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**Project Address:** Penoffa Farm  
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# Water Use Analysis

Penoffa Farm Event Barn

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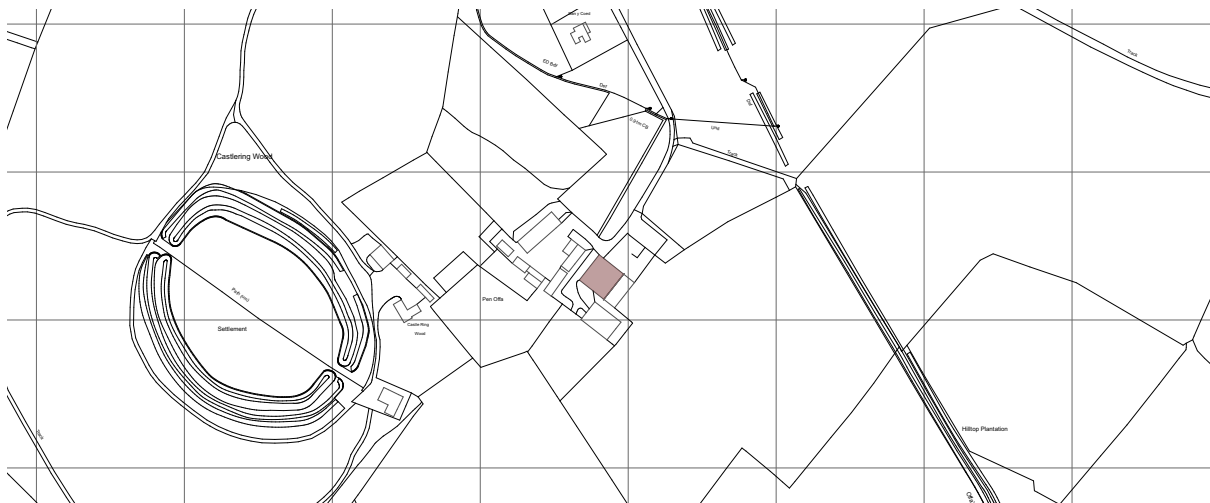
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## **Introduction**

This document provides information relevant to water management from the proposed development of Penoffa Farm.

The scheme proposes to convert an existing cow shed on the site into an event space for wedding, corporate and community events. The cow shed is highlighted on the plan below.



This document demonstrates that the proposed use will dramatically decrease the amount of waste water currently produced by the site.

The proposed scheme enables a reduction in daily waste water of approximately 736 litres per day. This is demonstrated in **Section 1: Foul Water Management**.

It should be noted that the calculation of water usage by the New Development in **Section 1** uses water efficient fixtures and fittings. Collection of grey water for wc flushing is also proposed and provides approximately 15 l/person/day.

**Section 2: Surface Water Management**, details the strategy for dealing with surface water and demonstrates an overall reduction in the amount of surface water collected and disposed from the site.

Overall the document demonstrates compliance with current General Binding Rules, Water and Building Regulations, Core Strategy policy SD4 hierarchy of drainage options; and compliant with Core Strategy policies SS6, SD3 and LD2 and all other appropriate and relevant legislation or regulations.

**SECTION 1: FOUL WATER MANAGEMENT**

**Existing Development**

Tables 1 shows a conservative estimate of water use per week for the barn under its existing use as a cow shed. The barn needs to be cleaned approximately once daily, although this was sometimes more frequent, additional water troughs required cleaning out at least once per day. Cleaning of the barn was undertaken with a commercial grade pressure washer using 9.33 litres of water per minute. The barn is approximately 688m<sup>2</sup> and operated for around 2hrs per day.

It should be noted that the calculation does not account for cleaning of the yard area which was undertaken between 2 and 4 times per week depending on the time of year, neither does it account for cleaning of machinery associated with farm use.

The daily use consumption is calculated only on those items undertaken on a daily basis, the weekly total is therefore based on 7 days.

**Table 1**

<b>LARGE COW SHED: EXISTING USE</b>		(1)	(2)	(3)	(4)
<b>Installation Type</b>	<b>Unit of measure</b>	<b>Capacity/ flow rate</b>	<b>Use factor</b>	<b>Fixed use (litres/day)</b>	<b>Litres/day = [(1) x (2) + (3)]</b>
<b>Washing down barn</b>	pressure water (litres/m)	9.33	120	0.00	1119.6
<b>Water Troughs</b>	volume per trough	180	10	0.00	1800
	<b>(5)</b>	<b>Total calculated use = (Sum column 4)</b>			<b>2919.6</b>
	<b>(6)</b>	Contribution from grey water (litres/day)			0
	<b>(7)</b>	Contribution from rainwater (litres/day)			0
	<b>(8)</b>	Total water consumption = [ (5) - (6) - (7) ]			2919.6
	<b>(9)</b>	External water use			0
	<b>(10)</b>	<b>Total water consumption = (8) + (9) (litres/day)</b>			<b>2919.6</b>
		<i>TOTAL COMBINED DAILY USE:</i>			<u><i>2919.6</i></u>
		<b><i>TOTAL COMBINED WEEKLY USE:</i></b>			<b><u><i>20437.2</i></u></b>

**Summary**

Even using conservative calculations the existing development has high level of water use, furthermore waste water washed into the drainage system is likely to contain high levels of animal waste, contributing to high phosphate levels.

