Four Arrows Rural Group

Introductory Environmental Report for a proposed integrated Ethanol Plant and Intensive Dairy Project

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1.0 INTRODUCTION

1.1 Purpose of Report

Four Arrows Limited, one branch of the Four Arrows organisation, proposed the development of an ethanol plant and intensive dairy located in the Murrumbidgee Shire between the towns of Coleambally and Darlington Point, NSW.

Booth Associates have been engaged by Rodney Price, Chairman of Four Arrows Limited to undertake investigations in the form of an Environmental Assessment (EA) for the aforementioned developments. This report is prepared for those agencies and other appropriate stakeholders invited to a Planning Focus Meeting to

- provide background on the proposed development and to
- allow relevant agencies and stakeholders an opportunity to develop their thoughts as to the potential impacts of the development and to
- provide considered details on the heads of consideration for incorporation into the EA.

This introductory project outline presents project specific information in a generic sense and should in no way considered an absolute document in relation to the heads of consideration that will be investigated in the preparation of the EA.

The project is expected to have infrastructural and setup costs nearing $100Million, and therefore meets the provisions of State Environmental Planning Policy (Major Projects). In meeting the provisions of SEPP (Major Projects), the proposed developments require the approval of the Minister of the Department of Planning as per Schedule 1 Part 3a of the Act (see Annexure 1).

2.0 PLANNING PROCESS

2.1 Legislative Requirements

The Environmental Planning and Assessment Act 2000 *(EP&A Act2000)* governs the assessment of development and land use proposals in New South Wales and defines the process for granting of approval. Part 4 of the Act identifies land use proposals that require development consent in accordance with an environmental planning instrument (eg local environmental plan, regional environmental plan or state environmental planning policy). These provisions require the project proponent to lodge a development application (DA) supported by an assessment of the environmental impacts of the development (Environmental Assessment - EA) with the relevant consent authority. In effect the EA supports the project. The proposed ethanol plant and intensive dairy are subject to the provisions of, but not limited, to the following environmental planning instruments:

- Murrumbidgee Local and Environmental Plan (1994)
  - Schedule 1 - Heritage Items.
  - Schedule 2 - development is that which must be advertised;
    - intensive livestock keeping;
    - Industries (other than rural industries) in zone No. 1 (a) or 1 (c).
  - Schedule 3 - restricted development along arterial roads

- State Environmental Planning Policy No. 30 (SEPP 30).
  - Requires development consent for cattle feedlots having a capacity of 50 or more cattle or piggeries having a capacity of 200 or more pigs
  -
- State Environmental Planning Policy No. 33 (SEPP 33).
  - Hazardous and Offensive Development

    - *potentially hazardous industry* means a development for the purposes of any industry which, if the development were to operate without employing any measures (including, for example, isolation from existing or likely future development on other land) to reduce or minimise its impact in the locality or on the existing or likely future development on other land, would pose a significant risk in relation to the locality:

      (a) to human health, life or property, or
      (b) to the biophysical environment,
  - and includes a hazardous industry and a hazardous storage establishment

- State Environmental Planning Policy No. 34 (SEPP 34)
  - repealed by Repealed by SEPP - State Significant Development

- State Environmental Planning Policy No. 46 (SEPP 46)
  - Protection and Management of Native Vegetation. This SEPP was repealed by the Native Vegetation Conservation Act 1997 now replaced by the Native Vegetation Act (2003).

- State Environmental Planning Policy (Major Projects)
  - Formerly referred to as SEPP (State Significant Development)

Furthermore, if the development is described in Part 1 of Schedule 3 of the Environmental Planning and Assessment Act (1974) the project becomes classified as “Major Project” (see Annexure 1a). A Major Project development application needs to be accompanied by an Environmental Assessment (EA) the form of which is specified in Schedule 2 of the Regulations.

The proposed developments trigger SEPP (Major Projects) and thus require the approval of the Minister of the Department of Planning as per Division 1, Part 3a of the Act (see Annexure 1b)

Consultation with relevant stakeholders is required in the preparation of an EA and in support of a development application for the Major Projects identified in this project. The consultation is required to take the form of a planning focus meeting. This meeting provides relevant departments, agencies and appropriate stakeholders an opportunity to both:

- Have the proponent describe the proposal to the agencies and stakeholders.

