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The horticulture handbook

A reference guide for establishing
horticulture enterprises in
Western Australia



Supporting your success

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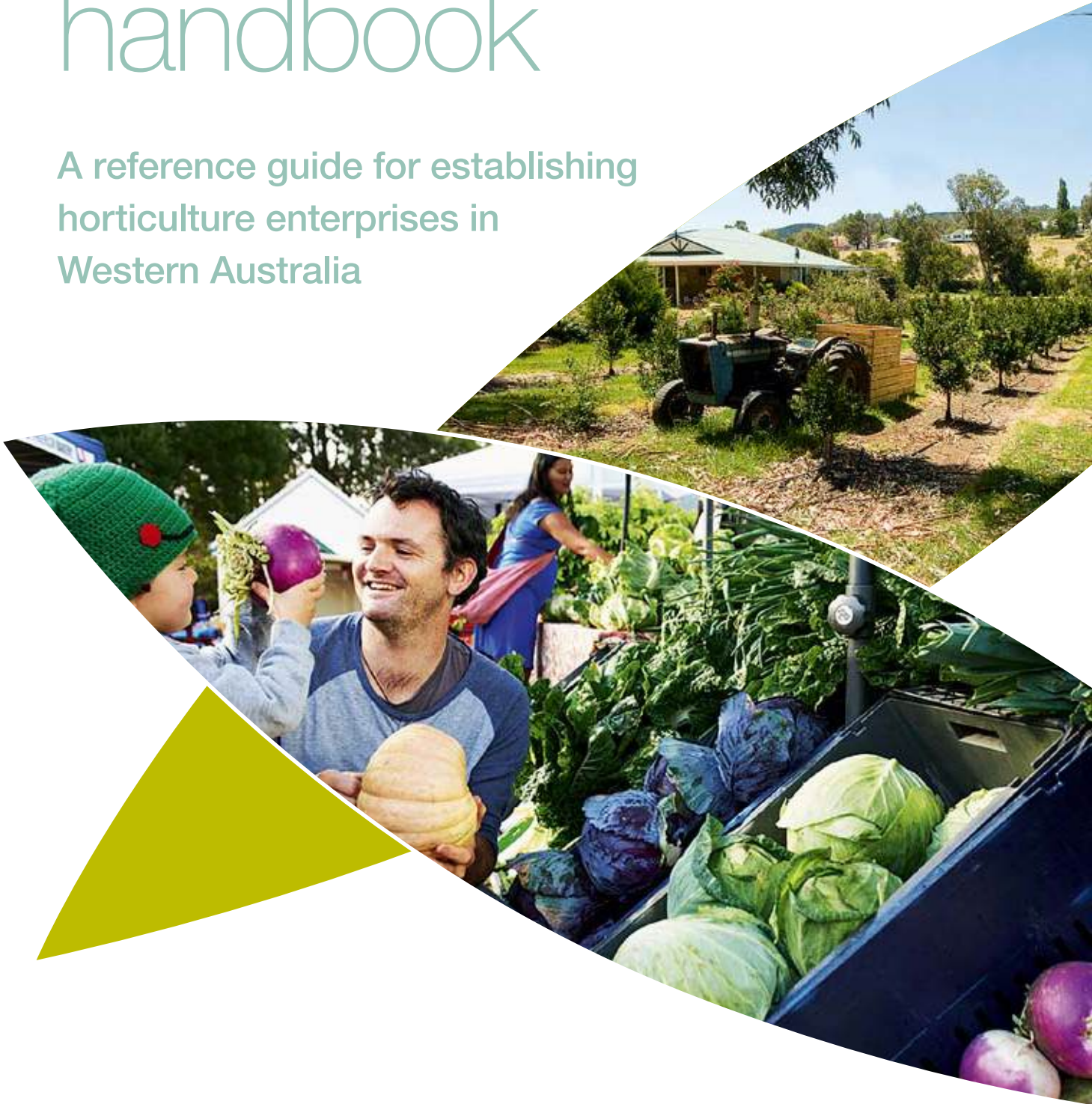
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Introduction

The Department of Agriculture and Food, Western Australia (DAFWA) assists WA's \$6 billion agriculture and food sector to be sustainable and profitable, with a clear focus on export-led growth.

Our department's vision is: "a progressive, innovative and profitable agriculture and food sector that benefits Western Australia". Our role as an economic development department is about supporting the success of, and creating value for, businesses all along the supply chain.

The horticulture handbook has been developed by the DAFWA Small Landholder Information Service (SLIS). This handbook is designed to acquaint landholders and potential investors with the regulations, requirements and considerations necessary to develop a block of land for horticulture in WA.

High prices, climate suitability and identified market opportunities make some horticultural crops appear an attractive investment. Before deciding to invest it is important to research a crop thoroughly from production planning all the way to the consumer. Thorough investigation will reveal a crop's true potential and help you make the best decision.

The horticulture handbook is a valuable guide, which includes a checklist and sections on regulations, key issues, production and marketing costs and approvals, along with a list of references and useful contacts.

The handbook is an excellent source of information designed to assist you to successfully establish a new horticultural business in WA.

Neil Guise
Regional Director, South West Agricultural Region

April, 2014

Acknowledgements

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Horticulture checklist



Horticulture checklist

This checklist is designed to get you thinking about some of the important things to consider before embarking on a horticultural venture.

By considering questions and cross checking actions, potential investors can increase the likely success and profitability of their new business.

Detailed information, tips and pointers are included to help potential investors answer the questions within the checklist.

There are two ways to approach investment in horticulture. One is to identify market opportunities before considering the purchase of suitable land. The other approach is to identify opportunities to utilise an existing area of land. This checklist starts with the assumption that you own, or have your eye on, a particular parcel of land.

The checklist is presented in three parts:

Part A: Regulations that apply to the use of land and licences you may need to develop a block for horticulture.

Part B: Crop requirements — suitability of local climatic conditions, soil type and water source.

Part C: Production and marketing costs and considerations.

Use the boxes beside each action to keep track of what you have and have not considered.

Part A: Regulations and licences

Are there any local, regional or state planning regulations concerning horticultural activities on the proposed development site?

To avoid conflict between different land uses and to support horticultural development in priority areas, there may be regulations in place that restrict or promote horticultural activity on the site.

Certain developments or changes in land use listed under local or regional planning schemes will require approval. Failure to obtain approval where necessary is an offence.

- Action:**
- Read Guide to legislation, section 1 (see page 41).
 - Check with your local government authority (LGA) for possible controls on horticultural developments, including minimum setback regulations, bans on the use of particular chemicals and bans on the use of manures.
 - Ask your LGA planning department if there are any other regional or state planning policies or schemes concerning horticultural activity on the site.



Do you need to clear land?

Permits from the Department of Environment Regulation (DER) and potentially your LGA are required to clear land. It is important to investigate the legalities and environmental impact of any land clearing before planning further development.

Information on land clearing, including application forms, fact sheets and guides can be found on the DER website.

In reviewing proposals, the principles contained in Schedule 5 of the *Environmental Protection Act 1986* (EP Act) and also any planning instrument or other relevant matter are considered. The clearing principles consider environmental impacts on biodiversity values, water quality and land degradation. Clearing that significantly impacts on the environment is generally not supported. The DER native vegetation fact sheet 1 *Native vegetation clearing legislation in Western Australia*, outlines the intent of the clearing legislation in more detail.

- Action:** Read Guide to legislation, section 2 (see page 44).
 Contact your LGA and DER offices to discuss your clearing proposal.

Do you need to drain or pump water to manage salinity or waterlogging?

Landholders intending to drain or pump groundwater for the purpose of controlling salinity must submit a 'notice of intent to drain' application to the Department of Agriculture and Food, Western Australia (DAFWA) at least 90 days before the commencement of works.

Landholders within the Peel-Harvey Catchment must notify DAFWA for **any works** involving the draining of surface water or groundwater.

The notification process allows for an assessment of the proposed works and ensures neighbouring landholders and affected public authorities have an opportunity to comment on the proposal.

DAFWA will generally object to works likely to cause onsite or offsite land degradation.

Failure to give notice is an offence and can expose the offender to an offence of causing serious or material environmental harm.

- Action:** Read Guide to legislation, section 4 (see page 49).
- Contact your LGA and DAFWA offices to discuss your options and to lodge a notification.

Could your activities be a source of a conflict (dust, noise, spray drift, pollution, odours, etc.) with your neighbours?

There may be conflicting activities between you and your neighbours. These conflicts may result in expensive damages or inconvenience.

- Action:** Read Guide to legislation, section 3 (see page 46).
- Identify the other land uses in the surrounding area and consider the impact they may have on your proposed operation and the impact your operation may have on others. This is particularly important when establishing a new type of horticultural enterprise.
- There may also be features of environmental significance to consider, such as lakes, rivers or rare plants located near your site. Contact your LGA, DER offices or catchment council to determine if this is the case, or for advice.

Do you have access to water?

Scheme water is usually too expensive to use for commercial horticulture. Water sourced from a bore, soak, stream, dam or irrigation scheme is often required.

The amount of water you can access will determine the type of crop you can grow and/or the area of crop you can plant.

You need to know how much water you can access in total each year.

Licences that allow you to take water from non-scheme sources in proclaimed areas, irrigation districts and prescribed areas are allocated by the Department of Water (DoW) under the *Rights in Water and Irrigation Act (RIWI Act) 1914*. Water allocations are calculated according to the area of land planted, crop type, local evaporation rates and water resource availability in the area.



Groundwater resources are often allocated in kilolitres per hectare per year (kL/ha/y).

- Action:** Read Horticulture, section 1 (see page 15) and section 2.1.2 (see page 18) and Guide to legislation, section 5 (see page 52).
- Contact the DoW or your local irrigation scheme for information on water availability on your property.

A licence from the DoW is required to access all non-scheme surface and groundwater resources, including water from bores, soaks and streams. Developments inside declared water catchment and water reserve areas also require DoW approval.

Part B: Crop requirements

How much water does the crop require?

How much water a crop requires each day throughout the year will determine the area of crop you can plant using the available water.

DAFWA has developed an online irrigation calculator to help determine monthly and annual crop water requirements. The calculator provides information on a range of crops under different management strategies or seasonal planting scenarios at 14 locations throughout WA.

The total amount of water required is calculated using recent historical weather data and the evaporation replacement requirement of specific crops, called 'crop factors', with adjustments made for planting date, soil type, irrigation system and efficiency.

For further information read:

- Noteworthy 41 — *Waterwise irrigation – big benefits for small properties*

- Action:** Read Horticulture, section 2.1.2 (see page 18).
- Check your crop's water requirements with DAFWA's online irrigation calculator at irrigationcalculator.com

What is the quality of the available water?

Water quality affects the type of crops you can grow, the type of irrigation system and filtering systems you require and how you manage your irrigation.

- Action:** Read Horticulture, section 2.1.1 (see page 17).
- Have the quality of your water source laboratory-tested before deciding what crop to grow and what irrigation system to use.
- Test the water for pH, salt (electrical conductivity: EC), sodium absorption ratio (SAR), chloride, iron and calcium levels. Other water quality measures to consider are biological and nutrient contamination.

Can your water source deliver enough water during peak demand periods?

Peak daily water requirements occur in most crops when evaporation rates are at their highest during summer or the dry season. If a crop's water requirements are not met each day, quality and yield will decline. To produce economical yields and marketable quality produce, climatic conditions must match crop requirements.

Climatic conditions, such as light availability, evaporation rates, wind conditions, rainfall, temperature and the frequency of frosts and heat waves, impact on crop growth and the amount of water needed during peak demand periods.

You need to know how much water your water source can deliver per hour and per day during peak demand.

If the irrigation system cannot supply the volumes required on a peak demand day, consider planting a smaller area or a crop with lower water requirements. Keep in mind it is more economical to plant a smaller area and meet peak water requirements than it is to plant a larger area and water-stress the crop.

Design the irrigation system to meet peak water requirement days. To calculate the peak water requirement for a 24-hour period select the highest daily evaporation figure for the January–February period, then multiply this by the appropriate crop factor for the crop in these months. This will give you the amount of water in millimetres that needs to be irrigated onto the ground in a 24-hour period. Check if your irrigation system can deliver this amount of water for the total crop area on the farm.

For information on:

- climatic characteristics — Bureau of Meteorology website or DAFWA website.
- climatic requirements of different crops — look at industry-specific growing manuals and websites and contact industry groups and horticultural specialists. To better understand how to grow a particular crop in your area join a growers' association and attend field days, conferences and workshops.

