



Assessment of Throughput Capacity

Re

**Planning Proposal - Lot 103 DP561082 and Lot 1
DP1005217 - 96 Rose Valley Road, Rose Valley. NSW**

SC1987

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1.0 Purpose of the Report

The purpose of this report is to assess the possible design capacity of the proposed Rose Valley Abattoir on Lot 103 DP 561082, 96 Rose Valley Road, Rose Valley, NSW. The proposed abattoir is currently before the relevant planning authority, Kiama Municipal Council (KMC) for consideration as part of a Planning Proposal. In brief, the proposal is for an Abattoir alongside an existing boning room on the subject property with the intention to slaughter two head of cattle per week which will be drawn from the proponent's farm.

2.0 ProAnd Associates Australia Pty Ltd

Our company was established in 1987 and is a specialised consultancy to the meat processing industry in Australia and in overseas markets. Our core business includes pre-feasibility and feasibility studies for new and refurbished meat processing plants, concept design through to detailed drawings and specification documents, competitive positioning studies and other services related to the red meat sector.

The qualifications and experience of the report author are presented in Annex 1 of this document.

3.0 Documents referenced

To determine the design capacity of the proposed abattoir, the following documents have been referenced:

Source/Reference	Title
Plannex Environmental Planning, March 2015 Rev. 1	Applicant's Concept Planning Proposal document
Gateway Report	Planning Proposal to amend LEP 2011 June 2016
Appendix A	Restaurant and Abattoir Concept Plans (Plannex Environmental Planning)
Appendix B	Kiama Local Environmental Plan 2011 Amendment to Additional Permitted Uses Map
Appendix D	Effluent Management Report – Pacific Environmental
Appendix G	Photographs of proposed site
Agricultural Research Service, United States Department of Agriculture	Layout Guide for Small Meat Plants – Report 1057.

4.0 Description of proposed building

The plan for the abattoir building is shown in two drawings contained in Appendix A of the proposal submitted to KMC. It is noted that there is already a building on the site which is used for deboning chilled beef carcasses that are brought back to the farm from an abattoir. However the location of this building is not depicted on the concept plan at Appendix A although their inter-relationship would be considered to be an important aspect of the abattoir's operations.

a. Building Features

- Single storey building with floor raised 700mm above nominal ground level
- The proposed buildings consist of 6 parts:
 - Abattoir - to be constructed of concrete block walls
 - Cool Room - Attached to Abattoir and to be constructed of what appears to be insulated panel
 - Staff Amenities Block including change rooms and sanitary facilities – attached to Abattoir and to be constructed of Timber Frame external walls
 - Awning over Cool Room Entry (outline only)
 - Cattle Walk (or race) (outline only)
 - Meat Testing Room (outline only)

This last item, the meat testing room, is depicted within a 190 m² planned shed (outline form only shown on the drawings) the intent of which is not clear. Its dimensions and placement suggest it could be intended for storage, expanded boning room facilities or for chiller/freezer installation at a later date.

b. Dimensions

Using the drawing 33/13 provided with the submission by Rika Drafting Pty Ltd drawings, sheets 5 & 6, it is determined that the buildings have the following dimensions:

Building	Dimensions
Abattoir building	7.62m x 7.62m internally x 5.8m ceiling height
Cool room building	7.70m x 2.70m internally x 3.55m ceiling height
Amenities building	6.00m x 2.4m externally x 2.55m ceiling height

c. Area

The internal area of the abattoir as drawn is 58m²; the attached cool room is 21m², giving a total area of just under 80 m².

5.0 Standard process flow in slaughter facility

By way of background, in a standard slaughter operation, the beast is led through a narrow 'race' (this roughly equates on the concept plan to the Cattle Walk) and is placed in a restraining device (Cradle on concept plan) where it is electrically stunned, followed by the slaughterman making a deep incision across the throat to sever the main arteries and permit bleeding. Following this, the carcass may be hoisted onto a stationary frame similar to a tripod (usually in the case of very low volume facilities or on-farm slaughter operations). In the current proposal's concept plan, the carcass is hoisted onto an overhead conveyor rail where it will undergo the various dressing stages. During the early dressing stages, the hide is removed. A vertical cut is made along the carcass's lateral surface. Evisceration then follows, with red offal (heart, lung, kidneys etc) and green offal (esophagus, stomachs, intestines etc) being removed to adjacent processing areas. This stage also includes emptying out and disposal of the paunch (stomach) contents.

