



NSW GOVERNMENT
Department of Planning

***MAJOR PROJECT ASSESSMENT:
Four Arrows Ethanol and Dairy Project,
Coleambally***



Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

December 2007

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EXECUTIVE SUMMARY

Four Arrows Ethanol Pty Ltd (Four Arrows) proposes to establish a new ethanol plant and dairy on 359 hectares of agricultural land located on the Kidman Way, approximately 7 kilometres to the north of Coleambally.

The ethanol plant would be capable of producing 300 megalitres (ML) of ethanol a year, while the dairy would have up to 18,000 head of cattle and be capable of producing up to 77ML of milk a year.

The proposal has a capital investment value of \$100 million, and would employ around 100 people.

It is classified as a major project under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) due to the scale and nature of both the ethanol plant and the dairy. Consequently, the Minister is the approval authority for the project.

The Department exhibited the application for the proposal between 2 November 2006 and 4 December 2006, and received 8 submissions on the proposal: 5 from government authorities and 3 from the general public.

These submissions raised some significant concerns about the potential odour, groundwater and solid waste management impacts of the proposal.

To address these concerns, Four Arrows decided to amend the proposal and provide a broad array of further information to justify other components of the proposal. The amendments and further information were provided to the Department in a Preferred Project Report for the project, and subsequently made public on the Department's website and at Murrumbidgee Shire Council's Coleambally office.

After reviewing the Preferred Project Report in consultation with relevant government authorities (including the Department of Environment and Climate Change, Department of Water and Energy and Murrumbidgee Shire Council), the Department is satisfied that the environmental impacts of the project can be mitigated and managed to ensure an acceptable level of environmental performance.

The Department is also satisfied that the project offers significant social and economic benefits to the region, as it would:

- produce ethanol and milk for domestic markets;
- promote the expansion of the renewable fuel industry in NSW;
- attract a least \$100 million of capital investment to the area; and
- create jobs for up to 100 people.

Consequently, on balance, the Department believes the project is in the public interest and should be approved subject to strict conditions.

1. PROPOSED PROJECT

1.1 Project Description

Four Arrows Ethanol Pty Ltd (Four Arrows) proposes to establish a new ethanol plant and dairy on 359 hectares of agricultural land located on the Kidman Way, approximately 7km north of the township of Coleambally (see Figure 1).

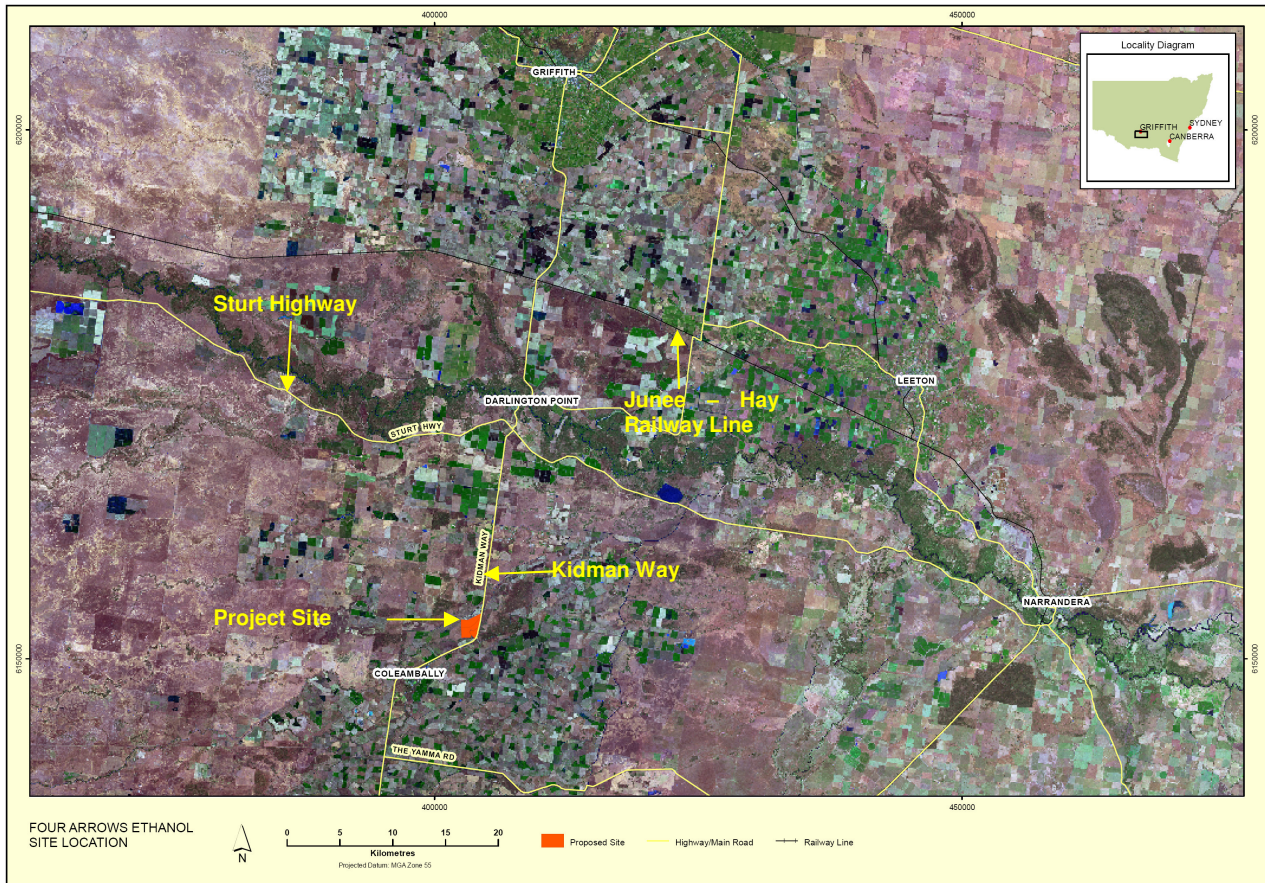


Figure 1: Regional Context

During the assessment process, Fours Arrows has made several changes to the proposal to address concerns raised in submissions. Most of these changes were to the proposed wastewater management system.

The major components of the revised proposal are summarised in Table 1, depicted generally in Figures 2 – 4, and described in full in both the Environmental Assessment (EA) (see Appendix F) and Preferred Project Report (see Appendix D) for the project.

Table 1: Major components of the project

Aspect	Description
Project Summary	Construction and operation of an ethanol plant, dairy facility and associated infrastructure. The ethanol plant would have a production capacity of 300ML per year, while the dairy would produce 77ML of milk a year.
<i>Ethanol Plant</i>	The ethanol plant would be located on the north-east corner of the site and have a footprint of 390 x 320 m. It would include a grain mill, distillation system, tanks, a boiler, a wastewater treatment system (anaerobic digester), dryers, carbon dioxide scrubber, and a cooling tower (see Figure 3 for an indicative design of the plant). Associated infrastructure would include a grain storage area consisting of 8 tarpaulin covered bunkers with a storage capacity of 150,000 tonnes. Approximately 725,000 tonnes of grain (e.g., wheat, barley, maize and sorghum) and 2,000 tonnes of additives (e.g., enzymes, yeast, urea etc) would be required to produce 300ML of ethanol. The grain would be milled to produce meal (flour). The meal would be mixed with water and enzymes and cooked, fermented and then distilled to produce ethanol (see Figure 5). The ethanol would be denatured by adding petrol (2-5%) and trucked to markets. By products of the process include carbon dioxide and wet distillers grain.
<i>Dairy</i>	The dairy would be comprised of a range of facilities, including a cattle yard, 4 freestall sheds, a dry pen, a sick shed, a milking barn, and a milk storage area. In total, the site would accommodate 18,000 head of cattle consisting of 6,000 milking cows, 1,200 dry cows and first calf heifers and 10,800 heifers ranging in age from 1 week to 3 years old. The 7,200 milking cows would be housed in the freestall sheds (see Figure 4) and milked 3 times a day in a milking barn. The remaining cattle would be housed in a dry lot (i.e., feedlot), and replace the milking cows as required to increase productivity. Associated infrastructure would include a commodity shed (i.e, grain storage) and feed mill. Cattle feed would be stored in the commodity shed prior to being delivered to the feed mill for missing before being distributed to the cattle.
<i>Water Demand and Supply</i>	Water demand for the facility would be about 1,750 ML a year. This water is likely to come from the Coleambally Irrigation Co-operative Limited's water supply channel, which is located on the northern boundary of the site. However, approximately 3,200ML of wastewater generated by the ethanol plant and dairy would be reused on site.
<i>Access</i>	There would be three vehicle access points to the site off Kidman Way, with dedicated access points for heavy, passenger, and management vehicles. The Kidman Way would be upgraded to include turning lanes, acceleration/deceleration lanes, and passing lanes at the site access points.
<i>Associated Infrastructure</i>	Includes a range of facilities such as workshop and truck washdown area; visitor centre and administration building; internal roads and carparking; and landscaping.
<i>Wastewater Management System</i>	The system would be comprised of sedimentation basins (36ML), storm surge ponds (40ML), recycling ponds (80ML) and an evaporation pond (200ML). Wastewater from the dairy would be directed to the sedimentation basins. Once the solids in this water had settled, it would be directed to the recycling ponds and reused in the dairy. All residual wastewater would be pumped to the evaporation basins. The wastewater from the ethanol plant would be captured and treated at the plant before being recycled back through the plant. Up to 240ML of wastewater (worse case scenario) would be directed to the evaporation basin a year.
<i>Employment</i>	Construction and operational workforce of 100 employees.
<i>Capital Value</i>	\$100 million.
<i>Hours of Operation</i>	The project would be constructed over a 6 month period. The hours of operation would be 24 hours a day, 7 days a week

