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See part publication below.

5 SITING AND DESIGN

5.1 SELECTING A SITE

The establishment of a meat chicken farm is a substantial long-term investment, making it **critical** to ensure that an appropriate development locality and site is chosen. The operation and management of a meat chicken farm established on an unsuitable site will be more costly and face difficulties, risking the operation's longer-term viability. Appropriate siting is the most cost-effective way of dealing with environmental performance issues such as odour, dust, noise and protection of waters. By addressing these issues at the planning stage, ongoing operational costs and management issues will be significantly reduced.

Locality

Meat chicken farms should be located within a reasonable proximity to the processing plant, hatchery, feed mill, clean litter supply, labour and services to minimise the cost of transport and ensure long-term sustainability. The site should have access to an adequate source of good quality water.

The farm should be well away from other poultry farms (at least 2 kilometres) for biosecurity reasons, and should not be in an area prone to natural hazards like floods or bushfires.

Local Government Areas that support and encourage meat chicken farm development are recommended when considering suitable localities for development. It is worthwhile contacting

Meat chicken farms must be located in a Rural Zone and not too near existing or potential sensitive land uses.



the local councils in a region to determine which may be more accommodating.

Meat chicken farms must be located in a Rural Zone, and not too near existing or potential sensitive land uses that are likely to be incompatible with poultry farming. Sensitive land uses include dwellings, hospitals, schools, and other places where people are present for extended periods of time. The location and size of a proposed meat chicken farm should be such that there will be no unacceptable impacts on the health and amenity (for example, from odour, dust, bioaerosols, noise, visual impacts) of residents on the property itself, on neighbouring properties, and in the surrounding area.

Sensitive land uses also include natural resources such as waterways, wetlands and water catchments. Consideration should be given to the suitability of the site in terms of protection of land, road capacity and safety, ground and surface waters, pests and other emissions or discharges to the environment.

It cannot be assumed that the neighbouring owners or land uses will remain the same, in the short or longer term. Where a site adjoining a proposed meat chicken farm is currently vacant, it should be assumed that a future dwelling might be located anywhere on the property. Any agreement with an existing owner regarding the acceptance of impacts is not binding on future owners. Consider reasonable separation distances for management of potential environmental impacts.

The potential for surrounding land use, including other agricultural activities, to adversely affect the meat chicken farm also needs to be considered (for example, biosecurity risk from spreading of poultry litter by neighbours).

Size

The land area required for a meat chicken farm will vary considerably depending on many variable factors, including the size of the operation, local topographical and climatic features, surrounding land uses, the technology used for the development and the proposed management practices. As a general rule, the smaller the block, the higher the dependence will be on technology to manage impacts.



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Adequate setback distances minimise off-site impact and allow for landscaping and screening plants around the farm facility.

The property must be of sufficient size to accommodate the facilities required to support the planned operation. These facilities include the chicken sheds and feed silos, amenity block, storage sheds, internal roads, stockpile areas and dead bird storage. If it is intended to apply litter to land as a fertiliser and soil conditioner, then sufficient land area is needed to ensure sustainable application rates. Consideration should also be given to management areas for mass disposal of dead birds (refer to section 6.11).

Adequate setbacks should be provided to allow for landscaping and screening of the chicken sheds, other buildings and storage areas on the property and, importantly, to minimise the likelihood of off-site adverse noise, odour, and dust impacts. Additional land is needed to ensure reasonable biosecurity, community amenity and natural resource protection. How odour impact is managed will be a significant determining factor in land area requirement.

In addition, local topography, climatic conditions or other features may indicate that greater separation or buffer distance is required. For example, a house located downhill from a meat chicken farm is more likely to experience odour impacts than a house uphill, owing to the pattern of cold air drainage. On the other hand, the particular development design and technology used and the local features or conditions may indicate that distances may be reduced and environmental impact objectives still achieved.

The local council may have guidelines or development control plans for meat chicken development in the area, and these may specify mini-

mum property sizes for meat chicken farms. Refer to local council guidelines when determining farm location and size.

