



GOLDEN PLAINS SHIRE

Investing in Intensive Agriculture

**Demand and Infrastructure Requirements for
Intensive Agricultural Industries and
Identification of the Economic and Social
Benefits**

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GMR Engineering Pty. Ltd.**

Investing in Intensive Agriculture

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Synopsis

This report investigates the provision of infrastructure for intensive agriculture to support existing farms and encourage new investment in the Golden Plains Shire. An earlier study¹ in 2004 identified two areas (Study Areas A and B) suitable for further investigation within an area extending west of the Midland Highway, broadly between Shelford and Rokewood. The investigation areas were defined to provide a 3-5 km protection 'buffer' around existing towns. These investigation areas already contain significant investment in intensive agriculture, with the opportunity for further investment if appropriate infrastructure is available. The Shire's objective is to create a 'best practice' environment for intensive agriculture, requiring co-operation between industry, infrastructure providers and government.

The evaluation of infrastructure availability has identified that power, roads and telecommunications within the Study areas can be upgraded to give greater reliability to existing industry and to create capacity for future investment. Improvements will need to be based on a business case, generally on a public/private partnership basis.

Natural gas passes through the south-eastern tip of the Shire but is unlikely to be reticulated unless a major industry user is identified. The most likely opportunity may be the development of a feed mill in the Shire.

It is clear, however, that a reliable water supply is the most important component of the infrastructure 'package' required by intensive agriculture. The availability of water in Study Area A is currently limited, with companies like Western Plains Pork relying on bore supplies to supplement on-site water retention. Study Area B contains most of the investment in broiler and egg production. Until recently, most farms have relied completely on a reticulated supply provided by Barwon Water. The system also supplies local townships such as Meredith and Lethbridge. The water reticulation system has grown incrementally over the years and as a result, some sections have supply limitations. This constraint has been exacerbated by the recent run of low rainfall years. Both urban and agricultural requirements are serviced from the same system, however, in times of water stress, urban requirements take precedence. Therefore, there is limited scope for new investment in intensive agriculture to obtain a reliable supply through the existing reticulation system.

Field observation of existing broiler farms indicates that there is a low level of on-site water harvesting, for example, by collection of rain water off sheds and impervious surfaces. Given the size of the sheds, this represents a significant underutilised resource.

¹ *Developing Suitable Areas for Intensive Agricultural Industries in the Golden Plains Shire, Area Improvement Project No. 20317, prepared by The Regional Development Company, Earth Tech Engineering and Ed Harvey Planning and Development, August 2004.*

Recently, investment by Rural Funds Management in a new broiler farm complex on Tall Tree Road near Lethbridge for Barrter Steggles has incorporated the on-site retention of rainwater to supplement the reticulated supply from Barwon Water. This is likely to be a mandatory requirement for future investment and accords with the objectives of the State Government's "Our Water, Our Future" strategy.

This study considers the RFM Tall tree Road farm is a water supply model for future intensive industry investment. Given the climate of the Golden Plains area, it is unlikely that broiler farms (in particular) can source all of their water requirements from on-site retention. Broiler farms use approximately 40% of their water requirement for shed cooling and the remainder for stock and shed maintenance. It is probable that water recycling and new technology will achieve water savings in the future, however, a reliable reticulated supply will continue to be required.

Based on a mandatory requirement for on-site water harvesting, the level of existing investment in broiler farms and the potential for future growth, this study investigated the physical suitability of a separate reticulated water supply for intensive agriculture, focussing on Study Area B. The suggested system takes water from the existing Moorabool Treatment Plant at She Oaks and pumps water via a new pipeline to a new storage facility (120ML dam and/or tanks) in the vicinity of Mount Mercer. This location has sufficient elevation to enable a gravity system to supply the farms in Study Area B and perhaps parts of Study Area A. An alternative is a storage facility in the centre of Study Area B, with a pump station to drive reticulation.

It is estimated that the ultimate total average annual requirement will be 900ML, which will replace the reticulated supply to existing farms and provide capacity for a further six farm complexes similar in size to the Tall Tree Road farm. The introduction of a dedicated system will mean that existing farms may have the option to disconnect from the urban supply, thereby gaining improved security for local townships. It is estimated that existing farms currently use 300ML, therefore, on the basis of a replacement supply, the net requirement for the new system will be 600ML. The total cost of the system is expected to be in the vicinity of \$11.4M, however, this will require further technical verification.

The proposal has been submitted to Barwon Water for technical appraisal. Discussions have also occurred with Regional Development Victoria and to date, the proposal has received local industry support. Further industry consultation will be required following Council's consideration of the report and the response from Barwon Water.

The funding of the project is anticipated to be a public/private partnership, involving private industry and State Government, with Barwon Water contributing to components that meet its existing infrastructure program. It must be emphasized that this project is unlikely to receive support if it cannot demonstrate water saving outcomes. The project will also need to be consistent with the "Our Water, Our Future" State and Regional objectives.

Introduction

This report has been prepared to identify the infrastructure required to serve existing and future investment in intensive agriculture in the Golden Plains Shire. The study also investigates the degree of industry and community benefit to be derived from further investment. The Golden Plains Shire has a pro-active approach to intensive agricultural investment as it recognises that the municipality possesses physical and logistical advantages for this form of investment.

Intensive agriculture investment in the Shire is dominated by the poultry and pig production industries. Within the areas of primary focus for this Study there are currently three piggeries, two major egg production farms, seven broiler farms and planning approval for a further two major broiler farm complexes. There are also major breeding and hatching facilities operated by Barrter Steggles in the southern part of the Shire near Bannockburn. Western Plains Pork has a current capacity for 3400 pigs and is seeking to increase this production to 7500 growing out pigs to meet export market opportunities.

The high level of investment (up to \$20M per farm complex) in the poultry industry in the Geelong Region (Geelong and the surrounding municipalities), has in part been a product of the consolidation by Bartter Steggles of their Victorian and South Australian operations in Geelong. The Company appears to be focussed on consolidation and growth, which will provide further opportunities for investment in the Golden Plains Shire in step with development of the domestic and export chicken meat market.

An initial study commissioned by the Shire in 2004 (refer to review notes in the following section) identified two areas (shown on the Existing Conditions Drawing GMR06015/10 as areas A and B) that are preferred by investors in intensive agriculture. These areas have attributes suitable for intensive agriculture (low development density, proximity to processing facilities and markets, access to labour and infrastructure) and have potential for further growth. This study looks at the infrastructure (water, power and roads) available within these areas and investigates the infrastructure requirements for existing and future investment.

It is not the intention to treat areas A and B as preferred areas, because it is generally not practical to try and direct where investment might occur. Rather, these areas have attracted significant intensive agriculture investment in the past and it is probable that investment will occur in the future. As such, areas A and B are good candidates for further investigation.

The purpose of this study is to determine the requirements for a sustainable future for existing intensive agriculture investment and the practicality of providing improved infrastructure capacity.

Review of previous documents and research

A number of studies have been undertaken in recent years that address the opportunities for investment in intensive agriculture. Initially, the focus has been on the Geelong Region, however, subsequent studies have concentrated on the Golden Plains Shire. The scope of these investigations is a reflection of the economic importance of intensive agriculture to the region.

Barwon Region Intensive Animal Industries Study

Barwon Region Intensive Animal Industries Study. Philips Agribusiness, with Agribiz Engineering and Nicolstam Pty. Ltd., January 2003.

The following information has been sourced from Council Minutes.

This Study concludes that the pig meat and broiler chicken industries in particular have strong growth prospects (projected annual growth rates over the next five years of 8% and 16% respectively). Eighty per cent of dairy production is exported, making this sector more susceptible to international forces than the chicken and pig meat industries which are far less reliant on exports and demonstrate the greatest regional growth potential.

It is estimated that both the pig and chicken meat industries have employment multipliers of approximately 2.2, with subsequent benefits not only in direct demand for on-site labour, but also labour associated with transport, processing, packaging and distribution industries. The Study notes that the Geelong Region is the centre of Bartter Enterprises' Victorian and South Australian broiler chicken operations which is being strengthened through the transfer of production capacity from other locations such as the Mornington Peninsula.

The Barwon Region Study also highlights that there are mutual benefits for pig producers and cereal growers arising from the rapid expansion of the open range piggeries sector, where rotations of cropping and grazing are utilised to absorb nutrients from pig effluent applied to the soil. Having identified the pig and chicken meat sectors as being those of highest growth potential, these are the industries that have been given the most attention through the remainder of the study and offer the greatest opportunities for the Geelong region.

Strengths

- Natural features such as climate, topography, soil type and low level of hazard (salinity, erosion) are well suited to intensive animal industries location.
- Property holdings to the north of the City are large with a relatively low population density.
- Bartter Steggles broiler processing facility is well established with a labour force of 800.
- An adequate labour supply is available for unskilled food processing opportunities.

-
- Good infrastructure availability, particularly road networks, reticulated water and natural gas.
 - Good training and educational facilities.
 - Strong regional centre capable of supporting further intensive animal industries developments such as feed mills and service industries.

Weaknesses

- The areas south of the City and including the Bellarine Peninsula are too densely populated to consider as intensive animal industry locations.
- Traditional broad acre agriculture is conservative in embracing change.
- The northern districts have limited opportunity for water harvesting.

Opportunities

- Existing processing capacity can readily absorb broiler growth arising from industry relocation.
- Relocation of Bartter Steggles feed mill to the Barwon region.
- Adequate supply of suitable land for new broiler and open range pig developments in the region, particularly north of Geelong.

Threats

- Adverse community reaction to any proposed new farm developments.
- Delayed decision making in considering permit applications for new developments.