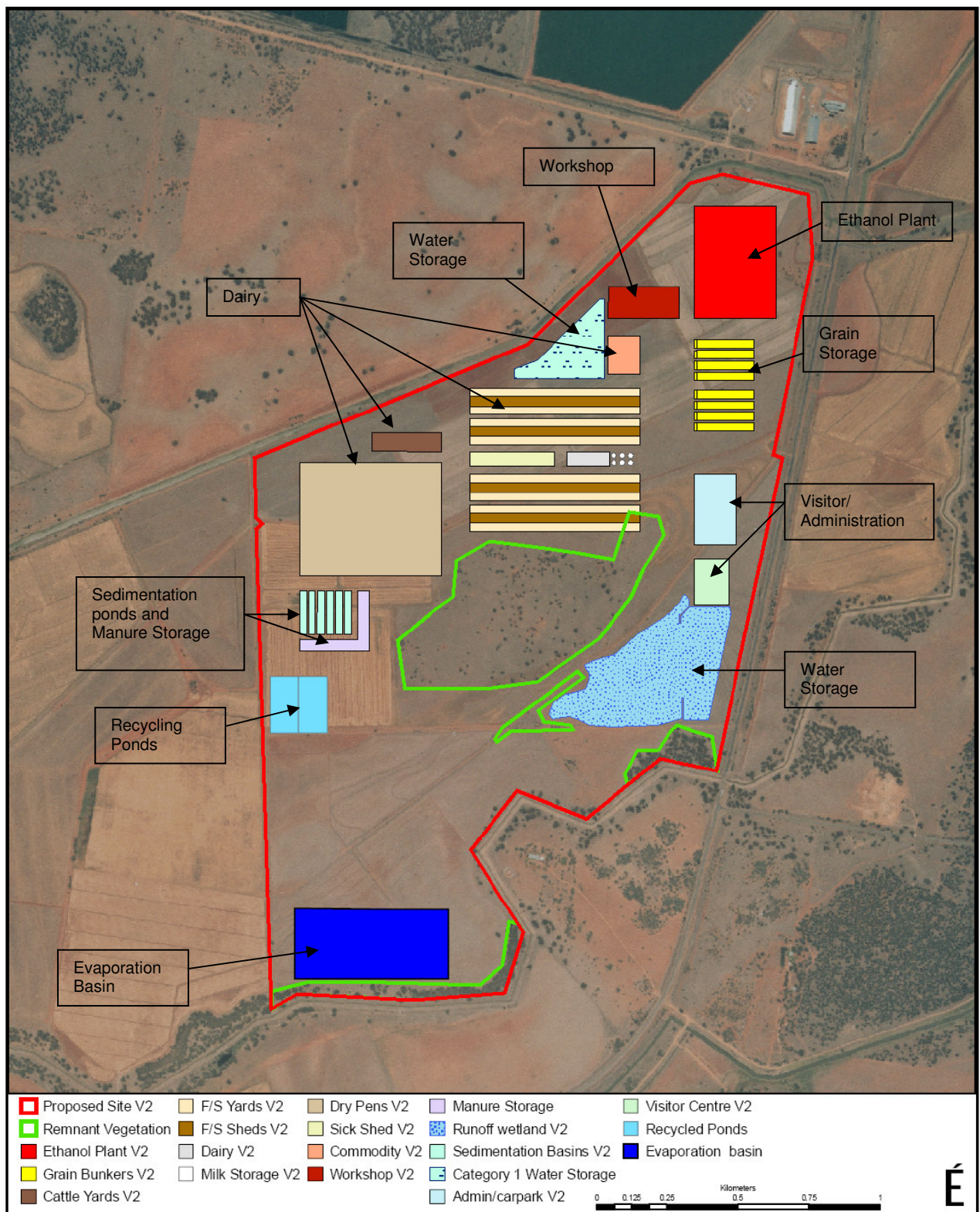


Figure 2: Site Plan

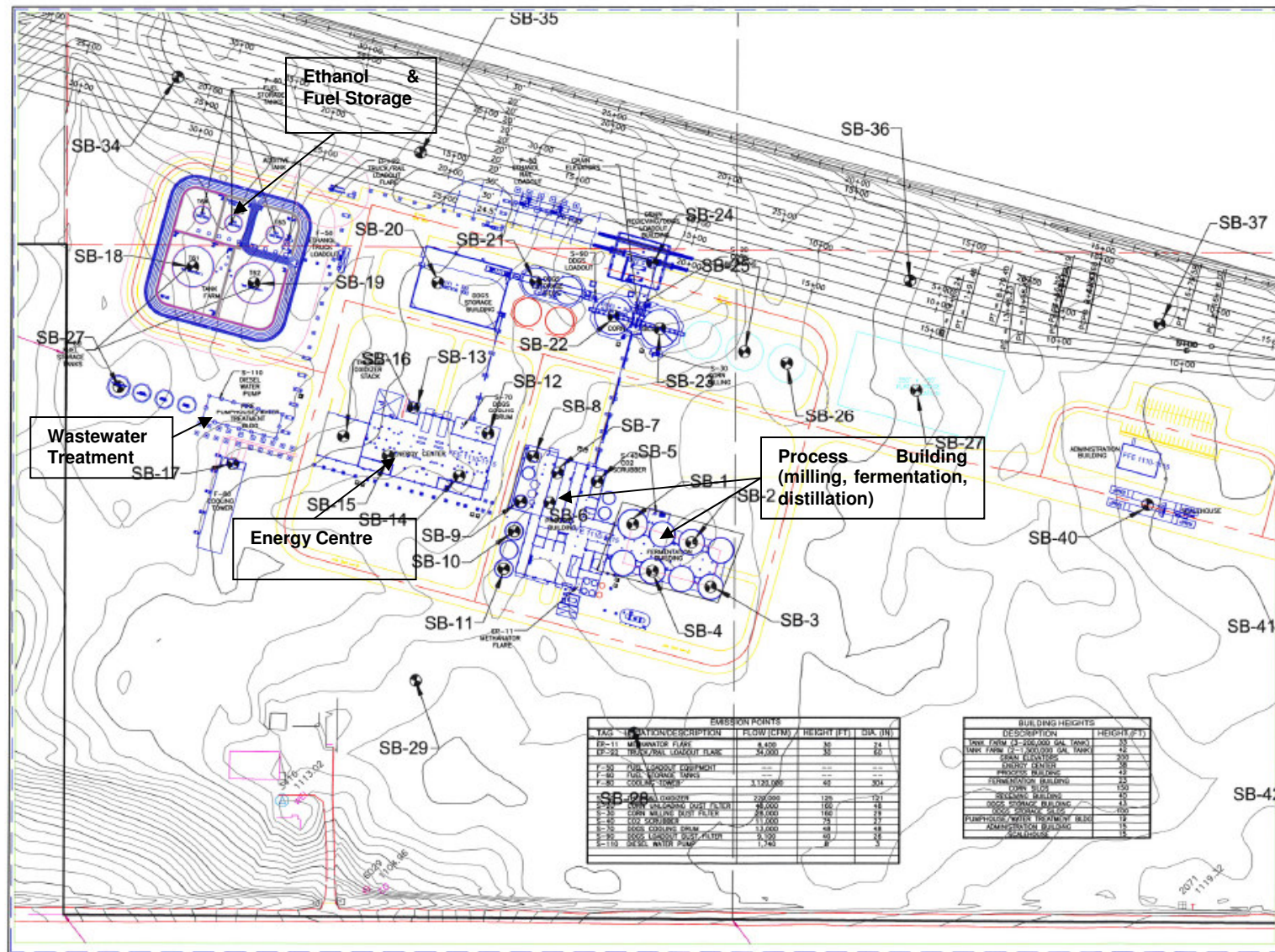


Figure 3: Indicative Design of the Ethanol Plant

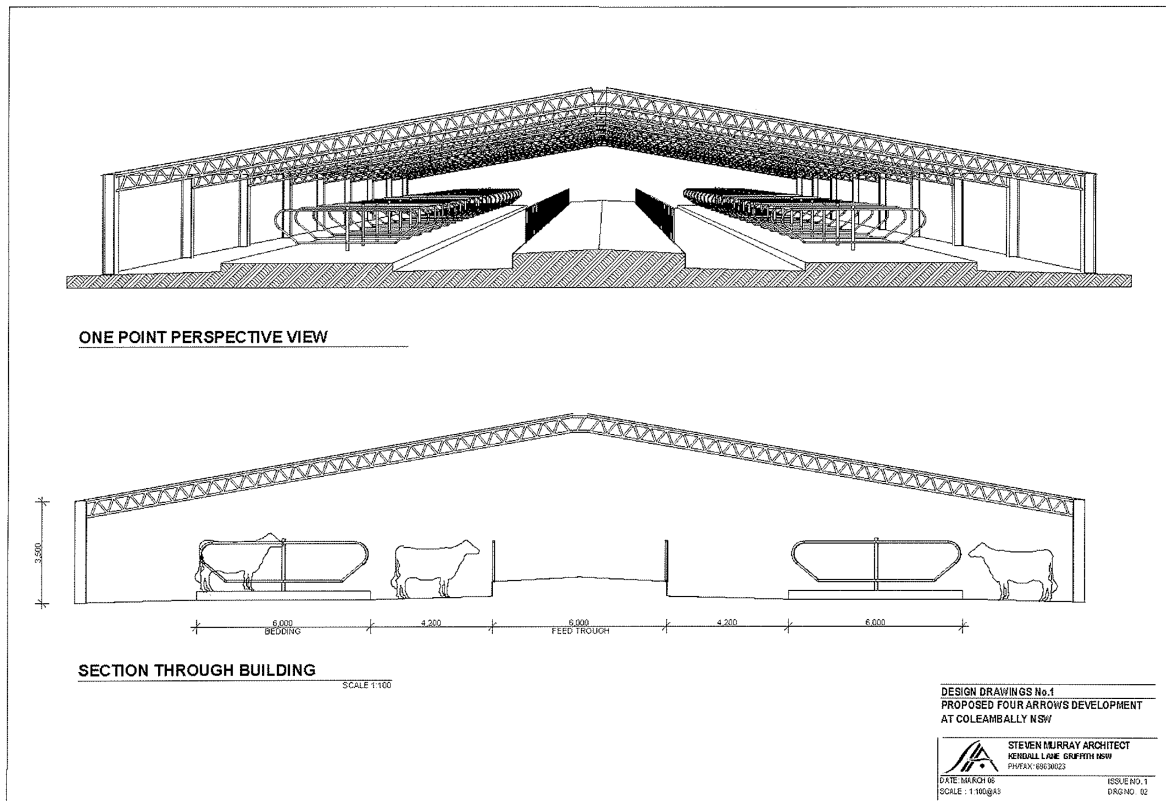


Figure 4: Freestall Shed Concept Design

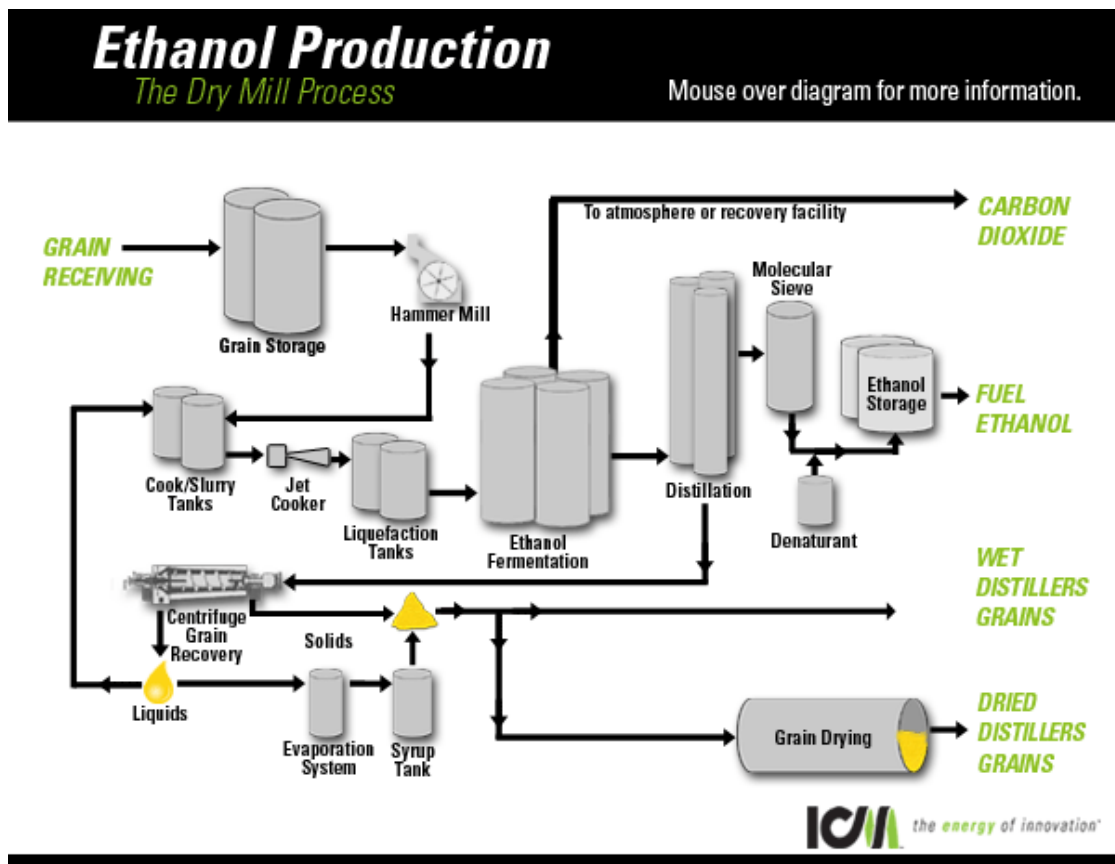


Figure 5: Overview of the Ethanol Process

1.2 Project Setting

The project site is comprised of almost 359 hectares of agricultural land, and is located off the Kidman Way approximately 7 kilometres to the north of Coleambally in the Murrumbidgee local government area (LGA).

The site is situated within the Coleambally Irrigation Area, an area covering over 80,000 hectares, and is predominantly surrounded by agricultural land that is used for both cropping (e.g., rice, wheat, barley, oats etc) and grazing. However, there is a rural industrial complex - the Welsh Rice Sheds - located directly to the north of the site.

There are approximately 26 rural residences within a 5 kilometre radius of the site, with the closest residence being located about 200 metres south of the site (see residence 1 on Figure 6). However, this residence is owned by Four Arrows.



Figure 6: Location of Nearby Sensitive Receivers

Nearby natural features include the Boona State Forest, which is approximately 500 metres to the east of the site, and the Bretts State Forest which is approximately 1.5 kilometres to the north-west of the site.

Key infrastructure in the surrounding area (see Figure 1) includes:

- the Kidman Way, some 800 kilometres of State road commencing at Jerilderie and traversing north to Bourke, where it joins the Mitchell Highway. The site is accessed from the Kidman Way;
- the Sturt Highway, a key east-west transport and freight corridor, linking Sydney and Adelaide;

- a 33KV electricity transmission line, running adjacent to the eastern boundary of the site, which connects to a 132kV substation that supplies the town of Coleambally with electricity;
- a water supply channel adjacent to the northern boundary of the site that forms part of the Coleambally irrigation network;
- a drainage channel (DC400) to the south of the site that drains into the Coleambally Outfall Drain and ultimately to Billabong Creek near Moulamein; and
- the Willbriggie Rail siding, which is located approximately 25 kilometres to the north of the site adjacent to the regional grain stores.

1.3 Project Need

The Federal and the State Government have introduced a number of initiatives to promote a viable ethanol industry in Australia (including industry grants and mandating that 2% of the total volume of sales of petrol in NSW must be ethanol). There are currently over 600 services stations nationwide selling ethanol blended fuel (E10). With the price of E10 approximately 2 to 3 cents a litre lower than regular unleaded petrol, the demand for ethanol is expected to increase.

The dairy industry is a key agricultural industry in Australia, with the local retail market valued at approximately \$4 billion and export market valued at approximately \$2.2 billion. Australia is the third largest exporter of dairy products (behind New Zealand and the European Union), accounting for 13% of the world market.

Four Arrows considers that the proposal is required to:

- supply the growing demand for ethanol and dairy products;
- facilitate the development of the renewable fuel industry in NSW; and
- contribute towards the Federal Government's objective of ensuring that by 2010 at least 350 ML of the total fuel supply in Australia is comprised of biofuels.

Four Arrows also considers that the proposal would benefit the region, primarily by providing employment and attracting professionals to the region, such as veterinarians, engineers, and animal nutritionists.

2. STATUTORY CONTEXT

2.1 Major Project

The proposal is classified as a major project under Part 3A of the *Environmental Planning and Assessment Act 1979* (the EP&A Act) because of the scale of both the ethanol plant and dairy, which trigger relevant criteria in the *State Environmental Planning Policy (Major Projects) 2005*: the ethanol plant because it has a capital investment of more than \$30 million (Clause 3 of Schedule 1); and the dairy because it is an intensive livestock industry (i.e., dairy) that would employ more than 20 people (Clause 1 of Schedule 1).