- Be afforded the right to provide written comment or raise issues in relation to the anticipated content of the EA.

It is also part of the EA process that broader community consultation is able to be provided by direct contact with the consultant team, at a progress review meeting if deemed appropriate and finally, during a period of formal public display after the EA has been prepared. Where relevant, concerns from any interested party will be incorporated into the EA.

3.0 Site Details

3.1 Location

The proposed development is to be established in the Murrumbidgee Shire, on the western side of the Kidman Highway, approximately 7km north of the township of Coleambally, and approximately 14km south of the township of Darlington Point. The site is commonly recognised or referred to as Coleambally Irrigation farm numbers 25 and 26, which in their entirety encompass an area of approximately 256ha (though the footprint for the proposed development does not utilise this entire area), and is directly south of the Walsh Rice Sheds (graphically represented in Map 1.0 attached).

Map 2.0 provides greater detail as to the features of the proposed site, and identification of the nearest potential noise/dust/odour/disturbance receptors to the site (see Section 4.1).

3.2 Project History

The Four Arrows Group of companies has substantial investments in rural properties with three (3) key aggregations near Wagga Wagga, Darlington Point and Hay in the Riverina region of NSW. These rural holdings are part of a rapidly growing and diverse but closely integrated investment portfolio in the primary and associated value adding sectors. The current enterprises include beef, sheep, dryland cropping, irrigated cropping, horticulture and dairying with the focus on achieving business critical mass and operational efficiencies for each individual enterprise as well as for the overall business. A major focus of the proprietors is to manage towards well defined long term strategic goals which are consistent with an on-going assessment of the future trends in consumer demands and best practice natural resource management.

The concept of establishing an ethanol plant is both timely and consistent with the fact that fossil fuels are finite resources. The relatively recent and significant price rises for both oil and petroleum products are but an impetus to the need to seek alternative and environmentally responsible fuel sources. Ethanol is currently being promoted as a worthy substitute for petroleum products by governments and environmental interest groups. Whilst the move to ethanol fuels will evolve over time, the level of interest in the product is increasing and usage could be expected to increase as blends with current fuel products.

The inclusion of an intensive free-stall dairy in the overall project reflects the need to effectively and responsibly manage the by-products from the ethanol plant. Intensive dairies are integral components of ethanol plants in many other countries where the use of ethanol blend fuels are more advanced.

The selection of the proposed project site has been based upon the following broad criteria;

- Four Arrows already owns the lands assigned to the project and has further substantial holdings in the immediate vicinity for optimum integration of management and operations, especially dairy.

- The other Four Arrows rural aggregations at Wagga Wagga and Hay are to the east and west and linked by their virtual frontage to the Sturt Highway for rapid and cost effective supply of input products to the proposed ethanol plant.

- The proposed project site is situated between the extensive, highly productive and now privatised irrigation districts of Coleambally Irrigation Area and the Murrumbidgee Irrigation Area. The Murray Irrigation Areas and Districts are also relatively close. Surrounding the irrigation districts are large private irrigation developments and extensive tracts of dryland farming areas for supply of input products. The mix of irrigation and dryland grain products will provide relative surety of grain supplies.

- Discussions with grain traders have further enhanced the concept of relative reliability of grain supplies with rail freight to the Wilbriggie siding from existing grain storages in southern and central NSW and from northern Victoria.

- The potential to lease and or contract store grain within existing and nearby private and kindred industry grain storage facilities.

- All weather road access is already available with the Kidman Way passing the front gate of the proposed lands. Electrical power and water are already available to the site and natural gas is nearby at Griffith. Other necessary services are available from the nearby communities of Griffith, Leeton, Coleambally and Darlington Point.

- The proponent is of the opinion that the proposed site is environmentally sound and that with appropriate attention to best practice environmental management, project sustainability will be achieved and enhanced with an on-going programme of continual performance monitoring and review.

