort. Dependant on waste type, options may include burial in landfill (council disposal facility) or burning (where

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legal). There are strict regulations related to the disposal of certain types of waste, particularly wastes that are defined as 'controlled' wastes.

Controlled wastes include items such as agricultural chemicals and chemical containers, tyres and oil. These wastes need to be carefully managed and are closely regulated because of their potential adverse impacts on human health and the environment.

Treated timber is not considered to be a controlled waste, however due to the chemicals used in the treatment process, it is considered toxic. Disposal methods for treated timber will differ depending on the quantity to be disposed of, and State legislation, local authorities can advise on disposal options.

Waste collection programs

ChemClear® – Collection of unwanted or out of date chemicals. Also provides handling and storage tips via the website: www.chemclear.com.au.

ChemClear® documents are issued to prove chemicals have been booked in for collection and also when chemicals are collected.

DrumMUSTER® – Collection of empty chemical containers see the website: www.drummuster.com.au for more information.

Official receipts are provided to participants in the drumMUSTER® program when drums are brought in for disposal. This is a signed document distributed through authorised inspectors at official drumMUSTER® collection sites, listing the number of drums brought in for disposal. The receipt provides proof of participation in drumMUSTER® and therefore proof of responsible disposal.

Charities that recycle and redistribute surplus fresh produce in Australia include:

- Foodbank: www.foodbank.org.au
- OzHarvest Food Rescue: www.ozharvest.org
- Fareshare (VIC only): www.fareshare.net.au
- SecondBite – food for people in need: <http://secondbite.org>

Factsheet – E7 Air quality

This factsheet covers:

- Air Quality Management
- Dust
- Light
- Noise
- Odour
- Smoke

Air Quality Management

Air pollution from odour, smoke, dust, noise and lighting can occur as a result of farming and business activities and needs to be managed to reduce the impact on the environment, neighbours and community.

An Air Quality Management Program is developed to document how issues affecting air quality will be managed within the business. The Air Quality Management Program will consider any issues to be addressed, the areas and location within the business, the management methods to control and/or improve the issues and the workers responsible.

Workers should be trained and aware of the requirements of the Air Quality Management Program and any associated operating procedures. Appropriate protective equipment (when required) should also be provided for workers use in accordance with the Air Quality Management Program.

The Air Quality Management Program should be reviewed and updated at least annually in consideration of improvement strategies for the better management of dust, light, noise, odour and smoke within the business.

Items that cannot be implemented or undertaken immediately to improve air quality, should be included in the businesses Sustainability Action Plan to allow for future improvements to be planned out and undertaken.

See Factsheet: M2 Sustainability Action Planning

Dust

Excessive dust can cause annoyance and potential health problems to neighbours and workers.

Dust control measures may include:

- planting shelterbelts and windbreaks
- only cultivating damp soil
- maintaining inter-row groundcover
- using slower cultivation speeds when there is a risk of dust
- wetting down, sealing and use of 'minimal dust materials' (for example blue metal or hardstand) for the surfaces of frequently used traffic ways (transport delivery and pickup areas, harvested produce delivery points and forklift routes at the packing shed)
- implementing slower traffic speeds around the property.

Shelterbelts/windbreaks should be designed to allow 30-50% of the wind to pass through. The protective effects from a shelterbelt/windbreak reduce with distance away from it (protection extends no more than 20 times the height of the vegetation).

Do not apply synthetic or mineral based oils to suppress dust on traffic ways as it may end up in watercourses (both ground and subsurface).

Light

Lights and lighting used around production areas or on machinery during vintage could also impact negatively on neighbours at night.

Light management strategies include:

- inform neighbours of operations occurring at night under lights
- avoid (flood) lighting unnecessary areas of the property
- where harvesting machinery is used at night, start work closer to the most sensitive area and then work away from neighbours.

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Noise

Noise may impact on neighbours and workers in the business. Workplace protection needs to be provided for workers, whereas buffer zones and vegetative or constructed barriers are useful to reduce noise if neighbours are close.

Noise reduction strategies include:

- changing pumps near residential areas from diesel to electric
- constructing sound barriers around pumps
- muffling/soundproofing equipment where daytime intermittent noise levels are excessive
- where harvesting machinery is used at night, start work closer to the most sensitive area and then work away - the converse applies for early morning activities
- use gas guns, and frost protectors in a considerate manner (daylight hours) and in accordance with local bylaws
- where possible have onsite parking located away from neighbours
- inform workers and transport operators that access the site to be considerate and not use exhaust brakes, horns or cause other unnecessary noise nuisance to neighbours
- reinforce requirements with on-site signage where appropriate.

Odour

Odours can be caused by animal manures, mulches, fertilisers and chemicals, composting sites and activities, waste disposal sites and waste management equipment.

Manure storage and application

Animal manure is often stored and used on farms, however, most people do not like the smell of raw manure. Ensure manure is stored and used in a way that minimises the nuisance to neighbours.

The nuisance impact on neighbours of odour from manures can be reduced by:

- replacing raw animal manure with other less odorous products such as composted or dry manure (more expensive but less volatile and less odour)
- discussing manure use strategies with neighbours in advance
- locating storage piles downwind from prevailing winds and as far from neighbours as is possible
- protecting stored manure (and compost) from rain to help reduce odours
- scheduling manure spreading on weekdays during office hours when neighbours are more likely to be away from home – avoid spreading manure on weekends, holiday periods or when social events are taking place
- rapidly incorporating manure into the soil after spreading
- ensuring adequate soil moisture (where possible) to allow rapid initial breakdown
- screening the storage and production areas to reduce perceptions of an odour problem and likelihood of complaints.

Waste management and disposal sites

Waste disposal areas and practices need to be managed to prevent odours on-site and nuisance to neighbours. Similar principles to those of manure management need to be in place for organic waste; with composting waste is also an option.

Factsheet – E7 Air quality

Smoke

Burning off can be illegal or may require a permit in many local government areas. Before burning, check local bushfire restrictions and permit requirements. If burning is the only practical method of disposal of materials, and it is legal in your area, precautions should be taken to prevent dark smoke being produced and causing a nuisance.

Do not burn plastics, chemical containers, rubber, tyres, synthetic or mineral based oil or other materials known to produce harmful gases and dark smoke. Where possible, recycle, reuse or dispose of these waste items at local waste depots.

Before burning:

- inform immediate neighbours, as a courtesy
- check material to be burnt is dry and has low moisture content
- check wind direction to ensure it is away from nearest neighbours
- check wind speed is favourable
- consider localised landscapes that can induce smoke problems, such as valleys.