Consequently, the Minister for Planning is the approval authority for the project.

2.2 Permissibility

The site is zoned 1(a) (General Rural Zone) under the *Murrumbidgee Local Environmental Plan 1994*. Development for the purposes of a "rural industry" (ethanol plant) and a "intensive livestock keeping establishment" (dairy) is permissible with development consent in this zone.

Consequently the Minister may approve the carrying out of the project.

2.3 Exhibition

Under Section 75H(3) of the EP&A Act, the Director-General is required to make the environmental assessment of a project publicly available for at least 30 days.

After accepting the environmental assessment for the project, the Department:

- made it publicly available from 2 November 2006 until 4 December 2006:
 - on the Department's website;
 - at the Department's Information Centre; and
 - at the Murrumbidgee Shire Council's Coleambally and Darlington Point Offices;
- notified relevant State government authorities and Murrumbidgee Shire Council by letter;
- notified landowners in the vicinity of the site about the exhibition period by letter; and
- advertised the exhibition period in the Griffith Area News.

This satisfies the requirements in Section 75H(3) of the EP&A Act.

During the assessment process the Department also made a number of documents available for download on the Department's website. These documents included the:

- project application;
- Director-General's requirements for the environmental assessment of the project;
- EA; and
- Preferred Project Report.

2.4 Environmental Planning Instruments

Under Section 75I of the EP&A Act, the Director-General's report is to include a copy of or reference to the provisions of any:

- *State Environmental Planning Policy* (SEPP) that substantially govern the carrying out of the project and;
- environmental planning instrument that would (but for Part 3A) substantially govern the carrying out of the project and that have been taken into consideration on the environmental assessment of the project.

The Department has considered the project against the relevant provisions of several environmental planning instruments (including SEPPs 30, 33 and 55; and the *Murrumbidgee Local Environmental Plan 1994*). The Department is satisfied that, subject to the implementation of the recommended conditions of approval, the proposal is generally consistent with the aims and objectives of these instruments (see Appendix C).

2.5 Objects of the Environmental Planning and Assessment Act 1979

The Minister is required to consider the objects of the EP&A Act when he makes decisions under the Act. These objects are detailed in Section 5 of the Act, and include:

'The objects of this Act are:

- (a) *to encourage:*
 - (i) *the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,*
 - (ii) *the promotion and co-ordination of the orderly and economic use and development of land,*
 - (iii) *the protection, provision and co-ordination of communication and utility services,*
 - (iv) *the provision of land for public purposes,*
 - (v) *the provision and co-ordination of community services and facilities, and*
 - (vi) *the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and*
 - (vii) *ecologically sustainable development, and*
 - (viii) *the provision and maintenance of affordable housing, and*
- (b) *to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and*
- (c) *to provide increased opportunity for public involvement and participation in environmental planning and assessment.'*

The objects of most relevance to the Minister's decision on whether or not to approve this project are those under Section 5(a)(i), (ii), (iii), (vi) and (vii).

With respect to ecologically sustainable development (ESD), the EP&A Act adopts the definition in the *Protection of the Environment Administration Act 1991*. Section 6(2) of that Act states that ESD 'requires the effective integration of economic and environmental considerations in decision-making processes' and that ESD 'can be achieved through' the implementation of the principles and programs including the precautionary principle, the principle of inter-generational equity, the principle of conservation of biological diversity and ecological integrity, and the principle of improved valuation, pricing and incentive mechanisms. In applying the precautionary principle, public decisions should be guided by careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment and an assessment of the risk-weighted consequences of various options.

The Department has fully considered the objects of the EP&A Act, including the encouragement of ESD, in its assessment of the project application.

This assessment integrates all significant economic and environmental considerations and seeks to avoid any potential serious or irreversible damage to the environment, based on an assessment of risk-weighted consequences.

Four Arrows has also considered a number of alternatives to the proposed project (including the alternative of not proceeding and alternative sites), undertaken an environmental risk analysis of the project, and considered the project in the light of the principles of ESD.

2.6 Statement of Compliance

Under Section 75I of the EP&A Act, the Director-General's report is required to include a statement relating to compliance with the environmental assessment requirements with respect to the project.

The Department is satisfied that the environmental assessment requirements have been complied with.

3. ISSUES RAISED IN SUBMISSIONS

3.1 Exhibition

During the exhibition period, the Department received 8 submissions on the proposal:

- 5 from public authorities (Department of Environment and Climate Change (DECC), Department of Water and Energy (DWE), Roads and Traffic Authority (RTA), Murrumbidgee Catchment Management Authority and NSW Health); and
- 3 from the general public.

Both **DECC** and **DWE** raised significant concerns about the potential groundwater and odour impacts of the proposal, and requested additional information on a broad array of matters including solid waste management and greenhouse gas emissions.

RTA did not object to the project and has provided recommended conditions of approval.

The **Murrumbidgee Catchment Management Authority** did not object to the project, however, raised concerns regarding water security and requested that the existing remnant vegetation on site be enhanced.

NSW Health (greater Southern Area Health Service) provided a number of requirements relating to potable water use, management of water storages, hazards and employee safety, and indicated that it was unclear how the environmental goals and commitments relating to air, noise, water, waste and chemicals would be achieved.

In terms of the general public, one of the submissions supported the project, but the other two submissions raised concerns about the potential impacts associated with traffic, odour, dust, flies, disease, storage of hazardous chemicals; impacts on groundwater and water supply; site selection; insufficient consideration of State planning matters; and inconsistencies in the EA.

A full copy of these submissions is attached in Appendix E.

3.2 Preferred Project Report

The Department, DECC and DWE meet with Four Arrow's consultants on three occasions to try and resolve some of the concerns raised in submissions.

Following these meetings and a review of the submissions, Four Arrows decided to amend the proposal, and submit further information to justify some of the other components of the proposal.

Both the amendments and the further information were incorporated into a Preferred Project Report for the project, which was submitted to the Department on 14 September 2007, with augmented on 23 October 2007 (see Appendix D).

The Department subsequently placed the Preferred Project Report on its website, and made it publicly available at the Murrumbidgee Shire Council's Colleambally office.

Following a review of the Preferred Project Report, both DECC and DWE have advised the Department that they are able to support the project subject to the imposition of strict conditions, such as requiring Four Arrows to:

- stage the development of the dairy – the biggest odour source - and ensure that the it does not generate any offensive odour;
- design and maintain the wastewater management system and solid waste storage system on site to strict standards to protect the region's drinking water supply; and
- obtain a further approval for any solid waste disposal associated with the facility.

While Council did not make a formal submission on the proposal, it asked for a range of conditions to be imposed on Four Arrows. These conditions have been incorporated into the Department's recommended conditions of approval.

4. ASSESSMENT

4.1 Odour

The project has the potential to cause offensive odour impacts on the surrounding area, which is generally sparsely populated but includes 26 residences with 5km of the site, and only 3 residences within 2km of the site.

The main sources of odour would be the dairy, ethanol plant, solid waste storage areas and wastewater ponds.

Four Arrows has undertaken an odour assessment of the project in general accordance with the guidelines for the *Assessment and Management of Odour from Stationary Sources in NSW* and *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW*, and believes this assessment represents a conservative estimate of the predicted odour impacts of the project.

Under NSW odour policy, the setting on odour assessment criteria is based on a range of factors including population size, cumulative impacts, anticipated odour levels during adverse meteorological conditions and community expectation of amenity, and usually requires some judgement. However, the odour assessment criteria for various population densities is summarised in Table 2.

Table 2: Odour Assessment Criteria

Population of affected community	Odour Assessment Criteria (ou)
Single residence (≤ 2)	7
~10	6
~30	5
~125	4
~500	3
Urban area (≥ 2000) and/or schools and hospitals	2

Based on this table, the relevant criteria for this project would vary with distance from the site with the criteria being 7ou in close proximity to the site and gradually declining to 2ou in the town of Coleambally.

According to Four Arrows, the predicted odour impacts of the project are likely to be consistent with the impacts shown in Figure 7 and Figure 8.



Figure 7: Predicted Odour Levels at Receptors within 2km of the Site

These predictions suggest that there are likely to be significant odour impacts at properties 1 and 7 and moderate odour impacts on properties 2, 3, 25 and 26. In terms of the significant impacts, the Department notes that Four Arrows owns property 1 and that property 7 is another rural industry, the Welsh Rice Sheds, which is predominantly occupied in the rice harvesting seasons (March – June) and does not contain any residences. In terms of the moderate impacts, the Department notes that these impacts are generally considered to be acceptable under NSW odour policy for a sparsely populated rural area.

Nevertheless, both DECC and the Department have some reservations about the accuracy and robustness of these predictions due to the lack of information on the detailed design of the project. This means there is some uncertainty about the likely scale and nature of the potential odour impacts of the project.

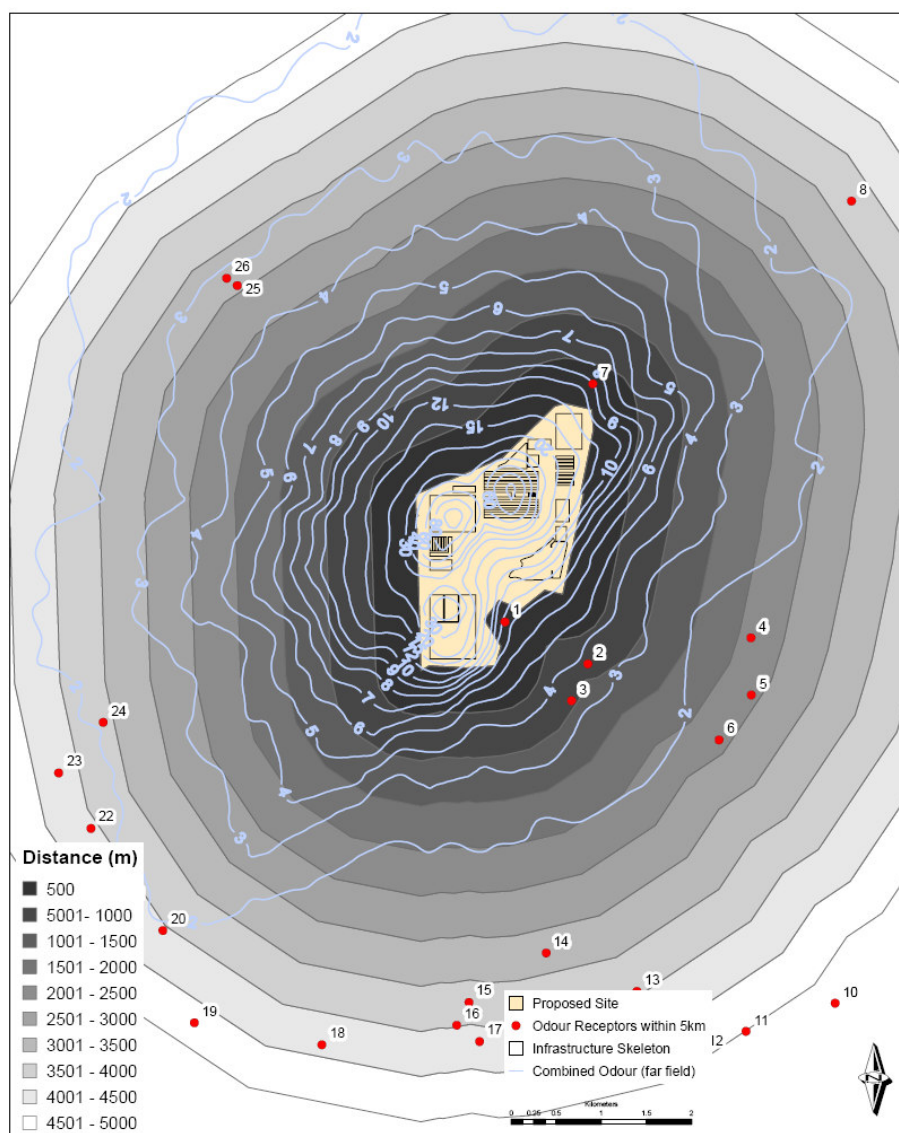


Figure 8: Predicted Odour Levels at Receptors Located more than 2km from the Site

Notwithstanding these reservations, both the DECC and Department are satisfied that suitable measures can be put in place to address this uncertainty, and to ensure that there are no offensive odour impacts on the broad community.

These measures include requiring Four Arrows to:

1. ensure that the project does not generate offensive odours beyond the boundary of the site;
2. prepare detailed plans for all components of the project prior to construction;
3. stage the implementation of the dairy, the most significant potential odour source on site, with stage 1 allowing the dairy to be stocked with up to 10,000 head of cattle. Any subsequent stages would be contingent on good environmental performance and advise for independent experts that the subsequent stages would not cause offensive odour impacts;
4. commission an independent team of experts, which includes an odour expert, to audit the environmental performance of the project within 12 months of the commencement of operations and every 3 years thereafter;
5. prepare a detailed air quality management plan for the project prior to construction that includes:
 - an ethanol plant verification report that demonstrates that the emissions of the ethanol plant (following finalisation of the detail design) will comply with the predictions in the EA and relevant DECC guidelines; and

- a detailed odour management plan for the project including appropriate monitoring; management practices that would be used throughout the project to ensure offensive odour impacts do not occur off site, contingency measures that would be implemented if offensive odour impacts occur, and complaints handling procedures; and
6. prepare a waste management strategy detailing management procedures for the storage of waste on site and contingency measures should the production of wet distillers grain exceed on and off-site demand.