Of particular note, the proponent is firmly of the opinion that the proposed development will enhance the social, economic and environmental well-being of the region and in doing so Four Arrows will be protecting the substantial investments the Group already has in the area. The regional benefits will include at least the following;

- Cash flow to keep local families and businesses intact and thereby foster the regional retention of professionals and other skilled people for employment in product supply, service, management, operational and marketing sectors.

- Encouraging the retention of water and foster the inflow of people resources in the region which then fosters the best practice management of these and other kindred resources.

Four Arrows senior management have determined that the proposed development with a capacity to produce some 275,000,000 litres of ethanol per year is of that scale necessary to achieve the optimal commercial critical mass and operational efficiencies required for long term sustainability. A lesser scale risks the loss of those efficiencies and a consequent marginal unit cost which is too high to be competitive in the longer term.

Finally, the proposed site will have room for expansion in later years if that is deemed both commercially and environmentally sound at that time.

3.3 Soils and Topography

The region around Coleambally has quaternary age landform features typical of the Riverina which are primarily composed of flat alluvial and lacustrine deposits of gravel, sand, silt and clay with areas of flat to gently undulating plains of red and red-brown clayey sands and loams, which are largely aeolian.

The general topography of the proposed development areas consists of flat, open, sparsely treed plains interspersed with alternating linear depression lines, higher ridges and aeolian sandhills.

The soils of the MIA and CIA have been classified into five broad soil groups by Horbuckle and Christen 1999, as follows:

- Clays, which were further divided into self mulching and hard setting clays.
- Red-brown earths, which were further divided into four sub-plasticity classes.
- Transitional red brown earths.
- Sands over clay (solodized solonetz)
- Deep sandy soils.

Subject to investigations for the EA, the proposed site comprises essentially clay soils.

3.4 Groundwater

Groundwater records for the area, include but are not limited to records on groundwater levels, piezometer readings, salinity and other various quality parameters. Other more technical data on hydrogeological parameters are available from a range of sources and agencies with the most recent investigations and performance monitoring being documented by Coleambally Irrigation Co-operative Limited as part of their Land and Water Management Plan.

These records will be collected, collated and analysed, and where appropriate, added to in the preparation of the EA.

3.5 Climate

The proposed development is situated just on the eastern extremity of the semi arid pastoral zone. No official rainfall stations are located in the vicinity of the proposed project and thus an average of three nearby stations provides a practical guide.

The rainfall is essentially winter effective even though the mean climatic data for the regional centres of Griffith, Hay, Deniliquin and Jerilderie suggests a relatively uniform distribution with a slight winter prominence. Rainfall is most reliable during the months of July and August and most variable during the January to March quarter. The June to September period is generally the most favourable for plant growth due to the high winter rainfall and low evaporation. The wettest months are June and October and the driest months November and February (Table 1).

Summer rains tend to be from cumuliform cloud and as a consequence events are erratic and tend to be variable across the landscape. They usually consist of relatively high intensity short duration events with the averages constructed of relative extremes. This absence of definable rain events results in summer days being hot and dry.

Winter rains tend to come from predominantly stratiform clouds which yield relatively low intensity and longer duration events. Winter rains are substantially more effective because of the lower evaporation during that period. The seasons are best described as winter dominant or Mediterranean in nature. This winter rainfall pattern results in winter days being cool to mild.

Table 1: Average rainfall data for official gauging stations surrounding the proposed development (mm/month).

Station	Yrs	Month												Total
		J	F	M	A	M	J	J	A	S	O	N	D	
Griffith	37	36	26	38	31	40	34	35	38	36	41	31	33	419
Hay	106	27	28	30	30	36	36	31	33	32	36	25	27	368
Deniliquin	134	29	27	32	32	40	41	35	37	39	40	28	29	408
Jerilderie	106	29	24	30	30	40	40	34	38	35	39	28	30	398
Total		85	79	92	92	117	118	100	108	105	115	81	86	1593
Average		**28**	**26**	**31**	**31**	**39**	**39**	**33**	**36**	**35**	**38**	**27**	**29**	**398**

Source: Bureau of Meteorology

The nearest official Class A pan evaporation stations are located at Griffith and the Deniliquin Post Office, with readings as follows (Table 2):

Table 2: Average evaporation data for nearby available stations. (mm/month).

