Planning and environment guideline for establishing meat chicken farms

Guide 2
Applicant guide

by Eugene McGahan and Stephen Wiedemann
(Integrity Ag and Environment)
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Abbreviations

**Application** An application for approval to conduct a proposed activity/land use on a particular piece of land.

**Approval** Permission under state planning or environment regulatory frameworks to conduct a proposed activity/land use on a particular piece of land. Terminology varies, but this includes planning consent, development consent, development approval, planning approval, planning permits, environmental licensing, environmental approval, or other approvals required for the proposed activity/land use under planning and environmental licencing regulations.

**AS** Australian Standard.

**Buffer distance** The distance between a source of potential impacts (such as nutrients, chemicals or pathogens) and an environmental receptor (such as a creek or water storage). This is measured as the shortest distance between the edge of the impact source and the receptor’s boundary.

**By-products** Outputs from the production system (other than finished birds) that can be used as inputs for a different process. For example, dead birds and spent litter both have high nutrient contents and could be used as inputs for composting or anaerobic digestion processes.

**CFM** Cubic feet per minute (CFM) is a volumetric flow rate, where 1 CFM in SI units is $4.7195 \times 10^{-4}$ m$^3$/s (cubic metres per second).

**Conventional production** Conventional production involves growing meat chickens indoors with no access to range areas. See Section 1 for further detail.

**CSIRO** The Commonwealth Scientific and Industrial Research Organisation is an Australian Government agency responsible for scientific research.

**Curtilage** The curtilage of a house or dwelling is taken as the land immediately adjacent to the premises (e.g., house yard), including any closely associated buildings and structures. It does not include any open paddocks or fields. It delineates the boundary where a home occupant can have a reasonable expectation of privacy and where home activities generally occur. For this guideline, it is taken to be a maximum of 25 m from the house’s exterior walls.

**EIS** An Environmental Impact Statement (EIS) is a detailed report that focuses on identifying the potential impacts of a development, including environmental, social and economic considerations, and any applicable design/management measures to reduce impacts. May be required to accompany certain planning/development applications. Regional terminology may vary.

**EMP** An Environmental Management Plan (EMP) is an environmental document that typically addresses the same issues as an EIS. An EMP is generally required to accompany a planning/development application. They typically include issue-specific management measures (where required) to address potential issues such as odour, surface water and traffic, among others. In some circumstances/jurisdictions, an EMP focuses on the day-to-day management of the farm and how operations will be undertaken to reduce impacts. Regional terminology may vary.

**EMS** An Environmental Management System (EMS) is a set of processes and practices environmental documentation typically developed at an organisational (rather than site-specific) level that addresses a wider range of issues than an EMP, including resource use efficiency. An EMS incorporates the organisation’s environmental goals and the policies, plans and procedures required to achieve these (such as training plans, SOPs, environmental monitoring and record-keeping). An EMS also includes measures to check the performance of the EMS (through the audit) and identifies corrective actions.

**Farm complex** The cluster of buildings, storages and services that form the main production area on meat chicken farms. This typically includes all the sheds and ancillary structures (such as silos, water storages, and shed loading and offloading/hardstand areas, as well as any range areas associated with the sheds). If a meat chicken farm has multiple farm complexes, each could have its own chemical storage shed, generator shed, workshop, wheel wash and amenities block. As a minimum, the sheds and feed silos are typically located on the compacted farm pad. The farm complex typically excludes farm managers’ accommodation, staff/general parking areas, by-product management and by-product application areas.

**Farm infrastructure** The buildings, sheds, silos, roads, drainage works, and other alterations to the site associated with land use for farm purposes.

**Farm pad** An impermeable pad that (at a minimum) includes all the poultry sheds. It may also include other farm infrastructure.

**Free-range production** Free-range production involves growing meat chickens indoors, as in conventional production, however, once birds are fully feathered, they are allowed access to an outdoor area for a period of about 2–6 weeks until harvested.

**Fresh litter** Litter not yet used by birds that is ready for use in sheds. Also referred to as bedding.

**Grower** The company/individual(s) responsible for producing meat chickens on farms.

**Integrator company** An integrator company operates multiple aspects of the chicken meat production and supply chain. These may include breeder farms, hatcheries, feed supply companies and processing facilities.

**LS** Length-slope.
### Abbreviations

**Meat chicken farm** The land parcel/s where the growing of meat chickens and ancillary land uses occurs (or will occur).

**ML** Megalitre, which is equivalent to 1,000,000 litres.

**MSDS** Material safety data sheet.

**NGERS** National Greenhouse Energy Reporting Scheme is a national framework for reporting and disseminating company information about greenhouse gas (GHG) emissions, energy production and energy consumption.

**NPI** National Pollutant Inventory is a database used to collect information about emissions and transfers of various substances across Australia. If a facility exceeds reporting thresholds for one or more substances, there is a requirement to calculate and report the annual emissions and transfers that result from the operations.

**Odour source** The point of measurement to calculate separation distances. The odour source for tunnel-ventilated sheds is taken to be 10 m from the exhaust end of each shed. For naturally ventilated sheds, the odour source is the shed wall nearest to the sensitive land use.

**OWG** Odour Working Group.

**Processor** The company/facility responsible for processing live chickens to produce chicken meat.

**Producer** See ‘Grower’.

**RIRDC** Rural Industries Research & Development Corporation, the previous trading name of AgriFutures Australia.

**SEE** Statement of Environmental Effect (SEE) is a document that describes the environmental impacts of a development proposal and is required by all local government councils for a Development Application in NSW, except for major developments where an EIS is required. An SEE is a slightly simpler, cheaper and shorter version of an EIS. It has less opportunity for objections because it is based on proposals that do not trigger the same level of risk with regards to water quality, sensitive receptors and the scale of development, among other considerations.

**Sensitive land use** A non-rural land use where potential amenity impacts may be experienced. Sensitive land may be zoned commercial, industrial or residential, and may contain private outdoor recreation areas (including detached dwellings, multiple dwellings, flat/apartment buildings, row dwellings and semi-detached dwellings), caravan parks, childcare centres, community centres, consulting rooms, educational institutions, hospitals, hotels, motels, nursing homes, retirement villages, tourism accommodation, parkland, recreation areas and reserves with regular public use, e.g., sporting fields. To measure separation distances, the point of measurement is the boundary of the non-rural zone.

**Sensitive receptor** A site (e.g., rural residence) where potential amenity impacts may be experienced. The curtilage of the sensitive receptor is used as the point from which separation distances are measured.

**Separation distance** The distance between a source of potential impacts (such as odour, dust or noise) and sensitive receptors/sensitive land uses. For odour, this should be measured as the shortest distance from the odour source to the sensitive receptor’s curtilage in a rural (or equivalent) zone or closest boundary of the non-rural zone.

**Shed litter** Litter in meat chicken sheds that is being, or has been, used by birds.

**Spent litter** Litter that has been removed from the sheds.

**USLE** The Universal Soil Loss Equation predicts the long-term average annual rate of erosion on a field based on rainfall pattern, soil type, topography, crop system and management practices. USLE only predicts the amount of soil loss that results from sheet or rill erosion on a single slope and does not account for additional soil losses that might occur from gully, wind or tillage erosion. This erosion model was created for use in selected cropping and management systems, but it is also applicable to non-agricultural conditions such as construction sites.

**VEB** Vegetative environmental buffer. A VEB is a dense, multiple-row planting of trees, shrubs and grasses positioned immediately downwind of tunnel-ventilated livestock buildings to filter, intercept and adsorb particulates (dust) and aerosols (odour and ammonia) from the exhaust fans’ emission plume. See Bielefeld et al. (2015) for the VEB guideline.

**VFS** A vegetative filter strip (VFS) is a defined area of vegetation below sites that can generate run-off (i.e., range areas). The primary aim of a VFS is to reduce nutrient concentration by slowing its velocity, trapping particles and increasing infiltration.
Independent research has shown that chicken meat production has the lowest greenhouse gas footprint of all intensive meat production industries (Wiedemann, 2018). Furthermore, chicken meat production uses the least water of all intensive meat production systems, a critical consideration for food security in the Australian environment.

In the past two decades, AgriFutures Australia has demonstrated its proactive commitment to improving the environmental performance and sustainable production of the chicken meat industry by funding and publishing the results of many research projects in this area. These projects are listed in Appendix E and the reports are available on the AgriFutures Australia website.

This Planning and environment guideline for establishing meat chicken farms (Guide 2 – Applicant guide) and its companion document (Guide 1 – Assessment guide) are the first national planning and environmental guidelines developed for Australia’s chicken meat industry.

Recent research conducted by AgriFutures Australia showed that the chicken meat industry contributes about $7.9 billion to the Australian economy and generates 58,000 jobs (Henderson, 2020), with demand for chicken meat increasing by about 3% per year. Additional shed capacity is required to meet this increased demand.

The principal aim of these guidelines is to ensure that the chicken meat industry’s ongoing economic growth upholds the principles of environmentally sustainable and socially responsible development. This will be achieved by ensuring that future meat chicken farms are located, designed and managed sustainably and provide confidence for ongoing industry investment. The outcomes are anticipated to be positive community-industry and government-industry relationships.

These guidelines incorporate the latest research and innovation (both national and international). They have been developed through an extensive review of state environmental requirements and application guidance for meat chicken farms and other intensive animal industries. These guidelines were developed in collaboration and consultation with researchers and industry experts, as well as local government and state departments of planning, environment, primary industries, and agriculture.
1.1 Background

Although some states have guidelines for the development and/or environmental management of meat chicken farms, others do not provide specific advice for planning and assessing new and expanding developments. Where guidance documents exist, and were best practice at time of publication, they are mainly now outdated, i.e., they do not reflect current industry practices or scientific understanding of the potential environmental impacts of meat chicken farming. This guideline and its companion document (Guide 1 – Assessment guide) are the first national planning and environmental guidelines developed for Australia’s chicken meat industry.

1.2 Purpose and scope

This guideline is intended to be used by applicants of new and expanding meat chicken farms. The information contained in this document provides details on important matters to consider in planning a new development, key steps to take in the application process, what information to prepare and include in an application, where to find important information, and how best to engage with government and the community.

Local government may find this guide valuable when reviewing and updating planning schemes, as it contains important strategic planning information that industry considers when planning development for a particular region. It may also be used by state and local government to inform their future policy settings or support their development assessment processes.