The Department is satisfied that these recommended measures would ensure that the potential odour impacts of the proposal are kept to acceptable levels.

4.2 Air Quality

Other emissions that would be generated by the project include dust (construction and operation), and carbon monoxide, nitrogen oxides as well as sulfur dioxide from the ethanol plant. The air quality assessment indicates that emission of these pollutants would not exceed DECC criteria. However, as the design of the ethanol plant has not been finalised, the Department concurs with DECC that Four Arrows should be required to verify that emission from the ethanol plant would comply with relevant DECC criteria once the design of the plant has been finalised. This requirement has been incorporated into the recommended conditions of approval.

An adjacent land owner raised concerns that dust from the facility would affect the organic produce grown on their property. Four Arrows has proposed a number of measures to minimise dust including:

- *construction* – the use of water carts; and sediment and erosion controls; and
- *operation* – the use of misting and sprinkler systems at the cattle housing facilities; hooded augers and screening at grain storage areas to minimise dust during grain transfers; and the sealing of roads.

While the Department is satisfied that there are a number of measures that could be adopted by Four Arrows to reduce dust impacts on surrounding properties, the Department recommends that Four Arrows should be required to comply with relevant criteria for air pollutants, and in particular dust, particulate matter and total suspended particulate matter. The Department considers that the measures proposed by Four Arrows and the recommended conditions of approval would ensure air quality impacts and in particular dust are minimised.

The Department is satisfied that the measures proposed by Four Arrows as well as the recommended conditions would ensure air quality impacts associated with the construction and operation of the project would be minimised.

4.3 Soils and Water

Water Supply

Water demand for the facility would be approximately 1,750 megalitres (ML) per year, including:

- ~530 ML for the ethanol plant;
- ~900ML for the dairy; and
- ~320ML for staff amenities, the workshop and landscaping.

Four Arrows proposes to predominantly source the project's water needs from CICL, with rain water harvested from the site to be used to supplement water supplies. Initiatives that have been proposed by Four Arrows to minimise water use include the re-use of treated wastewater for the flushing of the freestall sheds and the recycling of process water back through the ethanol plant. These measures are supported by the Department.

Four Arrows proposes to construct two water storages including a 800ML storage for water transferred from CICL and water harvested from roof areas (Category 1 water), and a 300ML wetland area for storage of stormwater collected from the site (Category 2 water). Category 1 water would be utilised in the dairy, ethanol plant and for staff amenities, while Category 2 water would be used for dust control, landscaping and the truck wash down area.

The Murrumbidgee Catchment Management Authority raised concerns that Fours Arrows has overstated the security of water. Current allocation for the CICL is 90% high security and 5% general security. Four Arrows has between 4,000 – 5,000ML of high security water allocations, and the Department is satisfied that Four Arrows has more than sufficient allocations to cover the needs of the project. Alternatively, options are available to purchase water on the open market.

The Department recommends that Four Arrows should be required to prepare a water management plan to ensure water storages are designed to appropriate standards and that the water balance for the site is regularly reviewed and updated to ensure water saving measures are identified and implemented.

Groundwater and Soils

The project site is over 350 hectares in size with varying soil types ranging from sands through to clays. Groundwater aquifers present under the site include the Upper and Lower Shepperton which are linked to the deeper aquifers of Calivil Formation and the Renmark Group. Discussions with DWE and Council indicate that these aquifers are used for stock and domestic purposes and town water supply for Coleambally and Darlington Point (population of ~1,500 – 2,000 people).

DWE has indicated that the site is considered to be of “high groundwater vulnerability” as mapped in Figure 9. It is noted that the purpose of DWE’s vulnerability mapping is not to preclude development from a specific area, but to inform the planning assessment process, and in particular to assist in determining the appropriate groundwater protection and level of assessment required for new developments. In this regard, DWE recommend that in seeking approval for a development within an area of “high groundwater vulnerability”, the application should include a desktop study, site investigations, ongoing monitoring and a remedial action plan to remediate groundwater in the event that the development results in the contamination of that resource. These requirements are based on the National Water Quality Management Strategy *Guidelines for Groundwater Protection in Australia* (1995).

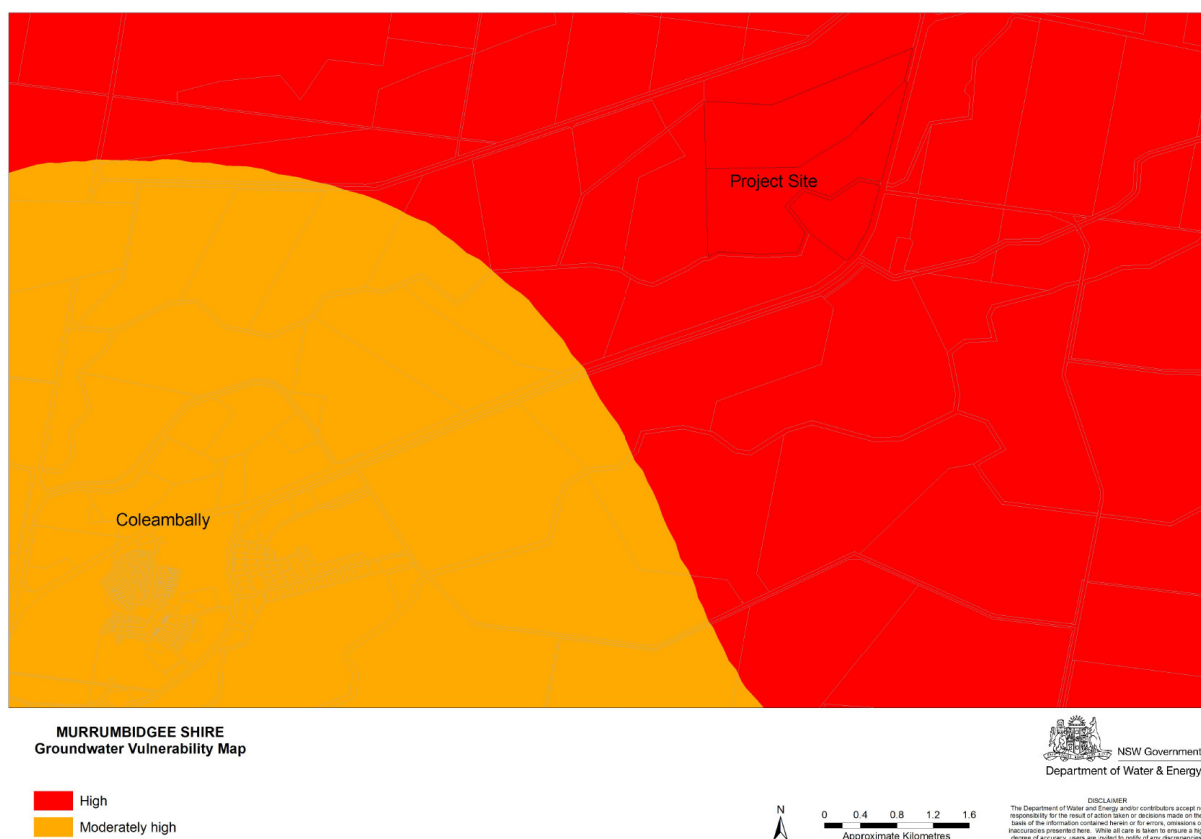


Figure 9: Groundwater Vulnerability

Due to the sensitivity of the underlying groundwater resource (i.e., its use for town water supply and stock and domestic purposes) the protection of groundwater from contamination is a key issue for this project. Potential sources of contamination include:

- *wastewater storages* – the project would generate up to 2,920ML of contaminated wastewater a year, including 380ML of stormwater and 2,540ML of highly contaminated water from the dairy. All wastewater would be captured, treated, re-used or disposed (evaporated) on site.
- *dairy* – 18,000 head of cattle would be housed in various facilities (sheds, dry lot etc);
- *waste storage areas* – waste that would be stored on site would include wet distillers grain (~930,000t) and manure (~30,700t), before being disposed of off-site; and
- *solid waste disposal* – Four Arrows propose to transport solid waste including manure, carcasses and, when required, wet distillers grain to its other land holdings including “Tubbo” for disposal.

If not designed appropriately, contaminated wastewater could leach from the wastewater storages, dairy and waste storage areas, and contaminate groundwater below the site. Additionally, the re-use/disposal of solid waste has the potential to contaminate groundwater if disposal areas do not have the capacity to accommodate this waste (i.e., the ability of the soil to absorb the nutrient, salt, hydraulic load and organic material from the solid wastes).

Initially, both DWE and DECC raised concerns about whether the proposed site was suitable to accommodate the proposed infrastructure (i.e. the water storages, wastewater storages, the dairy, and waste management areas) and the disposal of waste as no geotechnical investigations had been undertaken as part of the EA.

This issue has been discussed in detail with Four Arrows and to address DWE and DECC concerns, Four Arrows has undertaken further geotechnical investigations on site, including the chemical analysis of soils and groundwater, and has proposed changes to the wastewater management system and infrastructure to minimise the amount of wastewater that would be stored on site.

Based on the geotechnical investigations Four Arrows believes that suitable soil material is available on site for the construction of all water and wastewater storages, the dairy, internal roads, the grain bunkers and the foundation of the ethanol plant. Additionally, soil testing indicates that the soils on site would achieve a permeability of 1×10^{-9} m/sec (standard government requirement for storages etc).

Four Arrows has provided concept designs of the recycling ponds and evaporation storages (see Figure 10 and Figure 11, respectively). As part of this design of the evaporation basin, Four Arrows proposes to line this storage with a geosynthetic membrane and install a leakage detection system over a compacted clay layer.

The Department considers that this design is appropriate, however, is concerned that no firm commitments have been made regarding the design of wastewater infrastructure, solid waste storage areas, and cattle housing facilities, and that there are anomalies in the geotechnical assessment.

In addition, the Department does not agree with Four Arrows assessment that the proposal would have minimal impact on groundwater quality as the quality of wastewater produced from the site would be substantially better than the existing groundwater quality. As detailed in the PPR (see Table 5), the wastewater would have a higher concentration of all contaminants except sodium. Additionally, the concentration of nutrients (including nitrogen and phosphorus) in the wastewater would be considerably higher than groundwater levels.

Table 3: Comparison of Wastewater and Existing Groundwater Quality

Parameter	Concentration (mg/L)	
	Wastewater	Existing Groundwater
Nitrogen	73.2	1.0
Phosphorus	15.9	0.10
Potassium	53.8	7.0
Calcium	143.7	100

Parameter	Concentration (mg/L)	
	Wastewater	Existing Groundwater
Magnesium	126.1	63
Sodium	53.9	350
Calcium:Magnesium Ratio	1.23	1.59
SAR	0.35	6.8

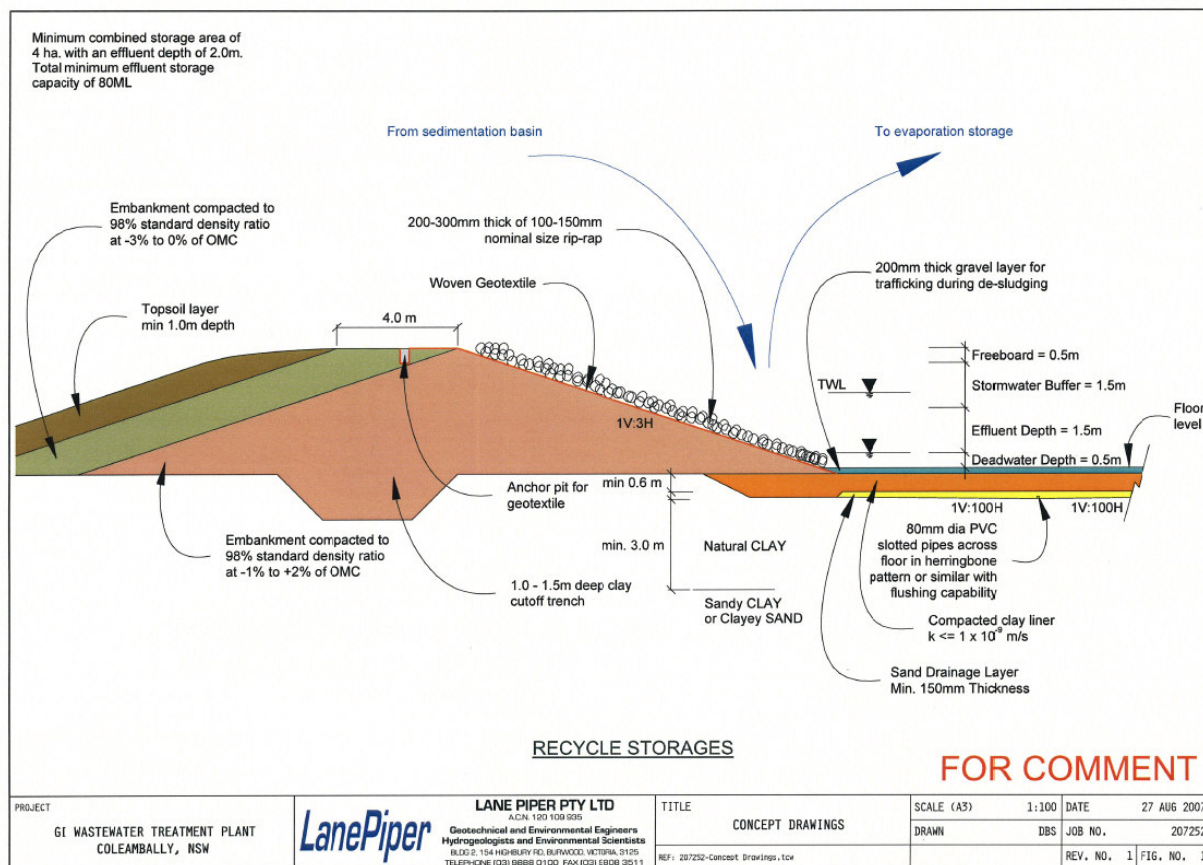


Figure 10: Recycling Ponds

Notwithstanding, the Department considers that suitable soil material is available on site to ensure infrastructure is constructed to appropriate standards that a range of engineering solutions are available to minimise impacts. The Department is satisfied that with appropriate design of infrastructure, as well as the best practice management of wastewater and solid waste, any potential contamination of groundwater can be avoided.