Do not burn green vegetation. Keep fires small and continually add combustible material, minimising the depth of the combustion area. Minimise the quantity of incombustible material added to the fire. Wherever possible keep incombustible materials separate from materials to be burnt. For better combustion, agitate the base of the fire to improve air supply.

Factsheet – E8 Energy and fuel

This factsheet covers:

- Reducing emissions
- Optimising energy and fuel efficiency
- Monitoring energy and fuel usage and maintaining records
- Fuel storage on-farm
- Fuel storage legislation

Reducing emissions

Improvements in the efficiency of energy use, more effective fertiliser management and minimising soil disturbance play an important role in reducing greenhouse gas emissions and in reducing the operating costs of business operations.

Activities such as planting, growing and harvesting, produce little net carbon dioxide as it is absorbed by growing plants. However, carbon dioxide emissions from transport and energy sources remain a significant issue.

Optimising energy and fuel efficiency

Sustainable practices can contribute to efficient energy use. Saving energy also makes good business sense as energy (fuel and electricity in particular) represents a significant cost to business operations.

Ways to save energy include:

- adopting work procedures that minimise the running time and energy consumption for major plant and machinery
- maintaining engines by following the manufacturers' recommendations
- regularly servicing vehicles and equipment to ensure efficient operation (fuel consumption can be reduced 5-15% by servicing air cleaners and fuel injectors regularly)
- minimising unnecessary journeys and cultivation passes (consider installing GPS on tractors to prevent overlap or missed coverage, utilise multi-row equipment or multi-task equipment)

- reducing loss of heating/cooling through effective insulation and preventing unintentional ventilation
- using properly designed and built coolrooms (regularly check door seals, hinges and catches to reduce leaking of warm air into the room, regularly check for damage to walls and roof)
- site coolrooms in shady areas
- minimise time coolroom doors are open and/or use plastic door strips
- using energy efficient lighting best suited for the task at hand
- considering energy efficiency when new buildings, equipment, machinery and vehicles are purchased
- selecting and maintaining irrigation pumps and irrigation systems (pumping water for irrigation is one of the main ways energy is used in viticulture)
- installing or turning on the power-save function on office equipment such as computers and photocopiers
- turn equipment off when work is finished
- consider solar panels or alternative energy sources (bio-fuel) that may be locally available
- consider an energy audit to identify areas for electricity and cost savings.

Annual Review

Improvement strategies for reducing electricity and fuel use should be reviewed by the business at least annually. Items that cannot be implemented or undertaken immediately should be considered for inclusion on the businesses Sustainability Action Plan, allowing future improvements to be planned out and undertaken.

See Factsheet: M2 Sustainability Action Planning

Factsheet – E8 Energy and fuel

Monitoring energy and fuel usage and maintaining records

It is most useful to review energy and fuel use at the same time each year to assess energy efficiency over time. For many businesses an energy and fuel review coincides with the end of each tax year as receipts and records are accumulated.

By reviewing and keeping records of your electricity usage, diesel use, LPG use, unleaded petrol use, and amount of nitrogen fertiliser applied for a financial year period, you are then able to compare usage records against production yields or throughput to determine whether energy and fuel are being used efficiently, or whether there are areas for improvement, cost and resource savings.

Servicing and maintenance records of machinery, equipment and vehicles are required to be kept. These records can also aid in identifying cost savings when reviewed with electricity and fuel usage records. For example, a review of energy and fuel usage against the servicing and maintenance records of two machines being used over the same time period might identify that an older machine is using significantly more energy/fuel than a newer machinery.

Options to resolve the issue might be a change to servicing frequency for the older machine to determine whether more frequent services increase its operating efficiency; or a comparison of the cost of energy and fuel use against the cost of replacing the older machine to identify whether an upgrade proves to be more cost effective.

Fuel storage on-farm

Incorrect and careless storage of fuel can lead to accidental spillage and contamination of soil, water and other materials that come into contact with the spill. Regular checking of fuel tanks, particularly underground tanks, is beneficial to ensure that there are no leaks, and if there are, they are promptly repaired.

In general, fuel storage is best located away from watercourses and with sufficient surrounding space to permit easy access, thus reducing the chance of accidental damage. Placarding of fuel storage may also be required.

If fuel tanks are banded, all valves should be inside the bund and should be closed and locked when not in use.

Where possible, the risk of fire should be minimised.

If bulk fuel storage is in a mobile tank, the following should apply:

- tank is designed to prevent accidental damage;
- all connections and valves, where fuel could empty by gravity, are kept locked when not in use;
- used with care, especially when near water courses; and
- not left near or uphill from a watercourse (where possible).

A current Safety Data Sheet (SDS) must be kept for all bulk fuel types stored on the property. These should be located near to where the fuel is stored and easily accessible. These can be obtained from the supplier of the fuel, with some available online.

Workers should be trained in the correct use, handling, safety procedures and required protective equipment as specified by the Safety Data Sheet (SDS) for the fuel type, and any on-site operating procedures.

Workers should also be trained and aware of emergency procedures and action to be taken in the event of a spill.

Factsheet – E8 Energy and fuel

Fuel storage legislation

Fuel storage (including underground tanks) must comply with relevant state and federal legislation.

Australian standards and national legislation includes:

Australian Standard 1940-2004: Storage and Handling of Combustible and Flammable Liquids

This Standard provides requirements and recommendations for the design, construction and operation of installations where flammable or combustible liquids are stored and handled. Fuels are defined in this standard as combustible materials. A preview of the standard is available:

[https://saiglobal.com/PDFTemp/Previews/OSH/as/as1000/1900/1940-2004\(+A2\).pdf](https://saiglobal.com/PDFTemp/Previews/OSH/as/as1000/1900/1940-2004(+A2).pdf)

National Standard for Storage and Handling of Workplace Dangerous Goods [NOHSC:1015(2001)]

The National Standard for the Storage and Handling of Dangerous Goods sets out the requirements to ensure the effective control of the storage and handling of dangerous goods. A copy can be freely accessed at:

https://www.safeworkaustralia.gov.au/system/files/documents/1702/nationalstandard_storagehandling_workplacedangerousgoods_nohsc-10152001_pdf.pdf

The Australian Dangerous Goods (ADG) Code

The ADG Code sets out the requirements for transporting dangerous goods (including by road or rail). Dangerous Goods have been classified into different classes, with the ADG Code detailing requirements for each class. A copy can be freely accessed at:

<https://www.ntc.gov.au/codes-and-guidelines/australian-dangerous-goods-code>

Factsheet – M1 Scope and commitment

This factsheet covers:

- Scope
- Flowchart
- Property map
- Organisational structure
- Commitment statement

Scope

To ensure activities from all business enterprises undertaken on the property are considered in relation to the Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture (AWISSP-VIT1), it is important that the owner or appropriate senior manager defines the scope of the business/operation.