Odour impact assessment

The results of an odour impact assessment play a key role in determining an appropriate location and size for a new meat chicken farm. Guidance on the expectations of the Department of Environment and Conservation (DEC) regarding odour impact assessment is contained in the *Draft Policy: Assessment and Management of Odour from Stationary Sources* (NSW EPA 2001) and *Technical Notes: Assessment and Management of Odour from Stationary Sources* (NSW EPA 2001). Odour impact assessment methodologies for chicken meat farms continue to evolve as new data and techniques become available. The Draft Policy reflects the state of knowledge at the time of publication. Before commencing any significant odour impact assessment, contact the DEC to discuss any changes to the preferred assessment methodology. Additional information on the DEC's requirements for a dispersion modelling based odour impact assessment is contained in the *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA 2001).

An assessment of odour impact will need to be completed to support an EIS, an SEE, a DA or a DEC licence application (if the activity is listed in Schedule 1 of the PoEO Act). This assessment must provide details of the odour impact assessment and clearly demonstrate to the consent authority (the local council or Minister for Infrastructure, Planning and Natural Resources) and

the regulator (local council or DEC) that the proposal is able to meet the DEC environmental outcomes for odour.

Odour impact assessment is a site-specific design tool. However, it can only predict the likely odour impacts. In some cases, once the facility is operational, odour impacts may be experienced at some locations. The operator will need to address these odour impacts and if necessary modify the facility on the basis of actual, rather than predicted, operational outcomes.

Shape

Square blocks are favoured over long, thin blocks of similar area in order to maximise farm layout and design options and separation distances from the sheds to the boundary of the property.

Topography

An elevated site is preferred for natural ventilation and drainage, but sites where cold air will carry odour down to residences should be avoided. A reasonably level site is preferable to a sloping one to minimise erosion potential and building costs. When spreading manure on-farm, flat to gently sloping land is preferred.

Topographical features can be used to shield meat chicken developments from view and lessen any potential visual impact on the surrounding area.

Power supply

Access to reliable three-phase power is essential for provision of water and feed to the birds and for lighting and ventilating the sheds. Discuss needs for future expansion with the power supplier when estimating power and electrical equipment requirements. Arrangements for electricity supply need to be made with the local electricity authorities. Private contractors may install electricity infrastructure on the property. Access to power may be a considerable cost if power is not already present on the site.

Installation of standby generators is essential to minimise the adverse consequences of power disruptions, particularly if controlled ventilation will be used.

Road access

Suitable all weather vehicle access able to support articulated vehicles of up to 40 tonnes

should be provided from a fully constructed public road for the transport of birds, litter, wastes and feed.

Choose a transport route to the farm that avoids truck movements near sensitive land uses such as schools and hospitals and through towns as much as possible.

Establish the access road on a compacted sub-base with good table drains, and with a compacted gravel layer with a good camber to shed rainwater to the drains. In some situations it may be appropriate to seal the farm access road.

Consideration should be given to the ease of access within and beyond the site. For site access from a public road, putting the gate 30 metres inside the property boundary of the farm will allow trucks requiring access to park off the road while the gate is being opened. Alternatively, the access roadway can be fenced off.

Take into account the impact of noise, dust, bioaerosols, lights and road safety on nearby sensitive land users when locating access roads, parking and turning areas. Some roadworks may be needed to accommodate this, such as development of turning lanes. Funding may need to be negotiated between the developer, the local council and the Roads and Traffic Authority.

Contact the Roads and Traffic Authority or the local council for further information.

Water supply

The site should have access to water of sufficient quantity and quality for each intended use. Water is required for drinking, shed cooling, shed sanitation, fire protection, irrigation of landscaping and domestic use (amenities block and residence).

Reticulated town water supply is ideal, but this is often not available. Alternatives are ground water (bore), surface water (dam or river) and rainwater (collected from shed roofs). All water sources other than town supply should be tested for quality to ensure they are reasonable for consumption by poultry and will not cause excessive corrosion or build-up on farm equipment.