The Department has recommended a number of measures to ensure groundwater is protected. These measures include requiring Four Arrows to:

- prepare detailed plans for all water and wastewater storages, cattle housing facilities and waste storage areas prior to construction. These components must be designed to appropriate standards, including:
 - floor and walls to be appropriately compacted to an impermeability equal to or greater than $1 \times 10^{-9} \text{ m/s}$ with a clay liner thickness of no less than 600mm, or an equivalent alternative;
 - a leakage detection system for the recycling ponds and evaporation basin;
 - sedimentation ponds to be constructed from reinforced concrete; and
 - that designated solids storage areas are located on impermeable pads;
- to prepare and implement a Water Management Plan that includes:
 - detail plans for all water and wastewater storages and the ground surfaces for the dairy;
 - measures that would be implemented to ensure all water and wastewater storages as well as cattle housing facilities and solid waste storage areas are constructed, operated and maintained to prevent leakage and failure;

- water balance for the site that must be reviewed and updated yearly;
 - leakage detection and groundwater monitoring plan;
 - a contingency plan for potential groundwater contamination; and
3. to seek further approval for the disposal of solid waste (i.e., disposal of carcasses, manure and wet distillers grain), as limited information has been provided on the location of the disposal areas and in particular the suitability of the disposal site to accommodate these wastes without impacting on local groundwater resources. In seeking approval for the disposal of solid waste Four Arrows must provide a soil and hydrogeological assessment of the waste utilisation area, a cropping and land management program and a soil, surface and/or groundwater monitoring program.

The DECC and DWE concur with the recommended conditions of approval.

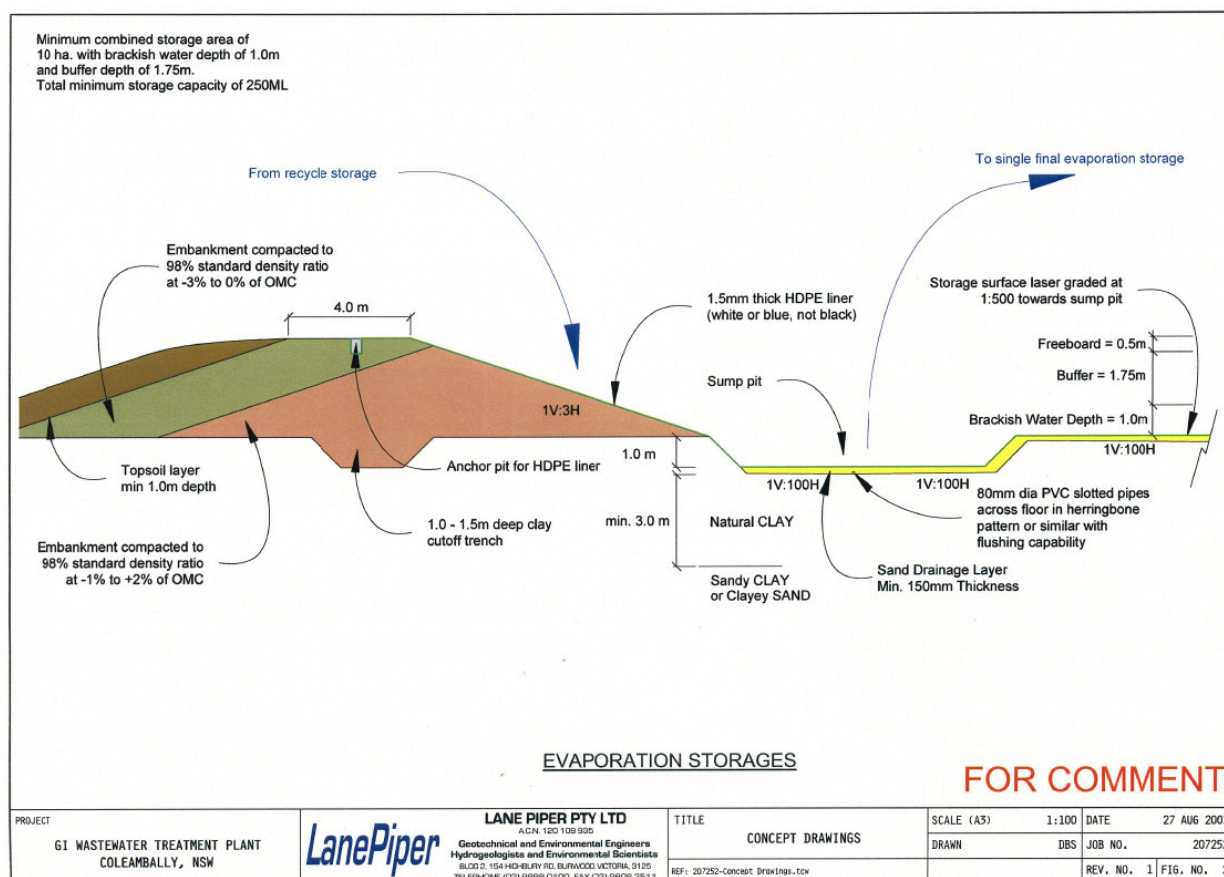


Figure 11: Groundwater Vulnerability

Surface Water

The nearest waterways include the CACL supply channel to the north of the site and a drainage channel located to the south of the site. The construction of the project would result in soil being exposed. To minimise potential impacts on nearby waterways from erosion and sedimentation during construction, the Department recommends that Four Arrows should be required to install sediment and controls prior to construction in accordance with the requirements of Landcom's (2004) *Managing Urban Stormwater: Soils and Construction*.

To ensure wastewater stored on site during the operational phase of the project does not contaminate these channels, Four Arrows proposes to bund the Category 2 storage (wetlands), sedimentation basins, recycling ponds and evaporation storage. DECC recommends that these drainage areas must accommodate the runoff generated from either a 90 percentile wet year or a 1 in 20 year 24 hour storm event, which ever is greater. This requirement has been incorporated into the conditions of approval.

The Department also recommends that all dangerous goods should be banded in accordance with Australian Standards. The Department considers that the measures proposed by Four

Arrows as well as the recommended conditions of approval would ensure that the project does not impact on nearby surface waters.

4.4 Hazards and Risks

The storage and transport of dangerous goods associated with the project would exceed thresholds identified in the Department's *Applying SEPP 33, Hazardous and Offensive Development Application Guidelines* (Department of Planning 1994). Accordingly, Four Arrows commissioned a Preliminary Hazards Assessment (PHA), which was prepared in accordance with the Department's *Multi-Level Risk Assessment* guideline.

The PHA indicates that the project is potentially hazardous. Hazards identified include:

- dust explosions associated with the receipt and storage of grain, and the milling of grain during the ethanol production process;
- fires as a result of incidents during the production, storage and loading/unloading of ethanol (i.e., release of ethanol which finds an ignition source);
- fires as a result of the unloading and storage of petrol (i.e., release of petrol which finds an ignition source);
- release of gases during the operation of the boiler;
- fires from the storage of cattle feed in the commodity sheds (e.g., decomposition of feed which results in heat being generated; and
- tanker rupture during transportation of ethanol and petrol .

The assessment indicates that the off-site societal impacts of any incidents on site would be minimal. In the case of a fire event at either the ethanol and petrol storage areas and the ethanol processing area, the PHA indicates that radiation levels of significance would not extend beyond the boundary of the site. The effects of a dust explosions would also be limited to the site.

To minimise potential vehicle accidents during the transportation of ethanol and petrol to/from the site, Four Arrows has provided separate entry and exit access points for heavy vehicles, separate access and dedicated internal roads for heavy and passenger vehicles, proposed a one way system for internal roads and proposes to upgrade the Kidman Way providing turning lanes and acceleration/deceleration lanes. The Department considers that these measures are appropriate.

The PHA has focused on the risks associated with the storage and transport of ethanol and petrol. However, other dangerous goods are likely to be stored on site including sulphuric acid, sodium hydroxide, urea, pesticides and veterinary products. A submission from a member of the general public raised concerns that these additional dangerous goods had not been considered as part of the PHA.

While the quantities of these dangerous goods to be stored on site would be considerably less than that of ethanol and petrol, it is unclear what additional risk, if any, these additional dangerous goods would pose. However, the Department considers that any risk from the storage and transport of dangerous goods could be managed and minimised through appropriate design and management procedures. Additionally, the site has more than sufficient area to ensure that storage areas can be separated from other buildings on site and the site boundary to minimise risks.

The closest residence is located within 1km of the site, with the township of Coleambally to 7km to the south of the site and therefore the site is suitably separated from nearby residential receivers. However, an industrial site (Welsh Rice Sheds) is located within 500m of the northern boundary of the site, with the majority of dangerous goods to be stored at the northern section of the site. The Department has therefore recommended a number of conditions of approval to ensure that adequate separation and risk minimisation measures are included in the design of the project. The recommended conditions would require Four Arrows to undertake further studies in accordance with the Department's guidelines for hazardous industries, detail the arrangements for the transport of hazardous goods including transport routes, and prepare and implement a Safety Management System and Emergency Management Plan. These conditions are standard Departmental conditions for hazardous projects and would ensure that

dangerous goods storage areas are designed to relevant standards, safety systems/procedures are implemented and that emergency procedures would be in place should an incident occur.

The Department also recommends that Four Arrows should be required to carry out a hazard audit once operational and regularly throughout the life of the project to ensure that all risk minimisation and management procedures are being adhered to and to identify any hazards that may have previously been unrecognised. With these measures in place, the Department is satisfied that hazards and risks can be minimised.

4.5 Traffic

The project would generate approximately 400 heavy vehicles movements and 200 light vehicles movements per day. However, Four Arrows predicts that actual vehicle movements are likely to be less than predicted as not all heavy vehicles would exit the site empty (i.e., backloading would occur) and staff would carpool. Consequently, it believes vehicle movements would be up to 50% less than predicted. That is, 50% of trucks would be backloaded (e.g., with wet distiller's grain, solid waste for disposal) and carpooling would result in a 50% reduction in light vehicles.

Vehicles would access the site via the Kidman Way. Four Arrows anticipate that 60% of vehicles generated by the project would travel north, with 40% to south. Traffic counts are available for 2003 and these figures indicate that the Annual Average Daily Traffic (AADT) for the Kidman Way north of the site near the Sturt Highway is 1516 vehicles, while the AADT south of the site past Coleambally is 1075. Therefore, under a worst case scenario (i.e., no backloading or carpooling) the traffic from the project would result in a 25% and 22% increase of vehicles utilising the Kidman Way north and south of the site, respectively.

It is noted that approximately 70% of the heavy vehicle movements relate to the transport of grain to the site (38%) and the transport of wet distillers grain from the site (33%). Regional grain stores are located at Willbriggie Rail siding, approximately 25 – 30km north of the site, and therefore the majority of deliveries of grain are likely to be from this location and therefore would be traveling short distances. Four Arrows has indicated that potential markets for wet distillers grain include feedlots, piggeries, and animal food producers. These markets would be within 200km of the site.

The Department considers that, as a state road and B-double route, the Kidman Way has sufficient capacity to accommodate the increase in traffic. RTA did not raise any concerns regarding the additional traffic as a result of the project and no road works would be required to accommodate the increase in traffic. Notwithstanding, to minimise impacts of the project on the surrounding road network, the Department recommends that Four Arrows be required to prepare a Transport Code of Conduct, detailing the traffic routes to be used by heavy vehicles, measures that would be implemented to minimise the traffic impacts of the project.

Access

As previously discussed, the site would be accessed from the Kidman Way. To service the site, three vehicle access points would be provided off the Kidman Way (i.e., along the eastern boundary of the site), including separate access points for heavy and passenger vehicles, as well as a dedicated access point for management vehicles. To provide safe access to the site, Four Arrows propose to upgrade the Kidman Way including the provision of turning lanes, acceleration/deceleration lanes, and passing lanes. The proposed upgrades for the heavy vehicle and staff access are provided in Figure 12 and Figure 13, respectively.