This guide applies to conventional production (i.e., birds housed in sheds) and free-range production (i.e., where birds also have access to outdoor areas). A small percentage of the industry uses mobile housing units that typically provide access to range areas and can be moved regularly. While this guide’s general environmental principles are relevant to small mobile production systems, their unique design and management mean that the measures detailed will not always apply to these systems.

1.3 Guideline structure

This guideline has been designed primarily as a guide for people wanting to build a new meat chicken farm or expand an existing operation. It details the steps and processes that require consideration when embarking on the approval process for a farm. Potential applicants should also refer to the companion document (Guide 1 – Assessment guide), as it details the information and measures administering authorities will consider when assessing an application.

Section 2 provides a broad overview of the planning and approval process, including both planning and environmental requirements.

Section 3 covers the important matters to consider before starting the application process.

Section 4 details the information required in an application.

Section 5 steps through the approvals process. Although this information is generic, the steps involved are similar in each state jurisdiction.

Section 6 contains information specifically for applicants to consider when planning and designing their farm operation, including power, water and shed design, among other topics.

Section 7 provides links to important planning, mapping and guidance information for application preparation.

Appendices – there are also several appendices covering:

- What to consider when preparing an environmental assessment report.
- Details to consider when preparing a Nutrient Management Plan.
- Guidance on composting options, design and practices for spent litter and mortalities.
- Designing vegetative filter strips to capture nutrient and contaminants from range areas.
- Research conducted over two decades aimed at ensuring the sustainable production of chicken meat in Australia.

As each state jurisdiction has similar but varying assessment and approval stages, this national guideline provides a broad overview of the processes required. Individual state requirements will also need to be followed to avoid unnecessary difficulties and hold-ups.
2.1 Approval types

A proposed or expanding meat chicken farm typically requires approvals under state planning and environmental legislation. Applications may involve varying levels of assessment depending on the size, complexity and risks associated with the proposal (e.g., proximity to watercourses, depth to groundwater, proximity to sensitive land uses or water protection areas). In some states, an environmental licence or approval is required to operate a meat chicken farm larger than a certain size. A range of other environmental approvals (such as water licences or vegetation clearing) may also be required.

While local government assesses most planning applications for meat chicken farms, some state planning frameworks mandate that proposals of a certain value or in a certain location must be assessed at a state or regional level.

2.2 Getting to know the planning system

The planning system aims to efficiently coordinate land development while also balancing social, environmental and economic needs and priorities. Planning regulations and legislation are tiered, i.e., different levels address impacts on the environment or communities, access to infrastructure and projected future needs. Planning frameworks range from matters of national importance (such as national infrastructure, economic growth and the environment) through to state strategies and plans, state planning frameworks, regional plans, local strategic plans, local planning instruments (such as planning schemes, local environmental plans and development control plans, among others) and local government planning policies (see Figure 1).

Categorising land parcels into particular zone types (such as industrial, residential or rural) is one of the major tools used to achieve local government planning goals (Commonwealth of Australia, 2011). A planning scheme for a local area (or other similar documents) will typically outline the range of appropriate land uses for each zone, the criteria under which they are allowed, and the level of assessment required before they are approved. The uses allowed in each zone are determined by overarching goals such as economic growth, efficient infrastructure planning, or reduced social and environmental impacts.

Some zones may list a land-use type as not being permitted in that zone. This would require a change in the land zoning (rezoning) before the proposed use would be allowed. This process is often costly and, in some states, more difficult due to legislative constraints. An overview of a typical approval process is provided in Section 5.

In addition to zoning requirements, local and state planning regulations also use codes or standards to specify requirements for certain aspects of development (such as stormwater or car parking) or overlays (such as environmental mapping or bushfire risk mapping) to further stipulate suitable locations for development. Depending on the nature of a proposed farm, the local planning regulations, and the zoning of the proposed land, a meat chicken farm development will have varying assessment levels applied to it at the state and local government levels.

2.3 Environmental legislation

Environmental protection legislation in each state follows a general format, with a central Act, subordinate regulations (used to categorise activities and detail administrative procedures), and policies that define outcomes relating to the receiving environment.

In addition to key environmental protection legislation, each state typically maintains legislation relating to heritage or environmental protection, or specific geographical areas. Although the scope and detail of environmental legislation varies between states, it typically covers some or all the areas shown in Figure 3.

Approvals under these pieces of environmental legislation may or may not be incorporated into the planning/development application process in each state.
Before applying for a planning/development approval for a meat chicken farm, observing the process outlined below can greatly increase the likelihood of approval.

1. Engage a suitable consultant/s.
2. Determine a suitable region.
3. Select a specific site.
4. Develop preliminary farm information, including plans.
5. Meet with state and local government representatives.
6. Engage with the community.
7. Prepare the application.

Engaging early with regulators and other stakeholders (including the community) can ensure that potential issues are identified and addressed before an application is lodged.

### 3.1 Engage a suitable consultant

Choosing the right consultant/s is important as it can significantly affect the quality of technical reports and the corresponding efficiency of the approval process. Consultants should understand all relevant regulatory requirements and can be engaged prior to meeting with regulators to help with site selection.

Consultants with a history of successful meat chicken farming applications or other intensive animal farming applications are likely to have a good understanding of the approvals process, and important aspects related to site and industry operations. Ask integrator companies, state-environmental regulators, state primary industries representatives, farmers groups/federations, or other producers for referrals to good-quality consultants.

When choosing a consultant, read through their previous work to determine its quality. Previous approvals and application documents may be publicly available under state planning frameworks and used for comparison.

It is recommended that a qualified consultant is engaged to coordinate the application process and prepare and lodge the application. They can also coordinate any additional consultants or technical reports covering issues such as odour and noise impact assessment, engineering design, and traffic assessment that are required for the project.

### 3.2 Determine a suitable region

Consult with integrator companies and state-based departments of primary industries or agriculture to determine suitable regions for a meat chicken farm. Suitable locations are determined by available land, proximity to required infrastructure (such as hatcheries, feed mills and processing plants), and favourable planning/regulatory environments. Information on selecting suitable regions may also be available from regional development authorities or state-based meat chicken grower groups (see Section 7). Experienced consultants may also be able to provide information on areas with favourable planning frameworks.

### 3.3 Select a specific site

When selecting a site, it is important to consider a range of planning, environmental and operational issues. It may not be possible to adequately assess some of these aspects without technical expertise, and so for this reason the use of a specialist consultant is highly recommended. In some cases, sites may be deemed unsuitable for meat chicken farms without conducting costly investigations and assessments, and implementing costly mitigation measures. In such cases, it may be more economically viable to find a new site.

An overview of concerns to address when selecting a site are detailed in Table 1, and additional guidance is included below.

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### Table 1

<table>
<thead>
<tr>
<th>Planning considerations</th>
<th>Natural environment and amenity considerations</th>
<th>Additional considerations</th>
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</thead>
<tbody>
<tr>
<td>Planning scheme compliance</td>
<td>Impacts of odour, dust and noise*</td>
<td>Land size</td>
</tr>
<tr>
<td>(located in a suitable zone and meets zone and overlay requirements)</td>
<td>Impacts on visual amenity</td>
<td>Availability of water</td>
</tr>
<tr>
<td>Interactions with existing land use and land-use zones</td>
<td>Impacts on surface water, groundwater and soils</td>
<td>Availability of power</td>
</tr>
<tr>
<td>Encroachment of non-compatible uses (such as urban land uses) into intensive animal industry areas</td>
<td>Impacts on local ecology (i.e., native vegetation and protected species)</td>
<td>Access to markets (hatcheries, feed, litter and processing)</td>
</tr>
<tr>
<td>State regulatory framework</td>
<td>Physical characteristics of the site (slope, soil type, landslide potential and erosion potential, among others)</td>
<td>Biosecurity risks (e.g., other intensive animal farms, litter composting sites, wild waterfowl habitats)</td>
</tr>
<tr>
<td>Suitability of road network</td>
<td></td>
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<tr>
<td>(including load limit and road widths along the transport network)</td>
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<td>Flood risk</td>
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<td>Bushfire risk</td>
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<td>Cultural heritage</td>
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<td>Biosecurity</td>
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*Odour, dust and noise are primarily addressed through separation distances for planning applications. Separation distances, however, cannot be substituted for good management.
3.3.1 Planning considerations

When preparing an application, show the proposal’s economic, social and environmental benefits and include any environmental risks. Details of money invested in regional economies, local employment, and the industry’s value to the Australian economy are important factors that add to the merit of an application.

To address other planning concerns, consult the relevant planning scheme to determine the suitability of the proposed use (i.e., whether it is permissible for the land zoning) and any requirements or assessment codes that apply. Alternatively, engage a suitable consultant to determine the requirements.

Planning scheme mapping, which details local planning scheme overlays (e.g., environmentally sensitive areas, zoning requirements and easements), may be available online. State online mapping services should be consulted to determine if the site is affected by any state planning and environment concerns. Mapping could include state and regional planning concerns, priority infrastructure areas, future development areas, flood risk, bushfire risk, and cultural heritage (see Figure 4).

The resources available via online systems are continually being updated and will vary between states. Check the following mapping services for the relevant state:

- South Australia: https://maps.sa.gov.au/SAPPA/
- Western Australia: https://www.dplh.wa.gov.au/information-and-services/mapping

If information is not available about certain topics online, contact state or local regulators, or a qualified consultant for assistance.

Some planning frameworks require consideration of potential amenity (odour, dust, noise and visual), impacts on future uses (e.g., residential development) within the affected area.

3.3.2 Natural environment and amenity considerations

As part of the assessment process, the applicant must typically demonstrate how a proposal can avoid or minimise potential environmental impacts on the environment. When there is a higher risk of impacts to the environment, specialist reports or additional design and management measures are likely to result in additional costs and delays for applicants. As such, selecting a site with minimal potential for environmental impacts is important.

One of the key tools used to minimise potential environmental and social impacts is the separation of potential impact sources and receptors. Good management and adequate separation distances are considered essential to managing the risks of odour, dust and noise. See the companion document Planning and environment guidelines for establishing meat chicken farms (Guide 1 – Assessment guide) or relevant state legislation and/or guidelines for information on determining suitable separation distances.

Also consider impacts to land and soil, including potential impacts of salt accumulation, nutrient imbalances, erosion, runoff and leaching. The companion document Planning and environment guideline for establishing meat chicken farms (Guide 1 – Assessment guide) provides details on assessing site risks, such as impacts to surface water and groundwater. Buffer distances to watercourses and declared drinking water catchments should also be considered.