Surface water may contain solids and may be contaminated with disease organisms from wild birds. Water sourced from dams and rivers should be filtered and treated before use in sheds. This will help prevent blockage of drink-

ers and minimise disease risk to the birds. Chlorination, ultraviolet light systems or other appropriate disinfection procedures may be used to disinfect the water.

Failure of water supply for even a short period can cause disastrous losses of birds. It is essential to have an alternative water source, or on-farm reserves for a minimum of 2 days' calculated water requirements at maximum usage (for example, in summer for cooling). The capacity of reserves should be based on water availability and reliability at the site of development.

Each bird produced requires about 8 litres of drinking water in their lifetime. Therefore, assuming the industry standard of 5.6 batches a year, an allowance of about 45 000 L/1000-bird shed capacity/year is needed. Additional water is also needed for cleaning, shed cooling and other purposes.

The water should be tested for salts, nitrates, pH, and bacterial contaminants.

In the Sydney Basin there will be increasing restrictions on availability of raw water since Sydney is now using more than the sustainable yield of water from the catchment. Plans for water supply for developments in the Sydney Basin should make use of water collected from sheds or stormwater, provided it does not compromise biosecurity.

When potable water is supplied from a public utility, a backflow prevention device must be installed for containment protection. A reduced pressure zone device valve or a registered break tank and air gap must be fitted immediately after each supply water meter. The backflow prevention must be installed on the farm's side of the water meter, with no connections between the water meter and the backflow prevention. The backflow prevention device must be installed and maintained in accordance with the National Plumbing and Drainage Code and Australian Standard 3500 (AS/NZS 3500).

In consideration of occupational health and safety, the farm owner must take responsibility for zone and individual backflow protection from hazards within their property, as specified in AS/NZS 3500. The farm owner is responsible for maintaining all backflow prevention devices in accordance with AS/NZS 3500 Part 1.2.

State Government guidelines and regulations are in place for sourcing water from bores or surface watercourses, or for catching water in dams. A



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The water supply should be of sufficient quantity and quality for each intended use, including shed cooling. Water used to wet evaporative cooling pads may be recycled. Water can be collected from shed roofs for farm use.

licence from DIPNR may be required. Contact DIPNR or NSW Agriculture for further information.

Hydrology

The proposed site should be above the level of flooding, with an average recurrence interval of 1 in 100 years. It should also be ensured that flooding will not impede road access to the farm.

The bases of the chicken sheds should be raised to facilitate drainage of stormwater away from the sheds. The use of properly designed gently sloping, wide, open drains that are well grassed and kept mown will avoid erosion, and the vegetation cover will help filter solid particles from the run-off.

Vegetation

Selecting a site that avoids the need to disturb or clear native vegetation and habitat greatly reduces potential impacts and the need for additional studies. Existing vegetation should be maintained where possible, but trees should be strategically cleared for a distance of 15 metres around the proposed sheds to allow adequate ventilation of the sheds and protect the sheds from falling debris and branches. Approval from DIPNR or in some instances the local council is required to clear vegetation.

Grass should be maintained around the sheds to avoid soil erosion and dust generation. These



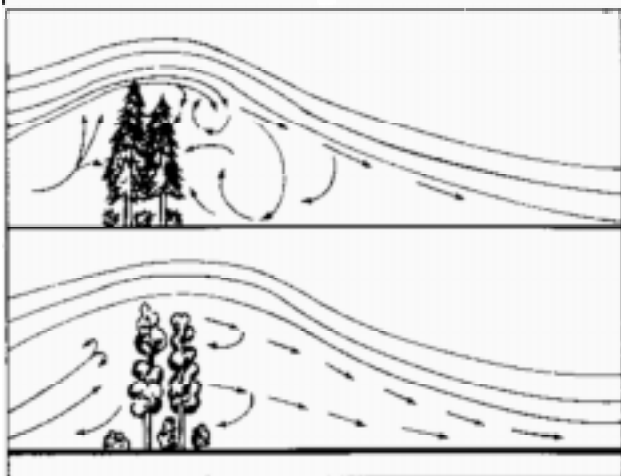
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Existing vegetation should be maintained where possible. Trees and topographical features can be used to help screen sheds from view. Grass should be maintained around sheds to avoid soil erosion but should be kept low around sheds for pest-control purposes.

grassed areas will also help reduce the heat load on the buildings from radiation off the bare ground.

