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# Environmental Impact Statement

## Wellard's Darwin Integrated Live Export Facility

Report Number 23919.78606



*Prepared for*



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## Executive Summary

### The Proponent

Wellard sells and exports livestock to overseas markets. It has a network of facilities across several States in Australia. It has a significant market share of the live export trade (see Appendix A). The company has made a significant investment in the long-term future of the livestock export trade and is committed to it. Wellard has been exporting from the Darwin for over 10 years. Currently they lease several pre-export quarantine (PEQ) holding yards close to and outside of Darwin.

Upon receipt of regulatory permission for a voyage, Wellard buyers begin sourcing quality livestock in advance of the shipment. Professional buyers work with farmers to select quality animals to meet the customers' specifications, and the health protocols of the importing country. Trucks transport the animals to the PEQ yard and thence to the ship, after a mandatory quarantine period.

The purchased stock are transported to PEQ yards for pre-shipment quarantine processing and checks. The consignment is aggregated, prior to loading, where the condition of the animals is monitored to ensure they will thrive on the voyage to the destination port.

At the PEQ yard stock are inducted and cared for by professional stockmen. Prior to loading livestock are inspected by both an accredited third party veterinarian as well as a veterinarian from the Australian Quarantine and Inspection Service, who must issue a "permit to leave for loading" before the consignment can be moved to the dock.

Ships travel to and from Darwin to the destination port on a regular basis. The voyage cycle is approximately 10-20 days. Livestock for shipping are aggregated in the PEQ yard over a 2-6 day period with the average holding time of just 4 days. This means that the yard fills quickly and then empties quickly; and, on average, the yard holds approximately 25% of its peak capacity over the shipping cycle.

Wellard currently lease yards and yard space for holding cattle for export. This presents several challenges to Wellard including;

- Increase operating costs associated with having to lease land and facilities;
- Risks of environmental harm with facilities that have "pre-existing" land use rights which do not adequately protect the environment;
- Impaired control of animal health and welfare associated with use of others yards; and,
- No business security for operations given that no long term tenure is held on the export facilities.

### The Proposal

The objectives of the proposal are to centralise, consolidate and modernise Wellard's Darwin facilities in one location. Wellard proposes to develop an integrated live export facility (ILEF) that on average holds 3000 SCU (1 SCU = one 600 kg animal), with a "peak" short term holding capacity of 12,000 SCU, as well as a 1,000 SCU short term feedlot for holding stock for longer than 30 days.

The project will be staged, with Stage 1 involving the development of the PEQ holding yards, and Stage 2 the short term feedlot. In addition to these structures, a compost manure pad, feedmill, commodity and fodder storage sheds, livestock truck washing facility, access roads and four (4) ponds/dams will be constructed onsite.

Once operational, the livestock will be transported to the ILEF from farms in the NT, WA, QLD and SA. PEQ Livestock will be fed a maintenance ration. All manure produced is to be composted onsite and sold off-site. Wastewater from the pens and compost manure pad will be treated onsite in the primary wastewater pond. Together with water from the drainage/stormwater system, the treated wastewater will be utilised on a 40 hectare irrigation area. It is anticipated that the irrigated crops will be Rhodes Grass, Purple Pigeon Grass and Lucerne due to their strong nutrient uptake abilities. These crops will be harvested to produce silage for the livestock.

## The Site

The site is situated on Stuart Highway, 50 km south-south east (SSE) of Darwin; 40 km south east of the Darwin harbour, and approximately 8 km East of Berry Springs.

The site is extensively modified and was previously used for grazing, cultivation and pasture production. It also has history of horticultural use (melon growing) and there is no evidence of cattle dips on the site.

Neighbouring properties on the north, west and south are utilised for agriculture, with the “Santavan” PEQ yards bordering the northern side of the site and the AA Co. meat processing facility to the west and south, separated by a railway line. The eastern side of the site is bordered by the Stuart Highway and across from that is a 200 m wide strip of vegetation, followed by an airstrip and then several houses in Hughes.

This site was selected as it is immediately adjacent to the existing “Santavan” PEQ holding yard which is currently leased by Wellard.

## The Impacts

The ILEF will extract a maximum of 250 ML of groundwater from a deep aquifer bore. This aquifer is deeper than those of surrounding properties and will not impact their household use. The application of treated wastewater to the irrigation block will be done so under strict environmental and nutrient loading controls.

The PEQ and feedlot pens are above the 1 in 100 year flood levels. Site sloping and drainage systems are planned to protect the local waterways on surrounding properties. Stormwater runoff from all areas will be captured and stored on-site for subsequent use within the site operations and on the irrigation block. A wet weather storage pond will capture any overflow from the primary wastewater pond. The wastewater irrigation will be undertaken using an automated low pressure poly lined lateral move irrigator with drop hoses. No aerosols will be generated and all wastewater will be applied directly to the ground.

Manure harvested from the pens and sedimentation basin will be stockpiled and composted on-site prior to its being sold for off-site use as a soil ameliorant. Composting of the manure will stabilise a large proportion of the organic matter constituents, reducing the odour and pollution hazards associated with any subsequent handling and use of the manure. Individual carcasses of any stock dying while resident will be sent to a pet food supplier or sent to be rendered at AA Co Meat Processing Facility, via a negotiated commercial arrangement. If these options are not available, the carcasses will be disposed of by composting via specially designed larger windrows for decomposition and vector control.

All livestock will be kept, transported and cared for under conditions consistent with the nationally recognised Australian Model Code of Practice for the Welfare of Animals: Cattle and Australian Model Code of Practice for the Welfare of Animals: Land transport of cattle. Compliance with these codes of practice will be subject to ongoing review and auditing.

The development is dependent upon the movement of livestock to and from the site, the transport of feed stuffs onto the site and compost offsite. Significant increases in traffic volumes will occur as a result. The ILEF will seal 100 m of its internal access road per year. The external road, owned by AA Co. has enough capacity to tolerate the movements of the ILEF and AA Co.

Noise is not predicted to exceed noise impact criteria.

An odour assessment has found that odour should not impact residents, provided vegetation on the borders of the property is not cleared and the minimum separation or buffer distances are maintained.

The proposal will entail the clearing of a 2.6 ha patch of heavily degraded remnant vegetation on the site. Clearing will be offset by the establishment of 2 hectares of native vegetative buffers along the boundaries of the site. No endangered or threatened flora and fauna species will be adversely impacted by the proposed development.

A comprehensive environmental management plan will be applied to the site. Environmental monitoring will be undertaken in accordance with best practice and regulatory requirements. The development and management of the site aim to mitigate impacts with known, scientifically based, practicable measures.

The potential environmental impacts should be balanced with the economic and social impacts Wellard may bring to the region. Each year Wellard buy at least \$50M worth of livestock from within the NT for export. Approximately \$5M is spent on transport of livestock and \$8M on fodder and feedstuffs for PEQ yards and feed for placement on ships. Approximately \$4M is spent on port costs. Thus approximately \$67M is expended in the NT. Of this, it is expected that \$2M will be spent each year on local labour and \$3M on local fodder and hay. Existing expenditure at the port and within the region will continue.

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## Glossary

|                        |                                                                                                                                                                                                                                                          |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Agribusiness zone      | A buffered area afforded to agricultural businesses to prevent prime agricultural land from being built up.                                                                                                                                              |
| ARI                    | Average Recurrence Interval – the average or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration. It is implicit in this definition that the periods between exceedances are generally random. |
| ASEL                   | Australian Standards for the Export of Livestock                                                                                                                                                                                                         |
| Cwth                   | Commonwealth                                                                                                                                                                                                                                             |
| dBA                    | Decibel (A-weighting) – sound level that is filtered to correspond to human sound perception. Zero dBA corresponds to the threshold of hearing (auditory threshold). 130 dBA is approximately the threshold of pain.                                     |
| DLRM                   | Department of Land Resources and Mines (NT)                                                                                                                                                                                                              |
| DoH                    | Department of Health (NT)                                                                                                                                                                                                                                |
| EcOz Environmental     | EcOz Environmental Consultants                                                                                                                                                                                                                           |
| EnviroAg               | EnviroAg Australia Pty Ltd                                                                                                                                                                                                                               |
| EPA                    | Environmental Protection Authority                                                                                                                                                                                                                       |
| EPBC Act               | Environmental Protection Biodiversity Conservation Act 1999 (Cwth)                                                                                                                                                                                       |
| GHG                    | Greenhouse gas – gases that contribute to the warming of the atmosphere.                                                                                                                                                                                 |
| ILEF                   | Integrated Live Export Facility                                                                                                                                                                                                                          |
| MLA                    | Meat and Livestock Australia                                                                                                                                                                                                                             |
| NSR                    | Noise sensitive receptor – a resident that may be sensitive to noise produced by the facility.                                                                                                                                                           |
| NT                     | Northern Territory                                                                                                                                                                                                                                       |
| NTWM Act               | Northern Territory Weed Management Act 2001(NT)                                                                                                                                                                                                          |
| PEQ                    | Pre-Export Quarantine                                                                                                                                                                                                                                    |
| PM10, PM2.5            | Particulate matter (including dust, smoke, etc.) smaller than 10µm and 2.5µm respectively.                                                                                                                                                               |
| PWC                    | Power and Water Corporation (NT)                                                                                                                                                                                                                         |
| SCU                    | Standard Cattle Unit – where 1 SCU is equal to one 600 kg animal.                                                                                                                                                                                        |
| TPWC Act               | Territory Parks and Wildlife Conservation Act                                                                                                                                                                                                            |
| NT Weed Classification | Class A weed – To be eradicated.<br>Class B weed – Growth and spread to be controlled.<br>Class C weed – Introduction into the Northern Territory is to be prevented.                                                                                    |
| Wellard                | Wellard Rural Exports Pty Ltd                                                                                                                                                                                                                            |

## Terms of Reference

The following table provides a summary map of the information required by the Northern Territory EPA in their Terms of Reference (Appendix U).

| Page No.         | Detail Requested in Terms of Reference                                                                                                                                                                                                                                                                | Where it is covered in EIS |
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| <b>Page 4</b>    | <b>2 Scope of the Project</b>                                                                                                                                                                                                                                                                         |                            |
| <b>Page 4</b>    | <b>2.1 General Information</b>                                                                                                                                                                                                                                                                        |                            |
|                  | Title of project                                                                                                                                                                                                                                                                                      | Section 1.2.2              |
|                  | Name of proponent                                                                                                                                                                                                                                                                                     | Section 1.2.1              |
|                  | Site owner/tenant's name & contact details                                                                                                                                                                                                                                                            | Section 1.2.1              |
|                  | Location of project (regional context)                                                                                                                                                                                                                                                                | Section 1.2.3              |
|                  | Current status of project                                                                                                                                                                                                                                                                             |                            |
|                  | Background to the development of the project, including any previous EIS, surveys or investigations undertaken on the site                                                                                                                                                                            | Section 1.2                |
|                  | Relationship of the project to any other industry or facility                                                                                                                                                                                                                                         | Section 1.2.1              |
|                  | Environmental record of proponent including any proceedings against the proponent under commonwealth, state or territory law for protection of the environment or the conservation and sustainable use of natural resources and details of systems and processes that have subsequently been upgraded | Section 1.2                |
|                  | National, state, territory standards, codes of practice and guidelines relevant to the project                                                                                                                                                                                                        | Section 1.1, Section 4.10  |
|                  | Facility expansion options                                                                                                                                                                                                                                                                            | Section 3.10.1             |
|                  | Outline of the net economic benefits of the project.                                                                                                                                                                                                                                                  | Section 7.17               |
| <b>Pages 4-5</b> | <b>2.2 Project Components</b>                                                                                                                                                                                                                                                                         |                            |
|                  | Community Consultation Strategy                                                                                                                                                                                                                                                                       | Section 5                  |
|                  | Type, Quantity of all Hazardous & Dangerous materials (Stored, handled, used, transported, disposed onsite) including but not limited to Pesticides and pharmaceuticals                                                                                                                               | Section 3.9, Section 7.13  |
|                  | Type and quality of liquid and non-liquid wastes (handled, stored, transported, disposed of onsite)                                                                                                                                                                                                   | Section 3.9                |
| <b>Page 5</b>    | <b>2.2.1 Built Structures and infrastructure</b>                                                                                                                                                                                                                                                      |                            |
|                  | Full description of construction works proposed                                                                                                                                                                                                                                                       | Section 3.10               |

| Page No.  | Detail Requested in Terms of Reference                                                                                                                                                                                                                                                                                                                                            | Where it is covered in EIS                                   |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
|           | Details of proposed earthworks and services including water supply, wastewater infrastructure and drainage                                                                                                                                                                                                                                                                        | Section 3.10, Section 3.11                                   |
|           | Construction timetable, staging, hours of construction, construction workforce and proposed construction methods and planned commissioning date                                                                                                                                                                                                                                   | Section 3.10, Section 3.11, Section 7.8                      |
|           | Outline how demolition activities for site preparation will be undertaken in accordance with NT EPA Asbestos guidelines for disposal in NT                                                                                                                                                                                                                                        | Appendix E, Appendix H                                       |
|           | Design details and rationale for feedlots, holding yards and hospital isolation pens; storm water management and wastewater treatment system, including capacity of the holding pond, spill frequency and drainage flow rates; composting and manure stockpile pads; irrigation area for treated wastewater reuse; livestock truck washing facility; caretakers ablution facility | Section 3                                                    |
| Pages 5-6 | <b>2.2.2 Operation</b>                                                                                                                                                                                                                                                                                                                                                            |                                                              |
|           | Project operational life and operating periods                                                                                                                                                                                                                                                                                                                                    | Section 3.11.3                                               |
|           | The stocking density, livestock diet, the predicted frequency and intensity of pen use and the proposed months of operation each year                                                                                                                                                                                                                                             | Section 3.6, Section 3.7                                     |
|           | An estimate of the predicted groundwater demand, extraction rate and target aquifers for the stock watering water supply                                                                                                                                                                                                                                                          | Section 7.5, Section 4.6                                     |
|           | The containment of livestock prior to movement                                                                                                                                                                                                                                                                                                                                    | Section 3.6                                                  |
|           | Transport - no truck movements, hours, procedures for unloading and re-loading livestock                                                                                                                                                                                                                                                                                          | Section 3.2                                                  |
|           | Frequency of pen cleaning, stock piling and management of effluent                                                                                                                                                                                                                                                                                                                | Section 3.9.2                                                |
|           | Details of the sources of wastewater to be disposed of at the irrigation area, include any wastewater additional to the project site accepted for disposal                                                                                                                                                                                                                        | Section 3.9                                                  |
|           | Assessment of size and suitability of irrigation area include any wastewater external to project accepted for disposal                                                                                                                                                                                                                                                            | Section 3.8, Section 3.9                                     |
|           | Assessment of the size and suitability of the irrigation area for treated waste water, including hydraulic and nutrient budgets for irrigation areas                                                                                                                                                                                                                              | Section 3.8, Section 3.9, Appendix H, Appendix M, Appendix O |
|           | Nature of processes and products and by-products produced                                                                                                                                                                                                                                                                                                                         | Section 3.9                                                  |
|           | Details of the operational arrangements relating to the management of compost aeration and moisture levels                                                                                                                                                                                                                                                                        | Section 3.9                                                  |
|           | Planned operational and equipment maintenance procedures                                                                                                                                                                                                                                                                                                                          | Appendix E, Appendix F, Appendix G, Appendix H, Appendix I   |
|           | Information on the management and storage of freshwater and waste water on site                                                                                                                                                                                                                                                                                                   | Section 3.8, Section 3.11.1, Section 7.5                     |

| Page No.    | Detail Requested in Terms of Reference                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Where it is covered in EIS           |
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|             | Management of effluent storage ponds, including maintenance of freeboard and frequency of removal of solids build-up                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Section 3.8, Section 3.9 Section 7.2 |
|             | Details of any contingency measures proposed to minimise the impacts of spills and safely dispose of contaminated waters that may result from storms, fire, flood, equipment malfunction or vandalism. Information should include workforce training, site monitoring and emergency response facilities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Section 7, Section 9, Appendix E     |
| Pages 6-7   | <b>2.3 Alternatives</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                      |
|             | <p>Discuss alternatives to the proposal using how it complies with principles and objectives of Ecologically Sustainable Development. Discussion should include built is not limited to:</p> <ul style="list-style-type: none"> <li>• Not proceeding</li> <li>• Alternative locations that reduce potential landuse conflicts between the project and present/future sensitive receptors. Considerations should include potential for any future residential developments local to the currently proposed ILEF site. In this respect consultation should occur with the DLPE, to identify any areas of potential future residential development.</li> <li>• Alternative layouts that improve project outcomes, such as demonstrating efforts to avoid proximity to water resources and showing potential areas of modification of contours, drainage etc</li> <li>• Option to optimise ecological sustainability for the project, such as alternatives to reduce/offset the projects' environmental footprint and reduce ongoing need for high rates of electricity and water consumption.</li> <li>• Considerations of alternative environmental management measures for key risks/impacts.</li> <li>• Adverse and beneficial effects (direct and Indirect) of alternatives at national , Territory, regional and local levels</li> <li>• The comparison of short and long term advantages and disadvantages of the alternatives</li> </ul> | Section 2                            |
| Page 7      | <b>2.4 Approvals, Conditions &amp; Agreements</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                      |
|             | Description of approvals obtained/required from NT or commonwealth agencies or authorities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Section 8                            |
|             | Summary of agreements relevant to the project between the proponent and the NT Govt, Aust Govt, Stakeholders, Traditional Owners, land managers and or other stakeholders                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Section 5                            |
|             | Details of approval(s), certificates, permits including any conditions currently imposed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Section 8                            |
| Pages 7 - 8 | <b>3 Existing Environment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |
|             | Meteorological data (rainfall, temperature and evaporation, wind speed and direction)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Section 4.1                          |
|             | Topography (landform element, slope type, gradient and length)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Section 4.2                          |
|             | Geomorphology (rates of landform change and current erosion and deposition processes)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Section 4.4, Section 4.5             |
|             | Surrounding land uses (potential synergies & conflicts) and present landuse zoning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Section 4.10                         |

| Page No.          | Detail Requested in Terms of Reference                                                                                                                                                                                                                                                                                                                                                                                         | Where it is covered in EIS           |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
|                   | Soil investigation - soil type, structure, properties (including erodibility; engineering/structural properties, dispersability, permeability), depth to water table, suitability to support wastewater irrigation practices.                                                                                                                                                                                                  | Appendix M                           |
|                   | Site history (site contamination, remediation etc.)                                                                                                                                                                                                                                                                                                                                                                            | Section 4.12                         |
|                   | Waterways (natural & artificial, permanent & ephemeral) within or downstream of the project. Description of hydrology (inc. drainage patterns), runoff rates, environmental values and potential for flooding.                                                                                                                                                                                                                 | Appendix O                           |
|                   | Risk to groundwater within and adjacent to project area: <ul style="list-style-type: none"> <li>Including analysis of all existing data relating to ground water resources on and adjacent to the project area;</li> <li>Environmental modelling conducted to determine interaction between surface water and groundwater;</li> <li>Identify groundwater recharge areas on the site or in the vicinity of the site.</li> </ul> | Appendix P                           |
|                   | Sensitive receptors at risk of construction and/or operation. Describe type, location and no. receptors at risk                                                                                                                                                                                                                                                                                                                | Section 7.9, Appendix C              |
|                   | Baseline dust monitoring                                                                                                                                                                                                                                                                                                                                                                                                       | Section 4.7, Section 7.9, Appendix E |
|                   | Physical survey                                                                                                                                                                                                                                                                                                                                                                                                                | Figure 1                             |
|                   | Soil assessment (geotech agronomic)                                                                                                                                                                                                                                                                                                                                                                                            | Appendix M                           |
|                   | Geological assessment (groundwater supply hydrology)                                                                                                                                                                                                                                                                                                                                                                           | Appendix P                           |
|                   | Odour assessment                                                                                                                                                                                                                                                                                                                                                                                                               | Appendix C                           |
|                   | Traffic assessment                                                                                                                                                                                                                                                                                                                                                                                                             | Appendix Q                           |
| <b>Pages 8 -9</b> | <b>4 Risk Assessment</b>                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |
|                   | Acknowledge and discuss project risks                                                                                                                                                                                                                                                                                                                                                                                          | Section 6, Appendix D                |
|                   | Quantify and rank risks                                                                                                                                                                                                                                                                                                                                                                                                        | Section 6, Section 6.2.2, Appendix D |
|                   | Acknowledge levels of uncertainty of risk                                                                                                                                                                                                                                                                                                                                                                                      | Section 7                            |
|                   | Identify members of the community expected to accept residual risk and consequences, providing better understanding of equity issues                                                                                                                                                                                                                                                                                           | Section 5, Appendix C                |
|                   | Anticipated level of performance in meeting required Environmental standard & cleaner production principles                                                                                                                                                                                                                                                                                                                    | Section 3.11.5, Section 7            |
|                   | <b>Key Risks associated with the project</b>                                                                                                                                                                                                                                                                                                                                                                                   |                                      |

| Page No.     | Detail Requested in Terms of Reference                                                                                                                              | Where it is covered in EIS                       |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Pages 9 - 11 | <b>4.1 Water</b>                                                                                                                                                    |                                                  |
|              | <i>Assessment of risks</i>                                                                                                                                          |                                                  |
|              | Contaminants and microbiological pathogens from the project entering waterways and/or aquifers                                                                      | Appendix E                                       |
|              | Changes to hydrology (incl drainage patterns, surface runoff yield, flow regimes, wetland hydraulic regimes and groundwater                                         | Section 7.4, Section 7.5, Appendix O, Appendix P |
|              | Identification of potential impacts of the project on quality or quantity of ground water.                                                                          | Section 7.5, Appendix P                          |
|              | Existing water users potentially impacted by the project                                                                                                            | Section 7.5, Appendix P                          |
|              | Seasonal use/storage and irrigation of water onsite. (risk during the wet season)                                                                                   | Section 7.5, Appendix O                          |
|              | Risk to values of areas used for recreation purposes downstream of the facility (fed by surface water or groundwater)                                               | Section 7.5                                      |
|              | Cumulative impacts of the project and existing developments                                                                                                         | Section 7.1                                      |
|              | <b>Mitigation</b>                                                                                                                                                   |                                                  |
|              | Management of surface water flows and waste water during times of high/extreme rainfall events and periods                                                          | Section 7.2, Section 7.4, Section 7.5, Section 9 |
|              | Maintenance and monitoring of stormwater management and wastewater treatment systems                                                                                | Section 7.2, Section 7.4, Section 7.5, Section 9 |
|              | Application of waste and chemical management principles on site for hazardous and dangerous materials and liquid and non-liquid wastes as identifies in Section 2.2 | Section 9                                        |
|              | Contingencies for operational events or emergencies                                                                                                                 | Section 9                                        |
|              | <b>Monitoring</b>                                                                                                                                                   |                                                  |
|              | Water monitoring program                                                                                                                                            | Section 9, Appendix E                            |
|              | Methods of monitoring performance of effluent and waste water treatment system                                                                                      | Section 9, Appendix E                            |
| Pages 11 -12 | <b>4.2 Air Quality</b>                                                                                                                                              |                                                  |
|              | <i>Assessment of risks</i>                                                                                                                                          |                                                  |
|              | The effect of seasons (Wet and Dry seasons) on the potential risk and nuisance to receptors.                                                                        | Section 4.7, Section 7.7, Section 7.9,           |

| Page No. | Detail Requested in Terms of Reference                                                                                                                                                                                                                  | Where it is covered in EIS           |
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|          |                                                                                                                                                                                                                                                         | Appendix C                           |
|          | Identify existing sensitive receptors                                                                                                                                                                                                                   | Section 7.7, Section 7.9, Appendix C |
|          | Future sensitive receptors, Including potential development of any new residential areas local to proposed ILEF                                                                                                                                         | Section 7.7, Section 7.9, Appendix C |
|          | <b>Mitigation and Monitoring</b>                                                                                                                                                                                                                        |                                      |
|          | Any operational arrangements to minimise dust and odour generation by the Project                                                                                                                                                                       | Section 7.7, Section 7.9             |
|          | Any management strategies that would be implemented to minimise the impacts of the development on local air quality                                                                                                                                     | Section 7.9                          |
|          | details of the separation distances from sensitive receptors, with reference to appropriate standards and / or guidelines                                                                                                                               | Section 7.7, Appendix C              |
|          | Details of the proposed air monitoring (odour and dust), including technique, location, frequency, laboratory analysis and certification, and target parameters. Proposed reactive management measures tied to monitoring thresholds should be provided | Section 7.7, Section 7.9             |
|          | Consideration of community consultation (strategy as required in section 2.2) regarding the potential impacts to community amenity arising from Project dust and odour emissions                                                                        | Section 5, Appendix C                |
|          | Complaint mechanisms including site contacts                                                                                                                                                                                                            | Section 7, Appendix E                |
| Page 12  | <b>4.3 Waste</b>                                                                                                                                                                                                                                        |                                      |
|          | <b>Assessment of risks</b>                                                                                                                                                                                                                              |                                      |
|          | The risks associated with the in-flow and out-flow of materials, including transportation, stockpiling, and any discharge to the environment (stormwater, atmosphere, recycling, reuse, landfill)                                                       | Section 3.9, Appendix E, Appendix H  |
|          | The risks associated with the proposed disposal methods for all solid and liquid wastes or recovered materials at the facility                                                                                                                          | Section 3.9, Appendix E, Appendix H  |
|          | <b>Mitigation and Management</b>                                                                                                                                                                                                                        |                                      |
|          | Demonstrated adoption of the waste hierarchy to minimise waste                                                                                                                                                                                          | Appendix H                           |
|          | Measures to ensure waste is appropriately handled to prevent contamination of land and water resources including reuse, recycling, processing and treatment both on- and off-site (including composting), and / or disposal                             | Appendix H                           |
|          | Consideration of potential requirement for an Environment Protection Approval and/or Environment Protection Licence under the Waste Management and Pollution Control Act.                                                                               | Appendix H                           |
| Page 13  | <b>4.4 Noise</b>                                                                                                                                                                                                                                        |                                      |
|          | Identify potential sources of noise and assess the impacts on sensitive receivers' current and future.                                                                                                                                                  | Section 7.8                          |

| Page No.      | Detail Requested in Terms of Reference                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Where it is covered in EIS                          |
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|               | Noise Management Monitoring Plan                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Appendix E,                                         |
|               | Community consultation to consider potential impacts to community amenity                                                                                                                                                                                                                                                                                                                                                                                                                              | Section 5                                           |
| Page 13       | <b>4.5 Weeds &amp; Pests</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                     |
|               | Identify and discuss potential impacts to vegetation, fauna and habitats of conservation significance at local and regional scale                                                                                                                                                                                                                                                                                                                                                                      | Section 4.3, Section 7.14                           |
|               | EMP to outline management measures to mitigate potential impacts associated with the spread of weeds and pests in the region                                                                                                                                                                                                                                                                                                                                                                           | Appendix E                                          |
|               | Prepare a Weed Management Plan in consultation with the DLRM - Weed Management Branch                                                                                                                                                                                                                                                                                                                                                                                                                  | Appendix G                                          |
| Page 13       | <b>4.6 Erosion &amp; Sediment Control</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                     |
|               | Prepare ESCP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Appendix I                                          |
| Pages 13 - 14 | <b>4.7 Biting Insects</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                     |
|               | Prepare Biting Insect Management Plan                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Appendix F                                          |
|               | Outline how design and construction of ponds associated with stormwater and waste water treatment will adhere to DoH Guidelines                                                                                                                                                                                                                                                                                                                                                                        | Section 3.8                                         |
|               | Consult with Department of Health regarding Biting Insect Management Plan                                                                                                                                                                                                                                                                                                                                                                                                                              | Section 7.14                                        |
| Page 14       | <b>4.8 Cumulative Impacts</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                     |
|               | Potential for future residential developments local to the currently proposed ILEF site, with associated new sensitive receptors to off-site Project impacts (such as odour, dust noise and traffic)                                                                                                                                                                                                                                                                                                   | Section 7.1, Section 7.17, Section 7.18, Section 10 |
|               | Landscape change that originates not only from single projects and management actions, but also from complex and dynamic interactions of multiple past, present and future management actions                                                                                                                                                                                                                                                                                                          | Section 7.1, Section 7.17, Section 7.18, Section 10 |
|               | Biophysical, social and economic change accumulates through additive or interactive (or synergistic) processes. The aggregate impact of multiple actions on the environment can be complex and may result in impacts that are more significant because of interactive processes                                                                                                                                                                                                                        | Section 7.1, Section 7.17, Section 7.18, Section 10 |
|               | The fact that an action does not operate in isolation. The most significant changes are often not the result of the direct effects of an individual action, but from the combination of multiple minor effects over the accumulation of time. Given that the action is located near other actions / operations which have the potential to cause environmental nuisance, consideration should be given to the potential for compounding and / or additional nuisance to the environment and receptors. | Section 7.1, Section 7.17, Section 7.18, Section 10 |
| Pages 14 - 15 | <b>4.9 Ecologically Sustainable Development</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                     |
|               | Promote ESD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Section 10                                          |
|               | Protect the environment, having regard to the need to enable ESD                                                                                                                                                                                                                                                                                                                                                                                                                                       | Section 10                                          |

| Page No.      | Detail Requested in Terms of Reference | Where it is covered in EIS |
|---------------|----------------------------------------|----------------------------|
| Pages 15 - 18 | 5 General Advice on EIS                |                            |
|               | Executive summary                      | Page ii                    |
|               | Appendices                             | Section 12                 |

# 1. The Proposal

## 1.1 Regulatory Context of the Proposal

The proposal is to develop an Integrated Live Export Facility (ILEF) at “Livingstone Valley” 2658 Stuart Highway, Livingstone Northern Territory (NT).

The activities associated with the construction and operation of the ILEF such as Intensive Animal Husbandry, feed milling, water extraction and land clearing constitute prescribed, scheduled or designated developments, actions or activities in the following legislation, regulations, policies or plans:

- Environmental Protection and Biodiversity Conservation Act 1999 (Cwth);
- Planning Act (NT);
- NT Planning Scheme;
- Territory Parks and Wildlife Conservation Act; and,
- Northern Territory Weed Management Act 2001.

The proposal requires the submission of a Development Application with the Department of Land, Planning and the Environment, an application with the Northern Territory Environmental Protection Authority (NTEPA).

## 1.2 Applicant and Site Information

### 1.2.1 *The Proponent and the Owners of the Subject Land*

The proponent for this application is Wellard Rural Exports Pty Ltd. Wellard currently leases the “Santavan” PEQ yards and has recently purchased the adjoining property “Livingstone Valley” (the proposed development site) from the previous owners Suncode Pty Ltd.

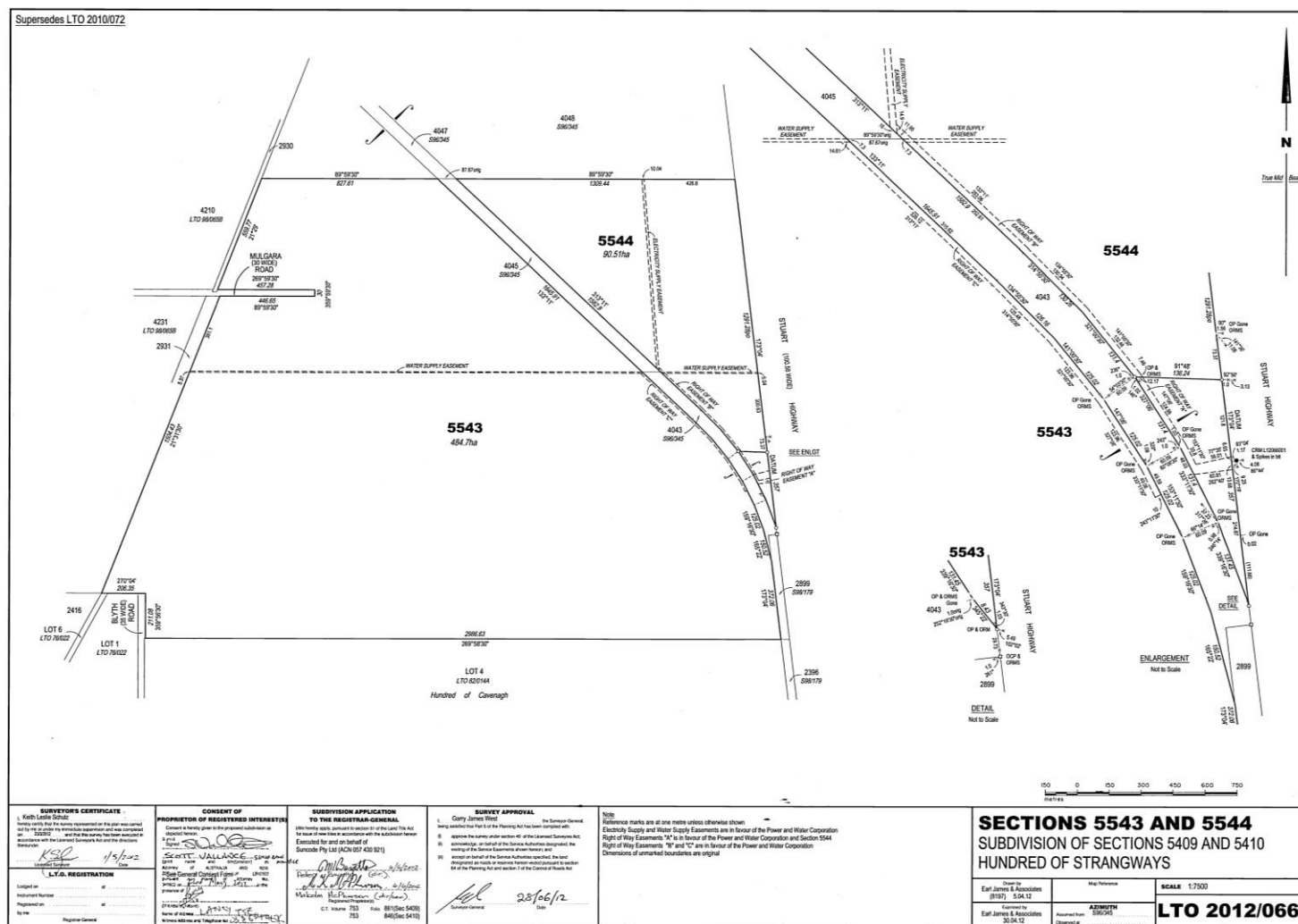
Wellard Rural Exports have not had any proceedings against them under Commonwealth, State or Territory law for the protection of the Environment or the conservation and sustainable use of natural resources.