- Action:** Check your crop's peak daily water requirements with DAFWA's online weather stations to get the evaporation figures for January.
- Talk to local market agents, agronomists, DAFWA staff and consultants and read the relevant horticultural sections of books, newspapers and magazines.

Are the soil and site conditions suitable?

Soil type and site conditions will influence the type of crop you can grow and/or the management techniques required to grow the crop successfully.

Before considering what type of crop to grow, thoroughly inspect the site and soil.

A survey of the site in a 75m x 75m grid is recommended; more intensive surveys can be undertaken if time and money permit.

Soil survey holes are generally dug to 1.5m deep, preferably with a backhoe.

At each site record the following parameters — soil texture (including stone and/or gravel content), depth of each soil layer, soil structure, presence of compaction and impeding layers, soil pH, soil salinity and sodicity.



Other things to look for include soil nutrient-holding capacity, acid sulphate soils, water repellence, saline patches, rocky outcrops, soil erosion, shallow watertables, flood-susceptibility, slope, access, water courses, weed infestation, herbicide resistance and residues, and plant diseases.

Aerial maps of many agricultural areas throughout the state are available from Landgate. Soil and land capability maps are available from DAFWA. These maps give a general overview of the different soil types that may occur on the land area and their suitability for horticulture. In addition to these maps, more detailed investigations of soils by professional surveyors are also recommended.

Action: Read Horticulture, section 2.5 (see page 24).

For further information read:

- Noteworthy 9 — *Soil sampling and testing on a small property*
- Noteworthy 16 — *Soil acidity needs your attention*

Part C: Budgets and marketing

Do you know when to harvest and what yield to expect?

Knowing when to harvest and what yield to expect allows you to estimate labour requirements and potential income.

For perennial crops, the time taken for plants to produce their first crop and the time taken to reach maximum levels of production vary depending on variety, rootstock (if applicable), management practices and climate. The seasonal timing of harvest and expected yields are influenced by the same factors.

For annual crops, the time taken for each crop to reach maturity depends on variety, management practices and climate.

Information on expected harvest timing and yields can be gathered from industry publications, websites, field days, conferences and workshops associated with a particular crop or industry. It is also worthwhile joining a growers' association and talking to seed merchants, consultants and DAFWA staff.

Your answer:

I expect my **first** harvest in _____
and expect to harvest between _____ and _____ kg/ha

Do you have access to labour to meet the requirements for pruning, harvesting, sorting and packing?

In many cases you and your family will not be able to do all the work. A lack of labour often results in lower crop yields and quality.

- Action:** Read Horticulture, section 2.4 (see page 23).
- Investigate labour resources within a 20km radius of your property. If there is insufficient labour to meet your requirements, consider providing accommodation for workers, alternative transport methods (for example, providing a bus for workers living in a nearby town), planting a smaller area or planting a less labour-intensive crop.

What are the production costs and what income can you expect?

A detailed budget allows you to assess the profitability of an enterprise and compare it with other enterprises. A budget can provide important information, such as how vulnerable an enterprise is to price or yield decreases, how much money you need to borrow and when, and when you can expect to break even.

It is wise to invest in an agricultural consultant who can work out a budget for each crop of interest.

You need to know:

It will cost between _____ and _____ \$/ha to produce and harvest a crop.

For this I expect an income of between _____ and _____ \$/ha

Action: Read Horticulture, section 4 (see page 28).



Is there a market for the crop and what price can you expect to get for it?

Market research reveals what people want, when they want it and how much they will pay for a product. This information helps identify the expected returns from a crop produced in a given area.

You may also like to identify a point of difference for your product as this can help with marketing (for example, organically-grown or from a certain region).

Market research should identify:

- the size of a market and how sensitive it is to increased volumes of production
- competition and prices in the market at the time your crop is ready for harvest
- how vulnerable the product is to price fluctuations
- supply chain analysis including transport and freight costs, one of the biggest considerations adding to production costs in WA
- the minimum amount of crop you need to produce to meet market demand for consistent volume; you may also need to be able to produce a minimum volume before a buyer will consider you as a supplier
- varieties and/or quality specifications preferred by consumers.

This information can be gathered from:

- DAFWA Trade Development branch (for export markets) and Food and Agribusiness Development branch (for local markets)
- online resources with import and export statistics and detailed market research reports, such as Global Trade Information Service, Euromonitor International, Business Monitor International and Perth Market Authority (Market City perthmarket.com.au) and agents within the markets
- industry field days, conferences, meetings and workshops and by joining a growers' association
- horticultural/agricultural newspapers and magazines.

Action: Read Horticulture, section 2.2 (see page 20).

For further information read:

- Noteworthy 44 — *Marketing for small producers*
- Noteworthy 48 — *Business planning for small producers*

Your answer:

I plan to sell

and I expect to receive prices ranging from

\$ _____/kg

to _____

\$ _____ /kg

Have you considered organic farming?

Organic products represent a business option for producers and processors, based on strong consumer trends in both domestic and export markets.

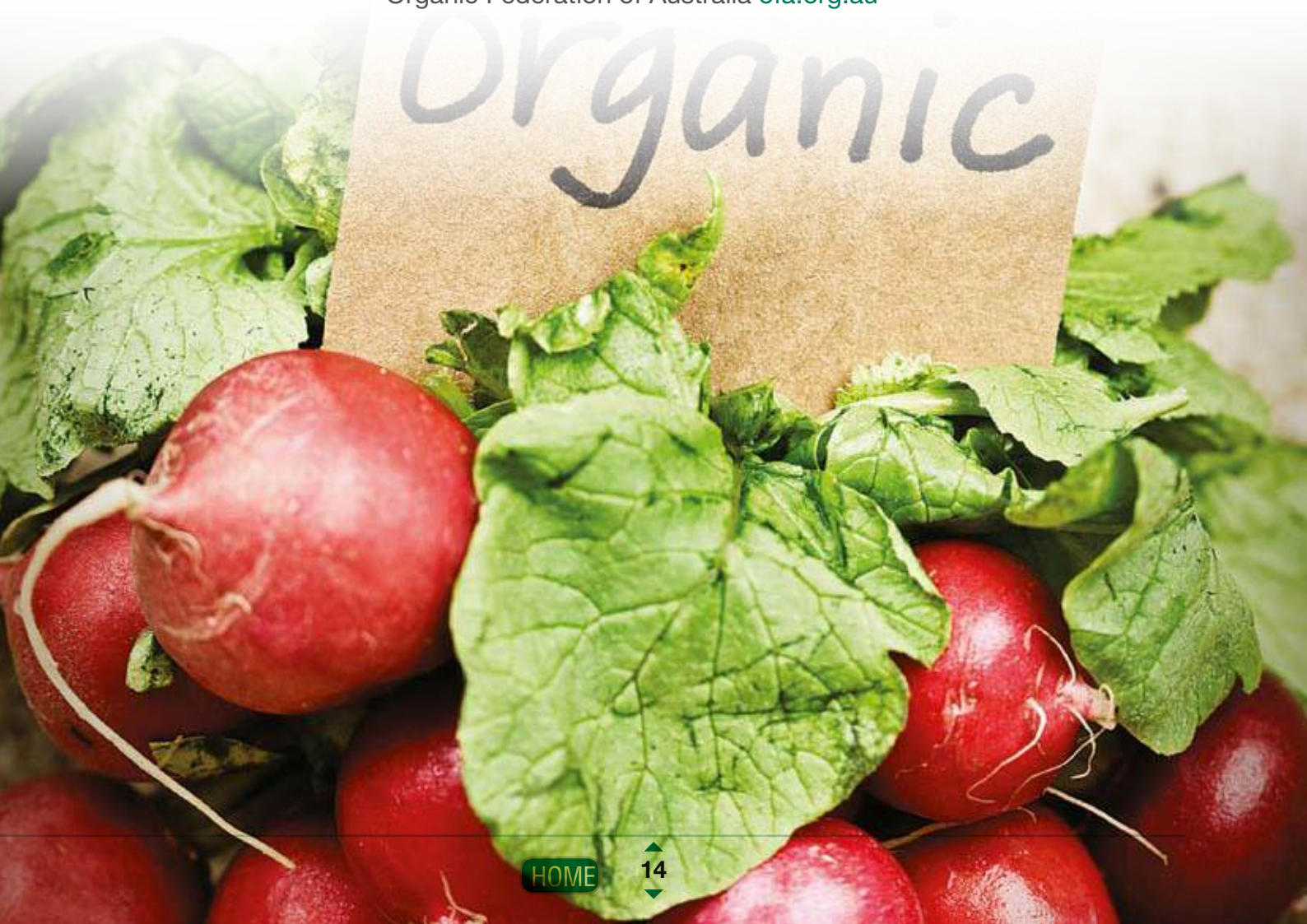
The term organic refers to a 'method of production' where techniques and inputs permitted are defined by organic standards and verified by an organic certification scheme.

Organic production prohibits the use of products or by-products derived from genetically modified (GM) organisms.

Conversion from conventional to organic typically takes three years, although a product can be sold labeled as 'in-conversion' organic after one year of compliance. If you are considering becoming an organic producer, carefully assess the technical feasibility and commercial viability of organic conversion before embarking on formal organic certification.

For further information read:

- Noteworthy 29 — *Going organic: what you need to know*
- Noteworthy 35 — *Marketing organic produce*
- Organic Association of Western Australia ogawa.org.au
- Organic Federation of Australia ofa.org.au



Horticulture — for fun, profit or ruin?

1. The major issue: water availability

Is there enough water for your plants?

The amount of water available, and its quality, will decide what you can grow and how much you can plant.

It is not economically viable to grow horticultural crops commercially on scheme water. The first thing to do, before buying land, is to ensure there is a source of sufficient high-quality water from a bore, dam or soak to irrigate your crop.

Given the high evaporation rates, crop water requirements and variability of rainfall, irrigation is essential for most commercial horticultural developments. Water dictates a plant's growth rate, planting density, yields and greatly influences fruit and flower quality. Consequences of insufficient water include:

- aborted flowers
- blossom end rot
- radial fruit cracking
- fruit splitting
- fruit drop
- small fruit
- lower yields
- insufficient leaf growth
- sunburn of fruit directly exposed to strong sunlight.

Water availability is important to achieve economically sustainable yields as it controls flowering time, flower stem length, fruit size, fruit total soluble solids content, oil content, harvest time, etc. It is better to plant a small area of crop and risk being left with excess water than plant a large area and risk not supplying enough water to the crop.

2. Key issues: water, market, climate, labour and soils

Do not rush into horticultural production.

How you start is much more important than when you start.

It should not make any difference to the market if you start production today or in two years time. However, spending two years researching and planning before starting production can make a significant difference to the future success of a horticultural enterprise and your financial situation. It can even be the difference between success and failure.

Hint

You should have access to 85 000L/day in summer to irrigate 1ha (2.5 acres) of fruit trees or vegetables.



In areas where there is no established horticulture, time is required to:

- Research the most suitable varieties and obtain sufficient quantities to plant on a commercial scale.
- Gather data on the time of production, yields, quality produced and the relevant markets.
- Assess the potential pest and disease hazards (soil types and location are important factors).
- Become familiar with the different production methods and select one suitable to the local conditions and/or your budget.
- Make an informed decision based on sound research and integrating the latest technology.
- Assess whether there is a chance the enterprise will be profitable (or if you will go broke).

Assuming you have enough water to grow horticultural crops commercially (read Water 2.1, below), you will need to undertake market research and find out what consumers want to buy and at what price (read Markets 2.2, page 20).

After producing a list of crops with reasonable market prospects, study the climate in your area and rule out those crops that will not successfully grow locally (read Climate 2.3, page 22).

More crops will be erased from the list when land, labour (read Labour 2.4, page 23) and cash flow requirements are considered.

The final decision will be taken after estimating the returns produced by the different crops (read Grow for profit 4, page 28).

Hint

The amount of water available, and its quality, will decide what and how many plants you can grow.

2.1 Water

Irrigation water is scarce, from both an economic and environmental point of view. One of the best selection criteria is:

the best crop among the list of suitable crops is the one that maximises the returns per unit of water used.

If you are buying a property with an existing water supply, check the water licence can be transferred into your name.

Check any caveats or encumbrances on the title, such as rights of way and drainage easements.



2.1.1 Water quality

Pool servicing businesses, bore drillers or chemical laboratories can test water salinity levels. Take water samples in the middle or end of summer as groundwater salinity often varies according to seasons and years and the highest salt levels are usually at the end of summer. Table 1 shows a list of commercial crops that can tolerate a range of salt levels.