Station	Yrs	Month												Total
		J	F	M	A	M	J	J	A	S	O	N	D	
Griffith	23	267	230	186	111	65	42	50	72	105	161	216	273	1778
Deniliquin	16	282	244	198	111	59	36	40	59	93	155	219	270	1766
Total		549	474	384	222	124	78	90	131	198	316	435	543	3544
Average		**274**	**237**	**192**	**111**	**62**	**39**	**45**	**65**	**99**	**158**	**218**	**272**	**1772**

Source: Bureau of Meteorology

Evaporation is highest in December and January with averages around 270mm/month, decreasing to 43 and 48 mm/month respectively for June and July (Table 2). Total annual evaporation is around 1770 mm.

In only June and July does the average rainfall almost match the average evaporative demand (Table 3). That is in the so-called average year; significantly effective rain is only likely to occur in June, July and August. In the remaining months the effectiveness of rain is highly dependent upon the particular event.

Table 3: 1:10 Wet, 1:10 Dry and average monthly rainfall for the area surrounding the proposed development.

RAINFALL	Month												
	J	F	M	A	M	J	J	A	S	O	N	D	total mm/yr
average yr	27.3	27.8	38.9	28.7	36.1	36.5	30.8	32.6	31.8	35.9	24.6	26.0	367.0
1:10 dry yr	16.4	16.7	17.4	17.3	21.7	21.9	18.5	19.6	19.1	21.6	14.8	15.8	220.7
1:10 wet yr	38.3	39.0	40.6	40.3	50.7	51.2	43.2	45.8	44.6	50.4	34.5	36.5	515.1

Source: Bureau of Meteorology

Winds generally increase in strength during the spring, peaking around October/November before falling away to a low in or around April/May.

Topography does not exert a strong influence on the climate of the region, except for local restrictions to and modifications of air flow.

Table 4: Minimum, Maximum and Average daily temperatures at Hay.

Descriptor	Month												Annual Average
	J	F	M	A	M	J	J	A	S	O	N	D	
Daily max °C	32.9	32.5	29.2	24.0	19.3	15.7	15.1	17.2	20.6	24.5	28.4	31.2	24.2
Daily min °C	16.4	16.3	13.7	9.9	6.7	4.5	3.4	4.5	6.6	9.4	12.4	14.8	9.9
Mean daily °C	24.7	24.4	21.5	17.0	13.0	10.1	9.3	10.9	13.6	17.0	20.4	23.0	17.1

Source: Bureau of Meteorology

Table 4 shows the daily maximum, minimum and average temperatures for the region west of the proposed development. June and July are the coldest and January and February the hottest. The diurnal contrast is one of hot days and cool nights in summer, and warm days and cold nights in winter.

The net effect of the climatic data is:

- The project site, in common with the rest of inland Australia, has a major moisture deficit for at least 80% of the year.

- Winds will advent significant energy from surrounding semi-arid rangelands, thereby, increasing vegetative evapotranspiration demand and will aid diffusion of odour.

- The site is not detrimentally affected by adverse temperatures in the majority of years.

3.6 Heritage

A preliminary data base search indicates the only items of European heritage significance are various cultural attachments to "Tubbo Station". Aspects of archaeological significance are yet to be investigated.

The use of the AHIMS database will be employed to identify all known items of Aboriginal significance. Both European and Aboriginal sites of significance will be investigated in detail in the preparation of the EA and appropriate strategies for management developed pursuant to the outcome to the investigation.

3.7 Flora and Fauna

A search of the NPWS data base has identified the following threatened or vulnerable fauna and avifauna species of conservation interest as potentially being present in the local region. Their relevance in the actual project area will be addressed in the field surveys.