### 1.2.2 *Title Description and Land Tenure*

**Table 1 Site Details and Title Description**

| Parameter                  | Value                                                          |
|----------------------------|----------------------------------------------------------------|
| Address                    | “Livingstone Valley” 2658 Stuart Highway, Livingstone, NT 0822 |
| Land Parcel Type and Label | Sec 5544                                                       |
| Town/Hundred               | Livingstone, Hundred of Strangways                             |
| Area                       | 90.5 ha (220 acres)                                            |
| Current Land Use           | Cultivation, fodder crop production and grazing                |
| Landuse zoning             | R - Rural                                                      |

The survey plan for the proposed development site is shown below in Figure 1, while the land use zoning for the area is shown in Figure 2, with the proposed development site in the centre.



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Page 1 of 1.

**Figure 1 Registered Survey Plan for Sections 5543 & 5544 Hundred of Strangways**



### 1.2.3 *Locality*

The development is situated 50 km south-south east (SSE) of Darwin; 40 km south east of the Darwin harbour, and approximately 8 km East of Berry Springs.

Neighbouring properties on the north, west and south are already being used for agriculture, with the “Santavan” PEQ yards bordering the northern side of the site and the AA Co. meat processing facility to the west and south, separated by a railway line. The eastern side of the site is bordered by the Stuart Highway and across from that is a 200 m wide strip of vegetation, followed by an airstrip and then several houses in Hughes.

The location of the property is shown in Figure 3 below. The proposed general arrangement of the development layout is shown in Figure 4 below. The site was selected as it is immediately adjacent to the existing “Santavan” PEQ holding yard which is currently leased by Wellard.

### 1.2.4 *Proposal Objectives*

The objectives of the proposal are to centralise and consolidate Wellard’s Darwin facilities in one location with modern facilities.

### 1.2.5 *Outline of Proposed Activities*

The operation of the proposed ILEF involves the following activities:

- Transportation of livestock to the holding pens;
- Collection and composting of manure;
- Treatment of wastewater;
- Irrigation of pasture using treated wastewater;
- Fertilising pasture with composted manure;
- Harvest of pasture for feed;
- Extraction of groundwater from bore; and
- Transportation of livestock offsite for live export.

### 1.2.6 *Current Project Status*

An application has been lodged with the Department of Land Planning and the Environment (PA2015/0296). The approvals process (NT EPA and DLPE) and the design and procurement process are being undertaken in parallel. Liaison with the NT Power and Water Authority has been undertaken to determine the relevant approvals require to connect power to the proposed facility.

A test bore was drilled on the property to determine if suitable water resource is available on the site. This bore was drilled to 114 m. More detail on this can be found in Section 4.6.2.

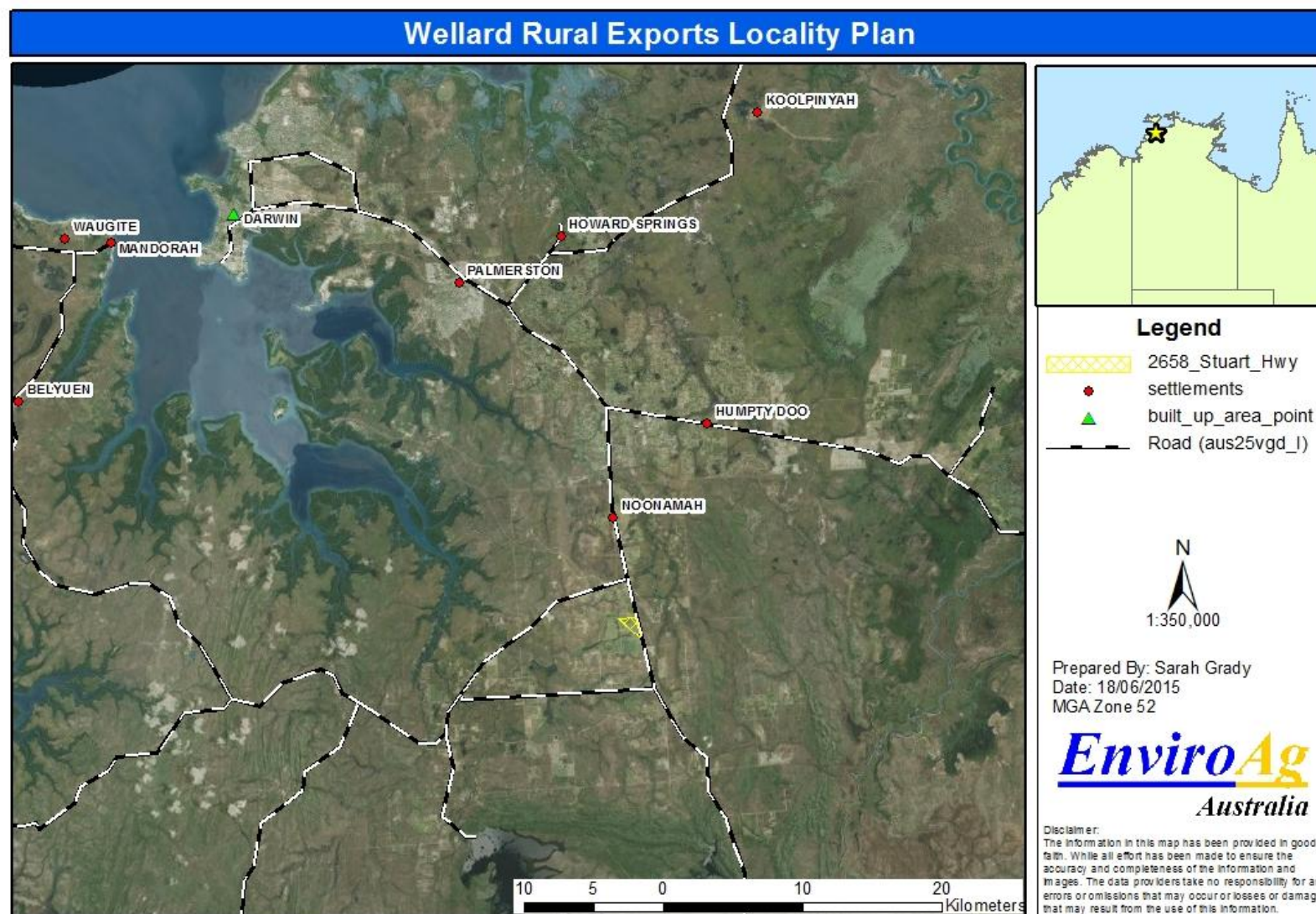


**Figure 3** Location of Wellard Integrated Live Export Facility; “Livingstone Valley” 2658 Stuart Highway, Livingstone NT

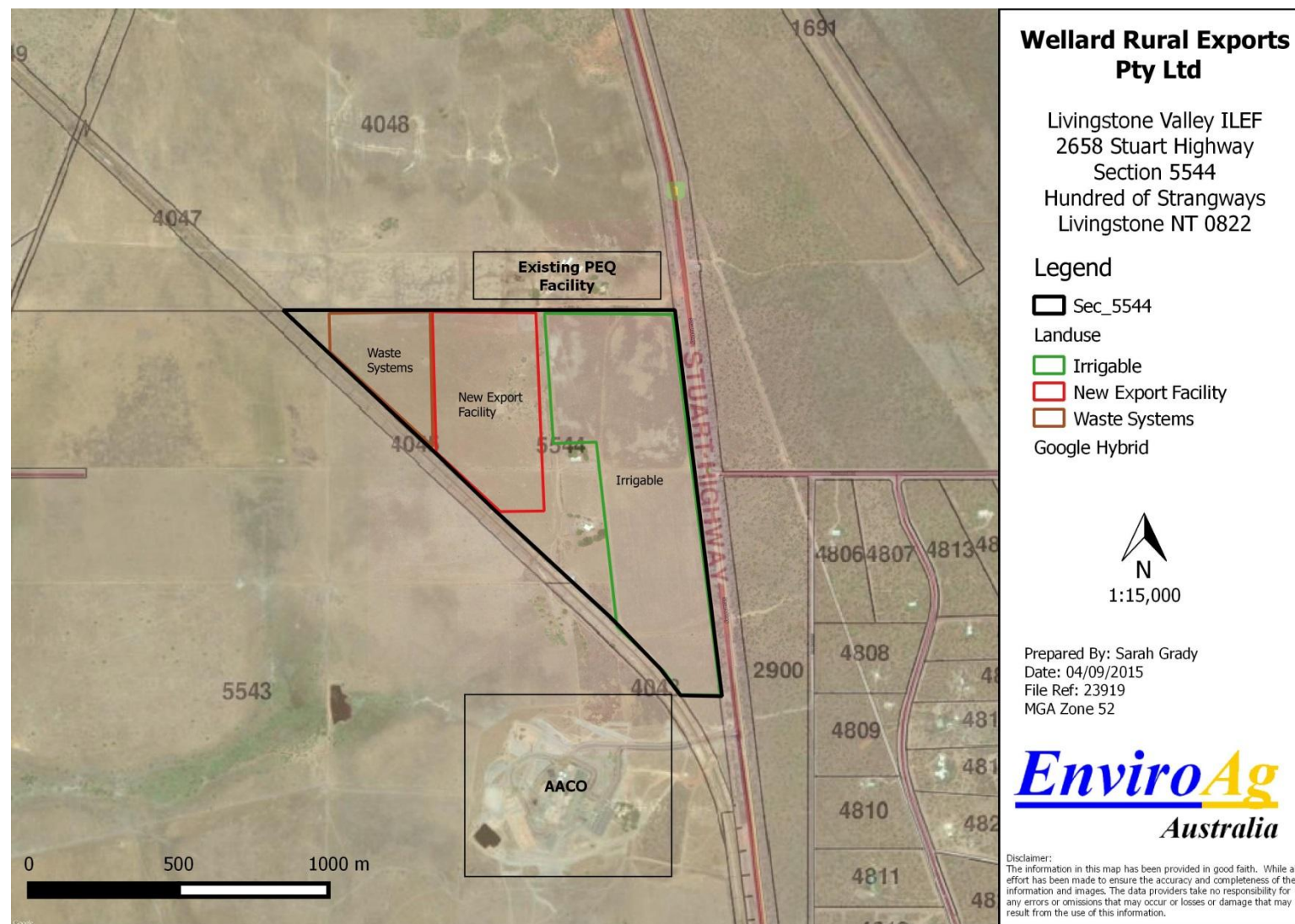


**Figure 4 General Site Layout of the Proposed Integrated Live Export Facility**

## **2. Consideration of Feasible Alternatives**

### **2.1 The “Do Nothing” Option**

Wellard lease a live export facility at “Santavan”. While Wellard can continue to apply the existing business model it is known that;

This present site presents several challenges to Wellard including;

- a) the future use of facilities proximate to the Darwin harbour are limited;
- b) the “Santavan” facility is relatively old and while it has right of “pre-existing” land use it does not meet current environmental and welfare standards;
- c) Increased operating costs associated with having to lease land and facilities;
- d) Impaired control of animal health and welfare associated with use of others yards; and,
- e) No business security for operations given that no long term tenure is held on the export facilities.

In summary the option of “Do Nothing” presents increasing risks of negative financial, environmental and welfare outcomes.

### **2.2 Local Facility**

A local facility in a rural area close to Darwin presents opportunity to Wellard as it mitigates many risks associated with the existing operations. A local facility does have potential to raise community concerns with regard to nuisance and cause environmental impact. Notwithstanding such a development would allow a reduction in use of existing facilities that more than mitigates any additional impact; indeed a net benefit would be gained by the business, environmentally and for the health and welfare of the cattle.

### **2.3 Remote Facility**

It is possible to hold cattle at a remote facility a significant distance from Darwin. The costs of holding cattle distant to the harbour and embarkation point increase significantly and are not economically justifiable. Further potential animal welfare impacts increase with stock transported further between the holding yard and the point of loading.

### **2.4 Summary**

An analysis of the above options by Wellard shows that the consolidation of its operations to one key site local to the Darwin rural area delivers improvements in business security, environmental management and animal health and welfare indices.

Wellard have operated the “Santavan” facility for over 8 years with only one complaint, relating to a dead cow on the property boundary. It is an old facility. A new facility using best practice design and management practices will deliver the best possible environmental and animal welfare outcomes.

Wellard wishes to proceed with the development of an Integrated Live Export Facility (ILEF) so as to improve the sustainability of their business.

### 3. Description of Proposal

#### 3.1 Integrated Live Export Facility Plan

The construction and operation of the proposed ILEF involves the following infrastructure:

- Care takers house;
- Commodity and Fodder storage shed;
- Feedmill;
- Freshwater storage (ring tank and tanks); for capture and storage of roof runoff and storage of ground waters for stock water supply;
- Pre-Export Quarantine (PEQ) 3,000 SCU holding yard (Average 3,000SCU; 12,000 SCU “peak” short term holding capacity);
- Livestock truck washing facility;
- Short term 1,000 SCU feedlot for holding stock for longer than 30 days;
- Irrigation area for treated waste water reuse and hay / fodder production;
- Access roads; and
- Wastewater treatment ponds.

The design and operations of the proposed facilities are well known, Figure 6 shows the general layout of the proposed development. Figure 7 below shows the proposed pen layout. It would not look dissimilar from the aerial view of the Queensland livestock facility shown in Figure 5 below. The following sections briefly describe components of the facilities and provide images of the same.



**Figure 5 Aerial Image of a (Similarly Sized) Queensland Cattle Feedlot and Facilities**

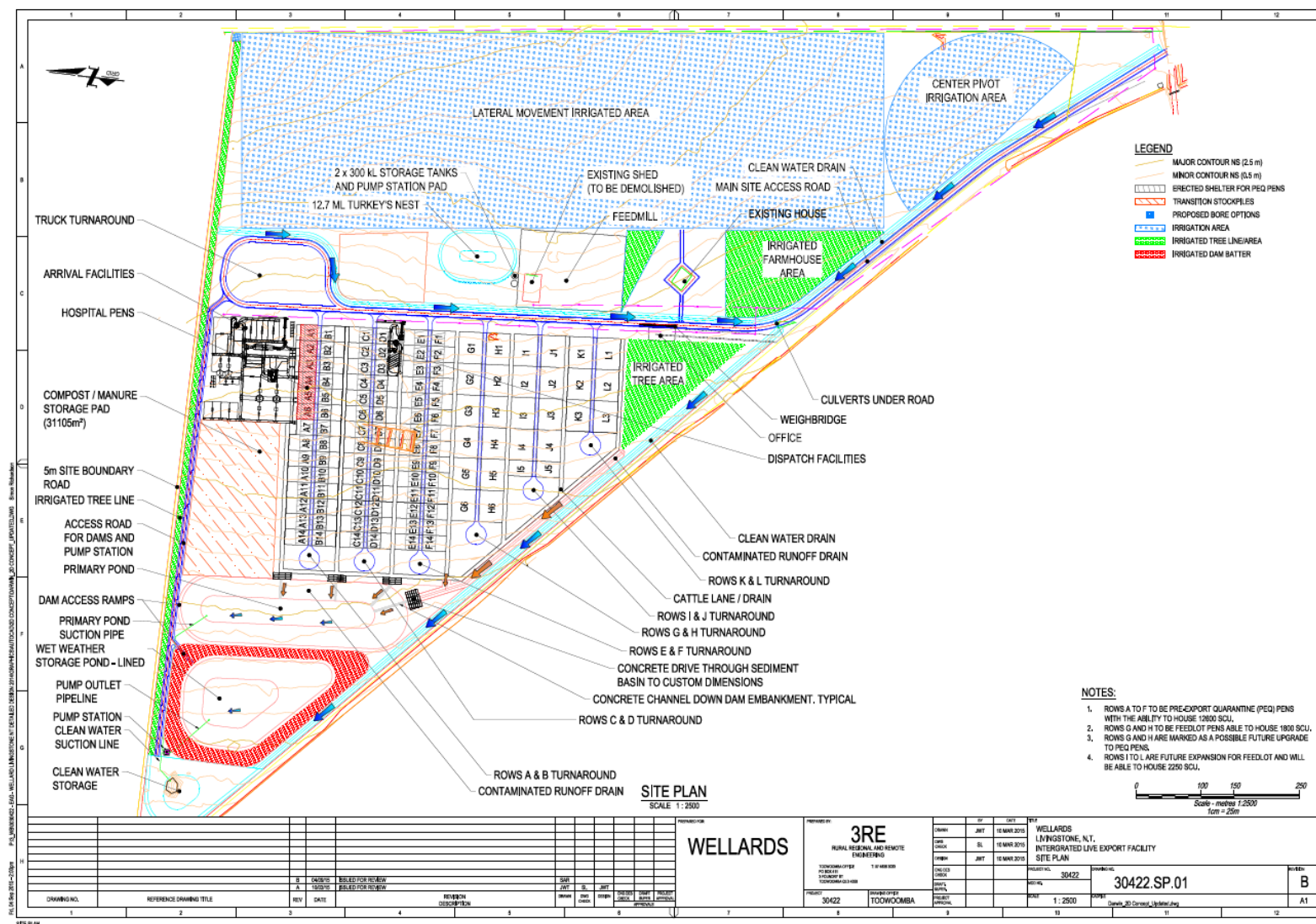


Figure 6 Proposed Site Plan

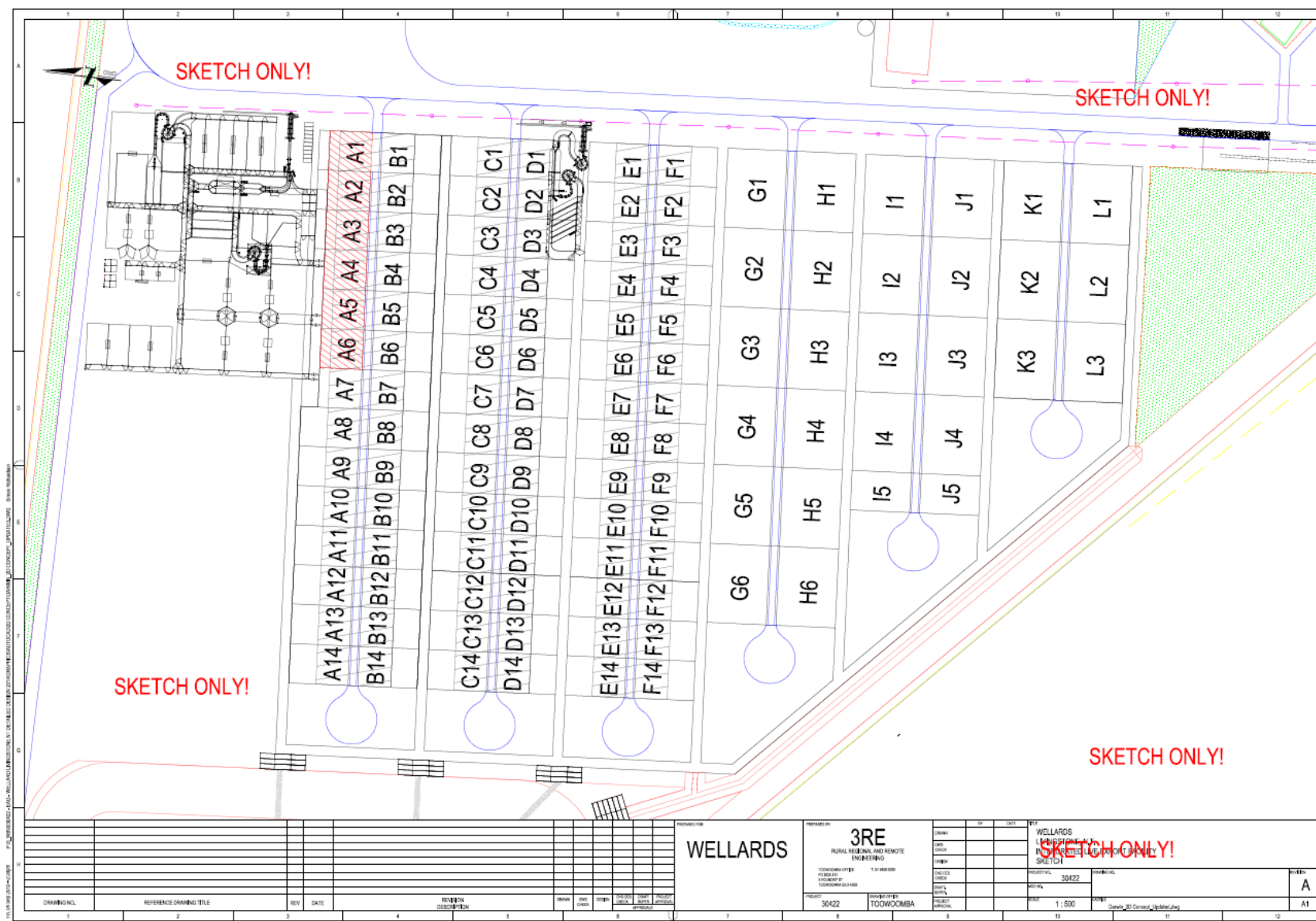


Figure 7 Proposed Pen Layout Plan

The expected land uses and their areas are listed in Table 2.

**Table 2 Land Usage Within the Controlled and Uncontrolled Discharge Areas at the ILEF**

| <b>Controlled Discharge Areas</b>       |                             |
|-----------------------------------------|-----------------------------|
| <b>Land Use</b>                         | <b>Area (m<sup>2</sup>)</b> |
| Open pen area                           | 96,094                      |
| Cattle handling & processing facilities | 23,306                      |
| Combined cattle lanes and drains        | 20,839                      |
| Manure stockpile                        | 30,591                      |
| Roads                                   | 28,589                      |
| Undefined areas                         | 52,718                      |
| Hard stand areas                        | 12,906                      |
| Sediment basins                         | 1,289                       |
| Wet weather storage pond                | 25,569                      |
| Primary wastewater pond                 | 37,445                      |
| <b>Total</b>                            | <b>329,346</b>              |
| <b>Non Controlled Discharge Areas</b>   |                             |
| <b>Land Use</b>                         | <b>Area (m<sup>2</sup>)</b> |
| Pen rooves                              | 45,360                      |
| Clean water drains                      | 26,759                      |
| Buildings                               | 1,632                       |
| Irrigated house area                    | 24,903                      |
| Irrigated cropping area                 | 333,268                     |
| Irrigated tree line                     | 2,857                       |
| Irrigated tree line/area                | 23,568                      |
| Freshwater runoff dam                   | 15,923                      |
| Freshwater supply turkey's nest         | 20,531                      |
| Undefined area                          | 81,399                      |
| <b>Total</b>                            | <b>576,200</b>              |
| <b>Combined Total</b>                   | <b>905,546</b>              |

## 3.2 Traffic and Access

### 3.2.1 Access roads

The access road will be a heavy vehicle access road that utilises the existing AA Co. Meat Processing Facility heavy vehicle access road from the Stuart Highway. The turn-in will be asphalted or concreted. The remainder of the access road will be a dual carriageway gravel road of approximately 10 m in width. It will be designed so that 2 triple road trains can safely pass each other on the road.

### 3.2.2 *Hard Stand / Heavy Vehicle Parking Area*

To accommodate trucks delivering cattle and commodity, and trucks waiting to pick up livestock and manufactured feed, a hard stand / parking area is included in the design. Stormwater from this area is directed away from the holding yards and pens via the storm water diversion drains.



**Figure 8**      **Heavy Vehicle Hard Stand / Parking Area**

### 3.2.3 *Truck Washing Facility*

The facility requires a truck washing area to allow the transport trucks to clean up before leaving the site. This facility would consist of a hardstand (concrete) pad with water access to wash the trucks and trailers down. The pad would be adequately sloped to allow drainage to the wastewater treatment ponds for reuse in accordance with the liquid and Solid Waste Management Plan, Appendix H.

### 3.2.4 *Traffic*

A detailed traffic study is provided in Appendix Q.

The development will use the existing heavy vehicle access off Stuart Highway that has been developed for the AA Co. Meat Processing Facility. The access will be at the boundary of the property; the AA Co. neighbouring allotment and the Stuart Highway. The access is via an existing right of way registered on the survey plan for Section 5543 and 5544 as shown in Figure 1.

The ILEF traffic will, in the main, consist of Road Trains, though smaller vehicles will enter and exit the facility also.

Cattle cartage is based on 150 head of cattle (large animals) per triple trailer truck. Actual peak traffic, based on the facility's maximum (peak) stock processing and holding capacity of 20,000 head of cattle, is determined to generate the following in and out flows:

- Trucks delivering 20,000 head of cattle to the facility prior to shipment over a period of 10 days prior to ship loading; and,
- Trucks transporting the processed 20,000 head of cattle to the port over a period of 24 hours.

This equates to a spread of 133 outbound vehicles over a period of up to 24 hours.

For trip generation purposes the recommended approach is:

- To review truck movement impacts during peak traffic flow to the AA Co facility during 2pm – 4pm and 10pm – 12pm.; and
- Address marginal lane widths and turning radii of the Wellard ILEF / AA Co access intersection, to prevent potential traffic flow breakdown and subsequent truck platooning on the Stuart Highway; and / or

- Implement measures to limit the potential for truck platooning on the Stuart Highway and the AA Co. access road;
- The Wellard Traffic Management Plan should include driver awareness or similar training to address vehicle platooning.



**Figure 9 Inward Bound trucks / Road trains**



**Figure 10 Trucks, Parked up and Awaiting Offloading at Port.**

### 3.3 Feedmill and Sheds

The Feedmill will have the capacity to manufacture feed for supply to ships; and also feed for use in the PEQ and Feedlot yards.

A number of large sheds will be constructed. One large shed will hold commodities for the Feedmill. Separate sheds will be spaced away from the commodities shed (and each other) for storage of hay.



**Figure 11 Feedmill**



**Figure 12 Feedmill Commodities Shed**

Several hay sheds will be constructed. They will be segregated from the feedmill and commodity sheds; and each other to minimise risk of losses by fire.



**Figure 13 Large Hay Shed**

### 3.4 Receival and Dispatch Yard

Livestock will be received into a dedicated receival yard. It will allow cattle to be unloaded and processed (inducted).



**Figure 14 Cattle Handling Facilities**

### 3.5 Lighting

Lighting on the site will be strategically placed to ensure there is minimum impact on neighbouring properties. The lighting will be directional (pointing downward) to minimise the amount of light that radiates past the property boundary. The design will reduce reflective surfaces and provide screening in areas to minimise light disturbance.

Lighting in the shed and pen areas will be manually operated. The eastern end of the pens will operate with limited light during night operations. The western ends will not be lit at night but lighting can be operated via manual switch if required.

### 3.6 Pre-Export Quarantine (PEQ) Yard

The PEQ yard area will be comprised of;

- (a) A “semi-confinement” yard area which will be partially covered by a shed; and
- (b) Open pens that will be used for housing stock in the dry season.

#### 3.6.1 Stocking Density

Stocking densities will be better than the minimum Australian Standards (ASEL Standard V2.3, DAFF (2011)), for registered premises.

*S3.11 Stocking density at registered premises must provide at least the following minimum space per head (cattle with horns must be provided with additional space), unless a variation is required and approved by the relevant Australian Government agency:*

- a) for cattle or camels held for 30 days or more, a minimum of 9 m<sup>2</sup>, based on an individual liveweight of 500 kg (this allowance can be varied by 0.09 m<sup>2</sup> for each 5 kg change in individual liveweight)*
- b) for cattle or camels held for less than 30 days, a minimum of 4 m<sup>2</sup>, based on an individual liveweight of 500 kg (this allowance can be varied by 0.04 m<sup>2</sup> for each 5 kg change in individual liveweight)*

Thus for a 600kg animal or Standard Cattle Unit (SCU) the stocking densities for >30 days is 10.8m<sup>2</sup> and < 30 days is 4.8m<sup>2</sup> (per SCU). The PEQ yard pens, which hold cattle for less than 30 days, will have a stocking density of 5.6m<sup>2</sup>, which exceeds the Australian Standards.

### 3.6.2 Equivalent "Feedlot" Capacity

A voyage cycle is approximately 10-20 days (average of 16 days). Livestock for shipping are aggregated in the PEQ yard over a 2-6 day period; the average holding time is just 4 days. This means that the yard fills quickly and then empties quickly. Generally; the facility has an average holding capacity of 25% of the peak capacity.

The "standard cattle unit" (SCU) is for a 600kg animal held full time in a yard. The SCU unit is used to define manure build up rates, manure moisture contents and likely odour generation rates. Given a peak holding capacity of 12,000 SCU then the real full time equivalent capacity of the PEQ yard is 3,000 SCU.

### 3.6.3 Semi-Confinement Structure

The shed area protects both the feed from spoilage and also the cattle in inclement weather. The open "loafing" yard at the back of the pen can be opened up to allow stock to spread out when conditions are dry.



**Figure 15 Cattle Held in Semi-confined PEQ Yard (courtesy of the Live Export Diaries)**

Manure is cleaned from the yards using bob cats in the semi-confined areas and or front end loaders in the open pens and feedlot.



**Figure 16** Cleaning of PEQ Semi-Confinement Facility (courtesy of the Live Export Diaries)

Pen cleaning will remove manure and, where necessary, place bedding materials in pens. Bedding will be by-product roughage (low grade hay).

#### 3.6.4 *Pen Size*

Most pens will be sized to hold 150 or 300 Standard Cattle Units (SCU's). 150 and 300 SCU PEQ pens will be 20m wide and 36m deep, and 40m wide and 36m deep, respectively. These pen sizes will be used for semi-confined and confined pens.

### 3.7 Feedlot

#### 3.7.1 *Stocking Density*

The National Guidelines for Beef Cattle Feedlots has a minimum stocking density of 11m<sup>2</sup> per SCU (per Table B.1). This stocking density will be applied during the dry season and a stocking density of 15m<sup>2</sup>/ SCU will be applied in the wet season if open pens are used. Using the open pen feedlot during the wet season is not considered best practice and is expected to occur very infrequently.

The pens will be cleaned back to the armoured surface prior to the wet season to reduce manure loads to the drainage systems. Where smaller ("lighter") cattle are housed then the relative stocking densities will be based on the comparative tables presented in the applicable National guidelines / standards.



**Figure 17** Lot Fed Cattle

#### 3.7.2 *Pen Size*

Most pens will be sized to hold 150 or 300 Standard Cattle Units (SCU's). 150 SCU feedlot pens will be 50m wide and 45m deep.



**Figure 18 Concrete Paved High Traffic Areas**



**Figure 19 Concrete Paved Cattle Handling Areas**

High traffic areas and internal cattle handling yard areas will be paved with concrete. Concrete will be patterned to minimise slip in stock movement.

### **3.8 Drainage Systems**

Drainage systems have been designed in consultation with the Department of Health (DoH) Guidelines for Biting Insect Management. Further detail in relation to drainage system design and sizing can be found in the Hydrology Assessment report in Appendix N.

#### **3.8.1 Surface Water Drainage**

To meet water quality objectives uncontaminated runoff water from any areas upslope of the ILEF should be prevented from entering the ILEF facility or the associated land areas where waste may be collected, stored or treated.

Open trapezoid drainage channels will be made of compacted clay seeded with grass. They will be located along both Santavan and AA Co.'s boundaries, as well as along the lower boundary of the access road below the irrigation block. These drains will catch stormwater and direct it to the freshwater runoff dam at the

lowest point of the property (north-western corner). All stormwater onsite will be directed to these drains by the topography of the site, excluding that of Controlled Drainage Area.

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### 3.8.2 *Pen Drainage*

The site has a natural fall of approximately 1-2% to the west and approximately 0.5% to the south. This allows the ILEF to be designed with pens aligned in straight rows on an east-west axis in a “back-to-back” configuration. In this configuration each row of ILEF pens is separated from the adjacent row of pens on its higher or “front” side by a common feed lane or alley (Figure 7). A common catch drain on the lower or “back” side separates the next two rows of pens. The catch drains will discharge to three main drains that run down the slope at the northern and southern ends of the ILEF and through the middle. The natural fall to the west will result in a minor step down between each successive pair of ILEF pens. It is expected that the pens with a southerly aspect will have a grade of 2.5-4.5% whilst those with a westerly aspect will have a grade of 2.0-3.5%.

Runoff from the ILEF pens is to be collected in catch drains situated directly behind each ILEF pen. The pens are arranged in “back-to-back” rows (Figure 7). The configuration of the rows and the cross-slope gradient in the pens are designed to minimise the volume of runoff draining through adjoining pens.

The catch drains are also to serve as laneways providing access for cattle moving to and from the ILEF pens.

Drains will discharge to sedimentation terraces and basins designed to drain freely after each runoff event so allowing the collected solids to be dried and removed at frequent intervals. The sedimentation system ultimately discharges to the primary wastewater pond.

### 3.8.3 *Sedimentation Basin*

The aim of the sedimentation basin is catch the solids from wastewater and allow the liquids to continue on to the primary wastewater pond for treatment. To achieve this, the sedimentation basin typically needs to slow water flow to less than 0.005 m/s (Lott & Skerman, 1995). The ILEF’s sediment basins will be terraced to slow water flow and constructed of concrete to allow for wet weather access for cleaning. Sediment basin cleaning will be undertaken via a front end loader. Solids recovered from the basins will be placed on the compost manure pad for composting. The liquids from the sedimentation basins will discharge to the primary wastewater pond.