Native vegetation on the site may be protected and any clearing required is likely to need approval. Other protected flora and fauna (threatened species/populations, ecological communities/habitats) or ecology (wetlands, riparian corridors, groundwater-dependant ecosystems) may also require protection.

Other physical characteristics, including land slope and soil type, may also limit development at the site. Sites with a steep slope are likely to experience greater impacts from erosion, be more difficult for vehicles to access, and result in increased infrastructure costs. Sites with highly dispersive soils may also be at a higher risk of erosion. In addition, acid sulphate soils present challenges that need to be addressed, though these are not typically present in meat chicken growing regions. These risks will be worse in regions with high rainfall.

3.3.3 Additional considerations for producers

Site selection is important to ensure adequate land size, access to farm inputs at reasonable price, proximity to industry infrastructure (pathways, processing plants etc) and biosecurity (appropriate distance from other poultry operations). Greater detail on producer considerations that may affect site selection can be found in Section 6.

Land size is important to ensure adequate area is available for proposed farm infrastructure and management practices. Separation, buffer and setback distances (land and other site constraints) can affect infrastructure placement on the farm. The developable area of the site may be significantly smaller than it first appears; additional land will be required if the operation manages by production/farm. In some states, by-product use and range areas may be included in calculating any separation distances, buffer distances or setbacks. This will increase the required land size. These considerations highlight the importance of developing preliminary farm information (see Section 3.4, Appendices B and Appendix C) to consider site selection and to include details of siting by-product treatment and use areas.

Figure 5. On-farm erosion caused by mismanagement of water.

To minimise potential environmental and social impacts, select a good site and plan good separation distances between potential impact sources.
3.4 Developing preliminary farm information

During community consultation and pre-lodgement meetings, include as much information as possible, using Section 4 to guide the type of material required. Individual states may also provide development checklists and guidance on the type of information to include.

The information in the companion document Planning and environment guideline for establishing meat chicken farms (Guide 1 – Assessment guide) and this Applicant guide can be used to develop preliminary farm information, including plans, important considerations for producers and measures to address planning and environment concerns.

Preliminary information may include:

- Economic, social and environmental benefits of the proposal.
- The zoning of the land, overlays and suitability for the proposed use.
- The size of the land and location of major farm infrastructure.
- The scale of production and typical production schedule (e.g., number of birds, stocking density, number of sheds, size of sheds, frequency of bird pick-up).
- Separation distances to sensitive receptors.
- Soils, topography and vegetation status.
- Local climatic conditions.
- Buffer distances to natural resources, e.g., watercourses.
- Transport routes and types/frequencies of traffic.
- Management practices for the use/disposal of spent litter and dead birds.
- Fuel and chemical storage.
- Information on how the proposal meets regulatory requirements.
- Preliminary information on potential impacts and mitigation measures.
- The proposed timing of the development.
- A contract or letter of support from the processor/integrator.
- Any major site risks identified (see Section 3.3 and Section 6) and how they will be addressed.

3.5 Meeting with state and local government representatives

Meeting with state and local government representatives before commencing the application process can help build strong relationships and identify any potential issues with the site that may otherwise cause delays and additional costs. Government representatives can identify the specific information they require for assessment, which will minimise further information requests and potential delays during the process. It is important to meet with representatives from local government planning departments, state-based environmental regulators, transport departments, water authorities and departments of primary industries or agriculture.

The local government or state planning department can determine which agencies or other bodies need to be involved and can organise or facilitate consultation/meetings. It is recommended applicants meet with other interested parties, such as biosecurity assessors or integrator/processor representatives, to ensure that the proposal is suitable. This can avoid costly delays and changes to proposals.

The purpose of such meetings is to determine any potential issues with the site or the proposal, and to outline the information each regulator requires to make an informed decision. These meetings serve to:

- Introduce the proposal and outline the primary components.
- Confirm the application and approvals process, including the level of assessment/assessment pathway, and any need for additional approvals.
- Identify the primary risks/potential impacts.
- Outline the intended controls and mitigation/management practices.
- Identify specific requirements for assessment.

3.6 Community engagement

When approval of a meat chicken farm development or expansion depends upon community opinion, it is important to engage the community early and keep it updated throughout the project. Community sentiment and objections can affect planning decisions, and improved public perception can maximise the chance of approval and reduce the likelihood of appeals. Early and honest community engagement can also improve trust between site operators and the community. It is better to take a proactive approach to community consultation, rather than trying to avoid confrontation. Community engagement should be undertaken prior to lodging an application, as early engagement can avoid costly changes and delays later in the process.

Engagement should be well-documented. This demonstrates that an applicant takes community concerns seriously by recording and documenting responses to any concerns. A suitably qualified consultant should be able to assist with this process.

Once preliminary site plans and information have been prepared, there will be enough information to engage in a meaningful way with the community and nearby landholders. It is important to be prepared to answer questions about the farm’s production and management, particularly of by-products. Being vague about certain issues at the first encounter will only serve to raise community concerns. The information in this guide can also help identify constraints that may make it difficult to address community concerns (i.e., moving site infrastructure may be difficult when possible locations are limited by site constraints or legislation).

Community engagement may involve nearby landholders or the wider community. Smaller engagement activities can be conducted by visiting neighbouring landholders to discuss plans. Larger engagements involving the wider community can be conducted as town hall meetings or a tour of the proposed site, explaining the proposed layout and operations. Visiting similar operations can help regulators and other stakeholders better understand the production system and potential impacts. Site tours, however, may result in additional biosecurity risks and this should be done when sheds are empty of birds, and after the processor has been consulted.

While the specific requirements will vary in each case, it is important to:

- Communicate all aspects of the proposed development with the relevant stakeholders.
- Clearly identify potential risks (e.g., odour) and benefits (e.g., economic growth, employment and food security).
- Ensure that community concerns are addressed where possible.
- Document any changes made to the design and operation to address community concerns.
- Document any changes that could not be made and the reasons why (conflict with legislation, prohibitive expense, processor/integrator requirements).
- Provide details of community engagement activities (names, dates, issues, solutions) with the application.

State government planning agencies have also developed guidance and toolkits for effective community engagement (see Section 7.8).

3.7 Preparing the application

The application requirements for meat chicken farm approvals vary between states. Variation may arise due to the scale of the development, the number of approvals required, and the level of risks of the development. State planning frameworks typically specify the minimum information needed to accept an application and provide prescribed forms that guide the applicant to all necessary details.

See Section 4 for more guidance on what information should be included in an application to ensure a streamlined assessment process. Aim to include as much information as possible, using Section 4 as a guide to the type of material required. The information in the companion document Planning and environment guideline for establishing meat chicken farms (Guide 1 – Assessment guide) and this Applicant guide can be used to develop planning documents, including important considerations for producers (Section 6) and measures to address planning and environment concerns. Some states may have mandatory codes of practice or voluntary guidelines that outline state-specific requirements.
The following information can be used as a guide to ensure relevant information is available for an application’s assessment and approval.

### 4.1 Basic information

Basic information includes general and background details on the proposal, such as:

- Details of the applicant
- Location of the development (e.g., lot/plan) and owner consent
- The land-use zone and associated overlays, and existing and proposed land uses
- Area of property, boundaries and dimensions
- Local climatic conditions
- The economic benefit to the region (expect sales, purchases and employment values)

### 4.2 Description of the operation

A description of the proposed land use should be included, with an overview of the site and its operation. The description should include:

- Production method (conventional/free range)
- Description of infrastructure (number of sheds, sizes of sheds, construction) and range area size
- Environmental and natural resource plans and overlays, showing the distance to/location of details of the following:
  - Regulated vegetation
  - Protected fauna and flora
  - Waterways
  - Bores
  - Location and depth of groundwater areas
  - Areas prone to flooding
  - Topography
  - Soils
  - Erosion or salinity-prone areas
  - Acid sulphate soils
  - Areas of cultural heritage

### 4.3 Site plans and information

The proposal should also include details on site layout, design and construction, accompanied by all relevant site plans with suitable scale and dimensions, such as:

- Locality plan showing nearby sensitive uses and transport routes
- Site plan showing location of sheds, range areas (if applicable), roads, parking and entryways, feed storage, power and water supply, temporary litter storage areas, dead bird management areas, and spent litter storage areas
- Building plans (layout, exhaust fan locations, materials and elevations for all regulated building work)

### 4.4 Stakeholder engagement

The proposal should include details of any stakeholder engagement that has been undertaken during the project’s planning stages. See Section 3.6 for more information.

On larger, state-significant proposals, applicants may be required to prepare and submit:

- A detailed community and stakeholder engagement strategy identifying the various stakeholders and how they will be engaged in the process.
- A report detailing the issues raised and how they have been addressed.
- Details of proposed engagement activities throughout the construction and operation of the development.

As part of the proposal being approved, applicants may be required to establish a community reference group or similar. They may also be required to develop a community communication strategy or consultation plan, or similar, to provide mechanisms to facilitate communication between themselves, the council and the community (including affected landowners and businesses and other parties directly affected by the development).

### 4.5 Planning report

The application should include details of how the proposal meets local planning regulations (including any applicable zone, use or overlay codes and objectives). This is typically done by listing each applicable provision of the local planning instrument and identifying how the proposed development complies with these provisions. See the ‘Planning concerns’ section of Table 1 for typical considerations. These concerns are typically addressed in a separate ‘Planning report’, though this can be combined with the environmental assessment to reduce duplication.

### 4.6 Environmental impact assessment

Environmental documents can form a significant component of any proposal. Terminology and specific requirements will vary between states. The central component of an environmental assessment, however, is to detail the potential risks from the proposed development, and proposed measures to mitigate these risks through design and management. See the ‘Natural environment and amenity considerations’ column in Table 1 for more detail.

The level of detail required, and the standard of mitigation measures employed, should reflect the level of risk associated with the proposal. Applications for larger farms, or farms on high-risk sites, should include greater detail on how the risks will be mitigated and managed to reduce regulator uncertainty. Examples of high-risk sites are those close to sensitive receptors and/or sensitive land uses, water courses, and shallow groundwater areas. Risk assessment processes and strategies to mitigate the risk can be found in the companion document Planning and environment guideline for establishing meat chicken farms (Guide 7 – Assessment guide).