Table 5: Current threatened fauna and avifauna recorded on the NSW NPWS as being potentially present in the project area

Scientific_Name	Common_Name	Legal_Status
Litoria raniformis	Southern Bell Frog	E1
Botaurus poiciloptilus	Australasian Bittern	V
Ardeotis australis	Australian Bustard	E1
Ninox connivens	Barking Owl	V
Macrotis lagotis	Bilby	E4
Limosa limosa	Black-tailed Godwit	V
Oxyura australis	Blue-billed Duck	V
Grus rubicundus	Brolga	V
Climacteris picumnus	Brown Treecreeper	V
Burhinus grallarius	Bush Stone-curlew	E1
Cinclosoma castanotus	Chestnut Quail-thrush	V
Stagonopleura guttata	Diamond Firetail	V
Stictonetta naevosa	Freckled Duck	V
Pachycephala inornata	Gilbert's Whistler	V
Calyptorhynchus lathami	Glossy Black-Cockatoo	E2
Calyptorhynchus lathami	Glossy Black-Cockatoo	V
Nyctophilus timoriensis	Greater Long-eared Bat	V
Falco hypoleucos	Grey Falcon	V
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subsp.)	V
Melanodryas cucullata	Hooded Robin	V
Phascolarctos cinereus	Koala	V
Anseranas semipalmata	Magpie Goose	V
Cacatua leadbeateri	Major Mitchell's Cockatoo	V
Leipoa ocellata	Malleefowl	E1
Pandion haliaetus	Osprey	V
Grantiella picta	Painted Honeyeater	V

Rostratula benghalensis australis	Painted Snipe (Australian subspecies)	E1
Certhionyx variegatus	Pied Honeyeater	V
Pedionomus torquatus	Plains-wanderer	E1
Xanthomyza phrygia	Regent Honeyeater	E1
Calamanthus cautus	Shy Heathwren	V
Pyrrholaemus sagittatus	Speckled Warbler	V
Polytelis swainsonii	Superb Parrot	V
Neophema pulchella	Turquoise Parrot	V
Climacteris affinis	White-browed Treecreeper	E2

Source: NSW NPWS database

A search of the NPWS data base has identified the following threatened or vulnerable flora species of conservation interest as potentially being present in the local region. Their relevance in the actual project area will be addressed in the field surveys

Table 6: Current threatened flora recorded on the NSW NPWS as being potentially present in the project area

Scientific_Name	Common_Name	Legal_Status
Caladenia arenaria	Sand-hill Spider Orchid	E1
Diuris pedunculata	Small Snake Orchid	E1
Convolvulus tedmoorei	Bindweed	E1
Boronia anethifolia		P13
Philotheca brevifolia		P13
Philotheca difformis		P13
Philotheca linearis		P13
Philotheca myoporoides		P13
Philotheca myoporoides subsp. acuta		P13
Casuarina cunninghamiana subsp. cunninghamiana	River Oak, River Sheoak	P13
Brachyscome papillosa	Mossgiel Daisy	V
Swainsona sericea	Silky Swainsona-pea	V
Diuris tricolor	Pine Donkey Orchid	V
Swainsona murrayana	Slender Darling Pea	V

Source: NSW NPWS database

The following endangered populations and ecological communities where identified from the NPWS database searches.

- Endangered Populations
    - White-browed Treecreeper, *Climacteris affinis*, in Carrathool LGA (south of the Lachlan River) and Griffith LGA
    - Glossy Black-Cockatoo, Riverina population

- Endangered Ecological Communities
    - Myall Woodland in the Darling Riverine Plains,
    - Brigalow Belt South,
    - Cobar Peneplain,
    - Murray-Darling Depression,
    - Riverina and NSW South western Slopes

- Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions
- *Acacia loderi* shrublands
- White Box Yellow Box Blakely's Red Gum Woodland
- *Halosarcia lylei* low open-shrubland in the Murray Darling Depression Bioregion

Awareness of the potential presence of the above endangered populations and communities will necessitate an appropriate assessment in the compilation of the EA

4.0 HEADS OF CONSIDERATION

At least, and not limited to, the following heads of consideration will be addressed to the appropriate depth, breadth and detail in the preparation of the EA

4.1 Odour and Aerosols

Odours of various nature and source may present as potential environmental and social hazard from both the ethanol plant and intensive dairy. It is foreseeable that odour modelling will be undertaken in the preparation of the EA. Climatic data and prevailing wind information will be compiled to provide an accurate indication of potential direction of odour emission and relevant effects on surrounding receptors. Map 2.0 indicates the location of potential receptors immediately surrounding the proposed development site. Relevant information as per acceptable odour emissions and limits will be sourced through the EPA's NSW Odour Guidelines and application of industry accepted predictive modelling.