Table 1 Tolerance of common plants to total salts in irrigation water

Conductivity/salinity	Salt-tolerant plants
0 to 90mS/m = 0 to 500mg/L salts = 0 to 500ppm salts.	Fruits — persimmon, passionfruit, strawberry, raspberry, loquat, avocado, almond, stone fruit, citrus, apple, pear Vegetables — green bean, parsnip, radish, celery, squash, pea, onion, carrot Flowers — rose, azalea, fuchsia, magnolia
90 to 270mS/m = 500 to 1500mg/L salts = 500 to 1500ppm salts.	Fruits — mulberry, grape Vegetables — cucumber, capsicum, lettuce, sweetcorn, rockmelon, potato, cauliflower, cabbage, watermelon, broccoli, pumpkin, tomato Flowers — gladiolus, hibiscus, geranium
270 to 635mS/m = 1500 to 3500mg/L salts = 1500 to 3500ppm salts.	Fruits — olive, fig, pomegranate Vegetables — spinach, asparagus, beet, kale, garden beet Flowers — chrysanthemum, carnation, rosemary

1000ppm = 77 grains per gallon.



2.1.2 Water quantity

After confirming water quality, make sure there is enough water to irrigate mature plants during the hottest period of the growing season.



Crops vary in their water needs throughout the year and their growth cycle. Some crops can be grown in the cooler months in the south-west with little need for irrigation at all. For example, during summer, an orange tree at Wokalup, measuring 3–4m across, will easily consume 100L/day. On average, during January, a 1ha orange orchard at Wokalup with 500 to 600 trees will require about 50 000 to 60 000L/day. Under extreme conditions, this may increase by 50%.

In another example, rockmelons, which do not require much water per day when young, require on average 85 000L/day/ha during their peak flowering time in January. On a hot, windy day, with 41°C and easterly winds, the same rockmelons may require 120 000 to 160 000L/ha of water depending on the growth stage. Table 2 shows the average irrigation requirements (kL/y/ha) for a number of selected crops at three different growing locations.

Table 2 Average irrigation water requirements of selected crops growing in three locations

Crop	kL/y/ha at Geraldton	kL/y/ha at Gingin	kL/y/ha at Manjimup
Avocado	25 000	20 000	10 000
Citrus	16 000	12 500	6300
Cucurbit (summer crop)	12 000 (rockmelon)	11 500 (rockmelon)	5500 (pumpkin)
Sweetcorn (summer crop)	9000	9000	6000
Tomato (summer crop)	15 000	13 000	9000

Note: These figures are approximate and allowances must be made for cooler or warmer climates and planting densities.

Generally, a crop's water requirement per day depends on evaporation, crop type, crop age and growth stage (flowering, fruit setting, etc.). It is essential to know how much water can be continuously extracted per hour from the water source and ensure you can meet the peak requirement of the crop. If a bore does not yield enough water per hour to supply the crop, you may have to use a windmill to pump slowly, but continuously, from the bore into a reservoir to protect the water source. The water from the reservoir can then be pumped out as

required. Excessive pumping from bores has often resulted in salty water intrusion, making the water too brackish for commercial horticultural crop production.

In summer, to irrigate 1ha (2.5 acres) you may need access to more than 100 000L/day.

Water – units of measurement

Water volumes are often expressed in different ways. We may talk about litres and kilolitres, but some publications (like the DAFWA irrigation calculator) quote water use in megalitres. It is important to understand water volumes as they relate to your crop and water resource.

For example:

- 1 kilolitre (kL) is one thousand (1000) litres (L), a cubic metre of water or 1 tonne (t) of water.
- 1 megalitre (ML) is 1 million litres (1 000 000L) or 100kL.
- 1 gigalitre (GL) is 1 thousand million litres (1 000 000 000L) or 1000ML.

The DAFWA online irrigation calculator provides information about the quantity of water required to grow a range of crops under different management strategies or seasonal planting scenarios at 14 locations throughout WA. The program is designed for general water budgeting and not detailed farm irrigation scheduling. Average weather data has been used to calculate water requirements for crops. Allowances need to be made for years that are hotter, drier, cooler or wetter than the long-term average.

“When establishing an irrigation system, make sure it suits your crop type and soil type.”

2.1.3 Irrigation

An irrigated crop can reach maturity more quickly than a dryland (unirrigated) crop. Irrigation also results in a more consistent yield and quality of product between plants and years, resulting in a higher income.

When establishing an irrigation system, make sure it suits your crop type and soil type. Investing in the right system and design at the start, is better than having to adjust or replace the system in the future.

There are three main types of irrigation systems:

1. overhead sprinkler (requires high pressure)
2. flood irrigation using bays or furrows (requires flat or gently sloping land and large volumes of water)
3. drip irrigation and micro-sprinkler (requires medium to low pressure and small volumes of water).



The most common systems used for horticultural crops are drip irrigation and micro-sprinklers. Drip irrigation is the most efficient system to deliver water to plants if designed and used correctly. Discuss your irrigation system with a competent irrigation designer. Contact Irrigation Australia Limited WA for a list of competent designers.

Also consider installing soil moisture monitoring equipment suited to the range of soil moisture tensions you want to measure to help apply the right amount of water at the right time. This will help reduce water use and maximise plant growth and productivity.

For land not previously irrigated you will need to increase the water allocation and develop a nutrient and irrigation management plan (NIMP). This plan will ensure irrigation water is applied efficiently and uniformly to the crop, and leaching of nitrogen (N) and phosphorus (P) fertilisers is minimised.

2.1.4 Rain-fed (dryland) crops

In areas with adequate predictable rainfall, crops such as olives, wine grapes and wildflowers, when established, can be commercially viable without irrigation. Be careful to select varieties that suit the area to achieve compatibility with the environment. Larger areas may need to be planted to compensate for the lower planting density required for rain-fed crops compared with irrigated crops.

The establishment of a rain-fed crop takes three to four years longer than an irrigated crop. Marketing of the final product is made more difficult by the inconsistency of the quality across the plantation and years. With irrigation, uniformity in yield and quality can be achieved between plants, sites and years. Irrigated plantations achieve faster and higher financial returns than non-irrigated plantations. The commercial production of olives, wine grapes and wildflowers without irrigation is an option suitable only in high-rainfall situations (for example >700mm/y).

Hint

Ask the market what does it want and then endeavour to produce it, rather than producing something and hoping the market will accept it.

2.2 Markets

If there is access to enough water and land to grow horticultural crops commercially, the next decision is 'what to grow'. The questions that must be answered, in order of priority, to generate a list of crops from which to select are:

1. What products does the market demand?
2. When is the peak period for demand?
3. What price will consumers pay for the products?

Thorough market research will provide the answers. Market research does not consist of going to the local fruit and vegetable shop to check the most expensive items. Horticultural crops, such as garlic, limes or avocados, are not necessarily profitable just because they are expensive to buy. Production costs are often high, so profits can be low.

Exert great caution when selecting an annual crop no one else is growing, such as okra or oyster mushrooms, because often the domestic market

for these products is small. A small increase in planted area will flood the market and reduce profit.

Prices often fluctuate between seasons. It is worth choosing a crop you can grow profitably when the price is at its peak. Price is determined by quality, presentation, a grower's reputation and the availability of produce on each market day. Growers with a reputation for consistent quality receive a premium price for their product. New growers have to establish a reputation and quality may be low at the start, so do not expect to receive top prices in your first year of production.

A valuable way to obtain information on markets and price is by:

- attending field days, congresses, conferences, workshops and other meetings associated with a particular crop or industry
- joining a growers' association
- talking to traders
- touring Market City at Canning Vale from 5 to 8am to obtain a sound understanding of the market system
- reading relevant horticultural sections of newspapers and magazines
- obtaining market information from DAFWA Trade Development Branch (for export markets) and Food and Agribusiness Development Branch (for local markets)
- gathering import and export statistics and detailed market research reports from online resources such as Global Trade Information Service, Euromonitor International, Business Monitor International and the United States Department of Agriculture (USDA) Foreign Agricultural Service (FAS).

Saturation point is reached quickly for unusual vegetables such as oyster mushrooms, taro and kohli rabi. Check the throughput figures and prices for your intended crop at Market City, Canning Vale.

2.2.1 Organics

Organic farming is generally defined as systems where the farmer develops sustainable crop management and a healthy soil, with no addition of synthetic agricultural chemicals, such as some fertilisers and pesticides.

Emphasis is placed on the use of renewable resources and the conservation of energy, soil and water resources. The production cycle is as closed as possible, with careful use of external inputs permitted by organic certification standards.



Organic standards require a farming enterprise to undergo a 12-month supervision period by an accredited certifying agency to ensure a workable conversion plan is in place. After the first year, the property enters the organic 'in-conversion' period, when produce sold in the organic marketplace can be labelled accordingly.

After three years of adherence to organic standards, a property typically progresses from 'in-conversion' to full 'organic' status.

Organic produce tends to attract higher prices compared with conventionally-grown produce.

However, organic systems are not as easy or as productive as conventional farming, especially on infertile sandy soils. It can be more difficult to control weeds, pests and diseases in organic farming systems compared with conventional systems. To be a successful farmer requires a sound knowledge of soil type, crop management and incidence of pests and diseases across different seasons.

2.3 Climate

You have enough irrigation water and a list of crops with promising market prospects. The next question is:

Which of these shortlisted crops can you grow *commercially* in your area?

Climate and crops must match. There are different varieties within a single crop species (such as grapes) and each variety can have specific climatic requirements to achieve optimum yields and quality.

Remember, markets want quality.

It can cost the same to grow a high-quality product as it costs to grow an average product, but the higher the quality; the higher the returns. Choose a crop that will produce high-quality produce because of its suitability to the local climate.

Knowledge about the local climate is important, because you must be able to predict the occurrence of key events, such as bud initiation, budburst, flowering, fruit set and fruit ripening, in order to calculate the crop water requirements and schedule irrigation, fertiliser application and labour.

Frequency and severity of frosts, the number of chilling hours and the average winter temperature are all important parameters to select a crop and the suitable variety of that crop for a particular area.

Discuss the commercial suitability of a particular crop with local DAFWA staff or a consultant. Give priority to those crops that can be easily produced off-season as they will get a well-above-average price for the same cost of production. Information about your local climate is available from the Bureau of Meteorology (bom.gov.au).

Hint

Avoid producing something of average quality at great cost. Select the right variety for your climate.

2.4 Labour

The demand for skilled labour for spraying, pruning, thinning, harvesting, sorting and packing is seasonal and usually for short periods that can vary from six to 16 weeks. The working hours, within the same week, can also vary from four to 10 hours per day (h/day). Two pickers may be sufficient to harvest 1ha of rockmelons, but the same area of tomatoes or strawberries could require 10 pickers.



To overcome the seasonality of horticultural work, producers regularly hire backpackers as they are often looking for short-term, casual employment. Providing accommodation can also be a draw-card as this eliminates the need for employees to look for accommodation while working in the area.

Individual workers will not generally commute more than 20km. However if your property is within a reasonable driving distance of a large town or city, providing a bus for workers to travel to and from work can increase the distance they are willing to travel. For instance, some producers north of Perth provide a bus from Wanneroo to Gingin/Lancelin (about 60km), allowing workers to live in a larger city with better facilities for their families, while still working on farm.

In general, for every 2ha of orchard or every 3ha of vegetables, the equivalent of one full-time job is created. Table 3 provides some figures associated for labour requirements.

Table 3 Approximate number of hours required for miscellaneous horticultural activities

Activity	Time hours (h) required
Pruning young mandarin trees	10h/ha/y
Pruning mature mandarin trees	50h/ha/y
Pruning olive trees	50h/ha/y
Thinning mandarin trees (biennial activity)	10mins per tree
Pest control and fertilising mandarin trees	20h/ha/y
Harvesting nectarines	5h/t or 200h/ha
Pest control and fertilising nectarine trees	50h/ha/y
Harvesting peaches	600h/ha/y
Harvesting olives	326h/ha/y
Picking and packing rockmelons	130h/ha/crop
Picking tomatoes	240h/ha/crop
Picking asparagus	466h/ha/y
Picking and packing mangoes (mature trees)	550h/ha/y

Hint

Labour must be available within a 20km radius.

2.5 Soils

If managed properly, most soils can be suitable for horticulture.

Where irrigation water is available, the most likely limiting factor to establishing perennial horticulture is the soil depth. A detailed soil survey, focusing on soil texture, will map those soils where depth is likely to be a problem and will also allow the planning of an efficient irrigation system.