- **20,437 litres/week** of waste water from the site

**Proposed Development**

Tables 2 and 3 and 4 show the water use per week for the proposed use as an event space.

Due to set up and clearance it is anticipated that the event space has a maximum potential to be used 3 days per week at full capacity. Table 2 demonstrates the potential water use for a week if the event barn achieved maximum capacity across all 3 days. The calculations include associated staff use during this period.

**Table 2**

<b>PROPOSED EVENT BARN: GUESTS</b>		<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<b>Installation Type</b>	<b>Unit of measure</b>	<b>Capacity/ flow rate</b>	<b>Use factor</b>	<b>Fixed use (litres/ person/day)</b>	<b>Litres/person/day = [(1) x (2) + (3)]</b>
<b>WC</b> (single flush)	Flush volume (litres)	0	4.42	0.00	0
<b>WC</b> (duel flush)	Full flush volume (litres)	0	1.46	0.00	0
	Part flush volume (litres)	4	2.96	0.00	11.84
<b>WC</b> (multiple fittings)	Average effective flushing volume (litres)		4.42	0.00	0
<b>Taps</b> (excluding kitchen/utility room taps)	Flow rate (litres/minute)	7.6	0	1.58	1.58
<b>Bath</b> (where shower also present)	Capacity to overflow (litres)	0	0.11	0.00	0
<b>Shower</b> (where bath also present)	Flow rate (litres/minute)	0	4.37	0.00	0
<b>Bath only</b>	Capacity to overflow (litres)	0	0.50	0.00	0
<b>Shower only</b>	Flow rate (litres/minute)	0	5.60	0.00	0
<b>Kitchen/utility room sink taps</b>	Flow rate (litres/minute)	0	0.44	0.00	0
<b>Washing machine</b> (water efficient model)	Litres/kg dry load	0	2.1	0.00	0
<b>Dishwasher</b> (water efficient model)	Litres/place setting	0	3.6	0.00	0
<b>Waste disposal unit</b>	Litres/use	0	3.08	0.00	0
<b>Water softener</b>	Litres/person/day	0	1.0	0.00	0
	<b>(5)</b>	<b>Total calculated use = (Sum column 4)</b>			<b>13.42</b>
	<b>(6)</b>	Contribution from grey water (litres/person/day)			5
	<b>(7)</b>	Contribution from rainwater (litres/person/day)			0
	<b>(8)</b>	Normalisation factor			0.91
	<b>(9)</b>	Total water consumption = [ (5) - (6) - (7) x (8) ]			8.42
	<b>(10)</b>	External water use			0
	<b>(11)</b>	<b>Total water consumption = (9) + (10) (litres/person/day)</b>			<b>8.42</b>
		<b>Max. No of people</b>			<b>120</b>
		<b>TOTAL COMBINED DAILY USE:</b>			<b>1010.4</b>
		<b>TOTAL COMBINED WEEKLY USE:</b>			<b>3031.2</b>

Table 3 demonstrates water use for the supporting camping facilities. Camping would be provided only for people using the event space, with the use of existing site facilities and acknowledging that not all guests will camp the calculations allow for 65 guests. Showering facilities would be provided within the event space and the calculation is based upon people staying at the campsite using these facilities. It should be noted that use of other facilities, such as toilets and washbasins are incorporated in the Table 2 calculation.

**Table 3**

<b>PROPOSED EVENT BARN: CAMPING</b>		<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<b>Installation Type</b>	<b>Unit of measure</b>	<b>Capacity/ flow rate</b>	<b>Use factor</b>	<b>Fixed use (litres/ person/day)</b>	<b>Litres/person/day = [(1) x (2) + (3)]</b>
<b>WC</b> (single flush)	Flush volume (litres)	0	4.42	0.00	0
<b>WC</b> (dual flush)	Full flush volume (litres)	0	1.46	0.00	0
	Part flush volume (litres)	0	2.96	0.00	0
<b>WC</b> (multiple fittings)	Average effective flushing volume (litres)		4.42	0.00	0
<b>Taps</b> (excluding kitchen/utility room taps)	Flow rate (litres/minute)	0	1.58	1.58	1.58
<b>Bath</b> (where shower also present)	Capacity to overflow (litres)	0	0.11	0.00	0
<b>Shower</b> (where bath also present)	Flow rate (litres/minute)	0	5.60	0.00	0
<b>Bath only</b>	Capacity to overflow (litres)	0	0.50	0.00	0
<b>Shower only</b>	Flow rate (litres/minute)	7.6	5.60	0.00	42.56
<b>Kitchen/utility room sink taps</b>	Flow rate (litres/minute)	0	0.44	0.00	0
<b>Washing machine</b> (water efficient model)	Litres/kg dry load	0	2.1	0.00	0
<b>Dishwasher</b> (water efficient model)	Litres/place setting	0	3.6	0.00	0
<b>Waste disposal unit</b>	Litres/use	0	3.08	0.00	0
<b>Water softener</b>	Litres/person/day	0	1.0	0.00	0
	<b>(5)</b>	<b>Total calculated use = (Sum column 4)</b>			<b>44.14</b>
	<b>(6)</b>	Contribution from grey water (litres/person/day)			10
	<b>(7)</b>	Contribution from rainwater (litres/person/day)			0
	<b>(8)</b>	Normalisation factor			0.91
	<b>(9)</b>	Total water consumption = [ (5) - (6) - (7) x (8) ]			34.14
	<b>(10)</b>	External water use			0
	<b>(11)</b>	<b>Total water consumption = (9) + (10) (litres/person/day)</b>			<b>34.14</b>
		<b>Max. No of people</b>			<b>65</b>
		<b>TOTAL COMBINED DAILY USE:</b>			<b><u>2219.1</u></b>
		<b>TOTAL COMBINED WEEKLY USE:</b>			<b><u>6657.3</u></b>