See Appendix A for more information on preparing environmental impact assessment and management documents.
4.7 Technical reports

Where assessment identifies a low risk due to location of a farm and the surrounding land use(s), a suitable level of detail in the planning report or environmental documents may be sufficient. However, larger farms or those on high-risk sites may be subject to a greater degree of assessment. For larger farms or farms on high-risk sites, some or all the following technical information may be required as part of the application process:

- Hazard identification and risk assessment
- Odour and dust report
- Traffic report
- Noise report
- Visual amenity assessment
- Cultural heritage management plan
- Biodiversity/threatened species management plans
- Vegetation management/removal plans
- Landscaping plan (detailed the final landscaping arrangements)
- Stormwater and erosion management
- Nutrient management plans for by-product utilisation areas or range areas
- Waste and wastewater management report
- Biosecurity plans
- Socio-economic assessment
- Environmental management plan (for construction and operational matters).

If external consultants are required to complete these reports, it is important to ensure they have appropriate qualifications (see Section 3.1).

Details on developing plans to manage nutrients in range areas and by-product use areas can be found in Appendix B.

Guidance on composting and design principles can be found in Appendix C.

Details on designing vegetative filter strips (VFS) to manage nutrients in range areas and by-product use areas can be found in Appendix D.
The approvals process varies in each state, as does the terminology and timelines associated with each of the major assessment stages.

The resources in Section 3.7 provide a general description of the application and approvals process that applies to meat chicken farms in each state. For a more detailed overview of the approvals process in each state, refer to the resources listed in sections 7.4 and 7.5.

The general assessment stages in each state are similar, and a broad overview is provided below to assist in understanding the process. For an overview of the common stages/phases involved, see Figure 6. As noted above, the terminology and timelines in each state may vary.

5.1 Pre-application

It is vital to ensure that all planning, environmental and community concerns have been addressed before submitting the application. See Section 3. Before you begin for essential considerations in preparing an application, and Section 4 for information on typical application requirements. During this stage, it is important to meet with state and local government representatives to identify any potential issues with the proposal and clarify the level of detail required in the submission. The time and cost of an application can be reduced by providing all the necessary information at the start of the process. Where insufficient information has been supplied to determine an application, requests for additional information may be issued, and this may result in significant delays and expenses.

5.2 Submission

The application for planning approval is submitted to the consent authority (typically local government), along with all the required forms, and submission fees. Once the application and all supporting documents have been received, the application will be assessed for its completeness. Once the consent authority is satisfied that the application is complete, the assessment process will begin.

5.3 Further/additional information

If the consent authority believes that further information is required or there is insufficient information to assess the application, the authority may issue an information request asking the applicant to provide additional information. This can significantly increase the length of the assessment process.

5.4 Referral

Referral of proposals to other parties varies between states and is detailed in the planning legislation requirements. Some planning frameworks will refer the approval to any agency with interest in the proposal. In contrast, others will limit referral to those agencies with a legislative role in the planning process, or where additional approvals (water licenses, environmental licenses and vegetation clearing permits, among others) are integrated into the planning process. Referral to some regulatory bodies may be mandatory if the planning legislation requires their input on certain matters (e.g., environmental impacts or transport infrastructure). Referral agencies may also request further information be provided to help them make their decision.

5.5 Public notification

The timing and duration of public notification varies depending on state planning requirements. In some states it may occur immediately following lodgement, while in others it may occur following response from referral agencies. Public notification may involve advertising in a local newspaper, signage at the property, and/or contacting neighbouring properties. The format and timeframes for public notification typically vary, with the level of assessment for the proposal and location.

5.6 Decision

Once third-party submissions have been responded to, and any requested additional information provided, the application is assessed and a decision is made regarding the suitability of the proposal. The consent authority may approve the proposal subject to conditions designed to ensure compliance with planning and/or regulatory requirements, or to reduce risk. If the parties involved are dissatisfied with the decision and/or the conditions, they may seek an appeal. Alternatively, the authority may not grant the approval. Whether or not an appeal can be made, the type of appeal, and eligibility to make an appeal are subject to the relevant legislation’s provisions in each state.
Although not part of the planning assessment process, the following considerations will assist applicants with determining suitable sites and help guide important decisions that affect the farm’s environmental performance.

6.1 Efficiency of layout and design

A variety of factors can influence the total size of land required for the development. Site constraints relating to biosecurity (location of existing poultry operations, vegetation, location of infrastructure, land slope, natural resources and flood impacts) can affect the location of farm infrastructure and the overall footprint of the farm. The site’s size should also account for site entry, parking and on-site transport requirements.

Separation, setback, buffer and biosecurity distances required by planning authorities and processor/integrator companies can also influence the locations of operational areas. They must be considered when determining if the land is of sufficient size to accommodate the development footprint.

To calculate the total land size needed, it is important to address the following:

- The size and spacing of sheds and production units, and the locations of roads and other farm infrastructure. This document (Section 6.6) discusses the elements of shed design and construction in greater detail.
- The size of any range areas, by-product stockpiles or utilisation areas. Consider implications of Restricted Animal Material (RAM) withholding periods, which may require fencing additional paddocks to comply with restrictions and withholding periods.
- Any setback or buffer distance requirements (such as from water resources and vegetation).
- Any separation distance requirements to nearby sensitive receptors, sensitive land uses or existing poultry operations.
- Any minimum lot sizes specified by the local government for the area, or in any plans for the area (i.e., a strategic plan that aims to increase the number of residential lots in proximity to the farm).

If a potential site has been identified, buffer distances, setbacks and separation distances can be applied to determine the size of farm infrastructure and its location on that site.

When considering if the land size of a potential site will be suitable for the meat chicken farm, it is important to consider future expansion, as additional separation distance would be required. The separation distances, buffer distances and setbacks that would apply to the final development should be considered when assessing land size. Future expansions can also be included in an application in a staged approach.

6.2 Land size

Potential environmental and amenity impacts may limit the location of farm infrastructure and roads. Secondary to this, the location of farm infrastructure can affect the amount of land disturbed, the amount of materials used (i.e., the quantity of road base required, depending on the length of roads), and ongoing resource use, such as fuel.

The location and design of farm infrastructure should also allow sufficient space for loading/unloading, vehicle movements and machinery operations.

Minimising the distance between energy and water points will reduce the cost and resources used for connections. Locating farm infrastructure close to access roads, power supply and water supply will reduce the cost and resources used for connections but, conversely, will increase biosecurity risk from passing traffic. It may also increase visual amenity impacts.

6.3 Access to water

Adequate, reliable water is required to operate meat chicken farms. Hence, farms should be located where there is sufficient access to reticulated water supplies, surface water, captured overland runoff or groundwater.

Using published water use values (McGahan et al, 2014; Wiedemann et al, 2012), it is estimated that a 100,000-bird farm would use about 6 ML of water per year. This will vary depending on local climatic factors. Anecdotal reports indicate that water use may vary from 4 to 11 ML per year for 100,000 bird places, depending on climate. This includes water used for drinking, evaporative cooling and shed wash-down. For free-range farms, water may also be required for irrigation, and this could double the values given above. Peak water demand may reach as high as 160,000 L per day for 100,000 birds on free-range farms in hot, dry climates, and therefore the water source (and on-farm storage) will need sufficient capacity to meet this demand. Water supply and storage systems should also be designed to maintain the normal flow of water to sheds during unexpected supply interruptions, such as burst mains or river pump failures.

The water supplied to meat chickens must be of suitable quality to meet animal welfare and biosecurity requirements. Where available water does not meet these standards, on-site treatment of water is also required.

Regulatory approval and appropriate licenses may be required for using groundwater or surface water. This should be undertaken early in the process of considering a potential site.

6.4 Access to power

On most farms, power is required to operate the ventilation, lighting, heating and cooling systems, and to ensure the welfare and thermal comfort of meat chickens and staff. Power is also required to operate automated feeders, transport belts and augers, and for the provision of pumped water. Considerations include:

- A reliable network power supply or alternative energy source (such as gas, solar, biogas, waste-to-power, gas/diesel generators or others) able to supply the complete energy needs of the site, either alone or in combination. For tunnel-ventilated sheds, this typically requires three-phase power.
- Available power must be sufficient to meet peak demand, or a supplementary power source must be available to meet any deficit. Supplementary power sources (such as generators or storage) must be able to immediately deliver enough power during any interruptions to supply.
- Provision of a reliable backup power source to ensure interruptions to power supply do not affect farm operations. Backup supplies should be configured to operate automatically to address fluctuations or interruptions to supply.
6.5 Access to markets

The availability of farm inputs is essential to ensure that the farm has all the necessary inventory to operate effectively. Bird welfare requirements also dictate transport limitations, restricting the distance that birds can travel between farms and processing. The availability of farm labour in the region may also be an important consideration.

The fresh bedding material used can affect meat chicken farm operation, and this is largely determined by availability and transport price. The volume of bedding materials required is typically high and therefore expensive to transport to site.

Unless otherwise constrained by separation distances (including biosecurity separation distances), zoning, planning regulations or available infrastructure, meat chicken farms should be located as close as is practical to processing facilities, feed suppliers, litter suppliers and any other suppliers that the farm relies upon. Meat chicken farms are typically located 1-2 hours from processing suppliers and any other suppliers that the farm relies upon. Meat chicken farms are typically located 1-2 hours from processing facilities due to bird welfare considerations during transport; however, improved transport systems mean this distance is increasing.

6.6 Shed design

The design of the sheds is an important consideration for producers when planning their development. Shed design should factor their size, footprint and orientation, the distance between sheds, and the construction materials to be used.

6.6.1 Sizing sheds

The stocking rate in meat chicken sheds (birds/m²) is determined by state animal welfare legislation, processor/integrator contract requirements, and independent certification scheme requirements. Stocking rates vary by shed type (i.e., natural ventilation vs. tunnel ventilation), as this can affect the thermal comfort and welfare of the birds. Stocking rates will also be specified for range areas for free-range production in independent certification schemes. This area between and around sheds must be accounted for if free-range certification is required.

Changes to stocking rates can affect the number of birds produced in each shed. A smaller number of birds could result in lower revenue and reduce the economic feasibility of each shed. At the same time, higher stocking rates may require additional ventilation, litter feed and water infrastructure, and result in more emissions. Higher stocking rates also result in increased production of farm by-products, which require appropriate management.

