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**REPORT ON SEWAGE  
EFFLUENT MANAGEMENT  
FOR THE  
PROPOSED  
LEGITIMISATION OF  
EXISTING SHORT TERM  
& TENT SITES  
KIOLOA BEACH  
HOLIDAY PARK  
JANUARY 2007**

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*For and on behalf of  
Pacific Engineering & Management.*

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## **1.0 INTRODUCTION**

Pacific Engineering & Management were commissioned by Cowman Stoddard Pty Ltd to review sewage effluent management at the Kioloa Beach Holiday Park.

Data on effluent generation was collected over the peak 2005/6 Christmas period in order to review the assumed design loadings.

The proposal seeks to legitimise an existing 23 short term sites (providing a total of 240 short term sites) and 93 tent sites (providing a total of 143 tent sites).

## **2.0 EXISTING SYSTEM**

The existing effluent management system was augmented in 2003 following a study undertaken by Pacific Engineering & Management (reference 02101, dated 28/2/03).

The design inputs for this study were based on actual water usage.

## **3.0 REVISED LOADINGS**

Design assumptions used in the determination of flows per site and flows per person plus volume recycled for toilet flushing have been revised for this report as follows:-

Peak flow: Whilst the recorded peak flow was 135,000 L on 1/1/06, the readings are not taken at the same time each day and an average of the surrounding peak days (as it is reasonable to assume that an insignificant number of people would stay for just one night on the 1/1/06).

For a 5 day average, from 29/12/05 to 2/1/06, the recorded daily flows were 117, 116, 130, 135, and 110 kL. These give an average daily total of 122 kL.

Total sites: 240 short (caravans & cabins)
143 campsites
<u>  3</u> dwellings
386 total

Volume recycled to toilet flushing, averaging over the same period, gives  $(2288-2226)/5 = 12.4$  kL or 10%.

Whilst it is noted that a number of van owners avoid the peak Christmas/New Year period, this situation is considered unlikely to change over the design life of the sewage system.

Maximum design daily inflow utilised for treatment plant design by Oliver-Higgins Wastewater was 100,000 litres/day

Maximum design daily inflow utilised for effluent disposal by Pacific Engineering & Management was 109,000 L/day

The effluent management evapotranspiration absorption system was designed by Pacific Engineering & Management to AS1547:2000 to bore logs provided by Network Geotechnics.

The existing trench length was assessed at 520m, however the construction and effectiveness of each section was not known.

#### **4.0 SEWAGE FLOWS FROM PROPOSED EXPANSION**

It is assumed that the existing peak sewage inflow rate of reuse (10%) continues and the maximum daily inflow is maintained at 122,000 L.

#### **5.0 TREATMENT PLANT AUGMENTATION**

The existing treatment plant has been advised by the manufacturer as having been designed for 100,000 L/day.

This will be required to be upgraded to at least 122,000 L/day.

The treatment plant designer, Oliver Higgins Wastewater, recommends adding an additional tank with a 130,000 litre capacity for primary digestion and settling only.

In addition, the performance of the system will be required to be monitored (via effluent quality testing) to ensure that its performance is satisfactory, and to ensure that a minimum of suspended solids are carried over to the absorption beds as these will reduce the capacity of the beds.

#### **6.0 EXISTING EFFLUENT DISPOSAL BEDS CAPACITY**

##### **6.1 Existing Performance**

The existing beds are assessed as being able to cope with existing peak loadings, as no failure was observed over Christmas 2005/6.

This is considered to result directly from a higher effluent quality due to the recent upgrade from a septic system to secondary treatment.

Further, the park manager reported that the northern bed/trench was kept as standby and not in use over this period.

The total effluent for January 2006 was 3045,000 L less 308,000 L recycled or 2,737,000 L as recorded by park management. (refer to the attached table)

## 6.2 Apparent Infiltration

The total length of utilised beds (trenches) is as follows:

Area 1: (not used)	106m	(northern most)
Area 2:	92m	(next northern)
Area 3:	55m	(next northern)
Area 4:	110m	(southern)

Total utilised at Christmas 2005/06 (Areas 2, 3, 4) = 92 + 55 + 110 = 257m

It is noted that the effective trench width must be estimated as the dune sand soils are very permeable and homogeneous around the trenches. An assumed effective width of 2m is utilised for the purpose of calculation.

The associated design loading rate for assumed 2m wide trenches is determined as follows:

Effluent (after recycling is removed): 2,737,000 L/month = 2,737,000 mm/month.

Evaporation/transpiration: pan evaporation from Bureau of Meteorology for HMAS Albatross factored by 0.8 as per Eurobodalla Shire Council = 195.3 mm/month x 0.8 = 156.24 mm/month.

Precipitation: for Batemans Bay factored by 0.2 to allow for runoff = 72 mm/month x 0.2 = 14.4 mm/month.

Infiltrated effluent (assuming trenches at maximum capacity) = effluent + factored precipitation - factored evaporation/transpiration.

$$\begin{aligned} &= 2,737,000 + 14.4 - 156.24 \\ &= 2,376,829 \text{ mm/month} \end{aligned}$$

Bed (trench) floor absorption area = 257 x 2 = 514 m<sup>2</sup>

Calculated design loading rate = 2,376,829 / 514 = 4,624mm/month or 150mm/day.

Again it is noted that this infiltration rate assumes a 2m effective trench width. A different trench width will give a different acceptance rate.

For a more accurate indication of acceptance rate via soil permeability, geotechnical testing is required.

## 6.3 Northern Absorption Bed

The northern most bed (Area 1) was not utilised during the above peak period.

The Department of Natural Resources in a letter to Cowman Stoddart Pty Ltd dated 23/4/06 note the opportunity to decommission this northern most disposal bed so that the area can be rehabilitated and returned to management as a Crown reserve.

The bed appears to have little actual or potential impact on the natural vegetation. It occupies a very small part of the dunal area available for rehabilitation.

Maintaining the area as operational would allow for the decommissioning of the southern bed (area 4) which is beside a creek and surrounded by a large area of native vegetation.

## **7.0 SUMMARY**

The sites proposed for legitimisation were fully operational at the times that peak effluent volumes were recorded.

No failure of the disposal beds was reported.

## **8.0 CONCLUSION**

It is concluded that the existing absorption bed system is adequate for peak flows from the current peak number of sites (including those sought to be legitimised).

The treatment system requires modification including a 130,000 l capacity digestion/settling tank, as recommended by the system designer, Oliver Higgins Wastewater.

The Park Management confirmed its intention to continue the monitoring of effluent quality in order to maximise the efficiency of the system.