The Study lists some general points in relation to competitive advantage in the Barwon Region:

- Broiler farms are spread across all four municipalities with their incidence being greatest in the Surf Coast and Golden Plains Shire.
- Broiler industry growth is being directed to the Lethbridge, Bannockburn and Winchelsea districts because of the comparative advantages they can supply in site location.
- Relocation of the Bartter Steggles feed mill from North Melbourne to a Barwon Region location is likely to occur within the next three years. The Barwon Study identifies prospective sites that include Winchelsea, Bannockburn, Lethbridge and Batesford. *(In respect to the Golden Plains Shire, the location of a new feed mill at Bannockburn, Lethbridge or Batesford will be subject to consideration of the location of existing urban development. Locations such as Stonehaven or Gheringhap may be preferred candidate areas).*
- The open range pig industry also offers good growth prospects and is not so constrained in its choice of suitable sites.

Infrastructure Needs

Infrastructure provision is important to attracting intensive animal industry investment to the region. The Barwon Region Study highlights the necessity for reticulated water and power and suitably sealed roads, particularly for the broiler chicken industry. However, the consultants have concluded that while

clustering of broiler farms is desirable to reduce infrastructure costs, a detailed assessment of infrastructure needs is beyond the scope of the Study and recommended it be considered as a secondary initiative.

It is noted that Golden Plains Shire has successfully sought a grant in the order of \$65,000 under the State Government's Areas Improvement Program to investigate infrastructure needs in a few select remote areas of that Shire which it believes would be particularly suitable for broiler chicken operations.

Future Economic Development Initiatives

The Study lists a number of recommendations aimed at assisting the development and expansion of key intensive animal industries.

The recommendations include:

- 1) That regional municipalities undertake a regular review with the major regional broiler and pig meat companies to establish each industry's intended strategic initiatives, projected production growth rates and where increased capacity is likely to be directed.
- 2) That regional municipalities, in co-operation with the industry, undertake an audit and review of all broiler farms to determine their ability to comply with the Broiler Code of Practice given their intended expansion plans.
- 3) That the respective municipalities, either independently or jointly, undertake discussions with Bartter Steggles to determine the likelihood, timing and preferred location of relocating their North Melbourne feed mill to a Barwon Region location.

Preferred Locations

One of the original intentions of the Study was to identify 'preferred locations' for intensive animal industries and to develop a draft Planning Scheme Amendment to give effect to the 'preferred locations'.

The consultancy team developed a 'preferred location' map after taking into account agricultural suitability and the different constraints which exist such as overlays within the planning scheme. The preferred location lies in the north of the municipality where holding sizes are generally greater than 100 hectares.

However, as the research progressed, it became clear that identifying 'preferred locations' was possibly not the best approach given that the major intensive animal industries (piggeries and broiler farms) are regulated by well established Codes of Practice. The Codes provide the basis for the planning, siting, design, assessment, approval, construction and operation of intensive animal industries and are intended to assist prospective developers, responsible authorities and regulators in the proper establishment and operation of these facilities or where there are alterations and/or extensions to existing operations. The Study discusses common elements of the various Codes.

The Codes are incorporated documents in the Victorian Planning Provisions and apply to all municipal planning schemes throughout Victoria. It is State

Government Policy that these Codes be applied uniformly across the State of Victoria.

It is considered that a Planning Scheme Amendment identifying 'preferred locations' would be unnecessarily restrictive and a double up on the function of the Codes thus serving no real policy purpose.

Golden Plains Long Term Strategic Data Analysis

*Golden Plains Shire Long Term Strategic Data Analysis
DSE Western Region and Clark Phillips Pty. Ltd., June 2003.*

Population

The total estimated Shire population in 2004 was 16,319 (*Towns in Time data, DSE*). This represents an increase in population of 3,595 since the 1996 census and is a reflection of the proximity of Golden Plains Shire to Geelong and the employment opportunities created by agribusiness investment.

The *Golden Plains Shire Long Term Strategic Data Analysis* identified that 67.5% of the Golden Plains population "resided in the rural communities of Golden Plains (S), outside of the townships of Bannockburn, Inverleigh, Teesdale, Enfield, Linton, Smythesdale, Scarsdale, Meredith, Lethbridge."

Contrary to many rural shires, Golden Plains achieved a net gain in population (between 1996 and 2001, a net gain of 139 people). The 'turnover' during this period was close to 1,000 people, indicating relatively high population mobility. Most of the people moving out of the Shire were in the 18-24 age group, however, this was more than compensated by an influx from the 25-54 age group into the Shire. The employment category "Farmers and Farm Managers" was well represented in this group, which correlates with the demand for trained personnel to operate and manage intensive agriculture.

Area Improvement Project 20317

Developing Suitable Areas for Intensive Agricultural Industries in the Golden Plains Shire, Area Improvement Project No. 20317, prepared by The Regional Development Company, Earth Tech Engineering and Ed Harvey Planning and Development, August 2004.

This study arose from the Geelong Region assessment described above but was specific to the Golden Plains Shire. The study made the following basic findings:

- Intensive agriculture investors are seeking sites that will provide long term operational stability; i.e. protection from encroaching urban subdivision, incompatible land use and sustainable environmental management.
- Two areas, Study Area A (between Shelford and Rokewood) and Study Area B (west of Lethbridge, between Shelford and Meredith) have

attracted intensive animal production investment and appear to have potential for further growth.

- The areas around the existing townships e.g. Shelford, Rokewood and Meredith, should be separated from intensive agriculture development by an appropriate 'buffer' of approximately 3 km.
- That water pipelines constructed into the centre of each study area would help secure existing and new investment in intensive agriculture.
- That three phase power was available to service each area based on a business supply plan.
- That strategic intersectional works and local road improvements partially funded by industry would be required to support new and existing investment.
- That the concept of an intensive agriculture planning scheme overlay be further investigated to provide long term protection for intensive agriculture from inappropriate subdivision and development.
- That a new feed mill be encouraged to locate in the Shire, utilising the existing rail facilities and the availability of natural gas.

Industry requirements

To date, investment in intensive agriculture in Golden Plains Shire has been strong on a project by project basis. The location of investment (refer to Drawing No. GMR060115/10) indicates that the Shire has a number of geographical and economic attributes:

- Large areas of undulating farm land with a low dwelling density.
- Ability to locate farms with appropriate separation distances for bio-security.
- Proximity to processing facilities and markets via an excellent regional road and rail infrastructure.
- In the case of the poultry industry, proximity to major breeding and processing facilities (Barrter Steggles).
- Ability (to date) to be able to connect to reticulated water or source suitable groundwater.

Golden Plains' advantage would be enhanced by:

- Improved water security for intensive agriculture.
- Access to a local feed mill.
- A wider distribution of three phase power.

-
- Improved local roads and key intersections with arterial roads for heavy vehicles.
 - Improved access to labour and support services.

The 2004 *Area Improvement Project* study clearly established that the first priority for intensive agriculture investment is long term stability without the threat of encroachment from subdivision and development. To date, the planning system has largely failed to provide intensive agriculture with the protection it requires. Planning remedies are not the province of this study, however, the effectiveness of the new Farming Zone combined with the application of codes for intensive agriculture (notably the Broiler Farm Code) are discussed in the section on planning controls.

In addition to the above requirements, the consultation conducted during the course of this study identified the importance of water for intensive agriculture, in terms of both quantum and security of supply. As a consequence, water is the predominant issue in this report.

Types of Intensive Agriculture

For the purpose of this study, intensive agriculture refers to production systems that require high capital inputs in terms of buildings, storage and infrastructure. Examples are poultry and egg production, breeding and 'growing out' of pigs, dairy farming, rabbit farming and some types of horticulture.

Within the two study areas, the predominant forms of investment are broiler farms, egg production and pig farming.

Infrastructure Requirements

The most representative intensive agriculture investment in the study areas is in broiler farms and piggeries. The following infrastructure assessment therefore addresses these two industries.

Broiler Farms

Recently approved broiler farm development in the Shire, notably Midland Poultry south of Meredith and the larger Rural Fund Management (RFM) farm west of Lethbridge both display a high level of capital investment and innovative technology, to the degree that there is a high level of control over the inputs and outputs from each enterprise. In addition to efficient production and improved conditions for the housing of birds, these farms also have improved environmental attributes in terms of waste management, odour and bio-security. The technology used in these 'best practice' farms has improved amenity issues (such as odour) to the degree that the main constraint on location is now adequate bio-security separation.²

² Refer to section on Planning Issues for a discussion on shed litter management options and the implications for odour control.

The principal infrastructure requirements are good road access for b-double and semi-trailer movement. Heavy vehicle movement for a typical five shed farm may involve a 5 to 8 B-double movements per week (feed supply) plus an average of 10 to 12 semi-trailer movements per week. The latter movements will fluctuate with the timing of growing cycles. Most farms use LPG for heating, which also involves regular delivery.

Water supply is also critical, both for drinking water (60%) and cooling purposes (40%). It is essential that each farm has sufficient water on hand to manage a succession of 3-5 hot days. Some farms rely entirely on an off-peak reticulated potable water supply, which is fed into on-site storage tanks. More recently, farms have supplemented their reticulated supply with water collected from roofs and impermeable surfaces. It is desirable, but not essential that farms have a potable supply, as all farms conduct their own water filtration to meet bio-security standards.

A comprehensive assessment of the water requirement for a modern broiler farm was undertaken by Geolyse Pty. Ltd. www.geolyse.com for Rural Fund Management Ltd. in support of their recently approved farm near Lethbridge.

Geolyse estimate a total average annual water demand per farm (five sheds) of 25ML³. Their report notes that this may be conservative compared with other farms in the region that have an annual consumption of approximately 17 ML. The total requirement for the 4 approved farms is therefore approximately 100ML. Barwon Water has agreed to supply 66.2 ML per annum based on an off-peak flow, with a caveat that could see supply disrupted in the event that urban supplies are threatened due to summer demand and/or supply restriction (note that Barwon Water has decided to double the storage capacity for the Lethbridge system, however, the impact of these works on the security of supply for agriculture is unknown). The remaining requirement will be obtained from on-site storage of storm water run-off and some recycling of cooling water. It is estimated that a typical five shed farm will have an estimated annual run-off of 14.5ML.

