

Table 1: Response to issues raised by unidentified community members

Issue	Specific Comments	Applicant Response
Odour	Methodology - verification and reliance on less than 12 months of site specific data - perception that local meteorological conditions were not represented within study. Submissions 4, 7, 8, 11, 12, 13, and 17	The Environmental Assessment provides discussion on the verification of site specific meteorological data obtained from the weather station installed at Moira Station. This discussion was provided in Appendix C Section 6.1, which states: “A meteorological station was installed for this project at Moira Station on 2 March 2005. The data generated for the site by The Air Pollution Model (TAPM) has shown good agreement with the first few months of wind data collected by the weather station. Additionally, Appendix C of Appendix B states: “At the time of writing, the data available from the on-site weather station included 10-minute records from 2 March 2005 to 12 August 2005. The data were subsequently processed into hourly records of temperature, wind speed, wind direction, atmospheric stability and mixing height – a form suitable for the AUSPLUME dispersion model. Stability was assigned using sigma-theta for each hour of the dataset.” For additional information, please refer to the attached letter from Holmes Air Sciences (HAS).

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	Odour impacts - unacceptable odour impacts to the local area, including surrounding towns Submissions 4, 5, 6, 8, 11, 12, 13, 14, 16, 17 and 19	A comprehensive odour impact assessment was undertaken for the project. This assessment is summarised in Section 11 of the EA and presented in full within Appendix C of the EA. Conclusions regarding predicted odour impacts of the proposed feedlot development were provided in Section 11.6, which states: “Odour from the feedlot is likely to be detectable on occasions at the nearest residences (as shown in Table 11-5 and Section 11.5); • The highest odour impacts would be observed at the residences closest to the feedlot with locations R2, R4, R5, R6, R11 and R12 predicted to experience odour levels above the odour criteria; • Odour levels at the remaining individual residences are predicted to be below the odour criteria however some predictions are close to the goal suggesting that these locations may not be free from odour impacts; • Odour impacts at the towns of Barmah, Moama and Mathoura are predicted to be acceptable; and • The low rainfall of the area would be beneficial for minimising the frequency of odour events.” Agricultural Equity Investments has reached acquisition and compensation agreements with the adversely affected owners of residential properties; namely R2, R4, R5, R6, R11 and R12.

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Groundwater	Potential impact to Green Gully - via groundwater contamination - via surface water contamination Submissions 12, 14 and 17	The EA discusses both the groundwater and surface water conditions at the site and measures aimed at minimising potential impacts of the project upon these features as a result of the project. Investigations undertaken at the site indicated that groundwater depth was suitable for a feedlot development. Section 12.2.2 states: “The draft New South Wales Feedlot Manual (NSW Agriculture, 2003) has the following requirements: • Effluent irrigation should always be separated from watercourses, with a minimum distance of 25 metres; • A feedlot is unsuitable on a site where groundwater is within 1 to 5 metres of the surface; and • Protect groundwaters by avoiding areas where there are existing shallow or rising groundwater tables, perched water tables, groundwater recharge areas or where groundwater is already polluted. Previous investigations have shown the site to have deep groundwater at approximately 20 to 22 metres which is of relatively low salinity (Cadell Land and Water Management Plan, 2001) and which is consistent with the PGI undertaken by GHD (2005). An existing water bore of 29.2m depth near the abandoned shearing shed encountered groundwater at 19m depth in February.” Section 13.2.2 states: “In general, contaminated runoff from the feed pens and receivals area would be drained to the west to the sedimentation ponds and would be separated from the clean water. Retention and holding ponds have been designed to contain these flows. During operation, runoff and wastewater would be stored, treated and disposed of on site by irrigation.

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		Operation of the feedlot, including the irrigation of wastewater is not expected to impact upon groundwater, which underlies the site at a depth of approximately 20 to 22 metres.” Due to the existing depth of groundwater on site and design measures of the water retaining structures, groundwater is not considered to be a development constraint. Additionally, Section 14.5 states: “As part of the detailed design process, additional geotechnical investigation would be undertaken to ensure that appropriate geotechnical design input is incorporated into the final feedlot design.” Therefore, it is predicted that the proposed project would not adversely impact upon the Green Gully located west of the site location via groundwater. Additionally, the controlled drainage area of the feedlot would prevent surface water runoff leaving the drainage area. The controlled drainage area is some 201ha and is the area of the proposed feedlot where runoff is generated from and flows to, and overall is subject to the site's designed drainage system. The maximum area inside the controlled drainage area has been estimated as approximately 201ha for calculating the expected runoff from the proposed project. The design of the feedlot has incorporated wet weather storage facilities where appropriate and there will be tailwater and stormwater controls where appropriate including a recovery system to capture and recycle stormwater runoff. Therefore, it is predicted that no surface water runoff would leave the controlled drainage area and enter the Green Gully located west of the project site.

Issue	Specific Comments	Applicant Response
Ecology	Ecological mitigation - maintenance of mitigation and ecological integrity of area Submissions 12, 14, 16 and 17	An ecological impact assessment was undertaken and presented in Section 16 of the EA. Conclusions and mitigation measures to be implemented regarding the ecological impact assessment were provided in Section 16.4, which states: “A summary of mitigation measures applicable to the site are provided below: • protect the northern belt of native woodland by leaving it ungrazed or lightly grazed; • stock should be excluded from sensitive moist habitats and from parts of the woodland habitat that occur in areas with predominantly native grass species; • deposit tree snags and branches removed as part of the project in a random and scattered manner in the northern woodland belt to enhance the habitat for reptiles and mammals. Care should be taken to avoid stockpiling the woody debris in such a way that it encourages fox and rabbit sheltering; and • trees that are native to the local area should be planted along the property boundary, fence lines and drainage lines that have few trees present. This would ensure these tree root systems would develop under the changed hydrological regime that would result from the proposed project and help to lower the water table.” The above ecological mitigation measures will be implemented during construction and operation of the project to ensure that there is minimal ecological impact due to the feedlot.

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	Threatened Species - potential impact to ecological values of the area. Submissions 12, 14, 16 and 17	The Ecological Assessment was undertaken in accordance with the Environmental Assessment requirement's as issued by the Minister for Planning and the NSW Department of Environment and Conservation. Discussion regarding the identified threatened species on site was provided in Section 16.5, which states: "The Ecological Assessment has identified potential habitat for two threatened woodland bird species: the Grey-crowned Babbler and the Brown Tree Creeper. Another threatened bird, the Blue-billed Duck, was observed in a farm dam in the south eastern part of the property. Eight part tests, provided in Appendix F, concluded that no significant impacts to these threatened species are expected as a result of the proposed project. Ecological investigations found no evidence of threatened flora species on the site. Habitat for the majority of threatened fauna species under the Threatened Species Conservation Act and Environment Protection of Biodiversity and Conservation Act that potentially utilise the site would not be impacted by the proposed project as it is outside of the project footprint. It is expected that, with the implementation of appropriate mitigation measures, the proposed cattle feedlot would not create significant ecological impacts."

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	Potential impact to Moira Wetland located east of the site Submissions 14 and 17	Information relating to the drainage control of the feedlot is provided in Section 12.3 of the Environmental Assessment, which states: “A controlled drainage area is the area of the proposed feedlot where runoff is generated from and flows to, and overall is subject to the site's designed drainage system. The maximum area inside the controlled drainage area has been estimated as approximately 201ha for calculating the expected runoff from the proposed project.” Given the level of drainage control within the feedlot and irrigation area and that the landform drains to the west and away from the Moira Lake and wetland system, it is predicted that stormwater runoff will be contained within the controlled drainage area in a storm event and not impact the Moira Lake and wetland system.
Pests	Increase in flies due to the development - management measures to minimise increase in flies Submissions 4, 5, 11, 12, 14, 16 and 17	The potential for increased levels of flies as a result of the proposed feedlot will be managed in accordance with the NSW Draft Feedlot Manual (Department of Primary Industries, 2002). The following practices will be implemented for insect control: • Maintain the feedlot to allow proper surface drainage and easy effluent removal. Elimination of potential fly breeding areas affords the best means of control; • Maintain a level pen surface, avoiding potholes where odours and fly breeding can occur and correct any pen drainage problems as they arise and ensure water troughs do not overflow; • Remove manure from pens within five days after cattle are removed, to prevent larval development; • Frequently remove manure and spilled feed from potential fly breeding areas such as along fence lines, around feed bunks, in hospital pens, at truck washing stations and in receiving and shipping areas; • Incorporate manure into the soil during, or as soon as practicable after application, to reduce odours and inhibit fly breeding in prolonged wet weather;

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		• Make sure that sprinkler heads for dust control and relief of cattle heat stress do not leak. Proper effluent management becomes even more important in fly control if a sprinkler system is used; • Mosquito breeding sites must be eliminated or controlled; • Slash grass and weed growth around pond perimeters regularly to eliminate harbours for mosquitoes; • Weed, which can harbour flies, should also be eliminated around the pond. One effective practice, however, is to provide a large patch of vegetation (for example, reasonably close to the yards) to attract the flies at harbour time (i.e. during the heat of the day), and to spray those weeds in the heat of the day to kill flies, say once a week; and • Use a fly-baiting program. The implementation of these measures would minimise the potential for a significant increase in flies due to the project.
Traffic	Access to the site - potential access from surrounding roads. - potential impact to surrounding roads. Submissions 11 and 17	Discussion on transport access to the site was provided in Section 15.3.2, which states: “Both cattle and grain trucks would enter the site via the access on Cobb Highway (SH21) and travel along the access road to the receivals area.” Additionally, Section 15.4.1 states: “Employee vehicles would also enter the site via the Cobb Highway access. Vehicles would travel along the access road to the allocated car park, located south of the administration building.” There will be no access to the site other than the proposed access on the Cobb Highway. It is not expected that the surrounding roads to the feedlot would experience a significant direct impact from traffic generated from the project.