The scope clearly identifies the activities conducted by the business for which certification is required, plus any other business enterprises that are undertaken on the property that need to be considered as part of the AWISSP-VIT1 program, such as intensive livestock or dairy operations.

The scope of the AWISSP-VIT1 program must be reviewed if different types of enterprises are introduced or if activities or practices change on farm, to ensure appropriate sustainability management has been considered.

Flowchart

All property activities undertaken by the business should be identified in a flowchart. A flowchart template is provided with the Freshcare Forms, which outline generic practices undertaken in viticulture production.

Flowcharts will be completed differently by each business, depending on the business enterprises undertaken on the property.

Update the flowchart (or develop your own) to ensure all production and post-production practices undertaken by your business are identified and selected.

Property map

A property map is required to identify property areas, infrastructure and surrounding areas.

A property map can be aerial photographs, topographical maps, cadastral maps, self-drawn maps or overlays that document and define the required features, infrastructure and natural resources on or adjacent to the property.

A checklist has been provided with the Freshcare Forms to ensure all items as prescribed by the Standard are considered and identified on the property map(s) as per the following categories:

- property boundaries, buildings and facilities
- production areas and infrastructure
- environmentally sensitive areas on the property
- environmentally sensitive areas adjacent to the property boundary.

Organisational structure

The organisational structure of the business may be documented as a written description of roles identifying who is responsible for the management of the AWISSP-VIT1 program, and the Sustainability Action Plan within the business, and how other workers report to this manager(s).

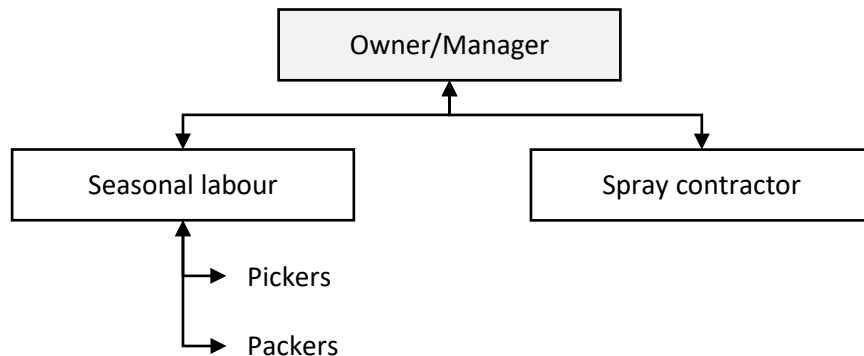
This requirement could be captured in the position descriptions for the specific roles of these workers i.e. Site manager, ENV/QA manager.

Alternatively, an organisational chart could be documented to demonstrate the organisational structure of the business and the roles of workers responsible for the management of the AWISSP-VIT1 program and the Sustainability Action Plan could be identified, with the reporting relationships (flow of information) of all workers whose roles may affect compliance with the requirements of the Standard.

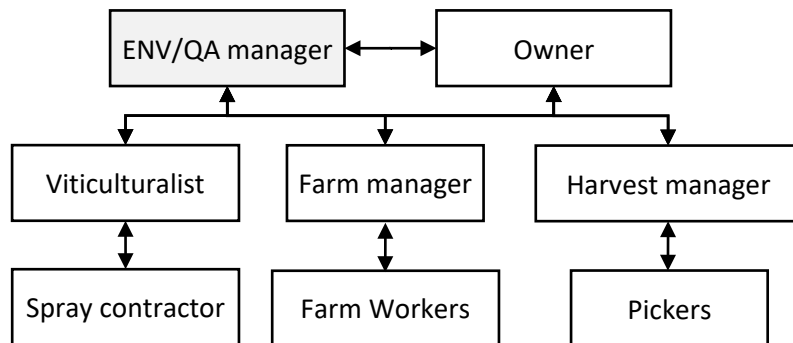
Factsheet – M1 Scope and commitment

Organisational charts examples provided below show the workers responsible for the management of the Standard and Sustainability Action Plan in the shaded boxes, arrows included in the diagrams indicate the reporting relationships and flow of information for all workers whose roles may affect compliance with the requirements of the Standard.

Example Organisational Chart – simplified business structure



Example Organisational Chart – more complex business structure



Commitment statement

A commitment statement should be documented and signed by the owner or appropriate senior manager, to formalise the businesses commitment to meeting the requirements of:

- Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture
- Freshcare Rules
- Sustainable Winegrowing Australia
- Sustainability Action Plan
- Legislative requirements (including licenses and permits).

The commitment statement must be communicated to all workers, to provide awareness of the business' commitment to sustainability and the continuous improvement outcomes of the AWISSP-VIT1 and Sustainable Winegrowing Australia program.

Communicating the commitment statement to all workers also highlights that sustainability is the responsibility of the entire business, and workers should be encouraged to support the sustainability outcomes via monitoring and reporting on activities associated with the program.

Prominently displaying the Commitment Statement will remind visitors and workers of the importance the business places on sustainability.

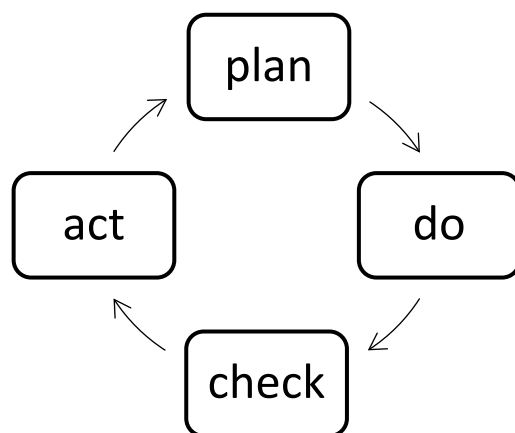
Factsheet – M2 Sustainability action planning

This factsheet covers:

- Sustainability action planning
- Environmental values
- Sustainability issues
- Sustainability Action Plan (SAP)

Sustainability action planning

All environmental and sustainability management systems require a continuous improvement cycle of 'plan, do, check, act.' The Freshcare Australian Wine Industry Standard of Sustainable Practice applies this cycle via the prescriptive compliance criteria and Sustainability action planning requirements outlined in the Standard.