The nearest potential receptors for odour from the centre of the proposed site are (see Map 2.0):

- 850 m south – residence
- 1700 m north – industrial (Walsh Rice Sheds)
- 1800 m south-south west – residence
- 3100 m south west - residence

The principle sources of odour are recognized as potentially occurring from

- both primary and secondary treatment systems for dairy wastes (manure, effluent, mortality and other organic matter composting),
- the potential for gaseous emissions from the ethanol production distillation process and
- the temporary storage and transfer of ethanol plant wastes (wet distillers grain, effluent).

Where necessary, models such as TAPM (The Air Pollution Model) developed by the CSIRO Division of Atmospheric Research and originally released in 1999 (with the latest Version 2 released in April 2002), can be used to predict three-dimensional meteorology and air pollution concentrations.

Aerosol risks will be assessed concurrently with odour.

4.2 Dust

Dust may or may not present as a major issue for the general maintenance and operation of either the ethanol or dairy sites. It is proposed at this stage that all traffic access and internal traffic movements within site will be on sealed/bitumen roadways, access ways and lane ways. Dust may present a hazard in relation to the storage of feed grains and other supplementary feeds and bulk products supplied to the site.

Best management practice guidelines would need to be adhered to in relation to minimisation of dust from both an occupational health and safety and an air borne pollutant perspective.

As identified in section 4.1 (see Map 2.0), receptors for dust are located as close to the centre of the proposed development site as 850m to the south, however preliminary data suggests the prevailing atmospheric conditions are west to east, avoiding impact on the 4 closest potential receptors identified. Where necessary, predictive modelling will be utilised to quantify this head of consideration.

4.3 Noise

Noise is not considered a significant issue. The report will address impacts of transport entering and exiting the site as this is considered to be the major noise source. Specific site location details and appropriate use of mitigation and screening will help against the potential for noise to be an issue. Specific siting of site access for transport streams, once determined, will allow for further quantification and qualification of this head of consideration in the preparation of the EA.

4.4 Visual Amenity Issues

There is potential for illumination on the site to present as an issue, both for neighbouring residences and for traffic utilising the Kidman Way and other arterial roads surrounding the proposed development site. Investigation will be undertaken to assess appropriate strategies to screen the ethanol plant and dairy. This may include the establishment of tree lines and earthen barriers.

Tree lines and earthen barriers may also be required for the screening of infrastructure from surrounding pre-existing roads networks and neighbouring occupants and land users from a diurnal visual perspective. The proponent has stated that it is their intention to plant and maintain extensive tree plantings of principally locally indigenous species for site enhancement and aesthetics.

Annexure 2 presents a collection of images of similar developments in other regions throughout Australia and internationally, and serves to provide some form of illustration as to the physical nature of the developments. These images provide a guide for a preliminary assessment of the potential for said developments to create an issue to visual amenity should tree & shrub plantings be not undertaken. More specific, quantifiable impacts will be determined during the preparation of the EA.

4.5 Waste Streams

There are a series of waste streams that are readily identifiable from both the ethanol plant and the dairy, and a range of potential solutions to address the treatment of wastes produced. Preliminary identification of waste streams, though not exhaustive are:

- *Ethanol wastes*: Wet distillers grain
  Waste waters (effluent)
- *Dairy wastes*: Manure
  Dairy washdown (effluent)
  Mortality products
  Emissions (eg: methane)

In addition to the wastes described, there are the general wastes both biological and administratively based, produced from the 95+ employees operating on the proposed development site.

4.6 Waste Treatment

As identified in Section 4.5, there are a range of options to be considered for the treatment of wastes produced by the proposed developments. Treatment options for biological wastes and effluents have been stated to be a combination of aerobic and anaerobic processes, with selection based on further investigations to identify the most appropriate systems for the nature of the wastes produced.