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	Traffic generation - increased traffic would require a new bridge crossing the Murray River. Submissions 7, 13, 14, 17 and 19	Based on the assumption that B-Doubles will transport cattle to and from the site, it was calculated that there would be a maximum average of 20 traffic movements per day during the operation of the feedlot (as shown in Section 15.3.2). Additionally, as discussed in Section 6.8.2, the feed requirements provided by AEI show that it is expected that 219,403 tonnes of dry matter are required to feed the cattle within the feedlot per year. Based on these calculations, it is predicted that there would be a maximum average of 36 traffic movements per day during the operation of the feedlot. There is expected to be a total of 182 traffic movements per day during the operation of the feedlot, which includes 4 compost truck movements and 122 employee vehicle movements. An assessment of traffic and transport impacts resulting from the project concluded that the Cobb Highway has sufficient capacity to accommodate the traffic generated during the construction and operation of the proposed feedlot. Therefore, it is expected that traffic generated by the project would not adversely impact the operation or safety of the local road network.
Wastewater	Liquid waste leaving the site - potential that local water supply could become contaminated. Submissions 5, 8 and 17	Information relating to liquid waste generation from site operations is provided in Section 12.3, which states: “A controlled drainage area is the area of the proposed feedlot where runoff is generated from and flows to, and overall is subject to the site's designed drainage system. The maximum area inside the controlled drainage area has been estimated as approximately 201ha for calculating the expected runoff from the proposed project.” Additionally, Section 12.4.2 states:

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		“The collected liquid waste effluent would typically drain into a sedimentation pond. Liquid manure is first settled in one of the two available sedimentation ponds adjacent to either the north or south sections. The second drying pond would be off-line and used for drying the solids and the alternative would be in active use handling the collected runoff wastes. Supernatant liquid from the sedimentation ponds then drain into a 130ML holding pond. From there it is pumped to a 500ML effluent storage pond.” Runoff from the feedlot is expected to be minimal due to low rainfall rates at the site. Runoff would primarily occur only after moderate storm events. The implementation of mitigation measures, which are outlined in Section 13 of the EA, will minimise potential surface water pollution. These measures include: - development and implementation of emergency and contingency plans within the EIMP detailing methods to manage spills or other emergencies on site, such as pipe breakages, pipe overflows, pump failures etc; - maintenance of 50 metre buffer zones around irrigation channels and freshwater storages to prevent contamination of freshwater supplies; - manure stockpiles would be established within controlled drainage area to prevent contaminated runoff into clean water areas; and - a layer of compacted gravel to be placed on all regularly used access routes to stockpile locations, which would prevent contaminated runoff into clean water areas. These safeguards would be implemented during construction and operation to prevent impacts upon the irrigation channel and freshwater supplies on the project site.

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	Appropriate selection of Irrigated crop Submission 17	Information relating to the selection of the irrigated crop is presented in Section 5.2.3 of Appendix E, which states: “Evapotranspiration varies throughout the year and is dependent upon temperature, humidity, solar radiation, wind, crop type and crop growth patterns. Evapotranspiration is calculated by multiplying the monthly evaporation values by the appropriate crop factor for the species of plant to be grown on the site. The crop factor takes into account plant productivity, and meteorological factors. The crop factor used for the calculations in Table 7 was provided in DEC 2004 Table 4.1 for lucerne. This crop factor was chosen for the following reasons: • The crop factors in Table 7 are for Wagga Wagga. For example, yearly evaporation between Wagga and Moira is within 5%. • The crop factor for lucerne was chosen because the yield for irrigated lucerne of 20 tonnes per hectare per year is the likely crop on the irrigation area. Therefore, it is considered that the use of lucerne is appropriate for the irrigated area at Moira Station.
	Soil – Suitability for irrigation Submissions 16 and 17	An agricultural soil test was undertaken and the results are provided in Appendix E. Table 2.2 of the Environmental Guidelines: Use of Effluent Irrigation (DEC, 2003) details the soil characteristics and limitations for effluent irrigation. Assessment of the soil results in relation to the appropriate criteria in the DEC document resulted in confirmation that the soils on the site are appropriate for effluent irrigation systems.

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	Operational activities - management of effluent on the site - environmental performance and monitoring of effluent Submissions 5, 8, 12 and 17	Information relating to the management of wastewater during operations is provided in Section 12.7.1, which states: “The Operational Environmental Management Plan would include an Effluent Irrigation Management Plan (EIMP). The EIMP would include: • Efficient irrigation facilities for applying wastewater to the site; • A control system to adjust the wastewater application rates or other factors to maintain optimum performance; • Wet weather storage facilities where appropriate; • Tailwater and stormwater controls where appropriate including a recovery system to capture and recycle any stormwater runoff; • Wastewater transport facilities to convey water from the Effluent Dam to the site; • A site specific management plan detailing the necessary procedures to maintain optimum performance of the irrigation system and satisfy statutory requirements; and • A monitoring system to measure, record and identify any action to ensure the environmental performance of the system.” The implementation and monitoring of the EIMP will minimise the potential for adverse impacts as a result of the irrigation of effluent generated from the project. The EIMP will be prepared in accordance with DEC guidelines and be subject to monitoring requirements as part of the project approval and Environment Protection Licence conditions.

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Noise	Traffic noise - increased traffic noise for residents in Mathoura. Submissions 7, 14 and 17	Discussion on predicted impacts from traffic noise as a result of the proposed feedlot development is provided in Section 19.3, which states: “Increased traffic generation on the Cobb Highway would result in an associated increase in traffic noise. The proposal is expected to generate approximately 182 vehicle movements per day. However, due to the low numbers of existing traffic on this road, the similarity of vehicles generated by the project and those currently using the Cobb Highway, and the few sensitive receivers the potential increase in traffic noise is not expected to exceed the DEC Traffic Noise Criteria for this type of development and any additional noise is not likely to impact upon the surrounding population.” Additionally, Section 19.5 states: “There are very few residential (sensitive) receptors in the vicinity of the noise sources of the proposed project...While the operation of the proposed feedlot will generate additional traffic, the level and types of traffic generated would not be expected to exceed Traffic Noise Criteria.”

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Economics	Tourism impact - the project would result in a detrimental impact to the region's tourism industry Submissions 7, 12 and 14	Discussion regarding the predicted impact to tourism is provided in Section 21.3.5, which states: "Tourism in the region is largely based around the Murray River. Moama-Echuca is renowned as "the paddle steamer capital of Australia" and tourism opportunities are based around the historic port of Moama-Echuca, once the largest inland port in Australia. The natural and ecological features of the River Redgum Forests are also a drawcard for tourists with opportunities for fishing, water skiing, boating, canoeing, bushwalking, bird watching and swimming. There is also potential for further growth in the eco-tourism sector with opportunities within the Barmah-Millewa Forest which is listed as a Wetland of International Importance under the Ramsar Convention. The management of the feedlot would be undertaken in such a way as to reduce impacts from odour or dust. The feedlot development is considered to be consistent with the nature of the surrounding environment, notwithstanding this there would be only obstructed views of the feedlot from visual receptors." It is not expected that the operation of the project would adversely impact upon the region's growing tourist industry.