Infrastructure availability

Existing Infrastructure

The existing intensive agriculture has access to the following infrastructure; town water, stormwater drainage, power and telecommunications. There is currently no reticulated natural gas available to the Bannockburn area, although a high pressure gas main passes through the southern-eastern tip of the Shire. The following sections describe the current infrastructure availability. Information on water supply is contained in following sections.

³ Geolyse Ltd. *Water and Waste management Proposal for Five Broiler farms at Tall Tree Road, Lethbridge*. January 2006, page 9.

Electricity

Power is supplied throughout the two study areas, predominantly via a single phase high voltage network. A 2 wire high voltage line services the western section of the study area, providing a service to the Western Plains Piggery on Gumley Road. On the eastern side of the study area, a 3 wire high voltage system runs north-south in the vicinity of the Midland Highway through Lethbridge and Meredith. This 3 phase component of the system services a number of broiler and egg farms on the western side of the Highway. The location and extent of the electricity reticulation system is shown in detail on the enlarged existing conditions maps (Drawings GMR060115/1 to 9).

The study areas are serviced by the southern and central supply districts of Powercor. Powercor has confirmed that 3 phase power can be extended to intensive agriculture sites within the two study areas if a business case for the infrastructure investment can be established.

The 2004 Area Improvement Project investigated the prospect of the extension of 3 phase power. The study reported that the... *"Most likely scenario from a power supply perspective is a group scheme where costs are shared between customers and perhaps with government. Effective access to the three-phase power network is dependent on peak loads and the position within the system (i.e. the system may be less effective 'down the system')."*

Intensive animal industry customers normally have a Powercor substation on site and connect supply at 240/415 volts. Powercor can respond to new sites that require augmentation, however the customer funds the capital works, although it is possible for Powercor to contribute to the cost, based on the business case. Group schemes can also be considered.

Powercor has assessed the augmentation of their existing system to provide 3-phase power to Study Areas A and B.

...

Power consumption was calculated on the following assumptions:

- *Broiler farm* *150 kVa / farm*
- *Piggery* *20 kVa / farm*
- *Feed mill* *300 kVa*

Powercor estimate the total project cost to be \$3.45M (excluding GST), made up of \$2.35M of backbone upgrade costs to reach areas A and B and \$1.1M of costs to provide supply points within these areas.

The above system would be able to service approximately 18 broiler farms, 6 piggeries and a feed mill. There is scope for a progressive up-grade, depending on the location of the first cluster of farms. The above cost estimate may therefore be reduced if specific sites are targeted."

It can be assumed from the above information that the case for extending and augmenting the 3 phase system within the study area would be

strengthened by the development of a feed mill and by keeping new investment within a single area. As indicated elsewhere in this report, prescribing the location of future investment may not be practical. The best approach may be to attract new investment to a particular area by making infrastructure available.

Roads

Golden Plains has a comprehensive road improvement program in place, therefore no further consideration is given to road infrastructure in this report other than the comments cited from the previous Area Improvement Project in relation to key intersections for heavy vehicles. This report does, however, include a comprehensive mapping of all roads in the study areas, including width and surface treatment (Drawings GMR06015/01-9).

Natural Gas

Natural gas is not currently available within the Golden Plains Shire, although a high pressure gas main runs through the south eastern tip of the municipality at Gheringhap, approximately 5 km south of Bannockburn. Provision of natural gas is part of the 'equation' for setting up a major feed mill in the Geelong Region, as gas is an economical source of energy for feed pellet production.

The 2004 Area Improvement Project also investigated the provision of natural gas and reported:

"There has been considerable public interest in the installation of a decompression valve to enable nearby residential areas to be serviced. The business case for a decompression unit apparently hinges on a significant industrial user. A feed mill to service both the pig and poultry industries would benefit greatly from gas power."

Telecommunications

A telecommunications 'hard wire' network extends throughout both of the study areas (refer to Drawings GMR060115/1 to 9). The availability of communication technology is unlikely to be a limiting factor for investment in these areas.

Consultation

Consultation has occurred with a range of interested parties and agencies external to Council during the development of the conceptual design for this project.

Barrter Steggles

26/6/06

Barwon Water (BW)

19/4/06, 17/7/06 and 29/8/06

Central Highlands Water Authority (CHW)
19/4/06 and 17/7/06

Midland Poultry
5/4/06
19/4/06

Regional Development Victoria
9/6/06
19/6/06

Rural Funds Management (RFM)
7/9/06

Water Supply Overview

There are three main sources of water for land within the study area;

- Town Water
 - treated water from reticulation and storages managed by the Water Supply Authorities, requires access to water authority mains, adequate pressure and supply.
- Groundwater
 - pumped from aquifers via bores, requires extraction license and adequate supply.
- Water Extraction
 - i.e. to extract water direct from rivers and streams, requires extraction license and adequate supply.
- Local Water
 - i.e. surface runoff from the site captured in dams or tanks, dependant upon rainfall.

The limited availability of water brought about by reduced rainfall, drought and consequently low storage levels has had a significant impact upon government policy in recent years.

The resultant reduction in the volume of available water has focussed attention upon levels of consumption and the needs of the environment. With population growth and the development of industry more water has been drawn from the catchments and diverted for consumption. This consumption has placed pressure upon the amount of water remaining in the rivers and streams to sustain the environment, therefore, water conservation has become a major priority for water supply authorities. Consequently, the scarcity of water may become a potential impediment to development.

Town Water

Only parts of the study area have ready access to town water (potable water). The supply of town water within the study area is managed by two

separate regional water supply authorities, the Central Highlands Region Water Authority (to the north-west) and the Barwon Region Water Authority (to the south-east).

There is limited water supply infrastructure available within the study area. The supply storages from which that infrastructure draws water are also limited. The infrastructure that is in place is also often of only limited capacity.

The study area traverses two main water supply catchments or river systems; the Moorabool River system, which is situated to the north of the study area and drains to the south-east towards Geelong and the Barwon River system, situated in the western half of the study area, which also drains to the south-east.

There are two main reservoirs in the Moorabool system. The White Swan Reservoir in the north (fed by the East Moorabool system) and the Lal Lal Reservoir in the south (fed by the West Moorabool system). The Moorabool/White Swan system is managed and operated by the Central Highlands Water Authority. The White Swan system has six small reservoirs that supply the White Swan Reservoir. This reservoir can store 14,107 ML when full.

The Lal Lal Reservoir is shared between the Barwon Water and Central Highlands Water Authorities, both of which draw water from that reservoir. ⁴Lal Lal Reservoir stores 39,719 ML of water for Ballarat. A smaller volume of water (19,685ML) is also stored in this reservoir for use by Geelong.

Central Highlands Water

Central Highlands Water (CHW) is an inland water authority, formed when 14 predecessor organisations were amalgamated in the mid 1990's. ⁵CHW provides water for a total population of 116,000 people. In relation to this study, the Central Highlands Water Authority's "water supply district" follows a narrow corridor along the north-south pipeline extending from Ballarat to Rokewood. Rokewood is a small rural township community situated south west of the study area.

The Rokewood area is part of the Ballarat water supply and distribution system. The Ballarat district has "stage 2 water" restrictions in place. Rainfall in the relevant catchments has been low for several years, for example, ⁶rainfall received in the Ballarat catchments areas in March 2006 was 17mm compared to the long term monthly average of 51mm, or 33% of average rainfall.

⁴ From CHW brochure entitled "Securing Ballarat's Future Water Supply", 2nd paragraph, page 3 August 2004.

⁵ From CHW website, general information 1/6/06.

⁶ Extract from the CHW website 1/6/06.

Central Highlands Water (CHW) current strategic planning document is the "CHW Water Plan 2005-2008". The Water Plan ⁷ describes how CHW has endured eight successive years of below average rainfall. CHW is also currently involved in the development of "Long Term Water Resource Strategy (LTWRS) for the Ballarat and District Water System" which is intended to address long term water supply needs.

Barwon Water

The Barwon Region Water Authority was created in the mid 1990's with the amalgamation of several predecessor water boards. The Authority is centred upon the Geelong urban area which has a total population base of 265,000 with a diverse industry base, over an area of about 8,100km² and coastal environment.

The location of the Barwon Water service area with respect to the study area identified in this report extends from the east to a north south line drawn approximately between the western extremities of the towns of Meredith and Shelford. The Moorabool River catchment supplies water to both the Central Highlands Water and Barwon Water Authorities.

Current status of the⁸ Lal Lal Reservoir.

<i>Location</i>	<i>Nominal Capacity (ML)</i>	<i>Volume Last Year (ML)</i>	<i>Present Volume (ML)</i>	<i>% Full</i>	<i>Weekly Variation (ML)</i>
Lal Lal Reservoir (Barwon Share)	19,685	3,314	907	4.6	11

In the context of the Central Region Sustainable Water Strategy, this report understands that the distribution of supply from Lal Lal Reservoir will remain under present arrangements; i.e. shared between Barwon Water and Central Highlands Water.

Groundwater

Throughout Victoria dependable groundwater supplies for stock and domestic bores are generally available at depths less than 50 metres. A bore yield of at least 0.5 litres per second is usually needed before a bore is considered viable.

More than 120,000 bores have been drilled across Victoria. Information including bore logs, groundwater levels and chemistry has been compiled on a central Groundwater Database for more than 50,000 bores. All of this information has been checked for reliability and pieced together with the data gained from strategic drilling programs during the 1970s and '80s to develop an understanding of Victoria's groundwater resources. The results

⁷ From CHW Water Plan 2005-2008, executive summary 8th paragraph, page 3.

⁸ Extract form the Barwon Water website 1/6/06.

are a series of maps, records and reports which detail many facets of groundwater and the associated geology.

The Groundwater Database contains data from a wide variety of sources. These include the former Rural Water Corporation and Minerals and Energy Department (now part of DSE databases and information from other Government Departments, industry and the community). The database includes the following datasets;

Bore Location Report, Aquifer Report and the Bore Chemistry Report.