The wetting pattern of a sandy soil is totally different to that of a clay soil and each soil type will require a specific irrigation system and/or irrigation schedule. Generally, sandy soils are irrigated for short but frequent periods, while clay soils are given water for longer periods and less frequently. Soils consisting of sand on clay require different management practices from clay on sand.

In some areas of WA, the soils are water repellent or acidic. Low soil pH (acidic) soils can be improved by regularly applying lime. Whenever possible, precede planting with pH correction. Three to four years may be required to increase the pH (in CaCl_2) from 4.5 to 5.5.

Obtain information on appropriate soil management and irrigation practices from DAFWA or attend topic-specific field days.

Most plants and soil micro-organisms thrive best in soils of a pH (H_2O) = 6–7.5.

Alkaline soils, mainly found along the coast, usually require phosphate fertilisers and crops on these soils often suffer from iron, manganese, zinc and boron deficiencies.

Fertiliser expenses are a large part of a horticultural budget so it is important to carry out soil tests before applying fertiliser. Understanding the soil nutrient status of your soils will ensure your investment in fertiliser pays off. When soil testing, it is important to sample soils at the same time of year (summer is recommended) and to follow an established sampling technique.

For more information on how to test soils:

- Visit the DAFWA website or contact your local DAFWA office. The soils in WA are relatively well mapped and maps can be purchased at DAFWA offices.
- Noteworthy 9 — *Soil sampling and testing on a small property*

3. Other important issues

3.1 Personal attributes

Successful growers have the following personal attributes:

- good health and enthusiasm for the work
- willingness to work long and unusual hours
- a supportive family who is willing to participate in the business
- mechanical ability is a distinctive advantage — it can save money in machinery maintenance and development
- business insight and the ability to manage labour
- knowledge of horticulture or the capacity to absorb and incorporate technical information. This may include:
 - precise husbandry — knowing the best planting times, choice of varieties and balanced plant nutrition
 - effective and efficient watering regimes, pest, disease and weed control and skills in harvesting, packing, storage and marketing.

A delay of only a few days in some of these operations or the wrong choice of management can be disastrous.



3.2 Impact on your neighbours

It is important to recognise that some horticultural production activities, such as pesticide spraying, construction of dams and vegetation clearing, can affect neighbours. Take reasonable and practicable measures to limit the impact of offending activities associated with chemical spray drift, intermittent or long-term odour and noise, dust, smoke and ash. In most cases, all that is required is a buffer area to separate conflicting land uses.

During August 2012, the Department of Health (DoH) released *Guidelines for Separation of Agricultural and Residential Land Uses*, which apply to all agricultural land uses. The guidelines require a 300m buffer, unless a vegetated buffer is established, prior to a sensitive use being established. The guidelines can be downloaded from the DoH website at public.health.wa.gov.au/3/1139/2/pesticide_use.pm

The most common concern neighbours have is associated with spray drift. Research and subsequent modelling has indicated negligible drift at a range of 300m downwind from the release point of a chemical spray application. Other research and field trials have shown vegetated buffers, such as windbreaks, are effective in capturing up to 80% of pesticide spray drift from an application upwind of a single row of trees.

Some of the factors affecting buffer area requirements for reducing agricultural chemical spray drift include:

- chemical composition (for example, toxicity, evaporation rates)
- method of application (for example, aerial application, mister, etc.)
- spray technology (for example, nozzle type, droplet size)
- adjuvant used
- weather conditions (for example, wind speed and direction)
- geographical conditions (for example, topography).

There are restrictions on the use of phenoxy-type ('hormone') herbicides such as 2,4-D, 2,4DB, MCPA, MCPB, dicamba, triclopyr, clopyralid and picloram.

There are restrictions on the use of phenoxy-type herbicides within 10km of any commercial tomato or vineyard crop. Generally speaking, the minimum separation distance between a sensitive receptor and agricultural land varies between 300 and 500m.

3.3 Firebreaks

Firebreaks are a legal requirement in WA. LGAs have specific firebreak notices, orders or regulations stipulating the width and placement of firebreaks. Firebreak notices, orders and regulations vary between LGAs, from town to rural land use and for firebreak purposes. Ensure your firebreaks comply with LGA requirements.

3.4 Quarantine

DAFWA must inspect all plants and nursery stock entering WA. There are restrictions on the entry and export of some seeds and plants to and from interstate and overseas.

Further information is available from Quarantine WA.

3.5 Buildings

Check LGA bylaws, as they may restrict the types of buildings you can establish. You may also need a building licence.



3.6 Planting material

Purchase healthy, disease-free planting material and plant varieties that suit the local climate and/or seasons. It takes the same amount of time, water, land and money to look after poorly-performing and/or unsuitable plants as it takes to look after a healthy crop.

Suitable varieties naturally produce more high-quality fruit while unsuitable varieties can produce unsaleable fruits (split, too small, immature, etc.) or no fruit at all. It is better to spend some time, even years if necessary, to research and/or obtain planting material suited to your climate rather than planting whatever is available or being promoted in other areas with a different climate.

When ordering stock (tube stock/plant material) from eastern Australia, remember that it will be subject to quarantine inspection, so if you are planning on hiring staff for planting allow extra time in the event plants are delayed in quarantine.

3.7 Windbreaks

Establish windbreaks before planting your crop if possible.

Windbreaks are essential.

Windbreaks significantly reduce plant stress and limit the spread of diseases. Wind can damage young trees and allow entry of collar rot organisms at ground level. Windbreaks will control bacterial black spot in mangoes. Dry winds interfere with pollination and prevailing winds result in fruit rub and unsightly marking of the skin, particularly in oranges, mangoes and custard apples. In addition, prevailing winds often prevent flowering on the windward quarter of the tree.

Windbreaks not only provide an improved microclimate for increased production by increasing water use efficiency, they also reduce wind erosion of the topsoil.

A windbreak consists of more than just one row of trees. An effective windbreak consists of external breaks planted with eucalypt, pine trees or

Hint

HOW you start is more important than WHEN you start.

sheoak and internal breaks planted with smaller trees or bushes such as tea-tree or bana grass. A windbreak, and the trees used in it, need to be porous to reduce wind speed.

For further information:

- Noteworthy 51 — *Establishing effective windbreaks on the Swan Coastal Plain*

3.8 Storage and transport

Most horticultural products require cool storage and refrigerated transport. Ensure you have access to suitable storage and transport facilities and include the associated costs in your budget.

4. Growing for profit

4.1 Finance

Do not use all your capital to buy a property. The cost of buying land is just the tip of the financial iceberg. Work through a budget carefully; include a capital budget, an annual cash flow budget and a development budget.

4.2 Quality product

Aim at producing quality rather than quantity. Quality fruits and vegetables may not always fetch the price they deserve, but they always sell and always sell first.





By subscribing to a quality assurance (QA) scheme you can obtain, for some crops, guidelines on how to grow, pack and store the crop. You will also be identified as a responsible supplier of safe, quality food products. This can enhance your image in the market place and provide a competitive advantage over others not involved in a QA scheme.

For further information:

- Noteworthy 49 — *Quality assurance schemes for fresh produce*

4.3 Budgeting

Budgeting is a necessary exercise to ensure you are not going to spend more than you can afford. A budget is required when you borrow money or apply for a grant or tax exemption. Even if you are not aiming to make a profit, or are going into horticulture purely for the lifestyle and do not have to worry about negative income, ensure you can continue to meet all your financial obligations.

Following is a summary of line items usually included in a budget template:

Investment inputs		Recurrent inputs	
Land		Seed	Seeds, rootstock, cuttings
Land preparation	Where applicable: clearing, deep ripping, liming	Irrigation/water	
Buildings	Sheds, storage tanks, cold store, packing shed	Soil preparation	Tilling, mulching, liming, etc.
Machinery	Tractor, harvester, sorter, etc.	Fertilisers	
Establishment	Fencing, banks, trellises, drains, netting, etc.	Chemicals	Herbicides; pesticides
Irrigation/fertigation	Irrigation equipment	Crop protection	Netting, trellises, covers, etc.
Processing	Where applicable: distillation, drying, etc.	Harvesting	
Permits, etc.	Permits, licenses, memberships to associations	Maintenance	Fencing, banks, structures, etc.
Working capital		Disposal	Disposal of refuse, waste, unused products
Water supply	Development and equipment (for example, dig dam, pump)	Levies, etc.	Annual permits, industry levies, subscriptions
		Transport	
		Packaging	
		Yield	
		Primary yield	Unit yield of primary crop
		By-product yield	Where applicable

In order to develop a budget you need to:

1. Adopt a production system for each envisaged crop. If you borrow a production system from a different area, ensure you modify it to suit your area.
2. Cost out each production system for each envisaged crop. In some cases, different varieties of the same crop must be treated as different crops because the varieties have different production costs. It is important to have an accurate estimate of the labour requirements because, in most horticultural crops, the costs of labour for picking and packing represent 70 to 80% of the total costs of production.
3. Estimate the achievable yields in the area with the adopted production system. Different varieties of the same crop can have different yields.
4. Estimate annual income across a minimum period of eight years for an annual crop and 12 to 18 years for a perennial crop. Different varieties of the same crop can fetch different prices on the market.

The information required to undertake an economic analysis of a particular horticultural enterprise can be obtained by attending relevant industry meetings, workshops, conferences, field days, etc., and by reading magazines covering issues associated with fruits and vegetables. The gathered information can be compared to example budgets, with the assistance of a consultant or local grower association.

5. Comments on selected crops

The following comments support a preliminary selection of crops suitable to your area.

These are provided as examples merely for reference.

5.1 Asparagus

Asparagus is grown in a wide variety of climates throughout WA, but yields and quality are best in the South-West. The main area for production is from Gingin to Denmark, from mid-August to December.

However, there is also a small area near Carnarvon where asparagus is produced from April to May and late spring.

Asparagus is more tolerant to large variations in temperature than most vegetables, but newly-emerged spears are frost prone. It is best grown on deep, well-drained soils where there is no shallow watertable.

After the spears have been cut, the 'fern' must be left for a minimum of four months to replenish the roots. Cutting for too long a period reduces the following year's crop and weakens the plant.





Irrigation is required from November to early March in the Albany area and may be required from September to April in the Perth area. Asparagus has a high salt tolerance compared with most vegetable crops.

Varieties such as UC 157 F1, Ida Lea F1, Atlas and Grande are recommended.

Picking of hybrid varieties can start in the second year and is heaviest in the third to sixth years. Yields will start to decline in year 10 and plants are normally replaced after 12 to 15 years.

Asparagus is hand picked three to seven times per week, early in the morning.

Asparagus must be taken to the packing shed as soon as possible after harvesting and cooled.

5.2 Avocados

Avocado trees are quite adaptable, growing from semi tropical (usually elevated locations) down to cool temperate locations. However, they are frost susceptible at any time of the year, particularly when young, so are best suited to frost-free locations. They are also susceptible to wind damage and sunburn.

The trees like well-drained soils and a pH of 5 to 6.

Avocado trees have a high water demand compared with many other fruit trees and their relatively shallow root systems require frequent irrigation. However, avocado trees are also highly susceptible to waterlogged conditions and 'dieback' (*Phytophthora cinnamomi*), so must not be over-watered.

The tree is sensitive to salt damage, especially chloride, so water quality is important. Effective soil moisture control and correct nutrition are the keys to successful avocado production.

Hass is currently the preferred variety in WA, with the best market prospect. This variety has moderate cold tolerance and grows and yields well in the south-west. Cross pollination, while not essential for the Hass, is becoming more popular to improve reliability of fruit set. Most other varieties of avocado do require cross pollination between flowering types 'A' and 'B'. Cold spring temperatures can affect pollination and fruit set, so avoid locations with cold night temperatures regularly below 10°C during flowering.

5.3 Brassicas

A wide range of vegetable brassicas is grown in WA, including head crops, leafy greens and Asian vegetables. The main vegetable brassicas produced in the state are broccolis, cabbages, cauliflowers and Chinese cabbages.

Brassicas are grown throughout the South-West. The two main growing regions are Manjimup and the Swan Coastal Plain, from 100km north of Perth to the Myalup region. Vegetable brassicas are cultivated on soil types ranging from light sands to heavy loam soils.

Vegetable brassicas are highly perishable. Ideally they need to be pre-cooled to 0°C, 95 to 100% relative humidity, then stored and transported at 0-2°C. Allowing produce to reach high temperatures during delivery and transportation will reduce post-harvest quality.

Storing or transporting vegetable brassicas with fruit and vegetables that produce ethylene (such as apples, apricots and avocados), will reduce their shelf life.

