REPORT

Waste Water Treatment Plant Review

Prepared for

Eastern Metropolitan Regional Council

1st Floor Ascot Place
226 Great Eastern Hwy
BELMONT WA 6104

15 November 2007

4290 6576

Executive Summary

The development of a waste water treatment plant raises many issues, the principal among them being:

- Odour emissions from treatment plant and by-products
- Community disquiet at enhanced emissions, increased development, environmental impacts
- Siting criteria for optimum buffer distances and diminuation of environmental impacts
- Environmental impacts to surface waters, flora, fauna and air quality from raw sewage, treated effluent and biosolids.

The treatment and re-use of treated effluent and generated biosolids is controlled by several distinct Acts and Regulations. Principal authority is administered by the Department of Health to control the spread of disease; the Department of Environment and Conservation to protect social amenity, the environment, flora and fauna; the Department of Water to protect surface and groundwater supplies; plus sundry other legislation related to placement, easements and administration of sewerage systems (see Appendix B).

Perth residents consume significant quantities of water per day (see Table 4-1). Of the water entering a household, approximately 50% is used on outdoor requirements (garden) while a further 42% is flushed into the sewer or other waster disposal systems (see Table 4-2).. The developments proposed for Stoneville, Parkerville and Gidgegannup have used average effluent generation figures. However, significant variance from these averages could occur depending upon the number of residents per household (families vs "empty nest tree changers") and the degree to which water recycling (grey water re-use) is employed. It is apparent from Table 4-2 that volume attributable to "Toilet", approximately 8% of water consumption, will be disposed to sewer while varying quantities up to 27% of water consumption may be disposed to sewer as grey water.

The wastewater treatment technologies proposed for the development have been utilised widely in Western Australia, nationally and internationally. The adoption of a particular technology is largely dictated by the quantity of inflow and the desired quality of treated effluent and biosolids for reuse.

Issues associated with wastewater treatment, other than operational issues, are mainly odour and the attraction and/or propagation of certain disease carrying vermin, such as flies. Both can be managed, however, the most important consideration in the management of these issues is the maintenance of an adequate buffer zone, minimal on-site storage of by-products and attention to maintenance of significant equipment such as aerators, mixers and chemical dosing systems.

The by-products of wastewater treatment technology, biosolids and treated effluent, can and have been re-used for many years in Western Australia, interstate and internationally. Currently, approximately 99.9% of biosolids arising in Western Australia are re-used while only 4% of treated effluent is re-used. The latter figure largely reflects upon the profligacy to which water has been subjected both historically and currently.

Issues associated with the production of both by-products are odour and vermin. Odour issues are mainly due to extended on-site storage, inappropriate chemical dosing and seasonal impacts of temperature and wind velocity/direction. Vermin relates to flies, mosquitoes and scavenging birds, able to spread disease outside the WWTP facility. On-site composting of biosolids is a potential value-add opportunity, providing an important nutrient source (P + N) during the composting of green waste and other carbon rich waste sources, while reducing on-site storage time.

Irrigation of commercial horticulture and parks and gardens with treated effluent may require acceptance by neighbouring property owners, however, the quality of the treated effluent should, in most circumstances, be suitable for sub-surface irrigation (Class C) and may, dependent upon the technology employed, be suitable for above-surface drip and/or spray irrigation (Class A). Retention periods for crops produced using treated effluent are determined by the Department of Health and should be strictly abided.

Contamination of groundwater resources either from application of irrigated treated effluent or from on-site groundwater contamination is assessed as a low to medium risk level. Down-gradient flows from the

Executive Summary

Red Hill site flow through the National Park and could be expected to be attenuated by natural soil chemistry prior to discharge into surface water bodies such as Susannah Brook, while irrigated effluent applied at appropriate and recommended times should ensure minimal surface run-off of nitrogen species and uptake by plants.

Catastrophic failure of plant and equipment is considered a very low risk, although potential failure of sewage pipelines is an on-going concern for infrastructure older than 10 years (due to sulphur attack on pipelining). The risk to flora and fauna (Section 3) in the down-gradient John Forest National Park from spills and catastrophic failure is significant but with low frequency. Nutrient levels in both raw influent and treated effluent are above native vegetation phytotoxic levels. In addition, BOD and nutrients entering surface water bodies (Section 2) would result in significant pathogen contamination and likely algal blooms.

Storage of treated effluent during winter wet periods will require consideration by the Water Corporation. At the proposed inflow rates, 18 weeks of treated effluent storage, assuming no other use for this volume, will require storage capacity for up to 360ML (assuming averaged flows).

Impact upon sensitive native flora is of higher significance but is assessed as a medium risk, although the opportunity for impacting upon rare and endangered species is assessed as of high consequence but low frequency.

Contamination of groundwater supplies in the Swan Valley is assessed as a high risk if inappropriate irrigation management practices are adopted. However, current ambient groundwater and soil conditions, resulting from the application of inorganic fertiliser and pesticides may down-grade this potential risk.

Development of strategies for siting of the proposed WWTP will be influenced by the ownership/lease arrangement between EMRC and Water Corporation. Of these two options, sale of a discreet parcel of land (option 2 - Section 11) is regarded as providing the most sustainable outcome for the EMRC, however, it must be also be stated that the implications for potentially negative attention for the Red Hill site will occur irrespective of which of these options is applied, given that such close proximity will draw criticism by those opposed to such developments.

Siting for the proposed facility, irrespective of the site being leased or sold, is largely determined by the requirement for adequate buffer distances (see Section 10) to sensitive land uses and the potential for surface water run-off though leaks and catastrophic failure.

