

Comments regarding a proposed abattoir & treatment system at 96 Rose Valley Road Rose Valley, NSW

Introduction

As faculty members in Environmental Engineering at the University of Wollongong, A. Professor Dr. M. Sivakumar and Principal Honorary Fellow (A. Prof.) Dr. J. Ongerth, have been engaged to review documentation submitted to the Kiama Municipal Council in support of a Planning Proposal to install an abattoir with design capacity of 120 beef cattle per year, i.e. 2 animals per week, accompanied by a restaurant, and to assess the information submitted documenting a proposed wastewater treatment and disposal system. Based on the information submitted likely environmental effects can be projected.

Dr. M . Sivakumar (brief cv attached) is a Civil and Environmental Engineer, an Associate Professor and an Academic Program Director of Environmental Engineering at the University of Wollongong. He has over 30 years of professional environmental engineering experience in research, teaching and consulting in Australian and overseas universities. He has also undertaken visiting Professorships in USA, Germany, China and India. He has published over 200 technical papers in water and wastewater treatment design and disposal systems, water quality management, groundwater contamination and transport. Over 25 PhDs have completed under Prof Sivakumar's supervision and some of the PhD projects specifically looked at design, monitoring and evaluation of municipal onsite waste management systems and dairy waste treatment and effluent disposal systems.

Dr. J. Ongerth (cv attached) is a Registered Civil Engineer and Fellow of the American Society of Civil Engineers having over 45 years of professional environmental engineering experience. He has held academic positions at the University of New South Wales and the University of Washington, teaching water quality management, wastewater treatment principles and design, and industrial wastewater management, and conducting research in various aspects of Environmental Engineering application. In addition he has over 10 years of consulting engineering experience in areas including wastewater treatment and disposal, land disposal system design and evaluation, groundwater contamination evaluation and remediation, and environmental control of waste disposal residuals.

Abattoir wastewater treatment and disposal system review

The principal document submitted in support of the proposed project is "Proposed on-site sewage treatment Facilities & Effluent Re-use Scheme" prepared by Pacific Environmental Services Pty Ltd., June 2015.

Successful wastewater treatment and disposal is essential to prevent environmental damage to receiving ecosystems, creation of conditions harmful and offensive to system owners, others visiting the site, and neighbours. Design of a treatment system begins with and depends on accurate assessment of the wastewater including its composition and generation characteristics. A treatment system must be designed to produce an effluent that is compatible with specific disposal requirements. Similarly, a disposal system must be selected that is compatible with and suited to the specific effluent characteristics of the treatment system, and is suitable for the selected disposal site.

The proposal describes features of an aerobic biological treatment system producing effluent to be disposed by subsurface irrigation on land adjacent to the proposed abattoir. Evaluation of the proposal includes the following elements:

Wastewater description:

- Flow volume from the abattoir and restaurant is given w/o support 2200 L/day, (abattoir, 400 L/day + $(3 \times 2400 + 3 \times 1200) / 7 = 1543 = 1943$ L/day total)
- Flowrate provided by pumping is given: 1.74 L/min or 2505 L/day
- Single unsupported values are given for wastewater composition for BOD (1877 g/day), plus N, and P.
- Solids, floating material, or grease are not accounted for

Treatment System Description:

- Grease traps: abattoir, 1000 L; restaurant, 5000 L
- Flow balancing and wet weather storage: 11,000 L
- Primary tank: 4000 L

- Aeration chamber: 5,500 L- No details of aeration method or duration is given
- Clarifier: 1,500 L
- Return of sludge- incorrect for activated sludge
- Pump well: 1000 L
- Sand filter: undefined
- Total system volume: 29,000 L. Detention time at 2505 L/day ca. 11.6 days--8.4 days prior to aeration OR during dry weather: Detention time at 2505 L/day ca. 8.8 days--5.6 days prior to aeration.
- No provision of operating contingency if rain longer than 5-days prevents disposal to irrigation site
- Long detention time prior to aeration will maintain anaerobic conditions resulting in solids accumulation and regeneration of N and P from biological solids
- Significant N removal is unlikely to be achieved despite apparent attempt to provide for alternating nitrification and denitrification.

In addition to neglecting important features of waste composition, the proposed scheme will allow solids to accumulate in the grease traps and balancing tank, and result in anaerobic decomposition producing significant quantities of highly malodourous and dangerous gas. Significant odour emission must be expected continuously.

The overall treatment scheme is not sufficiently described to permit detailed analysis. However, in addition to the anaerobic influent conditions described above, it is **not** likely to produce an effluent free of solids and readily decomposable material. As described, it will not be compatible with a subsurface disposal system, even allowing for the undefined sand filter and recommended disk filter at the disposal system entrance.

Subsurface Disposal System:

- Soil characteristics assessment: limited (3) samples analysed; grid reference to soil samples taken and method of collection (hand versus motorised) not provided; no structure information is provided
 - Liming is recommended although soils have been limed prior to soil sampling (Appendix E)
 - Surface soils (to 200mm) described as clay-loam without support or uniformity across the site
 - In light of the already limed soils, sodicity and cation exchange capacity will be major limitations for subsurface irrigation and absorption
- Water balance: average monthly rainfall data from Kiama used
 - More relevant BOM long term (1895 through 2012) rainfall data are available from Foxground (http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=139&p_display_type=dataFile&p_startYear=&p_c=&p_stn_num=068197).
 - Use of monthly averages seriously underestimate conditions in at least half of years
 - Percolation rates in moderate to heavy clays are unsupported and require measurement on-site
 - Under estimation of precipitation and over estimation of percolation would result in significant periods of site inability to accept applied effluent
- Design details as described
 - Insufficient to determine workability
 - Most likely to result in anaerobic clogging conditions
 - Location is on a creek drainage clearly visible in 2005 and 2012 Google Earth photos
 - Subsurface discharge at 200 mm depth at the surface of clay subsoils requires detailed description
- Subsurface disposal assessment
 - Based on expected treatment system effluent, subsurface disposal as described would not capable of significantly N reduction
 - The underlying clay layer with low quality effluent could result in ponding and surface runoff

The result of implementing a treatment and disposal system as described under reasonably expected conditions would be propagation to local water courses and downstream of contaminants from the poorly treated wastewater, most importantly N and P loads, contributing to increased algal growth. Degradable carbon (BOD) contribution may also contribute to stimulation of filamentous periphyton in downstream watercourses.

Conclusions:

The documentation provided to the Kiama Municipal Council in support of wastewater treatment and disposal for the proposed abattoir and restaurant is seriously flawed and has fundamental deficiencies. The report does not adequately address the significant environmental risks associated with the proposal and it is therefore not possible to make an informed decision regarding the proposal.