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	Local investment Submission 19	Information relating to the predicted economic benefits as a result of the proposed development is provided in Section 23.2.2, which states: “The operation of the feedlot is considered to have a beneficial impact upon the local and regional economy, primarily as a result of employment generation. The feedlot would directly employ 86 people in a variety of positions including administration, cattle management and feedlot maintenance. The feedlot would also have positive indirect effects on the local economy, with the creation of jobs associated with the production of feed and the transportation of feed and cattle. Generation of employment would have multiplier effects from income expenditure, as local businesses benefit from providing goods and services to the feedlot and its employees. It is also expected that grain for the feed of the cattle would be sourced from local suppliers. The proposed feedlot and the opportunities it would create would be an economic asset to the local area, resulting in a boost for the meat and grain industry and increasing the value of agricultural production in the Murray Shire.”
Project Alternatives	Site selection - the development should be located in an area with fewer small landholdings. Submissions 6, 10, 14 and 17	Information on the site selection study that was undertaken is provided in Section 5.3, which states: “The preferred location of the proposed cattle feedlot on Moira Station within Murray Shire was chosen due to the fact that the site satisfied the selection criteria with the following characteristics: • An area of a minimum of 120ha – Moira Station has an area of some 1,200ha; • A surrounding area with minimal close neighbouring properties in order to minimise potential impacts from the proposed development – Moira State Forest is adjacent to the north, west and south of the site. Therefore, there were relatively large separation distances to towns such as Deniliquin (42km), Moama (20km) and Shepparton (80km); • Access for transport to enable smooth delivery and distribution of cattle and grain – direct access to the Cobb Highway for road transport. Direct rail access to the Deniliquin-Bendigo railway should it be required to bring in cattle and grain by rail;

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		• Available water supply, preferably river and bore water – the site has an available water supply, with both a river and bore licence. Additionally, the site is located at the start of the Moira Channel which allows the opportunity to bring in additional water in consultation and agreement with MPID, should the need arise; • Existing power supply to the site – the site has an existing power supply available; • Comprise a suitable soil type for a feedlot – the site consists of a clay based soil which is a suitable soil type for a feedlot; • Access to suitable grain and feed components – rural properties in the Riverina Region produce suitable grain and feed components; • Access to suitable feeder cattle numbers in south eastern Australia – the Riverina Region is located in south eastern Australia and provides direct access to suitable feeder cattle markets; and • Access to a local workforce for the operation of the feedlot – a suitable and available workforce is located in Moama-Echuca and the surrounding area. The above characteristics of the Moira Station site indicate the suitability of the Project site for the proposed cattle.”

Issue	Specific Comments	Applicant Response
Construction	Dust - management of dust emissions during construction Submissions 6, 12, 14, 16 and 19	Information relating to the management of dust emissions during construction activities was provided in Section 27.3, which states: “A Construction Environmental Management Plan (CEMP) would form an integral part of the Environmental Management Plan (EMP) for the project and would be consistent with the requirements of ISO9001:2000 and ISO14001. Additionally, Section 28 states that the following measures to control dust emissions during construction would be implemented: • Keep areas of open excavation to a minimum; • Operation of water carts on stockpiles and exposed soils; and • Minimise stockpiling by co-ordinating excavation, spreading, regrading and compaction activities. The implementation of these measures will minimise the potential for dust generation leaving the site and adversely impacting adjacent properties.
	Diversion of Moira Channel - potential impacts during construction Submissions 12 and 17	Information relating to the diversion of the Moira Channel is located in Section 6.4.3, which states: “Following consultation and agreement with the Moira Private Irrigation District (MPID) Board, the newly constructed channel would be connected to the existing Channel at a time of year when the Channel contains no water. This would minimise potential impact to local water quality during construction. Scrapers, water carts and graders would be used to construct the Channel to the agreed specification.” There is not expected to be adverse impacts to surrounding land uses during the diversion of the Moira Channel.

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Operational activities	Dead stock disposal - management measures for dead stock Submissions 4, 5 and 17	Dead stock would not be removed from site, unless directed to by a regulatory authority. Information relating to the disposal of dead animals is presented in Section 12.4.1, which states: “Dead animals would be composted as outlined in the relevant guidelines. This would be undertaken in the manure storage areas. An area would be set aside for a larger scale death event. In this case, the animals would be buried in accordance with the appropriate guidelines.”
	Animal welfare - veterinary service on site. Submissions 4 and 17	Information regarding the welfare of cattle within the proposed feedlot is provided in Section 6.10, which states: “The operation and practices for the proposed cattle feedlot at Moira Station will comply with the nationally recognised Australian Model Code of Practice for the Welfare of Animals: Cattle (SCARM, 2004) and Australian Model Code of Practice for the Welfare of Animals: Land Transport of Cattle (SCARM, 2000). In addition, AEI will prepare an Animal Care Statement (ACS) prior to stocking the feedlot. The ACS would outline procedures and policies required for disease control and veterinary care. It would also detail the means of mass disposal of carcasses should a large death count occur at the facility.”

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	Water Supply - concern regarding feedlots operational viability with minimal water allocation - local access to water supply Submissions 13, 17 and 19	The Moira Station property has access to a water licence from Moira Private Irrigation District (MPID) of some 1,125ML per year and a groundwater licence of some 5,114ML per year. The annual water requirement of the proposed feedlot is predicted to be 1,790ML per year. In the event of low water allocation from MPID, the proposed feedlot would utilise the groundwater allocation. There has been discussion regarding the potential implementation of Groundwater Sharing Plans in the region. However, it is estimated that Moira Station would have sufficient water supply in the event of a groundwater sharing plan in Groundwater Management Area 016. Should the sharing plan reduce the current allocation by 60-70% (as indicated by Department of Natural Resources), it would leave approximately 2,000ML for extraction, which satisfies the annual water requirements for the feedlot.

Issue	Specific Comments	Applicant Response
	Environmental performance - noise levels during construction and operation. Submissions 8, 12, 13 and 17	Information relating to the environmental performance of the proposed feedlot is provided in Section 27.3, which states: “An Environmental Management Plan (EMP) is a procedural document which outlines the environmental goals of the project, the safeguard measures to be implemented, the timing of the implementation in relation to the progress of the project, responsibilities for implementation and management, and a review process. An EMP would be prepared to address each stage of the project namely, site preparation, construction and operation.” In addition to the EMP, AEI will also be subject to an independent environmental audit. Section 27.3.2 of the EA describes the process. “An independent accredited auditor would conduct environmental audits in accordance with a schedule nominated in the site EMP. Quantified and unquantified information contained in the EA would be assessed to ensure that the construction and operational phases of the project must meet acceptable environmental standards. The audit would be based on available information and observations and would not include additional sampling or data collection. An environmental audit would also test the rigour of the project against any conditions/approvals and licences imposed on the project by statutory authorities.” The EMP and the independent audits provide the community with assurance about the environmental accountability of the feedlot during operation.

Issue	Specific Comments	Applicant Response
	Disease management - risk of community catching disease from cattle Submissions 5, 11, 14, 16 and 17	Discussion relating to disease management of the proposed feedlot during operation is provided in Section 20.2, which states: “Q-fever is mainly acquired by workers in the livestock, agriculture, veterinary and meat industries as these people are more likely to come into contact with airborne particles created from tissue, waste and dust from infected animals. Therefore, there is the potential for employees at the site to come into contact with the organisms. The preparation and implementation of an Occupational Health and Safety Management Plan for the operations at the feedlot would manage the OH&S risks for employees such as general safety for working with machinery and cattle, including methods of managing the potential to acquire Q-fever. Mitigation measures to be implemented include: • Employees required to be vaccinated against Q-fever; • Maintenance of buffer areas between irrigation area and sensitive receivers.” Additionally, Section 20.6 states: “The main human risk is the potential for Q-fever, which is mainly acquired by workers in the livestock, agriculture, veterinary and meat industries as these people are more likely to come into contact with airborne particles created from tissue, waste and dust from infected animals. The preparation and implementation of an Occupational Health and Safety (OH&S) Management Plan for the operations at the feedlot would manage OH&S risks for employees such as general safety for working with machinery and cattle, including methods of managing the potential to acquire Q-fever. In summary, the proposed cattle feedlot is not expected to create significant hazards or risks to humans, animals or the biophysical environment provided the mitigation measures are implemented.”

Table 2: Response to issues raised by identified respondents

Respondent	Issue	Applicant Response
Roads and Traffic Authority	Road Design for access road	Agricultural Equity Investments will comply with the relevant RTA guidelines and criteria for the design of the access road off the Cobb Highway. Compliance is reflected in the Statement of Commitments.
	Internal traffic arrangements	Agricultural Equity Investments will comply with the relevant RTA guidelines and criteria for the design of internal traffic arrangements for the construction and operation of the proposed feedlot. Compliance is reflected in the Statement of Commitments.
Cadell Land and Water Management Plan	Soil investigations - request more detailed geotechnical investigations be conducted prior to construction.	As part of the detailed design process, Agricultural Equity Investments will undertake additional geotechnical investigation to ensure that appropriate geotechnical design input is incorporated into the final feedlot design.
	Environmental monitoring during operation	Agricultural Equity Investments will install a groundwater monitoring program to monitor storage areas and irrigation area.