The site should be planted with suitable trees and shrubs to allow the site to benefit from prevailing cooling breezes, form wind breaks to westerly winds, and improve the visual aesthetics of the area. Vegetative screens should be of a permeable nature that allows the air to penetrate, but need to be at least three rows thick to effectively slow air movement and trap the bulk of the dust and odour within the vegetative buffer. A densely planted screen of broadleaved trees and shrubs will look effective and will block the farm complex from public view. However, it is not appropriate because it will act like a wall, resulting in lifting and dumping of the air (taking dust and odour with it) on the

Figure 2. The effect on airflow of impermeable (top) versus permeable (preferred) screening



other side of the break rather than slowing the air movement down within the break. When planning for the planting of native vegetation, it is preferable to use local provenance native species. State Forests or a reputable local nursery will be able to advise on suitable/appropriate species.

Separation distances for biosecurity, community amenity and natural resources protection

Individual local governments may have their own requirements for separation distances in guidelines or development control plans (so the requirements of the local government area in which development is being considered need to be checked). In addition, meat chicken growers should confer with the processing company they are contracted to regarding their separation requirements.

Such distances should be considered to be minimum requirements, and the appropriate distance for any farm should be established on a case-by-case basis. Potential sites must be evaluated by the proponent for suitability on their individual merits, on the basis of the characteristics of the site and proposed development, and the proposed management practices. Management practices should be determined in an environmental management plan (EMP) and submitted with the DA. Information on Environmental Management Systems and Plans can be obtained from NSW Agriculture and the Rural Industries Research and Development Corporation.

Separation distances alone do not necessarily guarantee absence of environmental impacts on neighbours. Other measures, including improved technology and good management practice, should also be used to avoid, minimise and manage external impacts.

Biosecurity

Disease control is an important issue for the meat chicken industry. A number of serious airborne poultry diseases can travel large distances. To ensure optimal biosecurity the proximity to other poultry farms must be taken into account when choosing a location and site for a meat chicken farm development. A distance of at least 2 kilometres between poultry farms is recommended for new farms.



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Suitable separation distances from other poultry farms, neighbours and sensitive natural resource areas minimise the risk of impacts on the farm, community and environment.

In the event of an emergency animal disease, control zones of 3 kilometres or more may be put in place. Maintaining a suitable distance from other poultry farms will considerably reduce the inconvenience that may result from disease outbreak control measures.

Consideration should also be given to maximising the distance between chicken sheds and roads used by feed trucks and live-bird-hauling vehicles servicing the local poultry industry.

Avoid building new facilities within close proximity of wetlands or waterways utilised by migratory waterfowl that may carry avian diseases.

A poultry farm development within 500 metres of another poultry farm is a designated development under the EP&A Act and will require an EIS.

Community amenity

Meat chicken farms by their very nature will produce emissions of odour, dust, bioaerosols and noise. Odour nuisance complaints are the greatest source of environmental complaints made against the meat chicken industry. Provision of reasonable buffer distances within the proposed development boundary will help ensure that community amenity is maintained and that land-use conflict between the meat chicken farmer and neighbours is avoided or minimised.

Planting of vegetative screens in the buffer zone around the farm, or locating the farm sheds in already vegetated areas, will screen the farm and

help reduce odour and dust transfer to the surrounding environment.

A poultry farm development within 500 metres of a residential zone or 150 metres of a dwelling not associated with the development and likely to significantly affect the amenity of the neighbourhood is a designated development under the EP&A Act and will require an EIS to be lodged with the DA.