Where changes to stocking rates are possible, effects on the economic feasibility of low stocking rates and the increased by-product production of high stocking rates should be considered.

The shed’s size should be appropriate for stocking birds at the rate required by welfare standards and processor/integrator requirements. Modest changes to stocking rate requirements (reflecting changing welfare standards) should not affect the farm’s economic feasibility or its ability to deal with by-products adequately. Ventilation, feed and water infrastructure should be scalable to meet increased stocking rates.

6.6.2 Separation and orientation

Appropriate spacing and positioning of sheds enables efficient airflow and ventilation. The orientation of sheds can also reduce amenity impacts by locating noise, dust, and odour sources (e.g., exhaust fans) as far as possible from sensitive receptors. Orienting sheds on an east-west axis can reduce cooling costs associated with solar heat gain.

It is also important to consider visual amenity in shed location, as removing the line of sight can reduce complaints. If sheds are in the line of site of sensitive receptors, consider reducing visual amenity impacts by using the natural topography, moulding, vegetation, non-reflective materials and muted tones.

Where vegetation for screening is proposed, species with a range of heights should be used to collectively screen sheds when viewed at all levels. Consider the growth rate and tree lifespan to ensure that adequate vegetation is provided over the life of the development. In such cases, species selection should consider the climate, fire risk, biosecurity (e.g., attraction of wild birds), wildlife (e.g., predator attraction on free-range farms) and soil type at the site. Native vegetation that grows within the region can be used for site landscaping; however, species selection for vegetated environmental buffers (VEBs; see Figure 9) may require non-local species to meet the desired outcomes. Refer to the AgriFutures Australia publication Vegetative Environmental Buffers for Australian Poultry Meat Farms for more information (Blaefeld et al., 2015).

6.6.3 Shed and pad footprint

The development footprint of each farm varies depending on site-specific location and design considerations, and operational practices.

The size and number of sheds are related to the farm capacity and stocking density. The stocking density determines the maximum number of birds of a particular weight that can be placed per square metre in a shed. Therefore, to meet a certain farm capacity (often dictated by contract or financial requirements), the farm will need a suitable total production floor area. A 400,000-bird farm, for example, stocked at 15.88 birds/m², would require a little over 25,000 m² of production floor. This could be achieved with nine sheds with floor space of 155 m × 19 m. In summary, total farm capacity will depend on the number and size of the sheds, and the stocking density.

Examples of both calculated and actual development footprints of farms are provided in Table 2. The calculated development footprint assumes a maximum stocking density of 15.88 birds/m², with space between sheds and a service loop road around the shed pad.

Processor/integrator companies may specify distances between sheds. Where possible, shed exhaust fans should be located on the farthest end from sensitive receptors and sensitive land uses that are most likely to be affected (considering odour modelling contours, or prevailing winds, surface roughness, topography and distance if odour modelling has not been undertaken). Tunnel-ventilated sheds should be sited to prevent obstruction of ventilation fans, using clearance distances recommended by the fan manufacturer or shed designer. Furthermore, where ventilation fans on adjacent sheds face each other, plume merging may affect odour emissions from the sheds (see Appendix B of the companion document – Assessment guide). There should be a minimum of 15 metres between naturally ventilated sheds to facilitate adequate airflow for ventilation.

Suitable distances should be provided between sheds, or at the end of each shed, to allow access of delivery and collection vehicles (as suited to shed design and location of entryways).

6.7 Facility infrastructure

The facility infrastructure is an important element of the farm design. Adequate ventilation, feed and water infrastructure should be provided to ensure the desired outcomes. High stocking rates also result in increased production of farm by-products, which may require appropriate management. Shed design should factor their size, footprint and orientation, the distance between sheds, and the construction materials to be used.

Figure 9. A vegetated environmental buffer near tunnel-ventilated sheds.
particularly if rotational practices are adopted.

Free-range farms typically have an additional 150% of the shed area required for temporary spent litter storage, an additional 500 to 800 m\(^2\) for composting dead birds, and an additional 250 to 400 m\(^2\) for truck parking outside the pad area. An aerial survey of some existing chemicals sheds, machinery sheds and a generator shed will depend if management practices require it (see Appendix C for more details).

For a 100,000-bird farm, an additional 250 to 400 m\(^2\) would be required for temporary spent litter storage, an additional 500 to 800 m\(^2\) for composting dead birds, and 60 to 160 m\(^2\) for composting dead birds. If management practices require it (see Appendix C for more details). Additional area for vehicle wash-down, worker accommodation, chemical sheds, machinery sheds and a generator shed will depend on the proposed development’s nature.

The area required for parking will depend on any relevant standards or planning regulations that cover employee carparks and an area for truck parking outside the pad area. An aerial survey of some existing meat chicken farms showed that the additional area used for these purposes can range between 1,000 and 10,000 m\(^2\); though this sample is not considered representative.

Free-range farms typically have an additional 150% of the shed area for range areas; some free-range farms offer larger range areas, particularly if rotational practices are adopted.

### Table 2

<table>
<thead>
<tr>
<th>Number of birds</th>
<th>Shed size (m(^2))</th>
<th>Development footprint size (m(^2))</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calculated</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600,000</td>
<td>20 x 160 (12 sheds, 19 m between sheds)</td>
<td>97,800</td>
</tr>
<tr>
<td>500,000</td>
<td>18 x 150 (12 sheds, 12 m between sheds)</td>
<td>73,720</td>
</tr>
<tr>
<td>360,000</td>
<td>18 x 150 (9 sheds, 12 m between sheds)</td>
<td>53,640</td>
</tr>
<tr>
<td>180,000</td>
<td>17 x 140 (8 sheds, 12 m between sheds)</td>
<td>31,440</td>
</tr>
<tr>
<td><strong>Measured</strong>(^*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>514,512</td>
<td>18 x 150 (12 sheds, 12 m between sheds)</td>
<td>86,800</td>
</tr>
<tr>
<td>188,972</td>
<td>17 x 140 (8 sheds, 12 m between sheds)</td>
<td>26,640</td>
</tr>
</tbody>
</table>

\(^*\) The dimensions of these sheds and pads have been derived from aerial photography, and the bird numbers have been estimated using the same stocking density as in the calculated examples.

#### 6.6.5 Ventilation

Ventilation is an important aspect of bird production, health and welfare, as well as human health. Shed ventilation must comply with animal welfare and WH&S requirements.

Shed ventilation affects litter moisture and therefore odour generation. Ventilation requirements are, however, primarily based on bird welfare and consider the effects of temperature, ammonia levels and humidity. Tunnel-ventilation systems typically ensure shed temperatures are within the thermal comfort zone for birds older than four weeks (e.g., an effective temperature range of 18 to 21 °C, factoring in the wind chill effect of moving air). Thermal comfort requirements and ventilation system specifications may be stipulated by bird welfare requirements and processor/integrator contracts.

Ventilation systems may include adjustable vents, cooling pads (for fan-driven evaporative cooling of incoming air), foggers/misting sprays, and automated temperature and humidity responses (see Figure 10). Moisture that add moisture to the shed (such as foggers/misting sprays) should not result in detrimental changes to shed humidity or litter moisture content. In high-humidity areas, these may affect bird welfare and litter moisture (resulting in increased odour).

The ventilation efficiency can be improved by lining the roof with materials with lower pitch (creating a lower roof and smaller ventilation area). For tunnel-ventilated sheds, an automated ventilation system should be installed to achieve peak ventilation rates of at least three metres per second or higher, as specified by the processor/integrator. Fan spacing and shed design should result in uniform airflow throughout the shed. The system should be fitted with an alarm/alert system to notify relevant staff in the event of a malfunction.

#### 6.6.6 Feeding and watering

Bird access to feed and water should comply with state welfare regulations and processor requirements. Split and spoiled feed is a source of odour and can also attract vermin.

Adjustable feeder and drinker systems should be installed, as these can be adjusted to birds changing height as they grow. Nipple drinkers and trays should be used to provide drinking water. Slips and feed lines should be sealed to prevent spillage and ingress of water and access of pests. Water for birds must be kept in a closed system from the point of treatment to the drinker.

For tunnel-ventilated sheds, an automated ventilation system should be installed to achieve peak ventilation rates of at least three metres per second or higher, as specified by the processor/integrator. Fan spacing and shed design should result in uniform airflow throughout the shed. The system should be fitted with an alarm/alert system to notify relevant staff in the event of a malfunction.

Figure 10. Meat chicken shed with tunnel ventilation fans in the background.
7.1 Industry resources
• South Australia: https://www.dpi.sa.gov.au/animals/poultry-and-eggs (Department of Primary Industries and Regional Development, 2021)

7.2 State agriculture/primary industries departments
• South Australia: https://www.dpi.sa.gov.au/animals/ (Department of Primary Industries and Regional Development, 2021)
• South Australia: https://www.dpi.sa.gov.au/about-the-department (Department of Primary Industries and Regional Development, 2021)

7.3 Mapping services

7.4 State planning portals
• Western Australia: https://www.dpwh.wa.gov.au/ (Department of Planning, Industry and Environment, 2022)

7.5 State planning overviews
• NSW: https://www.dpl.nsw.gov.au/animals-and-livestock/ (Department of Primary Industries, 2020)
• Western Australia: https://www.dpwh.wa.gov.au/ (Department of Planning, Industry and Environment, 2022)

7.6 Pre-lodgement advice resources
• South Australia: https://www.planning.sa.gov.au/planning-applications/case-management-services/pre-lodgement-service (Government of South Australia – Attorney General’s Department, 2021b)

7.7 State meat chicken farm development guides and codes
• South Australia: Contact the Department of Primary Industries and Regions for more information
• Tasmania: Contact the Department of Primary Industries, Parks, Water and Environment for more information

7.8 State community engagement resources

Western Australian Government Department of Planning. (2014). Introduction to the Western Australian Planning System. Western Australian Government Department of Planning.
Appendix A

Environmental assessments

Environmental assessment documents, such as an Environmental Impact Statement (EIS), Statement of Environmental Effect (SEE), or Environmental Management Plan (EMP), are often required to provide sufficient information to allow for the stand-alone assessment of a proposal. Thus, information on all relevant aspects of the proposal should be included. This may include all the detail typically contained in the background information and planning report and the information detailed below.

Refer to the National EMS for Meat Chicken Farms (McGahan et al, 2014) for more details on how to write environmental management documents, including a template environmental management plan.