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	Effluent Irrigation Management Plan during operation of the feedlot	The Operational Environmental Management Plan would include an Effluent Irrigation Management Plan (EIMP). The EIMP would include: • Efficient irrigation facilities for applying wastewater to the site; • A control system to adjust the wastewater application rates or other factors to maintain optimum performance; • Wet weather storage facilities where appropriate; • Tailwater and stormwater controls where appropriate including a recovery system to capture and recycle any stormwater runoff; • Wastewater transport facilities to convey water from the Effluent Dam to the site; • A site specific management plan detailing the necessary procedures to maintain optimum performance of the irrigation system and satisfy statutory requirements; and A monitoring system is proposed to measure, record and identify any action to ensure the environmental performance of the system.
	Storage requirements	The effluent storage area would have a capacity of some 500ML, which satisfies the Cadell Land and Water Management Plan recommendations.
The Smith Family - (report undertaken by Booth and Associates)	Odour Impact Assessment	Please refer to the attached Holmes Air Sciences (HAS) letter.

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	Dust during construction and operation	The EA provides discussion and mitigation measures to be implemented to minimise the generation of dust during construction and operation of the project. Information relating to the management of dust emissions during construction activities was provided in Section 27.3, which states: “A Construction Environmental Management Plan (CEMP) would form an integral part of the Environmental Management Plan (EMP) for the project and would be consistent with the requirements of ISO9001:2000 and ISO14001.” Additionally, Section 28 states that the following measures to control dust emissions during construction would be implemented: • Keep areas of open excavation to a minimum; • Operation of water carts on stockpiles and exposed soils; and • Minimise stockpiling by co-ordinating excavation, spreading, regrading and compaction activities. An Environmental Management Plan (EMP) will be prepared for the operation of the project. This EMP will provide a list of management measures aimed at maximising the environmental performance of the feedlot. The potential for dust generation resulting from operational activities will be dealt with within this document. The EMP is a procedural document which outlines the environmental goals of the project, the safeguard measures to be implemented, the timing of the implementation in relation to the progress of the project, responsibilities for implementation and management, and a review process. An EMP would be prepared to address each stage of the project namely, site preparation, construction and operation.

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	Traffic Impact Assessment - traffic generation - traffic distribution	The traffic generated from the proposed feedlot is outlined in Section 15 of the Environmental Assessment. The traffic volumes were derived from the expected head of cattle to be processed through the feedlot per annum (approximately 160,000 cattle) and also the proposed feed requirements for this volume of cattle (approximately 220,000 tonnes). Given these assumptions, it is reasonable to assume that approximately 20 truck movements per day would be generated for cattle and 36 truck movements generated for grain. The traffic impact assessment assumed that the volume of traffic would be approximately evenly distributed to travel north and south along the Cobb Highway. This is assumed for both cattle transportation and grain delivery.
	Water Supply - adequate supply of water for the feedlot	The Moira Station property has access to a water licence from Moira Private Irrigation District (MPID) of some 1,125ML per year and a groundwater licence of some 5,114ML per year. The annual water requirement of the proposed feedlot is predicted to be 1,790ML per year. In the event of low water allocation from MPID, the proposed feedlot would utilise the groundwater allocation. There has been discussion regarding the potential implementation of Groundwater Sharing Plans in the region. However, it is estimated that Moira Station would have sufficient water supply in the event of a groundwater sharing plan in Groundwater Management Area 016. Should the sharing plan reduce the current allocation by 60-70% (as indicated by the Department of Natural Resources), it would leave approximately 2,000ML, which satisfies the annual water requirements for the feedlot.

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s6013311_Response to Submissions_8March.doc	Hydrology - potential impact to Green Gully	Investigations undertaken at the site indicated that the depth to groundwater was suitable for a feedlot development. Section 12.2.2 states: “The draft New South Wales Feedlot Manual (NSW Agriculture, 2003) has the following requirements: • Effluent irrigation should always be separated from watercourses, with a minimum distance of 25 metres; • A feedlot is unsuitable on a site where groundwater is within 1 to 5 metres of the surface; and • Protect groundwaters by avoiding areas where there are existing shallow or rising groundwater tables, perched water tables, groundwater recharge areas or where groundwater is already polluted. Previous investigations have shown the site to have deep groundwater at approximately 20 to 22 metres which is of relatively low salinity (Cadell Land and Water Management Plan, 2001) and which is consistent with the PGI undertaken by GHD (2005). An existing water bore of 29.2m depth near the abandoned shearing shed encountered groundwater at 19m depth in February.” Section 13.2.2 states: “In general, contaminated runoff from the feed pens and receivals area would be drained to the west to the sedimentation ponds and would be separated from the clean water. Retention and holding ponds have been designed to contain these flows. During operation, runoff and wastewater would be stored, treated and disposed of on site by irrigation.

Respondent	Issue	Applicant Response
		Operation of the feedlot, including the irrigation of wastewater is not expected to impact upon groundwater, which underlies the site at a depth of approximately 20 to 22 metres.” Due to the existing depth of groundwater on site and design measures of the water retaining structures, groundwater is not considered to be a development constraint. Additionally, Section 14.5 states: “As part of the detailed design process, additional geotechnical investigation would be undertaken to ensure that appropriate geotechnical design input is incorporated into the final feedlot design.” Therefore, it is predicted that the proposed project would not adversely impact upon the Green Gully located west of the project site.
	Agricultural Assessment - suitability of soils - irrigation management	An agricultural soil test was undertaken and the results are provided in Appendix E. Table 2.2 of the <i>Environmental Guidelines: Use of Effluent Irrigation</i> (DEC, 2003) details the soil characteristics and limitations for effluent irrigation. Assessment of the soil results in relation to the appropriate criteria in the DEC document resulted in confirmation that the soils on the site are appropriate for effluent irrigation systems. As part of the operation of the feedlot, an Effluent Irrigation Management Plan (EIMP) would be prepared and form part of the overall Environmental Management Plan (EMP). Details of the EIMP can be found in Section 12 of the EA.
	Livestock Diseases	Discussion relating to disease management of the proposed feedlot during operation is provided in Section 20.2, which states:

Respondent	Issue	Applicant Response
		“Q-fever is mainly acquired by workers in the livestock, agriculture, veterinary and meat industries as these people are more likely to come into contact with airborne particles created from tissue, waste and dust from infected animals. Therefore, there is the potential for employees at the site to come into contact with the organisms. The preparation and implementation of an Occupational Health and Safety Management Plan for the operations at the feedlot would manage the OH&S risks for employees such as general safety for working with machinery and cattle, including methods of managing the potential to acquire Q-fever. Mitigation measures to be implemented include: • Employees required to be vaccinated against Q-fever; • Maintenance of buffer areas between irrigation area and sensitive receivers.” Additionally, Section 20.6 states: “The main human risk is the potential for Q-fever, which is mainly acquired by workers in the livestock, agriculture, veterinary and meat industries as these people are more likely to come into contact with airborne particles created from tissue, waste and dust from infected animals. The preparation and implementation of an Occupational Health and Safety (OH&S) Management Plan for the operations at the feedlot would manage OH&S risks for employees such as general safety for working with machinery and cattle, including methods of managing the potential to acquire Q-fever. In summary, the proposed cattle feedlot is not expected to create significant hazards or risks to humans, animals or the biophysical environment provided the mitigation measures are implemented.”

Respondent	Issue	Applicant Response
Moir Private Irrigation District Board	Odour Impact Assessment - undertaken by Pacific Air and Environment	Please refer to the attached Holmes Air Sciences (HAS) letter.
	Diversion of irrigation channel	Agricultural Equity Investments has and will continue to consult with the Moira Private Irrigation District (MPID) Board with respect to the proposed diversion of the channel. The newly constructed channel would be connected to the existing Channel at a time of year when the Channel contains no water. This would minimise potential impact to local water quality during construction. Scrapers, water carts and graders would be used to construct the Channel to the agreed specification." There is not expected to be adverse impacts to surrounding land uses during the diversion of the Moira Channel.
	Water allocation	The Moira Station property has access to a water licence from Moira Private Irrigation District (MPID) of some 1,125ML per year and a groundwater licence of some 5,114ML per year. The annual water requirement of the proposed feedlot is predicted to be 1,790ML per year. In the event of low water allocation from MPID, the proposed feedlot would utilise the groundwater allocation. There has been discussion regarding the potential implementation of Groundwater Sharing Plans in the region. However, it is estimated that Moira Station would have sufficient water supply in the event of a groundwater sharing plan in Groundwater Management Area 016. Should the sharing plan reduce the current allocation by 60-70% (as indicated by Department of Natural Resources), it would leave approximately 2,000ML, which satisfies the annual water requirements for the feedlot. Additionally, the project comprises a freshwater storage of 1,000ML on-site.