Selected parts of that data are also available in a Bore Composite Report. The Ballarat section of the database includes listing for bores in the Parishes of Shelford, Shelford West and Meredith. Bores yielding better than 0.5litres/sec are listed.

Most Groundwater resources are now under the protection of a Groundwater Protection Plan. The Groundwater Protection Plan applies to a "Protection Area" as declared by a Governor in Council order made under section 27(1) of the Water Act. The objective of the Protection Plan is to make sure that the groundwater resources of the Protection Area are "managed in an equitable manner and to ensure the long-term sustainability of those resources". The Protection Plan prescribes a management regime which monitors bore allocations, water quality, maintenance, flow rates and annual volumes. The Plan also oversees the issue of licenses and enables the transfer of licenses.

Ground water is sourced by some intensive agriculture users in the study areas (e.g. Western Plains Pork in Gumley Road), however, groundwater is a limited resource that is unlikely to yield the quantity and quality of water required for intensive agriculture. Within the study areas, ground water quality is variable and can contain high levels of salt, requiring users to 'shandy' ground water with other sources.

Water Extraction

There are no perennial streams readily available or accessible to the study area from which land holders are likely to secure an extraction license.

⁹*Rural Water Authorities (RWAs) have delegated responsibility from the Minister for Agriculture and Resources to license the extraction of water from rivers and streams as set out in Part 4, Division 2 of the Water Act 1989. Within this delegation, SRW has the responsibility to progressively develop Stream-Flow Management Plans in priority rivers and streams in Southern Victoria.*

Rainwater Collection

The use of rainwater tanks to collect roof runoff is becoming a common feature in new developments. Rainwater use is now actively encouraged by

⁹ Extract from the Southern Rural Water website 1/6/06.

the State Government (Our Water, Our Future) and the Government offers rebates and other incentives for the capture and use of rainwater.

Intensive agriculture, particularly the broiler farm sector, has excellent potential for collecting and storing roof water. The ability to offset dependence on a reticulated water supply with storage of local water is becoming a necessary component of intensive agriculture investment.

The sources for the collection of rainwater include:

- Roof runoff.
- Impervious or paved areas.
- Pasture runoff.

The collection of water from roofs and formally drained paved areas is relatively easy and efficient, however, the collection of rainwater runoff from pasture is variable; varying from site to site and dependent upon topography, terrain, grass cover and ground conditions.

For the purpose of this study, the assessment of the available rainwater collection opportunity was based upon rainfall data for the ¹⁰average annual rainfall in the Warrambine basin (the reported average annual rainfall being 723.9mm per annum). Warrambine is situated within the study area, therefore the average estimated catchment runoff yield or capacity for a nominal 1 hectare catchment area is as follows:

- Roof - 6,443m³/ha/annum (equivalent to 0.64m³/m² or 640L/m²).
- Fields and paddocks - 1,086m³/ha/annum (equivalent to 0.11m³/m² or 110L/m²).

It is estimated that a typical 120 hectare broiler farm site at this location (without any licensing constraints and with average rainfall, favourable terrain and ground conditions) should be able to harvest up to 100ML per annum.

The Broiler Farm Code of Practise requires that farms have a "stormwater management pond" having sufficient¹¹ capacity to capture runoff from a 1 in 10 year ARI storm.

The development of large capacity on site storages (volumes over 5ML) is best achieved with the construction of earthen dams. Observation of the study areas indicates that the local terrain is often stony and prone to leakage and losses to groundwater, therefore, the local soil conditions are not always suited to dam construction due to permeability problems.

Note: Licensing of Dams

¹²*Rural Water Authorities licence all works on waterways, and can advise on whether the proposed site of a gully dam is on a waterway. Applicants are*

¹⁰ From the Bureau of Meteorology Website on 1 June 2006.

¹¹ From best practise guideline Design & Construction Element 2, E2 of G9, page 26 of the Victorian Code for Broiler Farms September 2001, (State Government of Victoria).

¹² Extract from the Department of Sustainability & Environment Website, 1/6/06.

required to undertake a local assessment of the impact of the proposed development, including environmental impact and the effect of extraction on other users.

A planning permit is generally required for the construction of a farm dam if the dam is considered to be a substantial structure (large wall), and is constructed on relatively steep land or across a watercourse.

Approval from DSE is required if a dam site is within a Declared Water Supply Catchment Area, or if stored water intrudes onto Crown Land.

State Water Strategy

Our Water Our Future

The State Government published its policy and directions for the water industry in the White Paper "Our Water Our Future"¹³ as a guide to the water authorities and others. The paper has set in place a number of measures intended to conserve water, seek reductions in waste, improve water recycling and improve environmental outcomes.

The paper also requires the preparation and implementation of a number of management and strategic planning documents. The documents to be developed included Stream Flow Management Plans, Sustainable Water Strategies, Water Supply Demand Strategies, Water Conservation Plans, the protection and restoration of groundwater etc. The paper also called for new developments to implement water sensitive urban design (WSUD) principles to achieve:

- a 25% savings in water use,
- to harvest urban stormwater for reuse,
- to encourage third pipe systems and
- to involve industry in water conservation.

The paper also committed Government to spending \$42M over 8 years in the development water supply and sewerage services to small country towns.

The White Paper contains little direct reference to water for agriculture, particularly intensive animal production. Presumably, this will be considered, in the detail of regional strategies, because there are a number of supply agreements in place for existing intensive agriculture producers.

Central Region Sustainable Water Strategy

The State Government also recently published the draft "Central Region Sustainable Water Strategy"¹⁴ (CRSWS) for community comment. The CRSWS is the first strategy arising from the Our Water Our Future White Paper and is intended to serve as a plan to secure water supplies for homes,

¹³ Our Water Our Future: Victorian Government White Paper, 2004.

¹⁴ Sustainable Water Strategy, Central Region: Victorian Government DSE, April 2006.

business, industry, agriculture and the environment for the next 50 years. The Central Region includes regional and rural areas around Melbourne, including Geelong, Ballarat, the Macedon district and West Gippsland. It includes the Barwon, Moorabool, Werribee, Maribyrnong, Yarra, Bunyip, Thomson and Latrobe river catchments.

The CRSWS is intended to address the recognised scarcity of water and to secure supplies for all users in the face of future pressures on the resource such as “climate change, population growth, economic development and land use change.”¹⁵ The draft strategy is an integrated approach to water resource planning. It considers all water sources including rivers, reservoirs, aquifers, as well as recycled water, storm water and seawater.

The total water supply estimate excludes water stored in small catchment dams, which is estimated to be 116,000ML in the Central Region.¹⁶ Intensive agriculture can use this source to supplement the reticulated supply, although the practice is not wide spread.

Water for broiler farms is generally supplied as an off-peak service, enabling farms to store water on site. As such, this type of reticulated supply can perhaps be considered as water for industry rather than water for agriculture.

Clearly there will be greater incentive to capture and store water on-site in the face of reticulated supply pressures. The potential for storing water from roof run-off is particularly suited to the broiler industry, given the extensive shedding required. The example of some recent broiler farms is evidence that water harvesting is becoming a ‘given’ for this form of intensive agriculture investment.

Ballarat (Central Highlands Water)

Central Highlands Water is reassessing future supply expectations due to the prolonged drought in the region and the possibility that the current decrease in catchment rainfall may be a long term trend. There is potential to provide an off-peak supply for intensive agriculture into the centre of Study Area A through improvements to the existing Rokewood pipeline from Ballarat via Dereel and Corindhap. Present indications are that a project of this nature would not gain support due to current supply limitations and the urban supply priority for Rokewood Township. A formal request will be required to CHW to assess the potential for off-peak capacity for intensive agriculture in Study Area A. At this stage, the focus of investigation is on Area B, supplied by Barwon Water.

Geelong (Barwon Water)

The Central Region Water Strategy identifies that the Geelong Region will require a further 10,000ML by 2030, in addition to the current use of 37,000ML. The current use includes water supplied to intensive agriculture,

¹⁵ From Barwon Water website, 1/6/06.

¹⁶ Ibid, page 21.

and as there is no distinction in the forecast between agriculture and urban supply, there is a prima facie assumption that future water supply increments for agriculture will be proportional to current supply arrangements. Given the current level of investment intensive agriculture and the prospect of further investment to support industry growth, a policy decision in the context of the Central Region Sustainable Water Strategy would be helpful. The work of this report may contribute to an appropriate policy stance by exploring the water saving options available to agriculture. The largest investment in intensive agriculture is in the broiler industry, which is a focus of this report.

The distribution of Barwon Water's supply system is defined by a Service Area, that is; where water distribution can be achieved within the Barwon Water supply system. This includes Area B of this study; however, the concept of a service area is different from a supply district, in that there is no obligation on Barwon Water to provide a supply to rural customers. Extension to each new customer is by agreement, based on water availability, infrastructure condition and a business case.

The existing supply system north of Lethbridge (which includes Study Area B) is at capacity. Barwon Water has approved a project to double the storage capacity of the Lethbridge system during the next 3-5 years, the constraint being the identification of a suitable storage site and the time taken to obtain necessary permits. This will help secure existing supplies and provide scope for some additional intensive agriculture investment west of Lethbridge. It should be emphasized, however, that the purpose of the increased capacity is to secure the urban water supply. A formal request has been made to Barwon Water to assess the potential for a separate supply system for intensive agriculture in Study Area B. This has the potential to create a new water market for Barwon Water, based on supplementing on-site water harvesting and storage by individual farms.

Water districts

Given the constraint on water resources in the district, the principle of committing to on site water harvesting in combination with a reticulated external supply provides a more sustainable model for future development.

The Central Highlands Water Authority, based at Ballarat, supplies water to Rokewood and Dereel west of Study Area A, but the precise extent of the water supply district for the Central Highlands Water Authority beyond the townships is not clear. The Central Highlands water supply district does not appear to enter the study area.