5.4 Carrots

Sandy soils are essential to produce high-quality carrots. Carrot production is located mainly on the Swan Coastal plain 150km to the north and south of Perth.

The mild climate and sandy soils of the Swan Coastal plain allow carrots to be sown and harvested every day of the year.

Carrot production is highly mechanised and export focused.

Winter-dominant rainfall means little irrigation is needed at this time of the year, while irrigation with quality water during summer is vital.



5.5 Chinese jujubes

The Chinese jujube is a medium-sized tree, growing 7-10m high, which produces a fruit with a thin, dark-red skin and sweet flesh surrounding a stone. Fruits are eaten fresh, dried or processed as 'Chinese dates'.

Chinese jujubes are currently grown in the Perth Hills, northern Rangelands, South-West and Great Southern regions of WA, where the rainfall ranges from 200–1000mm annually.

The jujube has a lower water requirement and a higher salt tolerance than most other fruits. The tree can produce a reasonable yield under severe drought due to its deep and substantial taproot. Strategic irrigation can improve fruit set, reduce fruit drop and improve fruit size, yield and quality.

The chilling requirement can range from 775 to 1737h at less than 7.2°C, depending on cultivar. For WA, low to medium chill varieties are best suited.

Fruit can be left on the tree to be picked when dried. In full yield, a tree can produce 30–40kg of fresh fruit with an estimated yield of 20–30t/ha.



5.6 Cider apples

The ideal conditions for cider apple production are cold winters, hot summers and low rainfall. Medium chill varieties are best suited to Australian conditions.

Production of fruit is gradual, starting at year three. When the tree reaches maturity, an average yield of 40t/ha (assuming 600–1000 trees/hectare) is expected. This can be higher under optimal growing and management conditions.

The crop can be mechanically harvested, using tree shakers, blowers, sweepers and washers. Any bruising sustained during harvest is nullified as the apple-crushing procedure is carried out soon after harvest.

Varieties with high tannin levels in the skin, acidic and high in natural sugar are the most suited for cider production.

5.7 Citrus

Oranges, mandarins, grapefruit, limes and lemons are grown in the south-west from Gingin to Manjimup. They can also be grown as far north as Kununurra. The South-West region has a temperate Mediterranean climate, suitable soils and high-quality irrigation water, allowing the production of high-quality, flavoured and good-coloured citrus. New growing areas at Carnarvon and Kununurra have shown strong expansion potential for red-fleshed grapefruit and summer lemons.

It is essential to select the right variety to produce fruits with a marketable acidity:sugar level ratio.

Wind protection is vital in avoiding skin-blemish due to leaf and branch rub.

5.8 Custard apples

Custard apple trees can grow up to 7m high and produce a fruit with a green skin and white juicy flesh. Custard apples require shelter as they are prone to wind damage. Trees prefer a warm, frost-free site preferably in an area along the coast. Temperature ranges for optimum growth and performance are 10 to 28°C. Custard apples also require deep, well-drained soil to minimise root diseases.

Hand pollination can improve fruit set dramatically and may be required to make it a commercial venture. Custard apples require high rainfall and humid conditions at flowering time.

Irrigation is not essential, but it does help increase yield and quality. Custard apple trees will do better than most unirrigated fruit trees under the same conditions.

Custard apple trees are labour intensive and many harvestings are needed per year, as fruit differing widely in stage of maturity is carried on the tree at one time.

Varieties include the atemoya variety Pink Mammoth with an optimum temperature range for fruit maturation of 20 to 26°C.

5.9 Figs

Fig trees are generally considered sub-tropical plants but can be grown successfully in cooler areas where winters are relatively moderate. Young trees are susceptible to frost damage, especially if spring frosts are severe.

Fig trees tolerate drier conditions than most fruit trees, but irrigation is still required. Most fig species do not cope well with major moisture variations and are easily stressed during dry conditions.

Bird netting may also be required.

Figs need to be cooled as soon as possible. They have a short shelf life of one to two days after they are taken out of cool store.

5.10 Green tea

Green tea is similar to black tea; the difference in the style of tea comes from the processing. Green tea is a small developing industry in WA, it is better suited to the south-west of WA as it needs minimal days above 35°C, but also requires a location that does not have spring frost as the first spring flush is the most valuable.

The crop prefers sandy loam to clay loam soils with a pH of 4.5 to 6.0. Green tea shrubs must be protected from winds, preferably located more than 10km from the ocean and irrigated with high-quality water during the warmer months.

Green tea has a relatively high nutrition requirement to push new soft growth flushes. Pruning and harvesting for green tea is mechanical and production locations need to be close to processing operations.

5.11 Mangoes

Mangoes are a tropical fruit, though commercial plantings are established as far south as Gingin, they are mostly grown in Kununurra, Broome and Carnarvon. Like many tropical fruits, mangoes can be grown out of their ideal climate, however a number of issues make it more difficult to produce consistent commercial crops. The fruit grows best in areas with low rainfall and low relative humidity at flowering, fruit setting and harvesting, and with a warm to hot climate during fruiting.

Mangoes are susceptible to cold and temperatures approaching 0°C will damage young trees and flowering flushes in mature trees. Older trees can tolerate a few degrees of frost but may be severely damaged. Temperatures approaching 0°C will damage young trees and also flowering flushes in mature trees.

The optimum soils are slightly acidic and well drained, but mature trees do tolerate flooding.

Mangoes can tolerate waterlogging and moderately saline conditions better than most tropical tree crops but for best results, irrigation water should contain less than 1000ppm total salts.

The standard variety is Kensington Pride, but newer higher-yielding hybrids are being released. Mango trees are not consistent bearers and yields can vary from year to year.



5.12 Olives

Olives are generally grown in WA from Northampton to Albany. The optimum temperatures for growth are 15 to 34°C. For successful flower initiation and production, olives require an average monthly minimum winter temperature of less than 10°C. However, this chilling requirement varies between varieties. Olive production becomes marginal north of Carnamah as winter temperatures are rather high and tree vigour increases at the expense of fruiting capability. The Dandaragan, Gingin and Moora regions are more suited to olive production. The selection of specific varieties suitable to a hot Mediterranean climate will ensure the economic viability of olive groves north of Dandaragan.

Temperature affects not only yield, but fruit and oil quality.

Olive oil produced in Australia requires marketing and for those in warm areas, this will be a significant cost during the lifetime of their project.

5.13 Passionfruit

Passionfruit growth is affected by wind and protection with windbreaks is important. Vines can tolerate light frosts.

Passionfruit vines like well-drained soils, with a pH ranging from 5.5 to 6.0 and water with less than 500ppm salts.

In WA, most of the passionfruit grown are varieties of the purple-fruited *Passiflora edulis*, which produces heavy crops of hard-shelled fruit with high pulp content and strong flavour. The variety Nellie Kelly has been superseded by hybrids such as Purple Gold and E-23. The Hawaiian or Golden passionfruit (*Passiflora edulis* f. *flavicarpa*) is also worth considering in areas north of Perth, where the summer heat allows full development of its aromatic flavour.

5.14 Persimmons

There are two types of persimmons — astringent and non-astringent. Astringent varieties contain a high level of water-soluble tannins and are generally unpalatable before they become soft. Non-astringent persimmons, or sweet persimmons as they are commonly marketed, have low levels of water-soluble tannins and can therefore be eaten when still firm. They also remain edible when soft.

Wind protection is vital to avoid skin blemish due to leaf and branch rub.

Persimmons have a chilling requirement of less than 50h. They can tolerate quite cold conditions when dormant but are frost sensitive when flowering and again when ripening (for late varieties). As such, the persimmon tree is quite climatically adaptable, growing in a wide range of locations across WA, however they can struggle with extremely hot and dry conditions.

Later-maturing varieties, such as the popular non-astringent variety Fuyu, require warmer climates to develop high sugar levels so are less suited to the lower south-west. Many non-astringent varieties will set fruit without pollination, resulting in seedless fruit; this is particularly favourable in the market place.

Persimmons also prefer loams to loamy clay soils and tend to struggle on sandy soils, regular irrigation during summer is essential to maintain tree health and fruit quality.

Non-astringent fruits have a shelf life of 10 to 15 days but modified atmosphere storage is possible for up to four months. Persimmons can therefore be exported using sea freight.

Growing persimmon trees is relatively easy, but growing quality fruit for market, particularly the competitive export market, has been rated by professional growers as difficult.

5.15 Pome fruit (apples, pears, etc.)

It is important to ensure the local climate matches the fruits' requirements before developing a pome fruit orchard.

Pome fruits require a sufficient amount of winter chilling hours. Low night time temperatures in the month before harvest are essential to ensure suitable colour on red or bicolour varieties. For these reasons, pome fruit are generally not grown north of Perth.

Pome fruit trees prefer areas with well-drained soil, protected from spring frosts and strong winds. They also require protection from hail storms, sunburn, birds and other pests.

Apple trees are prone to 'apple replant disease' when new trees are planted on an old orchard site. Recently cleared sites can cause trees to become infected with *Armillaria* root rots.

Water salinity in excess of 550ppm might affect tree health and fruit production. Apple orchards require on average between 6 to 7ML/ha/y depending on location.

There are many different rootstocks to choose from based on soil type, vigour control and the particular type of production system selected. A trellis is needed with most modern production systems.

Compatible pollinator trees must be planted among the main variety to ensure regular fruit production.

Chemical and hand thinning of young fruitlets after fruit set is required to ensure a marketable fruit size at harvest.



5.16 Pomegranates

The pomegranate tree is a small tree, growing 4 to 5m high, which can be grown in most parts of Australia. The fruit consists of many close-packed grains (arils) and segments separated by non-edible white pith. The arils contain a seed surrounded by an edible juice pulp.

Pomegranates require a Mediterranean climate with low rainfall in summer and early autumn to avoid fruit splitting. Established trees can tolerate frosts to -10°C and drought conditions. Pomegranates require 150 to 200 chilling hours (below 7°C) to break dormancy and start flowering.

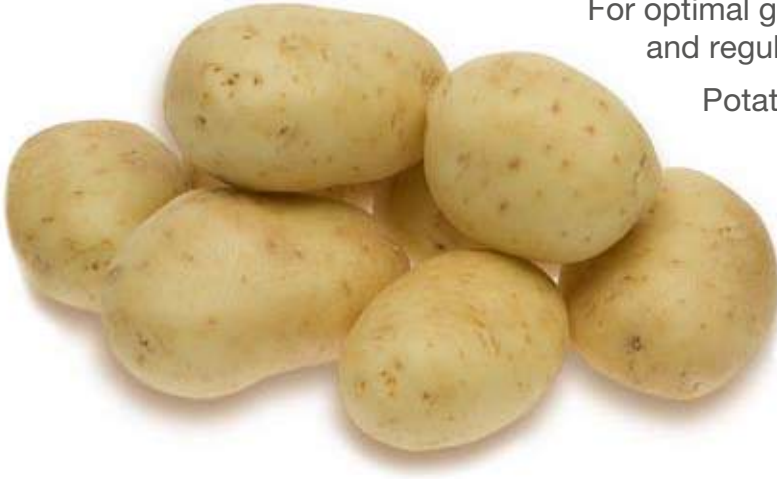
Pomegranates are salt and drought tolerant and will also withstand short periods of waterlogging. Mature plants need on average 5 to 8ML/ha/y, from September to April.

Pomegranates generally take three years to establish. Full production can produce up to 20 to 25t/ha at maturity. Fruit matures from March to May. The pomegranate can be stored for up to seven months.

5.17 Potatoes

Potatoes are grown in south-west WA across six different growing regions. They are grown as far north as Lancelin/Gingin, through the metropolitan region to Baldivis, south through Myalup to Busselton and inland to Pemberton/Manjimup.

For optimal growth, potatoes need long sunlight days and regular rainfall.



Potatoes are the only crop controlled by a marketing board (Potato Marketing Corporation). To grow more than 500 plants per year for sale of this crop, you need to buy a licence from an existing grower, which will specify the area of crop, time of planting and time of harvesting.

Licensed growers are issued a growing allocation by the Potato Marketing Corporation.

5.18 Stone fruits (plums, nectarines, etc.)

The requirements for stone fruits are similar to pome fruits. The selection of the right cultivar to match the amount of winter chill hours available in a particular area is essential. There are many 'low chill' cultivars of stone fruits (except for cherries).

Stone fruit trees must be planted in well-drained soil, protected from spring frosts and strong winds. They also require protection from hail storms, sunburn, birds and other pests. Stone fruits do not like to have 'wet feet' and can be prone to *phytophthora* spp or collar rot.