The Draft Policy: Assessment and Management of Odour from Stationary Sources in NSW and Technical Notes. Draft Policy: Assessment and Management of Odour from Stationary Sources (NSW EPA 2001) describe the odour performance criteria for meat chicken farms and how to determine separation distances by a tiered assessment process.

Natural resource protection

Natural resource protection should be a priority in any development proposal, and buffer distances from watercourses, wetlands and drinking water catchments should be maintained to ensure that nutrient and pathogen contamination does not occur.

Litter application methods, topography and vegetative cover dictate the potential risk of nutrients entering the water catchment. Vegetated buffer zones help reduce the risk by filtering the surface run-off water. The nutrient filtering capacity of buffer zones is increased with greater vegetative cover and distance. However, buffer zones alone will not guarantee environmental outcomes.

A poultry farm developed within 100 metres of a natural waterbody or wetlands, or within a drinking water catchment, is a designated development under the EP&A Act and will require an EIS.

5.2 DESIGN AND CONSTRUCTION

The design and construction of meat chicken farms may contribute to adverse impacts on sensitive land uses in the surrounding area. The design and construction should minimise off-site impacts and promote the economic and operational efficiency of meat chicken farms. The development should utilise site topography, existing vegetation and strategic planting of trees to integrate the development into the landscape.

Construction

The design and construction of the chicken sheds and associated works must meet technical and environmental standards that minimise the potential for offensive odours and unacceptable levels of dust and noise affecting neighbours. It should facilitate the cleaning and maintenance of collection areas. Sheds should be constructed and designed to exclude wild birds, vermin and rodents.

Consideration should also be given to minimising the potential for environmental impacts that may occur during the construction phase, including noise and vibration impacts, erosion and sedimentation. An EMP may be required for the construction phase of the development.

Most existing meat chicken sheds are about 100 metres by 12 metres, steel-framed, clear-span, gable-roofed structures. Sidewalls are generally

Meat chicken sheds are generally clear-span, steel framed, and gable roofed structures.



Most meat chicken farm sheds are about 100 metres long and 12 metres wide. Newer sheds are often larger.

solid up to 400 millimetres high, with the balance netted and fitted with woven plastic curtains or hinged metal shutters. The curtains or shutters are raised and lowered manually or automatically to control ventilation and temperature, and to provide protection from adverse weather conditions. Fogging the interior of the shed from ceiling-mounted fogger lines evaporatively cools the chickens in hot weather.

Newly constructed sheds are mostly tunnel ventilated and generally have either curtained or solid sidewalls with minimum-ventilation vents spaced along the top of the sidewalls. They are fitted with large extraction fans at one end. The fans draw air down through the length of the shed, either through the minivents or through evaporative cooling pads at the other end of the shed if the shed is in cooling mode.

Sheds normally have a raised, compacted impermeable base. The minimum acceptable permeability standard is 10^{-9} m/s. Some new sheds have a concrete slab base for ease of cleanout and disinfection, although this is a significantly more expensive alternative. A concrete base may be required on particularly vulnerable soils.

Roof eaves should be sufficiently wide to keep out rainwater and minimise the amount of excessive summer sun entering the shed. Gutters and down pipes will help in stormwater management and will also help prevent erosion of the elevated foundation pad edges.

Orientation

The orientation of the chicken sheds should complement the characteristics of the develop-

ment site (layout of nearby roads, topography, meteorology, and other natural features of the site). It is very desirable to align the long axis of the sheds east–west to minimise shed surface area exposure to the sun and sun entering the shed. Direction of prevailing winds should be taken into consideration, with sheds oriented to take advantage of cooling summer breezes. Tunnel-ventilated sheds should be oriented so that the fan-end of the shed, where the air exits, will have minimal impact on neighbours.

Layout

The layout of the farm should provide for efficient management of feed, placement of fresh litter, delivery and collection of birds, and collection, handling and treatment of wastes. It must also minimise off-site impacts on neighbouring land uses.