Project overview

The overview should identify the landowners, operators (if different), project location, locality and real property description. This is typically best achieved with clear plans (cadastral and locality) at a suitable scale that shows nearby towns. An aerial image is also useful to clearly show other nearby land uses. The overview is generally brief, but it must be consistent with the more detailed project description.

Project description

Begin with information on the site’s history, particularly if applying for an expansion, and provide a brief description of the approach used to choose the site.

The project description should provide a clear understanding of the entire scope of the proposed development. The following are typical components of the project description:

- A description of the site and its surrounds, with any area outside of the site that may be impacted by the development identified.
- Local climatic conditions.
- Any staging, including key construction or operation sequences, as well as the geographical staging of the project.
- Description of construction works, including any utilities and power supply that need to be supplied during construction.

In the project description, it can also be useful to spell out the benefits (economic and social) of the development to the region and state.

Project impacts

The environmental assessment should include a statement of likely environmental impacts, such as those described in Table 1 and Section 3.3.

Measures to address risk

The environmental assessment should provide design and management measures that address the environmental risks of the proposed operation. Advice on design and construction measures are provided in this Applicant guide. Advice on environmental management measures to address risk are provided in the companion document Planning and environment guideline for establishing meat chicken farms (Guide 1 – Assessment guide).

Specifically, the document should include measures that address:
- Odour, noise, dust, light and visual amenity concerns.
- By-product management (e.g., spent litter and dead birds).
- Impacts to surface water, groundwater and soils.
- Vegetation impacts.
- Stormwater management, including sediment and erosion.
- Site maintenance (including sheds, ventilation equipment, silos, roads, and stormwater management/ drainage controls).
- All traffic entering and exiting the site, as well as traffic movements on-site.
- Chemical management.
- Pest management.
- Emergency management.
- Stakeholder engagement and complaints handling.
- Cultural heritage issues.

Organisational considerations

In addition to design and management measures that address specific environmental risks, a range of organisational considerations should be addressed in an environmental management plan (EMP). These include:

- An organisational commitment or policy that identifies the organisation’s environmental goals (such as ensuring compliance, minimising resource use, or minimising impacts on the environment).
- Identification of responsible persons or positions for each environmental management task.
- A training program to ensure staff are trained appropriately for the environmental management tasks to which they are assigned.
- A schedule of environmental management tasks, including maintenance tasks.
- An auditing program that ensures environmental management practices identified in the EMP are being followed and organisational environmental goals are being met.
- A continuous improvement framework that enables review of the current management practices and identifies and addresses any shortcomings.
- Details of records that are required to ensure the EMP is operated correctly.

Environmental documents should also detail measures to monitor the farm’s environmental performance and what corrective measures will be employed to address any shortcomings of current management practices. Contingency measures to take if corrective actions fail to rectify environmental performance can be developed. The level of detail required will depend on the proposal’s risk level.
Stakeholder engagement
Open and honest stakeholder engagement can improve relationships between producers and stakeholders. Example stakeholder engagement measures include:

- Notifying stakeholders when there is an increased risk of impact, such as before litter cleanout, spreading of by-products or bird pick-up.
- Informing stakeholders of changes to operations that may increase the risk of impacts, including changes to delivery times, upcoming site works or unexpected changes to the shed cleanout schedule, or any other changes that are likely to create emissions (odour, noise, dust).
- Maintaining a feedback register to note any stakeholder feedback, including complaints. Contact details should be provided to identified stakeholders and displayed at the farm gate so that interested parties can provide feedback.
- Investigating complaints made by farm personnel to determine any production issues, and to identify strategies to resolve the issues. Details of any site investigations or remediation actions undertaken should be recorded and communicated to the complainant. Regular environmental monitoring should be undertaken to support investigations, and procedures should be in place to remediate any issues.

Emergency response measures
Emergency management measures reduce the risk of environmental impacts during or following an emergency. Example considerations include:

- Detailing the actions/procedures to be undertaken in the event of an emergency.
- Adequate provision of labour, feed, water and other essential requirements to ensure bird welfare, and identification of the person responsible for these actions/measures.
- Any actions/procedures required to address any pollution event, such as chemical spills or releases into waterways. Large spills may require reporting to regulators, and relevant contact details should be included in an EMP.

These measures can address natural disasters (fire, flooding), mass bird death (due to power failure, feed/water failure or disease), and other interruptions to operations (such as power failure, water failure, contractor failure, or feed and water contamination). Further examples for these considerations are given below.

Natural disasters
- Natural disaster management measures for the site are prepared in accordance with state disaster and emergency management guidance.
- Production sheds are well-maintained and are made secure against extreme weather events.
- Range areas are not used during extreme weather events or emergencies.
- Bushfire buffers are regularly maintained where permitted by state fire codes and vegetation clearing legislation. Vegetation clearing should not exceed the required or permitted amount.
- The site is registered with the local fire service.
- The grounds are maintained neatly and professionally, with no loose debris or waste stored on the site.
- Evacuation measures are determined for any identified risk.
- A management plan or emergency plan is developed in consultation with fire or emergency services representatives.
- If access is restricted due to natural disaster, determine the resources and measures required to ensure farm operation, or determine appropriate contingency measures.

Mass bird deaths
- If an emergency animal disease (EAD) is the suspected cause of mass deaths, then movements on and off-farm and access to the production area should be limited, and high-risk biosecurity procedures enacted in compliance with the relevant AUSVETPLAN (AHA, 2017) where required. If it is an EAD, destruction and disposal procedures and requirements will be determined by the relevant biosecurity agency in conjunction with industry under the relevant EAD Response Plan, as outlined by AUSVETPLAN. Where possible, disposal procedures should be conducted in a way that minimises the potential for environmental impacts.
- The integrator/processor should be contacted immediately following a mass bird death event and advised if a disease is the suspected cause. Integrators may arrange testing and disposal of the birds to determine the cause of death and limit the potential for future outbreaks.

- If the EAD is a notifiable disease under biosecurity legislation, state government primary industries representatives or environmental regulators should be contacted. Their contact details should be included in the farm EMP. Nearby landholders and other stakeholders should be informed of potential impacts (odour, traffic, noise) and their likely duration.
- A procedure for disposing of dead birds that are not the result of an EAD should detail how the disposal will be carried out. Where possible, disposal procedures should be conducted in a way that minimises the potential for environmental impacts.

Interruptions to operation
- A backup power supply capable of supplying operational power to ventilation systems (at a minimum) should be in place at the site. If the backup power supply uses fuel, sufficient fuel for 48 hours of operation should be stored. The backup power supply should be tested on load at least once per week to ensure it functions correctly. The backup power supply should be automatically activated during a power failure. Warning systems, including ‘back to base’ alarms and mobile phone notifications, must be installed in all sheds to notify the owner or site manager of power failure.
- A backup supply of water must be available to meet any unexpected interruptions to water supply, however downstocking of birds may be required in some cases. Two days’ worth of backup water supply is recommended as a minimum.
- Sufficient feed should be stored on-site in case of interruptions to feed supply.
- Water and feed can be distributed manually during a power failure if required.
- Determine contingency measures if staff are unable to access the site.
- Plan for emergency storage of spent litter and dead birds. Appropriate sites for storage of litter and dead birds should be identified and included in site planning, irrespective of intentions to immediately remove litter/dead birds under normal operational conditions.
- Procedures should be developed that detail the course of action and litter management measures to be undertaken in the event of contamination with animal diseases, or in the event of other issues that may prevent off-farm use.

Chemical use
Example chemical use measures to reduce the risk of environmental impacts include:

- Storage of flammable and combustible liquids should be undertaken in accordance with the Australian Standard AS1940:2004 (Standards Australia, 2004). Corrosive substances should be stored in accordance with the Australian Standard AS3782:2008 (Standards Australia, 2008).
- Selected chemicals should have low potential impacts on health, safety and the environment, as identified by the product MSDS.
- Manufacturer’s instructions should be adhered to, including application rates and methods. Application use rates can also be at the discretion of a vet.
- Washing of chemical containers or mixing of chemicals should be conducted in a sealed area capable of capturing any spills. Adequate ventilation is necessary to maintain health and safety requirements.
- Chemical use should be minimised near waterways or on sites with a high risk of impacts to surface or groundwater (in accordance with the Surface and Groundwater Risk Tool in companion document Planning and environment guideline for establishing meat chicken farms (Guide 1 – Assessment guide)).
- Spray drift should be minimised by using well-maintained equipment and correct application rates, and by applying chemicals during suitable weather conditions (winds not directed to sensitive receptors).
- A spill kit suitable for the size and nature of potential spills should be available. Staff must be trained in using the spill kit, and all spills must be cleaned up appropriately.
- An emergency response plan for pollution incidents, including large chemical spills, should be prepared. Large spills may require reporting to regulators, and relevant contact details should be included in the plan.
- Unwanted or out-of-date chemicals, containers and used spill containment materials must be disposed of in accordance with manufacturer’s instructions and regulated waste requirements. If a chemical is considered a regulated waste, legislation may require disposal by an approved waste contractor and the keeping of certain records.
Appendix A

Record keeping

Effective record keeping can demonstrate that environmental management measures are in place to reduce the risk of environmental impacts from the farm. Examples of records that should be kept include:

- All environmental monitoring that has been undertaken for the site.
- Details of staff environmental training (such as erosion and dust control, litter management, vehicle operation and traffic management requirements).
- Details of farm by-product sales, including details such as volume, date, associated testing results and client details.
- Details of chemical purchases and uses, and their MSDS.
- Details of fuel and energy use, and water use.
- Regulated waste transport restrictions may apply to composted animal materials and chemical container disposal, depending on state regulations. If a substance is considered a regulated waste, legislation may require disposal by an approved waste contractor and the keeping of certain records.

Information for end users

Provide end users of spent litter with a duty-of-care statement, including general litter characteristics or product analysis, best practices for storage and spreading (must include biosecurity, e.g., Restricted Animal Material and separation distances from other poultry/pig farms). Refer to the AgriFutures Australia publication Best practice litter management manual for Australian meat chicken farms (McGahan et al, 2021) for an example ‘warn and inform’ document that can be tailored for an individual operation.