For treated or partially treated wastes, a range of storage and handling solutions may include on-site composting of biological matter, reclamation and reuse of water where appropriate, or removal of wastes off-site. At this time, appropriate strategies for waste treatment have not been specifically determined, and will be defined as the EA progresses, based on best industry standards, EPA guidelines for various waste stream types and site specific requirements and parameters.

4.7 Site Access

It would be expected that site access would need to be developed or enhanced to ensure the safety of users of the Kidman Highway and surrounding arterial roads in relation to travel surrounding the entry and exit of heavy transport from the proposed development site. Road Traffic Authority (RTA) guidelines would be adhered to in relation to construction and development of appropriate turning lanes, site access, signage, etc.

4.8 Traffic/Transport

With the proposal of the production of ethanol in the order of 50M gallons/annum coupled to the potential production volumes of milk and dairy produce from a 6,000 head dairy herd, it is expected that an increase in heavy transport to and from the site along surrounding arterial roads and through neighbouring townships could be a potential issue. Investigation and modelling will be undertaken to calculate the degree of impact to surrounding communities.

It would be expected that site access would need to be developed to ensure the safety of users of the Kidman Highway and surrounding arterial roads in relation to travel surrounding the entry and exit of heavy transport from the proposed development site. Roads and Traffic Authority (RTA) guidelines would be adhered to in relation to construction and development of appropriate turning lanes, site access signage, and comment would be sought in regards the RTA's preferred list of transport routes throughout the region and surrounds. As an indication of transport numbers, the below table illustrates transport numbers into (and not out of) the site:

Transport requirement	Numbers anticipated/annum
Grain	17,000
Milk (collection)	4,000
Ethanol (collection)	14,000
Waste and Sundry	5,000

4.9 Zoning

The area is zoned Rural 1(a). The Murrumbidgee local environment plan does allow for the proposed development to be undertaken in area zoned as Rural 1(a).

4.10 Animal Husbandry/Health Issues

Best management practice and adherence to guidelines specific to the intensive housing of domestic stock, animal welfare, transport management, etc. will be used (information from worldwide sources and experience is being sought).

4.11 Land Suitability

At this stage, preliminary site assessment indicates the proposed site is suitable for the development of an ethanol plant and intensive dairy.

4.12 Sourcing of Livestock

The sourcing, training, feeding, disposal (mortality/performance based selection), transport of livestock and any other management activities required will all be managed as per best management practice and adherence to guidelines specific to the intensive housing of domestic stock, animal welfare, transport management will be the normal practice.

Discussions have already been held with a major pastoral house to source the stock. Once sourced, an on-going program of animal selection and advanced breeding techniques will be applied to ensure only the best available animals are available.

4.13 Livestock Feed Supply

Livestock feed supply is as per the nutritional needs of a 6,000 head dairy herd. Bulk feed will be supplied waste products in the form of fermented grains from the ethanol plant. This feed will be supplied coupled to nutritional supplements and roughage as per the dietary requirements of ruminant herds.

Pastoral and irrigation lands on the existing adjoining Four Arrows lands will be available for the growing out of selected heifers, dry cows, animals held for sale and animals recently purchased.

4.14 Feed Storage/Grain Storage

Grain storage will take the following forms

- Leasing and/or short term access to the adjacent storage facility owned by SunRice.

- Leasing of existing grain receival facilities and/or factoring in of the cost of storage to the actual grain price paid to existing grain traders.

- On site facilities. These are proposed to be in the form of fixed bunkers for dry feed and supplements where appropriate. Where ethanol production by-products are used as livestock feed (wet distillers grains), transport from the point of production to the point of utilisation/consumption/short term storage will be undertaken based on the most efficient and appropriate methodology identified pursuant to infrastructural design.

All storage and transfer systems and revised options will be assessed in the preparation of the EA

4.15 OH & S /Planning Emergency Procedures

Occupational Health and Safety guidelines would be adhered to by all employees of both the ethanol plant and dairy production plants. Specific induction training and emergency procedure, evacuation, personal health and safety, etc would be provided to all staff entering and leaving site as would detail instruction on site access for visitors, transport operations, etc.