### 3.8.4 *Primary Wastewater Pond, Wet Weather Storage Dam and Freshwater Runoff Ddam*

All ponds will have compacted clay lining and where required a HDPE synthetic liner placed around the inner batter to prevent vegetation growth. All ponds will possess batters with a 33 degree angle and include a crest that can be accessed by a body truck so that sludge can be removed using a vacuums pump and/or front end loader. All Ponds will be 3-8 m deep, with an additional 0.75 m dead/storage space, and are designed for rapid dewatering.

The principal design function of the primary wastewater pond is to store ILEF runoff until such time as the pond effluent can be safely used for irrigating the wastewater utilisation area. Depending on the time for which the runoff is stored in the primary wastewater pond, microbial degradation (principally anaerobic) of the entrained organic matter may occur, a portion of any mineralised nitrogen may be lost to volatilisation and denitrification processes and a proportion of the water will be lost to evaporation.

A single large primary wastewater pond is proposed. It will be designed so that:

- It can be rapidly dewatered
- It has a dead storage volume for accumulation of sludge;
- It self-drains for ready drying and cleaning (through the dry season); and
- It has an emergency over flow to a wet weather storage pond.

In addition, the primary wastewater pond will be constructed so that it is cut below the natural surface and will have an embankment of approximately 2-3m above the surface. The pond lining will be further “reinforced” to prevent lining ‘push out’ by the subsurface flow. Further, to reduce the risk of structural failure of the inner embankment and floor, a rock armouring will be implemented to improve stability during periods of heightened transient groundwater flow. Compacted material under the clay liner will undergo

stability treatment. A piezometer should be placed above and below the pond to monitor shallow groundwater depth and quality and to function as an early warning leak detection system.

### 3.8.5 *Irrigation Area*

The runoff from the ILEF's controlled drainage area captured in the primary wastewater pond is to be irrigated on land adjacent to the ILEF complex where the nutrients and water can be utilised in plant production. The area, adjacent to the Stuart Highway covers more than 40 ha of land.

The environmentally sustainable use of the wastewater utilisation area is directly related to the amount of nutrient applied to such areas, the amount of nutrient recovered in produce harvested or removed from the area and the amount of nutrient able to be safely stored in the soil. Some loss of nutrient (and salts) from the system will occur by way of leachate moving below the root zone of the crops and through processes such as erosive soil loss. However, such losses of nutrients and salts should not impact on the environmental value of any associated surface or groundwater resources.

The use of a source of "fresh" or "clean" irrigation water to supplement the applied wastewater will generally be necessary to help maximise crop yields and so maximise nutrient removal from the utilisation area. The amount and timing of both wastewater and fresh water applications will be largely determined by the irrigation requirement of the crops.

Irrigation will be undertaken using automated low pressure centre pivot sprinkler irrigators that are poly lined lateral move irrigators with drop hoses. No aerosols will be generated and all wastewater will be applied directly to the ground. Such irrigators generate a minimum of irrigation tailwater. Nevertheless, the potential does exist where a significant storm event may occur during or immediately after a wastewater irrigation application. Stormwater runoff from the wastewater utilisation area can transport unacceptable amounts of nutrient and other potential contaminants off this irrigation area. To mitigate against this, water from the irrigation area will be directed to the freshwater runoff dam via the surface water drainage system.

A detailed Soil Assessment is contained in Appendix M.

## 3.9 **Solid and Liquid Waste Management**

The Solid and Liquid Waste Management Plan is contained in Appendix G.

### 3.9.1 *Liquid Waste Management*

The ILEF wastewater facilities have been designed to detain wastewater onsite as much as possible. This is achieved through bunding contaminated areas (pens, compost manure pad) and sloping them to ensure that wastewater enters the sedimentation basins. The sedimentation basins separate solids and liquids, and direct the liquids to the primary wastewater pond. All ponds and dams onsite are lined with compacted clay lining weighted down to eliminate potential seepage. Primary wastewater and wet weather storage ponds will also have HDPE lining along the sides to reduce vegetation growth. A wet weather storage pond downslope of the primary treatment pond can hold additional water if the primary wastewater pond is full. The wastewater irrigation will be undertaken using an automated low pressure poly lined lateral move irrigator with drop hoses. No aerosols will be generated and all wastewater will be applied directly to the ground.

### **Capability of Soils for Irrigation**

The soils are Kandosols. They deliver a useful soil to sustain irrigated agriculture. The wet season delivers a moisture surplus. This significant episodic event provides a leaching fraction.

The SALF program was used to assess the leaching fraction of the soil profile in the proposed irrigation area. Based on this model, the leaching fraction is estimated to greater than 200mm/year. The model shows that this will adequately remove deleterious salts (sodium) from the soil profile so that they do not accumulate.

Given the leaching fraction; ongoing careful management of potential loss of nitrogen and phosphorus is important. This is best achieved by:

- Frequent moderate applications of irrigation;
- Maintaining an active plant growth;
- Maximising organic matter content to maximise nutrient holding capacity; and,
- Maximising nutrient recovery by crop harvest.

A detailed Soil Assessment is contained in Appendix M.

### **Crop Water Demand: Improved Pasture (Mixed)**

Crop water use is proportionate to the evaporation and consequent transpiration of the environment. A Crop Factor is applied to the evaporation to determine a transpiration rate. The Crop Factor considers soil and climatic factors to accurately determine the transpiration rates in different conditions.

Given the soil type, selected cropping regime, and considering the climatic data, a crop factor of 0.9 has been applied for all months. Given crop factors for improved pasture and effective rainfall considerations the expected irrigation demand of 11-15ML/ha can be expected.

The 190ML/yr of available wastewater, when applied across 40ha with an efficiency of 90%, will supply only 4.27ML of water per ha per year. This is not sufficient to meet the irrigation demand for an improved pasture. There is a critical moisture deficit in spring. It is proposed to use clean waters captured on site to supplement the irrigation in this period.

### **3.9.2 Manure Storage and Composting Area**

Manure harvested from the pens and sedimentation basin will be stockpiled and composted on-site prior to its being sold for off-site use as a soil ameliorant. Composting of the manure will stabilise a large proportion of the organic matter constituents, reducing the odour and pollution hazards associated with any subsequent handling and use of the manure. Manure will be regularly cleaned from pens. Sludge will be recovered from sedimentation basins. These wastes and spoilt feed from the feed mill will be combined at the manure storage area and windrowed so as to compost.

Individual carcasses of any stock dying while resident will be sent to a pet food supplier or sent to be rendered at AA Co. Meat Processing Facility, via a negotiated commercial arrangement. If this is not possible, dead animals will be placed in special larger windrows for decomposition and vector management. This removes the need for a “dead pit” which presents (unnecessarily) disease, vector management and environmental risks.



**Figure 20 Manure, Sedimentation Sludge and Spoilt Feed are Placed in a Windrow for Composting.**



**Figure 21 A Tractor Drawn Windrow Turner Turns the Compost**



**Figure 22 Low Pressure Centre Pivot Irrigation of Hay / Fodder**

### 3.9.3 *Mass Disposal*

Mass death events in a facility of this size are rare. Mass death may be as a result of various scenarios including but not limited to disease / quarantine outbreak or severe weather event (heat or cyclone).

In an event a mass death occurs at the site then the National AUSVET management plan for the same will be invoked. The Chief Vet and the Australian Quarantine Inspection Services (AQIS) would be advised of the mass death event.

The mass death site will become a secure quarantine facility. Entry will be by appointment only and all entry and exit points will be monitored by CCTV. In the event of a mass death event, a pit would be dug on the southern portion of the manure composting pad. This manure composting pad is approximately 3 ha in size. The mass death disposal area would occupy approximately 1.5 ha. The site would be fenced with an electric fence offset from the main fence. The pit would be lined where possible, with clay prior to the placement of carcasses. The carcasses would then be covered with composted manure and the excess soil removed from the pit to assist in the composting process. Following decomposition, the mortalities would be exhumed and introduced back into specially sized compost windrows to be further composting within the composting area and allowing for the pit to be re-instated and brought back on line for ongoing composting operations.

### 3.10 Site Construction

#### 3.10.1 *Staging of the Development*

The proposed ILEF would be constructed in two stages, with an early works package preceding the works to provide access, erosion and sediment control measures, temporary site facilities and water infrastructure for construction works to commence. The early works is expected to commence in late 2015 followed by Stages 1 and 2, to have all the works completed by September 2016.

Stage 1 includes the construction of most of the ILEF facilities (induction yards, bore, feedmill, office, commodity storage sheds, wastewater treatment ponds, clean water storage, diversion drains and the irrigation area). It also includes 80% of the short term holding pre export quarantine (PEQ) yards. The yard would then be ready to receive and process cattle.

Stage 2 would see the construction of the final rows of the short term feedlot, additional storage sheds and feed mill facilities. This stage is planned for construction in 2017.

### 3.11 Site Operation

#### 3.11.1 *Fresh Water Supply*

The National Guidelines for Beef Cattle Feedlots (MLA, 2012) recommend 24 ML of water per year, per 1000 SCU feedlot capacity. This includes water for stock, dust suppression, feed processing, cattle wash down, general cleaning and staff and office amenities. Under these guidelines, the ILEF will require a minimum of approximately 100 ML annually.

A groundwater bore will be developed on the site to provide stock with potable water. This bore is expected to yield more than 200ML/yr from a deep aquifer. A 3ML (3 day supply) tank will be established next to the bore to provide a short term emergency water supply. A 12.7ML freshwater supply Turkey's nest is to be constructed to allow storage of water within close proximity to the pens and yards.

The roof area of approximately 44,000m<sup>2</sup> will generate approximately 80ML of clean water runoff each year. Designated "clean" roof runoff will be directed to three (3) 300KL rain water tanks; the remainder will be directed to the 30ML freshwater runoff dam. The tank water will provide water for the site office.

An existing 50mm tapping on the Power Water pipeline exists for the existing house, sheds and workshops on the property. This existing tapping will remain in place and be used "as is". The only "emergency use" that will be allowed from this pipeline for would be for a short term fire-fighting supply, where water would be drawn to fill a holding tank and firefighting equipment.

#### 3.11.2 *Electricity*

There is an electricity easement that runs through the site. A step down will be installed to power the bore and infrastructure facilities for the ILEF. 200 m of the current overhead power line going through the site to the Santavan property will be placed underground for ILEF site operations. The specific location of the service facility will be detailed in the electrical arrangement of the detail design. Power usage will be approximately 160,000 kWh per year. Final power usage will be determined following detail design process. Water will be pumped between ponds and to the irrigation area by a diesel pump.

#### 3.11.3 *Hours of Operation*

The general hours of operation for the proposed facility would be 5 am to 9 pm for the incoming and outgoing trucks delivering stock to the facility. There would be staff on site 24 hours a day with a caretaker living on the site to oversee operations and increase security on the site. Staff vehicles will arrive and depart from the site outside these hours.

#### 3.11.4 *Number of Employees*

The work force that is estimated to be used by the facility is summarised below;

- Export Facility = 4-5 permanents; up to 15 casual workers;
- Feedlot facility = 2-3 workers;
- Feedmill = 5-10 workers;
- Contract farmers = 2 workers;
- Total work force is expected to be > 35 at full development
- This should be multiplied by 2-3 for ancillary work force; transport, vet, rural merchandise etc.

Given the lifetime of the development's operation is >40 years this work force is local and its presence is far more "sustainable" and beneficial than that from FIFO mining operations for the regional community.

#### 3.11.5 *Environmental Performance*

Wellard is committed to ensuring this facility is constructed and operated with best management practices.

#### 3.11.6 *Interrelationship with Other Activities*

The proposed ILEF will be run in conjunction with Wellard's existing operations in the area ("Santavan" and transport facilities). The facility will transport livestock to the docks for loading onto ships for export overseas.

The proposal involves the sale by a contractor of all compost produced from manure generated by the ILEF operation. The composed material will generally be utilised off site by users not directly associated with the proponent (third parties). Some of these users may be supplied with more than 1,000 tonnes of compost in any one year.

The proposal has no known, direct interrelationship with any other activity.

## 4. The Existing Environment

### 4.1 Climate

The climate of the site is best described as wet tropical. It is warm to hot through the year. The site has a defined dry season and wet season. The site has relative constant day time maximum temperatures. Detailed climatic data are available for Bureau of Meteorology Darwin Airport (AP) some 30km to the north.

A Bureau of Meteorology weather station is located at Berry Springs approximately 8 km from the site. Its data is similar to Darwin AP.

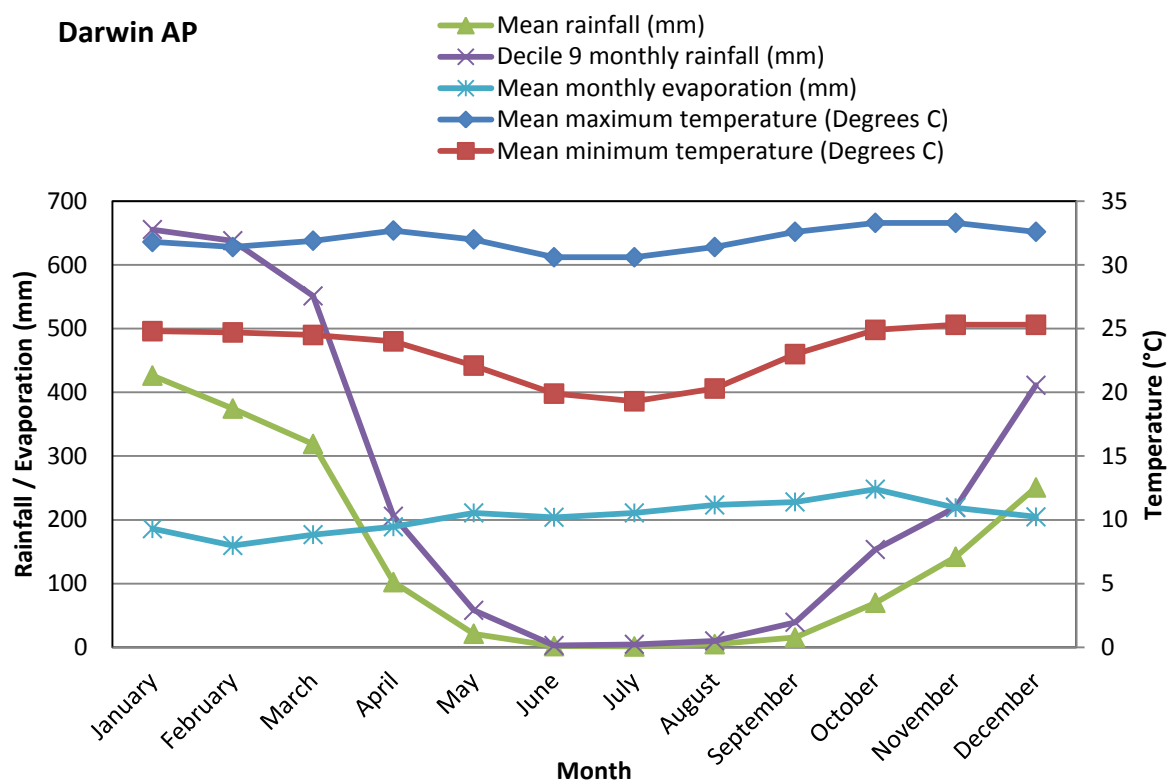


**Figure 23 Graph of Temperature and Rainfall and Evaporation for Darwin AP**

#### 4.1.1 Temperature

Average temperature data are presented in Table 3; these show the low level of variation in temperatures. During winter minimums are as low as 15°C overnight.

**Table 3 Monthly Average Temperatures for Berry Springs (~6km away) (1971-2013) (BoM, 2014)**

| Statistic | Jan  | Feb  | Mar  | Apr  | May  | Jun  | Jul  | Aug  | Sep  | Oct  | Nov  | Dec  |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|
| Lowest    | 31.1 | 30.5 | 31.4 | 32.6 | 31.7 | 29.8 | 29.4 | 29.9 | 31.2 | 32.5 | 32.2 | 32.3 |
| Highest   | 31.8 | 32.2 | 32.4 | 32.9 | 31.8 | 30.2 | 29.7 | 30.3 | 32.1 | 32.8 | 33.0 | 33.2 |

#### 4.1.2 Rainfall

Rainfall data for Berry Springs are provided in Table 4. Most rain is received from October to April. The dry season is from May to September. It would reasonable to expect an average rainfall of 1,800mm per year.

**Table 4 Rainfall Data for Berry Springs (~6km away) (1971-2013) (BoM, 2014)**

| Statistic     | Jan          | Feb          | Mar          | Apr         | May        | Jun        | Jul        | Aug        | Sep        | Oct         | Nov          | Dec          | Annual        |
|---------------|--------------|--------------|--------------|-------------|------------|------------|------------|------------|------------|-------------|--------------|--------------|---------------|
| Mean          | 394.1        | 309.1        | 299.9        | 97.7        | 14.3       | 0.1        | 0.7        | 1.7        | 15.6       | 67.3        | 157.1        | 339.7        | 1779.9        |
| Lowest        | 119.1        | 33.0         | 58.8         | 1.2         | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0         | 37.2         | 64.6         | 1156.1        |
| 5th %ile      | 235.1        | 73.2         | 71.9         | 17.1        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 6.7         | 46.9         | 70.4         | 1198.3        |
| 10th %ile     | 243.2        | 123.9        | 103.7        | 24.9        | 0.0        | 0.0        | 0.0        | 0.0        | 0.0        | 10.8        | 55.3         | 105.0        | 1283.0        |
| <b>Median</b> | <b>371.6</b> | <b>328.0</b> | <b>309.6</b> | <b>60.2</b> | <b>2.2</b> | <b>0.0</b> | <b>0.0</b> | <b>0.0</b> | <b>5.0</b> | <b>53.9</b> | <b>145.1</b> | <b>343.4</b> | <b>1807.5</b> |
| 90th %ile     | 554.5        | 449.4        | 480.5        | 160.3       | 30.9       | 0.0        | 0.0        | 6.1        | 43.1       | 142.9       | 240.2        | 541.9        | 2067.2        |
| 95th %ile     | 622.6        | 515.5        | 562.8        | 194.4       | 71.9       | 0.0        | 0.9        | 10.9       | 47.5       | 150.2       | 259.1        | 552.0        | 2169.8        |
| Highest       | 797.6        | 534.8        | 814.4        | 675.3       | 85.2       | 1.6        | 14.8       | 15.2       | 92.7       | 179.5       | 367.6        | 630.0        | 2309.6        |

#### 4.1.3 Evaporation

Evaporation data are collected at Darwin Airport. The annual average evaporation at Darwin is approximately 2460mm. Thus the site generally has a moisture deficit on an annualised basis of approximately 660mm. The greatest deficit occurs through the dry season; moisture surpluses occur in the wet season.

#### 4.1.4 Moisture Deficit

The annual average rainfall for Berry Springs is 1807.5mm, and the annual average evaporation for Darwin is 2460mm. Thus the average moisture deficit at the site is in excess of 600 mm/year. This is equivalent to an annual average water deficit of 6ML/ha.

However this is misleading with regard to actual deficits applicable to the crop. While moisture surpluses occur over summer, every dry season has a significant deficit. The deficit over the dry season is the key variable in sustainable re-use of wastewater. The dry season moisture deficit is approximately 1375 mm (on average) (April to November).

#### 4.1.5 Wind Data

Average wind speed and direction for the area varies according to season and time of day. The wind roses depicting the average wind speed and direction for each month at 9 am and 3 pm were procured from the Bureau of Meteorology. These are shown in Appendix S.

## 4.2 Topography

The ILEF site has a ridge that runs parallel to the Stuart Highway on the eastern boundary of the property. The highest point on the property is 60 AHD in the north east corner of the site. The land slopes predominantly to the west. The lowest point on the site is in the north-west corner of the site near the railway line. This point is approximately 42.1 AHD. The gradient of the slope is 1.5% from the ridge to the railway line. A topographic map of the region is shown in Figure 24 below.

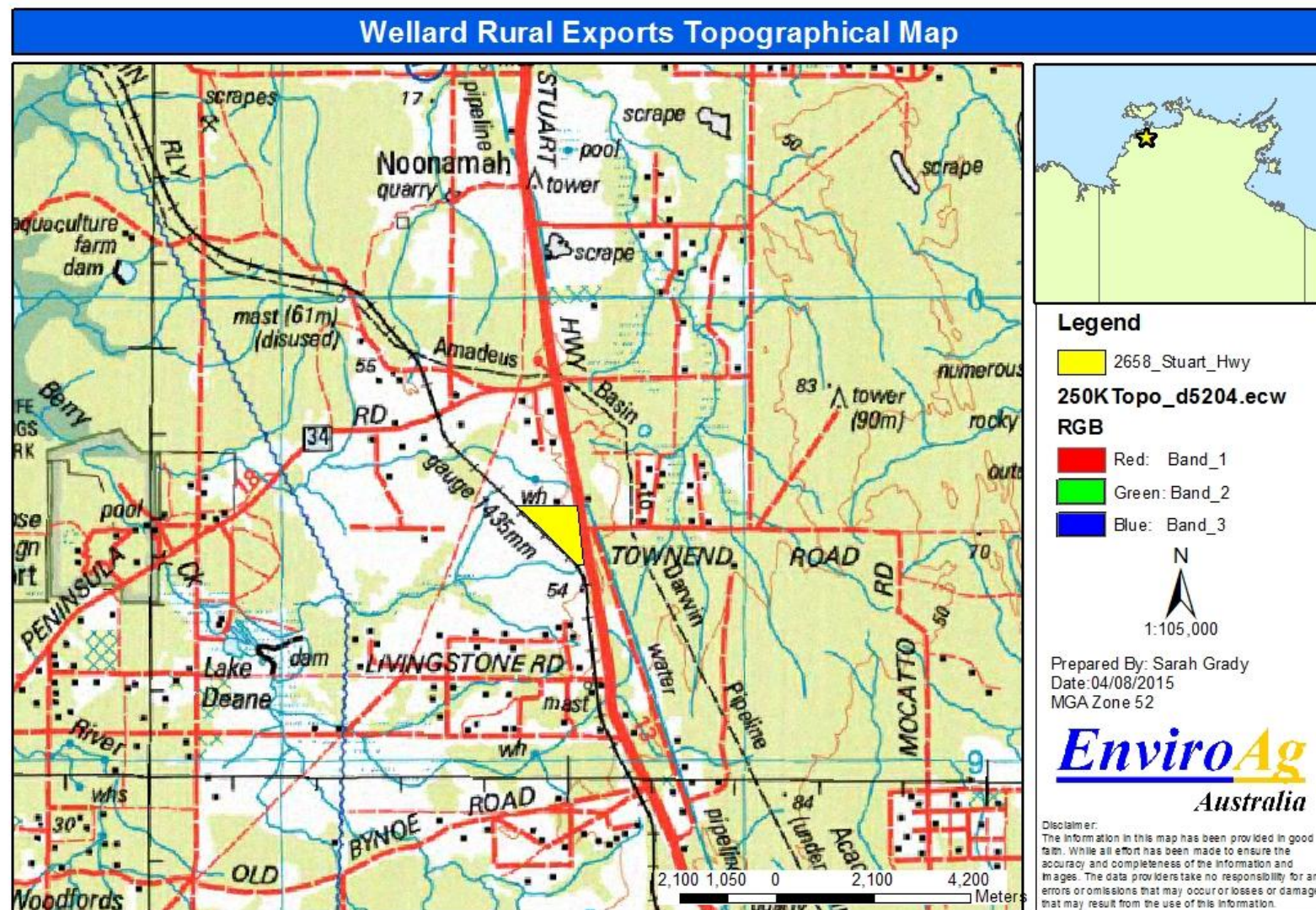


Figure 24 Topographical Map

### 4.3 Vegetation

The proposed development site has been cleared and developed as shown in Figure 25 below. Few trees remain on the site. Some exotic trees have been planted proximate to the existing residence.

EcOz Pty Ltd was engaged to undertake a rapid vegetation assessment on the site. A copy of this report is included in Appendix L.

#### 4.3.1 Pasture Species

The vast majority of the property has been cultivated and sown to improved pasture species Jarra Grass (*Digitaria milanijana* cv Jarra) and Tully grass (*Urochloa humidicola* cv Tully).



**Figure 25 Cultivation and Pasture on “Livingstone Valley”**

#### 4.3.2 Weed Species

Weed species on the site were identified and mapped as part of the Rapid Vegetation Assessment. The weed species identified are listed in Table 5 below.

**Table 5 Weed Species Identified by EcOz Environmental during 12<sup>th</sup> June 2015 Site Survey**

| Common Name    | Botanical Name            | Weed Type | Weed Class (NTWM Act) |
|----------------|---------------------------|-----------|-----------------------|
| Gamba Grass    | <i>Andropogon gayanus</i> | Grass     | Class B & Class C     |
| Spinyhead Sida | <i>Sida acuta</i>         | Herb      | Class B & Class C     |
| Sickle Pod     | <i>Senna obtusifolia</i>  | Herb      | Class B & Class C     |
| Flannel Weed   | <i>Sida cordifolia</i>    | Herb      | Class B & Class C     |
| Neem           | <i>Azadirachta indica</i> | Tree      | Class B & Class C     |
| Hyptis         | <i>Hyptis suaveolens</i>  | Herb      | Class B & Class C     |
| Lantana        | <i>Lantana camara</i>     | Shrub     | Class B & Class C     |

### 4.3.3 Native Species

A patch of native remnant vegetation is located in the middle of the northern part of the site. The patch is approximately 2.6 ha with extensive historical clearing taken place throughout the patch (EcOz Environmental: 2015). The following table (Table 6) lists the native vegetation species identified by EcOz Environmental during their survey.

**Table 6 Native Species Recorded within the Native Vegetation Patch**

| Botanical Name                     | Vegetation Strata | Conservation Status (TPWC Act) |
|------------------------------------|-------------------|--------------------------------|
| <i>Eucalyptus tetradonta</i>       | Upper             | Least Concern                  |
| <i>Acacia auriculiformis</i>       | Upper             | Least Concern                  |
| <i>Syzygium suborbiculare</i>      | Upper             | Least Concern                  |
| <i>Syzygium eucalyptoides</i>      | Mid               | Least Concern                  |
| <i>Xanthostemon paradoxus</i>      | Mid               | Least Concern                  |
| <i>Planchonia careya</i>           | Mid               | Least Concern                  |
| <i>Erythrophleum chlorostachys</i> | Mid               | Least Concern                  |
| <i>Persoonia falcate</i>           | Mid               | Least Concern                  |
| <i>Petalostigma pubescens</i>      | Mid               | Least Concern                  |
| <i>Melaleuca viridiflora</i>       | Mid               | Least Concern                  |
| <i>Fiscus acuminata</i>            | Mid               | Least Concern                  |
| <i>Calytrix extipulata</i>         | Mid               | Least Concern                  |
| <i>Acacia holosericea</i>          | Mid               | Least Concern                  |

### 4.3.4 Summary and Recommendations from EcOz Environmental Rapid Vegetation Assessment

The rapid vegetation assessment of the project area found the following:

- A total of seven (7) Class B and Class C weeds
- Weeds were mainly observed along fence lines and around infrastructure
- Tully Grass paddocks makes up a total of 35 ha
- Jarra grass makes up a total of 54 ha
- Hay paddocks are largely clean of weeds
- A highly degraded area of native vegetation is located within the project area (2.6 ha)
- Sixteen (16) native vegetation species
- No species listed as threatened under the TPWC Act or the EPBC Act were identified within the project area.

## 4.4 Geology

The Kandosol soils overlay a sedimentary geology. The Kandosols contain varying amounts of clay. Clays are generally shallow on the upper slopes or exposed hill crests; these are the likely recharge areas.

Haig and Townsend (2003) describe the geology:-

*The bedrock geology consists of dolomite, carbonate rocks, sandstone, shale, siltstone, schist, granite and metamorphic rocks. The highest yielding bedrock aquifers are the dolomites and carbonate rocks. Lesser yielding aquifers are found in the fractured sandstones and siltstone. Schist, granite and metamorphic rocks are low yielding aquifers.*

*Most of the region is covered with 20 to 50 metres of more recent sandstone, siltstone and claystone. There is a 5 to 10 metre thick layer of laterite ie. a residual clayey layer mainly consisting of hydroxides of iron and aluminium formed under tropical climatic conditions by the weathering of igneous rocks, that forms a capping layer over most of the area.*

*Recharge to the regional aquifers is a result of direct infiltration of rain through the surface deposits. The average annual rainfall in the region is 1,700 mm, as much as 200 mm is recharged to some of the more transmissive areas in the catchment.*

## 4.5 Soils

### 4.5.1 Soil Investigations and Description

The land drains from east to west, with elevation varying from 54 AHD to 24 AHD across the site. The gradient is approximately 1.5% to 3%.

The site is located in the NT Van Diemen soils group. Within this zone the landscape is undulating to rolling hills and rises with mostly poorly developed, shallow and gravelly Kandosols, though Tenosols dominate the southern half of the zone. The property is in the land units 3b and 1c (NT Gov, 2015). Land unit 3b covers the majority of the site with 1c located in the northern most portion of the site. The unit distribution is shown in Figure 26 and described below.

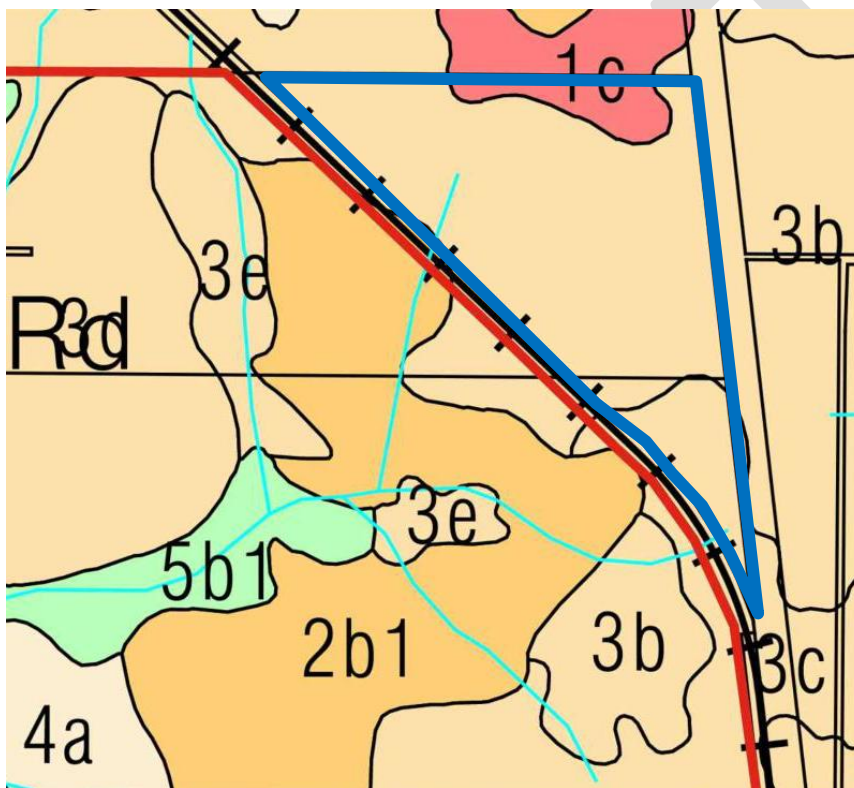


**Figure 26 Land Unit of the Site (Blue Boundary) (NT Gov – NR Maps:2015)**

Land Unit 3b is characterised by flat to very gently undulating upland surfaces, with gradient of 0.5 to 2.5%. Soils are generally moderately deep to deep gravelly yellow massive earths usually overlying friable weathered material and minor red massive earths, grading through the soil profile to sandy loam to sandy clay loam and light clay at depth. Soils are well drained. Thus the soils are typical of Kandosols associated with the wet tropics. Land Unit 1c is characterised by short steep slopes and rises, with gradients between 5 – 15%, located on shallow gravelly lithosols.

### 4.5.1 Physical Characteristics

The surface soils when wet, have a low strength whilst the laterite at depth presents a material that can be robust if not too mineralised and kept dry. “Laterite” is simply a continuous cemented layer of iron and aluminium oxides, formed through accumulation of these elements during extreme tropical weathering. In this case we are dealing with Ferricrete; which is an iron cemented rock found at depth; below the root zone.

#### 4.5.2 *Soil Permeability*

Soil sampling undertaken as part of the Geotechnical Assessment (Appendix N) shows a clay type material immediately above the Ferricrete and below the sandy silty materials comprising the A Horizon. This material is impermeable with a measured permeability of  $4.2 \times 10^{-11}$  m/s. This material is suitable for lining the wastewater ponds. However it will need to be protected by an armoured layer so it is recommended that a “Sandwich” layering of material is used in any dam lining process. The width of this band of material varies across the site from a depth of 0 to 0.5m and in gravel, sand and clay content.

#### 4.5.3 *Chemical Characteristics*

The soil on the site was sampled and analysed to determine the chemical characteristics. The following provides a summary of the chemical characteristics of the samples taken. A more detailed report can be found in Appendix M:

- The soil pH is slightly acidic to neutral throughout the profile with pH ranging from 5.1 to 6.1.
- The cation exchange capacity of this soil is low, both in surface and subsoils.
- Organic carbon levels range from low to very low in surface and subsoils respectively with soil nitrate levels deficient throughout the soil profile.
- Available nitrogen levels are extremely low, reducing through the profile.
- The exchangeable sodium percentages of these soils are also low throughout the profile and provide no risk of soil dispersion.