Respondent	Issue	Applicant Response
	Dead stock disposal	Dead stock would not be removed from site, unless directed by a regulatory authority. Information relating to the disposal of dead animals is presented in Section 12.4.1 of the EA, which states: “Dead animals would be composted as outlined in the relevant guidelines. This would be undertaken in the manure storage areas. An area would be set aside for a larger scale death event. In this case, the animals would be buried in accordance with the appropriate guidelines.”
	Location of Manure storage areas	As indicated in Figure 6.1 of the EA, the proposed manure storage areas are located in between the sedimentation basins and the holding pond.
	Increase in flies and management measures	The potential for increased levels of flies as a result of the proposed feedlot will be managed in accordance with the NSW Draft Feedlot Manual (Department of Primary Industries, 2002). The following practices will be implemented for insect control: • Maintain the feedlot to allow proper surface drainage and easy effluent removal. Elimination of potential fly breeding areas affords the best means of control; • Maintain a level pen surface, avoiding potholes where odours and fly breeding can occur; • Correct any pen drainage problems as they arise; • Ensure water troughs do not overflow; • Remove manure from pens within five days after cattle are removed, to prevent larval development; • Frequently remove manure and spilled feed from potential fly breeding areas such as along fence lines, around feed bunks, in hospital pens, at truck washing stations and in receiving and shipping areas;

Respondent	Issue	Applicant Response
		• Incorporate manure into the soil during, or as soon as practicable after application, to reduce odours and inhibit fly breeding in prolonged wet weather; • Make sure that sprinkler heads for dust control and relief of cattle heat stress do not leak. Proper effluent management becomes even more important in fly control if a sprinkler system is used; • Mosquito breeding sites must be eliminated or controlled; • Slash grass and weed growth around pond perimeters regularly to eliminate harbours for mosquitoes; • Weed, which can harbour flies, should also be eliminated around the pond. One effective practice, however, is to provide a large patch of vegetation (for example, reasonably close to the yards) to attract the flies at harbour time (i.e. during the heat of the day), and to spray those weeds in the heat of the day to kill flies, say once a week; and • Use a fly-baiting program.
	Contamination of water supply	The feedlot comprises a controlled drainage area which is the area of the proposed feedlot where runoff is generated from and flows to, and overall is subject to the site's designed drainage system. The maximum area inside the controlled drainage area has been estimated as approximately 201ha for calculating the expected runoff from the proposed project. Therefore, it is predicted that the controlled drainage area would prevent surface water contamination of the Moira Irrigation Channel.

Respondent	Issue	Applicant Response
Department of Natural Resources	Groundwater allocation	It is estimated that Moira Station would have sufficient water supply in the event of a groundwater sharing plan in Groundwater Management Area 016. Should the sharing plan reduce the current allocation by 60-70% (as indicated by Department of Natural Resources), it would leave approximately 2,000ML for extraction, which satisfies the annual water requirements for the feedlot.
	Stormwater runoff and potential impact to Moira Lake and wetland system	Information relating to the drainage control of the feedlot is provided in Section 12.3 of the Environmental Assessment, which states: “A controlled drainage area is the area of the proposed feedlot where runoff is generated from and flows to, and overall is subject to the site’s designed drainage system. The maximum area inside the controlled drainage area has been estimated as approximately 201ha for calculating the expected runoff from the proposed project.” Given the level of drainage control within the feedlot footprint and irrigation area and given that the landform drains to the west and away from the Moira Lake and wetland system, it is predicted that stormwater runoff will be contained within the controlled drainage area in a severe storm event and not impact the Moira Lake and wetland system.
	Effluent storage area	The effluent storage area would have a capacity of some 500ML, which satisfies the Cadell Land and Water Management Plan recommendations.
	Detailed design of the project	Section 14.5 of the Environmental Assessment states: “As part of the detailed design process, additional geotechnical investigation would be undertaken to ensure that appropriate geotechnical design input is incorporated into the final feedlot design.”
	Environmental monitoring during operation	Agricultural Equity Investments will install a groundwater monitoring program to monitor storage areas and irrigation area

Respondent	Issue	Applicant Response
	Recommended Conditions	Agricultural Equity Investments will comply with the recommended conditions of approval from the Department of Natural Resources. Compliance is reflected in the Statement of Commitments.
Murray Shire Council	Detailed design of the project	Agricultural Equity Investments will comply with the relevant legislation when undertaking the detailed design of the proposed feedlot. This includes the RTA guidelines and criteria for the design of the road access and internal traffic arrangements. Compliance is reflected in the Statement of Commitments.
	Operational compliance	Agricultural Equity Investments will comply with the conditions of approval and operational requirements from the Department of Environment and Conservation with respect to the Environment Protection Licence (EPL). Compliance is reflected in the Statement of Commitments.
Department of Environment and Conservation	Odour methodology	Please refer to Holmes Air Sciences (HAS) letter.
	Statement of Commitments	Agricultural Equity Investments has provided Department of Planning with an amended Statement of Commitments
	Staged Approval	Agricultural Equity Investments does not believe that a staged approval process is justifiable. Successful negotiations have resulted in options and agreements for acquisition and compensation with the property owners of the adversely impacted residential properties identified within the odour impact assessment; these residential properties being R2, R4, R5, R6, R11 and R12.
Department of Planning	Traffic – rail	Rail was initially considered as a transport option for grain and cattle. However, it was not financially appropriate for the proposed feedlot due to the requirement to construct the associated infrastructure on the site.

Respondent	Issue	Applicant Response
	Traffic – road classification	The Level of Service for the Cobb Highway was determined using the NSW RTA Guide to Traffic Generating Developments (RTA, 2002). Table 4.5 presents a summary of Levels of Service for rural roads. This information is discussed in Section 15.2.1, which states: “During several investigations in the vicinity of the sites, it was observed that approximately 15% of traffic along the Cobb Highway (SH21) consists of heavy vehicles which are transporting goods and materials from and to the region. The RTA Guide to Traffic Generating Developments (RTA, 2002) states that for a rural road with a Level of Service B with level terrain and with 15% of the traffic volume as heavy vehicles, the peak hour flow is 530 vehicles. The RTA states that a rural road is operating desirably at Levels of Service A, B and C. Given the absence of hourly traffic data for the Cobb Highway, the approximate peak hour traffic to determine the available capacity on the road has been calculated. It is generally accepted that peak hour traffic for a rural road is equivalent to approximately 15% of the AADT. The peak hour traffic volume of the Cobb Highway has therefore been calculated as being equivalent to approximately 352 vehicles per hour (15% of existing AADT). Therefore the Cobb Highway has available spare capacity to absorb approximately 170 vehicles per peak hour before the Level of Service of the road is adversely affected.”

Respondent	Issue	Applicant Response
	Traffic – road counts	The traffic counts utilised for the traffic impact assessment are the most recent traffic counts available for the Cobb Highway in Murray Shire. The traffic count was extrapolated using the growth rate to 2003 for another traffic count station on the Cobb Highway.
	Heritage – Historical	Agricultural Equity Investments has amended the Statement of Commitments to incorporate mitigation measures relating to the ruins adjacent to the shearing sheds. In summary, the ruins located near the shearing sheds will remain intact during construction and operation of the feedlot.
	Heritage – Indigenous	The Local Aboriginal Land Councils accompanied HLA's archaeologists during the indigenous heritage investigations on site and were satisfied with the methodology and results of the investigations. HLA is able to obtain a letter from these Local Aboriginal Land Councils satisfaction with the assessment if requested to do so by the Department.
	Waste – Construction	Construction of the storage ponds will commence with the stripping of the topsoil from the storage area and borrow pit. This topsoil would be stockpiled and spread over the banks and irrigation area if required. The excavated soil from the storage areas would be utilised in the construction of the feed pens. As discussed in Section 14.5 of the Environmental Assessment: “As part of the detailed design process, additional geotechnical investigation would be undertaken to ensure that appropriate geotechnical design input is incorporated into the final feedlot design.” Excess building wastes, such as concrete would be disposed of at an appropriate landfill.

Respondent	Issue	Applicant Response
	Waste – Mass Death	Dead stock would not be removed from site, unless directed by a regulatory authority. Information relating to the disposal of dead animals is presented in Section 12.4.1, which states: “Dead animals would be composted as outlined in the relevant guidelines. This would be undertaken in the manure storage areas. An area would be set aside for a larger scale death event. In this case, the animals would be buried in accordance with the appropriate guidelines.” Contingency plans dealing with a mass death would also be detailed within the Animal Care Statement, which would be produced prior to stocking the feedlot.
	Waste – Irrigation Storage	The size of the effluent storage on site will be of sufficient capacity for the predicted volume of effluent generated by the proposed feedlot. Table 7 in Appendix E of the Environmental Assessment displays that the expected maximum storage requirement is 386ML during the month of September and for a 90th percentile wet year. Table 7 presents the volumes of irrigation required for the crop during the months of the year with the amount of effluent produced during these same months. The table shows that during some months of the year, the amount of effluent produced exceeds the volume of irrigation required for the crop. When this occurs, the excess effluent would need to be stored on site. The size of the storage pond required is calculated using these predictions. As a result, it is predicted that the maximum storage requirement of effluent is approximately 368ML.