Water salinity in excess of 550ppm can affect tree health and fruit production. Stone fruit orchards require, on average, 4 to 7ML/ha/y depending on location and time of harvest.

Compatible pollinator trees must be planted among the main variety to ensure regular fruit production in cherries and plums. Apricots, nectarines and peaches are usually self-pollinated.

Hand thinning of young fruitlets after fruit set is required to ensure a marketable fruit size at harvest on most species.

5.19 Table grapes

Table grapes are grown commercially from Carnarvon in the north to Margaret River in the south within four main regions; Carnarvon, Mid West, Swan Valley and South-West. Harvest occurs from early November to early May but supply can be extended to July–August with cool storage.

Table grape varieties differ to those used in wine production because varieties are selected on entirely different characteristics than a wine

grape variety. The table grape variety must look visually appealing in terms of bunch size, bunch shape, berry shape, berry size, colour and ultimately must taste good.

Growers must carefully select rootstock and varieties in order to meet the demand of the various markets. Site selection again requires careful consideration when planning a table grape vineyard; climate, soil type and water availability/quality should all be reviewed.



5.20 Tomatoes

Tomatoes are grown from Geraldton and Carnarvon in the north to Perth, the South-West and the Southern Agricultural Regions in the south. They can be grown in the field or in a greenhouse.

Tomatoes will grow in a wide range of soil types. Sites should be relatively free of frost and protected from strong winds. Plan a five to seven year rotation of tomato crops because soil-borne diseases build up after repeated cropping of the same area.

5.21 Wine grapes

Wine grapes are successfully grown in WA ranging from the Mid West down to Albany. Predominately the industry is located in the cooler regions. Production levels are typically low but quality is high. Most wine grape businesses are small family-owned operations.

Site selection is paramount when considering planting a vineyard as this determines wine style and overall quality. It is important to match the variety to the vineyard to ensure the wine will reach its full potential. The market for wine grapes can be fickle and securing a market before planting is a sound strategy. Careful planning is essential before planting a new vineyard.

6. Tax matters

It is important to determine whether your enterprise is to be considered commercial or if it is a 'hobby'. If it is considered commercial, you will be able to claim various items as tax deductions.

Primary producers have some extra tax concessions not available to other businesses, such as deductions for conducting landcare operations, conserving or conveying water (i.e. water facilities dams, pumps, bores), electrical connections, telephone lines, plant material, forced disposal or death of livestock, etc.

Further information is available from the Australian Taxation Office (ATO), consultants and accountants.

Overview

This section is intended to provide landholders with information to increase their understanding of their rights and obligations in owning land and the various legislative controls that exist in developing and operating land use activities. The information has been compiled and condensed from various sources.

This section is for guidance only and it is advisable to seek advice from the relevant government agencies listed within each sub-section. Contact details for relevant government agencies are enclosed at the rear of this section.

Some of the information contained within this section includes:

- outline of relevant legislation
- application requirements
- overview of application process and decision-making powers
- appeal rights.

If you intend to buy land to develop, and the new land-use activity requires any of the approvals mentioned within this section, it would be wise to make sure there is sufficient time allowed in the Offer and Acceptance form to enable you to have a reasonable assurance that you will be able to undertake your venture, and to cover any necessary approval processes.

Government agencies involved in land-use planning issues are:

Department of Agriculture and Food, Western Australia	DAFWA
Department of Environment Regulation	DER
Department of Fisheries	DoF
Department of Parks and Wildlife	DPaW
Department of Planning	DoP
Environmental Protection Agency	EPA
Local Government Authority (the local shire, council or city)	LGA
Main Roads Western Australia	MRWA

This overview does not replace the need to seek specific advice regarding any particular proposal. It should only be used for the purposes of understanding some of the legislative controls, requirements and processes exercised by government agencies. It is not an extensive list of all legislative requirements affecting landholders, as this list is constantly changing and evolving.

1. Planning controls

1.1 Summary of controls

Ensure all activities undertaken are in accordance with the requirements of the LGAs local planning scheme.

Seek early guidance from your LGA office if considering undertaking any development or land use change, so all necessary requirements can be determined.

1.2 Application

Local government is responsible for developing local planning strategies and local planning schemes. Local planning strategies set out an LGAs broad vision, overall strategy and rationale for development controls and other provisions for land use and development, including rural land use and settlement.

Local planning schemes are statutory documents supported by the *Planning and Development Act 2005* that help LGAs achieve their municipal land use planning objectives. The schemes are prepared for all or part of the municipality and must be reviewed every five years by the LGA. The schemes can be amended and land rezoned during their operation to capture changing municipality needs.

District and town planning schemes are the most common local planning scheme for LGAs. These schemes use the concept of zoning to identify and allocate land for various purposes. Controls are established to ensure land is used for the intended purpose based on issues such as compatibility, equity and/or efficiency. A key or 'use class table' indicates the uses permitted within particular zones. 'Use class tables' contain cross-referencing systems that define the procedures used to assess the permissibility of an intended land use in a development application.

The 'model scheme text', prepared by the DoP, guides the content and format of local planning schemes. This includes recommended names for zones including agricultural zones and land use definitions including those for agricultural uses.

Local planning schemes can zone land for purely 'agricultural' use and prohibit any land use that is inconsistent with this designation. Controls can be incorporated into schemes to ensure land is used for its intended



“Local government is responsible for developing local planning strategies and local planning schemes.”

use and in a manner that ensures protection of the broader environment. Controls can also specify subdivision, development and land management requirements.

Some LGAs do not have planning schemes, while some only have schemes affecting portions of their LGA. In these instances, the LGA will have no control over land use and development, but will have controls on building construction and health matters.

Development approval is required to develop a land use that is listed within a local planning scheme. In most LGAs intensive agriculture uses, such as horticulture, require planning approval. In some zones (for example, rural-residential zones) horticulture may not be permitted due to the proximity of residential dwellings.

Landholders must complete an 'Application for Planning Approval' and submit this to their LGA for consideration before starting development.

Applications require information relating to land particulars, land use proposed, site details and plans/maps of the proposal. As part of the approvals process for a horticultural development the LGA may request information about the type of crops, the method of irrigation and the source of water to be used. You may also be asked to include a plan for managing water and nutrients, which may also include information about the source of water and the management of fertilisers. As part of an application for a water licence the DoW requires a nutrient and irrigation management plan and this plan can also be used for the LGA application. Some LGAs have a separate planning approval process for building dams in addition to permits that may be needed from the DoW.

Landholders would not normally require development approval for the erection of a boundary fence, clearing of fence lines and firebreaks, erection of a single house in a rural or general farming zone or broadacre cropping/farming or livestock grazing. Check with your LGA to confirm.

1.3 Approval process

The LGA may refer your proposal to develop land to various government agencies (DAFWA, DER, MRWA, etc.) that may be concerned with the proposal, requesting their consideration and comment. The LGA may also advertise your proposal to develop land to enable public consultation and comment.

The LGA will determine whether the proposal:

- (a) can proceed and impose relevant conditions or
- (b) may not proceed and will provide reasons for the refusal.

If approval is refused or conditions that have been placed on an approval are disagreeable, an appeal to the State Administrative Tribunal is available within 60 days of the decision.

“Development approval is required to develop a land use that is listed within a local planning scheme. In most LGAs intensive agriculture uses, such as horticulture, require planning approval.”

1.4 Issues to consider

Some activities or industries are deemed as an offensive trade under the *Health Act 1911* and are subject to registration by LGAs. LGA environmental health officers have a responsibility to administer the provisions of the *Health Act 1911* and local health laws in each municipality. This role is wide-ranging and covers areas such as monitoring of non-scheme public water supplies, commercial food premises, vetting and approval of building plans for certain health requirements and approval and inspection of onsite systems for disposal of water. There are many other areas of responsibility and enforcement.

If you wish to start a business or develop land that may impact on environmental health, contact the LGA environmental health officer for advice on relevant requirements. LGA health authorities often work closely with the DER in regard to the approval and monitoring of industries that may cause environmental pollution.

Activities that are listed in Schedule 1 of the Environmental Protection Regulations 1987 may cause your premises to become prescribed premises and subject to a works approval or licence requirement under the *Environmental Protection (EP) Act 1986* if there will be emissions or discharges to air, land or water. The DER administers that Act and can be contacted through their regional office for advice.

1.5 Key words

- Development:** Shall have the same meaning given to it in and for the purposes of the Act but shall also include the clearing of indigenous vegetation communities, excavation or filling of land or drainage works.
- Development approval:** The approval granted by an LGA for the development of land.
- Local rural strategy:** A non-statutory rural planning strategy prepared by LGAs to guide rural land use and development.
- Town planning scheme:** A town planning scheme adopted and gazetted under the *Planning and Development Act 2005* and *Approvals and Related Reforms (No. 4) (Planning) Act 2010*.
- Zone:** A portion of the scheme area for the purpose of indicating the restrictions imposed by the scheme on the use and development of land.

“If you wish to start a business or develop land that may impact on environmental health, contact the LGA environmental health officer for advice on relevant requirements.”

2. Land clearing controls

2.1 Summary of controls

If you intend to clear native vegetation you will need to apply for a permit from the DER, or otherwise an exemption must apply. The DER's *A guide to the exemptions and regulations for clearing native vegetation* will assist in determining exemptions that apply.

A proposal to clear land for agricultural purposes can be a lengthy process, due to the number of inherent environmental considerations and the various referrals to government agencies that must be undertaken.

Seek comment and guidance from your local DER office at an early stage of your proposal.

Information on land clearing, including application forms, fact sheets and guides can be found on the DER website.



2.2 Application

Clearing permit applications under the EP Act can be downloaded from the DER website. In reviewing proposals, the principles contained in Schedule 5 of the EP Act and also any planning instrument or other relevant matter are considered. The clearing principles consider environmental impacts on biodiversity values, water quality and land degradation. Clearing that significantly impacts on the environment is generally not supported. The DER native vegetation fact sheet 1 *Native vegetation clearing legislation in Western Australia* outlines the intent of the clearing legislation in more detail.

Certain items under the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 only exempt clearing to the extent that the total combined clearing under any of these exemptions does not exceed one hectare in any financial year. This means if you clear under one or more of the following items, the total area cleared for all of these purposes may not add up to more than one hectare in a financial year.

- Clearing to construct a building (Regulation 5, Item 1)
- Clearing to collect firewood (Regulation 5, Item 5)
- Clearing to obtain fencing or farming materials (Regulation 5, Item 6)
- Clearing for woodwork (Regulation 5, Item 7)
- Clearing for fence lines (Regulation 5, Items 10)

- Clearing for vehicular tracks (Regulation 5, Item 12)
- Clearing for walking tracks (Regulation 5, Item 13)
- Clearing isolated trees (Regulation 5, Item 19)

There are a number of areas where the exemptions under the Clearing Regulations do not apply. These areas are environmentally sensitive areas (ESA) declared by the Minister under section 51B of the EP Act. If you want to clear native vegetation in an ESA for one of the purposes under the Clearing Regulations, you need to apply for a clearing permit.

There are two types of permits:

Area permits — are used when the applicant owns the land or when the applicant is applying on behalf of the owner and has the written authority to do so. Area permits are for a defined area.

Purpose permits — can be used when the applicant does not own the land they wish to clear but has authority under a written law or permission to access the land to undertake clearing. Purpose permits are usually for clearing of different areas from time to time for a specified purpose.

“Purpose permits are usually for clearing of different areas from time to time for a specified purpose.”

Steps involved in applying for a permit to clear native vegetation

Step 1 — Contact your local DER office.

Step 2 — Submit application (available on the DER website or from your local DER office) and pay application fees.

To submit an application you must provide:

- a completed application form
- the correct application fee
- an aerial photograph or map showing north and clearly indicating the area you propose to clear.

Step 3 — Assessment and possible site visit by DER or other government agencies. You may be required to provide additional or more detailed information to help complete the assessment. Your application will be assessed for impacts on a wide range of environmental issues including biodiversity, land degradation and water quality.

Step 4 — The CEO of DER (or a delegate) will decide to either grant the permit or refuse the permit. The permit may be subject to conditions.

Step 5 — The applicant or a third party can appeal the decision or conditions of the permit. Appeals are made to the Minister for Environment. The Minister will refer the appeal to the Appeals Convenor who will then liaise with the EPA or DER depending on the nature of the appeal. Time limits to appeal do apply.



2.3 Key words

Clearing:

(a) the killing or destruction of; (b) the removal of; (c) the severing or ringbarking of trunks or stems of; or (d) the doing of any other substantial damage to, some or all of the native vegetation in an area, and includes the draining or flooding of land, the burning of vegetation, the grazing of stock, or any other act or activity that causes (e) the killing or destruction of; (f) the severing of trunks or stems of; or (g) any other substantial damage to, some or all of the native vegetation in the area.