The Standard outlines compliance criteria for a range of property activities common to viticulture farming systems and production inputs that are known to present risks that may cause business, worker, community, or environmental harm. The compliance criteria includes basic requirements for record keeping, documenting property plans, implementing good agricultural practices, and

reviewing performance to demonstrate the business' commitment to sustainability and environmental stewardship are maintained.

Adherence to the compliance criteria is required by all businesses seeking certification to the Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture and will ensure the mechanisms for achieving continuous improvement is occurring on-farm.

The Sustainability Action Plan (SAP) will help businesses complete the continuous improvement cycle. See details under Sustainability Action Plan following on in this factsheet.

Sustainability assets and environmental values

Sustainability assets and environmental values can be defined as 'worth that a community or society places on resources or services for their life sustaining, recreational, aesthetic or intrinsic ecological aspects.'

The Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture asks you to conduct an assessment of your property and business operations to identify any sustainability assets and environmental values.

Some examples include: areas of native vegetation; natural waterways, wetlands, riparian areas; areas where rare or threatened native animals nest, roost, rest or feed; a threatened species of animal or plant known to be on the property or in the area; sensitive areas of high conservation value; native grasses and ground covers.

Actions planned to manage and improve identified assets and values will be undertaken via the Sustainability Action Plan (SAP).

Sustainability issues

A sustainability issue is defined as 'the result of the negative impacts of human activity on the natural environment, resources or business services.' The Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture

Factsheet – M2 Sustainability action planning

asks you to conduct an assessment of your property and business operations to identify any issues to the sustainability of your business.

Some examples of issues include: soil erosion, creek or river bed erosion, areas affected by salinity or waterlogging, weed infestations, machinery or equipment emitting smoke, a dust or odour problem.

Actions planned to address, manage or improve identified sustainability issues will be undertaken via the Sustainability Action Plan (SAP).

Sustainability Action Plan (SAP)

The Sustainability Action Plan (SAP) is the documentation of planned actions to manage and improve assets and values, and address issues on farm and within your business. The SAP completes the sustainability action planning process and outlines a plan by which a business can establish targets for improving the sustainability outcomes of their property and operations. The SAP should set goals for when future actions are to be completed.

Timeframes and a target date of completion for planned actions need to be included in the SAP. Depending on the actions proposed, timeframes could vary from immediate action (within the next 3 months), to short-term action (within the next 12 months), or long term action (within the next 3-5 years).

The SAP is required to be reviewed and updated annually with records maintained for review during triennial audit cycles.

Part of the annual review process for the businesses SAP should include an evaluation of the progress of planned actions, any changes to set target dates (with an explanation of why), and a sign-off on any completed actions. The review process should also establish any sustainability issues or values to be added to the SAP, setting new targets for management and continual improvement.

During triennial site audits, the auditor will want to see evidence of works towards planned actions, or completed actions documented in the SAP. Evidence might be kept in the form of photographs (demonstrating site rehabilitation, fenced off areas, erosion control); purchase records; or documentation (such as diary entries, planned works).



The Sustainability Action Plan (SAP) is the core of your sustainability management program. By completing the process of assessing, planning, documenting, taking action and reviewing as required by the sustainability action planning element of the Standard, you are demonstrating continuous improvement in sustainability management on farm.

Factsheet – M3 Documentation

This factsheet covers:

- Documents required to be kept
- Record keeping to verify compliance
- Developing effective records
- Document control
- Storing records
- Sustainable Winegrowing Australia reporting requirements

Documents required to be kept

It is a requirement that all Freshcare participating businesses have a current edition of the Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture (AWISSP-VIT1) which includes the Freshcare Rules.

The AWISSP-VIT1 Standard is available to download from the Freshcare website: www.freshcare.com.au

If a certified business is using the Sustainable Winegrowing Australia trust mark, the trust mark style guide and rules for use must also be kept, along with evidence of approval for use of the trust mark. To access the Sustainable Winegrowing Australia trust mark rules of use and style guide specifications download: www.awri.com.au/wp-content/uploads/2020/06/trust-mark-rules.pdf

Record keeping to verify compliance

It is important to maintain all records as outlined in the requirements of the AWISSP-VIT1. Records are used to verify your compliance and ongoing management to the Standard and Sustainable Winegrowing Australia at audit. All records kept are required to include the following (as a minimum):

- title and date of issue or version number
- your business name and the name of person completing the record
- date record was completed

Other specific record requirements are outlined in individual elements AWISSP-VIT1, guidance on records required is also outlined in the following Factsheets.

Freshcare have also developed form templates which reflect the record keeping requirements of the Standard. These are provided may be used as is, or modified to suit individual business needs. It is not mandatory to use the Freshcare form templates, however the required information as specified in the AWISSP-VIT1 must be captured.

If you are new to the AWISSP-VIT1 program, it is recommended that a minimum of 3 months of records should be established prior to undertaking your first audit (to achieve initial certification).

Developing effective records

To be effective, records should be:

- legible
- user friendly
- clearly understood
- relevant to the situation
- consistent in format
- identified with a version number or date of issue
- maintained and kept up-to-date with old records replaced
- signed and dated by the person completing the record
- easily accessible, located where needed

Document control

Someone in the business needs to take responsibility for managing documents and records to ensure that only the latest version is used and available where needed. This applies to business documents and records, and to external documents such as off-label permits and quarantine regulations.

Storing records

Records may be kept in hard copy, soft copy, electronic or digital format. Completed records need to be stored in a safe location for possible reference at a later time or during your triennial audits.

Factsheet – M3 Documentation

Records associated with the AWISSP-VIT1 program must be retained for a minimum of 5 years. Individual States and Territories may also require longer retention periods for some records, such as records of chemical applications.

Sustainable Winegrowing Australia reporting requirements

Viticulture businesses participating in the Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture (AWISSP-VIT1) must also adhere to the reporting requirements for Sustainable Winegrowing Australia.

Required business metrics and the best practice workbook must be completed and submitted annually to Sustainable Winegrowing Australia via the businesses online member portal, login: <https://member.sustainablewinegrowing.com.au>

Evidence of annual reporting provided to Sustainable Winegrowing Australia, including supporting documentation for the metrics data submitted (such as electricity bills, water use statements etc.) should be kept for verification at triennial audits to the AWISSP-VIT1.

Factsheet – M4 Training and development

This factsheet covers:

- Approved training
- Other training requirements
- Review of training needs and development
- Instructions and signage to support workers and visitors

Approved training

It is a requirement that a management representative from each participating business completes approved Freshcare training as identified in Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture (AWISSP-VIT1) Appendix A-M4 - Approved training includes:

- Freshcare Australian Wine Industry Standard of Sustainable Practice Edition 1 – Viticulture training
- Freshcare Environmental Viticulture 2nd Edition Code of Practice training
- Freshcare Environmental Viticulture 1st Edition Code of Practice training

Approved Freshcare training is provided by Freshcare trainers or via the Freshcare eLearning platform. Details of training courses are available from the Freshcare website: www.freshcare.com.au.