Voluntary environmental monitoring

To demonstrate a proactive approach to environmental management on the site, voluntary environmental monitoring can be undertaken. Example measures that could be implemented include:

- Odour and dust levels are assessed at least once per growth cycle (as a starting point), at times of peak odour emission (i.e., one or two days before first thin out), and when prevailing winds and meteorological conditions are more likely to result in potential impacts at sensitive receptors. The frequency of voluntary environmental monitoring should be responsive to site risk. Sites that do not experience complaints or where the risk of impacts is low may reduce the frequency of monitoring. In contrast, highly constrained sites, or those subject to regular complaints (whether valid or not), would benefit from a higher frequency of voluntary monitoring.
- The person responsible for subjective odour assessments should not have been exposed to high poultry shed odour levels for three hours before the assessment.
- Voluntary self-assessment of noise is conducted when impacts at sensitive receptors are most likely, such as at bird pick-up. This involves vehicle and bird noise, often occurs at sensitive times such as evening or night-time, and does not offer the same acoustic dampening as activities that occur when sheds are closed.
- Other important times for noise assessments include periods of low or no wind speed and stable meteorological conditions, such as still winter nights. Identification of potential impacts is followed by site investigation to identify potential causes and mitigation options.

Records of voluntary environmental monitoring should be kept in an appropriate form. Monitoring points for voluntary monitoring of odour, dust and noise should be located at the property boundary between the risk source and potential sensitive receptors. If impacts are noted at the property boundary, additional monitoring may be required closer to the sensitive receptor.

NPI and NGERS reporting

To meet legislative reporting requirements, the following two example measures can be employed:

- Farms with a capacity of more than 87,600 birds (no litter storage and utilisation) calculate and report their emissions under the National Pollutant Inventory (NPI) (DSEWPaC, 2013). This number is 47,600 birds if the litter is stored and used on-site.
- Farms calculate their fuel and energy use and report if required under the NPI or National Greenhouse and Energy Reporting System (NGERS) (Clean Energy Regulator, 2020).

To demonstrate a proactive approach to environmental management on the site, voluntary environmental monitoring can be undertaken.
Appendix B

Nutrient management plans

Principles of nutrient management plans

Nutrient management plans (NMP) are prepared to understand nutrient application, deposition, risks and appropriate mitigation measures. Nutrients may be applied as spent litter, compost, irrigation water or directly deposited as manure on range areas.

The essential principle of an NMP is that where application rates exceed plant requirements and soil storage capacity, environmental risk increases. A nutrient budget determines the risk of loss by considering nutrient application rates, plant nutrient removal and soil nutrient storage capacity. On sites with a high risk of nutrient loss, the quality of runoff or leachate water may cause off-site impacts. Once a nutrient budget has been determined, appropriate management strategies can be developed. These strategies are likely to include soil testing to validate the nutrient budget predictions, to ensure nutrient losses are not occurring. This testing frequency will be driven by the risk of nutrient loss (soils, topography, rainfall) and the productivity (e.g., application rates) for a site.

Estimated quantity and composition of spent litter

To accurately determine the composition of spent litter, a representative sample should be taken at the end of a growth cycle and tested at a National Association of Testing Authorities (NATA) approved laboratory. Where bedding type and shed operations do not vary, the spent litter composition will vary little between batches. The following information is a useful rule of thumb in the absence of site-specific testing.

The amount of nutrients in spent litter per 1,000 birds typically ranges from:
- 64-72 kg of nitrogen
- 18-22 kg of phosphorus
- 30-40 kg of potassium
- 8-10 kg of sulphur

These values are based on measured manure concentrations of various litter types by Griffiths (2007) and Draddock and Hollett (2010), and litter production rates from Watson and Wiedemann (2018). A portion of the nitrogen will be lost from the shed, primarily as ammonia volatilisation.

The amount and composition of the fresh bedding material used also contribute to the spent litter characteristics.

Estimated quantity and composition of manure deposited on range areas

There is little research information available on the quantity of manure deposited to range areas; at least one study reports free-range meat chickens access the range 2-8% of each day (0.5-2 hours/day), averaged over the whole flock. If manure deposition corresponds with time on the range as estimated above (2-8%), this would equate to the following deposition per 1,000 birds:
- 1.3-5.4 kg of nitrogen
- 0.36-1.8 kg of phosphorus
- 0.6-2.9 kg of potassium
- 0.2-0.8 kg of sulphur

As genetics and management encourage longer ranging by the birds, these estimated deposition rates are likely to increase.

Most nutrients deposited in the range area are likely to be close to the sheds. Farms that are therefore located on sites that are at a high risk of nutrient loss (e.g., highly permeable soils, high rainfall, close proximity to waterways) should consider design and management options that reduce the risk of nutrient loss. These include verandas (compacted earth/combined with stones/pebbles) adjacent to the shed.

Regular soil testing based on the level of risk is a good way to track the nutrient content of soil in the range area, and management strategies can be developed/adjusted to avoid losses.

Nutrients removed by plants

Typical nutrient removal by plants in common cropping systems is shown in the table below.

Table 3 Yield and nutrient off-take for some crops

<table>
<thead>
<tr>
<th>Crop</th>
<th>Yield (t/ha)</th>
<th>N (kg/ha per year)</th>
<th>P (kg/ha per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dryland pasture hay</td>
<td>1-4</td>
<td>20-80</td>
<td>3-12</td>
</tr>
<tr>
<td>Irrigated pasture hay</td>
<td>8-20</td>
<td>160-400</td>
<td>24-60</td>
</tr>
<tr>
<td>Lucerne hay</td>
<td>5-15</td>
<td>150-450</td>
<td>15-45</td>
</tr>
<tr>
<td>Dryland winter cereal (grain only)</td>
<td>2-4</td>
<td>40-80</td>
<td>6-20</td>
</tr>
<tr>
<td>Dryland winter cereal (grain + straw)</td>
<td>2-4 grain + 2-5 straw</td>
<td>59-239</td>
<td>9-20</td>
</tr>
<tr>
<td>Grain sorghum</td>
<td>2-8</td>
<td>40-160</td>
<td>6-24</td>
</tr>
<tr>
<td>Forage sorghum</td>
<td>10-20</td>
<td>200-400</td>
<td>30-60</td>
</tr>
</tbody>
</table>

Adapted from Reuter and Robinson, 1997.

Management and mitigation actions

Additional management of nutrient sources may be required for high-risk by-product utilisation or for range areas that have the potential to place excess nutrients in the soil.

For by-product utilisation areas, information on appropriate nutrient application and risk mitigation strategies is available from Fertcare/Fertilizer Australia, (2023), the National. EMS for Meat Chicken Farms (McGahan et al, 2014), and the companion document Planning and environment guideline for establishing meat chicken farms (Guide 1 – Assessment guide).

For range areas where nutrient hotspots are observed near shaded areas, consider using movable shade structures, rather than fixed shades, to encourage birds to use different parts of the range. This will ensure more even distribution of nutrients over the range.

Other enrichment measures can also assist in encouraging birds to use more of the range. Where higher nutrient levels are found, accumulated manure could be removed from shed surrounds with machinery. More detail on managing nutrients in range areas can be found in the companion document Planning and environment guideline for establishing meat chicken farms (Guide 1 – Assessment guide).
Composting guidance

Legislative considerations

Depending on the location and scale of the operation, composting may require additional environmental approvals or permits. Furthermore, composted animal material (such as dead birds) may be considered regulated waste or be subject to other regulatory considerations. The sale and utilisation of compost materials may also be subject to additional standards and regulations. Consult with state EPA representatives regarding additional considerations for composting activities.

Types of composting

The main types of composting used on meat chicken farms are:
- Windrows (for litter or dead birds)
- Bays (typically for dead birds)
- Rotary bins (for dead birds)

Windrows are long, outdoor compost piles, separated by spaces between each windrow. Bays are typically smaller piles, separated by sidewalls and are typically indoors or are covered if required (i.e., in high-rainfall areas). Rotary bins are specially designed composting equipment that rotate to mix compost and keep it aerated.

Sizing compost areas

Dead birds

Dead birds can be composted in windrows, bays, bins or rotary composters. An example of how to size composting bays and windrows is included below.

Composting in windrows

This method of sizing is derived from the Ontario Ministry of Agriculture, Food And Rural Affairs (see The Poultry Site, 2008) and adapted to metric measurements.

\[
V = B \times Bw \times M / T \times 0.32
\]

Where:
- \( V \) = volume required (m³)
- \( B \) = number of birds (number)
- \( Bw \) = finished bird weight (kg)
- \( T \) = time on farm (days)
- \( M \) = mortality rate (%)

For:
- \( B = 100,000 \)
- \( Bw = 2.3 \)
- \( T = 49 \)
- \( M = 4 \)

We get:
- \( V = 100,000 \times 2.3 \times 0.04 / 49 \times 0.32 \)
- \( V = 70 \) m³ of windrows

Windrows can be up to 4 m wide and 1.5 m high (to ensure ease of handling) with sloping sides. Windrows that are much larger than this may require specialised machinery to manage.

Composting in bays

This method of sizing is derived from The College of Agricultural and Environmental Sciences at the University of Georgia (see The Poultry Site, 2012) and adapted to metric measurements.

\[
V = B \times Bw \times M / 130
\]

Where:
- \( V \) = volume required (m³)
- \( B \) = number of birds (number)
- \( Bw \) = finished bird weight (kg)
- \( M \) = mortality rate (%)

Spent litter composting

The amount of spent litter produced on a 100,000-bird farm depends on the birds' stocking density in the shed and the depth of litter used.

The volume of litter produced is:

\[
V = B / Bd \\
Ld
\]

Where:
- \( V \) = volume of litter produced per growth-cycle (m³)
- \( B \) = number of birds (number)
- \( Bd \) = stocking density (birds/m²)
- \( Ld \) = litter depth (m)

Assuming the same windrow cross-section as for dead bird composting, this results in a windrow length of 84 m. The additional area needs to be added for loader movement and material handling,

\[
W = 6 \times (4 \text{ m windrow} + 2 \text{ m loader movement})
\]

\[
L = 93 \times (84 \text{ m windrow} + 2 \times 1.5 \text{ m and slope} + 2 \text{ m loader movement} + 4 \text{ m material handling area})
\]

Composting in bins

This method of sizing is derived from College of Agricultural and Environmental Sciences at the University of Georgia (see The Poultry Site, 2012) and adapted to metric measurements.

1.5m

4m

1m

With this cross-sectional area (3.75 m²), the windrow would need to be approximately 18 m long. Additional space needs to be added to account for loader movement, and to create an area to turn the piles.