Land degradation:

Includes soil erosion, salinity, eutrophication (nutrient export) and flooding; and the removal or deterioration of natural or introduced vegetation; that may be detrimental to the present or future use of the land (*Soil and Land Conservation Act 1945*).

Native vegetation:

Indigenous aquatic or terrestrial vegetation. Includes dead vegetation unless that dead vegetation is of a class declared by regulation to be excluded from this definition but does not include vegetation in a plantation.

3. Pollution controls

3.1 Summary of controls

Ensure all activities undertaken are in accordance with the prescribed limits of state and federal legislation. Be aware of your obligations and responsibilities to neighbours and the general community, ensuring that any activity is properly managed to prevent pollution or loss of amenity.

Industry regulation

Certain industrial premises with significant potential to cause emissions and discharges to air, land or water are known as ‘prescribed premises’ and trigger regulation under the EP Act. The EP Act requires a works approval to be obtained before constructing a prescribed premise and a licence or registration to operate the premises. The prescribed premises categories are outlined in Schedule 1 of the Environmental Protection Regulations 1987 (EP Regulations).

Contact the local DER office in the first instance, where a landholder’s facility is responsible for emissions or discharges to the environment. Proposals for horticulture or other intensive agriculture close to environmentally sensitive areas may be referred to DER by DAFWA, the LGA or DoW. These proposals may require special management to protect those areas and in some (usually exceptional) cases, assessment by the EPA.

“Be aware of your obligations and responsibilities to neighbours and the general community, ensuring that any activity is properly managed to prevent pollution or loss of amenity.”

Buffer distances

Advice on separation distances between industrial activities and sensitive receptors or residences is available in the guidance statements on the website of the EPA. The statements are used by government authorities as guidance when they are considering land use applications.

Noise

DER and LGAs also administer the Environmental Protection (Noise) Regulations 1997. These regulations control noise levels permitted from activities and processes.

Seek comment and guidance from the local DER or LGA office at an early stage of your proposal, to identify all necessary requirements.



3.2 Application

Works approval and licensing

If you propose to operate, or do operate, a premises prescribed in Schedule 1 of the EP Regulations, you will require a works approval to construct, and a licence or registration to operate. A works approval, licence or registration is issued to the person or company who is in control or occupation of the premises (the occupier).

An occupier must hold a works approval:

- before starting any work or construction that will cause the premises to become prescribed as a category under Schedule 1 of the EP Regulations
- before starting any work or construction that may cause, increase, or alter emissions and discharges from an existing prescribed premise.

Before operating a premise in Part 1 of Schedule 1, you must obtain a licence. Part 1 premises are engaged in activities that produce emissions and discharges with significant risk to the environment and trigger the regulation of management through a licence. For categories in Part 2 of Schedule 1, occupiers of the prescribed premises require a works approval to construct but may apply to DER to be registered instead of holding a licence as they are lower risk activities.

Works approvals and licences are issued with conditions that apply to specific premises and are intended to prevent or minimise the emissions and discharges of waste to the environment. Registrations do not contain conditions and are issued to premises that are then managed and regulated through industry-generic regulations and codes of practice or guidelines.

“Works approvals and licences are issued with conditions that apply to specific premises and are intended to prevent or minimise the emissions and discharges of waste to the environment.”

Any proponent can appeal the refusal of, or conditions in, a licence or works approval to the Minister for Environment.

Issues to consider

LGAs also employ environmental health officers. These officers may have responsibilities under the local rural strategy, town planning scheme, the *Health Act 1911* and the environment protection regulations. Some aspects of your project may need to be licensed and/or monitored by this officer.

3.3 Key words

- Emission:** Discharge of waste, emission of noise, odour or electromagnetic radiation or transmission of electromagnetic radiation.
- Residential:** Any permanent structure whose primary use is as a dwelling place.
- Sensitive land use:** Land use sensitive to emissions from industry and infrastructure. Sensitive land uses include residential development, hospitals, hotels, motels, hostels, caravan parks, schools, nursing homes, childcare facilities, shopping centres, playgrounds and some public buildings. Some commercial, institutional and industrial land uses that require high levels of amenity or are sensitive to particular emissions may also be considered 'sensitive land uses'. Examples include some retail outlets, offices and training centres and some types of storage and manufacturing.
- Separation distance:** The shortest distance between the boundary of the area that may potentially be used by an industrial land use and the boundary of the area that may be used by a sensitive land use.

4. Drainage and pumping controls

4.1 Summary of controls

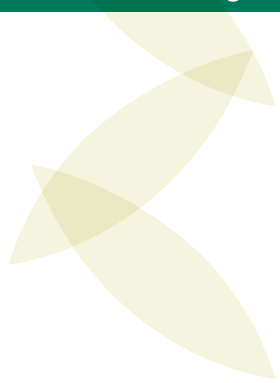
Certain types of drainage are regulated under the *Soil and Land Conservation Act 1945*. Regulation 5 concerns saline groundwater drainage discharge throughout the State, except in the Gazetted Peel Harvey Estuary Catchment (PHC). In the PHC, all types of drainage works need to be notified to the Commissioner of Soil and Land Conservation under Regulation 6.

As drainage may have undesirable impacts, do not undertake drainage works before obtaining the necessary consent. Be aware of your obligations and responsibilities to neighbours and the general community to ensure these activities do not lead to land degradation.

The draining or pumping of saline groundwater and discharging it onto other areas or into waterways can degrade water quality and the surrounding land and utilities by:

- increasing salinisation of land or waterways further away
- increasing waterlogging
- increasing nutrient export
- creating loss of amenity (for example, degradation of natural vegetation, damage to roads or culverts or an increase in soil erosion).





DAFWA is required to refer your proposal to various other government agencies and consider any advice received when assessing its likely impacts when determining the application.

Seek comment and guidance from your local DAFWA office at an early stage of your proposal so all necessary requirements can be identified.

“If you plan to pump or drain water into a reserve vested with Department of Parks and Wildlife, seek their permission before undertaking any activity.”

4.2 Application

An owner or occupier of land must complete a Notice of Intent (Form 2 in Schedule 2 of the Regulations) and lodge it with the Commissioner for Soil and Land Conservation at least 90 days before starting the notifiable drainage activity.

Notices will require information relating to:

- area of land to be drained or pumped
- where the water is to be drained or pumped to
- period of draining/pumping activity
- map of the proposal.

If you plan to pump or drain water to control salinity you are also required to seek the endorsement of any downstream user that may be affected by the proposal.

If you plan to pump or drain water into a reserve vested with DPaW, seek their permission before undertaking any activity.

Unless the property is located in the PHC, if you are undertaking shallow drains and banks for controlling non-saline surface water you are not required to notify the Commissioner unless the quantity of water that is discharged by the drains is likely to cause problems for landholders downstream. In the PHC, modifications to existing drains or construction of new drainage works are required to be notified under Regulation 6. Water cannot be moved from one drainage line to another without the permission of downstream landholders.

4.3 What happens to my application?

The Commissioner for Soil and Land Conservation will refer your proposal to drain or pump water to various government agencies (LGAs, DAFWA, DoW, DER, DPaW, etc.) that may be concerned with the proposal requesting their consideration and comment.

The Commissioner will determine if the proposal:

- can proceed and impose relevant conditions
- may result in land degradation and issue a Soil Conservation Notice to prevent the proposal from proceeding
- should be referred to the EPA, DER and DoW.

Consult the DPaW if your proposal is likely to affect any land under their control.

If no activity has commenced for a period of two years from the date of approval, fresh notification is required.

4.4 Other approvals

Other approvals may also be required, including:

- Planning approval — some LGAs require development approval for certain types of earthworks, which may include deep drains. Check with your LGA before starting work.
- Public land — where your drain is proposed to cross or discharge onto public land (such as a road reserve, rail reserve or conservation reserve) you must seek approval from the authority responsible for that land.
- Native vegetation — if your drain requires the removal of native vegetation or will lead to the destruction of native vegetation, a permit may be required from the DER.
- Interfering with watercourses — some watercourses are subject to special controls and may require the approval of the DER.

Telecommunication services always make sure the excavation of a drain does not interfere with or damage telecommunication cables, as repair costs can be significant.

If the drain crosses minor or major roads approval may be required from the LGA or MRWA.

4.5 Key words

Drainage: The interception and removal of excess surface and/or sub-surface water from land using artificial means.

Salinity: Deterioration in soil quality or water quality resulting from the accumulation of, or a variation in the amount of, any salt in the soil or water.

“New licences are only issued where the allocation limit has not been reached ensuring the protection of the interests of existing users and the environment.”

5. Water licences

5.1 Summary of controls

The DoW administers two Acts that allow licences to be granted for use of surface and groundwater. These Acts include the *Rights in Water and Irrigation Act 1914*, (RIWI Act) which allows for the licence to take water and the *Country Areas Water Supply Act 1947*, which allows for licences to clear native vegetation.

The RIWI Act allows DoW to protect the state’s water resources and promote the sustainable and efficient use of water. Licensing is active in all 45 groundwater and 22 surface water management areas proclaimed under the Act and for all artesian groundwater wells throughout the state. It is illegal to take water in these areas without a licence. New licences are only issued where the allocation limit has not been reached ensuring the protection of the interests of existing users and the environment.

Seek comment and guidance from your local DoW office at an early stage of your proposal.

5.2 Application

There are three types of licences and permits issued by DoW under the RIWI Act:

1. a licence to construct or alter a well — S26D (bore)
2. a permit to interfere with bed and banks — S11/17/21A
3. a licence to take water — 5C.

A licence to construct or alter a well allows you to construct, alter or deepen a bore, well or excavation to access groundwater and may include exploratory, monitoring or production bores.

Applications are generally assessed in the order in which they are received (first-in first-served).

Each application is assessed in accordance with the requirements of the RIWI Act, licensing policies and water allocation plans. Consideration is given to both the short-term and long-term economic, environmental and social impacts of granting and/or refusing licences. A general licence assessment will consider:

- Is the application in the public interest, environmentally acceptable and ecologically sustainable?
- Does the application prejudice current and future needs for water or is it likely to have a detrimental effect on another licensee's use of water?
- Can the water be provided by another source?
- Does the application comply with local practices or approved water allocation plans?
- Is the proposed development consistent with current land use planning, requirements and policies of other government agencies?

After an initial assessment, the DoW will clarify any issues that will need to be resolved before the assessment can be completed. This may include:

- the requirement for any further information
- if the site requires inspection
- if the application needs to be referred to other government agencies
- current water availability
- further details regarding the proposed use of water
- the need to advertise the application for public comment.

If unsatisfied due to DoW's refusal to grant a licence or by applied terms, conditions or restrictions to a licence, you can request a review of the department's decision through the State Administrative Tribunal.

If you are unsuccessful in obtaining a water licence due to the resource being fully allocated, there may be the opportunity to trade water. Existing licence holders may transfer all or part of the water entitlements or may enter into agreements with third parties. A water entitlement transaction must remain within a water resource management unit (i.e. same surface water subarea or groundwater subarea and aquifer). Approval for such a transaction must be sought from the DoW.

The value of a water entitlement depends on demand, the location and the conditions of the licence. DoW does not set prices or participate in any market in water entitlements that has been created.

DoW has created a 'water register' to assist the general public to search, view and print licensing and water availability information to determine possible trades. Contact your local DoW office for more information on water licences or water trading.

6. Fire control measures

6.1 Summary of controls

Landholders are required to comply with the relevant firebreak notice adopted by the LGA, except when exempted by council.

As a landholder, you are responsible when undertaking burning within 3km of a conservation reserve or national park vested under the control of DPaW to advise them accordingly.

Always seek comment and guidance from the LGA or DPaW office, so all the necessary fire control requirements are identified.



“If you are proposing to construct or expand any access/egress point onto a road under the control of an LGA you are required to obtain their approval.”

6.2 Application

There are various controls that apply to fire control measures within the State. The government authorities that administer these controls are LGAs or the DPaW. All LGAs in the region have firebreak notices adopted on an annual basis.

The firebreak notice provides standards required for firebreak and other control measures necessary to be undertaken by landholders and prescribes certain periods of the year when lighting fire is not permitted.

All LGAs may grant exemptions from complying with the requirements of a firebreak notice where it is considered that land degradation may occur as a result of complying with the express intent of the notice.

7. Property access/egress controls

7.1 Summary of controls

Landholders proposing to construct or expand any access/egress point onto a road under the control of MRWA are required to obtain the approval of the respective regional manager.