A receipt of training (detailing the trainees name, trainer and date of training) or a training certificate, should be kept as evidence that approved training has been undertaken by a management representative.

Other training requirements

Workers whose complete tasks associated with the management of the AWISSP-VIT1 program should have adequate knowledge and the skills to perform the duties required of them. Workers' training needs relevant to the AWISSP-VIT1

and Sustainability Action Plan need to be considered, with appropriate training planned and carried out.

Within the business, the most appropriate person must conduct internal training. For example, the person on farm that has completed recognised farm chemical user training would be responsible for training other workers in chemical handling and application.

Training needs to be provided in the relevant language or pictorially, where workers may have a first language other than English.

Records of internal and external training must be kept, and include:

- Name of trainee
- Name of trainer/training provider
- Title or topic of training
- Date of training and/or expiry date

Review of training needs and development

A review of all training by the owner or appropriate senior manager should be conducted at least annually, or when a workers tasks change, or a new worker is appointed.

The training review will help identify any new training needs of workers, or refresher training that may be required to ensure adequate knowledge is present for all tasks undertaken. The owner or senior management also needs to be aware of local or regional environmental issues that may impact their business operation, and identify areas where training of workers to manage these issues may be required.

It is a good management practice to advise workers that it is also their responsibility to identify training needs within a business. Workers should be encouraged to notify the owner or senior manager if they identify a process, task or area where further workplace training or external training may be required.

Factsheet – M4 Training and development

Further Freshcare training or refresher training to AWISSP-VIT1, could be recommended by the auditor conducting your external audit. This would only occur if inadequate understanding, implementation or management of the Standard was evident during the external audit.

Instructions and signage to support workers and visitors

Site instructions and signage should be provided to all workers and visitors to support the sustainable outcomes of the program.

The Freshcare Form – M4 Site access instructions provides examples of the information that should be provided to all workers and visitors, including information on the businesses:

- environmental priorities
- biosecurity and hygiene requirements
- site access and movement
- use of protective clothing and footwear (where required)
- emergency procedures
- general behaviour.

Factsheet – M5 Suppliers

This factsheet covers:

- Establishing approved suppliers
- Evidence of compliance
- Approved supplier example
- Competent laboratories
- Plant breeder's rights
- Managing certified wine grapes
- Supplier requirements table

Establishing approved suppliers

When sourcing suppliers of materials and services each business should review the supplier to ensure they can demonstrate that they comply with the applicable requirements of the Standard and don't present a risk to the business engaging in their service of product.

Input materials and services should be sourced from businesses whose credentials can be verified for the products and/or services they're providing. Once this verification has been undertaken they can then become part of your 'approved supplier' list which should be reviewed and updated annually.

Suppliers that should be considered include those used by your business for: packaging, fertilisers and agricultural chemicals; as well as services such as transport, or those providing advice such as pest management or nutritional advice.

Managing your suppliers to ensure they meet as a minimum legislative requirements, will help minimise risks to your business.

Purchase records for materials and services that could present a risk to your business must also be kept.

Evidence of compliance

Suppliers of materials and services that may introduce a business or environmental risk, should provide evidence of compliance for them to become an 'approved supplier'.

You can use one of the following methods and evidence of compliance to approve suppliers of materials and services:

- **Independent evidence of compliance** – could include evidence of the suppliers Certification; Business credentials; Qualifications; Certificates of analysis; Water Quality Reports; Statements of Compliance, etc.
- **Freshcare Recognised Supplier Register** – businesses listed on the Freshcare recognised supplier register provide supporting evidence of their credentials to demonstrate they adhere to approved supplier requirements. Visit: www.freshcare.com.au/recognised-suppliers
- **A written declaration from the supplier to comply with requirements** – establishing a supplier agreement that they will meet the specifications as outlined by the business or provided in the supplier requirements table.
- **A record of inspection/assessment against requirements** – in lieu of one of the above options, the business sourcing the material or service could choose to inspect/assess the product or service prior to use, against the specifications in the supplier requirements table (see following section).

If you sourcing from more than one supplier of a material or service, evidence of compliance is required to be managed for each supplier.

The Freshcare Recognised Supplier Register is a subscription service managed by Freshcare. The registration process determines that businesses listed as a Recognised Supplier meet the applicable requirements for supply of the specified materials and services they are listed for.

Reliance on the information provided by suppliers and businesses listed on the F Freshcare Recognised Supplier Register is at the end users' own risk. For more information please refer to: www.freshcare.com.au/recognised-suppliers/about

Factsheet – M5 Suppliers

Approved supplier example

The Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture requires that agricultural chemicals are purchased from approved suppliers to demonstrate that the suppliers are meeting best practice requirements.

The following provides three examples of how to establish an ‘approved supplier’ for agricultural chemicals:

1. Suppliers’ evidence of accreditation to Agsafe

Agsafe accredits stores or businesses that distribute or supply agricultural and veterinary chemical products. The accreditation process ensures that stores are compliant with all Commonwealth, state and territory regulations for the transport, storage and handling of these products.

2. Establishing a supplier agreement/letter (see example following)

Supplier agreement/ letter ensures:

- *the supplier is approved to operate in accordance with the relevant legislative/regulatory requirements;*
- *all chemicals provided are adequately labelled and in acceptable condition;*
- *all chemicals provided are within Use By dates; and*
- *all chemicals provided are appropriate for the use required.*

3. Inspect each purchase/delivery against specifications,

Inspect and record compliance for each purchase, to ensure:

- *all chemicals provided are adequately labelled and in acceptable condition;*
- *all chemicals provided are within Use By dates; and*
- *all chemicals provided are appropriate for the use required.*

Example of supplier agreement for an agricultural chemicals supplier

EXAMPLE ONLY

Business logo
Business name
Business address

Date

Approved supplier acknowledgement

We acknowledge the requirements of the Freshcare Standards and agree to:

- provide chemicals appropriate for the use required,
- be approved in accordance with the relevant legislative/regulatory requirements,
- provide products that are packaged accordingly and adequately labelled (including Expiry Date or Date of Manufacture),
- abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.

Regards,
Name
Position
Contact details

Factsheet – M5 Suppliers

Competent laboratories

When testing is undertaken as part of verifying requirements to the Standard, including water, soil or produce testing, a competent laboratory must be used. The Standard defines a competent laboratory as:

“a laboratory with NATA* accreditation, or accredited to ISO/IEC 17025, for the required scope of testing. Or a laboratory run by a local, state, or federal government authority or university that follows Australian Standard methods for the required scope of testing.”