The layout should provide an optimal design in response to the site and local environmental conditions and features. Factors to be taken into account include existing buildings, roads, dams, vegetation and valuable habitat, watercourses, drainage lines and waterbodies, slopes and other topographical features, and local meteorological conditions such as wind patterns and atmospheric stability.

Consideration should be given to the impact of prevailing winds and katabatic drift (cool air draining downhill) on surrounding sensitive land users, with regard to transport of odour, dust and noise.

Sheds should be a minimum of 15 metres apart from sidewall to sidewall to ensure good ventilation. This distance is less critical for forced-

Adjustment of drinker line height helps ensure litter remains dry and odour is minimised.



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Feed systems should provide wholesome feed with minimum wastage.

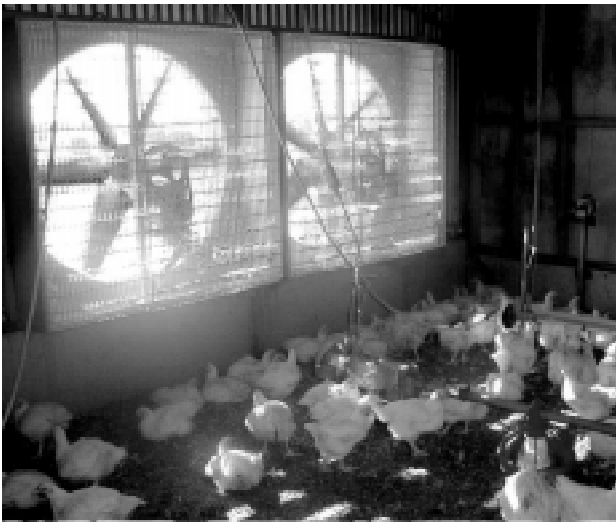
ventilation (tunnel) sheds, although vehicle access between sheds for maintenance and other purposes should be considered.

Infrastructure

The selection of drinker-system technology is based on minimal water leakage to avoid wetting the litter while meeting the birds' requirements for drinking water. For most situations, nipple drinkers with drip trays are best practice. The drinker systems are designed to work at specific pressures, and manufacturers' recommendations should be followed for functional requirements and the number of birds per drinker. Drinkers should be checked and fixed daily to ensure they are working effectively and are not leaking. The height of drinkers needs to be altered regularly in keeping with manufacturers' recommendations.

Silos and feed systems should be designed to efficiently provide wholesome feed without contamination and with minimum wastage. Feed wastage and bird enteric problems not only add to the amount of nutrient and water in the litter, but also can add substantially to the cost of production. Feed system capacity and design influence the number of truck movements and dust and noise generation. Consider these and other potential impacts on neighbours when deciding on a feed system.

Fans are fitted in chicken sheds to facilitate air movement (ventilation) and for bird cooling. Circulating fans may be used inside naturally ventilated sheds to encourage air movement in the shed. Tunnel ventilation depends on a



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Extraction fans are fitted to tunnel-ventilated sheds for ventilation and bird cooling.

number of large fans installed into the shed's end-wall pulling fresh air into the shed and expelling stale air (which also holds moisture). To ensure correct capacity and installation, select the fans in consultation with the manufacturer and an independent expert. Other factors to consider are fan efficiencies that influence running costs, as well as noise levels. It is important to clean and maintain fans to ensure that they are functioning properly, to avoid ventilation problems and slower drying of litter.

Evaporative cooling pads and fogger systems are installed for evaporative cooling inside the sheds to optimise the environment for the birds in hot weather. Fogger line pressure and fogger nozzles need to be properly maintained, otherwise

Heater units fitted to sheds are used to warm the shed for young birds.



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problems could result in overheating of birds or wetting of litter, resulting in odour.

Heaters are used to warm the shed environment for young birds, which until fully feathered are unable to adequately maintain body temperature. Hanging radiant heaters have traditionally been used, but forced-air space heaters are becoming the norm. These include free-standing vented or unvented gas heaters.