The Kidman Way is a state road and RTA does not object to the proposed access arrangements and has recommended a number of conditions relating to the design of access locations. Four Arrows has committed to upgrading the Kidman Way in accordance with RTA's requirements, and as such, these requirements have been incorporated into the recommended conditions of approval.

Regional grain stores are located at the Willbriggie Rail siding and the RTA has raised concerns that the project would substantially increase the number of heavy vehicles movements at the intersection of the Willbriggie Rail siding and the Kidman Way as grain for the project would be obtained from this location. The RTA has therefore recommended that Four Arrows should be

required to prepare a report on the impact of the project on the intersection of the Willbriggie Rail siding and the Kidman Way. The Department recommended conditions would require Four Arrows to complete this report to RTA's satisfaction and if upgrades are required, to seek approval for these upgrades prior to the commencement of operations.

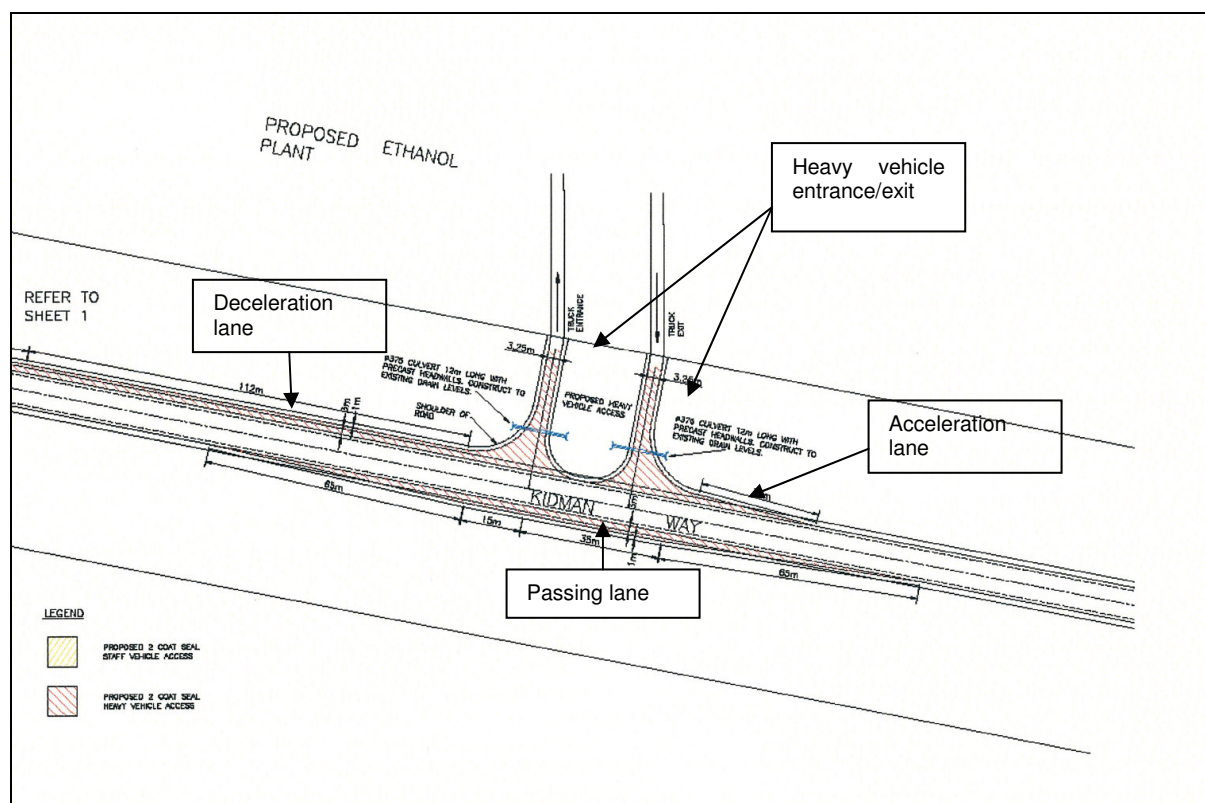


Figure 12: Heavy Vehicle Access

The Department is satisfied that Four Arrows has adequately addressed road traffic access and safety issues associated with the project. The Department considers that the measures proposed by Four Arrows and the recommended conditions of approval would ensure that the safety of the Kidman Way is not compromised.

Internal Roads and Parking

To minimise conflicts between heavy and passenger vehicles, staff and visitor access is limited to the administration buildings and visitor centre. The majority of internal roads would therefore be dedicated to heavy vehicles movements, however, management vehicles would also use these internal roads. To increase safety, Four Arrows has proposed a one-way system for heavy vehicle movements (and management vehicles) around the site (see Figure 14).

While heavy vehicle parking would be available adjacent to the grain, no details have been provided on the number of parking spaces for passenger vehicles. However, the Department considers that sufficient area is available on site for employees and visitor parking. Notwithstanding, the Department concurs with RTA that Four Arrows should be required to design and construct the internal road network and parking in accordance with the relevant Australian Standards. Additionally, to ensure that vehicles do not impact on nearby roads, the Department's recommended conditions prohibit any vehicles associated with the project from queuing or parking on local roads in the vicinity of the site.

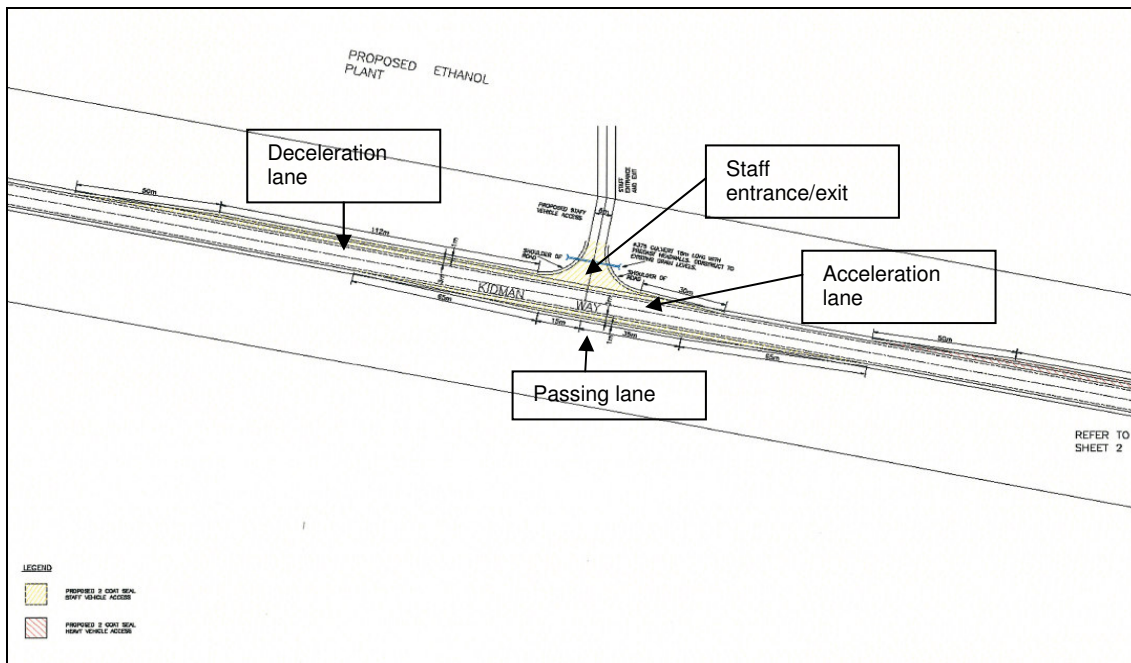


Figure 13: Staff Access

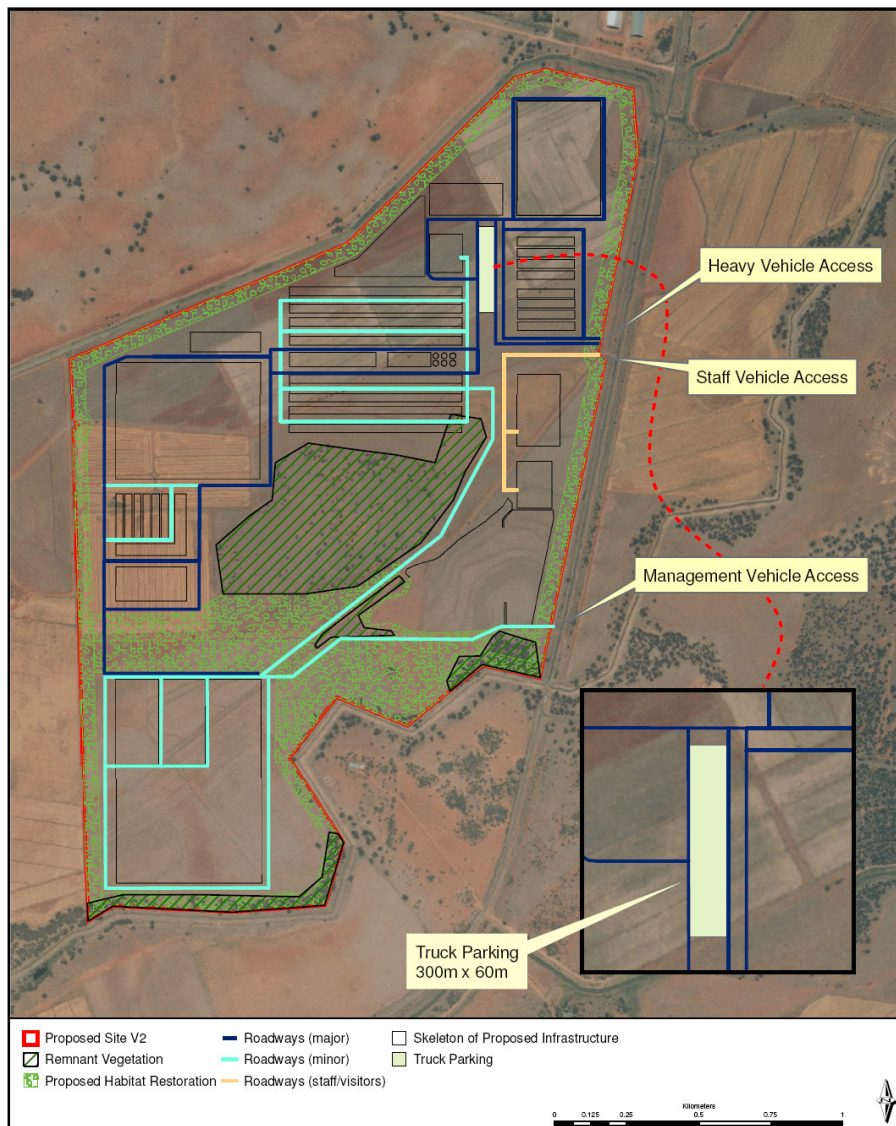


Figure 14: Internal Roads and Parking

4.6 Waste

Waste that would be generated by the project would include wet distillers grain, wastewater, solid waste from the dairy, oils, petrochemicals and parts from the workshop and general waste from the administration/visitor centre. The types and quantities of waste that would be generated by the project are detailed in Table 4.

Table 4: Types and Quantities of Waste

Component	Waste Streams	Quantity (per annum)	Comments
Ethanol plant	Carbon Dioxide	235,000 t	- Refer to Section 4.8. - All CO₂ to be emitted.
	Wet Distiller's Grain	~1.1 million t	~176,000 tonnes (88% moisture) to be used on site to feed cattle. Remaining 930,000 tonnes (80% moisture) to be sold and transported off-site.
	Wastewater	-	- Refer to section 4.3. - All wastewater from the ethanol production process would be recycled in the ethanol plant.
	Stormwater	up to 740ML	- Refer to section 4.3. - All stormwater would be directed to either the Category 1 or Category 2 water storage and would be re-used on site
Dairy	Manure	30,700 t	- Manure would be removed daily from the freestall sheds, prior to the sheds being flushed with water. - Manure would be removed monthly from the other cattle housing facilities (dry-pens, loafing areas etc). - Manure would be stored on site prior to being disposed of off-site to properties owned by Four Arrows, including "Tubbo".
	Wastewater	up to 3,100ML	- Refer to section 4.3. - Includes stormwater from roofed and paved areas as well as wastewater from the dairy. ~2,860ML re-used on site including dust control, irrigation of landscape areas, and flushing of freestall sheds.
	Carcasses of dead cattle.	610	- Carcasses to be buried on "Tubbo". - Four Arrows are also investigating the option of carcasses being disposed of at the "Barnawartha" biodiesel plant in Victoria.
Evaporation Basin	Tailings (salts, nutrients, manure)	~250t	- Management options include off-site disposal and decommissioning of the basin and replace it with a new evaporation basin. - Sufficient area is available on site should Four Arrows be required to construct a new evaporation basin.
Grain Storage	Damage grain	NA	The covering of grain would minimise the amount of grain damaged. Damaged grain would be transported to "Tubbo" for disposal.
Administrative areas	General waste	NA	- No details of how waste from this area would be disposed of. - Four Arrows would be required to ensure all waste is disposed of at an appropriate licensed facility.
Truck wash down	Oils, petrochemicals, parts, general waste	NA	- No details of how waste from this area would be disposed of. - Four Arrows would be required to ensure all waste is disposed of at an appropriate

Component	Waste Streams	Quantity (per annum)	Comments
			licensed facility.

NA – not available, ie not provided in the EA.