*NATA = National Association of Testing Authorities, Australia.

Competent laboratories can be managed via the approved supplier process with records of use kept.

Plant breeder's rights

Plant breeder's rights are exclusive commercial rights for a registered variety of plant.

New planting materials must be purchased from suppliers that are managed in accordance with the supplier requirements as outlined in this factsheet. Evidence that planting materials also comply with applicable legislation and plant breeder's rights where required.

For more information on Plant breeder's rights visit:

www.ipaustralia.gov.au/plant-breeders-rights

Managing certified wine grapes

The Standard requires that all wine grapes represented for sale by a certified business, must be sourced from a business currently certified to the Freshcare Australian Wine Industry Standard of Sustainable Practice.

This means if you are a certified producer and are sourcing wine grapes from other producers or vineyards, those wine grapes cannot be represented for sale

under your certificate/certification, unless those producers and vineyards are also certified.

This can be managed through the suppliers list (refer to Form – M5 Approved supplier table) and traceability records.

Factsheet – M5 Suppliers

Supplier requirements table

Suppliers of materials and services identified in Form – M5 Approved supplier table, must comply with the applicable requirements of the Freshcare Standard, as outlined in the table below.

Input material/service	Requirements for suppliers
Agricultural chemicals	<ul style="list-style-type: none"> • Evidence of AgSafe accreditation/compliance with legislative requirements. • Provide chemicals appropriate for the use required. • Approved in accordance with the relevant legislative/regulatory requirements. • Packaged accordingly, adequately labelled (including Expiry Date or Date of Manufacture). • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Agricultural chemical application	<ul style="list-style-type: none"> • Hold appropriate accreditation e.g. commercial spray licence and provide copies of accreditation. • Apply chemicals: <ul style="list-style-type: none"> ○ according to label directions, or ○ under 'off-label permits' issued by the Australian Pesticides and Veterinary Medicines Authority (APVMA), with a current copy of the permit kept, or ○ according to relevant state legislation for 'off-label use', and ○ according to specific customer and/or destination market requirements. • Check chemicals for withholding periods prior to use. • Check chemicals for label changes when opening each new container. • Avoid chemical application when the risk of contaminating off-target areas with spray drift is high. • Ensure application equipment is maintained and checked for effective operation before and during each use. • Ensure equipment is calibrated at least annually or as per manufacturer's instructions, and immediately after spray nozzles are replaced. • Dispose of leftover chemical solutions according to label directions where specified, or in a manner that minimises the risk of contaminating the site or waterways. • Maintain records of all chemical applications. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.

Factsheet – M5 Suppliers

Input material/service	Requirements for suppliers
Agronomist/technical advisor	<ul style="list-style-type: none"> • Be appropriately certified/qualified and provide details of these qualifications. • Make all recommendations in writing. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Chemicals – cleaning	<ul style="list-style-type: none"> • Ensure chemicals are approved for use in a food handling area and provide evidence. • Packaged accordingly and adequately labelled (including Expiry Date or Date of Manufacture). • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Chemicals – water treatment	<ul style="list-style-type: none"> • Ensure chemicals are approved for use in a food handling area and provide evidence. • Packaged accordingly and adequately labelled (including Expiry Date or Date of Manufacture). • Where required, ensure additional validation and monitoring requirements are provided for the required use. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Consultants	<ul style="list-style-type: none"> • Ensure consultants or consultancy service providers are appropriately qualified for the scope of service. • Where required be appropriately licensed/certified, provide copies of credentials. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Contract cleaning	<ul style="list-style-type: none"> • Ensure chemicals are approved for use in a food handling premises and provide evidence. • Ensure cleaning equipment and chemicals are stored, applied and handled to prevent contamination. • Provide details of cleaning activities as requested including areas/items cleaned, cleaning agents and methods used and frequency of cleaning. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.

Factsheet – M5 Suppliers

Input material/service	Requirements for suppliers
Contract labour	<ul style="list-style-type: none"> • Provide evidence of compliance or licensing to relevant statutory/regulative requirements for this type of business (i.e. State licensing schemes, Worksafe, superannuation, etc.). • Ensure all workers have been appropriately trained for work to be undertaken. • Maintain records of training and provide copies of records. • Ensure staff/workers abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Fertilisers and soil additives	<ul style="list-style-type: none"> • Provide fertilisers and soil additives appropriate for the use required. • Ensure packaging is intact and there is no leakage or possibility of contamination. • Ensure fertiliser or soil additive is mixed to correct specifications and is of good quality, free flowing and dry (if solid). • Ensure fertilisers and soil additives meet legal requirements for heavy metals. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Laboratory testing	<ul style="list-style-type: none"> • Hold NATA accreditation to ISO/IEC 17025 for the specific testing requested and provide evidence of accreditation. • Laboratory run by a local, state, or federal government authority or university that follows Australian Standard methods for the required scope of testing.
Packaging	<ul style="list-style-type: none"> • Ensure packaging is appropriate for use and made of substances that are non-toxic and food grade when required. • Ensure packaging is compliant with relevant statutory/regulative/customer requirements. • Ensure packaging is clean and free of foreign objects and pest infestation prior to delivery. • Ensure packaging meets businesses requirements for reuse and/or recycling
Pest control	<ul style="list-style-type: none"> • Be appropriately licensed/certified, and provide copies of credentials. • Ensure all chemicals and baits supplied or recommended are approved for use, used in accordance with label instructions. • Ensure baits/traps are located and contained to minimise the risk of contaminating the site, equipment, and surrounding environment. • Provide a map of bait/trap locations. • Provide written records of inspections, pest levels and action taken after each visit. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.

Factsheet – M5 Suppliers

Input material/service	Requirements for suppliers
Planting material	<ul style="list-style-type: none"> • Provide healthy and disease free planting materials. • Provide seedlings of the age/growth stage and variety requested. • If applicable, evidence of plant breeder's rights and licensing, where required. • If applicable, provide evidence of compliance to interstate requirements (e.g. Interstate Plant Health Certificates). • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Portable toilets	<ul style="list-style-type: none"> • Position portable toilets to minimise risk of contamination to the site, environment and waterways. • Regularly maintain and service portable toilets. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Training	<ul style="list-style-type: none"> • Ensure trainers or training service providers are appropriately qualified for the scope of service. • Where required be appropriately licensed/certified, provide copies of credentials. • When entering the business (produce handling, packing and storage areas) abide by: <ul style="list-style-type: none"> ○ food safety instructions ○ site clothing and PPE requirements • site movement requirements.
Transport	<ul style="list-style-type: none"> • Evidence of current certification to a third party audited food safety standard for the scope of transport services being supplied. • Ensure produce is not transported under conditions or with other goods that present a potential source of contamination. • Check transport vehicles before use for cleanliness, foreign objects and pest infestation and, where necessary, clean to prevent contamination of produce. • Check transport refrigeration systems prior to loading to ensure they are operating at specified temperatures. Maintain records to verify temperature during transit. • Ensure that all vehicles used are free of / have not been in contact with known allergens (unless properly cleaned). • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.

