Diston
WASTEWATER TECHNOLOGY

50 Years' experience in engineering, design, consulting, manufacturing, installation and maintenance of waste water treatment systems.

WASTEWATER TREATMENT & REUSE OPTIONS REPORT

Project: Kongwak Butter Factory Destination Precinct Wastewater Treatment and Reuse Options Report

Project Location: 1486- 1488 Wonthaggi Road Kongwak, Victoria. 3659

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In association with
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ENGINEERS AUSTRALIA

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CERTIFICATION		
		
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GLOSSARY OF TERMS

BOD	Biochemical Oxygen Demand – a measure of the waste strength as expressed by the amount oxygen consumed in the breakdown of the organic constituents.
Class A	EPA recycled water quality criteria level for restricted in house use.
Class B	EPA recycled water quality criteria level for restricted use close to sensitive facilities.
Class C	EPA recycled water quality criteria level for use away from sensitive facilities
Efficacy	Capacity for producing a desired result or effect; effectiveness:
EIP	Environmental Improvement Plan
Endogenous Digestion	Internal process of reabsorption and biological breakdown
HDPE Liner	High Density Polyethylene sheet liner applied to dams.
HEMP	Health Environmental Management Plan
LCA	Land Capability Assessment
FOG	Fats, Oil and Grease
Sodic/sodality	Sodic soils are characterized by a disproportionately high concentration of sodium (Na) in their cation exchange complex.
SS	Suspended Solids
Total N	Total Nitrogen
Total P	Total Phosphorus
Turkey Nest Dam	A dam formed predominantly above ground in the fashion of a turkey's nest.
T.I.T.	Triple Interceptor Trap

1.0 INTRODUCTION

Kongwak is a small township that grew around the presence of the Butter Factory, which was established back in 1896 and was operative up until the 1960's.

Kongwak is an old town with many older buildings having been settled in the 1860's. As with many older settled towns, the allotment sizes are small, and services are at a minimum. The district is now devoted to small agricultural enterprises and a weekend market. Being only 20 minutes from Inverloch, Korumburra and Wonthaggi, the site is on a popular tourist circuit.

The Butter Factory is part of a 39-acre site, with surrounding Township and Farming Zone Land around the original 2.5-acre Butter Factory site. The expanded farm has been purchased by the Butter Factory owners to accommodate wastewater management needs. The site has Foster Creek running through it.

The township is not serviced by a reticulated sewage system and given the small nature of the town, it is unlikely to attract investment for one for a long time. Simply, the scheme would be excessively costly, requiring pumping to Inverloch's Wastewater Treatment system some fourteen kilometres away.

Wastewater treatment and reuse has always been an integral issue with the site for a long while, with a previous proposed development being restricted due to the parent sites size. The current owners have addressed this constraint through the purchase of surrounding land. The soils of the area are not conducive to absorption being dispersive and strong clays with low percolation capacity. The town has a reasonably high rainfall and a relatively low evaporation potential in the cooler months, plus a limited footprint area for a reuse field on the site, necessitating the purchase of the farmland to the east for use.

The site is now in the hands of new owners, who are seeking options to refurbish the old butter factory and cheese factory into a destination precinct and lift its trading potential.

This report reviews the wastewater treatment and reuse options for the site in relation to the future potential trading conditions at the site.

2.0 SITE CONDITIONS

The site is old and has only ever had basic septic and adsorption systems. Previous trade waste handling at the site is unknown.

Inspection of the site in January 2022 showed that the system elements are old. The current adsorption system on the old butter factory location is unknown but is presumed to be in the land to the north of the facility. The former Cheese factory has no wastewater facilities at all. There are no obvious discharges to Foster Creek.

As indicated the soils of the region are tight Strzelecki Clays that have very low percolation capability. This applies also to the farm purchased, but with the increased area seasonal reuse can be provided.