The Barwon Water Authority supplies water to the communities of Shelford, Teesdale, Lethbridge and Meredith at the perimeter of Study Area B. Barwon Water has provided a detailed district map showing the district boundary and details of their assets, indicating that the Barwon Water district does cover a proportion of Study Area B (refer to sheet no. 11 of the map set).

There are significant assets of the Barwon Water Authority situated within (basins) and passing through (mains) Study Area B. Under certain conditions specified in the Water Act (section 141, part 1), Water Authorities have the ability to “reduce, restrict or discontinue water supply”. However, part 2 also requires that the “Authority must reduce the supply of water under subsection (1)(a) or (b) to all persons in the same proportion unless the Minister is of the opinion that the circumstances are so extreme as to justify some other basis.” The Act makes a distinction in part (c) between water supplied via “private works for the supply of water to a person . . . and parts (d), (e), (f) and (g) which apply to non payment of accounts, people in breach of regulations etc.”

Under section 164 (part (2) of the Water Act a Water Authority must not “provide a service outside its district” without the approval of the Minister. Section 163, part (1) (b) of the Water Act also requires “an Authority that has a water district” to “identify community needs relating to water supply and to plan for the future needs of the community relating to water supply”.

Broiler Farm Water Requirement

The principal type of investment in intensive agriculture is in broiler farms, which also has the greatest potential for future growth within Study Area B, based on current approval and investment trends. Water available through the Barwon Water urban water system has been one of the main attractions for Broiler farms in the Meredith and Lethbridge areas.

The following section describes the water supply arrangements determined for a recently approved broiler complex being constructed near Lethbridge. The basis of the information is from expert evidence provided by Geolyse Pty. Ltd. The information has been used later in this report to assist consideration of a broader dedicated supply system for intensive agriculture.

Rural Funds Management, Geolyse Report

Early in 2006, the Victorian Civil and Administrative Appeals Tribunal approved an application for five broiler farms west of Lethbridge. The applicant was Rural Funds Management¹⁷, and investment group contracted to Barrter Steggles. This example has been cited because it was required to address on-site collection and retention of water as part of the overall design. Expert witness submissions to the VCAT Hearing in January 2006¹⁸ included a report entitled “Water and Waste Management Proposal for Five Broiler Farms at Tall Tree Road, Lethbridge”. The report provided an assessment of rainwater collection opportunities for 5 farms, each having a capacity of 320,000 birds (total 1.6 million birds).

The report noted that Southern Rural Water describes the Barwon River basin as a “capped” basin, with “no capacity to source any new or additional water from either surface runoff or waterway extraction”.¹⁹ The report also

¹⁷ Prepared for Rural Funds Management Ltd by consultants (Martin Haege) Geolyse, from Orange NSW.
¹⁸ VCAT reference No. P2703/2005, P2704/2005, P2708/2005.

¹⁹ From Geolyse Report, section 3.3.2 Surface Water Harvesting 3rd paragraph, page 5.

advises that 'there is, however, an opportunity to purchase water through the water trading scheme'; (i.e. to buy the rights to the water already held by others). However, it is understood that there are no substantial water rights or extraction licenses available for purchase in this catchment.²⁰

The report explains that roof runoff is not covered by the cap and does not require a license, however, the size of the dams required to store roof water is regulated (i.e. dams more than 5m high and/or greater than 5ML will require a Works License and planning approval). The Geolyse design proposes that only the roof runoff, surface water drainage from around the sheds and the gravel pavement would "be collected in a surface water management system and reused in the facility".

The Geolyse report also proposes that collected water be filtered through grass lined drains to an 8ML dam (stormwater pond), sized to capture runoff from a 1 in 10 year storm. The pond will also receive runoff collected from the evaporative coolers. A separate 0.6ML storage is proposed for the wash-down water.

The Geolyse assessment is based upon rainfall data taken from the Durdidwarrah meteorological station, 17km north of the study area where the average annual rainfall is 692mm.

In addition to the above storage measures, the Geolyse report suggests that Broiler farms each maintain a 250kL onsite storage tank. That tank would be kept full, thereby ensuring sufficient supply for 2 to 3 days in the event of a pump or water main failure. Each farm has its own pressure pump for internal reticulation with a filter and UV or chlorine disinfection system. The report also identifies the local evaporation levels as a significant cause of water loss and advocates covered storages.

A supply agreement has been negotiated with Barwon Water which allows the RFM farm to draw up to 68ML of potable water per annum, supplied from an existing 100mm main situated on the western edge of Lethbridge. The amount of water in the system is limited and consequently, Barwon Water has required the supply of water to the farms be constrained by a "pressure sustaining valve" which ensures that water can only be drawn when the available pressure is adequate (above 30m). This is intended to ensure that the existing water supply to Lethbridge is not adversely affected by the broiler farm demand. This constraint is likely to limit the broiler farm water supply to off peak periods (i.e. at night and around midday) when demand is low.

The Geolyse report proposes the construction of an additional 85ML on site storage dam which is intended to help buffer the limited supply and support the broiler farms during periods of high demand. A pump station would be required to distribute the water from the storage to the 5 farms. The report also estimates that each of the farms will require a total of between 17 to 25ML per annum,²¹ depending upon seasonal conditions, therefore, the 5

²⁰ From Barwon Water.

²¹ From section 3.4.6 Summary, last paragraph, page 9 of the Geolyse report.

farms would require from 85 to 125ML per annum. The Geolyse report included modelling of the available water resources and estimated that “the full 68ML will be drawn from the Barwon Water system in 28 of the 50 years modelled, with an average annual draw of 66ML and a minimum draw of 58ML.

Following consideration of the data, VCAT determined to reduce the number of farms to be developed at this site from 5 to 4 (that is; four farms of five sheds, each shed containing 64,000 birds with 320,000 birds in each farm - making a total of 1.28 million birds in the four farm complex).

It is clear, therefore, that Barwon Water does not have the infrastructure capacity to meet the requirements of the Lethbridge development, necessitating that the RFM project obtain the balance of the water requirement from surface water harvesting.

While the study areas are geographically, topographically and strategically suited to intensive agriculture, water supply is clearly a constraint on future development of the industry. The RFM approach creates a shared responsibility between the water authority and the user that moves in the direction of a more sustainable model for future intensive agriculture investment.

In summary, therefore:

- The major limiting factor on future intensive agriculture investment is the availability of water supply, not the water distribution infrastructure; although the existing reticulation system does place constraints on the supply of water to some farms.
- The RFM/Geolyse water management approach is an appropriate model for future development because it supplements reticulated supply with on site water harvesting.
- Briefly, the RFM/Geolyse approach includes the following elements:
 - Drawing water from potable supply systems without any adverse impacts upon existing consumers.
 - Securing in advance an agreed annual volume and pressure regime.
 - Securing in advance an agreed connection point with maximum draw down rates.
 - Supplementing the available potable source with onsite harvesting.
 - Adopting a water conservation approach within the farm operations to minimise water consumption and eliminate waste.
 - Maintaining a ready reserve of on-farm water storage capacity for emergencies.
 - Where necessary, establishing buffer storages and sharing the associated distribution infrastructure (pumps & pipes).
 - Adopting covered water storages to reduce losses through evaporation.

Future Development

In the past the water supply 'culture' within the broiler industry has been based on the expectation that a reticulated supply from a water authority will meet 100% of the on-farm requirement. In a regime of reliable rainfall, that has not been an unreasonable expectation, constrained only by the cost of reticulation infrastructure and the cost of water. Both Barwon Water and Central Highlands Water now operate in a different environment. Water supply is limited and gains must be made within the system through water use efficiencies, supply scheduling and on occasions, restrictions on water use.

For industries such as the broiler industry, a shift in emphasis has occurred to the degree that on-site storage is now a pre-requisite for obtaining a reticulated supply. Given the supply priorities placed on the water authorities, the move toward self-sufficiency should ideally result in a reliance on the reticulated supply for 'top-up' purposes only. This means that water storage capacity becomes a function of operational need, rather than availability 'on tap'.

To facilitate the development of an expanded level of intensive agriculture within the Study Areas and to address the water supply constraints, we propose that the RFM/Geolyse model be given wider application in the study area, supported by a separate dedicated supply for agriculture.

The undulating nature of the terrain makes the development of a gravity based supply across the Study Area unlikely unless a new storage facility can be located at an appropriate elevation. An alternative is a series of storages where the supply and transfer of the water is pumped from storage to storage. The operation of a series of linked buffer storages is likely to be complex and require the high level skills and operational resources of the Water Authorities. The location, size and need for these storages and the connecting infrastructure will depend on the type and location of development. Given an open land market, it is difficult to predict where future development is likely to occur, although investment will be drawn to areas with good infrastructure.

Study Area A is water poor, having no infrastructure and no formal Water Authority with a water supply district coverage.

Study Area B is partially covered by the Barwon Water Authority's water district and has a substantial water supply infrastructure. The water supply assets include a 4ML storage basin at Shelford, pipelines passing through the district and a nearby 25ML storage basin at Meredith.

For the purposes of determining the infrastructure requirements, the following assumptions can be made:

Broiler Farms

- Broiler farms have a higher water demand and smaller ‘footprint’ than piggeries, with unused land around the perimeter.
- The development of broiler farms is more likely be concentrated in Study Area B, east of the Shelford-Mt. Mercer Road, where there is some water infrastructure available.
- Subject to land ownership and bio-security, there is the capacity for the development of another 6 developments in Study Area B equivalent to the proposed RFM development on Tall Tree Road.

Piggeries

- Piggeries generally have a reduced water requirement and larger footprint.
- The strict code of practise requirements for piggeries will limit siting options.
- Based on current preference, new piggery investment is more likely to take up undeveloped land in Study Area A, i.e. west of the Shelford Mt. Mercer Road.
- It is estimated that Study Area A has capacity to develop another 4 farms of a scale equivalent to the existing WPP Piggery on Gumley Road.

Water supply model

Given the uncertainty of supplying water through the existing reticulation system, we consider a separate supply system dedicated to the needs of intensive agriculture warrants further analysis.