Veterinary inspection will occur prior to evisceration when the carcass is suspended from the rail; the head and hooves will also be removed. When the carcass is inspected and passed by the relevant inspector, it is moved along the rail into a cool room. Splitting the carcass into sides may occur at this stage, or after refrigeration in the indicated cool room where the core temperature is reduced to retard bacterial growth. After chilling for the required period of time, the sides will be split into quarters for 'breaking up' or deboning.

6.0 Potential capacity of the slaughter facility as drawn

The current proposed process layout shown on drawing 33/13 Sheet 5 is considered unworkable based on the writer's experience due to:

- Placement of dressing cradle adjacent to two walls, with very limited access to the restrained beast
- Lack of space for stands to permit workers to perform carcass dressing due to the position of the conveyor rail.

With a modified process layout, however, the same floor area of approximately 58m² in the abattoir building would easily allow slaughtering of up to eight cattle per eight-hour working day. This is assuming a nominal two-man team to perform the tasks described in section 4.0 above, with only a limited range of offal being retained. Assuming one processing shift per week of eight hours and operating 50 out of 52 weeks, this could be reasonably expected to produce in the order of 416 bodies per annum. Apart from the design points noted above, the floor area itself is sufficient to allow the team to work, with sufficient room for installation of equipment if needed to aid carcass dressing.

The application of more labour units could also increase the number of head processed, however, slaughtering capacity is also ultimately limited by the cool room capacity as currently drawn, if it is intended that all carcasses be chilled onsite.

Reference information sourced from a US report¹ on small-scale abattoirs indicates a throughput of 15 animals per day is possible based on a smaller floor area, however, the writer believes this throughput would not allow compliance with Australian meat processing standards.

The cool room holding capacity as drawn could hold eight bodies of approximately 300 kg each when broken down into quarters (a total of 32 quarters). After overnight chilling, the bodies could be transferred to another premises on or off-site for boning. The presence of a loading dock at the side of the cool room is noted potentially for this purpose.

The ability to chill the quarters limits the output as product must be chilled prior to deboning, particularly high value carcasses. Quarters need to receive a minimum overnight chill prior to shipment or further processing. However, if more chiller space can be installed to accommodate more quarters, then the effective limit on slaughter capacity can be substantially increased.

It is possible that the operator could slaughter on one day, chill the beef bodies overnight in the cool room, then transfer the quarters back into the abattoir area for boning the following day. This would restrict slaughter capacity to say 4 bodies per day on average and slaughter could not occur at the same time. It would also necessitate a slightly different room configuration than that which is used for offal handling during the slaughter phase.

7.0 Other relevant points re abattoir building as drawn

Although mentioned in the Concept Planning Proposal, the concept plan drawings do not take into account the following activities that are essential for an abattoir:

- a. Collection and storage of cattle hides
 - Hides are highly perishable and must be taken from site daily, unless provision is made to chill or salt them. No area is shown for this task nor a process included to perform either option. Hides cannot be stored in cool rooms with beef carcasses/quarters.

¹ 'Layout Guide for Small Meat Plants,' Agricultural Research Service, United States Department of Agriculture. [Marketing Research Report 1057.](#)

b. Handling and disposal of waste

Livestock slaughter entails the collection, storage and disposal of putrescible solid wastes including:

- Heads
- Hooves
- Inedible offals, and
- Paunch contents from the animal's gut

These materials could be in the order of one cubic metre per carcass. The concept plans do not provide for in-wall chutes, bins or collection areas for these materials which must be kept segregated from edible products i.e. meat and offal.

The Concept Planning Proposal makes reference to collection and removal of these waste materials weekly, however, unless they are chilled in a segregated area, these waste items must be taken away daily for rendering, or the product will pose a significant odour risk. There is no provision shown to collect and chill/store these waste products on the supplied drawings.

c. Blood collection

Each slaughtered beast yields in the order of 20 - 25 litres of blood which is highly putrescible and prone to creating a significant odour source. The concept plan shows no provision for collection of blood via drain or receptacle, although the proposal document suggests the blood products will be collected and treated in the site's wastewater treatment system.