Automatic controllers are fitted to most new sheds. The computer controllers are used for temperature and ventilation control and other operational aspects such as feed, water, light and weighing of birds. Correct operation of the automatic controllers is essential to management of the birds' environment, and emergency alarms and backup generators in case of problems or power failure are a must to ensure bird welfare and survival. Backup power is essential for fully enclosed sheds as well as those with drop-down sides.

All infrastructure should be planned to ensure the health and safety of employees, contractors and other visitors to the workplace. An OHS risk assessment should be undertaken before finalisation of plans, and relevant modifications should be made to control identified risks.

Stormwater management

A Stormwater Management Plan should be developed for inclusion in the EMP. This plan should include provisions for the routing of clean storm water around the development site and for the retention of potentially contaminated storm water within the site.

The locations of nearby watercourses, dams and lakes must be identified and provision made for adequate setbacks and other measures needed to prevent contamination by stormwater or wastewater run-off from the meat chicken farm.

Shed bases need to be elevated to prevent entry of stormwater. Litter stockpile and carcass disposal areas must be located, designed and managed to avoid stormwater entry. Bunding is often required to contain any stormwater that does enter these containment areas, and this nutrient-rich water should be directed to catchment dams or storage tanks.

Keep clean stormwater separate from areas that may be affected by meat chicken farm wastes. Establish stormwater table drains along all building lines to collect stormwater run-off from

roofs, roads and hardstand apron areas to discharge into a catchment dam or filter within the property before release to the catchment. Table drains should be grassed to avoid erosion and to catch sediment, and they should be graded to make mowing easier. In areas prone to soil erosion, crushed rock traps and drops may need to be incorporated into the drainage system to slow down the water and minimise erosion.

Run-off from the property should not be more than pre-development levels; to achieve this retention dams may be required. If retention dams are used as a mechanism to capture run-off, these should have a capacity to retain run-off from a 1-in-20-year storm. Keep excavated soil from dam construction and reuse it on site wherever possible. For further information on stormwater management contact DIPNR.

Ground water management

Meat chicken farms should not be constructed on areas with shallow ground water. Poultry sheds and storage, stockpile and disposal areas for used litter and carcasses should have impermeable bases and adequate clearance to the ground water table to protect against ground water pollution.

The vulnerability of the ground water resource to pollution depends on the depth to the ground water, soil type and the nature of the aquifer systems in the region. A development in a vulnerable area will require more thorough assessment and investigation, and will need more control strategies to ensure protection of the ground water resource.

Generally, an impermeable compacted base will prevent nutrient leaching, but on vulnerable soils a concrete base may be needed to ensure ground water protection.

The local DIPNR office can advise on ground water vulnerability.

Ventilation

Adequate ventilation is essential to maintaining acceptable air and litter quality inside the chicken shed. Ventilation management involves reaching a balance between maintaining air quality and temperature to achieve reasonable bird comfort and growth performance.

Insufficient ventilation can result in excess heat, humidity, waste gas and dust remaining in the sheds. This causes poor air quality, which nega-

tively affects bird health and welfare. It also results in wetter litter and associated odour problems.

The first step to achieving good shed ventilation control is to have the shedding and equipment designed to do the job effectively and efficiently. Having the right infrastructure for good ventilation control is wasted without good management practices to maintain the optimum conditions. So the second step to ensuring good ventilation is to set up maintenance and management systems to keep the chicken sheds running at their best.

Although capital investment in shedding and equipment is substantial, ultimately a good maintenance and management program will make the job easier with fewer problems, which is more cost effective in the long term. It is always a good investment of time and money to research the best shedding and equipment alternatives for a proposed development. It represents a small cost when compared to the capital outlay, and it is important to get it right the first time.



NSW Meat Chicken Farm Guidelines - Readers' Note

This document is part of a larger publication. The remaining parts and full version of the publication can be found at:

<http://www.agric.nsw.gov.au/reader/orchard-plant-protection>

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