The following proposal is preliminary only, the assumptions require further testing and analysis through a feasibility study to examine the engineering requirements and to verify the likely disposition of Barwon Water.

The proposal involves establishing a new water storage north of Study Area B, approximately 5km west of Meredith in the vicinity of the high ground near ‘Woodbourne’ on the Meredith-Mt. Mercer Road. The site would require an elevation of 320m (or better) to ensure it is well placed to service the prospective development sites in Study Area B to the south. The majority of the Study Area B has an elevation of between 140 and 260m. A separate new water storage facility would also provide additional fire fighting capacity for the area.

The likely source of water for the storage will be Moorabool Water Treatment Plant (WTP) at She Oaks, approximately 8km south east of Meredith. The Moorabool WTP has a capacity of 65ML/day. It is understood that the

existing infrastructure linking Meredith to the Moorabool WTP has little or no surplus capacity to supply sufficient water for this project. Therefore a new connecting pipeline will be required.

The following solution is intended to provide an offline dedicated buffer storage and distribution system for the development of intensive agriculture with Study Area B, east of the Shelford-Mt. Mercer Road. The projected demand is based upon connecting the existing farms and the development of a further 6 x 5 farm complexes (320,000 birds in each farm complex). Each complex being equivalent to the original RFM proposal in Tall Tree Road at Lethbridge.

Existing water usage estimated at 100ML per annum.	300ML*
Six new farms @ 100ML per annum each.	600ML
Maximum future demand per annum	900ML

Average daily demand estimated to be 2.5ML per day.
Total likely pumping throughput; 5ML per day (maximum).
Assume 180 days pumping.

*Estimated total usage by existing farms. Proposed new system would replace existing farm connections, therefore improving infrastructure capacity for urban customers.

The following assumptions determine the likely development costs for the new water supply infrastructure:

- Construct a new dedicated pump station at the Moorabool WTP and a dedicated pipeline to transport the water to the proposed storage basin.
- Pump station and pipeline to have a capacity of about 60L/s or up to 5ML/day.
- The Moorabool WTP is situated at about 200m elevation, requiring the pump station to have a static lift of about 120m (or more).
- The proposed storage basin(s) to be located at an elevation of 320m (or better).
- The proposed buffer storage basin(s) to have a total capacity of 120ML. This will ensure that the storage has the ability to buffer demand over an extended period without the need to pump, i.e. having up to 20 days supply on hand during peak demand and 48 days supply on average.
- The basin(s) are covered and based upon an earth fill structure.
- Water to be distributed through a gravity based reticulation system, with a 150mm diameter trunk main (about 20km long) to distribute the water to the general vicinity of the development sites. A further 20km of smaller 100 (and 80mm) diameter mains will then be used to supply specific development sites.

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- Each farm provides its own on-site roof and hard standing water collection and storage system.
 - Water authority to control the system to the farm gate to ensure consistency in system maintenance and water quality.

Based upon the above assumptions the cost of the necessary infrastructure is estimated to be about \$11.4M excluding individual service connection costs. A preliminary estimate for the breakdown of these costs, including inclusions and exclusions is included in the funding section of this report.

This solution assumes a gravity based reticulation system, however, the length of pipelines could be reduced with the introduction of a pumped distribution system. A further refinement of Barwon Water's capacity to supply water and confirmation of the actual demand for water (i.e. the number and location of the farms) will enable more precise solutions and costs.

If the proposed new infrastructure were to be an asset of the Barwon Water Authority, the need for pressure limiting valves on the existing system would no longer exist and the infrastructure could then be allowed to perform at its maximum efficiency. A separate supply system would also provide greater locational flexibility for future farms, allowing them to locate away from the urban supply system.

Water Supply Pipelines

The development of efficient transmission of water via pipelines needs to take into account the following factors;

1. The source elevation and available pressure.
2. The delivery site; i.e. elevation relative to the source.
3. The length and alignment of the proposed pipeline, i.e. the cumulative losses due to friction effects.
4. The nature of the terrain/topography being traversed.
5. The delivery rate required and timeline within which that water is to be consumed.
6. Local ground conditions; e.g. rock can increase trenching costs.

Water Storages

The efficient development of earth cut/fill structure type water storages is dependant upon the following factors;

1. Formation of a leak proof structure.
2. Covered storages to minimise evaporation.
3. Efficient placement of storages to make use of the terrain, reduce earthworks and maximise water capture.

A proposal for a new storage network is dependent on:

1. Support from Barwon Water for the concept of developing parallel infrastructure dedicated to intensive agriculture.
2. An extension to the Barwon Water District or consent from the Minister to enable Barwon Water to operate outside their district.
3. Advice from Barwon Water on the amount of water available, its source and the conditions of supply.
4. Agreement that Barwon Water is prepared to manage the proposed infrastructure and administer the likely costs to consumers.
5. Participation by existing intensive agriculture sites in the new water supply system.

Cost estimate

PRELIMINARY ENGINEERS ESTIMATE (subject to detailed design)									
<i>Item</i>	<i>Description</i>			<i>Cordell's Reference</i>	<i>Qty</i>	<i>Units</i>	<i>Rates</i>	<i>Cost</i>	<i>Subtotal</i>
1	Water Supply Pump Station at Moorabool WTP								
1.1	To develop connecting infrastructure at Moorabool WTP								\$ 200,000.00
	1.1.1	To supply necessary materials, connecting pipe work, structures etc. nominal provision @ per item.				item	\$ -	\$ 200,000.00	
1.2	To develop pump station.								\$ 650,000.00
	1.2.1	To manufacture, supply, install and commission variable speed, multi stage pump sets (standby & duty), complete with control panel and switchboard, telemetry etc. nominal provision only, @ per item.				item	\$ -	\$ 450,000.00	
	1.2.2	To construct pump station building, dry well arrangement, connect power supply etc. nominal provision @ per item.				item	\$ -	\$ 200,000.00	
2	Water Supply Pipeline from Moorabool WTP to Storage at Woodbourne								\$ 1,744,000.00
2.1	To supply and install pipeline.								
	2.1.1	To establish right of way, property easements, road crossings and co-ordination with other agencies, nominal provision only @ per item.				item	\$ -	\$ 100,000.00	
	2.1.2	To supply, excavate, lay, join, test and commission 150mm diameter DICL class K9 pipeline @ per lineal m.		<i>page 202</i>	15,000	m	\$ 99.60	\$ 1,494,000.00	

	2.1.3	To supply, lay and join various 150mm diameter DICL class K9 pipeline air valves, bends and other fittings (nominal provision only) @ per lineal m.	15,000	m	\$ 10.00	\$ 150,000.00	
3 Water Supply Buffer Storage at Woodbourne							
	3.1	To acquire land for basin site.					\$ 200,000.00
	3.1.1	Nominal provision only @ per item.		item	\$ -	\$ 200,000.00	
	3.2	To construct basin.					\$ 3,785,000.00
	3.2.1	To excavate and construct a cut and fill 120ML capacity earthen structure, assuming balanced earthworks, say 120 x 200 x 5m, good ground (nominal provision only) based on earthworks volumes @ per m ³ .	400,000	m ³	\$ 7.50	\$ 3,000,000.00	
	3.2.2	To line basin with 1.5mm HDPE liner, to base and all sides, nominal provision only @ \$/ML.	120	ML	\$ 3,000.00	\$ 360,000.00	
	3.2.3	Security fence around perimeter, 2.9m high with 3 wires @ per lin. m.	1000	m	\$ 65.00	\$ 65,000.00	
	3.2.4	To cover basin with floating cover and anchorages, HDPE?, nominal provision only @ per ML.	120	ML	\$ 3,000.00	\$ 360,000.00	
4 To Reticulate Water from Woodbourne Storage to Study Area B							
	4.1	To supply and install pipeline.					\$ 2,840,000.00
	4.1.1	To establish right of way, property easements, road crossings and co-ordination with other agencies, nominal provision only @ per item.		item	\$ -	\$ 100,000.00	
	4.1.2	To supply, excavate, lay, join, test and commission 150mm diameter UPVC class 12 pipeline @ per lineal m.	20,000	m	\$ 72.91	\$ 1,458,200.00	
	4.1.3	To supply, lay and join various 150mm diameter UPVC class 12 pipeline air valves, bends and other fittings (nominal provision only) @ per lineal m.	20,000	m	\$ 10.00	\$ 200,000.00	
	4.1.4	To supply, excavate, lay, join, test and commission 100mm diameter UPVC class 12 pipeline @ per lineal m.	20,000	m	\$ 44.09	\$ 881,800.00	

	4.1.5	To supply, lay and join various 100mm diameter UPVC class 12 pipeline air valves, bends and other fittings (nominal provision only) @ per lineal m.	20,000	m	\$ 10.00	\$ 200,000.00	
5 Service Connection Costs							\$ -
	5.1	To supply and install water service connections and meters etc.					
		NOT INCLUDED	0	0	\$ -	\$ -	
6 Project Management, Design & Documentation							\$ 941,900.00
	6.1	<u>Consultancies</u>					
	6.1.1	Engineering Survey, Design & Documentation @ 5.5% of construction costs.	\$ 9,419,000	item	5.5%	\$ 518,045.00	
	6.1.2	Provision for other consultancies including geotechnical investigations, testing and commissioning, planning approvals etc @ 2%.	\$ 9,419,000	item	2.0%	\$ 188,380.00	
	6.1.3	Project Management @ 2.5% of construction costs.	\$ 9,419,000	item	2.5%	\$ 235,475.00	
	6.2	<u>Other Costs</u>					
	6.2.1	Headwork's charges and development contributions, NOT INCLUDED.	0	item	\$ -	\$ -	
	6.2.2	Stamp duty, legal costs and fees or charges (if any) to be paid to other agencies, NOT INCLUDED.	0	item	\$ -	\$ -	
							TOTAL CONSTRUCTION COST \$ 10,360,900.00
							GST \$ 1,036,090.00
							OVERALL CONSTRUCTION COST inc' GST \$ 11,396,990.00
Notes	1	This estimate is compiled based upon information drawn from the "Cordell Commercial & Industrial Building Cost Guide - Victoria".					
	2	At the time of writing our current version of "Cordell Commercial & Industrial Building Cost Guide - Victoria" is dated July 2006.					
	3	This estimate does not include and adjustment for a location factor of 0.94 from "Cordell Commercial & Industrial Building Cost Guide - Victoria" as nominated for Geelong.					