The planning document states elsewhere that blood volumes will be collected along with washwater from the abattoir and sent for processing in the onsite wastewater management system. However, blood has a high capacity to absorb oxygen and its presence in the raw effluent can be expected to curtail the effectiveness of the wastewater treatment system. Blood will impose a continually high load on the system and will return Biological Oxygen Demand (BOD) readings well in excess of the 1,800 mg/L cited in the proposal documents. In our experience plants that collect blood on the slaughter line i.e. where it does not enter the effluent treatment system, return BOD readings in the region of 3000-4400 mg/L in the raw effluent stream. When blood is not collected and it enters the effluent system, the BOD readings could easily be up to five times this figure. Intermittent loading of the wastewater treatment facility caused by the intermittent slaughter program will further exacerbate sound operation of the treatment plant.

It is possible to capture the blood from the slaughter process and process it or transport it off site along with solid waste - in fact it is a valuable commodity for the rendering sector - but this provision is not included in the current plan.

d. Utilities

The concept plan drawings do not appear to consider the following issues regarding utilities:

- Refrigeration: a separate covered or enclosed Plant Room will be required for the refrigeration equipment needed to chill the quarters. Nothing is shown on the concept plan.
- Electricity: concept plans show no provision for electrical transformers and main distribution boards. To operate a cool room to chill large Wagyu cattle prior to loadout or boning will require significant refrigeration that is continuously available. No mention is made with regard to the electrical power requirement in the Planning Proposal.
- Water treatment: there is no indication of a water treatment system for on-plant use, therefore it is assumed the reticulated water supply in KMC will meet relevant requirements.
- Hot water production: the concept plan and the proposal document do not appear to provide for the production of warm and hot water. (Warm water, usually 43 °C, is required for personnel, hand and equipment washing, while hot water at 82 °C is required for sterilization.) This can be up to 50% of the water used. There appears to be no area set aside to produce and store this water.

e. Wastewater

- The Planning Report indicates that abattoir liquid waste quantity will be 700 litres/day for 4 days per week (although the main planning document proposes operation only one day per week). Stated maximum average kill is to be five animals per fortnight and 120 animals per annum.
- The writer believes the stated figure for water usage is too low for an abattoir operation and will adversely affect the wastewater treatment system and land requirements proposed for disposal of wastewater.
- The quantity of water used to slaughter cattle can vary from 1,600 to 3,000 litres per animal according to known Australian meat industry data.² For the micro abattoir such as proposed, the water usage should be at the lower end of this range (partly because no tripe and only limited offal are expected to be processed and these items will instead be disposed to waste).
- It is noted that the proposal document provides for wastewater from the staff amenities to be treated in the onsite wastewater system along with

² Australian Meat Processor Corporation. Environmental Performance Review. 29th May 2015. This report found average site water intake was 8.6 kL/t HSCW or roughly 2600 litres/head assuming a hot standard carcass weight (HSCW) of 300 kg.

processing water: this may not be acceptable to environmental authorities as the treated wastewater is destined eventually for crop irrigation and, moreover, undigested (ex livestock) and digested (ex humans) proteins are typically treated in different timeframes.

8.0 Proposed throughput target

a. Upper range of production

- The writer considers that this abattoir and cool room with small modifications to process equipment positions should be capable of allowing slaughtering of 6 – 8 cattle per 8 hours working day if required.
- The Planning report states several times that the maximum average throughput will be 5 animals per fortnight or 120 animals per annum.
- Therefore the abattoir will be idle a considerable amount of the time with concomitant pressures of an economic nature.
- It is conceivable that the 5 animals could be slaughtered on one day a fortnight if market conditions required this, however, the planned cool room capacity will likely still be a constraint.

b. Constraints

- Major constraint on the design is the chilling capacity of the cool room
- Large carcasses such as those processed from Wagyu cattle may require two days of chilling to meet market requirements, further restricting the throughput of the abattoir.

c. Omissions

- Major omissions from the proposed abattoir drawings appear to be:
 - Collection/storage/preserving facility for hides
 - Collection/storage/preserving facility for solid waste
 - Facility to deal with blood
 - Facility for handling paunch contents
 - Facility to house refrigeration/electrical supply/hot water/water treatment.