Factsheet – M5 Suppliers

Input material/service	Requirements for suppliers
Waste management	<ul style="list-style-type: none"> • Ensure waste disposal services (where required) are appropriately licensed/certified, provide copies of credentials. • Ensure workers undertaking waste disposal are appropriately trained. • Ensure waste containers provided are appropriate for use. • Check waste transport vehicles prior to entering the site for cleanliness, foreign objects and pest infestation and, where necessary, clean to prevent contamination on site. • Provide records of waste disposal. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Water	<ul style="list-style-type: none"> • Ensure water supplied meets relevant quality for use, and evidence of compliance is provided (e.g. Certificates of Analysis, Water Quality Reports, Statements of Compliance). • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Water – recycled/reclaimed	<ul style="list-style-type: none"> • Ensure water quality supplied for use meets the appropriate specifications as defined in the Australian Guidelines for Water Recycling and evidence of compliance is provided (e.g. Certificates of Analysis, Water Quality Reports, Statements of Compliance). • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.
Wine grapes	<ul style="list-style-type: none"> • Provide evidence of certification to the Freshcare Australian Wine Industry Standard of Sustainable Practice. • Advise the business immediately if the certification is withdrawn or expires. • Ensure produce supplied is compliant with relevant statutory/regulative/customer requirements, and provide evidence of compliance. • Ensure staff abide by site access and movement instructions including priorities for environmental management, biosecurity and hygiene requirements if/when entering the business premises.

Factsheet – M6 Customer and regulatory requirements

This factsheet covers:

- Customer specifications
- Customer requirements
- Regulatory body or legislative requirements
- Record keeping requirements and verification at audit

Customer specifications

A customer is the business or winery to whom you supply.

Meeting customer expectations is an important part of any business. To be able to meet these expectations, a clear understanding of what the customer requires is essential.

Customers will often set specific specifications and requirements for suppliers to comply with, these may be issued as part of your contract, written agreement or provided in writing.

Customer specifications most commonly relate to:

- Product quality
 - variety, size, maturity, colour.
- Handling requirements
 - temperature management,
 - handling instructions,
 - packaging,
 - transport.
- Compliance requirements
 - compliance with a nominated standard such as AWISSP-VIT.

Customer requirements

Customer requirements are other specific requirements set or agreed with your customer.

If your Customer is supplying your produce onto specific markets (EU or US export), establishing compliance for their own Certification to a specific standard (ISO 14067 Carbon footprint), or are participating in an industry best practice initiative (for example: Sustainable Winegrowing Australia), they may set specific environmental, sustainable agriculture or greenhouse gas emission targets not covered in this Standard.

Regulatory body or legislative requirements

Regulatory bodies or legislative requirements may be applicable to businesses based on their location or proximity to sensitive areas with high conservation value (such as the Great Barrier Reef).

Businesses operating in such locations may have specific nutrient application limits, environmental licensing requirements, or business practice records that must be maintained in order to demonstrate they are complying with regulatory and legal requirements.

Element M6 of the Standard requires that any business that needs to comply with regulatory or legislative requirements that relate to specific environmental guidelines, sustainable agriculture or greenhouse gas emission practices, must maintain records of these requirements for review at their AWISSP-VIT audit.

Record keeping requirements and verification at audit

Customer, regulatory body or legislative requirements to be taken into consideration under M6 of the AWISSP-VIT1 are those that relate to specific environmental guidelines, sustainable agriculture or greenhouse gas emission practices, **outside of the requirements outlined in the Standard.**

It is only if a specific requirement as outlined above is required of your business, that a written copy of these practices be kept and complied with and included in M7 Internal audits.

Factsheet – M7 Incident management, internal audit, corrective & preventative action

This factsheet covers:

- Business continuity
- Incident management plan
- Responding to an incident
- Defining audits
- Internal auditing
- External auditing
- Corrective action
- Documenting corrective actions
- Management review

Business continuity

Business continuity is about planning and preparing your business to avoid and reduce the risks associated with events or environmental incidents that could result in major disruptions to operations; and preparing a plan to ensure services to customers can continue.

Business continuity planning will help detail the steps to be taken before, during and after an incident or event to maintain the financial viability of the business. It helps you to anticipate, prevent or prepare for disruptions such as fire, flood or storms, computer or system crashes, or illness, and how to respond and recover from them.

Preparing for business continuity makes your business more likely to survive an emergency or critical disruption, as well as forecasting ways to minimise potential impacts to the site, business, community and environment.

Incident management plan

An incident management plan should be developed in consideration of business continuity to identify ways to:

- reduce the likelihood of an incident occurring
- respond to, and recover from, an environmental incident.

Document an incident management plan and identify and include:

- potential environmental risks to business continuity
- strategies and practices to manage the identified risks
- workers responsible for incident management
- contact details for internal and external stakeholders
- name of the person developing and documenting the plan
- date the plan was developed.

A test of the businesses incident management plan must be conducted at least annually, with a record kept.

Responding to an incident

When responding to an incident, it is important for the business to first ensure the safety of workers and the surrounding environment and wider community are protected.

When an incident occurs, the incident management plan must be followed to ensure:

- workers safety is protected
- risks to the environment are minimised
- product safety and quality is not compromised
- affected areas are segregated and controlled
- if impacted, affected product is identified and isolated

If an incident has occurred requiring the incident management plan to be actioned, a record of protocols undertaken must be kept.

Following an incident, a review of the event and incident management plan should be undertaken by workers responsible for incident management and the appropriate supervisors. A record of the review and any updates to the plan must also be documented.

The incident management plan should be reviewed at least annually, and after any event requiring the incident management plan to be actioned. Records of reviews must also be maintained.

Factsheet – M7 Incident management, internal audit, corrective & preventative action

Defining audits

An **audit** is a formal review of practices.

- An internal audit is when a worker representing the business, reviews practices within the business
- An external audit is when a customer or an independent organisation (auditor from one of the nominated Freshcare Certification Bodies) reviews the business practices.