The literature review failed to demonstrate an example of a sewage wastewater treatment plant being sited within the boundary of an operating landfill site. Although WWTP for treatment of on-site generated leachate at landfills is a reasonably common experience (Cleanaway's Tullamarine facility, Melbourne; Waste Services, Sydney) and off-site treatment of leachate at designated WWTPs (Maroochy Shire, Queensland) occurs where required. This circumstance is not unusual given the completely different technologies historically used for "dry tomb" landfills and for treatment of liquid wastes.

It should be noted that, prior to 1987, most industrial liquid wastes in Western Australia were forwarded to largely unlined landfills for disposal. However, this is a situation that has changed for the better. Indeed, the treatment of sewage in relatively sophisticated treatment plants (primary and secondary) pre-dates sophisticated (lined) landfills by several decades. This may well explain why the two waste streams appear not have come together.

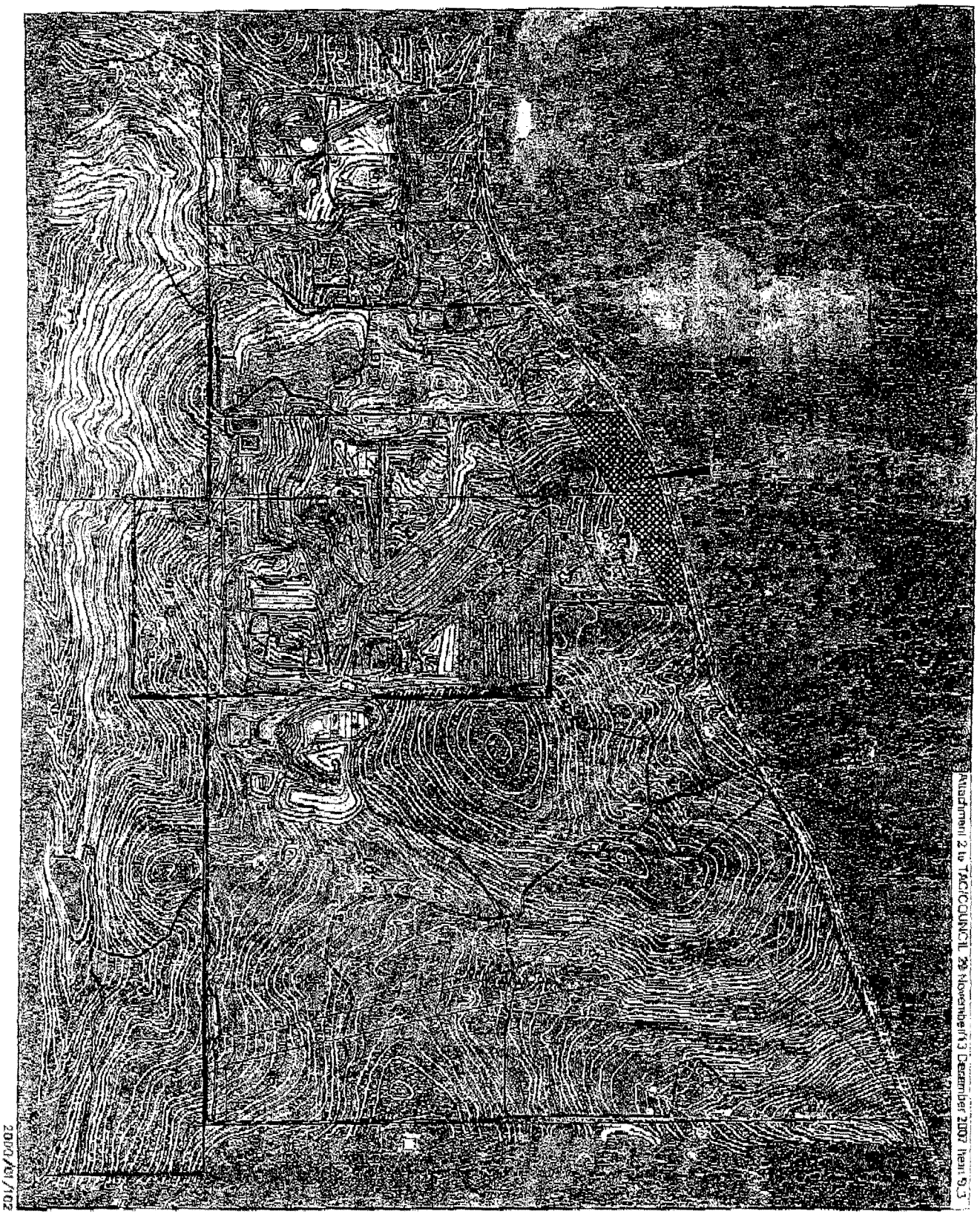
However, with recent development in landfill technologies, including composting of green waste, and the European experience in enhanced bioreactor technology using recycled leachate and third party liquids, it may be reasonable to expect that outdated "dry tomb" technology and ocean disposal of treated effluent may be environmental practices best consigned to a less enlightened past.

Overall, the risks associated with the EMRC leasing land to Water Corporation for development of an on-site WWTP outweigh current known on-site requirements for reuse water supplies or the estimated revenue resulting from such an arrangement.

The opportunity to sell to Water Corporation a site which has previously been developed (closed landfill cell) or which may become isolated from current on-site activities by the Perth-Adelaide Highway is a

Executive Summary

potentially attractive proposition, particularly if on-site development will require significant additional water consumption and the cost of reticulating from a distant WWTP is prohibitive.



Attachment 2 to TAC/COUNCIL 29 November/13 December 2007 Item 9.3

2007/01/02

TOTAL P. 16