Respondent	Issue	Applicant Response
		The proposed feedlot has an effluent storage of 500ML with a holding pond capacity of 130ML, which satisfies the expected maximum requirement for the storage of effluent.
	Waste – Manure	Guidelines indicate that an animal (cattle) in a typical feedlot produces approximately 1 tonne of manure (25% moisture) per head per year. The proposed feedlot would contain smaller animals and would not be 100% full all year around, say 80%. An estimate of the amount of dry manure (without moisture) was calculated at being approximately 64,000 tonnes per year.
	Soil – Suitability for irrigation	An agricultural soil test was undertaken and the results are provided in Appendix E. Table 2.2 of the <i>Environmental Guidelines: Use of Effluent Irrigation</i> (DEC, 2003) details the soil characteristics and limitations for effluent irrigation. Assessment of the soil results in relation to the appropriate criteria in the DEC document resulted in confirmation that the soils on the site are appropriate for effluent irrigation systems.
	Detail design of project	All structures will be appropriately lined to prevent leakage. A detailed geotechnical investigation will determine the appropriate lining for these structures.

Respondent	Issue	Applicant Response
	Stormwater runoff and potential impact to Moira Lake and wetland system	Information relating to the drainage control of the feedlot is provided in Section 12.3 of the Environmental Assessment, which states: “A controlled drainage area is the area of the proposed feedlot where runoff is generated from and flows to, and overall is subject to the site’s designed drainage system. The maximum area inside the controlled drainage area has been estimated as approximately 201ha for calculating the expected runoff from the proposed project.” Given the level of drainage control within the feedlot and irrigation area and that the landform drains to the west and away from the Moira Lake and wetland system, it is predicted that all stormwater runoff will be contained within the controlled drainage area in a storm event and not impact the Moira Lake and wetland system.
	Animal Welfare	Section 6.8.1 describes the Cattle Management Plan and Feedlot Management Plan. These plans refer to transportation, movement, feeding/watering, health check, operation of the feedlot, its design and general treatment and its consistency with the relevant guidelines. Specific information regarding the welfare of cattle within the proposed feedlot is provided in Section 6.10, which states: “The operation and practices for the proposed cattle feedlot at Moira Station will comply with the nationally recognised <i>Australian Model Code of Practice for the Welfare of Animals: Cattle</i> (SCARM, 2004) and <i>Australian Model Code of Practice for the Welfare of Animals: Land Transport of Cattle</i> (SCARM, 2000). In addition, AEI will prepare an Animal Care Statement (ACS) prior to stocking the feedlot.

Respondent	Issue	Applicant Response
		The ACS would outline procedures and policies required for disease control and veterinary care. It would also detail the means of mass disposal of carcasses should a large death count occur at the facility.” Additionally, the EA has assessed the potential risk to animal health within the feedlot in Section 20.3, which states: “There are a number of potential risks to cattle health in a feedlot environment as animals reside in close contact. Potential risks include disease and heat stress. The welfare of cattle is an important consideration to maximise cattle growth and productivity therefore the feedlot has been designed and would be operated to ensure that the health and well being of cattle is maintained. There are a number of illnesses and diseases which affect cattle, particularly in feedlots. However, the feedlot has been designed to best practice standards in order to minimise potential for disease and for spread of disease. The feedlot would also be operated in accordance with the requirements of NSW Agriculture. High temperatures with high humidity and no wind, especially when temperatures are high overnight can result in heat stress in animals (NSW Department of Primary Industries, 2004). Healthy cattle can tolerate extremes of heat and cold if they are acclimatised and have adequate feed and water and this would be provided. Should there be conditions when heat stress may be likely, measures, as outlined below, would be implemented to prevent animals suffering heat stress.”



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2 March 2006

Mr Duncan Peake
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Dear Duncan,

Response to review of odour impact assessment for Moira Feedlot by Pacific Air and Environment

Thank you for providing us with a copy of the submission by the Moira Board of Management regarding the proposed Moira Feedlot. We have reviewed the submission and have prepared this letter as a response to the review of our air quality impact assessment which was prepared by Pacific Air and Environment (PAE) and contained in the Moira Board of Management submission.

Responses to the PAE review are provided below.

ODOUR ISSUES

The PAE review refers to "soft-factors" which have been suggested as a way to modify odour impact assessments for specific situation. There is no doubt that "soft-factors" play a part in odour nuisance, however, this methodology appears to provide the most useful information for environments where there is an existing odour emitting operation with a surrounding community. It is mentioned also that, in a particular case study, "in the more adversely affected community, there were clear signs of sensitisation". For the Moira project, the most affected residences were predicted to be closest to the site. In the present environment these individuals are unlikely to already be "sensitised" by feedlot odours since the only similar source is of the order of ten kilometres from these locations. Furthermore, these residences were identified as being in the impact footprint where some resolution is required.

The Moira odour assessment was conducted in accordance with the regulatory guidelines published by the DEC. The concept of "soft-factors" are not noted explicitly by the DEC and these were not introduced in the Moira odour assessment. The sliding scale of odour criteria incorporates some aspects of "soft-factors" as it recognises a range of sensitivities in the community.

Holmes Air Sciences acknowledges that there is some uncertainty in the modelling for the Moira feedlot. However, it should also be noted that, for any project where there is modelling and assessment of odour issues, there will be uncertainty in every odour impact assessment. The Moira odour assessment was carried out using what were considered to be the most appropriate data for the purposes of the study. For a new project that will generate odour some level of uncertainty will always need to be accepted in order to make a decision on whether a project should proceed or not.

ODOUR EMISSIONS FROM FEEDLOTS – BACKGROUND INFORMATION

E A Systems have provided HAS with details on the FSIM model to assist with the preparation of a response to the PAE comment on verification of the FSIM model. Information is provided below.

FSIM is a program that is based on physical based algorithm and is a physically based deterministic model. The algorithms that give rise to both characterization of the manure surfaces and thence manure moisture contents and subsequently rainfall runoff have been defined by algorithms that predict manure accumulation, manure moisture evaporation rates, subsequent manure moisture contents, pen surface roughness, retention of water and infiltration of the same following rainfall and runoff from the pen surface.

1. The algorithms were first derived from full statistical analyses of single unrelated and geographically spread data sets obtained from field measurements at real field sites over a 4 year period.
2. These were then tested for robustness and accuracy using second unrelated datasets. (sensitivity analyses were applied, variability in coefficients in the algorithms were checked and parameterized etc)
3. Then, the predictive output from the algorithms were used to generate a dataset from known physical attributes (inputs) at a “third site” (i.e. other unrelated datasets) and these were matched with actual records of the same variables to verify the predictions and their statistical representiveness.

The work was done and reported in the PhD of Dr Simon Lott (Lott, 1998; Feedlot Hydrology), and various papers. In the case of evaporation algorithms there a total of approximately 7 sites used across quite a spread of locations and conditions in Southern Queensland. Subsequently, the manure accumulation rates and changes in manure moisture content (as a function of water balances) have been checked against various data sets from various MLA and in house projects. Results from the comparisons were considered by E A Systems to be quite good.

The weakness has been identified, by E A Systems, in extreme wet areas, that is, prolonged wet periods and their effect on manure degradation and losses from pen surfaces. This does not include the Moira site.

ESTIMATED ODOUR EMISSIONS

Estimates of odour emission rates from feedlots will always contain some level of uncertainty. There are few robust methodologies or models that will accurately replicate the variation in odour emission rates from feedlots.

The odour emissions model employed for the purposes of the study was considered to be a more useful tool for quantifying the odour impacts of the project than conventional methodologies such as assuming a constant odour emission rate. Firstly, the model has a dependence on the feedlot pad moisture content which is an important factor for determining the odour emission rate. Also, the odour emissions model is dependent on the amount of time since rainfall. The result from the model was a year-long record of hourly odour emissions with a pattern influenced largely by rainfall events. Some assumptions were, of course, required for this assessment approach.

The assumptions made for the purposes of the assessment were considered to be up-to-date estimates from available information on cattle feedlots. It should be noted that an objective of the dispersion modelling was to provide indication of likely odour impacts from the project – from which a decision on approval (or rejection) could be made. It is noted that rainfall for 2003 was close to the historical median rainfall for the area, thus, the odour assessment could be considered to represent a typical year. It is also recognised that there will be years with higher or lower than average rainfall and odour impacts from year to year may therefore be higher or lower than those presented in the odour assessment.

LOCAL ENVIRONMENT

TAPM (Version 2.0) was used to simulate the weather patterns for the proposed feedlot site. The CALMET model used output from TAPM to establish a three-dimensional wind field for the site, based on finer scale terrain and landuse features.