Table 4 demonstrates water use of the bar and kitchen facilities when the event space is running at full capacity.

**Table 4**

<b>PROPOSED EVENT BARN: BAR AND KITCHEN</b>		(1)	(2)	(3)	(4)
<b>Installation Type</b>	<b>Unit of measure</b>	<b>Capacity/flow rate</b>	<b>Use factor</b>	<b>Fixed use (litres/person/day)</b>	<b>Litres/person/day = [(1) x (2) + (3)]</b>
<b>WC</b> (single flush)	Flush volume (litres)	0	4.42	0.00	0
<b>WC</b> (dual flush)	Full flush volume (litres)	0	1.46	0.00	0
	Part flush volume (litres)	0	2.96	0.00	0
<b>WC</b> (multiple fittings)	Average effective flushing volume (litres)		4.42	0.00	0
<b>Taps</b> (excluding kitchen/utility room taps)	Flow rate (litres/minute)	0	0	0.00	0
<b>Bath</b> (where shower also present)	Capacity to overflow (litres)	0	0.11	0.00	0
<b>Shower</b> (where bath also present)	Flow rate (litres/minute)	0	4.37	0.00	0
<b>Bath only</b>	Capacity to overflow (litres)	0	0.50	0.00	0
<b>Shower only</b>	Flow rate (litres/minute)	0	5.60	0.00	0
<b>Kitchen/utility room sink taps</b>	Flow rate (litres/minute)	12	0.1	0.00	1.2
<b>Washing machine</b> (water efficient model)	Litres/kg dry load	0	2.1	0.00	0
<b>Dishwasher</b> (water efficient model)	Litres/place setting	1.08	3.6	0.00	3.888
<b>Waste disposal unit</b>	Litres/use	1	3.08	0.00	3.08
<b>Water softener</b>	Litres/person/day	0	1.0	0.00	0
	<b>(5)</b>	<b>Total calculated use = (Sum column 4)</b>			<b>8.168</b>
	<b>(6)</b>	Contribution from grey water (litres/person/day)			0
	<b>(7)</b>	Contribution from rainwater (litres/person/day)			0
	<b>(8)</b>	Normalisation factor			0.91
	<b>(9)</b>	Total water consumption = [ (5) - (6) - (7) x (8) ]			8.168
	<b>(10)</b>	External water use			0
	<b>(11)</b>	<b>Total water consumption = (9) + (10) (litres/person/day)</b>			<b>8.168</b>
		<b>Max. No of people</b>			<b>120</b>
		<b>TOTAL COMBINED DAILY USE:</b>			<b>980.16</b>
		<b>TOTAL COMBINED WEEKLY USE:</b>			<b>6861.12</b>

### **Summary**

The proposed development will feature modern, water efficient appliances, additionally a grey water storage system will have the potential to provide unto 20 litres of grey water per person per day. Through the above an overall use of;

- **3,031 litres/week** will be used by event space guests
- **6,657 litres/week** will be used by people camping
- **6,860 litres/week** will be used by the kitchen and bar facilities
- **TOTAL litres/week = 16,548**

### **Conclusion**

*Existing Development:*       **20,437 l/week**  
*Proposed Development:*    **16,548 l/week**

A reduction in waste water of approximately **3,889 litres/week** or **555 litres/day** will be achieved by the event space replacing the existing cow shed.



**SECTION 2: SURFACE WATER MANAGEMENT**

**Existing Development:**

Roof Area:	660m <sup>2</sup>
Non Permeable Paved Area's:	585m <sup>2</sup>
<b>TOTAL:</b>	<b>1,245m<sup>2</sup></b>

**Proposed Dwelling:**

Roof Area:	660m <sup>2</sup>
Non Permeable Paved Area's:	585m <sup>2</sup>
<b>TOTAL:</b>	<b>1,245m<sup>2</sup></b>

The existing surface water drainage arrangements will remain unchanged for the site.