4	<i>In this edition, page 5 of Cordell's advise that "Commercial building costs in Victoria 1.4% compared with the previous quarter".</i>	
5	<i>The above rates have been drawn from various line items in Cordell's where noted above.</i>	
6	<i>No provision for cost of capital, holding or delay costs, contingencies, legal costs or stamp duty or profit unless shown.</i>	
7	<i>All costs based upon information available at the time of compilation.</i>	
8	<i>All costs subject to detailed design development.</i>	
9	<i>All costs subject to planning approval and the requirements of the relevant authorities.</i>	
10	<i>All costs subject to geotechnical information and conditions.</i>	
11	<i>All sub-consultants costs subject to quotation and confirmation.</i>	
12	<i>GMR Engineering Services does not purport to be Quantity Surveyors.</i>	
13	<i>Any cost estimates prepared by GMR should be considered as a "preliminary advice" only.</i>	
14	<i>We recommend that Quantity Surveyors be engaged should you need accurate or more detailed cost estimates.</i>	
15	<i>Construction cost outcomes can vary considerably and are very much dependant upon the prevailing market conditions at the time of construction</i>	
16	<i>Construction cost outcomes are also dependant upon the availability of suitable contractors and materials at the time of construction.</i>	
		<i>Prepared by GMR 9/8/06</i>

Industry benefit

The Golden Plains Shire continues to attract new investment in intensive agriculture. The potential for growth was identified in an intensive animal industries study commissioned by the Geelong Region (including Golden Plains Shire) in 2003.²² Back then, the Study concluded that the pig meat and broiler chicken industries in particular have strong growth prospects (projected annual growth rates over the next five years of 8% and 16% respectively). The rate of growth has not quite reached this prediction, but growth has nevertheless been solid, with expansion of existing farms and the development of new farms being undertaken in both the broiler and pig industries within the Shire.

While the Shire has little control over markets for agricultural products in national or international markets, it can and is addressing the limitations to growth in intensive agriculture at the local level. From an industry perspective, the limitations include:

- Finding suitable land.
- The time taken to obtain the necessary planning and environmental approvals.
- Infrastructure availability and cost.
- Workforce recruitment.

In Australia, the chicken meat industry exhibits a high degree of vertical integration, particularly in Victoria. The Barrter Steggles operation in the Geelong Region is a good example, where many growers in the Golden Plains Shire are contracted to the supply the processing plant in Geelong. The trend is for growing to be contracted to a separate investment entity responsible for meeting the processing requirements. In Golden Plains Shire, this is reflected in the involvement of Rural Fund Management as the investment vehicle for establishing new contract farms supplying Barrter Steggles.

Based on this trend, the prospect of 'ad hoc' development of individual farms becomes less likely. The scale of the Barrter Steggles operation leads to the conclusion that a more structured approach to new farm development is required, whereby industry growth may require the simultaneous development of multiple farms to meet new markets. Municipalities that plan to accommodate this growth in appropriate areas will have an economic advantage.

²² Geelong –Barwon Region Intensive Animal Industries Study.
RN Phillips & Associates Pty Ltd, Agribiz Engineering, 2003.

The prospect of a new feed mill in the Geelong area has been discussed for some years²³ and locations in the southern part of the Golden Plains Shire with access to rail, road and natural gas are good candidates for this investment. At the present time, grain is mostly sourced from areas west of Golden Plains with the majority of processing occurring in the Melbourne region.

A decision to develop a new feed mill in the Geelong Region to partner the growing capacity of broiler farms, piggeries and other intensive animal production will help consolidate the attraction of the Golden Plains area. Naturally, it would be a distinct economic advantage to Golden Plains to have a new feed mill within the Shire, where all of the above locational and infrastructure criteria can be met. While not central to the topic of this study, the development of a feed mill in the Shire will strengthen the case for public and private infrastructure investment to support intensive animal production.

Increasing the investment in intensive agriculture in the Golden Plains Shire will also serve to create a 'centre of excellence' within the various related industry sectors. This attracts improved skill levels and training in the Shire, a trend evident from the 1996 and 2001 census data. Examples of the influence of specialised agriculture to attract new skills and increase the population of rural towns can be seen in the dairy processing industry in the Goulburn Valley and Gippsland, the wine and olive industries in northern Victoria and South Australia and the horse industry in north eastern Victoria.

Community benefit

Intensive animal production requires:

- a high level of capital investment,
- large areas of rural land (mostly for bio-security reasons),
- access to heavy vehicle road infrastructure and
- access to water and 3 phase power (potentially in competition with urban communities).

Some older intensive farming processes can also cause amenity problems, principally in the form of odour and dust. It is not surprising therefore, that community reaction to intensive animal production investment can be adverse.

For Golden Plains Shire to be in a position to actively encourage further intensive agriculture investment, the community will need to be assured that new farms will be appropriately located, will have acceptable environmental standards and will not threaten the infrastructure of existing towns.

²³ Geelong –Barwon Region Intensive Animal Industries Study.
RN Phillips & Associates Pty Ltd, Agribiz Engineering, 2003.

There is actual and potential progress on a number of fronts to meet these expectations. Elsewhere in this report, the concept of a township 'buffer' of 3 km has been suggested, which would contribute to alleviating public uncertainty about where the next farm might 'pop up'. The introduction of a separate water supply system, as suggested in this report, will also enable future farms to locate away from the urban water supply network.

On the environmental front, modern broiler farms are technically highly sophisticated, with computer control of all the operational systems. The use of dry litter systems has also resulted in a decrease in detectable odour from broiler farms. As part of the dry litter management system, modern farms remove litter after each growing cycle to meet the growing demand for horticultural fertiliser, further reducing odour potential.

In the case of reticulated services, this report devotes considerable attention to the potential for reducing the dependence of farms on a reticulated water supply. In the past, most farms have relied on a reticulated potable water supply simply because it was available. Good water quality is an important requirement for intensive animal production and most farms undertake their own water treatment to ensure bio-security. This provides the opportunity for farms to capture and store water from building surfaces, thereby reducing dependence on a reticulated source. Restriction of intensive agriculture access to off-peak flows is intended to protect the security of supply to urban customers. This restriction comes at a risk to the operational requirements of intensive agriculture, particularly broiler farms. For this reason, our proposal to investigate a separate supply for intensive agriculture will help sustain an important local industry and provide reasonable capacity for growth. A separate system will also reduce the competition between urban and rural customers using a single reticulation system.

It is important that information on the changing environment for intensive agriculture investment is available to the community. It is only with this understanding that an informed decision on community benefit can be assessed. Without a well articulated structure for growth, the community cannot be blamed for regarding intensive agriculture as a threat rather than an opportunity.

The Geelong Council reported in 2003 that the intensive animal industries study "estimated that both the pig and chicken meat industries have employment multipliers of approximately 2.2, with subsequent benefits not only in direct demand for on-site labour, but also labour associated with transport, processing, packaging and distribution industries."²⁴ This presents the real community benefit to be derived from intensive agriculture investment, a trend evident from the data in Council's *Long Term Strategic Data Analysis*. Since publication of that work, the rate of estimated population growth and the number of new and expanded farms during the

²⁴ Ibid.

past five years indicates that the positive influence of intensive agriculture investment has continued during the 2001–2006 intercensal period.

Planning issues

The development of intensive agriculture is controlled by the Golden Plains Planning Scheme, which is the local expression of the Victorian Planning Provisions (VPP). There is a hierarchy of planning controls within the Scheme that relate directly to intensive agriculture:

- 10 State Planning Policy Framework (SPPF).
 - 15 Environment.
 - Economic Development.

- 20 Local Planning Policy Framework (LPPF).
 - 21 Municipal Strategic Statement (MSS).
 - 22.03 Intensive Animal Husbandry.

- 35.01 Rural Zone.
 - Schedule to the Rural Zone.

- 42.01 Environment Significance Overlay (ESO).
 - ESO1, ESO2, ESO3.

- 44.02 Salinity management Overlay (SMO)

- 50 Particular Provisions.
 - 52.26 Cattle Feed Lot.

 - 52.31 Broiler Farm.

- 65 Decision Guidelines.
- 70 Definitions.

- 81.01 Incorporated Documents.

Victorian Code for Cattle Feed Lots, Aug. 1995.

Code of practice, Piggeries, Dept. of Planning and Housing and Dept. of Food and Agriculture, 1992.

Victorian Code for Broiler Farms 2001.

The Study Areas A and B considered in this report are both within the Rural Zone (RUZ) of the Golden Plains Planning Scheme. When the new Victorian

Planning Provisions (VPP) rural zones are introduced, it is anticipated that both areas will be included in the new Farming Zone. Under both the existing and anticipated zones, intensive agricultural use such as a broiler farm, piggery or cattle feed lot, are section 2 uses requiring a planning permit.

The Study Areas are within a section of the RUZ that has a 100 hectare minimum for property subdivision. The Schedule to the Rural Zone also requires a permit for any dam greater than 3000m³.

Various overlays apply within the study areas, specifically the Environment Significance Overlay (ESO), which relates to the protection of waterways and native vegetation along waterways and applies setbacks to various forms of development.

The Salinity Management Overlay (SMO) applies generally throughout the Study Areas and refers to vegetation removal, revegetation, earthworks and drainage.

Decision guidelines are included in the Planning Scheme to provide a planning 'framework' to encourage consistency in the assessment of land use and development proposals.

Finally, detailed control of intensive agriculture is found at the various industry Codes of Practice which form part of the Planning Scheme as Incorporated Documents.