Internal auditing

The purpose of internal auditing is to:

- confirm that practices are being carried out as required by the Freshcare Standard
- ensure records are up-to-date, accurate and contain all the required information
- identify inefficiencies and problems and correct them.

Who should conduct the internal audit?

Any person representing the business can conduct the internal audit. This may be an owner, worker or external consultant. If it is an external consultant, it is important that the owner or senior manager is made aware of the results of the internal audit.

Ideally, the person conducting the internal audit should be independent of the practices being carried out, however Freshcare recognises that this may not be achievable by some businesses.

How often should internal audits be done?

It is always best to do an internal audit before any external audits from customers or other independent organisations are undertaken, as it is better for you to detect problems and correct them before the external auditor does.

Freshcare requires businesses to conduct a minimum of one internal audit each

year covering all elements of the Freshcare Standard, and a record of internal audits must be kept.

Freshcare encourages internal audits to be used as a tool to improve areas of the business, and therefore the internal audit activities can be spread out throughout the year.

Internal audit report

Form M7 Internal audit report, provides a useful tool to assist you in conducting your internal audit. It provides a simple, systematic outline of the elements to assist you in reviewing practices. Sections of the internal audit report should be signed and dated by the person completing that section. Once completed the internal audit report provides a record of the internal audit conducted and any areas that need to be addressed or actioned as a corrective action.

Conducting an internal audit

Conducting a thorough internal audit involves:

- talking to workers
- observing operations
- checking records for accuracy and completeness
- recording your findings, both positive and negative .

External auditing

An external audit is a review of your practices and documentation by someone external to your business, such as a customer or an independent auditing organisation – a Certification Body (CB).

Customer audits (2nd party)

Wholesalers, packers and processors who have implemented a sustainability standard may be required to carry out an audit of their suppliers. They may carry out the audit themselves or contract an external auditor.

Their audit activities may include:

- checking your records

Factsheet – M7 Incident management, internal audit, corrective & preventative action

- internal audit report
- requesting a copy of your Freshcare certificate
- carrying out on-site audits of operations on your farm.

Independent or external audits (3rd party)

An independent or external (3rd party) audit will provide objective evidence of compliance against a nominated Standard. It is carried out by a certification body independent of your business and of your customers. A Freshcare (3rd Party) audit will provide objective evidence to your customers that you have met the requirements of the Freshcare Australian Wine Industry Standard of Sustainable Practice – Viticulture.

The independent or external audit provides customers with the option of using 3rd party auditors rather than doing the auditing themselves. It also means one audit may satisfy all of your customers, rather than having many customers auditing your business. Auditing of the Freshcare Standard is managed by Freshcare Ltd and its approved Certification Bodies.

Preparing for an external audit

The idea of an audit is not to 'pass' or 'fail'. The audit should be seen as an opportunity to identify areas in your business where procedures and practices can be improved. Part of the auditor's role is to be helpful and understanding of your needs.

The most important thing to do is review your practices and documentation to ensure that everything has been identified and applied as required by the Standard. Use your internal audit checklist to complete this process.

Make sure records are up-to-date and available (or easily retrievable) for the auditor to review.

What will happen on the day of the external audit?

Your audit will consist of three stages; the entry meeting, the audit, and the exit meeting.

At the entry meeting, the auditor will discuss your business, your expectations, describe what will happen during the audit and set a timeframe for the audit.

During the audit itself, the auditor will be looking for objective evidence that requirements of the Standard are being met. The auditor does this by asking you questions, talking with your workers (and observing practices) in the work environment and reviewing your documents. The auditor will be working through a checklist similar to your internal audit checklist.

At the exit meeting the auditor will discuss their audit findings and provide you with a written report of the audit. They will identify the strong points of your system and any areas that you may need to improve. You will be invited to respond and comment about the audit or audit process. If there are things that need to be rectified before certification is recommended, then they will be discussed at this point.

Corrective and preventative action

Despite best intentions, you can still have problems from time to time. Whenever a problem arises, you must take action to ensure that the problem has been brought under control. Further actions may be required to prevent the problem happening again, thereby improving the system.

Keeping a record of corrective actions helps you to look back at problems that have occurred in the past, and show customers and other external bodies that you have a system in place to fix such problems.

A Corrective Action Record (CAR) is completed when requirements of the Standard are not being met, problems have caused or have the potential to cause significant environmental harm. The recording of near miss activities is also useful in identifying any areas where procedures or processes may require additional support through training etc.

An important aspect of corrective action is checking that the steps taken have been effective in eliminating or controlling the problem. Once the actions are completed, a review must be conducted to ensure actions taken have been effective. This is often termed preventative action.

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If the problem has not been fixed, or the same problem reoccurs, then the action has not been effective and another CAR must be completed, including alternative actions.

Reoccurrences of non-compliance must be reviewed by the owner or appropriate senior manager, to ensure adequate measures are taken to effectively address the problem and prevent the non-compliance from occurring again.

Documenting corrective and preventative actions

A Corrective Action Record (CAR) should be completed when the requirements of the Freshcare Standard, Freshcare Rules or legislation are not being met. Issues may be identified through:

- routine activities
- internal audits
- annual external audits
- complaints (received from a neighbour, customer or regulatory authority)
- incidents and near misses (environmental harm has occurred/may occur as a result of property activity, neighbouring activity or a natural event).

Form M7 Corrective action record (CAR) provides you with a template to be used when an issue is identified.

Corrective Action Records must be retained for a minimum period of five (5) years (or longer if required by legislation or customers).

Corrective Action Records are tool for documenting and demonstrating continuous system improvement, as they provide the mechanism for identifying a problem, whether it has occurred before, how the problem is being managed and what resolve has been established to prevent the problem from recurring.

Management review

A management review is a structured meeting which involves owners and/or senior managers of the business that takes place at least annually to review and review the Standard implemented and systems in place in the businesses remains suitable, adequate and effective to achieve the sustainability outcomes as set by the business' Sustainability Action Plan and commitment to Sustainable Winegrowing Australia

The Management Review must cover the following agenda items:

- internal and external audits
- corrective and preventative actions
- complaints
- incidents and near misses
- training
- the Sustainability Action Plan (SAP).

It is a requirement that a record of the management review and any follow-up actions is kept.

The Freshcare **Form – M7 Management Review Minutes** has been provided as a template for capturing a record of the management review/meeting process, and includes the required agenda items. Please note that this form is provided is a suggested template only – minutes in an alternate format; diary entry of the actions and discussion; or alternate records could be used as evidence for the management review taking place.