The application of “nudging” in TAPM would have been of limited value for this project. The closest known weather station data were found to be from Deniliquin, approximately 50 km to the north of the project site. The Deniliquin data were considered to be of limited value for “nudging” TAPM for several reasons as follows:

- The Moira site would be considered to be outside the radius of influence of data from Deniliquin;
- Wind directions at Deniliquin are measured in 10 degree increments;
- The average wind speed at Deniliquin was higher than averages from either TAPM or the measured on-site data

The comparison of the meteorological data records (presented in Appendix B of the assessment) was carried out on the information available at the time of the assessment. These records included data from the TAPM simulation for 2003, data from the on-site weather station for the period March to June 2005 and data collected at Deniliquin by the Bureau of Meteorology. There will be slight variations in meteorological records from year to year at any one site so the comparison generally focused on average wind speeds, annual percentage of calms and annual wind-roses. A useful outcome of the comparison was that the TAPM 2003 data were not vastly different from the available on-site data. Although the TAPM data were not considered the most ideal information for the assessment, the result of the comparison suggested that TAPM data were an adequate representation of the dispersion conditions in the area. The occurrence of very light winds was found to be higher in the on-site data than for the TAPM 2003 data. This suggests that possibly higher off-site odour concentrations would occur had the on-site data been available for use, however, the TAPM 2003 also had a higher percentage of F-class stabilities – also associated with conditions where high odour events are observed.

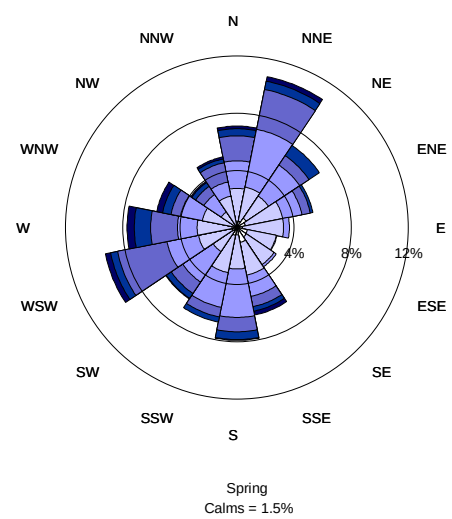
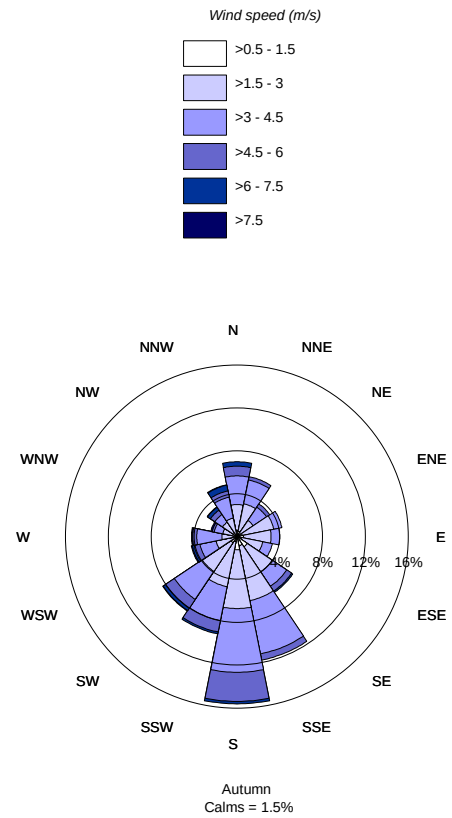
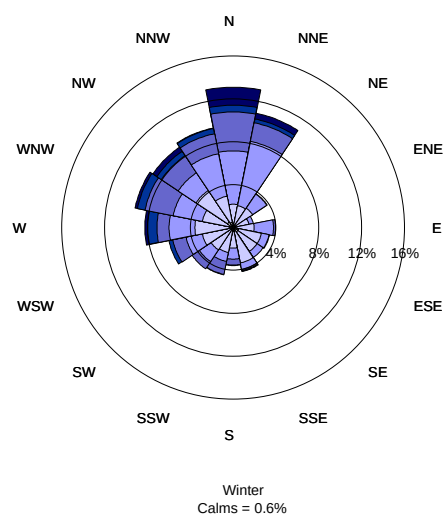
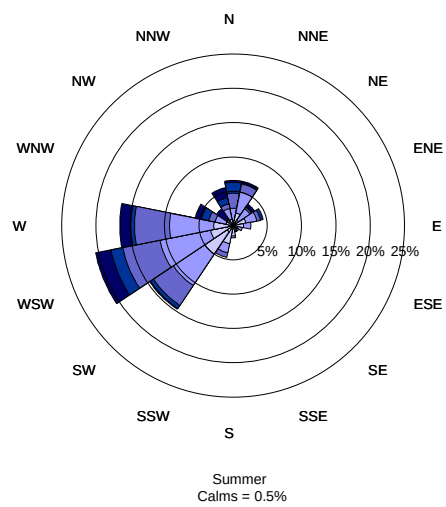
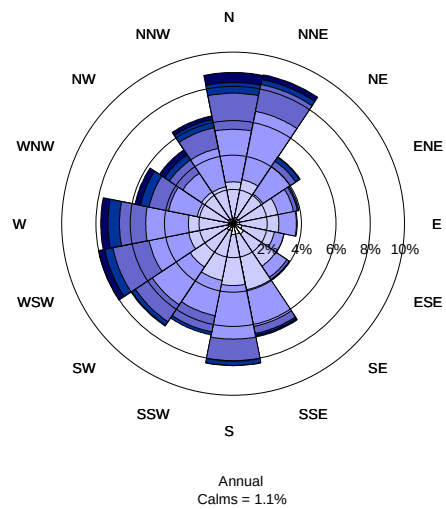
The collection of meteorological data at Moira has continued following the submission of the Environmental Assessment. Wind-roses and graphs have subsequently been prepared from data for a year 2005 TAPM simulation and on-site data collected in 2005. The wind-roses and graphs are provided below for comparison.

The following observations were made from the comparison:

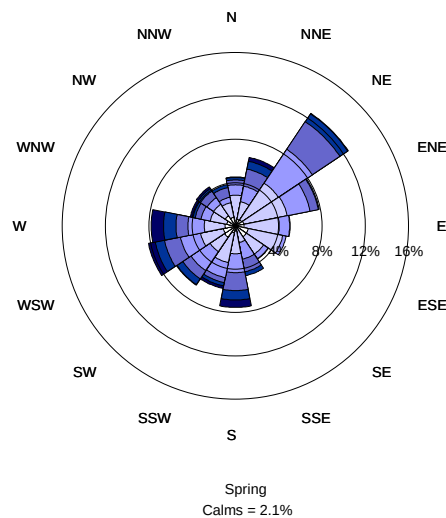
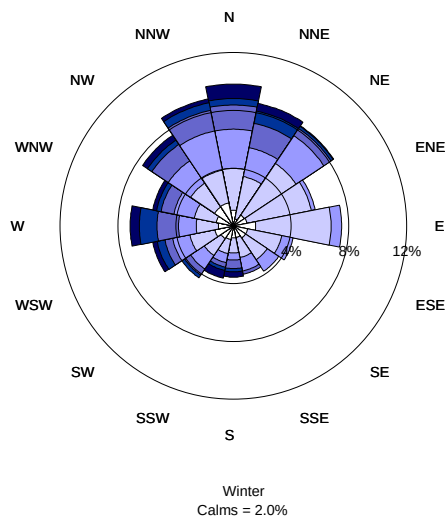
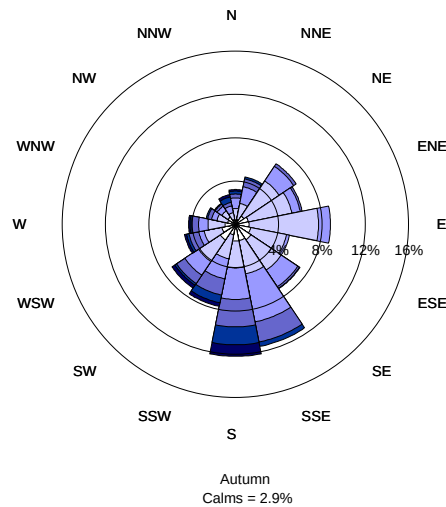
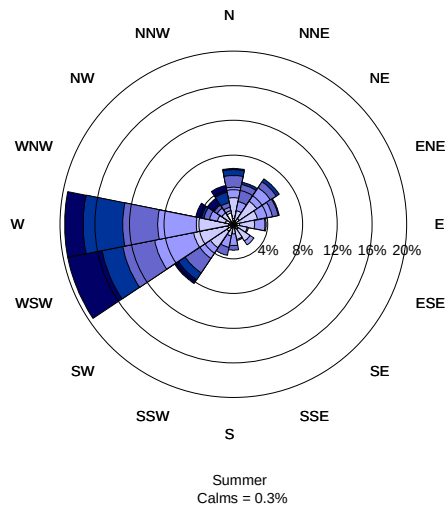
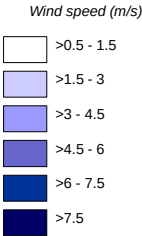
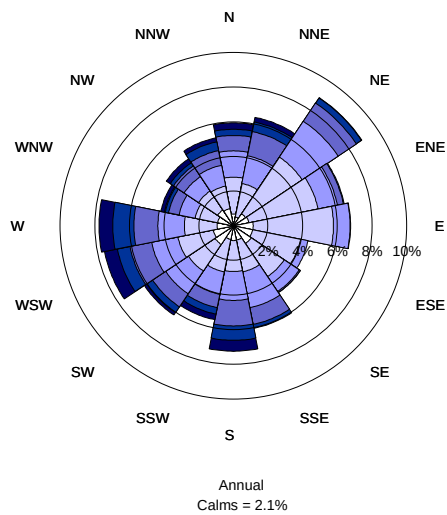
- Annual and seasonal wind-roses are considered to be similar for both the TAPM 2005 and Moira 2005 datasets
- The annual percentage of calms was 1.1% for the TAPM 2005 data and 2.1% for the Moira data.
- Annual average wind speeds were 3.5 and 3.3 m/s for the TAPM and Moira datasets respectively
- The TAPM 2005 data have a greater percentage of F-class stabilities while the Moira data have a greater percentage of D-class stabilities
- The frequency of light winds, say less than 2 m/s, is still slightly higher for the Moira data than for the TAPM data