Of the waste products to be stored and disposed of, the key waste generated by the project includes wet distillers grain, manure and wastewater. The Department's assessment of the potential odour and groundwater impacts associated with the collection and storage of this waste on site is provided in section 4.1 and 4.3, respectively.

As detailed in the above table, Four Arrows proposes to utilise some of the wet distillers grain in the dairy facility as cattle feed, with the remainder to be sold. Four Arrows believes that sufficient demand is available from other industries (e.g., feedlots and the like) for the purchase of any excess wet distillers grain produced by the proposal. However, in the event that Four Arrows is unable to sell the wet distillers grain, it proposes to dispose of any surplus wet distillers grain to its other land holdings including "Tubbo" Station. Four Arrows also propose to dispose of other solid waste, including manure and carcasses, at "Tubbo" Station.

While Four Arrows has considerable land holdings within the region ("Tubbo" Station includes some 9,000ha of irrigation lands), the Department concurs with DECC and DWE that insufficient information has been provided to demonstrate that the proposed disposal areas can accommodate this waste. Therefore, the Department considers that Four Arrows should be required to seek further approvals for the off-site disposal of any solid waste (including manure, carcasses, and wet distillers grain) prior to the commencement of operations. In seeking approval for the disposal of solid waste, the Department recommends that Four Arrows be required to provide a soil and hydrogeological assessment of the waste utilisation area, a cropping and land management program and a soil, surface and/or groundwater monitoring program.

Additionally, the Department recommends that Four Arrows should be required to prepare a Waste Management Plan for the management and disposal of waste during construction and operation, including procedures to monitor waste, management measures for the re-use/recycling/disposal of the waste and contingency measures should the production of wet distillers grain exceed on site and off-site demand.

With these measures in place, the Department considers that potential impacts associated with waste generated by the project can be appropriately managed and minimised.

4.7 Greenhouse Gases

The most significant gases produced by the project are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). Carbon dioxide would be released as a waste product of the ethanol production process and in the generation of electrical energy used by the project. Methane would be released from animal digestive emissions and manure, while nitrous oxide would be released from ancillary development associated with the dairy, namely the production of feed for the cattle.

Four Arrows estimated emissions from the project using the CSIRO Greenhouse Abatement Calculator. Four Arrows argue that as the ethanol produced would be displacing petrol, any emission generated by the project would be off-set. Four Arrows estimate that the project would have a net saving of 2,800t CO₂e per year.

DECC raised concerns that limited information was provided in the EA and it was therefore unclear whether the assessment provided an accurate account of the full life-cycle greenhouse gas emissions. The DECC also noted that Four Arrows proposed to capture CO₂ produced as a result of the ethanol process, and required further information on the practicality and commercial viability of this measure.

Four Arrows argued that a full life cycle analysis was undertaken and that in accordance with the *AGO Factors and Methods Workbook* the assessment included emissions from scopes 1, 2 and 3, which covers:

- Scope 1 – direct emissions from sources within the boundary of the site;

- Scope 2 – indirect emissions from consumption of purchased electricity, steam or heat, for example, the emissions from combustion of fuel to produce the electricity, steam or heat;
- Scope 3 – other indirect emissions, i.e. upstream emissions from extraction and production of fossil fuels.

However, Four Arrows acknowledged that the initial GHG assessment contained a number of errors and estimated that the project would result in GHG emissions of 53,560t CO₂e per year. The Department notes that GHG emissions generated from an ethanol plant relate to the feedstock used and the type of energy source. As the detailed design of the ethanol facility has not been finalised, it is therefore possible that GHG emissions could change slightly from those predicted once operational due to the type of feedstock and energy source used.

The Department does not agree with Four Arrows argument that as the ethanol produced would be displacing petrol, any emission generated by the project would be off-set. Firstly, it is unlikely that production of ethanol would result in a decrease in the production of petrol. Secondly, research commissioned by the Australian Greenhouse Office (AGO) has indicated that the GHG emissions associated with premium unleaded petrol and E10 fuel (i.e., blend of 10% ethanol with 90% unleaded petrol) are similar (see Figure 15, and available at: <http://www.greenhouse.gov.au/transport/comparison/pubs/comparison.pdf>).

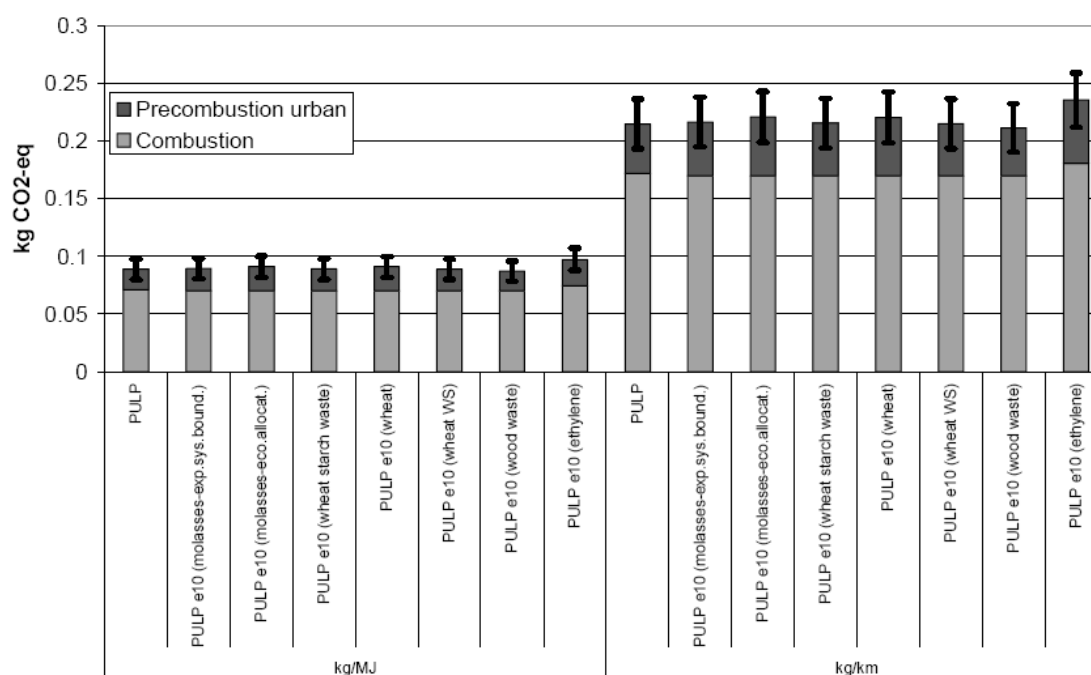


Figure 15: Comparison of GHG Emission for Premium Unleaded Petrol and E10 Fuels (Beer et al., undated)

The DECC and Department remain concerned that the GHG assessment does not provide an accurate account of the impact of the project. A review of the model used by Four Arrows has been undertaken. Based on a worst case scenario (i.e., use of wheat alone as a feed stock. Other feed stock, such as sorghum, produce lower emissions) emissions that would be produced from the various activities associated with the project is provided in the following table.

Component	Source	GHG Emissions (tCO ₂ e) per Annum
Ethanol Plant	Fermentation and Distillation	
	- Scope 1	184,200
	- Scope 2	241,200
	- Scope 3*	16,500
Dairy	Digestive Emissions	35,500
	Manure Emissions	72,200
	Feed Supply to Cattle	
	- Absorption by plants	-5,900
	- Production	64,300
Total		607,970

*excludes the burning of the ethanol as a fuel source

The Department notes that it appears that this model does not include emissions associated with the production and transport of the denaturant (i.e., petrol), and the burning of ethanol as a fuel source. The modelling undertaken by Four Arrows also assumes that 80% of energy would be from coal derived energy and 20% as natural gas. However, natural gas is currently not available at the site. While Four Arrows is investigating options to connect the site to gas, it is unclear whether gas connection is a feasible option.

For assessment purposes, the downstream impacts associated with the burning of fuel is required to be considered. However, the burning of fuel is in fact a Scope 1 emission for the end user. As a scope 1 emission, the burning of the 300ML of ethanol as a fuel source would equate to GHG emissions of 630,000 tCO₂e a year. This is based on an emission factor of 2.1 as detailed in the *AGO Factors and Methods Workbook*, with the ethanol component of the blended fuel making up 10% of the total emissions (i.e., emission factor is 2.1 t CO₂-e/KL for E10 fuel. 300ML of ethanol would be mixed with 2700ML of petrol to make the E10 fuel. Therefore, $2.1 \times 3,000,000\text{KL} \times 0.1 = 630,000 \text{ tCO}_2\text{e a year}$).

Total greenhouse gas emissions in NSW in 2005 were 158.2 million tonnes/year CO₂-e, therefore, operation of the proposed facility would represents approximately 0.78% of the total NSW emissions annually. In the context of global emissions, the project is estimated to contribute 0.0025% of global emissions. Therefore, the impacts of the project are insignificant in a global context.

Additionally, fuel is essential for the operation of the majority of industries in NSW and in fact every day life. Additionally, the demand for fuel, whether petroleum or ethanol based, is likely to continue to increase. The Department therefore considers that the scope 3 emissions associated with project from the burning of the ethanol as a fuel source would be generated irrespective of whether the project proceeds.

Four Arrows has committed to off-setting all the GHG emissions generated by the project, including emissions from the production of feedstock, transport of feedstocks, and the transport of ethanol and waste products, as well as direct emissions from the operation of the plant. This commitment is supported by both the DECC and the Department. However, the Department recommends that Four Arrows be required to monitor the GHG associated with the project and report on GHG emissions.

The project would be a large user of energy, therefore to reduce energy consumption the Department recommends that Four Arrows should be required to develop an Energy Savings Action Plan in accordance with DWE's *Guidelines for Energy Savings Action Plan*. The development of this Action Plan would also ensure that accurate energy data is produced, which would assist in determining the level of off-sets that would required.

The Department considers this level of action appropriate to the scale of emissions generated by the project and given its contribution to establishing an alternative fuel market in Australia.

4.8 Other

Other issues raised during the assessment process and the Department's consideration of the issues are summarised in Table 5 below.

Table 5: Summary of Other Impacts

Issue	Comment
Noise	Four Arrows has undertaken a noise assessment in accordance with relevant DECC guidelines and policies. The assessment indicates that the project would meet relevant criteria for construction, operation and traffic noise at all private residential receivers and the nearby industrial site (Welsh Rice Sheds). Four Arrows proposes a number of measure to minimise any potential impacts, including enclosing plant and equipment (e.g., the hammermill) and restrict heavy vehicles movements between the hours of 7:00am – 10:00pm, therefore, negating any impacts at night. With these measures in place, the Department considers that potential noise impacts would be minimal. Notwithstanding, to ensure the amenity of nearby private residents is protected, the Department recommends: • project specific noise criteria for the construction and operation phase; and • that construction hours should be limited to 7am to 6pm Monday to Friday, and 8am, 1pm on Saturdays, with no construction activities to be undertaken on Sundays or Public Holidays.
Flora and Fauna	The site is highly modified and degraded as a result of agricultural practices, with vegetation on site consisting of pasture species, weeds and some remnant vegetation. Floral communities identified on site consist of Acacia, Callitris, Black Box and agricultural communities. While the vegetation on site is degraded and fragmented, Four Arrows considers that would provide forage habitat for fauna and a link to other remnant vegetation in the area and the Boona and Brett's State Forest. No threatened fauna species, as listed under the <i>Threatened Species Conservation Act 1995</i>, were recorded on the site. However, the threatened Grey Crown Babbler was recorded in roadside vegetation approximately 3km from the site. As the majority of the site is presently cleared, limited clearing would occur during the construction of the facility. Therefore, the impacts of the proposal on native vegetation on the site would be limited. Additionally, Four Arrows proposes to protect and enhance these areas through planting and implementing measures such as the management of feral pests (rabbits) and weeds. The Department considers that these measure are appropriate and is satisfied that appropriate consideration has been given to potential flora and fauna impacts of the project.
Visual	The site is generally flat and has been cleared for agricultural purposes. The buildings and structures associated with the project would be visible from the Kidman Way. However, the majority of structures (i.e., sheds, grain storage, water storages) that would be built on site would be consistent with surrounding agricultural structures. Four Arrows propose to establish a 50m wide landscaped area around the perimeter of the site and to design outdoor lighting in accordance with relevant Australian Standards to minimise visual impacts of the project. The Department considers that the measures proposed by Four Arrows are appropriate and would reduce the visual impact of the project. However, the design of the facility has not been finalised, therefore, the Department recommends that Four Arrows should be required to submit detailed designs and external finishes of all buildings, structures, fencing and signage on site, for approval prior to construction. Additionally, the Department recommends that all lighting is designed in accordance with Australian Standards.
Animal Welfare and Disease Management	Four Arrows is committed to protecting and enhancing the welfare of cattle as the condition of the cattle relates to the quality and quantity of milk produced. Measures proposed by Four Arrows to preserve animal welfare include: • minimising dust through regular cleaning of cattle areas, landscaping cleaning internal roads, and setting speed limits for on-site traffic; • provision of loafing areas, regular feeding of cattle; • use of misting sprays during elevated temperatures to cool the cattle; and • engaging a nutritionist. Additionally, to minimise the risk of disease Four Arrows proposes to: • base standard operating procedures for the dairy on Hazards analysis Critical Control Point (HACCP) methods. HACCP methods. HACCP is an internationally recognised method used to identify and managed risks in the food industry;