#### 4.5.4 *Phosphorous Sorption Capacity*

The capacity of the soil to absorb Phosphorous is determined by the mineralogy, the amount of clay, pH and the temperature of the soil. The soils on the development site have low Phosphorous sorption capacity as a result of the silty, sandy clay in the A2 horizon, which has a low absorption and is unreactive. The significant presence of iron at depth would significantly increase the P sorption capacity due to ready precipitation of iron phosphates.

It must be noted that P sorption capacity may be reduced by “flooding” of the soil, increasing the solubility of phosphates. The wet season annually inundates the lower parts of “Livingstone Valley” with surface and shallow water. It is for this reason that wastewater should be irrigated on elevated areas only; as have been selected for the proposed irrigable areas.

The low P sorption in surface soils and Phosphorus-Colwell readings, combined with the limited total phosphorus depicts an extremely phosphorus deficient soil. Based on the available data the surface soils in the proposed irrigable area can readily sorb 2000 kg/ha/m of soil within the top 1m.

The soils also show low levels of Total Phosphorous indicating that the soils are extremely Phosphorous deficient. The soils in the irrigable area will require significant nutrient management. The application of treated wastewater with the application of gypsum will improve the nutrient uptake and soil condition.

### 4.6 **Site Hydrology and Water Quality**

#### 4.6.1 *Surface Water*

The site is located on the western side of a plateau. Its location is such that it is at the top of the foothill slope adjoining the plateau. Water onsite drains to the west. The site has no creeks and sits at the top of a watershed. The site does not flood. However, low lying areas in the north-west corner of the property, where it is lowest, and proximate to the railway line are flat and become inundated with runoff from upslope.

Adjacent properties downslope each have tributaries of Blackmore River - Berry Creek on AA Co. and Hardy Creek on Santavan. Hardy Creek is a tributary of Berry Creek, which runs into Blackmore River (15km from the site). Blackmore River runs for another 8km to Darwin Harbour.

The NRETAS Aquatic Health Unit monitors a number of freshwater and estuarine sites in the Berry Creek and Blackmore River catchment as part of their annual reporting of the environmental condition of waterways within the Darwin Harbour Region. The last report card was in 2012 and this showed that total suspended solids (TSS), nitrates and total phosphorus were high, whilst electrical conductivity, turbidity, pH, dissolved oxygen, chlorophyll, total nitrogen and filterable reactive phosphorus were within the water quality objectives. The high nutrients and TSS were likely due to the increase in agricultural and urban development within the catchment.

#### 4.6.2 Groundwater

The ILEF is located at the eastern edge of the Berry Creek sub-catchment, a part of the Blackmore River and Darwin River Catchment. This catchment is well developed with unregulated rural and rural living activities. Land uses in these areas include commercial cattle holding facilities, cattle grazing, rural living and associated hobby farming activities.

Areas to the east of Stuart Highway are considered to be recharge areas. There is some connectivity between these recharge areas, ground waters and downslope surface waters. Berry Creek gains water from the shallow groundwater systems and it is groundwater that delivers water to this system during the dry season.

The site is underlain by clays associated with decomposed claystone, siltstones and sandstones and as such transmission of surface waters from the property to the ground waters is at the best slow. Most recharge will occur in the Whites formation which is located just to the west of the site and the interbedded and disrupted beds lower on the slope (lower foothills).

A study on the pesticide and herbicide levels in groundwater discharge at Berry Springs during the dry season detected no herbicide and only one pesticide (Chlorpyrifos), which was found at a concentration below the ANZECC guidelines (Schult, 2014). Berry Springs' groundwater also had elevated nitrate, total phosphorus, and marginally elevated Filterable Reactive Phosphorus. This shows that there are already some impacts on the groundwater system at present from the region. However, due to the shallow depth of the aquifer feeding Berry Springs, these nutrients are likely to be a result of leaching from unregulated residential septic tanks.

The majority of the existing registered bores in the locality were drilled and constructed between 1996 and 2012 for domestic and agricultural production purposes. Figure 27 shows the registered bores in the locality from the Northern Territory Government (2014b) NR Maps.

Soil drill logs were recorded for the majority of these bores in the immediate vicinity of the proposed development. The majority of borehole/drill logs exhibited the following information:

- Topsoil to 0.5 – 1.0 metre depth;
- Sandy surface soil is underlain by sandy clay and clay layers to ~20 - 30 metres in;
- Depth providing a barrier to the groundwater aquifer;
- Deeper layers generally included grey clay, brown and grey “shale”; and
- Siltstone with gravelly seams.

Most bores were drilled to depths of approximately 40 metres with standing water levels of 1 – 6 metres below ground level. Yields were mostly sufficient for domestic and production bores – less than 2 litres/second. The main water bearing zones are recorded as being from approximately 5 – 10 metres in depth in the near surface aquifers; and most generally at a depth of 20 – 40 metres, whilst the deepest aquifer is approximately 104 – 130 m in depth.

There are two existing bores registered on the site (RN000030 & RN 000079). These bores were drilled in 1943 by the Australian Army. These bores were drilled to 79.3m and 61m respectively and exhibit low flow rates of 0.9 – 1 litre per second..

A pilot bore hole was drilled in the north east corner of the property in early May 2015 (Bore completion report included in the Geotechnical Assessment located in Appendix N . This bore was drilled to a depth of 114 m with a standing water level of 6 m and flows of up to 5 litres per second.

## 4.7 Air Quality

The NT EPA measures air quality parameters at Palmerston (30 km from the site), including ozone, nitrogen dioxide, carbon monoxide, sulphur dioxide and particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>). The major air pollutant found at this monitoring station is particulate matter, which includes solid and liquid particles such as smoke, dust and plant spores (NT EPA, 2013). It is the only pollutant that exceeds guidelines regularly. Both PM<sub>2.5</sub> (particulate matter smaller than 2.5µm) and PM<sub>10</sub> (particulate matter smaller than 10µm) exceedances are associated with smoke from burning vegetation. All particulate exceedances in 2012 occurred during the dry season. Savannah burning also accounts for 35% of agricultural greenhouse gas emissions in the NT (NT Government, 2008).

This air quality station is, however, located in bushland in the suburbs of Palmerston on the edge of agricultural land. Land use in the vicinity of the ILEF is dominated by grazing, dryland cultivation, meat processing and rural residents. These land uses will result in additional dust from dirt roads, cutting of hay, and tilling of soil (USDA & US EPA, 2012).

Agricultural odours are produced through many agricultural operations, including wastewater processing, pesticide applications, mowing and ploughing, as well as the handling of grazing livestock in yards and loading facilities, all of which are already present in the area. The NT EPA has received odour complaints for Santavan, AA Co. and Noonamah Cattle Yards (5.3 km north of the site). The Santavan complaint was for a dead animal in the grazing area, the AA Co. complaints for their wastewater ponds and the Noonamah complaints for unknown odour sources. The odour Assessment report can be found in Appendix M.

## 4.8 Noise

The background sound level in rural areas is characteristically low, and often variable. Typically, ambient levels are in the range of 25 to 45 dBA (0 dBA corresponds to the threshold of hearing (auditory threshold) and 130 dBA is approximately the threshold of pain). However, seasonal factors, both natural (e.g. cicada, frog or bird activity) and man-made (e.g. harvesting, pesticide spraying, or other seasonal farming operations) may ordinarily produce higher background levels than those above. In contrast, factors such as night-time inversions and low wind speeds, which may be more pronounced in rural areas, may also act to increase propagation or decrease attenuation in these areas. The site currently does not produce much noise, since it is being used for pasture. However, neighbouring sites AA Co. and Santavan would produce similar noise to the ILEF due to the similarities in their operations.

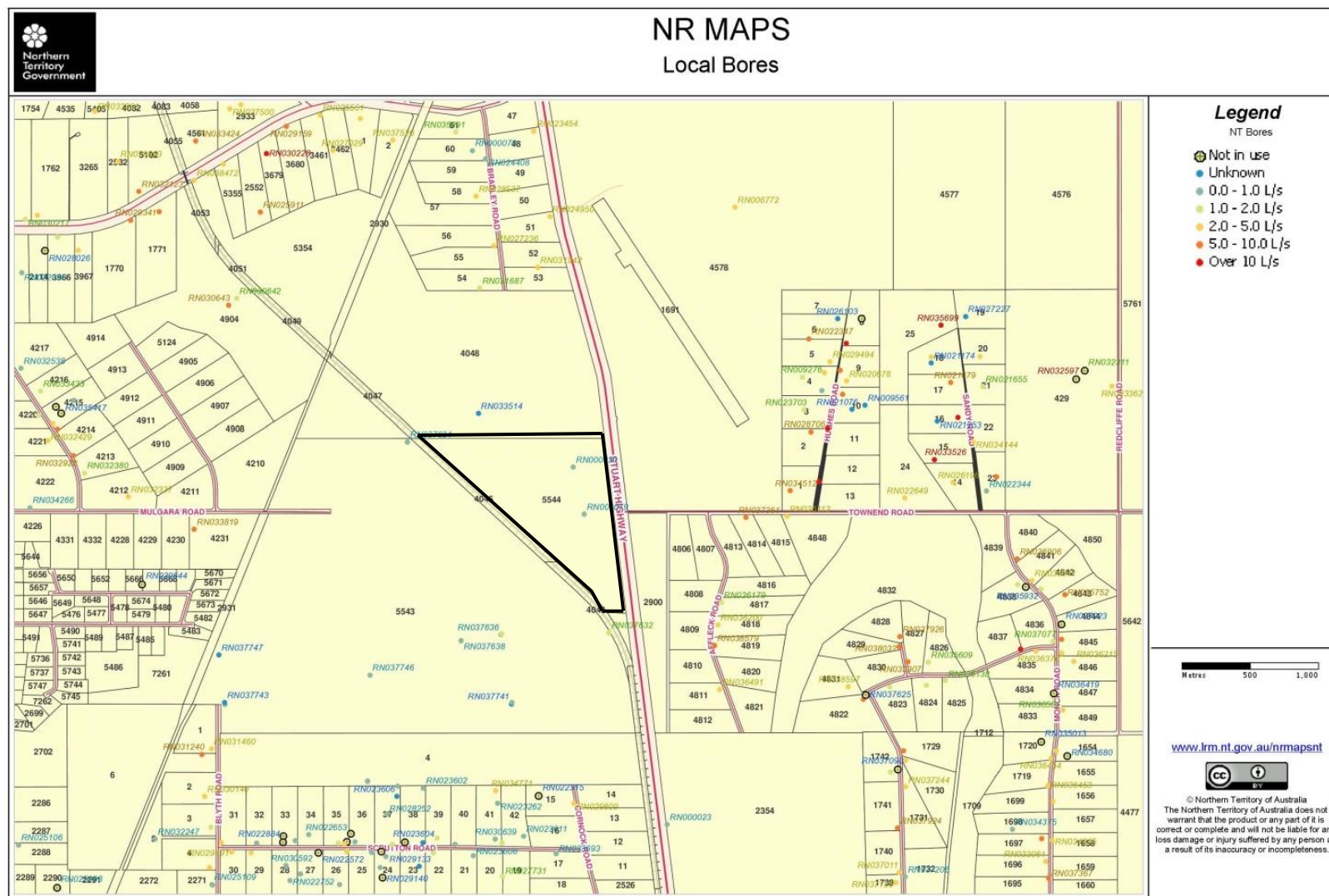


Figure 27 Local Bore Map (NRMAPS:2015)

## 4.9 Land Capability

Land use mapping was undertaken in the Northern Territory in 2003. The land use mapping used the Australian Land Use and Management Classification. The site has been mapped as Land class 3 Production from Dryland Agriculture and Plantations sub class 3 Cropping (Owen & Meakin: 2003). This mapping is based on the land use present at the time of mapping. The soil on the site is free draining with the potential for good plant growth. The land capability is the ability of the soil on the site to accept or handle the nutrient and water loading for the proposed development. The soils on the site are shallow Kandosols. These present a Moderate Risk Category Criterion due to their shallow nature, their ability to become seasonally waterlogged and the slopes (NT DoH, 2014).

## 4.10 Land Use and Planning Controls

Zoning and land use constraints relevant to this proposed development are:

- Environmental Protection and Biodiversity Conservation Act 2000 (Cwth);
- Planning Act (NT); and
- NT Planning Scheme.

### 4.10.1 *Environmental Protection and Biodiversity Conservation Act 2000 (Cwth)*

The Environmental Protection and Biodiversity Conservation Act (2000) (EPBC Act) requires any development that could have a significant impact on the environment or matter of national significance to be referred to the Australian Government Minister for the Environment for assessment. A search of the EPBC Act protected Matters Search Tool was undertaken and no controls were found for the site under this legislation.

### 4.10.2 *Planning Act (NT)*

There are no Interim Development Control Orders currently applying to this development site. A Notice of Intent was prepared for the Northern Territory Environmental Protection Authority (NT EPA). A copy of this report is attached as Appendix A. A Statement of Effects was lodged with the DLPE on the 24<sup>th</sup> of April 2015. This provides an outline of the legislative requirements relevant to the proposed development.

The proponents are aware that the Strangways Developments Pty Ltd have lodged an application to amend the planning scheme for special use as part of Planning Application (PA2015/0259) to the Department of Land, Planning and the Environment (TPG Town Planning, Urban Design and Heritage, 2015). The application includes a Sewage treatment facility proposed to be located on “Santavan” which will require the implementation of an odour buffer around the Sewage treatment facility.

Under the Planning Act (NT) the Northern Territory Planning scheme forms part of the development approval process.

### 4.10.3 *Northern Territory Planning Scheme (NTPS)*

The NTPS zones the proposed development site as R-Rural; and outlines the objectives and allowable development within the zone. The proposed development is noted as Intensive Animal Husbandry and is discretionary which means development consent is required from the Department of Land Planning and the Environment before this development can be undertaken on the land. The Statement of Effects was lodged with the DLPE on the 24<sup>th</sup> of April 2015.

Under the NTPS the zoning for the proposed development is Rural (R). For land zoned Rural (R), the following purposes exist under the (NT) Planning scheme:

- The primary purpose of Zone R is to provide for a range of activities including residential, agricultural and other rural activities.

- The larger lot sizes in this zone facilitate the separation between potentially incompatible uses and restrict closer settlement.
- If lots are unsewered, provision for the disposal of effluent must be made on-site so that the effluent does not pollute ground or surface waters.

The proposed development is considered to align with these purposes. An on-site wastewater system will be installed and an onsite liquid and solid waste management plan (Appendix H) will form part of the environmental management plan (Appendix E).

The proposed development is classified as Intensive Animal Husbandry and is 'discretionary' in land zoned, Rural (R). The following constraints apply to Intensive Animal Husbandry in the Rural (R) zone:

6.1 General Height Control – limits the height of buildings to two storeys maximum of 8.5m.

**Comment:**

The proposed house will not exceed 8.5m in height. The hay sheds, PEQ sheds and other feed mill infrastructure exceed 8.5m in height, but is not expected to exceed 15 m in height. The buildings are for agricultural use and not inconsistent with the land uses. The facilities have been sited to the east of a low ridge which will reduce their profile and partly lower their presence when viewed from the highway. They will be visible from the edge of the property. Tree lines will be established and this will partially screen the buildings reducing their presence.

10.1 Animal Related Use and Development – Purpose of this clause is to minimise the adverse effect of animal related activities on the environment and to ensure that those activities do not detract from the amenity of the locality.

**Comment:**

The proposed development has been designed using known design principles to minimise the risks identified in the Environmental Risk Assessment. An Environmental Management Plan would be developed to set out the mitigation measures to be implemented on the proposed development site to minimise risk on the site and during operations.

- The pens and yards will be designed by a suitably qualified engineer to ensure that the pens are free draining with no ponding of water.
- The sediment ponds have been designed with 3:1 peaked batters with no shallow water in the holding ponds. The ponds would have the ability to dewater rapidly.
- The pasture areas would be slashed regularly to minimise the breeding habitat of insects and thereby minimising the need for insecticides.
- Nutrient product from manure and effluent would be applied directly to the irrigable area.

10.2 Clearing of Native Vegetation in Zones H, A, RR, RL, R, CP, CN, RD and WM and on Unzoned Land. – The purpose of this clause is to ensure that the clearing of Native Vegetation does not unreasonably contribute to the environmental degradation of the locality.

**Comment:**

The proposed development site is currently developed for cultivation and pasture production. There is minimal native vegetation on the site. The proposal will entail the clearing of a 2.6 ha patch of heavily degraded remnant vegetation on the site. Clearing will be offset by the establishment of 2 hectares of native vegetative buffers along the boundaries of the site. No endangered or threatened flora and fauna species will be adversely impacted by the proposed development.

#### 4.10.4 *Land Use Compatibility*

The subject land is currently zoned Rural (NTPS, 2015). The Darwin Regional Land Use Plan 2015 notes the subject land as Rural / Rural Lifestyle and notes that agriculture and related niche business are important to the Northern Territory economy and the Livingstone municipality. The proposal is categorised as Intensive Animal Husbandry under the Northern Territory Planning Scheme. Intensive Animal Husbandry is a discretionary development within the Rural Zone which means the development is permitted in the zone with Development Consent.

According to the Darwin Regional Land Use Plan 2015, the majority of the proposed site has a low horticulture potential (with the southern section having a “high annual horticultural potential”).

#### 4.10.5 *Residential, Recreational and Tourism Encroachment*

As outlined in the odour assessment (Appendix C) the ILEF can be developed at the site without undue odour nuisance. Whilst some odour may be generated from time to time the existing environment and existing separation distances and buffers will adequately mitigate against odour nuisance.

The train track and vegetation will also act as buffers for visual amenity and odour. The proposed site is also immediately adjacent to the existing live export facility “Santavan” which provides another buffer for surrounding sites. The closest existing residential site is 800m away. This distance is considered great enough to restrict encroachment of the proposed facilities negative impacts (such as odour and visual amenity) on surrounding land uses.

Agricultural developments such as the ILEF and rural and residential development can co-exist. The Northern Territory government is able to proactively manage future planning of land uses to facilitate this. It is recommended that the Northern Territory government apply a buffer zone between the agricultural developments and the rural and residential developments to reduce the risk of residential encroachment within the agribusiness zones. Examples of how and where this system has been implemented are detailed in the Odour Assessment in Appendix C.

### 4.11 **Archaeological and Heritage Matters**

The site has been cleared and developed. While it is possible that aboriginal artefacts may remain on the property, given the extent of the property development this appears to be unlikely. No evidence of artefacts has been found. An application was made with the NT Aboriginal Areas Protection Authority who assessed the site with representatives from local Aboriginal families. This assessment found no sites of heritage significance in the area of the proposed development. A Certificate of Authority has been received from the NT Aboriginal Areas Protection Authority and is attached in Appendix K.

A search of the national database revealed one (1) site of significance registered on the Register of National Estate. This site is the Northern Territory Railway Darwin to Pine Creek. A search of the Northern Territory heritage databases did not reveal any results. A phone call with the NT Heritage office on 7<sup>th</sup> July was made to confirm these details and the email response is attached in Appendix K.

### 4.12 **Previous Operations on the Site**

The proposed development site was previously used for grazing, cultivation and pasture production. The site also has history of horticultural use and for the growing of melons. There is no evidence of cattle dips on the site and no evidence of contamination was found during the soil surveys.

## 5. Community Consultation

### 5.1 Objectives of Community Consultation

The objectives of the community consultation are:

- To liaise with the surrounding land holders (residents and operators) regarding the proposed development and what it will mean for them.
- Provide information and answer questions that the community may have in relation to the development.

### 5.2 Community Engagement

Stakeholder and Community consultation has been an important component associated with the development of this EIS and will continue through construction and operation of the facility.

Meetings with key stakeholders have been held regularly since the inception of the project. The development of a number of the key information aspects of the project enabled the establishment of a web portal for the project and production of a pdf format newsletter for download and public distribution. This occurred on in April 2015.

Table 8 details the meetings undertaken as part of the consultation process with key stakeholders. Community consultation for the proposed development commenced in December 2014 with an initial briefing between Wellard, EnviroAg and the Department of Land, Planning and the Environment (Steve Kubasiewicz).

A planning focus meeting was held on the 6<sup>th</sup> January 2015 where Government Departments were called together and introduced to the proposed development. The Departments present at the planning focus meeting include: Litchfield Council, DLPE – Heritage, Land Planning, DLRM, NT EPA, PWC, DoT, NT MLA.

A series of consultation and briefing meetings were undertaken with the DLPE & the NT EPA to discuss the Development Application and Notice of Intent application. On the 15<sup>th</sup> May 2015 a stakeholder meeting and a tour was conducted to show the existing facilities at “Santavan” and discuss the proposed facility and site. Representatives that attended this meeting were from DPLE, DLRM & DPIF. NT EPA was unavailable at the time of the meeting. A separate meeting was undertaken at their office in Parap on the 18<sup>th</sup> of May 2015.

The main community consultation meeting was held on the 16<sup>th</sup> July 2015 at the Berry Springs Recreation Reserve Community Hall. A letter drop was conducted on the 10<sup>th</sup> July 2015 to those residents that fell within or adjoining a 1 km odour impact buffer. Eleven (11) concerned residents attended the meeting. The concerns raised are detailed in Table 7.

**Table 7 Concerns Raised by Locals during Community Consultation**

| <b>Concern</b>                     | <b>Mitigation measures</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Where it is covered in this document</b>                                                                                                         |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Truck Access</b>                | <ul style="list-style-type: none"> <li>Proposed facility will utilise the existing AA Co. turnout which is road train rated.</li> <li>Communications between trucks for both delivery and transhipment of cattle to port facilities will be managed to ensure that traffic is not held up at Stuart Highway turn-off.</li> </ul>                                                                                                                                                                                                                                                                                                | 3.2 Traffic and Access<br>7.16 Traffic and Road Impacts                                                                                             |
| <b>Odour Management of Compost</b> | <ul style="list-style-type: none"> <li>Compost moisture will be managed to optimum levels and the formation of compost into windrows which are turned will ensure that aerobic digestion is maintained within the mounded material and odour prevented from becoming offensive.</li> <li>Stockpiled material will be sold prior to the onset of the wet season.</li> <li>There is an ample market within economic transport distance from the proposed facility to sell all composted/finished material.</li> </ul>                                                                                                             | 3.9 Solid and Liquid Waste Management<br>7.3 Solid Waste Management<br>7.7 Odour                                                                    |
| <b>Pond Odour Management</b>       | <ul style="list-style-type: none"> <li>Wastewater ponds have been designed to allow rapid dewatering during the dry season.</li> <li>Sedimentation basins will be installed at the end of each feed lane to reduce the amount of solids entering the wastewater treatment system.</li> <li>Wastewater regularly used to irrigate pasture and fodder crops keeping wastewater levels to a minimum.</li> </ul>                                                                                                                                                                                                                    | 3.8 Drainage Systems<br>7.2 Liquid Waste Management<br>7.7 Odour                                                                                    |
| <b>Dust Management</b>             | <ul style="list-style-type: none"> <li>Sprinkler systems will be set up on exposed pen surfaces and key transport lanes to suppress dust throughout the dry season.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 7.9 Air Quality                                                                                                                                     |
| <b>Control of Water Runoff</b>     | <ul style="list-style-type: none"> <li>Wastewater management design ensures the separation of clean/dirty wastewater streams.</li> <li>All wastewaters from this operation will be captured and diverted to wastewater storages.</li> <li>All fresh water captured on site will be either stored or diverted as per that permitted by existing infrastructure.</li> <li>The site will not generate any additional freshwater runoff than that currently experienced.</li> <li>All “dirty” water runoff will be captured in a sedimentation basin and subsequent storage for irrigation onto fodder production areas.</li> </ul> | 3.8 Drainage Systems<br>7.2 Liquid Waste Management<br>7.4 Drainage and Stormwater Management<br>Appendix H: Solid and Liquid Waste Management Plan |
| <b>Mosquito Control</b>            | <ul style="list-style-type: none"> <li>Lime dosing of ponds can be undertaken to control any mosquito populations.</li> <li>The capacity to rapidly dewater ponds during the dry season will also work to actively control mosquito populations.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                     | 7.14 Weed, Pest and Insect Control<br>Appendix F: Biting Insects Management Plan                                                                    |
| <b>Weed</b>                        | <ul style="list-style-type: none"> <li>Once the site is owned, existing weed infestations will be managed through a combination of</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 7.14 Weed, Pest and Insect Control                                                                                                                  |

| Concern                      | Mitigation measures                                                                                                                                                                                                                                                                                                                                                 | Where it is covered in this document                             |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| <b>Management</b>            | spraying and active cultivation of arable areas.<br><ul style="list-style-type: none"> <li>• Drain areas and those adjacent to the train line will also be chemically managed to reduce the spread of weeds from passing rail traffic.</li> </ul>                                                                                                                   | Appendix G: Weed Management Plan                                 |
| <b>Lighting</b>              | <ul style="list-style-type: none"> <li>• Facility lighting will be downward facing to minimise the radiation of lights outside the property boundary.</li> </ul>                                                                                                                                                                                                    | 3.5 Lighting<br>7.10 Lighting and Visual Amenity                 |
| <b>Facility Noise</b>        | <ul style="list-style-type: none"> <li>• Cattle well managed are quiet as they in a general paddocked situation.</li> <li>• Some noise will be generated through truck movements and the loading/unloading of cattle.</li> <li>• Extensive tree buffers and forage production will all assist with the buffering of noise generated within the facility.</li> </ul> | 7.8 Noise                                                        |
| <b>Truck Servicing</b>       | <ul style="list-style-type: none"> <li>• The requirement for a truck wash down is an integral part of an export quarantine facility.</li> </ul>                                                                                                                                                                                                                     | 3.2 Traffic and Access<br>7.16 Traffic and Road Impacts          |
| <b>Incident Alert System</b> | <ul style="list-style-type: none"> <li>• An incident alert hotline will be established so that residents can report any direct issues arising from the operation of the proposed facility.</li> </ul>                                                                                                                                                               | 7.18 Social Impacts<br>Appendix E: Environmental Management Plan |

**Table 8 Community Meeting Register**

| <b>Date</b>                     | <b>Name</b>                                                                                                                                                                                                                                                                                                                             | <b>Company</b>                                                                                                                                                                                                                                                         | <b>Venue</b>                           | <b>Meeting Purpose</b>                          |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------------------|
| 16 <sup>th</sup> December, 2014 | Simon Lott<br>Bernie Brosnan<br>Brad Gosling<br>Steve Kubasiewicz                                                                                                                                                                                                                                                                       | EnviroAg Australia<br>Wellard Rural Exports<br>Wellard Rural Exports<br>DLPE                                                                                                                                                                                           | Arnhemica House, 16 Parap Rd, Parap NT | Initial Briefing for DLPE                       |
| 6 <sup>th</sup> January, 2015   | Simon Lott<br>Miriam Lott<br>Joanne Mullins<br>Rita-Lee Tamous<br>Vianne Bensley<br>Jamie Castles<br>Kate Rogers<br>Del Batton<br>Sherry Cullen<br>Natalie Calder<br>Emma Plint<br>Andrew Tjitaih<br>Don Buentipo<br>Luke Host<br>Ian George<br>Steven Kubasiewicz<br>Allison Hooper<br>Roderick Johnson<br>Gerry Wood<br>Kezia Purrick | EnviroAg Australia<br>EnviroAg Australia<br>Litchfield Council<br>Litchfield Council<br>DLPE – Heritage<br>DLPE<br>DLRM<br>DLPE – Lands Planning<br>DLPE – Lands Planning<br>NT EPA<br>NT EPA<br>PWC<br>PWC<br>DoT<br>DoT<br>DAS<br>DLPE<br>NT EPA<br>NT MLA<br>NT MLA | Arnhemica House, 16 Parap Rd, Parap NT | Initial Introduction and Planning Focus Meeting |
| April 2015                      | Meeting with owners of “Santavan” and their representatives                                                                                                                                                                                                                                                                             | EnviroAg Australia<br>Strangways Developers                                                                                                                                                                                                                            |                                        |                                                 |

|                            |                                                                                                  |                                                                                              |                                                             |                                           |
|----------------------------|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------|
| 8 <sup>th</sup> May, 2015  | Simon Lott<br>Rod Johnson<br>David Ryan                                                          | EnviroAg Australia<br>NTEPA<br>NTEPA                                                         | Via Teleconference                                          | Discussion about Statement of Reasons     |
| 11 <sup>th</sup> May, 2015 | Simon Lott<br>Richard Pillow<br>Bernie Brosnan<br>David Walker                                   | EnviroAg Australia<br>EnviroAg Australia<br>Wellard Rural Exports<br>Strangways Developments | Wellard Rural Exports, Santavan PEQ Yard, Stuart Highway NT | Consultation                              |
| 13 <sup>th</sup> May 2015  | Simon Lott<br>Richard Pillow<br>Bernie Brosnan<br>Alistair Trier                                 | EnviroAg Australia<br>EnviroAg Australia<br>Wellard Rural Exports<br>DPIF                    | Wellard Rural Exports, Santavan PEQ Yard, Stuart Highway NT | Briefing/Consultation                     |
| 13 <sup>th</sup> May, 2015 | Simon Lott<br>Richard Pillow<br>Allison Hooper<br>Anne Wilson<br>Del Batton                      | EnviroAg Australia<br>EnviroAg Australia<br>DLPE<br>DLPE<br>DLPE                             | Arnhemica House, 16 Parap Rd, Parap NT                      | Briefing/Consultation                     |
| 14 <sup>th</sup> May, 2015 | Simon Lott<br>Richard Pillow<br>Rod Johnson                                                      | EnviroAg Australia<br>EnviroAg Australia<br>NTEPA                                            | Teleconference                                              | Consultation                              |
| 15 <sup>th</sup> May, 2015 | Simon Lott<br>Richard Pillow<br>Jo Brosnan                                                       | EnviroAg Australia<br>EnviroAg Australia<br>Strangways Developments                          | Humpty Doo, NT                                              | Consultation                              |
| 15 <sup>th</sup> May, 2015 | Simon Lott<br>Richard Pillow<br>Bernie Brosnan<br>James Pratt<br>Luis de Rocha<br>Allison Hooper | EnviroAg Australia<br>EnviroAg Australia<br>Wellard Rural Exports<br>DLRM<br>DLRM<br>DLPE    | Wellard Rural Exports, Santavan PEQ Yard, Stuart Highway NT | Project briefing/update and on-site tour. |

|                              |                                                                                                                                                                                                             |                                                                                                                                                                                                                       |                                                                       |                        |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|------------------------|
|                              | Anne Wilson<br>Karen McGuigan<br>Malcolm Anderson                                                                                                                                                           | DLPE<br>DLPE<br>DPIF                                                                                                                                                                                                  |                                                                       |                        |
| 18 <sup>th</sup> May, 2015   | Richard Pillow<br>Rod Johnson                                                                                                                                                                               | EnviroAg Australia<br>NTEPA                                                                                                                                                                                           | 2/201, The Avenue, 12 Salonkia St,<br>Parap NT                        | Consultation           |
| 16 <sup>th</sup> July, 2015  | Richard Pillow<br>Simon Lott<br>Kevin Henry                                                                                                                                                                 | EnviroAg Australia<br>EnviroAg Australia<br>Strangways Developments                                                                                                                                                   | 4/85 Cavanagh St, Darwin NT                                           | Consultation           |
| 16 <sup>th</sup> July, 2015  | Richard Pillow<br>Graham Francis<br>Edward Li<br>Natasha McAlister<br>Herb Backers                                                                                                                          | EnviroAg Australia<br>Litchfield Council<br>Litchfield Council<br>Litchfield Council<br>Litchfield Council                                                                                                            | 7 Bees Creek Road, Freds Pass NT                                      | Project Briefing       |
| 16 <sup>th</sup> July, 2015  | Richard Pillow<br>Simon Lott<br>Bernie Brosnan<br>Andrew & Maria Tuckey<br>Stuart & Jayne Stockwell<br>Sally Isberg<br>Alastair Barker<br>Anna Malgorzewicz<br>Lyle Hebb<br>Zoe & Glenn Spiers<br>Mick Wing | EnviroAg Australia<br>EnviroAg Australia<br>Wellard Rural Exports<br>Local Residents<br>Local Residents<br>Local Resident<br>Local Resident<br>Local Resident<br>Local Resident<br>Local Residents<br>Local Residents | Berry Springs Recreation Reserve,<br>Community Hall, Berry Springs NT | Community Consultation |
| 5 <sup>th</sup> August, 2015 | Bruce Bennett<br>Jason Strong<br>Simon Lott<br>Sarah Grady                                                                                                                                                  | AA Co.<br>AA Co.<br>EnviroAg<br>EnviroAg                                                                                                                                                                              | Tower A, Level 1, Gasworks Plaza, 76<br>Skyring Terrace, Newstead     | Consultation           |

|                                 |                                                                        |                                                                 |                                                         |                                                                                                                                                                         |
|---------------------------------|------------------------------------------------------------------------|-----------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 28 <sup>th</sup> August, 2015   | Steve Rutter<br>Glen Bulloch<br>Simon Lott                             | AA Co.<br>AA Co<br>EnviroAg                                     | AA Co, 2660 Stuart Hwy, Livingston                      | Consultation                                                                                                                                                            |
| 28 <sup>th</sup> August, 2015   | David Rhind<br>Paul Person<br>Mitchell<br>Simon Lott<br>Bernie Brosnan | NT EPA<br>NT EPA<br>NT EPA<br>EnviroAg<br>Wellard Rural Exports | 2/201, The Avenue, 12 Salonkia St,<br>Parap NT          | Consultation                                                                                                                                                            |
| 2 <sup>nd</sup> September, 2015 | Allison Hooper<br>Karen McGuigan<br>Simon Lott<br>Bernie Brosnan       | DLPE<br>DLPE<br>EnviroAg<br>Wellard Rural Exports               | Arnhemica House, 16 Parap Rd, Parap<br>NT               | Consultation/ Future Planning                                                                                                                                           |
| 2 <sup>nd</sup> September, 2015 | David Sneedon<br>Glen Bulloch<br>Simon Lott                            | AA Co.<br>AA Co<br>EnviroAg                                     | AA Co, 2660 Stuart Hwy, Livingston                      | Consultation                                                                                                                                                            |
| 2 <sup>nd</sup> September, 2015 | Kevin Boland<br>Peter Saunders<br>Simon Lott<br>Bernie Brosnan         | Trop Water<br>Jacobs<br>EnviroAg<br>Wellard Rural Exports       | Jacobs, Level 2, 25 Parap Road<br>Parap, Darwin NT 0820 | Discussions pertaining to the Weddell East residential development and the use of "Santavan" for the Sewage treatment facility and wastewater irrigation disposal area. |
| 2 <sup>nd</sup> September, 2015 | Simon Lott<br>Bruce Bennett                                            | EnviroAg<br>AA Co                                               | Teleconference                                          | Phone calls attempted to Bruce Bennett's office and mobile with no answer or response received in reply to messages left.                                               |

### 5.3 Results of Community Consultation

As part of the letter drop the residents were supplied with a questionnaire and a pre-paid addressed envelope to facilitate the return of the questionnaire. A copy of the questionnaire is provided in Appendix R. To date (23/10/2015) only three of questionnaires have been returned. In the questionnaire residents were asked to rate various issues on a scale of 1 to 5 corresponding to not important and extremely important. The responses obtained are summarised in Figure 28. Respondents were also asked to indicate whether they considered each impact to be positive or negative. All ratings were negative, except for economic and social impacts, which were deemed positive.