Outside the Planning Scheme, the State Environmental Protection Policy (SEPP) applies to assess environmental management proposals and the environmental risk associated with a particular proposal. In practice, however, the SEPP, and in particular, air quality management (AQM) are referenced through the various Codes of Practice in the Planning Scheme.

The most contentious planning issues for intensive agriculture relate to the amenity of broiler farms. Historically, broiler farms have been developed in rural areas close to towns and cities where over time, urban growth encroaches close enough to cause amenity problems, generally through odour and heavy vehicle traffic. More recently, broiler farms in rural shires have met resistance from rural 'lifestyle' residents who expect their amenity to be similar to an urban environment.

Similar problems can occur with piggeries, however, piggeries and cattle feed lots tend to be located in more remote rural locations with less chance of interface with urban or rural 'lifestyle' settlement.

The Broiler Code, introduced in 2001, was developed to provide standards for new broiler farms. The Code specifies three classes of farm. To quote the Minister for Planning, the Hon. John Thwaites, at the introduction of the Code:

“Class A farms have the least risk for off-site impacts because the boundary buffer (distance from sheds to boundary) and separation distance (distance to nearest sensitive use, such as neighbouring house) are fully satisfied within the farm boundaries.

In Class B farms, part of the separation distance may be outside the farm boundary provided no sensitive uses nearby;

Class C farms meet neither the Code’s boundary buffer or separation distance. No new class C farms will be allowed, nor will existing Class C farms be able to expand unless they use ‘superior technology’ which reduces pollution and odour.”

The boundary buffer and separation distance requirements are shown in the following table from the Victorian Code for Broiler Farms 2001.

Table 1. Boundary buffer and separation distance requirements for Class A and Class B farms

FARM CAPACITY (number of birds)	CLASS A		CLASS B	
	MINIMUM BOUNDARY BUFFER	MINIMUM SEPARATION DISTANCE	MINIMUM BOUNDARY BUFFER	MINIMUM SEPARATION DISTANCE
80,000	220 m	300 m	180 m	300 m
80,001–120,000	240 m	400 m	200 m	400 m
120,001–160,000	260 m	500 m	200 m	500 m
160,001–200,000	300 m	550 m	220 m	550 m
200,001–240,000	340 m	600 m	240 m	600 m
240,001–280,000	375 m	650 m	250 m	650 m
280,001–320,000	400 m	700 m	260 m	700 m

Source: Victorian Code for Broiler Farms 2001.

In some parts of Victoria, the issue of broiler farm location is contentious, often due to decisions by broiler farmers to locate in areas either close to urban development or in areas where rural property fragmentation or the rural landscape makes compliance with the Code difficult and/or expensive. The development of the Broiler Code was mainly a response by government and planning authorities to deal with the development of broiler farms in these ‘closer settled’ situations. There is currently tension between intensive agriculture interests and rural communities in municipalities within and around the Melbourne Region. This tension is reflected in dissention over the interpretation of the Broiler Code by planning authorities like the Victorian Civil and Administrative Tribunal, which in turn, results in pressure on politicians by affected rural communities.

Ironically, there are a number of municipalities in Victoria that are actively planning areas for intensive agriculture. Given the problems for this type of development in the Melbourne Region, it would seem appropriate to give encouragement and support to Councils who are prepared to plan for a

sustainable future for intensive agriculture. These municipalities have large areas of low density rural land, proximity to markets and appropriate infrastructure, where development of intensive agriculture can comfortably meet Best Practice Codes. The issues in these areas have more to do with bio-security protection, infrastructure provision and environmental management than urban or rural amenity.

This report is a product of the initiative by Golden Plains Shire to plan appropriate areas for intensive agriculture. Study Areas A and B are within a 100 hectare minimum subdivision area and contain properties that are generally in the range 200-300 hectares or larger. For example, all of the recent applications for broiler farms within and adjacent to the Study Areas meet Broiler Code Class A or B requirements.

The planning tools for the development of broiler farms in the Study Areas are well established, in the sense that there are overlays to protect waterways and vegetation and zoning controls on subdivision designed to retain a low dwelling density in preferred rural locations. The main issues to be addressed are the satisfactory separation of uses for bio-security protection, landscaping and re-vegetation and the provision of infrastructure.

The implementation of infrastructure investment for intensive agriculture is generally achieved through a private/public partnership, with the applicant responsible for the cost of 'direct impact' infrastructure and state and local governments contributing to 'generic' infrastructure requirements over time. A recent decision of the Victorian Civil and Administrative Tribunal (VCAT Ref No. P2703/2005, P2704/2005 and P2708/2005) in relation to a major broiler farm complex near Lethbridge in Study Area B is an example of the conditions placed upon modern broiler farms for infrastructure provision, landscaping and environmental management.

Since the introduction of the Broiler Code, investigations have been conducted to test the performance of the Code's requirements, particularly in relation to odour. The results to date indicate that the management of farms is just as important as the application of separation criteria. The inspections carried out as background to this report support this observation. For example, the design of tunnel vented broiler sheds has been developed to a high level of sophistication, resulting in much reduced odour perception in the vicinity of the sheds. When these design measures are combined with adequate property size, dry litter production systems and the removal of litter between production cycles, the historical amenity problems that have characterised broiler farms can be greatly reduced or even eliminated.

Given the designation of appropriate areas within the Rural Zone, suitable infrastructure and the combination of good technology and management, the key issue for sustainable intensive agriculture is protection from incompatible development and urban encroachment.

There is discussion within planning circles in Victoria about the application of specialised zones for intensive agriculture. By definition, such areas need to be large and run the risk of alienating land owners who do not wish to participate. This report takes the view that the existing Rural Zone (and its successor, the Farming Zone), when combined with appropriate minimum subdivision standards, environmental overlays and the various Codes of Practice, contain adequate measures for managing intensive agriculture development. The 'residual' threat is inappropriate subdivision (generally through application of the small lot provisions of the planning scheme) and incompatible development (generally rural dwellings on existing titles) that over time, jeopardise separation distances and bio-security.

To help overcome this threat, the application of an Agriculture Protection Overlay (APO) may warrant consideration. An overlay would allow existing farms to comment on development proposals that may affect operational performance and planning permit compliance in much the same way that the Airport Environs Overlay functions. The application of the overlay could be at the instigation of intensive agriculture operators and only apply over existing intensive agriculture areas. This would allow surrounding farms to operate under normal rural zone provisions. It is suggested that this approach is preferable to rezoning large areas specifically for intensive agricultural use. A draft of the suggested APO is attached to this report.

Conclusion

"Investing in Intensive Agriculture" commenced as a report on rural infrastructure for intensive agriculture in the Golden Plains Shire. The purpose was to identify the infrastructure requirements necessary to service existing and future investment. During the course of the investigation, it became clear that:

- While there are many low density parts of the Shire that can and no doubt will attract investment in intensive agriculture, the areas identified in the previous Area Improvement Study, where investment in pig and poultry production (Areas A and B) has occurred were confirmed as being most suited to future intensive agriculture investment.
- Road, power and telecommunications infrastructure to service intensive agriculture investment is available to Areas A and B and can be upgraded and/or augmented, generally on a public/private 'partnership' basis.
- Water availability is the most critical constraint on future intensive agriculture investment.

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- The broiler and pig industries dominate intensive agriculture investment in the Shire and represent the most likely form of future investment.
 - Broiler farms (in particular) will need to incorporate both water saving and water harvesting measures in their development plans to supplement any 'external' supply from water authorities.
 - Security of water supply for intensive agriculture is unlikely to be sustained under the present supply conditions due to urban supply priorities, physical constraints within the reticulation system and water availability.

In view of the above circumstances, this report recommends investigation of a water supply reticulation system independent of the existing urban supply. Creation of a separate water supply system is perceived to have the following advantages:

- Improved security of supply for intensive agriculture.
- Creation of a separate business water market independent of the urban water system.
- Water savings through the use of conditional supply arrangements requiring on-farm water harvesting and water recycling.
- Removing of the need for pressure limiting valves on the existing urban system, allowing the infrastructure to perform at its maximum efficiency.
- Greater flexibility for the location of new farms away from the urban supply network.
- Improved supply of water for fire fighting purposes.
- Increased local employment resulting from the ability to continue intensive agriculture investment in the Golden Plains region.

It is anticipated that if accepted, the new system will become an asset of Barwon Water, therefore, the next step is to assess the technical, environmental and economic merit of the proposal.

The proposal for a new storage system is dependent on:

- Support from Barwon Water for the concept of developing parallel infrastructure dedicated to intensive agriculture.
- An extension to the Barwon Water District or consent from the Minister to enable Barwon Water to operate outside its district.

- Advice from Barwon Water on the amount of water available, its source and the conditions of supply.
- Agreement that Barwon Water is prepared to manage the proposed infrastructure and the likely costs to consumers.
- Participation by existing intensive agriculture sites in the new water supply system.

Assuming technical feasibility, the proposal will also need the support of the Victorian Government. A key to earning this support will be the ability of the project to advance the strategic objectives of "Our Water Our Future", particularly in the context of the Central Region Sustainable Water Strategy.

As mentioned earlier, "Our Water Our Future" has the following broad objectives;

- a 25% savings in water use,
- to harvest urban stormwater for reuse,
- to encourage third pipe systems and
- to involve industry in water conservation.

The new 'water for intensive agriculture' system proposed in this report will have the ability to meet these criteria and will therefore contribute to Victoria's water saving objectives.

Investment in intensive agriculture in the Golden Plains Shire is of State significance. The areas proposed for future intensive agriculture development in the Golden Plains Shire will provide the opportunity to establish new investment under 'best practice' conditions, with consequent benefits for the whole of Victoria.

Attachments

Drawing GMR06015/0 Existing Conditions Key Sheet

Drawings GMR06015/01 to 09 Existing Conditions

Drawing GMR06015/10 Topographic Map

Drawing GMR06015/11 Catchment Plan