

Appendix E

Consulting Environmental Engineers
(CEE) Report



Consulting Environmental Engineers

90 Bridge Road, Richmond VIC 3121

Phone 03-9429 4644 Fax 03-94280021

email wallis@cee.com.au

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Mr I Matesic
SMEC
PO Box 1654
Fyshwick ACT 2609

Dear Mr Matesic,

**re: Southern Broadacre Planning Study –
Sewage Pumping Station Odour Management**

Consulting Environmental Engineers is pleased to provide this report on buffer zone planning and odour management for the existing sewage pumping station near Jerrabomberra Creek within the area of the Southern Broadacre Planning Study.

The area was inspected by Dr Ian Wallis of CEE and Mr Ivo Matesic of SMEC Australia on 11 May 2004. Subsequently CEE obtained information from ACTEW on the design and proposed operation of the pumping station, and reviewed planning proposals for the area, including the proposal for future use of reclaimed water on the site.

It is noted that the proposal area plan shows the development of a rowing course in Jerrabomberra Creek. There is residential zoning to the west of the creek and mixed uses – residential/recreation/reserve – to the east of the creek.

The pumping station is located within the proposed residential zoning. Thus careful management of odours from the proposed sewage pumping station is essential.

This report sets out our findings and recommendations under the following headings:

1. Duty of Pumping Station
2. Odour Management
3. Buffer Zone for Pumping Station
4. Emergency Storage
5. Overflows
6. Use of Reclaimed Water.

An odour model has been used to confirm that the proposed odour management will result in no odour nuisance.

1. Duty of Pumping Station

The Jerrabomberra pumping station is designed to serve the whole of the Southern Broadacre Planning Area plus a small industrial area to the south and, potentially, a the small adjacent developed area in NSW. However all the land likely to drain to this pumping station is within a 2 km distance of the pumping station, so all sewage to be handled should be relatively fresh.

The proposed residential development in this area is planned to occur over the next 20 years and thus will probably involve water-sensitive urban design, with a high rate of household and neighbourhood recycling of water. In that event, the remaining wastewater could be stronger than at present, increasing the risk of odours.

The future population that may be served could be about 6,000 to 8,000 persons. In that event, and assuming reduced flows per capita, the design future flows for the pumping station would be of the order of:

Average dry weather flow: 20 L/s
Peak dry weather flow: 50 L/s
Peak wet weather flow: 75 L/s.

Odour control for the pumping station is designed on the basis that the low residence time in the sewers leading to the pumping station will result in low emissions of hydrogen sulphide and other odours.

2. Odour Management

Management of odours from the sewers in this catchment is expected to involve the following principles:

- Natural ventilation of inlets to sewers by a vent at each household;
- Additional natural ventilation by elevated stacks on major sewers;
- Gravity sewers draining the whole catchment to the existing pumping station;
- Design of sewers to avoid sudden drops and turbulence;
- Submerged inlet at pumping station;
- Fan to withdraw air (and any odours) at pumping station;
- Elevated stack (about 10 m to 12 m height) at pumping station;
- Possibly an activated carbon canister or similar if necessary.

The extent of odour management would depend on the degree of the problem, and obviously would be increased as the odour problem increased.

Activated carbon is relatively costly and produces a waste product (spent carbon) which must either be regenerated or disposed of. It is best to avoid the need to use activated carbon for as long as possible.

3. Buffer Zone for Pumping Station

The buffer zone for the pumping station depends on several considerations. Assuming the surrounding land use is residential, the buffer distance should be sufficient to avoid any odour nuisance during normal operations, maintenance and unusual operations. It is now generally recognised that “good operating practice” is sufficient to control odours so that only a small buffer zone is needed around the pumping station (principally for maintenance). However a reasonable buffer distance is necessary to protect the public during periods of upsets or unusual events (for example, prolonged power failures).

For a pumping station with the capacity projected for this site, the minimum buffer distance for maintenance would be a buffer zone of 30 m radius. However recognising the potential for additional odours due to reduced water use, sewer mining and wastewater reclamation, it is considered that a buffer zone of 50 m radius should be provided at this stage. Ideally, the buffer zone would be incorporated into the creek reserve or become part of land zoned for recreational use or open space.

As a check, the dispersion of odour has been modelled for the “worst case” situation of a discharge gas containing 2 ppm of hydrogen sulphide released from a 10 m tall stack PLUS a residual odour of 10 OU/m²/s from leaks around the access hatches at ground level.

The computer model predictions are based on use of the *Ausplume* version 5 dispersion model with two odour sources: (1) a 10 m high stack and (2) a 1.8 m square access hatch. A one-year wind file from Canberra airport has been used to predict odour concentrations on a grid extending for 1,200 m in each direction from the pumping station.