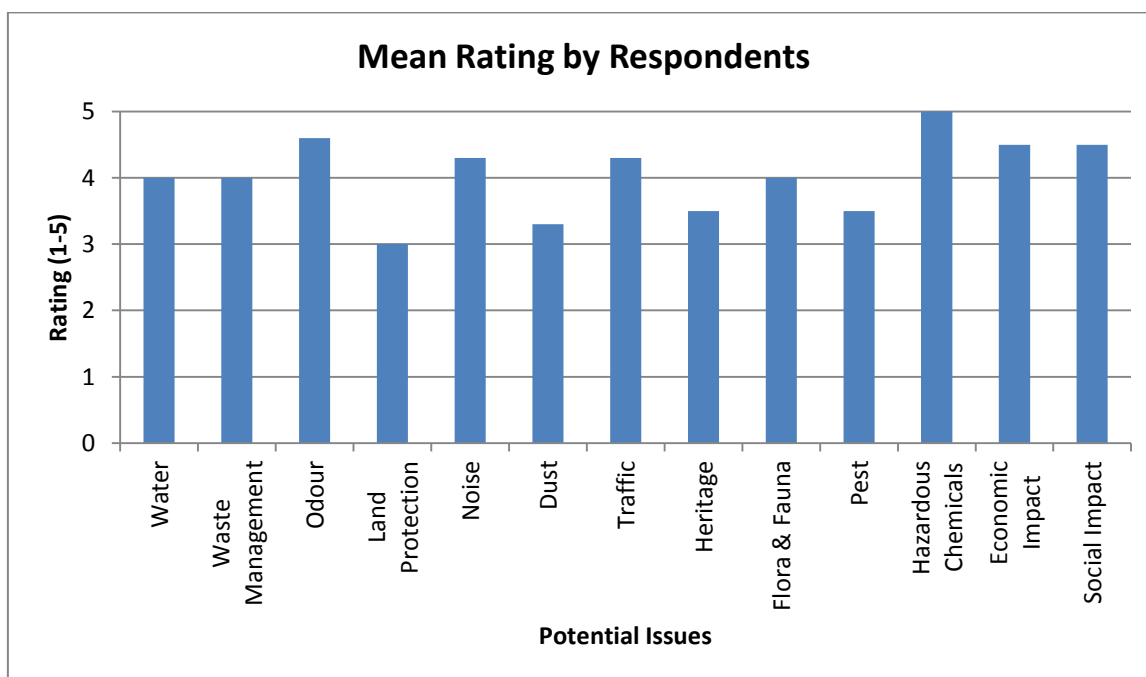


**Figure 28 The Mean Importance Rating - given to various issues by nearest receivers responding to the questionnaire**

The web portal was established to provide information to the community. Since the web portal was established in April there have been approximately 406 unique visitors to the site. The newsletter has been downloaded 105 times. Table 9 below provides a summary of the total hits and visits to the site. Figure 29 below summarises the website hits/visits on a monthly basis.

**Table 9 Summary of Website Hit/Visit Data.**

|                      | Unique Visitors                                   | Number of Visits              | Pages                         | Hits                         | Bandwidth                      |
|----------------------|---------------------------------------------------|-------------------------------|-------------------------------|------------------------------|--------------------------------|
| Viewed traffic *     | ≤ 406<br>Exact value not available in 'year' view | 1042<br>(2.56 visits/visitor) | 10,477<br>(10.05 Pages/Visit) | 16,555<br>(15.88 Hits/Visit) | 141.03 MB<br>(138.59 KB/Visit) |
| Not viewed traffic * |                                                   |                               | 7,633                         | 9,274                        | 48.82MB                        |

\* Not viewed traffic includes traffic generated by robots, worms, or replies with special HTTP status codes.

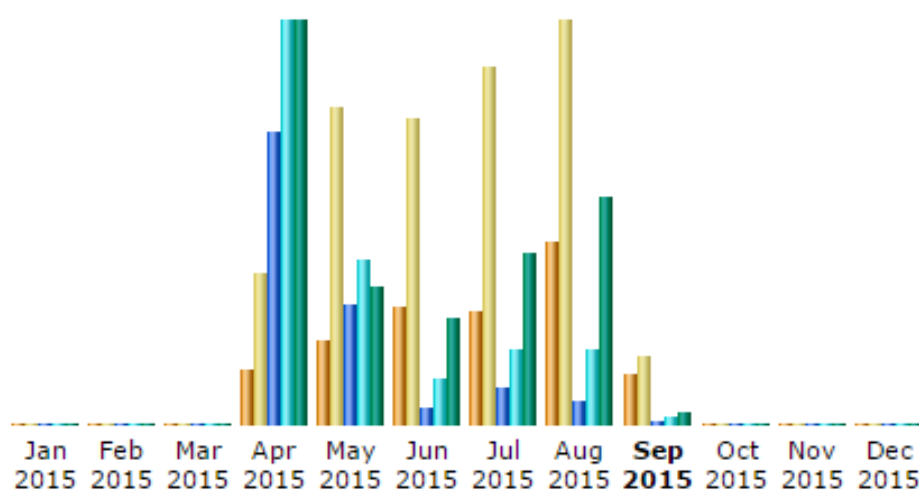


Figure 29 Monthly Website Hits/Visits Data as at 4/09/2015

## 5.4 Discussion/Outcomes

As a result of the community consultation Wellard is aware of the current issues the community is facing and as such the design of the facility has been amended where possible to mitigate any potential impacts that were raised during the community consultation. Wellard will continue with community consultations into the future through regular correspondence via the web portal, the implementation of a consultation hotline for the community to contact the facility to voice concerns and the opportunity for concerned residents to meet with facility operators via appointment.

## 6. Identification and Prioritisation of Environmental Issues

### 6.1 Methodology

#### 6.1.1 Information sources

A diverse range of information sources was used to identify and prioritise environmental issues associated with the proposed development. Some of the guidelines, codes of practice and handbooks that were consulted included “Australian Standards for the Export of Livestock” (DAFF, 2011), Australian Animal Welfare Standards and Guidelines – Land Transport of Livestock (AHA 2012; National Guidelines for Beef Cattle Feedlots (MLA 2013), “National Beef Cattle Feedlot Environmental Code of Practice” (MLA, 2012). A wide range of other, more general reports, research and reference material was consulted in the preparation of this document and these are shown in the references section of this report.

Extensive community consultation has taken place regarding the ILEF. Issues raised by the community have been described in Table 7 and have been taken into consideration for the risk assessment.

#### 6.1.2 Checklists

Generic checklists such as “Guidelines and criteria for Determining the Need for and Level of Environmental Impact Assessment in Australia” (ANZECC, 1996) were consulted as an aid to the identification and prioritisation the environmental impacts associated with the proposal.

### 6.2 Process Outcomes

#### 6.2.1 Issues Identified

The review of literature and the consultative process detailed in Section 5 identified the following issues:

- Cumulative impacts;
- Traffic & road impacts;
- Liquid waste management;
- Solid waste management;
- Odour;
- Noise;
- Lighting;
- Land capability & protection;
- Water quality & catchment protection;
- Air Quality (including dust);
- Flora & fauna;
- Heritage;
- Hazardous chemicals;
- Pest & insect control;
- Weed management;
- Animal welfare; and
- Economic and social effects.

#### 6.2.2 Risk Assessment and Prioritisation of Key issues

To assess the environmental relevance of the identified issues a qualitative risk assessment approach was adopted. This approach uses a risk matrix to assess the priority or significance of the identified issues based

on the joint likelihood of occurrence (in the absence of mitigating measures) and resultant magnitude of any impact (Koks, 1998).

The risk assessment matrix is attached in Appendix D. The determined scores can be evaluated on the basis that scores of 0 generally require no response, 1 to 8 are of a low priority, 9 to 15 are of medium priority and scores of greater than 15 are of high priority. The results of the risk assessment are provided in Table 10.

**Table 10 Results of the Risk and Prioritisation Assessment**

| Issue                                | Risk /<br>Prioritisation<br>Score |
|--------------------------------------|-----------------------------------|
| Liquid waste management              | 25                                |
| Solid waste management               | 20                                |
| Water quality & catchment protection | 20                                |
| Air Quality (including dust)         | 20                                |
| Odour                                | 15                                |
| Noise                                | 15                                |
| Economic and social effects          | 15                                |
| Land capability & protection         | 12                                |
| Pest & insect control                | 12                                |
| Weed management                      | 12                                |
| Cumulative impacts                   | 10                                |
| Traffic & road impacts               | 10                                |
| Flora & fauna                        | 10                                |
| Hazardous chemicals                  | 10                                |
| Lighting                             | 8                                 |
| Animal welfare                       | 5                                 |
| Heritage                             | 2                                 |

Liquid and solid waste management, air quality, as well as water quality and catchment protection were all identified as high priority issues. High Risks activities should cease immediately until further control measures to mitigate the risk are introduced.

Issues such as cumulative impacts, odour, noise, traffic, lighting, land capability, flora and fauna, hazardous chemicals, pest and insect control, as well as economic and social effects were considered as significant issues but of medium priority. Medium Risks should only be tolerated for the short-term and then only whilst further control measures to mitigate the risk are being planned and introduced, within a defined time period.

Due either to the nature of the environment and or the minor nature of likely impacts, issues such as animal welfare, lighting, and heritage were considered to be of a relatively low priority. Low Risks are largely acceptable, subject to reviews periodically, or after significant change.

The issues identified above have been examined in the following sections.

## 7. Environmental Management

### 7.1 Cumulative Impacts

#### 7.1.1 *Baseline Conditions*

The Litchfield Council and Livingstone area have historically been rural and rural-residential areas. In particular, neighbouring properties on the north, west and south are already being used for agriculture, with the “Santavan” PEQ yards bordering the northern side of the site and the AA Co. Meat Processing Facility to the west and south, separated by a railway line. The Darwin Regional Land Use Plan 2015 has indicated that some neighbouring properties are planned for urban and peri-urban developments. This has the potential to bring new sensitive receptors to the area.

The results of the community consultation brought to light some aspects that neighbouring properties felt were not being controlled well enough at the adjoining meat processing facility and PEQ facilities in the area that should be improved so as not to cumulate impacts with this new development. Impacts included noise, odour, light, dust, mosquito control and increased traffic.

#### 7.1.2 *Impact Analysis*

Cumulative environmental impacts relate to the aggregate effect of a number of individual actions. These actions are generally on larger spatial and temporal scales than those over which the impacts of an individual activity might normally be considered or assessed. The aggregate effects may be purely additive or the result of synergistic or antagonistic interactions. The effects may not necessarily be adverse, although the adverse effects are likely to be of greatest interest. Importantly, the individual actions need not necessarily be alike and the aggregate effects may also result from any combination of point source and diffuse emissions.

Sensitive receptors to the cumulative impacts of the ILEF and surrounds are likely to be neighbouring residential properties, ground and surface water, as well as native fauna.

#### **Neighbouring Properties**

Due to the agricultural nature of the region, odour, dust, noise and traffic impacts are nuisances to local residents that will be expected increase as agriculture becomes more intensive. Odour complaints have been received with regards to an agricultural facility 5.3km north of the ILEF site (Noonamah Cattle Yards), as well as the AA Co. Meat Processing Facility, located south-west of the site. However, the odours from the AA Co. Meat Processing Facility have a different odour signature to that of the proposed ILEF and those odours are not additive. An odour assessment is attached in Appendix C and is discussed in Section 7.7. The Odour Assessment shows the odour buffer zone, which includes the neighbouring Santavan PEQ Yards, since their odours would be cumulative. The minimum odour separation distance for the fully developed ILEF with an upgraded Santavan is 496.4m. A conservative buffer zone of 1000m was used for the community consultation. If a similar buffer zone was used for the Noonamah Cattle Yards there is no overlap of odour sensitivity and it is unlikely that cumulative impacts will be produced. Noise and dust are likely to be similar to odour in terms of buffer zones and cumulative effects, since the main sources of these impacts are the same.

Traffic impacts associated with the ILEF, AA Co., Santavan and Noonamah Cattle Yards are likely to be cumulative to the noise, dust and odour of the area, even if only while they pass by. The ILEF is essentially stopover for the transport of live animals. The specific contribution of the proposed development to noise, dust and traffic impacts will be discussed respectively in Sections 7.7, 7.9, 7.16. Measures are available to minimise the contribution of the proposed development to dust and, to a lesser extent, cumulative noise impacts. However, the contribution to cumulative road impacts may be more difficult to mitigate. Consequently, these potentially deleterious impacts need to be assessed in association with positive impacts, such as the economic and social benefits described in Sections 7.17 and 7.18 of this Environmental Impact Statement.

## Fauna

Whilst the ILEF site is predominantly cleared and has been used for pasture for an extended period of time, there is a 2.6 ha area of degraded native vegetation that will be cleared. AA Co. and Santavan have also been extensively cleared, bar a small area of vegetation around Berry Creek on AA Co. and the north-eastern corner of Santavan. However, the surrounding residential properties and airstrip are well vegetated. While clearing this small patch of vegetation will not currently make a large impact, in conjunction with the proposed residential developments on the other side of Stuart Highway, connectivity of Berry Creek with surrounding bushland may be reduced without this vegetation “stepping stone”.

It is intended that any impacts resulting from this loss of highly degraded remnant vegetation will be offset by the establishment of 2 hectares of vegetative buffers along the boundaries of the site. These buffers have the potential to act as wildlife corridors.

## Surface and Groundwater

Due to the topography of the site (Section 4.2) cumulative impacts could arise from wastewater or effluent runoff into local creeks at AA Co. (Berry Creek) and Santavan (Hardy Creek), which are both tributaries of Blackmore River. These creeks run through Berry Springs Recreation Reserve and are part of the Blackmore River and Darwin River Catchment (Haig & Townsend, 2003). In addition to the topography, Stuart Highway forms a barrier to surface water flowing east and the railway lines forms a slight barrier for surface water travelling to AA Co. and Berry Creek. However the railway is likely to direct surface water to Hardy Creek (NT Government Statement of Reasons).

The ILEF could present several sources of contaminants to the catchment. These include:

- Overflow of wastewater treatment ponds;
- Runoff from livestock pens;
- Runoff from compost/manure pad;
- Irrigation of the land with the treated water;
- Sediment runoff from irrigated land; and
- Runoff from chemical application (eg., pesticides, herbicides, veterinary chemicals).

The majority of properties in the catchment are listed as rural residential, irrigated perennial horticulture and grazing modified pastures in the Litchfield Shire Primary Land Use Map (Owen and Meakin, 2003). These neighbouring properties are likely to apply pesticides, herbicides, fertiliser and manure to the land and there may be cumulative effects on the catchment. Additional housing developments on the eastern side of the Stuart Highway as planned under the Darwin Regional Land Use Plan 2015 are likely to increase sediment runoff into the creek system, which is a big contributor of nutrients and pesticides to water systems. Excessive pesticides and nutrients in surface waters may lead to toxic effects on the aquatic and riparian ecosystems downstream, as well as the people that use this water. However, provided that the ILEF’s runoff is maintained onsite and does not run onto neighbouring properties during the wet season, this risk will be mitigated.

Similarly, groundwater is likely to be affected by cumulative impacts due to extraction of water and nutrient/chemical leaching. The bore proposed for the ILEF is expected to pump up to 200 ML of water per year to maintain livestock drinking water supplies. Groundwater is the only source of water flow into Berry Creek during the dry season (Tien 2006), so excessive use of groundwater within the catchment may impact the ecosystem downstream, as well as the social aspects of Berry Springs Recreational Area. With the number of unregistered and unregulated bores in the area, there could potentially be cumulative effects on the water table. However, some water from the operation will be returned through application of wastewater on the irrigation area and AA Co. and Santavan also both use town water instead of groundwater.

A study on the pesticide and herbicide levels in groundwater discharge at Berry Springs during the dry season detected no herbicide and only one pesticide (Chlorpyrifos), which was below the ANZECC guidelines (Schult, 2014). Berry Springs’ groundwater also had elevated nitrate, total phosphorus, and marginally elevated Filterable Reactive Phosphorus. This shows that there are already some impacts on the groundwater system at present from the region. The application of composted manure, treated wastewater, and captured freshwater runoff to the irrigation area, as well as the use of pesticides and chemicals in the

general maintenance of the property could leach into groundwater. However, irrigation will occur in accordance with the EMP.

Further developments to increase population in the area are likely to add additional strain to the groundwater, both in use and chemical leaching.

### 7.1.3 *Mitigation, Management and Monitoring*

It is recommended that the strip of vegetation between the WWII Hughes Airstrip and Stuart Highway be left as is, and not be developed as part of the Darwin Regional Plan. This will not only protect the airstrip, but will also act as an additional buffer for odour, noise and dust from the ILEF, AA Co. and Santavan.

The individual impact of activities can be managed by a range of measures such as those described in subsequent sections of this Environmental Impact Statement. Further, the resultant direct effects can be readily monitored. The adequacy of these measures and the monitoring are subject to regulatory reporting requirements and review.

However, a more general or collective move towards intensification of agricultural activity is more difficult to address, particularly where some of these activities might not automatically trigger formal regulatory review of the proposed development or regulatory oversight its subsequent environmental performance. Consequently, it could be considered onerous or discriminatory to place the onus for mitigating cumulative impacts only on activities subject to regulatory oversight.

Notwithstanding this, annual monitoring of water and aquatic ecosystem health in the Blackmore River currently undertaken by NRETAS (Darwin Harbour Region Report Cards) is capable of providing valuable information on catchment water quality and cumulative impacts.

It is likely that the proposed development will contribute, in the least, to cumulative traffic impacts. While individual impacts can be addressed, it will be necessary, as discussed above, for assessment agencies and the community to consider the nature of these impacts and their relative significance in light of possibly beneficial cumulative economic and social impacts associated with development in the region. Aside from the water quality monitoring, no specific monitoring is proposed to assess the cumulative impacts described.

### 7.1.4 *Confidence in Predicted Outcomes*

Due to associated uncertainties and lack of controls, there is limited scope for accurately predicting the relative contribution of the proposed development to many of the identified cumulative impacts. Consequently, there is only a moderate level of confidence to much of the above assessment.

## 7.2 **Liquid Waste Management**

### 7.2.1 *Baseline Conditions*

Land use in the vicinity of the proposed development site is dominated by grazing, dryland cultivation, meat processing, PEQ and rural residential areas. Liquid wastes that currently occur in the area are from the AA Co. Meat Processing Facility to the west of the proposed development site, from the use of sewage treatment systems on residential and commercial premises and from the operations of the existing PEQ facility on Santavan.

### 7.2.2 *Impact Analysis*

The modelling undertaken and described in the hydrological assessment (Appendix O) shows that the annual average yield of wastewater from the facility is expected to be 190ML/year. The yield in the wettest year in 10 years is expected to be 240ML/year.

The ILEF wastewater facilities have been designed to detain wastewater onsite as much as possible. This is achieved through bunding contaminated areas (pens, compost manure pad) and sloping them to ensure that wastewater enters the sedimentation basins. The sedimentation basins separate solids and liquids, and direct

the liquids to the primary wastewater pond. Ponds and dams onsite are lined with compacted clay and HDPE to eliminate potential seepage and to reduce vegetation growth. A wet weather storage pond downslope of the primary treatment pond can hold additional water if the primary wastewater pond is full. This will be achieved by way of a diesel pump that will also pump the treated wastewater to the irrigation area to grow pasture for feed. Drainage lines along the northern and western borders will catch any additional runoff and redirect this water to the freshwater runoff dam, which will also be used for irrigation.

These design features reduce the potential impacts of the ILEF substantially. However, if not properly managed this development could still represent a point source for nutrients, biodegradable organic matter and other environmental contaminants that have the potential to cause environmental harm to soil and water resources.

- Impacts from improper management of the ponds/dams include:
  - Increase in biting insect population;
  - Odour production;
  - Increase in pest (e.g. cane toad) population
  - Inefficient treatment/insufficient breakdown of organic material and other contaminants, and insufficient settling of solid material in the wastewater ponds due to overloading with wastewater;
  - Algal growth; and
  - Release of un-treated or semi-treated effluent during a severe weather event.
- Runoff and spills are the main risk for liquid waste environmental contamination, particularly during a wetter than average year. If the dams/ponds are all full and the irrigation block is saturated, overflow can occur, resulting in a variety of environmental issues including:
  - Contamination of surface water downslope (Hardy Creek, Berry Creek) resulting in algal blooms, eutrophication, offensive odours, degradation of aquatic ecosystems and Berry Springs Recreation Park;
- Improper management of the irrigation block may result in:
  - Contamination of groundwater aquifers, particularly during the wet season when groundwater levels are close to the surface;
  - Contamination of the soils of the irrigation block (increased salinity, acidification, breakdown of soil structure);
  - Altering the nutrient balance in the soils causing nutrient accumulation
  - Insufficient uptake of nutrients by the irrigated crops due to nutrient overload, insufficient water, waterlogging, salinity, sodicity, and soil degradation, or other factors affecting plant growth such as disease, pests, or toxic chemicals in the irrigation water.

### 7.2.3 Mitigation, Management and Monitoring

Key management features for the ponds and dams will include:

- Regular pen cleaning to reduce the risk of overloading the sedimentation and wastewater system;
- Regular pumping of treated water to irrigation block;
- Adhering to the Biting Insects Management Plan (Appendix F):
  - Regular slashing of vegetation around ponds/dams;
  - Lime will be added to wastewater to reduce odour and make the pH inappropriate for biting insect breeding;
- Emptying the ponds/dams prior to the wet season; and
- Regular inspections to monitor the structural integrity of drainage system components (including, embankments and clay liners).

Key irrigation area management features will include:

- Adhering to the Solid and Liquid Waste Management Plan (Appendix H);

- Irrigation carried out in line with the Soil Assessment Report (Appendix M)
- Careful management of irrigation program with consideration of the leaching fraction and potential loss of nitrogen and phosphorus offsite. This is best achieved by:
  - Frequent moderate applications of irrigation;
  - Maintaining an active plant growth;
  - Maximising organic matter content to maximise nutrient holding capacity; and,
  - Maximising nutrient recovery by crop harvest.

In addition, fast growing tree species will be planted on the northern and eastern boundaries of the facility (tree lines will take some time to become established) as an additional buffer for runoff and odour production.

In an emergency the following measures will be applied:

- Gypsum or lime will be added to holding pond if biting insect populations are found;
- The EPA Pollution Hotline will be called if the primary wastewater pond or wet weather storage pond overflow onto neighbouring properties; and
- Spill kits are available onsite.

The following monitoring will be undertaken:

- Pond and dam levels;
- Daily weather conditions onsite;
- Severe weather warnings during the wet season;
- Record the date and nature of cleaning and maintenance operations and any overtopping or spillages from wastewater storages;
- Volume of treated wastewater applied to the irrigation block;
- Quality of wastewater applied to the irrigation block (nutrients, salts, etc.);
- Physical and chemical properties of soils in the irrigation block;
- Pest species present (cane toads);
- Biting insects present (as detailed in the Biting Insect Management Plan);
- Record of complaints as per the Environmental Management Plan;
- Records of any emergency use of gypsum or lime to treat sources of odour; and
- A piezometer placed above and below the primary wastewater pond will be used to monitor shallow groundwater depth (quarterly) and quality (biannually) and to function as an early warning leak detection system.

#### 7.2.4 *Confidence in Predicted Outcomes*

The ILEF has been designed by engineers with vast experience and knowledge in feedlot expansions. The practices and systems have been designed and managed in order to mitigate and reduce the risk of liquid waste contamination. There are also emergency procedures in place should a contamination event occur. The design was also done in consultation with the Department of Health to ensure that biting insects do not become an issue. Thus there is a high level of confidence in the predicted outcomes.

## 7.3 Solid Waste Management

### 7.3.1 Baseline Conditions

Solid waste currently onsite that will need to be cleared during the construction phase includes non-hazardous wastes such as vegetation, soil (from excavations), and concrete, timber and steel from existing structures.

### 7.3.2 Impact Analysis

Construction will generate nonhazardous wastes such as steel and metal, plastic from pipelines, as well as hazardous wastes such as paints, resins, and cleaning products. General waste (food waste, some plastics and paper) as well as sewage effluent will also be generated onsite. During operation, the ILEF will produce large volumes of manure from the livestock, carcasses, general waste from the office and sheds, as well as hydrocarbons and hazardous substances from generators, vehicles and their maintenance.

A full list of waste types produced during construction and operation of the facility has been provided in the Solid and Liquid Waste Management Plan in Appendix H.

If not properly managed, this development would represent a substantial, point source for nutrients, and other environmental contaminants through water and sediment runoff, leaching into the ground and being carried by wind. These wastes have the potential to cause immense environmental harm to soil and water resources as well as impacting on air quality, human health and community amenity.

The ILEF organic solid waste facilities have been designed to detain potential environmental impacts onsite. The livestock pens and compost manure pad have compacted clay surface and are sloped to sedimentation drains to eliminate potential seepage and water runoff, as well as to reduce moisture and water build up and vegetation growth. The compost manure pad will also have an armoured base (road base). They are also sloped to the sedimentation basins to reduce water and moisture build-up. The solids will be moved from the sedimentation basin to the compost pad with a front-end loader.

Well managed compost should not readily produce environmental issues. However, ill-managed compost that is too wet, dry, hot, cold or undisturbed may:

- Produce odour;
- Produce dust; and
- Attract pests and scavengers.

All other wastes will be dealt with through management strategies.

### 7.3.3 Mitigation, Management and Monitoring

All waste will be managed through the “Eliminate, Reduce, Reuse, Recycle, Treatment, Disposal” hierarchy.

Key compost/manure management include:

- Frequent, scheduled pen cleaning will ensure the depth of (dry) manure is maintained at 50mm or less;
- Pens will be cleaned, at minimum, every 13 weeks;
- Manure will be harvested from the semi-confinement facilities as required;
- In open pen areas manure will be harvested twice per year; in April-May after the wet season and then in October-November prior to the onset of the wet season;
- Compost manure pad will be maintained at conditions as described in Table 11;
- Manure and bedding materials will be windrowed in the manure compost management area;
- Compost windrows will be turned to reduce pest occupancy and moisture levels, at a rate dependant on moisture content and wind speed;

- All compost will be removed (sold) off site prior to the wet season. Most will be sold off site to orchards; limited amounts will be used on site based on the agronomic requirements of the land and its pastures and crops;
- All trucks will cover their compost loads to reduce dust.

**Table 11 Compost Conditions Recommended by the National Beef Cattle Feedlot Guidelines (MLA, 2012)**

| Parameter                   | Acceptable range | Optimum range |
|-----------------------------|------------------|---------------|
| Carbon:Nitrogen             | 15:1 – 40:1      | 25:1 – 30:1   |
| Moisture levels (%)         | 45-65            | 50-60         |
| Oxygen levels (%)           | >5               | >5            |
| pH                          | 5.5 – 8.0        | 5.5 – 8.0     |
| Temperature (°C)            | 40 – 65          | 55 – 60       |
| Particle size diameter (mm) | 5 – 50           | 5 – 25        |

Key non-compostable waste management measures include:

- All non-compostable waste will, to the extent that it is practicable, be recycled or reused;
- Any solid wastes unable to be recycled or reused will be disposed of off-site in an appropriate manner at licensed waste management facilities (particular emphasis will be given to the appropriate disposal of veterinary sharps and any empty or disused chemical, vaccine, drug and antibiotic containers and packaging);
- Any wastes arising from spills, such as contaminated runoff and contaminated soil will be collected and remediated on site, or transported to a suitable facility for disposal;
- General waste from the site is to be placed in the skip bin, which will be taken to a licenced waste management facility and emptied on a regular basis.
- Construction waste is to be separated and stockpiled, where possible, into waste type (e.g. Steel, plastic, timber, organic) to be reused or recycled, otherwise transported to a licenced waste management facility for disposal.
- Biohazardous waste is to be contained to one area of the site, and then removed from the site by a certified agent.
- An extensive list of ILEF construction and operation wastes and their appropriate disposal methods are listed in the Solid and Liquid Waste Management Plan. This plan will be followed as part of the Environmental Management Plan and is provided in Appendix H.

In an emergency the following measures will be applied:

- Lime will be added to anaerobic manures in compost windrows to provide for alkaline stabilisation whilst the anaerobic conditions are being reversed via mechanical aeration;
- In the event of a severe weather warning solid waste material should be covered or secured or removed from the site.
- In an event a mass death occurs at the site then the National AUSVET management plan for the same will be invoked:
  - A pit would be dug on the southern portion of the manure composting area;
  - The mass death disposal area would occupy approximately 1.5 ha;
  - The pit would be lined where possible, with clay prior to the placement of carcasses;
  - The carcasses would be covered with composted manure; and
  - Following decomposition, the mortalities would be exhumed and introduced back into specially sized compost windrows to be further composting within the composting area and allowing for the pit to be re-instated and brought back on line for ongoing composting operations.

Monitoring of solid waste will include:

- Heat and moisture content of compost windrows;
- Wind speed and direction (to reduce dust and odour nuisance when turning the compost);
- Pest species present in waste (including compost manure pad and pens);
- Records of all waste removed from the site and receipts from the facilities the waste is disposed at;
- Number of carcasses composted;
- Record of complaints; and
- Records of any emergency use of lime to treat sources of odour resulting from anaerobic conditions within the compost windrows

#### 7.3.4 *Confidence in Predicted Outcomes*

The management practices, mitigation measures and monitoring described above are consistent with well established, scientifically based principles and practices detailed in various codes of practice, guidelines and standards (ARMCANZ, 1997; Skerman, 2000; MLA, 2012). Consequently there is a high level of confidence.

## 7.4 **Drainage and Stormwater Management**

### 7.4.1 *Baseline Conditions*

The site currently has little drainage and stormwater management, but has good groundcover in the form of pasture grass, which reduces sediment runoff. There is a slope of approximately 1.5 – 3%, draining from east to west, with elevation varying from 54 AHD to 24 AHD across the site. The site does not flood. However, low lying areas in the north east corner of the property, where it is lowest, and proximate to the railway line are flat and become inundated with runoff from upslope.

Using the Revised Universal Soil Loss equation, this site is estimated to have an annual soil loss of approximately 1.97 tonnes/ha/year (calculations in Appendix I). The current health of the local creeks on neighbouring properties is discussed in Section 7.5.

### 7.4.2 *Impact Analysis*

The wet season will be the most challenging time of year for drainage and stormwater management. Excess water runoff from the ILEF has the potential to spread sediment and nutrients to neighbouring properties and water systems, increasing the risk of aquatic ecosystem damage. The impacts of water and sediment runoff from the site into water systems on neighbouring properties are discussed in Section 7.5.

The construction phase removes vegetation and increases erosion, so there is a high risk of drainage and stormwater issues during the construction phase. An erosion risk assessment has been completed for the construction phase of the ILEF Darwin site in accordance with the principles outlined in Matthews (2008). The assessment, included in the Erosion and Sediment Control Plan (Appendix I), concluded that during the land disturbance activities (12 months) the total soil loss would equal approximately 101.71 tonnes. An area of approximately 51.63 ha would be disturbed during this period.

The impact of the ILEF on the environment from improper drainage and stormwater management while operational is largely mitigated by the design of the facility. Open drainage channels along both Santavan and AA Co.'s boundaries, as well as along the lower boundary of the irrigation block will catch stormwater and direct it to the freshwater runoff dam at the lowest point of the property (north-western corner). All stormwater will be directed to these drains by the topography of the site, excluding that of the pens/compost manure pad which is directed to the terraced sedimentation basins through bunding and sloping of these areas. The drainage channels will be made of compacted clay seeded with grass, and the sedimentation basins of terraced concrete to decrease the speed of water flow. After manure precipitation, water is redirected to the primary wastewater pond. A wet weather storage pond is available should the wastewater

treatment pond become too full. The site coverage of this drainage system ensures that runoff is captured from all areas and there should be no impacts external to the property. However, these design features rely on proper management to function efficiently.

#### 7.4.3 *Mitigation, Management and Monitoring*

The ILEF aims to detain as much water and sediment onsite as possible throughout the construction and operational phases.