	- engage a veterinarian; - provide a sick bay to isolate diseased cattle; and - dispose of dead cattle off-site. To ensure the health and wellbeing of cattle is maintained, the Department recommends that Four Arrows should be required to prepare and implement an Animal Care Statement to address all issues associated with the welfare of the cattle, particularly health, housing, watering, feeding and handling. The Statement should be prepared in accordance with the relevant codes of practice relating to cattle, including the <i>Australian Model Code of Practice for the Welfare of Animals – Cattle</i> and the <i>Australian Model Code of Practice for the Welfare of Animals – Land transport of cattle</i>. The Statement should also be prepared in consultation with Murrumbidgee Shire Council, the RSPCA and DPI. In addition, the Department recommends that Four Arrows should be required to prepare an Emergency Disposal and Bio-security Protocol to address all issues associated with biosecurity and the potential outbreak for disease. The Department considers that the mitigation measures proposed by Four Arrows and the recommended conditions of approval would ensure the welfare of animals is maintained and suitable procures would be in place to minimise and manage disease outbreaks.
Fly Management	A submission from the general public raised concerns that a control plan to manage flies had not been included in the EA, however, acknowledged that measures can be put in place to control flies. Four Arrows has proposed a number of measures to manage and control any potential increase in flies. These measures include: - minimising odours; - regular cleaning of cattle areas to remove organic matter such as manure and rotting feed; - management of moisture including design of cattle areas to ensure appropriate drainage occurs, regular maintenance and repair - chemical control including the installation of fly traps, targeted spraying and the use of electrical equipment to attract and destroy flies. The Department considers that procedures proposed by Four Arrows would minimise and control flies at the facility.
Aboriginal Heritage	A targeted survey of the site identified three Aboriginal objects – two scarred trees were identified within the Black Box community located near the south east corner of the site and another scarred tree was identified on the sand hill located at the centre of the site. Limited development would occur at these locations, therefore, the project is unlikely to impact on these items. Additionally, Four Arrows proposes to engage an indigenous officer/consultant to monitor existing items and to verify any new sites/items that may be identified. With these measures in place the Department is satisfied that impacts on Aboriginal sites/items would be minimised. Notwithstanding, the recommended conditions would require Four Arrows to seek approval from the Director-General before destroying and removing any Aboriginal objects from the site.

5. RECOMMENDED CONDITIONS

The Department has prepared recommended conditions of approval for the project (see Appendix B), and summarised these conditions in Appendix A. These conditions are required to:

- prevent, minimise, and/or offset adverse impacts of the project;
- set standards and performance measures for acceptable environmental performance;
- ensure regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.

The Department has provided the draft conditions of approval for the project to relevant government authorities, including DECC, DWE, RTA and Council, for comment, and has incorporated their comments into the conditions of approval where appropriate.

Four Arrows has reviewed and accepts the recommended conditions.

6. CONCLUSION

The Department has assessed the EA, submissions on the project, and Four Arrow's response to submissions in accordance with the requirements of Clause 8B of the *Environmental Planning and Assessment Regulation 2000*.

The key issues associated with the project include odour, groundwater contamination, hazards, and waste management. The Department has assessed the key issues and considered the project with regard to the objects of the EP&A Act, and the principles of ecologically sustainable development. The Department is satisfied that with appropriate design and management the project would not result in unacceptable impacts on the surrounding environment. A number of conditions have been recommended to ensure that impacts are minimised and environmental criteria are met.

The proposed ethanol plant and dairy is surrounded by agricultural land and is in close proximity to key infrastructure including a major transport corridors (Kidman Way), electricity and water supplies. Additionally, the measures proposed by Four Arrows and the recommended conditions of approval would ensure the amenity of nearby residents is protected. The Department is therefore satisfied that the site is suitable for the proposed project.

The Department considers that the project is in the public interest as it would contribute to establishing a market for ethanol blended fuels in NSW and would provide a renewable fuel source to meet growing fuel demands. The project would also contribute to milk supplies to meet local and export demands.

In addition, the project would generate significant socio-economic benefits for the Murrumbidgee region, including an initial capital investment value of about \$100 million, and the generation of up to 100 jobs during construction and operation.

Subsequently, the Department recommends that the project should be approved, subject to conditions of approval.

7. RECOMMENDATION

It is RECOMMENDED that the Minister:

- consider the findings and recommendations of this report;
- approve the project application, subject to conditions, under section 75J of the *Environmental Planning and Assessment Act 1979*; and
- sign the attached project approval (see Appendix B).

David Kitto
Director
Major Development Assessment

Chris Wilson
Executive Director
Major Project Assessment

Sam Haddad
Director-General

APPENDIX A – SUMMARY OF CONDITIONS OF APPROVAL

<i>Aspect</i>	<i>Condition</i>	<i>Requirement</i>
Schedule 2: Administrative Conditions		
Limits of approval	5	Requirement to submit detailed plans for all components of the project, prior to construction.
	6	Requirement to seek further approval for the disposal of any solid waste.
	7	Requirement to commission an independent audit once the dairy is stocked with 9,000 head of cattle to demonstrate that an increase to full capacity would not cause offensive odour.
	8	Limits production of ethanol on site to 3000ML per year.
Schedule 3: Specific Environmental Conditions		
Dairy	1 - 3	Requirement to design, construct, operate and maintain the dairy according to relevant guidelines, code of practices and best management practices.
	2	
	3	
Solid Waste and Water Management Systems	4	Design requirements for the Solid Waste and Water Management System.
Odour	5	Requirement to not cause or permit the emission of offensive odours
Air Quality Criteria	6	Requirement that emissions do not exceed the requirements of the EPL and/or limits detailed in the Ethanol Plant Verification Report.
	7	Air quality assessment criteria for total suspended particulate matter, particulate matter, and deposited dust.
Air Quality Management	8	Requirement to prepare and implement an Air Quality Management Plan.
	9	Requirement to prepare an Odour Management Plan including an Ethanol Plant Verification Report
	10	Details to be included in the Odour Management Plan.
Meteorological Monitoring	11	Requirement to install meteorological station on site.
Water Discharges	12	Requirement to only discharge water in accordance with the EPL or in accordance with Section 120 of the POEO Act 1997.
Water Management	13	Requirement to store wastewater in approved areas and there is to be no irrigation of wastewater on the project site.
	14	Requirement to prepare a Water Management Plan to the satisfaction of the Director-General, DECC and DWE, including the detailed design of all water storages, wastewater storages, cattle housing facilities and waste storage areas.
Site Water Balance	15	Requirements for details to be included in the Site Water Balance including measures to minimise water use.
Erosion and Sediment Control	16	Requirement to install and maintain sediment and erosion controls on site prior to construction.
Water Monitoring Program	17	Details to be included in the Groundwater monitoring program.
Waste Management	18	Requirement not to receive waste at the site or to dispose of any waste at the site, unless permitted by the EPL.
	19	Requirement to prepare a Waste Management Plan, including contingencies for the disposal of wet distiller grains should production exceed on and off site demand.
Noise	20	Requirement to comply with project specific noise limits.
	21	Construction and operation hours for the project.
Safety and Risk Management	22	Requirement to prepare a Fire Safety Study, Hazard and Operability Study, and a Final Hazard Analysis prior to construction.
Pre-commissioning	23	Requirement to prepare a report detailing transport arrangements for hazardous materials, an Emergency Plan and a Safety Management System prior to the commencement of operation.
	24	Requirement to submit a report detailing compliance with conditions 24 and 25.

Post-commissioning	25	Requirement to submit a report detailing compliance with conditions 11 and 13.
Dangerous Goods	26	Requirement to detail transport arrangements for hazardous materials, an Emergency Plan and Safety Management System prior to operations.
Traffic and Transport		Requirement to design the intersection of the site with the Kidman Way in accordance with RTA's requirements.
		Requirement to design the internal roads and parking in accordance with Australian Standards and to the satisfaction of Council.
		Requirement to prepare a report on the impact of project on the intersection of the Willbriggie Rail Siding and the Kidman Way and to seek approval for any upgrades required from Council and/or the RTA.
		Requirement to prepare a Transport Code of Conduct.
Greenhouse Gas Emissions		Requirement to prepare a Energy Savings Action Plan
		Requirement to implement a Greenhouse Gas Off-Set Strategy
Visual		Requirement to submit detailed designs of all structures, including external finishes, signage and fencing for approval to the Director-General prior to installing these structures on site.
		Requirement to protect and maintain landscaping and to minimise lighting impacts of the project.
<i>Schedule 4: Environmental Management, Monitoring , Auditing and Reporting</i>		
Environmental Management Strategy		Requirement to prepare an Environmental Management Strategy for the project
Environmental Monitoring Program		Requirement to consolidate all monitoring requirements in Schedule 3 into a Environmental Monitoring Program
Incident Reporting		Requirement to report incidents
Annual Report		Requirement to condition an Annual Environmental Management Report
Independent Environmental Audit		Requirement to commission regular independent environmental audits of the project including an odour audit and hazard audit.
Access to information		Requirement to publicly report environmental management plans/programs/strategies, and monitoring results.

APPENDIX B – CONDITIONS OF APPROVAL

APPENDIX C – CONSIDERATION OF ENVIRONMENTAL PLANNING INSTRUMENTS

State Environmental Planning Policy No. 11

State Environmental Planning Policy No. 11 – Traffic Generating Developments applies to the site. SEPP 11 aims to ensure that the RTA is made aware of and allowed to comment on proposals for developments listed in Schedules 1 and 2 of SEPP 11. The proposed development is a development listed under Schedule 1 and 2 of SEPP 11. SEPP 11 requires the Department to forward a copy of the development application to the RTA within 7 days of receipt. A copy of the development application was provided to the RTA on 30 October 2006. The RTA provided a response on the proposed development during the exhibition period and its requirements have been incorporated into the recommended conditions of approval. Therefore under clause 7(5) of SEPP 11, the Minister is able to determine the application.

State Environmental Planning Policy No.30

The aims of *State Environmental Planning Policy No. 30 – Intensive Agriculture* (SEPP 30) are:

- to require development consent for cattle feedlots with the capacity to accommodate 50 or more head of cattle, or piggeries with a capacity of 200 or more pigs;
- to provide for public participation in the consideration of development applications for feedlots or piggeries of this size; and
- to require the consent authority to ensure that the potential impacts of the proposal are fully assessed and effective planning controls are in place for these types of development.

While dairies are not covered by this SEPP, the operation of some of the components of the dairy (i.e., dry pen) would be similar to that of feedlot, and as such the provisions of SEPP 30 have been considered.

The Department considers that the proposal is consistent with the aims and objectives of this Policy and is generally consistent with the heads of consideration specified under clause 7 of the Policy which relate to appropriate siting and management of the proposal.

State Environmental Planning Policy No.33

State Environmental Planning Policy No. 33 – Hazardous and Offensive Development (SEPP 33) applies to the site. SEPP 33 aims to identify proposed developments with the potential for significant off-site impacts, in terms of risk and/ or offence (odour, noise etc). A development is defined as potentially hazardous and/ or potentially offensive if, without mitigating measures in place, the development would have a significant risk and/ or offence impact on off-site receptors. The proposed project constitutes hazardous industry under SEPP 33. A preliminary hazards analysis undertaken by Four Arrows indicated that the proposal would comply with the relevant guidelines for hazard and risk and the Department is satisfied with this analysis.

SEPP No.55 – Remediation of Land

The Department is satisfied that the land subject to the project application does not have a significant risk of contamination given its historical landuse, and that the proposal is generally consistent with the aims, objectives, and requirements of SEPP 55.

Murrumbidgee Local Environmental Plan 1994

Murrumbidgee Local Environmental Plan 1994 (LEP) provides development controls for development in the Murrumbidgee local government area. Relevant provisions that apply to the project and the Department's assessment of the project against these provisions is detailed below. The Department is satisfied that the project generally complies with the aims and objectives of the LEP.

Provision	Comment
Clause 10 list those matters that must be considered in relation to development on rural lands (i.e., within Zone No 1 (a), 1 (c) or 1 (d))	The Department has considered the requirements of clause 10 in its assessment of the proposal. The Department considers that the project is unlikely to impact on those matters listed in clause 10 and the Department is satisfied that with appropriate design

	and management the project would not result in unacceptable impacts on the surrounding environment
Under Clause 20 designated development must be advertised	Complies, see Section 2.3.
Clause 22 details those matters that must be considered when determining development on land that has frontage to an arterial road. Under this clause certain types of development which are restricted/prohibited along arterial roads.	The project site has frontage to and would be accessed from the Kidman Way, which is an arterial road. The Department considers that this clause does not apply to the project as development for the purposes of “intensive livestock keeping establishments” (i.e., dairy) and “rural industries” (i.e., ethanol plant) is not restricted along arterial roads. Notwithstanding, the Department considers that Four Arrows has adequately assessed the potential impacts associated with traffic generated by the project and is satisfied that the project would have minimal impact on the safety and efficiency of the Kidman Way. Additionally, the Department and RTA consider that access arrangements from the Kidman Way are appropriate.

APPENDIX D – RESPONSES TO SUBMISSIONS AND ADDITIONAL INFORMATION

APPENDIX E – SUBMISSIONS

APPENDIX F – ENVIRONMENTAL ASSESSMENT