If you are proposing to construct or expand any access/egress point onto a road under the control of an LGA you are required to obtain their approval.

Always seek comment and guidance from the regional MRWA or LGA office at an early stage of your proposal so all necessary requirements can be identified.

7.2 Application

There are various controls that apply to access/egress points onto roads in the state. The government authorities that administer these controls are MRWA and LGAs.

Each region contains various roads that are classified for different purposes such as highway, state road, local government road, etc.

Applications will require information relating to land particulars, site details, proposed position of access/egress point and plans/map of the proposal.

The MRWA or LGA will then determine whether the proposal can proceed and impose relevant conditions or may not proceed and will provide reasons for the refusal.

Landholders would not normally require approval for the regular maintenance of existing access/egress points.

8. Flora/fauna controls

8.1 Summary of controls

The DPaW administers the *Wildlife Conservation Act 1950*, which contains general controls to enable the protection of native fauna and flora. Specific controls relate to rare and endangered species.

The protective status of native flora does not inhibit normal activities on private property (unless affected by other considerations). However a licence is required to sell native flora harvested off private land (and the harvesting of flora from Crown land).

As the owner of private land you have certain responsibilities to protect rare (threatened) plants. Species of plants declared as rare are afforded special protection and can only be taken, killed, damaged or otherwise affected with the written permission of the Minister for Environment.

A licence is required from the DPaW to take (capture or kill or otherwise affect) fauna listed as threatened under the *Wildlife Conservation Act 1950*. Animal welfare (*Animal Welfare Act 2002*) and the conservation of the species are considered when assessing such licence applications.

Flora and fauna listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and their habitat is also protected and any proposal that may have a significant impact on these species may be required to be referred to the Australian Government for assessment.

Always seek comment and guidance from the local DPaW office to determine whether your proposal requires assessment and/or approval.



8.2 Application

Those species listed as declared rare fauna (threatened flora) **may not be taken** without the specific written approval of the Minister for Environment. This prohibition applies equally to both Crown and private land; to licensed and unlicensed persons; and to the owners and occupiers of land on which rare flora is found. The prohibition does not extend, however, to cultivated or domesticated plants.

Where a person wishes to take declared rare flora, either for scientific or developmental purposes, they must make an application to the Minister for Environment for permission. All applications to take rare flora should, in the first instance, be referred to the DPaW. The DPaW provides advice



on the likely impact of the taking on the conservation of the species and assesses alternatives to the proposed activity.

Where a proposal will take threatened fauna, make an application to the DPaW for a licence to take the fauna. The DPaW will assess the licence application with respect to animal welfare and conservation considerations.

The DPaW will determine whether the proposal:

- (a) can proceed, and impose relevant conditions
- (b) may not proceed, and will provide reasons for the refusal.

8.3 Key words

Fauna: Any animal that is native to or a periodic migrant to Australia.

Includes:

- an individual animal
- eggs, larvae or semen
- carcase, skin plumage or fur (*Wildlife Conservation Act 1950*).

Flora: Any plant or part of a plant which is native to the State or declared by the Minister for Environment to be flora (*Wildlife Conservation Act 1950*).

9. Handling and applying chemicals

9.1 Summary of controls

Agricultural and Related Resources Protection (Spraying Restrictions) Regulations 1979.

Applies only to hormone-type herbicides applied in the Swan Valley, an area around Geraldton, the Ord River Irrigation Area and areas within 5 or 10km of commercial vineyards or tomato crops. The aim of the Regulation is to protect prescribed agricultural crops from damage from prescribed herbicides by restricting storage, transport and use of these herbicides within prescribed distances from the crops.

Aerial Spraying Control Act 1966 and Regulations.

This covers licensing of aerial operators and pilots and prohibits aerial application of prescribed chemicals within 'hazardous areas' without prior approval. Controls over aerial application of chemicals and to protect prescribed crops include:

- chemical rating certificate
- third-party insurance.

“The aim of the regulation is to protect prescribed agricultural crops from damage from prescribed herbicides.”

Biosecurity and Agriculture Management (BAM) Act and Biosecurity and Agriculture Management (Agricultural Standards) Regulations 2013

This Act and Regulations control the supply of agricultural produce contaminated with residues of agricultural chemicals before it leaves the farm. It is an offence to sell or supply product with residues above the maximum residue limit (MRL). Offences are committed when the conditions set out in a residue quarantine notice, or other requirements under the Act or Regulations, is not complied with.

Poisons Act 1964

The Poisons Act provides for the classification of substances into poison schedules, which have different levels of control of supply and use based on risk to human safety. Some schedules require specific licences to sell and use them. The Act also provides labelling and packaging controls over poisons and supply and storage controls over prescription animal remedies.

Occupational Safety and Health Act 1984

This Act is the responsibility of employer and employees when using, transporting or storing chemicals. If you wish to apply chemicals that you believe might be restricted, contact the local DAFWA office. At this time you will need approval to use restricted chemicals within restricted areas.

9.2 Approval process

The relevant DAFWA officers can provide you with application forms and advice should you need it.

9.3 Issues to consider

Tomatoes and grapes are not the only vulnerable crops. Others include cotton, broadleaved vegetables, lupins, peas, beans, ornamental roses, marron, yabbies and general aquaculture species.

Contact the local DAFWA office to find out more.

Should you be using agricultural chemicals inappropriately or in a fashion that causes pollution or degradation of groundwater supplies, DER has powers to restrict usage of those chemicals.



9.4 Key words

- Acid:** A chemical, whether in a salt, amine or other form as identified by the Agriculture and Related Resources (Spraying Restrictions) Protection Regulations 1979.
- Agricultural chemical:** An all-encompassing term that includes insecticides, herbicides, fungicides, plant growth regulators, etc. This does not include veterinary chemicals.
- Hazardous area:** Areas identified under the Regulations where chemical usage and handling is restricted to protect horticultural endeavours.
- Prescribed chemicals:** 2,4-D esters and amines of phenoxy herbicides. These include 2,4,5-T, MCPA, 2,4-DB, MCPB, Picloram. The ester is the most volatile however the less volatile amine form can also be damaging as drift.
- Prescribed crops:** Crops identified under the Regulations to be protected from damage caused by identified pesticides and chemicals. These crops are tomatoes and grapes.
- Restricted areas:** Zones of restricted chemical use (two levels; 5 and 10km with varying restrictions) around commercial plantations of prescribed crops. Approval is required to use chemicals within either hazardous areas or restricted areas.

References

Acts

Approvals and Related Reforms (No. 4) (Planning) Act 2010
Animal Welfare Act 2002
Biosecurity and Agriculture Management Act 2007
Bush Fires Act 1954
Dangerous Goods Safety Act 2004
Environmental Protection Act 1986
Health Act 1911
Local Government Act 1995
Main Roads Act 1930
Occupational Safety and Health Act 1984
Planning and Development Act 2005
Poisons Act 1964
Soil and Land Conservation Act 1945
Wildlife Conservation Act 1950

Regulations

Environmental Protection (Noise) Regulations 1997
Noise Abatement (Neighbourhood Annoyance) Regulations 1979
Soil and Land Conservation Regulations 1992
Town Planning Regulations 1967

Relevant land use planning documents

State Planning Strategy
Strategic Agricultural Resource Policy
Town Planning Schemes and Local Rural Strategies
State Planning Policy 2.5 Land use planning in rural areas
Development Control Policy 3.4 Subdivision of rural land

Other References

Clement, J.P & Bennett, M 1998 *The law of landcare in Western Australia*, Environmental Defenders Office WA (Inc), Perth

Cox, N, Tetlow, S & Coles, N 2004, *Deep drains to manage groundwater*, Department of Agriculture and Food, Western Australia, Bulletin 4617.

Separation Distances between Industrial and Sensitive Land Uses 2005

Contact details

Organisation/ program	Address/postal	Phone	Website/email
AusIndustry	Level 25 St Martins Tower 44 St Georges Terrace Perth WA 6000	13 28 46	e aiwa@innovation.gov.au w ausindustry.gov.au
AusTrade	Level 26 Exchange Plaza Sherwood Court Perth WA 6000	13 28 78	e info@austrade.gov.au w austrade.gov.au
Australian Bureau of Statistics (ABS)	Level 15 Exchange Plaza Sherwood Court Perth WA 6000	1300 135 070	w abs.gov.au
Australian Customs and Border Protection Service	Customs House 2 Henry Street Fremantle WA 6160	1300 363 263	e information@customs.gov.au w customs.gov.au
Australian Quarantine Inspection Service (AQIS)	7 London Circuit Canberra City ACT 2601	1800 020 504	w daff.gov.au/aqis
Australian Tax Office (ATO)	45 Francis Street Northbridge WA 6003	13 28 61	w ato.gov.au
Bureau of Meteorology (BoM)	1100 Hay Street, West Perth WA 6872	+61 (0)8 9263 2222	e webops@bom.gov.au w bom.gov.au
Chamber of Commerce and Industry Western Australia (CCIWA)	180 Hay Street, East Perth WA 6004	1300 422 492	w cciwa.com
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Locked Bag 10 Clayton South VIC 3169	1300 363 400	e enquiries@csiro.au w csiro.au
Department of Agriculture and Food, Western Australia (DAFWA)	3 Baron-Hay Court South Perth WA 6151	+61 (0)8 9368 3333	e enquiries@agric.wa.gov.au w agric.wa.gov.au
DAFWA's Small Landholder Information Service (SLIS)	120 South West Highway Waroon WA 6215	+61 (0)8 9733 7777	e small_landholder@agric.wa.gov.au w agric.wa.gov.au/small_landholder
Department of Commerce (DoC)	221 St. Georges Terrace Perth WA 6000	1300 136 237	w commerce.wa.gov.au
Department of Environment Regulation (DER)	168 St Georges Terrace Perth WA 6000	+61 (0)8 6467 5000	w der.wa.gov.au
Department of Fire and Emergency Services (DFES)	Emergency Services Complex 20 Stockton Bend Cockburn Central WA 6164	+61 (0)8 9454 0777	w dfes.wa.gov.au

Contact details

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Department of Planning (DoP)/ Western Australian Planning Commission (WAPC)	140 William Street Perth WA 6000	+61 (0)8 6551 9000	e corporate@planning.wa.gov.au w planning.wa.gov.au
Department of Water (DoW)	168 St Georges Terrace Perth WA 6000	+61 (0)8 6364 7600	w water.gov.au
Environmental Protection Authority (EPA)	168 St Georges Terrace Perth WA 6000	+61 (0)8 6145 0800	e info@epa.wa.gov.au w epa.wa.gov.au
Export Finance and Insurance Corporation (EFIC)	Level 10 Export House 22 Pitt Street Sydney NSW 2000	1800 887 588	e info@efic.gov.au w efic.gov.au
Fruit west	PO Box 7198 Karawara WA 6152	+61 (0)8 9368 3869	e admin@fruitwest.org.au w fruitwest.org.au
Landgate	1 Midland Square Midland WA 6056	+61 (0)8 9273 7373	e customerservice@landgate.wa.gov.au w landgate.wa.gov.au
Main Roads Western Australia (MRWA)	Don Aitken Centre Waterloo Crescent East Perth WA 6004	13 81 38	e enquiries@mainroads.wa.gov.au w mainroads.wa.gov.au
Market City	280 Bannister Road Canning Vale WA 6155	+61 (0)8 9456 9200	e pma@perthmarket.com.au w perthmarket.com.au
Potato Marketing Corporation (PMC)	PO Box 62 Sth Fremantle WA 6162	+61 (0)8 9335 8999	w pmc.wa.gov.au
Organic Association of Western Australia (OGAWA)	PO Box 1512 Booragoon WA 6954	+61 (0)8 9453 1783	w ogawa.org.au
Organic Federation of Australia (OFA)	GPO Box 787 Brisbane QLD 4001		w ofa.org.au
Small Business Development Corporation (SBDC)	Level 2 140 William Street Perth WA 6000	13 12 49	w smallbusiness.wa.gov.au
vegetablesWA	103 Outram Street West Perth WA 6005	+61 (0)8 9481 0834	e office@vegetableswa.com.au w vegetableswa.com.au
Water Corporation (WC)	629 Newcastle Street Leederville WA 6007	13 13 85	e customer@watercorporation.com.au w watercorporation.com.au

The background is a solid dark green color. Overlaid on this are several thin, white, curved lines that intersect to form abstract, organic shapes, resembling stylized hills or fields. These lines are positioned primarily in the lower half of the page, framing the contact information.

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