A construction phase Erosion and Sediment Control Plan (Appendix I) has been developed to reduce the effects of sediment runoff to neighbouring properties and creeks. This plan states the sequence in which construction is required to take place and the management measures that will be undertaken to reduce sediment runoff.

In addition to the design, the following management strategies will be undertaken during the operational phase:

- The drains will be slashed regularly to ensure that water is not impeded by excess vegetation;
- Sedimentation basins will be cleaned out regularly with a front-end loader and moved to the compost manure pad;
- The primary wastewater pond and wet weather storage dam will be emptied prior to the wet season (via irrigation) to reduce the risk of overflow;
- The freshwater runoff dam will be emptied prior to the wet season (via irrigation and dust suppression) to reduce the risk of overflow;
- 100 m of the main access road will be sealed with bitumen per year;
- Additionally, the northern and eastern borders will be planted with vegetation buffers to reduce water and sediment flow onto neighbouring properties in the event of the drainage system overflow.

Monitoring measures include:

- Water quality monitoring of Hardy Creek downslope of the ILEF will be undertaken monthly for the first year and also in the event of a dam/drainage system overflowing;
- Pond and dam levels;
- Severe weather warnings during the wet season; and
- Records of the date and nature of cleaning and maintenance operations and any overtopping or spillages from wastewater storages ponds will be maintained.

#### 7.4.4 *Confidence in Predicted Outcomes*

The ILEF will incorporate banded, controlled drainage areas enclosing the sources of nutrients and contaminants. These measures will provide significant intrinsic protection from unacceptable impacts resulting from the transport of potential pollutants off the site in stormwater runoff. Consequently, there can be a high level of confidence in the predicted outcomes.

### 7.5 **Water Resources**

#### 7.5.1 *Baseline Conditions*

The ILEF is located at the eastern edge of the Berry Creek sub-catchment, a part of the Blackmore River and Darwin River Catchment. This catchment is well developed with unregulated rural and rural living activities. Land uses in these areas include commercial cattle holding facilities, cattle grazing, rural living and associated hobby farming activities.

## Surface water

There are no surface waterbodies onsite and a geotechnical study of the site found that there was minimal overland flow during the wet season. However, adjacent properties downslope each have tributaries of Blackmore River - Berry Creek on AA Co. and Hardy Creek on Santavan. Hardy Creek is a tributary of Berry Creek, which runs into Blackmore River (15km from the site). Blackmore River runs for another 8km to Darwin Harbour.

The NRETAS Aquatic Health Unit monitors a number of freshwater and estuarine sites in the Berry Creek and Blackmore River catchment as part of their annual reporting of the environmental condition of waterways within the Darwin Harbour Region. The last report card was in 2012 and this showed that total suspended solids (TSS), nitrates and total phosphorus were high, whilst electrical conductivity, turbidity, pH, dissolved oxygen, chlorophyll, total nitrogen and filterable reactive phosphorus were within the water quality objectives. The high nutrients and TSS were likely due to the increase in agricultural and urban development within the catchment.

## Groundwater

Groundwater is proposed to be the main source of water for the ILEF. The bore is expected to pump up to 200 ML of water per year to maintain livestock drinking water supplies. The geotechnical report found that there was a substantial increase in shallow subsurface water flow during the wet season. This ephemeral groundwater can adversely affect the construction of infrastructure if not correctly managed.

Groundwater is also the only source of water flow into Berry Creek during the dry season (Tien 2006), so excessive use of groundwater within the catchment may impact the ecosystem downstream, as well as the social aspects of Berry Springs Recreational Area, which is used as a local swimming hole. However, Santavan and AA Co. meat processing facility use town water, not groundwater.

A study on the pesticide and herbicide levels in groundwater discharge at Berry Springs during the dry season detected no herbicide and only one pesticide (Chlorpyrifos), which was found at a concentration below the ANZECC guidelines (Schult, 2014). Berry Springs' groundwater also had elevated nitrate, total phosphorus, and marginally elevated Filterable Reactive Phosphorus. This shows that there are already some impacts on the groundwater system at present from the region. However, due to the shallow depth of the aquifer feeding Berry Springs, these nutrients are likely to be a result of leaching from unregulated residential septic tanks.

### 7.5.2 Impact Analysis

#### Surface water

The lower reaches of the Blackmore River and Berry Creek are estuarine and tidally influenced. However, because incoming tides are larger than outgoing tides, the upper reaches of Darwin Harbour are not well flushed. As a result, there is a tendency for fine sediments to become trapped, and nutrients and other contaminants bound to the sediment may build up (DNREAS, 2010). Contamination of surface water may lead to toxic effects on the aquatic and riparian ecosystems downstream, as well as the people that use this water. This means that water quality should be maintained at a healthy level as much as possible upstream.

The main source of surface water contamination from the ILEF is likely to be from offsite runoff during high rainfall events in the wet season, as the nearest creeks are on neighbouring properties. The construction phase will present the greatest risk, as this will remove vegetative cover and expose soil to the elements. Earthworks for the ponds, dams and drainage are expected to start before the wet season. Prior to construction of the drainage systems (see Section 7.4), sediment runoff will need to be carefully managed to ensure that creeks downstream are not inundated with sediment laden water.

Once the operational phase begins, the water will enter the drainage system (as described in Section 7.4) due to the topography of the site. Due to the coverage of the drainage system, it is unlikely that the site will have an impact on surface water quality during operation.

## Groundwater

Groundwater is more likely to be affected by the ILEF than surface water. In particular, dry season flows of Berry Creek rely on aquifer fed groundwater at Berry Springs (Tien 2006). Excessive use of groundwater may reduce water flow downstream, which may affect the aquatic ecosystem and the community that uses Berry Springs Nature Park as a swimming hole. Whilst the ILEF will extract up to 250 ML of groundwater per year, the majority of Berry Spring's groundwater comes from shallower aquifers than that which the ILEF will access (Appendix P). The majority of the domestic bores in the area are also much shallower than the ILEF bore, so the ILEF is unlikely to have a great impact on community water availability.

Contamination can reach groundwater via the bore or by leaching through soil. Contamination via the bore can result through back flow after filling chemical containers, damage to the bore and poor bore construction. However, this is unlikely if licenced, accredited operators are used to construct the bore and it is visible and protected.

The design of the ILEF includes the following features that will decrease contamination of groundwater via the soil:

- Double bunding of the diesel and lime tanks, as well as chemical storage areas,
- Clay lining of pens;
- Clay lining and armouring of compost manure pad;
- Concrete lining of the sedimentation basins;
- Clay lining of all ponds and dams to reduce access to ground water; and
- Where appropriate, heavily trafficked areas will also be concreted.

These design features will reduce the risk of groundwater impacts occurring in the waste systems and export facility areas. However the application of compost and treated wastewater to the irrigation area can leach into groundwater if not managed properly.

### 7.5.3 Mitigation, Management and Monitoring

#### Surface Water

- The Erosion and Sediment Control Plan (Appendix I) for the construction phase will reduce sediment laden water from running off into surface water; and
- The drainage system will detain most water onsite during the operational phase.

#### Groundwater

- The development will extract a maximum of 250ML/year of groundwater by production bores to compliment the use of captured roof runoff. It is expected that two (2) bores will be drilled to secure this water. The extraction rate is modest and within production rates of bores within a 10km radius of the site;
- All roof runoff will be captured in gutters and piped to tanks or to separate clean water storage. This will significantly reduce inflows to the waste water treatment systems. It will also bolster the onsite supply of both domestic, stock water by approximately 50ML/yr;
- Chemicals will only be mixed and handled in sealed and bunded areas by appropriately licenced/accredited personnel;
- Current Jarra and Tully grass in the irrigation area will be replaced by a mixture of pasture plants with high nutrient uptake rates (Rhodes grass, purple pigeon grass, Lucerne, medic) in the irrigation area to ensure that excess nutrients do not leach into groundwater;
- Pens will be cleaned out regularly to reduce the risk of overloading the wastewater system with nutrients just prior to the wet season;
- Treated wastewater will only be applied to the irrigation block when there is a water deficit, to avoid waterlogging and effluent runoff; and

- Application of treated wastewater to irrigable areas will completely cease during the wet season to reduce recharge of groundwater, as irrigating during the wet season increases deep water drainage of nutrients and chemicals.

## Monitoring

- Record the date and nature of cleaning and maintenance operations and any overtopping or spillages from wastewater storages;
- Volume of treated wastewater applied to the irrigation block;
- Quality of wastewater applied to the irrigation block (nutrients, salts, etc.);
- Physical and chemical properties of soils in the irrigation block;
- Hardy Creek water quality will be monitored monthly for the first year, and then reviewed, as per the Environmental Management Plan; and
- Two bores onsite (one of the shallow 61m/79.3m deep bores and the new 114m deep bore) will be monitored for water quality and depth monthly for the first year, and then reviewed, as per the Environmental Management Plan.

### 7.5.4 Confidence in Predicted Outcomes

The ILEF will incorporate bunded, controlled drainage areas enclosing the sources of nutrients and contaminants. These measures will provide significant intrinsic protection from unacceptable impacts resulting from the transport of potential pollutants off the site in stormwater runoff. Consequently, there is a high level of confidence in the measures for surface water protection.

Groundwater impact assessments rely heavily on quantitative or semi-quantitative modelling or calculations. However, where possible, a conservative approach has been adopted, in line with the National Guidelines for Beef Cattle Feedlots (MLA, 2012). Consequently, while the nature of probable impacts can be identified, their magnitude cannot be reliably or fully ascertained. However, groundwater monitoring programs will allow for early detection of any changes. Thus there is a moderate-high level of confidence in the predicted outcomes.

## 7.6 Land and Soil Resources

### 7.6.1 Baseline Conditions

The soils and geology of the site have been described in detail in Sections 4.5 and 4.4 and a thorough geotechnical report has been provided in Appendix N. In summary, the soils in the area directly affected by ILEF are kandosols that are low in nitrogen and phosphorus. The surface soil pH is lightly acidic to neutral throughout the profile with pH ranging from 5.1 to 6.1. The cation exchange capacity of this soil is low, both in surface and subsoils. Organic carbon levels range from low to very low in surface and subsoils respectively with soil nitrate levels deficient throughout the soil profile.

The ILEF's land has been mapped by the NT Government as Land class 3 Production from Dryland Agriculture and Plantations, sub class 3 Cropping (Owen & Meakin, 2003). This land capability is the ability of the soil on the site to accept or handle the nutrient and water loading for the proposed development. The soils on the site are shallow Kandosols, which puts the site in the Moderate Risk Category for onsite wastewater management, due to the shallow nature of the soil, the ability to become seasonally waterlogged and the slope of the site (NT DoH, 2014).

### 7.6.2 Impact Analysis

The potential impacts of the proposed development in respect to soil erosion and sediment transport have been discussed in Section 7.4 and 7.5. Other potential soil impacts that might be associated with the proposed development are degradative processes associated with soil nutrient storage, structural decline and acidification.

Figure 4 divides the facility into three zones – the export facility zone, irrigation zone and waste systems zone. These areas will have different impacts on the land and soil resources.

The export facility and waste systems zones will house the majority of the infrastructure. The top soil has a moderate sand content, has low bearing capacity when wet and is slightly acidic to neutral, so it will be removed so that building can be carried out on the cemented ferricrete, which is less reactive and more stable than the top soil. Clay materials in the B1 and B2 will be selectively stripped and used for pond lining materials due to their low permeability. Due to the nature of the soil, pavement and foundations will also kept as dry as possible through the use of good drainage (Section 7.4). Removal of the topsoil for construction of infrastructure will change the land capability of these zones. However, the ILEF and its associated infrastructure is expected to have a lifespan of >40 years, minimising the significance of these changes.

Operation of the ILEF will introduce significant levels of nutrients to the export facility and waste systems zones. However, all ponds, dams, pens and then compost manure pad will have compacted clay floors to minimise nutrient leaching and contamination of soil. All chemical storage in these areas will also be bunded and locked.

The irrigable zone, which runs north-south along the eastern border of the property, will be irrigated with treated wastewater and will require significant nutrient management to ensure its sustainable use. The soils currently have a low water and nutrient holding capacity, but will respond well to the application of nutrients and water. They are also phosphorus deficient and will respond well to the application of gypsum, and organic matter, both of which will improve nutrient uptake and soil condition.

Ill-managed application of treated wastewater to the irrigation block can result in the following impacts:

- Increase of soil acidity;
- Waterlogging leading to plant death and odours;
- Soil salinisation;
- Loss of soil structure; and
- Nutrient leaching into groundwater.

### 7.6.3 *Mitigation, Management and Monitoring*

The construction phase will be undertaken as per the Erosion and Sediment Control Plan to ensure soil resources are retained onsite.

The operational phase will require excellent management of the irrigation area in the following ways:

- Area will need nutrient management due to the soils low water and nutrient holding capacity. The addition of gypsum and organic matter will improve nutrient uptake and soil condition;
- Irrigating the irrigation block only when there is a water deficit and during the dry season;
- Establishing a variety of pasture plants with good nutrient uptake abilities (Rhodes grass, medic, Lucerne, purple pigeon grass) to ensure that pasture does not die down during the dry season and nutrients do not leach into groundwater;
- Stubble retention and suitable tillage practices for erosion control and preventing soil runoff;
- Field operations will be planned or restricted so as to avoid heavy trucks, tractors and other equipment unnecessarily traversing the soils or entering cultivated areas under “wet” conditions.
- Lime can be applied to soils receiving holding pond effluent so as to avoid acidification and aluminium toxicity; and
- Spill kits are available onsite if a chemical spill occurs.

The following monitoring will be undertaken:

- Daily weather conditions onsite;

- Severe weather warnings during the wet season;
- Volume of treated wastewater applied to the irrigation block;
- Quality of wastewater applied to the irrigation block (nutrients, salts, etc.); and
- Physical and chemical properties of soils in the irrigation block.

#### 7.6.4 *Confidence in Predicted Outcomes*

The geotechnical model and recommendations presented in the geotechnical report are based on a limited number of test pits and a test borehole, with limited site coverage. Variations in ground conditions occur over relatively short distances and with depth. Thus there is a moderate level of confidence in the predicted outcomes.

### 7.7 **Odour**

#### 7.7.1 *Baseline Conditions*

Land use in the vicinity is dominated by grazing, dryland cultivation, meat processing and rural residential areas. Such activities do generate odours, particularly operations such as wastewater processing, pesticide applications, mowing and ploughing, as well as the handling of grazing livestock in yards and loading facilities.

The selected site is immediately adjacent to the “Santavan” PEQ holding yard, which has had only one recent odour complaint reported against its operations. This was the result of a dead animal in a grazing paddock close the boundary fence. The recently constructed and commissioned AA Co. meat processing facility that is located to the south of the proposed ILEF has caused some reported odour nuisance. The odours from the AA Co. meat processing facilities have a different odour signature to that of the proposed ILEF and those odours are not additive.

Several potential sources of odour emissions from the proposed site may include the livestock and PEQ yards, water treatment and retention ponds, and the compost manure pad.

#### 7.7.2 *Impact Analysis*

Construction should not produce any odour nuisance, but operation of the ILEF will produce odours. The facility is designed to minimise odour and dust. The crux of both issues stems from manure management or lack thereof. The object is to ensure that no wet manure accumulates, as this encourages odour-causing bacterial growth, and to ensure that no dry, powdery manure is generated that can give rise to dust when strong winds occur. To achieve this objective, all weather pens are covered by shed rooves and their floors are sloped to allow good drainage and maximise drying and dry manure conditions. Free draining drains and sediment basins lead to holding ponds which can be does with lime if they become malodorous. Treated wastewater is also directly placed onto irrigation grounds to negate aerosol generation.

In addition to these design features, an odour assessment has been undertaken and is presented in Appendix C. This assessment contains detailed separation distance calculations and recommended buffer zones. Factors used to calculate recommended buffer zones include the design and management of the facility, nearby receptors, terrain, vegetation, wind and food that the cattle are fed. The ILEF will have an average of 1,000 SCU in the short term feedlot and 3,078 SCU in the PEQ Yard. This facility is adjacent to an open PEQ yard at “Santavan” of some 1,851 SCU. The combined average capacity of the facilities is 5,292 SCU. An integration calculation was performed to obtain the buffer distance for both facilities combined, with the results of several scenarios showed in Table 12. The buffer zone suggested in the odour report is 496.4m – the full ILEF development and upgraded Santavan.

**Table 12 Buffer Distances from the ILEF for Several Scenarios**

| Scenario                                                                                              | Buffer (m) |
|-------------------------------------------------------------------------------------------------------|------------|
| Distance (m) – Stage 1 Excluding Santavan                                                             | 251.5      |
| Distance (m) – Stage 2 (Full Development) Excluding Santavan                                          | 429.5      |
| Distance (m) – Stage 1 + Current Santavan                                                             | 466.0      |
| Distance (m) – Stage 2 (Full Development) + Current Santavan                                          | 584.0      |
| Distance (m) – Stage 2 (Full Development) + Upgraded Santavan (Cumulative Impact Separation Distance) | 496.4      |

Table 13 shows receptors within/near to the buffer zone. All are outside the recommended 496.4m buffer zone. However, it should be noted that:

- If the livestock are full fed a production diet then the minimum separation distance would be increased (the maintenance diet proposed for the ILEF has less protein);
- If a prevailing wind occurs the separation distance would increase; and
- If the existing trees to the east of the site are retained then the separation distance is reduced.

**Table 13 Nearest Receptors to the Odour Buffer Zone**

| Receptor Type       | Contact Name             | Address                                                 | Distance (m) | Buffer (m) – Stage 2 (Full Development) + Current Santavan | Buffer (m) – Stage 2 (Full Development) + Upgraded Santavan |
|---------------------|--------------------------|---------------------------------------------------------|--------------|------------------------------------------------------------|-------------------------------------------------------------|
| Industrial          | AA Co.                   |                                                         | 530m         | - NA -                                                     | - NA -                                                      |
| Intensive Livestock | “Santavan”<br>Matt Dench | Manager’s residence<br>2500 Stuart Highway, Livingstone | 200m         | - NA -                                                     | - NA -                                                      |
| Residential         |                          | 42 Townsend Road, Acacia Hills                          | 800m         | 584m                                                       | 496.4m                                                      |
| Residential         |                          | 23 Affleck Road, Acacia Hills                           | 1230m        | 584m                                                       | 496.4m                                                      |
| Residential         |                          | 63 Affleck Road, Acacia Hills                           | 1150m        | 584m                                                       | 496.4m                                                      |
| Residential         |                          | 89 Affleck Road, Acacia Hills                           | 1092m        | 584m                                                       | 496.4m                                                      |
| Residential         |                          | 125 Bradley Road, Livingstone                           | 950m         | 584m                                                       | 496.4m                                                      |
| Residential         |                          | 120 Bradley Road, Livingstone                           | 1061m        | 584m                                                       | 496.4m                                                      |
| Residential         |                          | 105 Bradley Road, Livingstone                           | 1210m        | 584m                                                       | 496.4m                                                      |
| Residential         |                          | 110 Bradley Road Livingstone                            | 1150m        | 584m                                                       | 496.4m                                                      |

Based on the design and odour assessment, the impact of odours on neighbouring residents is likely to be minimal and only present during strong winds and if tree buffers are removed. However, odours from secondary sources, such as the trucks transporting the livestock, are still likely to produce nuisance, if only momentarily as the trucks drive along the highway.

### 7.7.3 Mitigation, Management and Monitoring

Key operation management features include

- Frequent, scheduled pen cleaning will ensure the depth of (dry) manure is maintained at 50mm or less;
- Pens will be cleaned, at minimum, every 13 weeks;
- Management of pen stocking densities so that they are not too wet, nor dry.

- Low starch rations will be used to reduce nutrient ‘bypass’;
- Use dust suppression systems to “lay” dust as soon as it is noticed. The dust suppression systems will be used early in the morning and late in the afternoon to minimise humidity and impact on livestock. Application rates will not exceed 6mm at one time.
- Monitoring of compost moisture and temperature levels as per the MLA (2012) National Guidelines in Table 11;
- All compost will be removed (sold) off site prior to the wet season.
- Recirculation of holding water with an input of lime to adjust the pH and remove odorants; and
- Tree lines placed on the northern and eastern sides of the facility (tree lines will take some time to become established). It is expected that the existing vegetated area that separates the receptors from the Stuart Highway will minimise the potential odour impacts from the ILEF.
- An Odour Management Plan is provided as part of the Environmental Management Plan in Appendix E.

In an emergency the following measures will be applied:

- lime will be applied to pen surfaces;
- lime will be added to anaerobic manures in compost windrows; and
- Gypsum and/or Lime dosing will be used to rapidly alter pH and conditions in waste water storages.

Monitoring of air quality and potential for odour and dust nuisance will include:

- Recording of daily cattle numbers;
- Recording of wind speed and direction;
- Certification of ration compositions (to demonstrate reduced protein and ME);
- Recording of feed fed;
- Monitoring of compost moisture and temperature levels;
- Record of complaints;
- Record of dust suppression systems use; and
- Records of any emergency use of gypsum or lime to treat sources of odour.

#### 7.7.4 *Confidence in Predicted Outcomes*

The methods of assessing odour nuisance are well defined and consistent with the requirements of the National Guidelines for Beef Cattle Feedlots in Australia (MLA, 2012). The management practices, mitigation measures and monitoring described above are also consistent with well established, scientifically based principles and practices detailed in various codes of practice, guidelines and standards (MLA, 2012; Skerman, 2004). Whilst some uncertainty will apply to all modelled outcomes, given the conservative nature of the predictions and the mitigation measures proposed by the development, odour nuisance could be expected to be lower than predicted levels. Provided that current vegetation buffers are maintained and that new vegetation buffers are planted, it is likely that odour nuisance will not be an issue in the long term due to the significant decrease in required separation distance.

It is recommended that the NT Department of Planning place a buffer zone around the agricultural business precinct of the “Livingstone Valley” ILEF, “Santavan PEQ Depot” and the AA Co. Meat processing Facility and that they regulate the clearing of remnant native vegetation, so that native vegetation in current rural zones close to the proposed site cannot be cleared thus increasing the likelihood of impacts of odour nuisance.

## 7.8 Noise

### 7.8.1 Baseline Conditions

The background sound level in rural areas is characteristically low, and often variable. Typically, ambient levels are in the range of 25 to 45 dBA. However, seasonal factors, both natural (e.g. cicada, frog or bird activity) and man-made (e.g. harvesting, pesticide spraying, or other seasonal farming operations) may ordinarily produce higher background levels than those above. In contrast, factors such as night-time inversions and low wind speeds, which may be more pronounced in rural areas, may also act to increase propagation or decrease attenuation in these areas.

The site currently does not produce much noise, since it is being used for pasture. However, neighbouring sites AA Co. and Santavan would produce similar noise to the ILEF due to the similarities in their operations.

### 7.8.2 Impact Analysis

Sources of noise that are associated with this site include:

- Construction work;
- Traffic noise levels;
- Vehicles moving on-site including truck and tractor movements;
- Operation of feed mills;
- Heavy vehicle reversing alarms;
- Animals held on site;
- Harvesting crops;
- Irrigation infrastructure;
- Manure reuse operations;
- Pen cleaning; and
- Manure and carcass composting – windrow turning.

There are no listed maximum noise levels for rural zoned areas in the NT guidelines. However, according to the NSW Environmental Noise Control manual, (DEC 1985) maximum noise generated by construction related activities depends on the construction period. A construction period of more than 4 weeks but less than 26 weeks should maintain noise levels at background +10 dB(A) in a rural area. Based on the noise that neighbouring properties would be producing, we have assumed a background noise of 45 dB. As a result, the maximum noise that should be produced during construction should be maintained below 55 dB within 15 metres of a Noise Sensitive Receptor (NSR) or at the boundary of the NSR (adjusted for tonality, impulsiveness, and/or modulation) during acceptable construction times. This lines up with the NSW Industrial Noise Policy, which suggests that noise from sites near rural residences have a daily maximum of 55 dB. It is also lower than the NT guidelines for maximum noise suggestions for mixed commercial/residential use areas (60 dB(A)), commercial use areas (65 dB(A)) and industrial use areas (70 dB(A)).

The nearest sensitive receptor is a rural resident 800 m away from the centre of the proposed development site in Townend Road (see odour assessment in Appendix C). Residents in Townend and Affleck Roads (Acacia Hills) are protected from potential noise by a 200m wide stretch of vegetation, which is a particularly effective noise absorber. The next nearest neighbour is 950m away on Bradley Road, Livingstone. This neighbour is on the opposite border (northern border) of Santavan to the proposed site and currently has a 10 m vegetation buffer on Santavan. These residents are likely to be impacted by increased noise levels for construction, but operation should not impact them any more than current operations in the area.

### 7.8.3 Mitigation, Management and Monitoring

Construction activities will be carried out 6.5 days a week between the following times:

- Between the hours of 6am and 6pm Monday to Saturday; and

- Between the hours of 9am and 6pm on a Sunday or public holiday.

The NT EPA Noise Guidelines for Development Sites in the Northern Territory state that construction noise should be restricted to between 7am and 7pm Monday to Saturday, and between 9am and 6pm on a Sunday or public holiday. However, due to the agricultural nature of the area and the buffer distance from the nearest neighbours, moving the time an hour earlier should not present significant issues.

If construction will be taking place outside these planned times, a construction Noise Management Plan must be developed.

Additionally:

- Construction activities will comply with Australia Standard AS 2436 Guide to Noise and Vibration Control on Construction, Maintenance and Demolition Sites; and
- Residents will be notified of the construction timetable and kept up to date as work progresses, particularly as work changes from one set of machines and processes to another.

If a site is managed correctly with the appropriate mitigation measures in place noise nuisance can be reduced and in some cases removed. Operational noise will be limited with the following measures:

- All equipment will be fitted with efficient silencers, in accordance to the Motor Vehicles Act 1949;
- All equipment will be maintained to reduce noise emissions,
- Noisier activities will be undertaken in the late morning and early afternoon when most people are at work;
- Vehicle engines (specifically trucks) will be turned off and not left idling when not in use;
- Silencers will be used on equipment where possible;
- All efforts will be made to reduce the effects of noise on personnel and neighbours; and
- A vegetation buffer will be planted to reduce the effects on neighbouring properties.

When employees and contractors are involved in tasks that exceed occupational health and safety limits for noise (above LAeq,8h of 85 dB(A)) they will be required to wear hearing protection that meet Australian Safety Standards.

A noise management plan is included in the Environmental Management Plan (Appendix E).

#### 7.8.4 *Confidence in Predicted Outcomes*

These procedures were developed with consideration to the NT Government's Noise guidelines for development sites in the Northern Territory, the NSW Environmental Noise Control manual and the NSW Industrial Noise Policy. As such, there is a high degree of confidence in the predicted outcomes during the construction phase and a moderate level of confidence during the operation phase.

## 7.9 Air Quality

### 7.9.1 *Baseline Conditions*

Two air quality parameters have been highlighted as impacts of concern for the ILEF – dust and greenhouse gases (GHG). Dust has been listed by the local community as an issue that needs to be addressed, whilst greenhouse gases are a significant by-product of livestock industries.

#### **Dust**

Airborne particulate matter or dust is a common issue in agricultural areas. Amenity impacts related to dust in agricultural areas are typically associated with issues such visible haze and deposition on surfaces in

buildings as well as on equipment and clothing. Baseline conditions, including total solids ( $\text{g/m}^2/\text{month}$ ), will be measured prior to and during construction.

### Greenhouse Gas Emissions

In the NT, agriculture accounts for 56% of commercial GHG emissions (NT Government, 2008). Of this, 17% is from livestock, 4% from agricultural soils and 35% from savannah burning.

Ruminants, such as cattle, contribute directly to net greenhouse gas emissions by way of eructated or enteric methane ( $\text{CH}_4$ ), largely produced in the ruminants' microbially facilitated digestion of cellulose and other complex carbohydrates. Methane has 58 times the ability of that of  $\text{CO}_2$  per molecule of gas to trap heat in the atmosphere.

The emissions from agricultural soils result from the application of nutrients to soil. When nitrogen is added to the soil,  $\text{N}_2\text{O}$  is formed naturally through the process of nitrification and denitrification.  $\text{N}_2\text{O}$  has 298 times the ability of  $\text{CO}_2$  per molecule of gas to trap heat in the atmosphere.

#### 7.9.2 Impact Analysis

##### Dust

Dust will be generated during the construction phase through:

- Travel onsite (machinery, workers);
- Earthworks to build the dams and pond;
- Vegetation clearance; and
- Building the required infrastructure.

During the operational phase, dust will be generated through:

- Cattle movement off trucks and within pens;
- Vehicular movement over unsealed roads onsite;
- Harvesting of pasture, hay baling and feed mill activities;
- Collecting manure and moving to compost manure pad; and
- Turning of the compost manure pad wind rows.

Dust emissions can occasionally cause a nuisance for neighbours, particularly during prolonged periods of hot, dry weather. Table 13 shows potential sensitive receptors to activities on the ILEF. The nearest residential neighbour is 800 m away. Skerman (2000) indicates that the separation distances required to meet odour nuisance criteria (see Odour Assessment, Appendix C) inherently provide potential rural residence receptors with a high level of protection from feedlot dust impacts. The South Australian EPA (2007) also suggests a minimum separation distance of 500 metres for compost piles from residences for dust protection, which is far less than the current separation distance proposed. There is no innate feature of the proposed development that would necessarily make it an exception to this observation. Nevertheless, there are a number of measures available to actively and passively manage dust emissions.

However, the visibility and safety of those driving on Stuart Highway are also a high priority, so buffer distances alone cannot be relied upon. There is a significant amount of anecdotal information to indicate that dust emissions from the feedlot pen surface increase once the moisture content of manure on the pen surface decreases below approximately 10% (Sweeten & Lott, 1994 and DAF, 2011b). As a result, the dry season would present greatest risks associated with dust generation.

### Greenhouse Gas Emissions

GHG will be generated during the construction phase through:

- Travel and movement onsite (machinery, trucks, workers); and

- Vegetation clearance.

Truck and machinery movement, as well as vegetation clearance will be unavoidable for this development. It will produce GHG emissions, as well as remove a sink for atmospheric carbon. However, 2 ha of trees will be planted along the boundaries of the property as a buffer and the mulch from the vegetation will be reused onsite. The mulch will be used for erosion and sediment control (as per the Erosion and Sediment Control Plan in Appendix I), as well as for mulching of the new buffer trees.

Sources of GHG emissions at the ILEF during operations include:

- Livestock (CH<sub>4</sub> from belching);
- Composting of manure (CH<sub>4</sub> and N<sub>2</sub>O released, particularly when wet);
- Application of nutrients to soil (N<sub>2</sub>O from soil during nitrification and denitrification);
- Diesel water pump;
- Transport of livestock to and from the facility; and
- Use of machinery on the facility – front end loaders, tractors

Livestock will be the main source of GHG emissions at the ILEF. Methane is produced by the fermentation of feed within the animal's digestive system. Generally, the higher the livestock's feed intake, the higher its methane emission (IPPC, 2006). However, the extent of methane production may also be affected by the composition of the diet. Feed intake is also positively related to animal size, growth rate, and production (eg, milk production, wool growth, or pregnancy). The livestock at the ILEF have an empty gut on arrival at the PEQ yard from defecating in pre-transport stock yards and on transport trucks. They are also fed a maintenance ration, which is relatively low in energy and protein. Consequently the amount of nutrient that bypasses the digestive systems is substantially less than a production feedlot. A maintenance ration is a diet where energy intake is equal to the energy used. As such, there is very little growth or production, and it is expected that the cattle will produce less CH<sub>4</sub> than those entirely on pasture or in feedlots, or in the process of growing to maturity.

High stocking density leads to the accumulation of manure on the surface of the pens. Moisture derived from precipitation and the voided urine results in accumulated manure periodically becoming highly anoxic. The resulting anaerobic degradation of the constituent organic matter by methanogenic microorganisms produces CH<sub>4</sub> and N<sub>2</sub>O, which are more effective atmospheric warmers than CO<sub>2</sub>. Similarly, compost manure pads and organic matter entrained in runoff from the pens can be subject to anaerobic degradation where it accumulates in areas such as sedimentation basins and holding ponds within the feedlot's controlled drainage system. It is essential that these structures be sloped for drainage and cleaned or turned regularly to reduce wetness and anaerobic conditions.

### 7.9.3 *Mitigation, Management and Monitoring*

#### **Dust**

Construction will be undertaken as dictated by the Erosion and Sediment Control Plan (Appendix I). This plan describes sediment control procedures that will significantly reduce dust, including:

- Unsealed roads and areas where vehicles will travel onsite will be sprayed with water to reduce dust;
- Applying water, gluon or erosion control blankets where necessary;
- During all stages of the development, all disturbed areas, including stockpiles, are to have a maximum C-factor of 0.15 (50 percent ground cover or more) after 20 days;
- Growing quick germinating annuals on exposed areas and covering with jute matting as soon as possible after ground disturbance;
- Placing mulch over bare ground; and
- Where possible, only handling moist top soil (not dry).

Prior to and during the construction phase dust monitoring will also be undertaken to determine baseline dust levels and whether the ILEF's activities are a nuisance. A tree break will be established along the boundaries

to reduce dust travelling offsite and all access roads, vehicle manoeuvring surfaces, and car parks will be sealed.