9.0 Conclusions

The Brief for this report was to determine the possible throughput for the proposed abattoir.

- Past experience and published data support the belief that this abattoir could achieve up to eight beasts per day i.e. significantly more than the proposed throughput indicated in the Planning Proposal.
- The abattoir capacity would be underutilized if operated to the level proposed in the planning document of five head per fortnight, but will be partially constrained by its projected cool room chilling capacity. Adding more cool room capacity would allow increased throughput levels.
- Essential service areas associated with meat processing plants, regardless of scale, appear to have been overlooked and are not shown on the proposed plans.
- Wastewater quantities appear to be understated for known meat industry operations. Importantly, the potential impact on BOD levels from not segregating blood will likely compromise the efficacy of the wastewater system.

Annex I - Experience and Qualifications (Stuart Osborne)

Stuart Osborne



Title: Process Design Engineer
Profession: Mechanical Engineer
Qualifications: NZ Certificate of Engineering (Mechanical & HVAC)

Stuart is a Director of Proand Ltd, bringing 47 years' experience in the Meat Processing and associated products industry. He has a proven track record in designing and engineering of innovative and cost effective meat processing plants.

Stuart's experience is in all engineering facets of a project, from feasibility study to successful commissioning of the processing plant.

He has extensive international experience in both the design and practical side of meat processing plants. International experience has included New Zealand, Australia, China, USA, Canada, Middle East and South America. Practical experience comes from several years as Plant Engineer at a large multispecies plant in Australia

Relevance to Project

- ▶ Extensive experience in process design and plant installation in overseas locations.
- ▶ Strong working knowledge of meat processing regulations.
- ▶ Ability to manage and supervise projects.
- ▶ Extensive international experience in both design and practical side. International experience has included New Zealand, Australia, China, USA, Canada, Middle East and South America.
- ▶ Practical experience comes from several years as Plant Engineer for a large multi-species plant in Australia.

Role – Tasks – Outcomes

- ▶ **Engineering** - full involvement with detailed design and implementation for upgrades or new plants.
- ▶ **Project Management** - development of proposals, scoping, design, costing, process contract management and scheduling. Managing and working with design teams to achieve the project goal. Construction management including site co-ordination of process contractors.
- ▶ **Customer Liaison** - interfacing with customers for the purposes of meat process consultation and advice in all aspects of meat plant and associated operations. Assisting customers in the management and decision making processes and forward planning.

Recent Experience to Project

- ▶ **2016 – Australia**
 - Process design of plant development for multi-species plant



- ▶ **2015 – New Zealand**
 - Process design and project management of offal processing departments on Lamb Processing
- ▶ **2014 – Saudi Arabia**
 - Detailed process design and tender specifications for new slaughterhouse complex
- ▶ **2012 – 2013 New Zealand**
 - Process design and project management of a Bio-Products Shelf Stable products plant
- ▶ **2012 – 2013 Qatar**
 - Initial process design and advice for a new Qatar Slaughterhouse Complex
- ▶ **2011 - 2009 – New Zealand**
 - Process design and detailed engineering advice for new Lamb and Beef Processing Complex
- ▶ **2010 - 2009 – Niger**
 - Process design and tender specifications for new Lamb and Beef Processing complex
- ▶ **2007 – New Zealand**
 - Process design, including on site supervision, for a 300/day beef hot boning room
- ▶ **2007 – Chile**
 - Process design, then 6 months on site supervision of contractors for a new 1,000 lambs/day lamb processing plant to full EU requirements
- ▶ **2006 – New Zealand**
 - Process design to allow existing lamb processor to increase processing rate by 33%
- ▶ **2006 – Australia**
 - Conceptual design for a new 3,000 lambs/day processing plant
- ▶ **2005 – New Zealand**
 - Process design for new 2,100 lambs/day processing plant
- ▶ **2005 – USA**
 - Feasibility, concept and detailed design for new 600 lambs/175 white veal processing plant