While the concurrent TAPM and on-site data are still not identical, we consider that this comparison gives some more confidence in the performance of TAPM for the Moira area and reduces some of the uncertainty associated with the assessment.

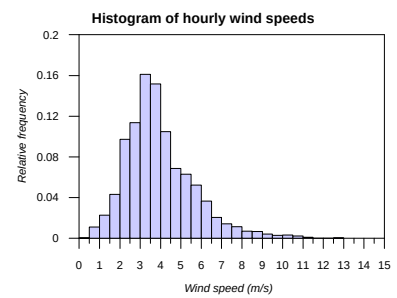
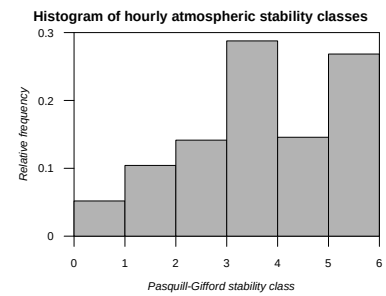
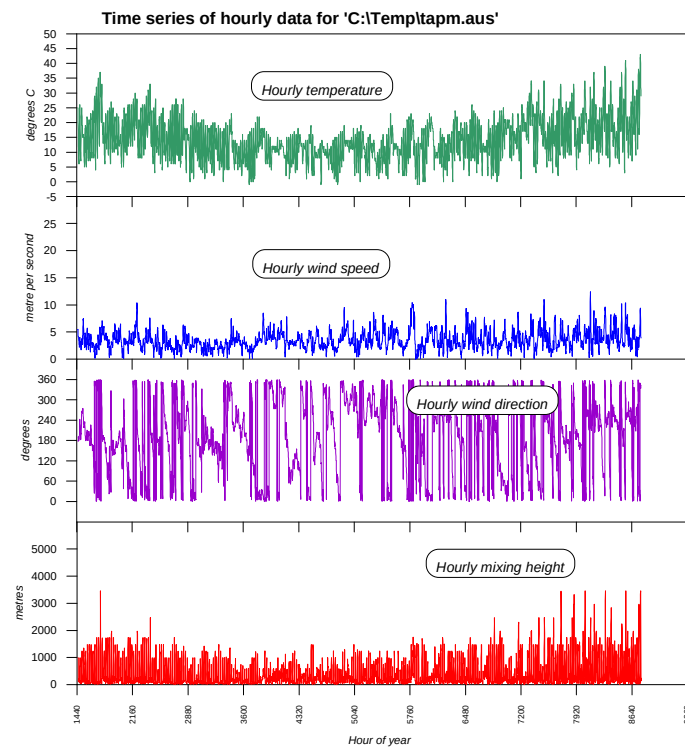
Annual and seasonal windroses for Moirá by TAPM (Mar 2005 to Dec 2005)



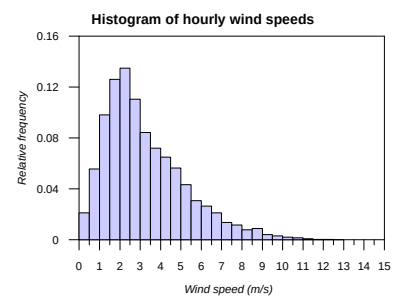
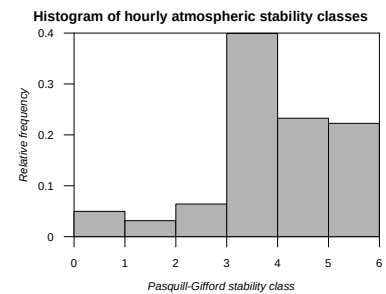
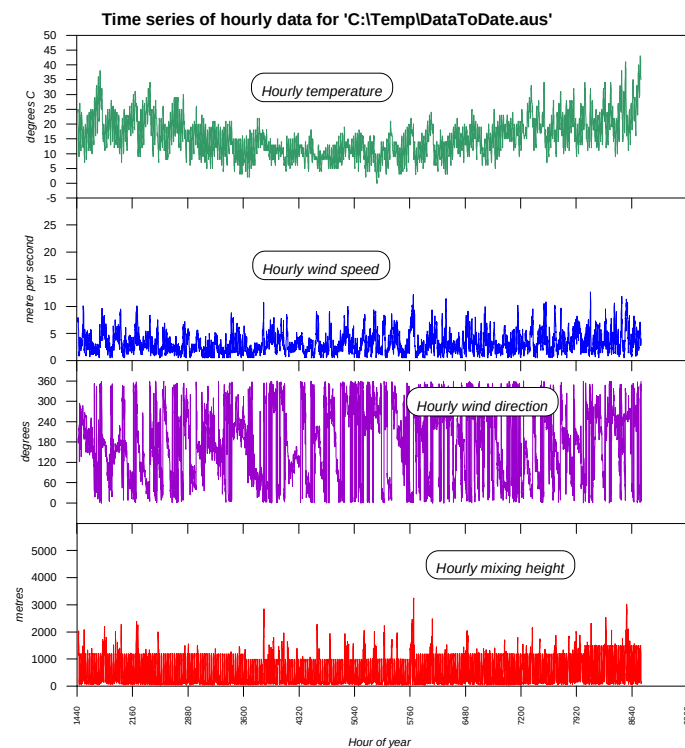
Annual and seasonal windroses for Moira as measured (Mar 05 to Dec 05)



TAPM 2005 data:



Moira 2005 data:



APPROACH TO ASSESSMENT

The DEC refer to the use of the generic calculations as a Level 1 odour impact assessment and recommend adopting a Level 2 or Level 3 (dispersion modelling using representative meteorological data) type assessment for large cattle feedlots or complex situations. The odour impact assessment has provided results from both Level 1 and Level 3 type assessments. Discussion on uncertainty in the modelling approach has been provided in earlier sections of this document.

Receptor information for the dispersion modelling was as follows:

- Gridded receptors covering an area 4 km by 4 km with 1 km m spacing, and
- Discrete receptors to represent the residences around the proposed site.

Results obtained for both the gridded and discrete receptors were used to generate contour plots. Model predictions at the discrete receptors (residences) were presented in Table 8 of the air quality assessment report.

ASSESSMENT OF IMPACTS

The generic calculations for feedlots are generally interpreted as a “first-pass” screening assessment of odour impacts. Results from the calculations will, inherently, be conservative. Thus, it would be expected that separation distances based on these calculations would lead to acceptable off-site odour levels. Dispersion modelling is generally undertaken as a more refined approach to odour assessments and, for a large project such as the Moira feedlot, more detailed assessment is usually warranted rather than relying on the generic calculations.

It is recognised that there could be several approaches for applying the DEC odour criteria. However, these are currently being refined. Interpretation of the odour criteria for the project was developed in consultation with the DEC and is therefore a valid interpretation of their criteria.

The assessment clearly identifies that some residences will be affected by odour and therefore there needs to be satisfactory resolution of this matter. This does not impose a constraint in the project as appears to be implied by the PAE report, as long as resolution is achieved.

We trust this information will be of assistance.

Yours faithfully,

Holmes Air Sciences