Final project design documents will incorporate all the required OH+S structural requirements and the whole project will have a fully documented OH+S procedure manual with full emergency training to be undertaken.

4.16 Environmental Contamination Risk

There is the potential for environmental contamination through either spillage contamination, waste storage failure, increased nutrient or salt loads through improper waste utilisation, airborne environmental contaminants, contaminated groundwater issues, etc.

Environmental contamination risks will be minimised through appropriate design of infrastructure, strategic policy development in the form of operating procedures for management of potential environmental contamination factors, and risk management strategies and procedural documentation in the event of contamination.

4.17 Infrastructure (inc. electricity, gas, water, telecommunications etc)

Infrastructure of electricity access, telephone sewerage, potable water supply, etc will be developed pursuant to specific site selection and requirement. The supply of essential services in the form of electricity, gas and water will be investigated and where necessary proposed upgrades or improved access to such demands will be identified.

4.18 Chemical/Mass Balances/Storage/Handling

It is proposed that chemical management will be to the best practice standards for developments of this type. Chemical storage and handling would adhere to all state and federal policy requirements.
A mass balance of the relevant products will be undertaken as will an assessment of the proposed management practices and risk appraisals.

4.19 Socio Economic/EBS or TBL

The proposed development are not only of direct benefit to Four Arrows, but in their creation provide opportunities for surrounding community in the form of increased employment, economic growth for the region, security of social opportunities for employees and their families, etc.

These potential opportunities can be demonstrated through the use of environmental balance sheets or triple bottom line analysis and it is proposed that economic analysis and social benefit or risk will be analysed with the production of the EA.

4.20 Impacts on Other Industries

It is foreseeable based on the inputs and outputs required for or generated from both the ethanol plant and dairy facilities that significant impact on other industries within and beyond the region could be realised. Investigation will be undertaken on the potential impacts on other industries and identification of threats in the form of a threats or options matrix.

The processes employed in the proposed developments have the potential to add value to existing industries (ie: cattle feedlots, poultry, pigs, sheep etc). Additionally there will be many indirect or positive multiplier economic impacts on the community based on the demand for supporting services.

4.21 Greenhouse Gas Balance

Investigation will be undertaken to determine the net benefit/loss ratios in relation to the emission of greenhouse gasses, and establishment of parameters in line with EPA and other agency guidelines.

Whilst detailed data on standards are not yet set, an assessment is still proposed.

The proponent has indicated a strong desire to capture methane and other energy products being generated for on-site energy consumption and reducing the need for external energy sources. This policy will also reduce the potential for environmental degradation by project greenhouse gases.

4.22 Fuel Industry Impacts on Human Health

It is largely considered that the production of biofuels provides inherent improvements in the quality of life expected from the broader community through the reduction in fossil fuel based vehicular emissions etc. Issues specific to this consideration will be investigated during the course of the preparation of the EA.

4.23 Employment

The proposed developments have the potential to dramatically increase the employment opportunities in the surrounding community, both directly, and indirectly across an even broader area. Let us consider both direct and indirect impacts:

- ***Direct:***

It would be anticipated approximately 45 – 50 employees in two 12 hour shifts would be employed in the ethanol plant, 7 days/week, 330 days/year. The dairy would employ 60 employees working through 12 hour shifts, 7 days/week, 365 days/year. This is a dramatic increase in employment opportunities for the surrounding communities and will have a calculable economic flow-on effect to other industries and services throughout the region.

- ***Indirect:***

There are expected flow-on effects across a range of industries and support networks, including, but not limited to:

- Transport
- Veterinary services
- Agricultural production (input supply)
- Waste disposal
- Construction phase inputs
- Maintenance works supply
- Administrative services
- Community services (shops, schools etc)
- Health services

5.0 REFERENCES

J Hornbuckle and E Christen (1999), *Physical Properties of Soils in the Murrumbidgee and Coleambally Irrigation Areas,* Technical Report 17/99 CSIRO Land and Water, Griffith NSW 2680