If two bays were used to ensure a more manageable windrow length, the overall dimensions would be:

\[
W = 6 \times (4 \text{ m windrow} + 2 \text{ m loader movement})
\]

\[
L = 27 \times (18 \text{ m windrow} + 2 \times 1.5 \text{ m and slope} + 2 \text{ m loader movement} + 4 \text{ m material handling area})
\]

A = 162 m²

Spent litter composting

The amount of spent litter produced on a 100,000-bird farm depends on the birds' stocking density in the shed and the depth of litter used.

The volume of litter produced is:

\[
V = B / Bd \\
Ld
\]

For:
- \( B = 100,000 \)
- \( Bd = 15.88 \)
- \( Ld = 0.05 \)

We get:
- \( V = 100,000 / 15.88 \times 0.05 \)
- \( V = 314 \) m³

Assuming the same windrow cross-section as for dead bird composting, this results in a windrow length of 84 m. The additional area needs to be added for loader movement and material handling,

\[
W = 6 \times (4 \text{ m windrow} + 2 \text{ m loader movement})
\]

\[
L = 93 \times (84 \text{ m windrow} + 2 \times 1.5 \text{ m and slope} + 2 \text{ m loader movement} + 4 \text{ m material handling area})
\]

A = 558 m²

Appendix C

Guide 2 – Applicant guide
Vegetated filter strips

Vegetated filter strips (VFS) are an area of vegetation used to reduce the nutrient load in surface runoff. VFSs can effectively reduce nutrient, sediment and pathogen concentrations in the runoff (Bielefeld et al, 2015). The species used for VFSs depend on local ecology, with runner-developing, non-clump-forming grass achieving the highest groundcover rates with the lowest maintenance requirements. The typical deployment of a VFS, with the long axis of the strip transverse to the flow direction, is depicted in Figure 11.

VFS design

The width of a VFS is the narrowest width in the direction of water flow. The width of a VFS required to reduce contaminant load adequately varies depending on the flow rate and contaminant load of the runoff. As such, factors that affect runoff speed, and the likelihood of contaminants being captured in runoff, also influence the required VFS width. Key factors are:

- The erosivity of rain
- The erodibility of soils where contaminants are deposited
- Slope
- Length of the runoff area

VFSs should be located close to contaminant sources to minimise the catchment areas size and volume of runoff across the VFS. Ideally, runoff across a VFS will be uniform and have a low velocity, rather than concentrated, high-velocity flow from drainage lines. This can be achieved by using flow control measures, such as spreader weirs immediately before the VFS.

The design width recommendations that follow are based on the work of Karssies and Prosser (1999). Advice on determining the required factors is given below. Follow these steps to determine the required VFS width:

1. Determine the rainfall factor.
2. Determine the soil erodibility.
3. Determine the slope factor.
4. Determine the groundcover factor.
5. Determine the required VFS width (using Table 4).

If the capture of water is required as part of any condition of approval for a farm, a detention basin is preferred to a retention basin, as detention basins are designed to capture and settle nutrients and then slowly drain, rather than store water permanently, as this can create a higher biosecurity risk. These detention basins should be accompanied by a VFS to capture sediment and nutrients from the basin.

<table>
<thead>
<tr>
<th>Rainfall factor</th>
<th>Soil erodibility</th>
<th>Slope</th>
<th>Filter width Poor groundcover (m)</th>
<th>Filter width Good groundcover (m)</th>
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</thead>
<tbody>
<tr>
<td>Low (&lt;1,250)</td>
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<td>2</td>
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<tr>
<td></td>
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<td>Medium</td>
<td>Low</td>
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<td>High</td>
<td>High</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Low</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>High</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>High</td>
<td>30</td>
<td>12</td>
</tr>
</tbody>
</table>

* Based on author calculations and homogeneity with work of Karssies and Prosser (1999).
Rainfall factor

The rainfall factor is based on rainfall erosivity reported by CSIRO (Lu et al, 2001) and the erosivity risk rating described in Karssies and Prosser (1999). First determine the erosivity rating from Figure 12, then determine the corresponding rainfall factor from Table 5.

Table 5
Rainfall erosivity and corresponding rainfall factor

<table>
<thead>
<tr>
<th>Rainfall erosivity (MJ/mm)</th>
<th>Rainfall factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1200</td>
<td>Low</td>
</tr>
<tr>
<td>1200 to &lt;2500</td>
<td>Medium</td>
</tr>
<tr>
<td>2500 to &lt;5000</td>
<td>High</td>
</tr>
<tr>
<td>5000 to 10000</td>
<td>Very High</td>
</tr>
<tr>
<td>&gt;10000</td>
<td>Extreme</td>
</tr>
</tbody>
</table>

Soil erodibility factor

Table 6 shows several soil types and the associated soil erodibility factor, based on Karssies and Prosser (1999).

Table 6
Soil erodibility factors

<table>
<thead>
<tr>
<th>Soil type</th>
<th>Soil erodibility factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black and red-brown earths</td>
<td>Low</td>
</tr>
<tr>
<td>Duplex soils</td>
<td></td>
</tr>
<tr>
<td>Cracking clays</td>
<td></td>
</tr>
<tr>
<td>Solodic soils</td>
<td>Medium</td>
</tr>
<tr>
<td>Shallow loam soils</td>
<td></td>
</tr>
<tr>
<td>Podzol</td>
<td></td>
</tr>
<tr>
<td>Non-calcic brown soil</td>
<td>High</td>
</tr>
<tr>
<td>Structured earths</td>
<td></td>
</tr>
<tr>
<td>Structured loam soils</td>
<td></td>
</tr>
<tr>
<td>Sand</td>
<td></td>
</tr>
</tbody>
</table>

Slope factor

The slope factor can be determined from Table 7, which is derived from the LS (length-slope) equation in the USLE and the risk ratings of Karssies and Prosser (1999). Using measurements of the slope and length of the runoff area (in the direction of flow), determine the slope factor, as shown in Table 7.
Groundcover factors given in Table 8 are based on Karssies and Prosser (1999). Permanent pasture with significant groundcover (>80%) is predicted to generate one-tenth of the erodible materials as other “good cover” ratings, based on the equivalent C-factor used in USLE soil loss equations for comparable systems.

Table 7
LS factors

<table>
<thead>
<tr>
<th>Length (m)</th>
<th>Slope (%)</th>
<th>5</th>
<th>10</th>
<th>20</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>350</th>
<th>500</th>
<th>750</th>
<th>1000</th>
<th>1500</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
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</tr>
<tr>
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<td>Low</td>
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</tr>
<tr>
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<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
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<td>Low</td>
<td>Med</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Med</td>
<td>Med</td>
<td>Med</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Med</td>
<td>Med</td>
<td>Med</td>
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<td>High</td>
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<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Med</td>
<td>Med</td>
<td>Med</td>
<td>High</td>
<td>High</td>
<td>High</td>
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<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
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<td>Med</td>
<td>Med</td>
<td>Med</td>
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<td>High</td>
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<td>High</td>
<td>High</td>
</tr>
<tr>
<td></td>
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<td>Low</td>
<td>Med</td>
<td>Med</td>
<td>Med</td>
<td>High</td>
<td>High</td>
<td>High</td>
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<td>High</td>
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<td>High</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Low</td>
<td>Low</td>
<td>Med</td>
<td>Med</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
</tbody>
</table>

Groundcover factor

Table 8
Groundcover type and the corresponding factor

<table>
<thead>
<tr>
<th>Rainfall erosivity (MJ/mm)</th>
<th>Rainfall factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional cropping</td>
<td>Poor</td>
</tr>
<tr>
<td>Improved cropping practices</td>
<td>Good</td>
</tr>
<tr>
<td>Permanent pasture (80% annual ground cover)</td>
<td>Good</td>
</tr>
<tr>
<td>Permanent pasture (40% annual ground cover)</td>
<td>Good</td>
</tr>
</tbody>
</table>
Chicken meat industry research

In the last two decades, AgriFutures Australia has demonstrated its proactive commitment to improving the environmental performance and sustainable production of the chicken meat industry by funding and publishing the results of many research projects in this area. The following projects are evidence of that commitment:

- Odour and ammonia emission reduction from breeder hens (2000)
- Sustainability improvements in the Victorian chicken meat industry (2003)
- Chicken Litter: Issues associated with sourcing and use (2007)
- Control of odour and dust from chicken sheds – review of add-on technologies (2008)
- Separation distances for broiler farms: verifying methods including the effects of thermal buoyancy (2010)
- Trials of odour control technology on broiler farms (2010)
- Using life cycle analysis to quantify the environmental impact of chicken meat production (2012)
- Managing litter re-use for minimal nutrient run-off to surface water (2012)
- Conversion of waste to energy in the chicken meat industry (2013)
- Control of odour and dust from chicken sheds – evaluation of windbreak walls (2013)
- Monitoring mechanical ventilation rates in poultry buildings (2014)
- Chicken litter: alternative fertiliser and ways to increase soil carbon (2014)
- Odour dispersion modelling of meat chicken farms (2014)
- Solar guidelines for Australian meat chicken growers (2014)
- Two case studies of commercial viability for solar photovoltaic systems on meat chicken farms (2014)
- Quantifying on-farm energy usage in the Australian meat chicken industry (2015)
- Free range chickens – odour emissions and nutrient management (2015)
- Reducing costs and energy by replacing inefficient ventilation fans (2015)
- Guide – how to reduce costs by replacing inefficient ventilation fans on meat chicken sheds (2015)
- Vegetative environmental buffers for meat chicken farms (2015)
- Grower options for spent litter utilisation (2015)
- Causal factors of ‘wet litter’ in chicken meat production (2016)
- Artificial odour emission system for on-site odour measurement (2016)
- Addressing odour abatement and assessment knowledge gaps using PTR-ToFMS (2016)
- Variable-speed exhaust fans for meat chicken sheds (2017)
- Review of fresh litter supply, management and spent litter utilisation (2017)
- Mass disposal preparedness for the poultry industries (2017)
- Review of rodent control for the Australian chicken meat and egg industries (2017)
- Suitability of litter amendments for the Australian chicken meat industry (2017)
- Water security in the chicken meat industry (2018)
- Best practice litter management manual for Australian meat chicken farms (2018)

These and other project reports are available on the AgriFutures Australia website, http://www.agrifutures.com.au/publications-resources/publications/.