During operation, the ILEF will:

- Seal or wet roads and parking areas to reduce vehicle related dust;
- Holding yards will be surfaced with compacted clay;
- Frequent, scheduled pen cleaning will ensure the depth of (dry) manure is maintained at 50mm or less;
- Pens will be cleaned, at minimum, every 13 weeks ;
- Use a sprinkler system in the livestock pens to reduce dust in dry conditions (during the dry season, (ICIAI, 1997) and (DAF, 2011) suggest an initial application of 5 mm (5 L/m<sup>2</sup>) over the whole pen followed by daily applications of 1 mm. However, care needs to be exercised in applying water as excessive applications can increase odour emissions;
- Ensure that compost manure pad moisture levels are optimal to reduce dust and increase composting efficiency (45-65% moisture content);
- Turning compost windrows only in low wind conditions and when moisture levels are optimal;
- Compost will only be loaded for transport offsite when wind conditions are favourable;
- Vehicles moving the material off-site will be required to be covered;
- Harvesting of pasture and hay bailing will only be undertaken in low winds conditions (this will be monitored with an onsite weather monitoring station);
- Seal augers, conveyors, silos and bins; and
- Maintain vegetative cover over the site.

Any complaints involving dust will be handled via the processes outlined in the Environmental Management Plan. Maximum acceptable increases of dust will be 1 or 2 g/m<sup>2</sup>/month over pre-existing levels (Cattle & Elias, 2003).

### **Greenhouse Gas Emissions**

During the construction phase, the ILEF will manage GHG emissions through the following methods:

- Vehicles and machinery will be well maintained to improve fuel efficiency,
- Materials already found onsite will preferentially be used to reduce GHG emissions from transporting new materials to the site. Examples of this include quarrying the clay for the clay lining of the various ponds and dams onsite.

During operation, the ILEF will manage GHG emissions through:

- Reuse of liquid and solid of waste through irrigation and manure composting, which, when applied to pastures, will improve fodder yields and provide a carbon sink;
- Animal waste will be converted into a product of commercial value, and will be applied to maintain and improve soil condition on and off the site;
- Monitoring moisture levels in the compost manure pad and aerating the compost to reduce anaerobic CH<sub>4</sub> producing conditions;
- Cleaning the pens regularly to reduce anaerobic microbial activity in manure;
- Monitoring irrigation schedules closely to ensure that the irrigation block is not saturated with water;
- Regular maintenance of vehicles, machinery and pumps; and
- Monitoring of fuel use of the diesel pump.

#### 7.9.4 *Confidence in Predicted Outcomes*

“Passive” dust management measures, such as the separation distances necessary to meet odour nuisance criteria, inherently provide substantial protection from adverse impacts. The proposed “active” dust management and control measures are based on well-established industry practices (MLA, 2012) and should therefore provide a high level of confidence in the predicted outcomes.

### 7.10 Lighting and Visual Amenity

#### 7.10.1 *Baseline Conditions*

The site is visually very typical of an agricultural site in this area. On the northern border is Santavan, another PEQ yard, and on the western/southern border is AA Co., a meat processing facility. Along the Stuart Highway, there is a vegetation buffer approximately 5-10 metres wide with a thin line of trees and an understory of grasses and palms of varying density. From this highway, pasture and the caretaker’s house can be seen. However, there is a 1.5% slope down to the western side of the property and the north-western corner cannot be seen from the highway. No other public access roads border the property and there is currently minimal lighting on property.

#### 7.10.2 *Impact Analysis*

Sources of lighting onsite will include the following:

- External security lighting around buildings; and
- Internal lighting in sheds.

The nearest residential neighbours are in:

- Affleck and Townend Roads, Acacia Hills, on the opposite side of Stuart Highway;
- Bailey Road, Livingstone, on the opposite side of Santavan; and
- Kowari Road, Berry Springs, on the opposite side of AA Co.

Figure 6 shows the design map of the site and where infrastructure will be placed onsite. The proposed development will have an irrigation block approximately 280m wide for growing pasture crops running alongside Stuart Highway. Running parallel to the highway and the same distance from the highway as the caretaker’s house will be water tanks, irrigation systems, a feedmill and feed storage sheds. These structures are likely to be the only structures seen from Stuart Highway due to the sloping nature of the property. However, they are quite normal within an agricultural production area and fit within the uses of the surrounding land area and its zoning. Neighbours in Affleck and Townend Roads are unlikely to be able to see this because of the thick vegetation buffer between them and Stuart Highway, as well as a slight downhill slope to their houses from the Highway.

Bailey Road is separated from the proposed development by Santavan. There is currently a small piece of vegetation approximately 10m wide on Santavan’s site in front of the nearest Bailey Road house. Provided this buffer is not cleared, it is highly unlikely that this area will have its visual amenity affected.

Kowari road residents are separated from the proposed site by 1km of AA Co.’s land. However, they are downhill from the site and will most likely to be able to see the north- western corner due to the low vegetation on AA Co.’s property. This corner will include a primary wastewater pond, wet weather storage pond and a freshwater runoff dam. Further up the hill, there will be the compost pad, and pens. However, given that AA Co. has planted buffer vegetation the visual impact on Kowari Street residents is likely to be low.

#### 7.10.3 *Mitigation, Management and Monitoring*

All neighbouring residents are over 900 m away. However, where the topography or existing vegetation does not currently provide substantial shielding of the site, vegetative buffers will be established. The ILEF will

have vegetation buffer zones planted along the northern and western borderlines. These plants may take some time to grow. However advanced trees will be planted where possible. Other measures to minimise visual impacts include:

- The use of shielded directional lights (facing downwards);
- Lighting will be on a timer system; and
- Undertaking appropriate levels of maintenance to ensure the site does not become an eyesore. Particular emphasis would be given to keeping the pens, ponds and their environs tidy.

The level of complaints regarding visual amenity impacts will be a suitable performance indicator for monitoring the extent of any impact.

#### 7.10.4 *Confidence in Predicted Outcomes*

The visual impact of the feedlot should be comparable to that of its neighbouring businesses, so there is a moderate degree of confidence that the vegetation, buffer zone and appropriate lighting choices will provide enough of a barrier to potential visual impact.

### 7.11 Heritage

#### 7.11.1 *Baseline Conditions*

The Aboriginal Areas Protection Authority assessed the proposed site and found no sites of aboriginal heritage significance present. An Authority Certificate has been issued for the proposed works and is attached in Appendix J.

An EPBC Act Protected Matters tool search revealed that the North Australia Railway is located in the area to the west of the ILEF. However, it is listed as an “Indicative place” which means that data has been provided to or obtained by the Heritage Division and has been entered into the database, but a formal nomination has not been made and the Council has not received the data for assessment. The Department of the Environment describes the condition of the railway as such:

*“Subsequent to closure many elements of the system, including most buildings and most of the rail line, were sold for removal. Only some severed elements of the system now remain (at such places as Adelaide River and Pine Creek), but as a whole the system does not meet the threshold for listing on the Register of the National Estate.”*

The NT Government also does not recognise any heritage listed places on the proposed site.

#### 7.11.2 *Impact Analysis*

The Aboriginal Areas Protection Authority assessed the proposed site and found no sites of aboriginal heritage significance present. An Authority Certificate has been issued for the proposed works and is attached in Appendix I. As such there are no impacts associated with this proposal with respect to Heritage.

#### 7.11.3 *Mitigation, Management and Monitoring*

This project is located on land that has already been used for grazing and will not disturb any known Indigenous or non-Indigenous heritage site, object or place. However, if Indigenous or non-Indigenous relics are found during the operation of the ILEF, work must cease and the Department of Natural Resources, Environment and the Arts (NRETA) must be contacted to inspect the finds.

#### 7.11.4 *Confidence in Predicted Outcomes*

The Aboriginal Areas Protection Authority assessed the proposed site and found no sites of aboriginal heritage significance present. As such, there is a high degree of confidence in the predicted outcomes.

## 7.12 Flora and Fauna

### 7.12.1 Baseline Conditions

A rapid vegetation assessment of the site was undertaken by EcOz on the 12<sup>th</sup> of June 2015. The remnant patch of native vegetation had extensive clearing throughout. The northern side of the patch was described as isolated trees dominated by *Acacia auriculiformis* in the upper strata; *Syzygium suborbiculare*, *Syzygium eucalyptoides bleeseri*, and *Pandanus spiralis* in the middle strata; and Tully Grass with no native species on the ground strata. The southern end of the patch was described as open woodland dominated by semi-mature *Eucalyptus tetrodonta* re-sprouts with a high cover of the weed Annual Mission Grass (*Cenchrus pedicellatus*) on the ground strata. A list of the species found onsite is included in Section 4.3. They found no species listed as threatened under the TPWC Act nor EPBC Act were found onsite.

A desktop search of NT NR Maps listed four (4) TPWC Act threatened species as historically occurring on the property, namely *Dasyurus hallucatus* (northern quoll), *Ardeotis australis* (Australian bustard), *Mesembriomys gouldii* (black-footed tree rat) and *Cycas armstrongii*.

The EPBC Act Protected Matters Search Tool identified the twelve (12) fauna and one (1) flora species listed as threatened under the EPBC Act that may occur onsite. It also indicated that thirteen (13) migratory species are likely to occur onsite.

Of these, three (3) threatened species and six (6) migratory species (of which three (3) are primarily aerial foragers) were considered to have potential habitat represented at the site. This reasoning is described in Appendix J and is based on the open, poorly connected and disturbed nature of the site, as well as the dominance of improved pasture and other introduced species.

The potential threatened species are:

- *Dasyurus hallucatus* (Northern Quoll);
- *Erythrorhynchus radiatus* (Red Goshawk); and
- *Geophaps smithii smithii* (Partridge Pigeon).

The potential migratory species are:

- *Apus pacificus* (Fork Tailed Swift);
- *Hirundo rustica* (Barn Swallow);
- *Merops ornatus* (Rainbow Bee-eater);
- *Ardea ibis* (Cattle Egret);
- *Charadrius veredus* (Oriental Plover); and
- *Glareola maldivarum* (Oriental Pratincole).

### 7.12.2 Impact Analysis

Due to the remnant vegetation onsite being highly degraded and modified, clearance of the site is unlikely to have a significant impact on connectivity of surrounding woodland habitat. The potential impact on threatened and migratory species was assessed under EPBC Act considerations in Appendix J. The assessment found that the proposed development is unlikely to disrupt the species' lifecycles in such a way that any potentially viable local population would be placed at risk of extinction.

Apart from vegetation clearance, fire, weeds and other pest species are listed as key threats to many of these species. Without mitigation procedures, the ILEF would increase weed and pest species movement in the area. Many weed species, such as the gamba grass already on the property, also alter fire regimes and intensify dry season fires, reducing the success of native plant regeneration.

### 7.12.3 *Mitigation, Management and Monitoring*

Whilst the 2.6 ha area of remnant vegetation will need to be cleared for the proposed development, additional trees will be planted as a buffer along the boundaries. This buffer will function as a vegetation corridor but will also help to address visual, odour and dust amenity issues and intercept shallow groundwater. It is also recommended that the current vegetation buffer along both sides of Stuart Highway not be cleared.

Fauna spotter catchers will be on hand during the construction phase to ensure that any fauna found onsite are relocated to a suitable area.

In addition to the buffer zones, weed and pest management plans will ensure that the ILEF detracts pest species from the area and does not contribute to the spread of pest species that are key threats to many of these threatened species.

### 7.12.4 *Confidence in Predicted Outcomes*

The studies used established, well accepted methodologies, consistent with requirements of Commonwealth's guidelines for the assessment of the significance of impacts on matters of national environmental significance to identify species present at the site and assess the nature of likely impacts. Consequently, there can be a high degree of confidence in the predicted outcomes.

## 7.13 Hazardous Chemicals

### 7.13.1 *Baseline Conditions*

Despite widespread usage of pesticides and other hazardous chemicals in agriculture, there is little evidence in Australia of widespread pollution of the general environment resulting from this usage. Detections of these substances in systems such as waterways are normally isolated or ephemeral events and are generally restricted to some of the more persistent compounds (including halogenated hydrocarbons such as endosulfan and its breakdown products), compounds subject to very widespread or almost ubiquitous usage (such as endosulfan and atrazine) or due to unusual conditions at or following application (atmospheric inversions at the time of application or major storm events immediately after application).

Studies on groundwater and surface water in the Berry Creek Catchment have shown minimal presence of herbicides and pesticides (Schult, 2014). These studies have been discussed in Section 7.5 water resources. There appears to be no specific data on pesticide and chemical levels in soils although the surface water data would appear to indicate that levels in the general environment are not extraordinarily high.

### 7.13.2 *Impact Analysis*

Chemical contamination of the general environment would result in a potentially serious non-compliance with legislative requirements and regulatory standards. Any impact of this nature would be extremely serious having possible repercussions in terms of environmental, public and animal health, food safety and workplace health and safety as well as economic and trade implications. However, the level of legislative and regulatory oversight of the registration of these products means that there is a high level of safety associated with their use provided that label directions and recommendations are carefully followed.

To optimise performance, reduce the impact of chronic cattle diseases and minimise the risk of major or catastrophic outbreaks of acute diseases, it is normally considered necessary to use a range of veterinary medicines and animal treatments to treat or help prevent certain diseases or conditions. A range of pesticides are likely to be used to control insect and rodent pests and weeds onsite.

The greatest risk of environmental harm resulting for the use of the above materials would appear to lie in their misuse, their inappropriate storage or the disposal of any unused product and used containers. It is also likely that substantial quantities of petroleum fuels (diesel, unleaded petrol and liquefied petroleum gas) and lubricants (oils and greases) will need to be stored on site to service the needs of vehicles, the feedmill plant and equipment. These materials are potentially dangerous (flammable or explosive).

Similarly, modest quantities of bottled gas (oxygen, acetylene and argon) will need to be stored on site to satisfy workshop requirements for repairs and maintenance of plant and equipment. These particular materials are oxidising gases (oxygen), flammable gases (acetylene) or, if non-reactive and non-toxic, stored in a compressed form (argon).

### 7.13.3 Mitigation, Management and Monitoring

Certain materials or substances likely to be stored or used on site are classified as dangerous goods. These goods would fall within the following classes;

- (2.1) Flammable gases,
- (2.2) Non-flammable non-toxic gases,
- (2.2) Oxidising gas,
- (3) Flammable liquids,
- (6.1) Toxic substances, and
- (9) Miscellaneous dangerous goods and articles.

All dangerous goods will be stored in designated areas according to their specific storage requirements and, where applicable, consistent with any requirements under the Dangerous Goods Act 1975. Where Australian Standards are available, these will provide the minimum storage conditions applicable. Applicable standards include AS 1940-1993: The storage and handling of flammable and combustible liquids, AS 2507-1984: The storage and handling of pesticides, AS 4452-1997: The storage and handling of toxic substances, and AS/NZS 4861- 2000: The storage and handling of Class 9 (miscellaneous) dangerous goods and articles.

Permanent storage areas housing bulk containers of dangerous liquids (generally >1 000 L) (e.g. the diesel for the wastewater treatment pump) will be bunded. These bunds will have a volumetric capacity equivalent to either 133% that of the largest container within the bund or 25% of the total volume of stored products within the bund (whichever is the larger). Where necessary, any temporary storages areas for dangerous liquids will consist of at least an impervious earthen bund with a capacity consistent with those for permanent bunding detailed above. Moveable polymer pallet bunds will be used for any palletised containers requiring temporary storage. Risk assessments will be undertaken to assess the need for bunding of any new dangerous goods entering the site and any exceptional need for bunding of containers holding less than 1 000 litres.

After rainfall, all bunded external storages will be drained as soon as possible. If there is reason to believe the bund water is contaminated, it will be tested. If it is found to be contaminated, the bunded water will be disposed of at an appropriately licensed waste management facility or an approval will be sought from the Environment Protection Authority for on-site treatment.

Appropriate spill kits will be on hand to reasonably cater for the range of spills possible on the site. Spill management plans will be prepared and employees trained in spill management response and made aware of their legislative and regulatory obligations in terms of their duty of care, both from an environmental and occupational safety perspective. A library of material safety data sheets (MSDS) on dangerous goods will be developed and maintained by the site manager onsite.

All of the veterinary medicines, animal treatments and pesticides will be registered for their respective uses and will be used in strict accordance with label directions or as prescribed by a consulting veterinarian. Any application equipment to be cleaned after use in accordance with the product label and or industry guidelines (ensuring soil, groundwater and surface water are not contaminated). Empty chemical, drug, antibiotic, vaccine and disinfectant containers to be disposed of at an appropriately licensed waste management facility. Unused chemicals, spilt product or contaminated materials are to be disposed of in a manner approved by the Environment Protection Authority.

Monitoring of products and by products for the detection of residues above prescribed Maximum Residue Levels (MRLs) in products and monitoring of the quality and integrity of adjacent groundwater and surface water resources will be undertaken to ensure that hazardous chemicals are being controlled.

#### 7.13.4 Confidence in Predicted Outcomes

Based on the nature of the control measures to be employed and the level of third party review of these aspects of the ILEF's operations, there can be a high level of confidence in predicted outcomes.

### 7.14 Weed, Pest and Insect Control

#### 7.14.1 Baseline Conditions

A search for pest fauna species on NRM Infonet found 13 pest animal species recorded in the general area of the proposed site (Table 14).

**Table 14 Pest Fauna Species Found in the General Area of the Proposed Site**

| Pest species found        |                                              | NT Status                  |
|---------------------------|----------------------------------------------|----------------------------|
| Common Name               | Botanical Name                               |                            |
| Cane toad                 | <i>Rhinella marina</i>                       | Prohibited                 |
| Asian house gecko         | <i>Hemidactylus frenatus</i>                 | Prohibited                 |
| Rock dove                 | <i>Columba livia</i>                         | Prohibited                 |
| Red-tailed black cockatoo | <i>Calyptorhynchus banksii macrorhynchus</i> | Native with pest potential |
| Sulphur crested cockatoo  | <i>Cacatua galerita</i>                      | Native with pest potential |
| Agile wallaby             | <i>Macropus agilis</i>                       | Native with pest potential |
| House mouse               | <i>Mus musculus</i>                          | Prohibited                 |
| Black rat                 | <i>Rattus rattus</i>                         | Prohibited                 |
| Dingo                     | <i>Canis lupis</i>                           | Native with pest potential |
| Cat                       | <i>Felis catus</i>                           | Prohibited                 |
| Horse                     | <i>Equus caballus</i>                        | Prohibited                 |
| Pig                       | <i>Sus scrofa</i>                            | Prohibited                 |
| Swamp buffalo             | <i>Bubalus bubalis</i>                       | Prohibited                 |

Biting insects and flies may also be a problem, since a neighbouring property has a swampy wetland area and cattle graze in the area. Flies tend to be a seasonal problem in most rural areas, breeding in material such as animal dung under favourable temperature and moisture conditions.

A rapid vegetation assessment of the site found several weed species on the property and an NT NR Maps search found several additional declared weeds on neighbouring properties as listed in Table 15.

**Table 15 Weed Species Identified Onsite and on Neighbouring Properties**

| Weed species found                |                                 | Declared under NT Weed Management Act? |
|-----------------------------------|---------------------------------|----------------------------------------|
| Common Name                       | Botanical Name                  |                                        |
| <b>Onsite</b>                     |                                 |                                        |
| Gamba grass                       | <i>Andropogon gayanus</i>       | Yes – Class B/C                        |
| Spinyhead sida                    | <i>Sida acuta</i>               | Yes – Class B/C                        |
| Sickle pod                        | <i>Senna obtusifolia</i>        | Yes – Class B/C                        |
| Flannel weed                      | <i>Sida cordifolia</i>          | Yes – Class B/C                        |
| Neem                              | <i>Azadirachta indica</i>       | Yes – Class B/C                        |
| Hyptis                            | <i>Hyptis suaveolens</i>        | Yes – Class B/C                        |
| Lantana                           | <i>Lantana camara</i>           | Yes – Class B/C                        |
| Calopo                            | <i>Calopogonium mucunoides</i>  | No                                     |
| Annual mission grass              | <i>Cenchrus pedicellatus</i>    | Yes – Class B/C                        |
| Rosella                           | <i>Hibiscus sabdariffa</i>      | No                                     |
| Rattlepod                         | <i>Crotalaria goreensis</i>     | No                                     |
| Coffee bush                       | <i>Leucaena leucocephala</i>    | No                                     |
| Sandpaper fig                     | <i>Ficus acuminata</i>          | No                                     |
| Guinea grass                      | <i>Panicum maximum</i>          | No                                     |
| <b>On neighbouring properties</b> |                                 | No                                     |
| Olive hymenachne                  | <i>Hymenachne amplexicaulis</i> | Yes – Class B/C                        |
| Bellyache bush                    | <i>Jatropha gossypifolia</i>    | Yes – Class A/B/C                      |
| Perennial Mission grass           | <i>Cenchrus polystachios</i>    | Yes – Class B/C                        |
| Salvinia                          | <i>Salvinia molesta</i>         | Yes – Class B/C                        |
| Paddy's Lucerne                   | <i>Sida rhombifolia</i>         | Yes – Class B/C                        |
| Branched porterweed               | <i>Stachytarpheta australis</i> | Yes – Class B/C                        |
| Grader grass                      | <i>Themeda quadrivalvis</i>     | Yes – Class B/C                        |
| Snake weeds                       | <i>Stachytarpheta spp.</i>      | Yes – Class B/C                        |
| Water hyacinth                    | <i>Eichhornia crassipes</i>     | Yes – Class A/C                        |
| Mimosa                            | <i>Mimosa pigra</i>             | Yes – Class B/C                        |
| Parkinsonia                       | <i>Parkinsonia aculeate</i>     | Yes – Class B/C                        |

#### 7.14.2 Impact Analysis

##### Pests

Many pests have the potential to breed in or derive shelter and sustenance in feedlots and water holding ponds. They may have an impact on community amenity, directly and indirectly affecting the health of people and domestic animals, reducing biodiversity in the natural environment, damaging crops and degrading soil and water resources.

The proposed development will remove most non-pasture vegetation (bar buffer zones) from the site and increase built-up areas, which will make it inappropriate for many of the listed pests such as red-tailed black cockatoo, sulphur crested cockatoo, horses, pigs and swamp buffalo.

The remainder of the pest fauna species listed may still frequent the site. Dingoes are opportunistic feeders and may attack cattle and native wildlife, or be attracted to any carcasses that are inappropriately disposed of. Feral cats may also attack wildlife remaining in the area. However, these pests are not likely to increase from the proposed site, provided rodent pest numbers are kept down and carcasses disposed of in a timely and appropriate manner.

Mice and rats are a seasonal or sporadic problem, breeding in the open under warm conditions and entering buildings and feedlots seeking food and shelter under cold and or wet conditions. They may spoil food, carry and spread diseases, damage buildings, and can threaten agricultural productivity because they feed heavily on grain. The proposed development may make the site more attractive to these rodent pests.

Rock doves (feral pigeons) are not considered to have a significant impact on biodiversity, but can be a public nuisance due to their tendencies to nest in buildings, flock in areas where food is available causing extensive mess from droppings.

Cane toads are one pest species that may increase due to the proposed water and wastewater ponds installed on the property. Cane toads are also listed as key threats to many of the species that may use this general area as habitat as they are poisonous to those who eat them.

Biting insects and flies may also be a problem, since a neighbouring property has a swampy wetland area and the proposed site will install wastewater ponds and a composting pad, which could potentially act as breeding grounds. Flies tend to be a seasonal problem in most rural areas, breeding in material such as animal dung under favourable temperature and moisture conditions. These insects may cause nuisance and amenity issues, as well as carry diseases (see Appendix F as more detail is provided in the biting insect management plan).

## **Weeds**

The proliferation of weeds on and adjacent to this site may have significant impacts, including degradation of water quality, increased intensity of fires, toxic effects on stock, displacement of native flora and fauna, as well as legal implications for failing to control weeds (discussed in Appendix G - the Weed Management Plan).

This development will have the potential to introduce weeds to the site and surrounds in several ways. They may be introduced to the site or spread to other sites via livestock (hooves, hides and manure), the transport trucks, and construction and operation vehicles. Additionally, weed species may be transported off site if composted materials are inadequately treated or included in the harvested fodder crop. Additionally weeds can be transported downstream if stormwater retention is found to be inadequate.

### **7.14.3 Mitigation, Management and Monitoring**

## **Pests**

Modifying their environment, in particular depriving them of suitable food and shelter, is a potential means of managing pest and insect problems. In many cases, these “management” control measures may be sufficient to provide effective control of pest populations without having to resort to the use of chemical control agents. This has advantages in regard to minimising the use of pesticides and prolonging their effective life as control agents by restricting the build-up of resistance or tolerance in the insect and pest populations.

Intensive livestock facilities can attract pests and vermin if they are poorly run. The key to control of these pests is appropriate design and management of the facility. The facility is a quarantine facility, so pest management is of high importance. The following construction and operational mitigation and management procedures will be applied:

- The ILEF will be double fenced so that no feral pigs can enter the facility;
- Vehicles will be inspected while being washed at the wash-down facility to ensure that there are no “hitchhiking” pests;

- Additional manure will be added to burial piles with dead livestock to hide the smell from potential scavengers;
- Good “house-keeping” of the feed storage and feedmill areas will prevent infestation by rats, mice and rock doves. This is critical to reduction of feed spoilage and minimisation of disease risks;
- Any debris lying around will be stored to ensure that suitable habitat is limited for smaller pests such as rodents, cane toads and Asian house geckoes;
- All wastewater and freshwater ponds will be monitored for cane toad eggs and mosquito larvae; and
- Composting piles will be monitored for presence of pests.

A Biting Insect Management Plan has been attached in Appendix F and a Pest Management Plan has been provided as part of the Environmental Management Plan in Appendix E. These management plans describe the practical aspects of mitigation, management and monitoring.

Flies can breed in wet manure, decaying feed and dead animals. Fly breeding grounds will be eliminated with the following actions:

- Shaping all areas close to the facilities so that they are sloped and free draining so no wet areas exist;
- Manure will be managed so that there are no areas where wet manure can accumulate without being disturbed and aerated (by stock movement); flies do not breed in yard manures; a fly larva does not survive when trodden on by a 200-600kg animal;
- Sludge will be collected frequently and taken to the compost area and placed in windrows;
- All spoiled feed will be collected and removed to the composting area; and
- Dead animals will be composted on site in windrows of manure and spent / spoiled feed (this is a common; and accepted practice in the Australian lot feeding industry; flies do not breed in hot compost windrows).

The best means of preventing infestations of midges and mosquitos is to ensure that there are as few open water bodies possible in which they can breed and if such water bodies do exist that they can be treated if required. Engineering and operational mitigation will be applied. These include:

- All animals will be “back-lined” or dipped with a chemical treatment to mitigate against “Buffalo Fly”; this will prevent blood feeding by female mosquitoes;
- All drains will have slopes >0.5% so no low spots occur, eliminating any pooling;
- The sedimentation basin will be self-draining and concrete lined so it can be quickly and efficiently cleaned so sludge is removed quickly;
- Holding ponds will be designed and constructed so that there are no shallow areas; they will have steep batters (1H:3V) to prevent any shallow areas and the floor of the ponds will have slopes of 1%;
- Fresh water dams will be similarly designed and constructed;
- Vegetation will be regularly cleared from the edges of water storages and holding ponds;
- Grass areas close to drains, sedimentation basin, holding ponds and water storages will be regularly slashed; before the wet season and through the wet season where possible; and
- If required grass areas will be burnt off to reduce ground cover / organic matter content of surface soils to reduce pest habitat).

## Weeds

The development is a centroid for accumulation of feed and livestock. Thus it may potentially attract weeds foreign to the area. Equally manufactured feed and PEQ livestock will move from the site to ships for export. Both feedstuffs and livestock must be weed free.

Engineering and operational mitigation will be applied. These include:

- A wash-down area will be constructed to ensure that incoming vehicles and machinery do not bring weeds to the site.
- Livestock will be washed down on arrival.
- Feed stuffs purchased for use on the property will be procured on the basis that they are free of weeds.
- The property will be monitored regularly for weed presence and effectiveness of weed treatment methods
- A Weed Management Plan has been developed to ensure that weed monitoring and treatment are carried out efficiently
- Weeds will be controlled either with herbicide or manually, as specified in the Weed Management Plan (Appendix G)

#### 7.14.4 *Confidence in Predicted Outcomes*

The Biting Insects Management plan and Weed Management Plan were developed under NT Government Guidelines for biting insect control (Warchot & Whelan, 2009) and weed management (Northern Territory Government, 2014c). Consequently, there can be a high degree of confidence in the predicted outcomes.

### 7.15 Animal Welfare

Wellard is currently operating the PEQ yards on Santavan. The facilities on Santavan are old and degraded. The development of the proposed ILEF will increase animal welfare, setting a standard for live export facilities in the top end. The essential needs for animal welfare are:

- Suitable quantity and quality of water. This is provided according to age, bodyweight, production level, air temperature, humidity and feed;
- Access to air free from dust or noxious chemicals;
- Suitable quantity and quality of food. Variations to these standards will result in the reduction of stocking rate, and animal monitoring to ensure satisfactory body condition;
- Protection from climatic extremes. These can be shade/cooling systems, wind breaks, fire and flood mitigation; and
- Protection from predators.

The ILEF has been designed to create adequate provision for cleaning, drainage, waste disposal, age and size of cattle, space and feed requirements. This will increase the welfare of the cattle and reduce excessive; smell, noise and dust. The specific requirements are set out in National Guidelines for Beef Cattle Feedlots in Australia (MLA, 2012). These design features include:

- Due to the climate of the region, cooling measures like sprays and misters are used
- Roofing and shelter that is open to allow aeration. This will decrease the risk of noxious gas build up; reduce smell and adverse health problems.
- Pen pads that are graded and drained to ensure bogging doesn't occur in rain events
- Safe and efficient waste disposal to reduce potential disease outbreak, dust and odour issues.
- Pen floors are concrete/hardstand, with little slope and patterns to reduce slip and possible injury to animal and aid with waste disposal/cleaning.
- Minimum space requirements for cattle depending on age, size and behaviour, to increase welfare and minimise noise and odour.
- Adequate bedding material, to minimise feet and leg problems and have adequate absorption of moisture, which will minimise odour and noise issues.

### 7.15.1 *Mitigation, Management and Monitoring*

#### **Health**

The ILEF will consult with a veterinarian and develop and operate a specific health management programme which will provide for the particular need of the feeding programmes proposed for the site. The facilities are largely a PEQ facility. They deliberately hold livestock to ensure that they meet quarantine standards for animals prior to them embarking on a voyage to another country. Cattle are received and upon unloading are immediately checked, dipped and assessed for any health issues.

Sick animals are removed from the herd and placed in hospital pens; separate from cattle that have passed inspection. Livestock due to be shipped are inspected by 3<sup>rd</sup> party veterinarian prior to transport to the port for loading.

#### **Welfare**

The live export industry is under intense scrutiny from political parties, Government regulatory agencies, animal welfare groups and the community. The Australian Federal, State and Territory Governments have over the last few years positioned themselves so they support live exports from Australia but strictly on the basis of industry delivering the best possible welfare standards.

The need for Wellard to continuously improve its management of animal health and welfare underpins the business decision to secure its own facilities. Over time, Wellard's aim is to achieve a certified animal welfare system for the ILEF.

#### **Management**

Veterinary chemicals and drugs are held on site in a secure storage. Only the amounts required for the processing of cattle on a particular day are dispensed. Most chemicals are applied to the hide; few injectable chemicals are used.

Where sharps are used, spent sharps will be stored in a prescribed waste container. It is expected that <500kg of prescribed wastes will be generated each year.

#### **Mass Death**

If in an exceptional circumstance a mass death occurs at the site then the National AUSVET management plan for the same will be invoked.

The site will be a secure quarantine facility. Entry will be appointment only and the facility will be design to limit entry by the general public. All entry and exit points will be monitored by CCTV. The site will be fenced with a 5 barb boundary fence with an electric fence offset from this main fence.

All workers on the site will sign in and out each day. All contractors will be "approved" contractors. An office will be located prominently at the main access road (next to the truck weighbridge). The office will be manned during operating hours.

#### **Site Security**

A caretaker / property manager will reside on property. The access road to the facility will have a lockable gate to restrict access to and from the site during quarantine events.

### 7.15.2 *Confidence in Predicted Outcomes*

The design and build of the ILEF is an improvement on the animal welfare present on the current Santavan site. With the introduced features incorporated into the facility, the site will surpass the expectations recognised within the Australian Model Code of Practice for the Welfare of Animals – Cattle 2nd Edition (PISC, 2004) and National Guidelines for Beef Cattle Feedlots in Australia (MLA, 2012).

Constant review and monitoring of the practices and state of the facility will ensure its high standard into the future.

## 7.16 Traffic and Road Impacts

### 7.16.1 Baseline Conditions

The ILEF's access road was constructed by the NT Government in support of the AA Co. Meat Processing Facility development. This development proposes to share the access with AA Co., as this is a stipulation set out by the Department of Transport in the terms of reference (Appendix U).

The existing access is approximately 50m from the boundary of the Stuart Highway road reserve. The access is described as an Auxiliary Lane Turn Treatment; the intersection has been designed and graded to be suitable and safe for triple road trains, as seen in Figure 30.

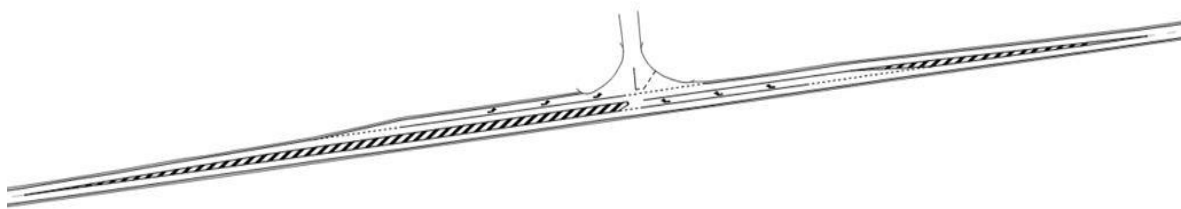


**Figure 30 Existing AA Co. Access Arrangement (AUR/AUL) (i3 consultants, 2011)**

### 7.16.2 Impact Analysis

AA Co. undertook a traffic impact study of the intersection in 2011 (i3 consultants, 2011). The report determined a safe operational capacity for the intersection. A traffic assessment for the ILEF has been included in Appendix Q. This assessment is based on the data obtained in the AA Co. traffic impact study.