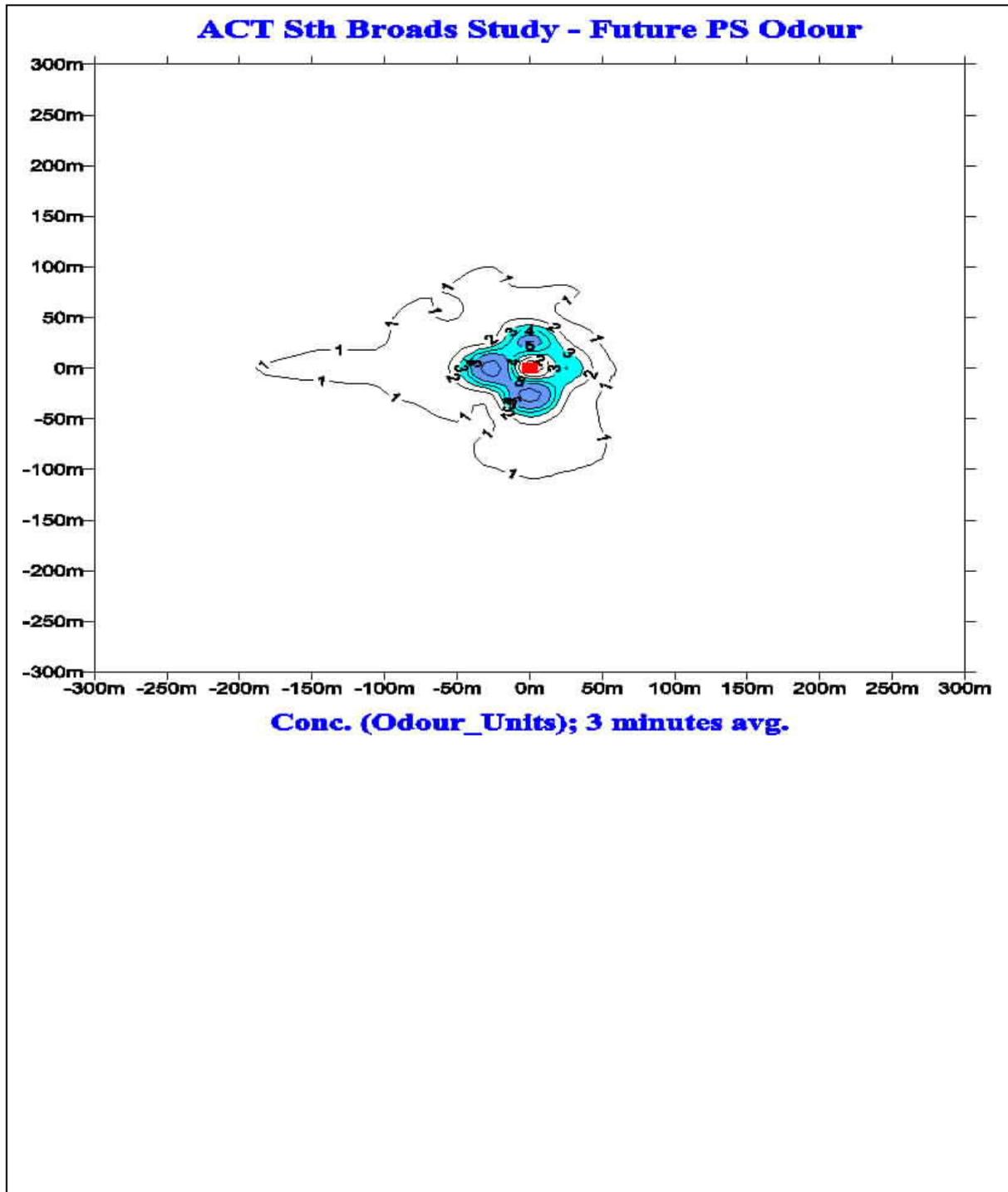
The predicted odour contours for the area within 300 m of the pumping station are shown in the figure on the following page. Under “worst case” conditions, the 2 OU contour is about 50 m from the centre of the pumping station. Generally it is considered that 1 to 3 OU is below the level of detection. Under normal operating conditions, the odour level will be well below the level of detection.

The odour model therefore confirms that a buffer zone radius of 50 m will be satisfactory to prevent any odour nuisance to surrounding residences.

It should be noted that the elevated odour levels occur at night, when dispersion is lower. During the day, dispersion is greater and hence odour levels are substantially lower, and below the level of detection. Thus the buffer zone is available for recreational uses during the day.

Figure 1. Predicted “Worst Case” Odour Contours

Note: Contours are 99.9 % frequency, 3-minute odour levels



4. Emergency Storage

An emergency storage tank for sewage is essential. The tank should have sufficient capacity to store two hours of the peak flow in wet weather, ie 540 m³. The storage tank can be provided within the buffer zone or as an oversized sewer leading to the pumping station. Any emergency storage will be below ground and therefore will not be visible apart from the access covers.

5. Overflows

At present, the overflow from the pumping station is to Jerrabomberra Creek. The overflow operates only at times of prolonged power failure (more than 2 hours in wet weather or more than 6 hours in dry weather) or a severe mechanical failure of the pumping station.

If the rowing course is constructed, the overflow pipeline will need to be extended to below the rowing course.

6. Use of Reclaimed Water

The planning proposals for the area include conceptual arrangements for future use of reclaimed water on the site. These may involve construction and operation of a sewer mining plant or a wastewater reclamation plant or a stormwater storage and reclamation facility or other facilities. Treatment and storage facilities for wastewater reclamation will require their own buffer zone: however the size and location of these buffers cannot be determined until the facilities have been identified. It is noted that the development plans include a considerable area of open space and reserves on the eastern side of the creek, and these may be a suitable location for reclamation plants and storages.

Conclusion

In conclusion, it is recommended the planning scheme provides a buffer zone of 50 m radius from the centre of the pumping station to avoid any future odour nuisance.

Yours faithfully
Consulting Environmental Engineers

Ian Wallis