#### *Construction phase:*

During the construction phase, it could reasonably be expected that more than two construction vehicles per hour may access the Wellard development during construction. However, this is expected to be early in the morning and late in the afternoon, and it is unlikely to contribute any traffic volume of significance to the peak hour traffic generated by the AA Co. facility, 2 to 3pm and 4 to 5pm. As such no further assessment of the impact of construction traffic is warranted.

#### *Operations phase:*

Cattle cartage is based on 150 head of cattle (large animals) per triple trailer truck. Actual peak traffic, based on the facility's maximum (peak) stock processing and holding capacity of 20,000 head of cattle, is determined to generate the following in and out flows:

- Trucks delivering 20,000 head of cattle to the facility prior to shipment over a period of 10 days prior to ship loading; and,
- Trucks transporting the processed 20,000 head of cattle to the port over a period of 24 hours.

This equates to a spread of 133 outbound vehicles over a period of up to 24 hours.

For trip generation purposes the recommended approach is:

- To review truck movement impacts during peak traffic flow to the AA Co facility during 2pm – 4pm and 10pm – 12pm.; and

- Address marginal lane widths and turning radii of the Wellard ILEF / AA Co access intersection, to prevent potential traffic flow breakdown and subsequent truck platooning on the Stuart Highway; and / or
- Implement measures to limit the potential for truck platooning on the Stuart Highway and the AA Co. access road;
- The Wellard Traffic Management Plan should include driver awareness or similar training to address vehicle platooning.

Within the current design, coupled with scheduling constraints, i.e. loading, weighing, certification etc. it is unlikely that the facility can accept a large number of fully loaded incoming trucks, to replenish cattle stock numbers, in excess of the numbers dispatched to the wharf. Therefore, a reliable spread of incoming traffic numbers are over a 24hr period, rather than the 20 hr period, where some stock replenishment will take place outside of the core wharf delivery period.

It is also expected that some inbound and outbound movements will occur concurrently, i.e. fully laden inbound trucks (180 head, lean beasts) and empty trucks arriving from the north for reloading, back from offloading to the ship. Trip calculation for a round trip to the wharf and back is approximately 2hrs.

Therefore, it is expected that all trucks dispatching cattle could be available for reloading up to approximately 2.5hrs prior to end of the 24hr loading period, equating to 116 trucks returning for reloading.

The current design assumes optimization of utilization of trucks for loading and offloading. However it is reasonable to expect that some empty trucks would be on site prior to the commencement of loading for shipping, and some trucks may not be available for reloading.

As such approximate truck movements (inbound and outbound) are as follows:

- Inbound from the north – 116 trucks over a period of 24hrs, approx. 5 trucks/hr (incl. AA Co trucks);
- Inbound from the south – 16 trucks over a period of 24hrs, approx. 1 truck/hr (incl. AA Co trucks);
- Outbound to the north – 139 trucks over a period of 24hrs, approx. 6 trucks/hr (incl. AA Co trucks); and
- Outbound to the south – 11 trucks over a period of 24hrs, approx. 1 truck/5hr period (incl. AA Co trucks)

The SIDRA model from the i3 Consultants' report indicated that the above traffic movement at the intersection, in conjunction with the through traffic on the Stuart Highway, to be performing at a Class B traffic Level of Service (LoS) i.e. Good with acceptable delays and having spare capacity, with a 15 to 28 second delay per vehicle, for peak hour periods. Although the peak hours to and from the AA Co facility is now different from that used in the SIDRA model, the modelling was undertaken at peak traffic flow on the Stuart Highway, hence the most conservative scenario.

The times of the compounded peak traffic through determined by the i3 study was calculated to be between 2 and 3pm for light traffic and between 4 and 5pm for heavy vehicles. However, there is now only one peak hour traffic from AA Co that coincides with peak hour traffic on the Stuart Highway, i.e. between 2 and 4pm at the intersection:

- 170 light vehicles to and 170 light vehicles from site, seven days a week.

Adding an average six vehicles incoming and eight outbound vehicles per hour, during peak traffic hours, from the Wellard facility from both the south and north, will not alter the previous conclusion from the i3 study, that the intersection will be performing to a Class B traffic Level of Service (LoS), i.e. Good.

Similarly, adding, approximately eight to ten incoming vehicles to the Wellard facility during the peak hours will at most result in the intersection being performing to a Class C traffic Level of Service (LoS), i.e. Satisfactory.

### 7.16.3 Mitigation, Management and Monitoring

The following management procedures will be undertaken to reduce the effects of the ILEF on its neighbours:

- Review truck movement impacts during peak traffic flow to the AA Co facility during 2pm – 4pm and 10pm – 12pm.; and
- Address marginal lane widths and turning radii of the Wellard ILEF / AA Co access intersection, to prevent potential traffic flow breakdown and subsequent truck platooning on the Stuart Highway; And / or
- Implement measures to limit the potential for truck platooning on the Stuart Highway and the AA Co. access road;
- The Wellard Traffic Management Plan should include driver awareness or similar training to address vehicle platooning.
- Monitoring will be undertaken by way of the complaints register in the Environmental Management Plan.

### 7.16.4 Confidence in Predicted Outcomes

This traffic assessment has extrapolated from earlier data from the AA Co. i3 Traffic Impact Study. Thus there is a moderate level of confidence in the predicted outcomes.

## 7.17 Economic Impacts

### 7.17.1 Baseline Conditions

Traditionally, economic activity in the area has been reliant on primary production. The subject land is currently zoned Rural (NTPS, 2015). The Darwin Regional Land Use Plan 2015 notes the subject land as Rural / Rural Lifestyle and notes that agriculture and related niche business are important to the Northern Territory economy and the Livingstone municipality.

Northern Territory exports livestock predominantly to Asia and the demand has increased due to the growth of importing countries, as seen in Figure 31. Live exports are a major part of the NT economy and contribute a large percentage of the Australian live export economy.

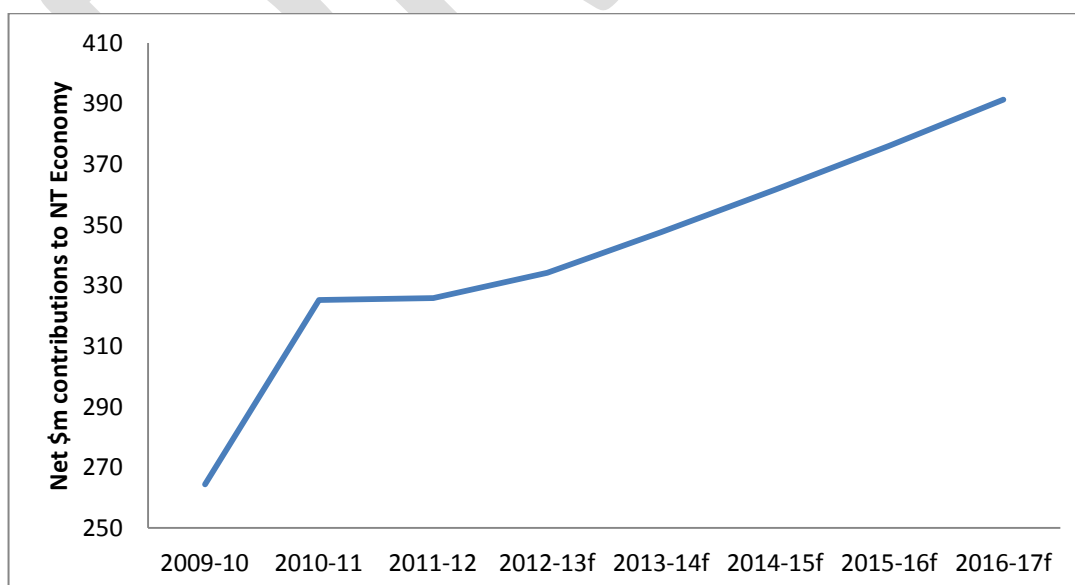


**Figure 31 Live Export Outlook Production in \$million from 2009-2010 to 2016-2017 (Department of Primary Industry and Fisheries, 2013)**

### 7.17.2 *Impact Analysis*

Wellard is currently using Santavan which is an older holding facility. They are increasing facilities into the new proposed ILEF, thereby growing the live export economy, both at a state and federal level.

The development of the ILEF will be undertaken in three stages. The full development will have a capital cost of approximately \$12M (based on 2014 costs). The majority of this expenditure will be in the local Darwin business community (contractors, materials and labour). Other project capital will be spent on the feedmill, and sheds, which are likely to be manufactured inter-State and transported to the site for erection. The proposed facility is a large expansion on the current facility being used. The ILEF will have a large local economic boost both in the short term and the long term.

In the short term, the construction phase will bring a team consisting of:

- Engineers;
- Machine operators;
- Labourers;
- Environmental officers; and
- Admin officers and other staff.

This increase of people in the area will naturally lead to an economic flow through to the local communities (e.g. accommodation, food etc.)

In the long term, the work force that is estimated to be used by the facility is summarised below.

- Export Facility = 4-5 permanents; up to 15 casual workers
- Feedlot facility = 2-3 workers
- Feedmill = 5-10 workers
- Contract farmers = 2 workers
- Total work force is expected to be > 35 at full development
- This should be multiplied by 2-3 for ancillary work force; transport, vet, rural merchandise etc.

Given the lifetime of the development's operation is >40 years this work force is local and its presence is far more "sustainable" and beneficial than that of FIFO mining operations for the regional community. This facility is industry leading, in its design and functionality. It is believed that with the success of this facility that further ILEF's will be built to strengthen the industry to a level not yet reached. The increase in SCU being processed and sent to export will subsequently help strengthen and increase the Northern Territory economy and in the big picture, increasing the strength of the Australian live export economy.

### 7.17.3 *Mitigation, Management and Monitoring*

Each year Wellard buys at least \$50M worth of livestock from within the NT for export. Approximately \$5M is spent on transport of livestock and \$8M on fodder and feedstuffs for PEQ yards and feed for placement on ships. Approximately \$4M is spent on port costs. Thus approximately \$67M is expended in the NT.

Of the above expenditure it is expected that \$2M will be spent each year on local labour and \$3M on local fodder and hay. Existing expenditure at the port and within the region will continue.

Wellard also plans to employ local people during operations and particularly those who live in the immediate vicinity. This would provide a more stable workforce. No mitigation, management or monitoring measures are warranted or proposed. A number of economic indicators regularly determined by the Australian Bureau of Statistics will be available to monitor general economic performance in the locality and regions subsequent to the proposed development going ahead. However, more detailed analysis will be required if the specific impacts associated with the proposed development are to be monitored.

#### 7.17.4 *Confidence in Predicted Outcomes*

The ILEF is at an industry leading level, designed by experienced engineers and scientists through which the long term, economic values will increase and stay strong into the future.

The predicted outcomes are based on the most reliable and relevant data possible. As with all economic data more reliance can be placed on the predicted character of impacts rather than the exact magnitude of those impacts.

### 7.18 Social Impacts

#### 7.18.1 *Baseline Conditions*

The ILEF site is situated 2 km north-west of Hughes, 50 km south-south east (SSE) of Darwin, and about 8 km west of Berry Springs. The site is zoned rural, with a high proportion of rural residences. Litchfield Shire offers what many individuals see as significant lifestyle benefits associated with residing in a relatively undeveloped rural environment. Whilst rural residents are typically more tolerant of agricultural impacts (odour, noise, etc.) than urban residents (Belgiomo et al 2012), an intensive agricultural facility such as the ILEF will present additional social impacts.

The results of the community consultation showed concerns regarding environmental impacts of current neighbouring agricultural facilities, AA Co. and Santavan. This included issues with their waste management, odour, noise, traffic and hazardous waste. However, the community found that the economic and social impacts were largely positive, due to increased employment prospects.

#### 7.18.2 *Impact Analysis*

Social impacts are described as impacts that result in changes to people's way of life, their culture, community, political systems, environment, health and wellbeing, personal and property rights, as well as their fears and aspirations (Vanclay et al. 2015).

The change from grazing/pastoral land to ILEF will not bring about major change to culture, political systems, ambitions and personal and property rights. Environmental impacts have been discussed in depth throughout Section 7 and health and wellbeing is likely to be most affected by these environmental factors. However, fears are difficult to difficult to assess, other than through the comments raised in the community consultation meeting.

This ILEF will generate positive results for the community through job creation and improvement of the local economy. This increase of people in the area will lead to an economic flow through to the local communities. Based on the positive economic impacts outlined in Section 7.17, it can be expected that the proposed development will enhance the economic stability of the local community and not result in any changes in consumption or expenditure patterns likely to adversely impact on any sector of the community.

The ILEF is unlikely to result in significant social impacts, provided that the environmental impacts are managed well.

#### 7.18.3 *Mitigation, Management and Monitoring*

Wellard used the community consultation and EnviroAg's experience in order to address, mitigate, manage and monitor the community concerns. A detailed analysis can be seen in Section 5. Specific mitigation, management and monitoring measures proposed elsewhere in this document to address issues related to odour, traffic, noise, dust and visual impacts should be sufficient to adequately address the adverse social impacts potentially associated with the proposed development.

An ethos within the company that instils in staff the need for Wellard to be a good "corporate citizen" or "good neighbour" and for individual staff to actively participate in the local community should help to address any potential for disruption or discontent in the local community resulting from the development or its operations. In addition, such measures should provide suitable mechanisms for timely feedback of

community concerns to the management prior to these concerns causing disruption or ill feeling in the local community.

Monitoring of social impacts will be done via the community hotline. This hotline will be used for alerting Wellard of any further issues that residents may have. Complaints will be dealt with as described in the Environmental Management Plan (Appendix E). This information will also be used in the annual review of procedures.

#### 7.18.4 *Confidence in Predicted Outcomes*

Objective assessment of social impacts is difficult and confidence in predicted outcomes is limited to that applicable to any highly subjective assessment. Social impacts and community welfare will be a continuing issue in which Wellards will take into full consideration with any works proceeding. Ongoing community meetings and the phone hotline will ensure that both parties can benefit on the long term basis.

## **8. Approvals and Licences**

### **8.1 Development Consent**

An application with the Department of Land Planning and the Environment (DLPE) was lodged on the 23<sup>rd</sup> of April 2015. Development application number PA2015/0296. This application is currently deferred waiting the issue of approval from the NT EPA.

### **8.2 Water Licences**

Bore construction permit (BCPD01821) has been obtained pursuant to Section 57 of the Water Act.

A Groundwater Extraction License will be obtained prior to the extraction of any water, as the ILEF is under the Darwin Rural Control area for groundwater.

### **8.3 Construction Permits**

Permits will be sought from NT Power and Water in relation to working within the power and water easements on the property. The work entails the construction of roads and installation of underground services over or under current NT Power and Water assets.

### **8.4 Buildings and Structures**

Buildings and structures will be designed to meet the standards as stipulated in the Northern Territory Building Regulations 2008.

Prior to construction, as required by the NT Building Act, an application for a building permit will be lodged with the local building authority, for all non-habitable buildings, sheds and structures classed as Class 10a structures as per the Building Code of Australia (BCA).

Similarly, as required by the Building Act 1975, final inspection certification (BCA Form 21) will be sought prior to use of the buildings and structures.

### **8.5 PEQ Approvals and Licences**

- Livestock Premises Registration – Department of Agriculture (Cwth) (DoA, 2015)

The 'Export Control Act 1982' states that livestock for export by sea must be assembled at Department of Agriculture-registered premises for preparation for export. The premises operator must prepare an operations manual that sets out how the premises will operate. If the application passes initial assessment, a department officer conducts an on-site audit of the premises. The audit is to check compliance with Export Control (Animals) Order 2004, Australian Standards for the Export of Livestock, the registered premises operations manual, any other registration conditions.

If the operator of registered premises wishes to change the particulars such as the premises' livestock holding capacity, or design, or livestock species to be prepared for export, the operator must apply for a variation to the particulars of registration. The operator must also amend the operations manual and send a copy of the amended manual with the application for variation.

- Livestock Export Licence – Department of Agriculture (Cwth) (DoA, 2015)

The Export Control Act 1982 states that a livestock exporter must hold a livestock export licence issued under the Australian Meat and Live-stock Industry Act 1997 and the Australian Meat and Live-stock Industry (Export Licensing) Regulations 1998. The Department of Agriculture is responsible for issuing a livestock export licences if an application for a licence meets criteria for issue that are set out in the Australian Meat and Live-stock Industry (Export Licensing) Regulations 1998.

## 8.6 Other Approvals or Authorities

- Exporter Supply Chain Assurance System – Department of Agriculture (Cwth) (DoA, 2015)

Exporters are required to submit Exporter Supply Chain Assurance System (ESCAS) applications separately from NOI/CRMP applications. ESCAS applications will set out the details of a supply chain used for consignments on an ongoing basis, rather than being assessed in relation to each consignment to be exported. The 'Export Control (Animals) Order 2004' requires that a licensed exporter must submit their ESCAS applications no later than 10 working days prior to the date of the proposed export; or if the importing country requires pre-export quarantine, no later than 10 working days prior to the commencement of that quarantine.

- Notice of Intention to Export Livestock / Consignment Risk Management Plan – Department of Agriculture (Cwth) (DoA, 2015)

The 'Export Control (Animals) Order 2004' requires that a licensed exporter must submit their Notice of Intention to Export livestock (NOI) and Consignment Risk Management Plan (CRMP), at least 10 working days before the proposed export, or 10 working days before the quarantine or isolation begins. The NOI (and CRMP for livestock exported by sea) must be submitted for each consignment of livestock, and include information on how the exporter plans to comply with the Australian Standards for the Export of Livestock (ASEL). The CRMP must contain the proposed treatment and testing schedule of livestock in compliance with importing country requirements. The NOI must include the ESCAS that will apply to the proposed export. If the importing country requires an import permit, this must be included with the NOI and CRMP. If these documents are not in English, the exporter must provide a certified translation by a NAATI level 2/3 translator or equivalent.

- Permit to leave for loading – Department of Agriculture (Cwth) (DoA, 2015)

Permit to leave for loading: At the feedlot the stock are inducted and cared for by professional stockmen. Prior to loading livestock are inspected by both an accredited third party veterinarian as well as a veterinarian from the Australian Quarantine and Inspection Service, who must issue a "permit to leave for loading" before the consignment can be moved to the dock. Wellard trucks, as well as high quality contractors, then begin transporting the animals to the ship.

- Middle East Exports – Heat Stress Assessment – Department of Agriculture (Cwth)

If a livestock export consignment transits to the Middle East, the exporter must prepare a heat stress risk assessment as part of the CRMP, using the HotStuff Version 4 software.

## 9. Mitigation Measures

### 9.1 Environmental Management Plan

The site manager will be responsible for the development and implementation of an environmental management plan covering the construction activities on the site.

An operational Environmental Management Plan (EMP) is attached as Appendix E and it has been developed to ensure that environmental impacts are minimised as much as possible. Much of the information on which this plan is based has been provided in previous sections of this report. Following is a summary of the mitigation measures and management activities that comprise the basis of this management plan. The EMP is subject to ongoing review, which will be under the control of Wellard's ILEF Manager.

All activities will be carried out in a competent manner with a general environmental duty of care and due diligence requirements. All new employees and contractors entering the site will undergo a site induction and any additional required training as outlined in the EMP. The EMP has addressed the following activities and their associated impacts:

- Traffic management
- Odour management
- Solid and Liquid waste management
- Pasture and feed mill management
- Weed and pest management
- Emergencies

Due to the nature of the site and its activities, individual management plans have also been created for:

- Solid and liquid waste (construction and operational phase)
- Biting insects (operational phase only)
- Weeds (operational phase only)
- Erosion and sediment control (construction phase only)

### 9.2 Monitoring Program

Under the operational EMP and additional management plans the following parameters will be monitored:

#### Weather conditions:

- An automatic weather station will be installed away from buildings or trees so as to obtain representative data. It will be maintained to monitor and record the following parameters:
  - Air temperature (hourly average),
  - Wind direction (10 minute average),
  - Wind speed (10 minute average),
  - Precipitation (hourly total),
  - Relative humidity (hourly average),
  - Solar radiation (hourly average), and
  - Evaporation (calculated daily total).
- Severe weather warnings will also be checked daily during the wet season.

#### All ponds and dams:

- Water levels
- Weekly mosquito larvae and pupae check

- Cane toads, tadpole and eggs;
- Six monthly wastewater testing from the primary wastewater pond will include the following:
  - Chemical composition of removed material;
  - pH;
  - Electrical conductivity;
  - Volatile solids;
  - Total nitrogen;
  - Ammonia/ammonium;
  - Nitrate;
  - Total phosphorus;
  - Orthophosphate;
  - Potassium;
  - Calcium;
  - Magnesium; and
  - Sodium.
- A piezometer should be placed above and below the pond to monitor shallow groundwater depth (quarterly) and quality (biannually) and to function as an early warning leak detection system;
- Record the date and nature of cleaning and maintenance operations;
- Record any overtopping or spillages from wastewater storages;
- Monitoring of fuel use of the diesel pump

#### **Truck wash-down area:**

- Pooling water;
- Vehicles checked for “hitchhiking” pest species; and
- Weed wash down carried out.

#### **Compost/manure pad**

- Monitored for presence of vermin;
- Daily Temperature and moisture checks;
- Pest species present in waste (including compost manure pad and pens);
- Number of carcasses composted;
- Record amount of manure compost produced and analyse samples every six months for the following analytes:
  - pH,
  - Electrical conductivity,
  - Organic carbon,
  - Total Kjeldahl nitrogen,
  - Total phosphorus,
  - Potassium,
  - Calcium,
  - Magnesium,
  - Sodium, and,
  - Trace elements.

#### **Irrigation area**

- Volume of treated wastewater applied to the irrigation block;

- Monitoring irrigation schedules closely to ensure that the irrigation block is not saturated with water;
- Record rates at which wastes are applied to the utilisation area (T/ha) and total area receiving solid wastes (carcase compost) (ha) and wastewater annually (ML/ha).
- Record cropping area activities, including:
  - Crop type(s) sown,
  - Areas planted and harvested,
  - Yields
- Undertake the following chemical analyses on soils biannually:
  - pH,
  - Electrical conductivity,
  - Total nitrogen,
  - Nitrate nitrogen,
  - Available phosphorus,
  - Organic carbon,
  - Chloride,
  - Exchangeable cations (Ca, Mg, Na, K & Al) and cation
  - Exchange capacity
  - Trace elements.
- Undertake the following analyses on soils every three years:
  - Water stable aggregates,
  - Bulk density,
  - Hydraulic conductivity.
  - Phosphorus sorption capacity.

#### **Entire site:**

- Two comprehensive weed searches in February and November each year
- Monthly monitoring to assess effectiveness of treatment methods and to remove any regenerating plants
- Pest species present;
- Record of complaints as per the Environmental Management Plan;
- Records of any emergency use of gypsum or lime to treat sources of odour;
- Records of all waste removed from the site and receipts from the facilities the waste is disposed at; and
- Records of any emergency use of gypsum or lime to treat sources of odour.

#### **Groundwater Bores**

- Two bores onsite (one of the shallow 61m/79.3m deep bores and the new 114m deep bore) will be monitored for water quality and depth monthly for the first year, and then reviewed, as per the Environmental Management Plan:
  - Standing water levels.
  - Groundwater samples to be taken and analysed for the following analytes:
    - pH,
    - Electrical conductivity,
    - Total nitrogen,
    - Nitrate,
    - Ammonia
    - Total phosphorus.

**Offsite:**

- Hardy Creek water quality will be monitored monthly for the first year for the following analytes, and then reviewed, as per the Environmental Management Plan:
  - Temperature
  - Electrical conductivity;
  - Turbidity;
  - pH;
  - Dissolved oxygen;
  - Total suspended solids;
  - Chlorophyll;
  - Sodium;
  - Nitrates;
  - Ammonia;
  - Total nitrogen;
  - Total phosphorus; and
  - Filterable reactive phosphorus.

**9.3 Monitoring Locations****Onsite**

The weather station will be located away from buildings or trees so as to obtain representative data. Its location will comply with the relevant Australian standards for its location and measurement of variables.

Ground water monitoring points will be located between the feedlot/pens and the irrigation block.

Environmental monitoring areas will be established in the irrigation block. The areas from which soil samples will be collected will be representative of the paddock and shall be chosen using principals set out by Lott and Blair (1996).

Additional monitoring locations include:

- All ponds and dams;
- Truck wash-down area;
- Compost/manure pad;
- Entire site within boundary perimeter
  - Weed and pest searches;
  - Complaint area investigation

**Offsite**

Hardy Creek – on the western side of Santavan.

## 10. Justification for the Proposal - Ecologically Sustainable Development

There would appear to be sufficient, established, scientifically valid and verified mitigation measures available to address potentially adverse environmental impacts that could arise from the proposed development. In addition, there are satisfactory means of monitoring the application these mitigation measures and the correspondence between the predicted environmental outcomes with actual outcomes. Should the monitoring program detect undesirable outcomes or trends, alternative management strategies and methodologies are available to be applied in a timely manner to preclude serious or irreversible, adverse environmental impacts occurring.

The Department of the Environment (ESDSC, 1992) states that ecologically sustainable development in agriculture should contribute to long-term productivity and to Australia's economic well-being, whilst protecting the biological and physical resource base on which agricultural industries depend, and improving human health and safety. The NT EPA has defined the following six principles which will provide a basis for assessing the justification of the proposal.

### 10.1 Integration

*Decision-making processes should effectively integrate both long-term and short-term economic, social, environmental and equitable considerations.*

The proposed ILEF site is located on land that is currently zoned rural and is listed as rural/rural lifestyle in the Darwin Regional Land Use Plan 2015. The NT EPA Statement of Reasons stated that the ILEF was not in line with the proposed future urban and peri-urban land uses in this locality, as identified in the Darwin Regional Land Use Plan 2015. The Darwin Regional Land Use Plan shows that the ILEF is located adjacent to 13,500 proposed residential lots known as the East Weddell Development (Figure 32). However, the recent development of a meat processing facility directly south of the site and the existence of a PEQ yard directly north of the site (labelled as urban/peri urban in the plan) already decreases the suitability of the area for residential development as depicted in the plan. Bisecting suitable agricultural land with residential land does not integrate all the ESD considerations.

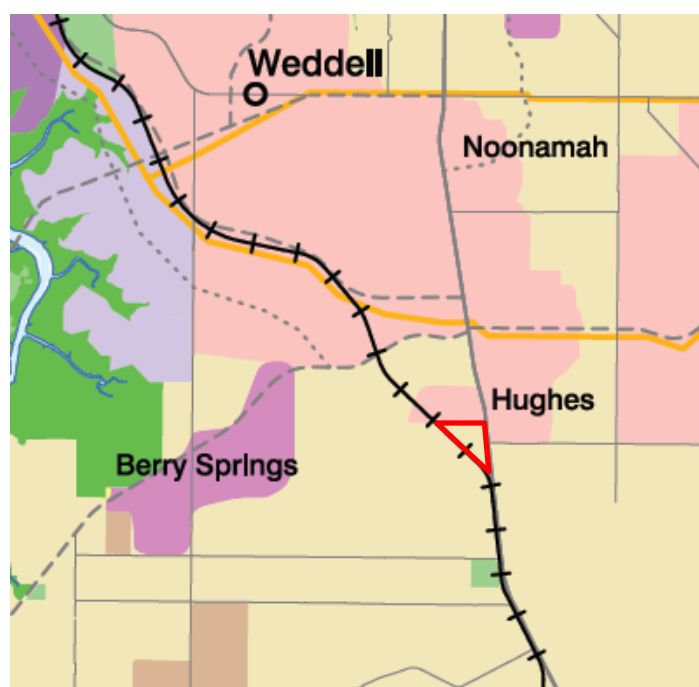
Additionally, The East Weddell – Northern Territory Planning Scheme Amendment Report (TPG Town Planning, Urban Design and Heritage, 2015) refers to Santavan (north of the ILEF) as the proposed location of the wastewater treatment plant for the East Weddell development. Regardless of whether Santavan remains a PEQ facility or becomes a wastewater treatment plant for the development, a buffer zone will be required for this property if the East Weddell development goes ahead. The ILEF, Santavan and AA Co. meat processing facility should be considered a precinct of “agri-business” and be afforded a buffer zone to protect its future operations and prevent them from being “built out” or having unnecessary impacts on neighbouring residents.

The ILEF is expected to have a lifespan of >40 years, and the live export industry is expected to increase in future. This brings with it economic and social benefits to the local community, as well as the communities of the livestock farmers.

### 10.2 The Precautionary Principle

*Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*

The nature and size of impacts flowing from a development of this nature cannot be conclusively established with scientific certainty prior to the development going ahead. However, the body of scientifically valid information available that pertains to feedlot developments, which have many design similarities to the ILEF, means that potential impacts are readily identifiable. In this instance, a diverse range of potential impacts has been identified and mitigation measures have been proposed or are available to address all those that might result in environmental degradation. In no instance has uncertainty been used as a reason for not putting in place appropriate mitigation or monitoring measures.



#### LEGEND

|                                                                             |                                                                                    |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <span style="border: 2px solid red; padding: 2px;"> </span> Plan Area       | <span style="background-color: #800080; color: white;"> </span> Strategic Industry |
| <span style="background-color: #FFC0CB;"> </span> Urban / Peri-Urban        | <span style="background-color: #D3D3D3;"> </span> Commonwealth                     |
| <span style="background-color: #FFDAB9;"> </span> Rural Lifestyle           | <span style="background-color: #FFB6C1;"> </span> Rural Activity Centre            |
| <span style="background-color: #FFDAB9;"> </span> Horticulture              | <span style="background-color: #90EE90;"> </span> Grazing / Agriculture            |
| <span style="background-color: #FFFFE0;"> </span> Community / Government    | <span style="border: 2px solid orange;"> </span> Utility Corridor                  |
| <span style="background-color: #90EE90;"> </span> Open Space / Natural Area | <span style="border: 2px solid blue;"> </span> Water Supply Catchment              |
| <span style="background-color: #3CB371;"> </span> Mangrove / Conservation   | <span style="background-color: #ADD8E6;"> </span> Existing Waterbody               |
| <span style="background-color: #9370DB;"> </span> Industry                  | <span style="background-color: #B0E0E6;"> </span> Potential Waterbody              |
|                                                                             | <span style="border-bottom: 2px solid blue;"> </span> Coastline                    |

**Figure 32** The Location of the Site (red triangle) Within the Planned Area Use as Depicted in the Darwin Regional Land Use Plan 2015

### 10.3 Inter-generational and Intra-generational Equity

*The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of present and future generations.*

As discussed in the preceding sections, the ILEF should not have considerably negative effects on biodiversity and economy that will affect current and future generations. If managed correctly, the proposed development should not contribute to deleterious long-term impacts such as land, water and air contamination. The ILEF has the capacity to enable wastewater generated to be safely assimilated back into the environment on a local, regional and catchment basis without permanently degrading any natural resources. It should also not deleteriously affect land capabilities or permanently alienate land from future development. Furthermore, provided that the “eliminate, reduce, reuse, recycle, treatment, disposal” hierarchy is adhered to the ILEF should also decrease resource and landfill use. This proposal should not have a significant or disproportionate impact on environmental diversity on a local, regional or larger scale for future generations.

### 10.4 Conservation of Biodiversity and Ecological Integrity

*The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making.*

The proposal involves disturbance of ecological systems that have been subjected to extensive prior development and modification. The proposal should not unduly exacerbate existing impacts. It will have

little effect on biodiversity onsite. Drainage channels around the borders of the property, and proper management of the irrigation block should protect the integrity of aquatic ecosystems offsite.

## 10.5 Improved Valuation, Pricing and Incentive Mechanisms

*Improved valuation and, pricing and incentive mechanisms should be promoted to ensure that the costs of environmental externalities are internalised and that the polluter bears the costs associated with environmental pollution.*

These mechanisms include

- Ensuring those who generate pollution and waste should bear the cost of containment, avoidance or reduction (polluter pays);
- The users of goods and services pay prices based on the full life cycle of costs of providing those goods and services (user pays); and
- That established environmental goals are pursued in the most cost effective manner (by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems).

While the proposed development will involve some regulatory monitoring of compliance with environmental standards, the cost of these measures is not disproportionate to the anticipated public benefit. Importantly, the ILEF will directly bear the costs associated with implementing mitigation measures as well as the costs of monitoring and reporting of environmental outcomes and other compliance costs. In a modern market economy, such as Australia's, mechanisms are available for these costs to eventually flow through to the consumers and users of products produced by the proposed development and sold for gain. If the environmental costs are significant and do not flow through, the business would become uneconomic and cease with a resultant cessation of any environmental impact.

## 10.6 Public Participation

*Decisions and actions relating to ecologically sustainable development should provide for broad community involvement on issues which affect them.*

Community consultations have formed the basis of the impact analysis for the ILEF. The public will continue to make an impact on the management of the ILEF through the community hotline and environmental management plan.

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## 12. Appendices

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## **Appendix A. Notice of Intent**

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## **Appendix B. Economic Significance of Australia's Live Export Industry**

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## **Appendix C. Odour Assessment**

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## **Appendix H. Solid and Liquid Waste Management Plan**

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## **Appendix I.     Erosion and Sediment Control Plan**

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## **Appendix J. Flora and Fauna EPBC Act Assessment**

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## **Appendix K. Cultural Heritage and European Heritage**

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## **Appendix L.   Vegetation Assessment**

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## **Appendix M. Soils Assessment**

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## **Appendix N. Geotechnical Assessment**

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## **Appendix Q. Traffic Assessment**

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## **Appendix S. Wind Roses 9am & 3pm – Darwin**

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## **Appendix U. Terms of Reference**

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