The parent site has a very limited capability and would not be suitable for any expanded operation, particularly in the cooler and wetter times of the year. There are significant doubts as to the ability of the parent site to operate without offsite impact under existing heavy trading conditions if it tries to rely on the immediate site only.

The addition of the farm to the site changes the options available and gives onsite winter storage capability plus sufficient unconstrained land to establish dedicated fixed seasonal irrigation.

Rainfall in the area is relatively high with records available for the area showing a mean of 1073.7mm/annum and a 90%ile of 1298.7mm/annum. Evaporation as measured at the nearest station at Korumburra South, exceeds rainfall in the late spring through to early autumn period with an annual mean total of 1067.8mm/annum. The mean evaporation is higher than rainfall for the months of the December to April inclusive. It indicates that storage of treated effluent may be required in the cooler and wetter months due to directly incident rainfall and lower evaporation and higher soil moisture content and likely saturation of the local soils.

There are currently no treated effluent storage facilities at the parent butter factory site. However, addition of the fam land opposite provides increased confidence that it is possible to satisfy the EPA and Shire requirements for retention of wastes on the site for a larger operation.

2.1 THE EXISTING TREATMENT SYSTEM

As indicated in the introduction, an older septic and grease trap system is installed. The septic is a poured in situ tank of 3,500 litres, that discharges to the absorption trenches.

The existing treatment system not adequate or capable of consistently meeting more rigorous EPA standards for reuse or discharge off site.

3.0 PROJECTED WASTE PRODUCTION

The site has a limited current patronage. No addition works have been conducted for the small restaurant and accommodation usage permitted for the site.

The new owners are desiring to lift the sites peak capacity significantly. All options for waste management are above a total waste load of over 5,000L/day, the daily limit above which the EPA get involved.

Any upgrade option for the new proposal would require a new treatment plant to address the loadings and increase in BOD to cater for the following.

- Bistro/restaurant meal trade of 130 seats max during normal operations (150 special events)
- Event space with a peak capacity of 200 persons per day (Max usage on weekends and during peak season)
- Accommodation for 40 rooms in self-contained motel style accommodation (including 32 cabin type A, 7 cabin type B, and 1 cabin type C)
- Caretakers residence
- A multi-purpose art gallery / conference space for 52 people
- Hotel reception / private guest lounge
- Bridal suite / small conference room with shower facility and toilet provision
- Art gallery
- Providore
- Allowances for additional catering and house staff

The peak projected future loadings for the site will increase to about, 36,550L/day at full flow and about 24,800L/day using conservation flow fittings and an average 69,100L/Week loading. Peak BOD loadings are estimated to be around 26.94Kg/day.

3.1 OVERALL WASTE MANAGEMENT

The organic loadings for BOD vary as per the EPA's Code of Practice 500, depending on the type of activity. Again, as for the flows, the applied experience on BOD or organic loading is also generally lower than the average figures from that of the Code of Practice.

These are above the EPA's thresholds for Development Licence Approval and or Operation Licencing.

The BOD is a key factor in determining the wastewater treatment options for this site.
The projected flows and loads for the development are summarised as follows:

Summary of Desired Future Design Loads	
DESIGN PEAK FLOW (full flow)	**36,550 L/Day**
DESIGN PEAK FLOW (conservation flow)	**24,800 L/day**
AVERAGE FLOW (over a week)	**69,100 L/Week**
Design Peak flows for	
ADOPT DESIGN PEAK DAILY BOD LOADING	**26.94 KG/DAY**

All these figures are subject to confirmation of the site's operation profile. The BOD loadings are the critical design characteristic of how the treatment plant is sized.

The business profile is that peak activity is typically in the window from Friday to Sunday lunch, and on public holidays outside of this window business activity is significantly reduced. Seasonal peak trading commences in October and runs through to April which aligns with when evapotranspiration is high. The events function will match the wedding celebrations profile of spring through to late autumn.

3.2 Treated Effluent Reuse

As the site is too small to reuse its effluent, adjoining land will have to be utilised to ensure that all wastes are reused in accordance with the EPA's criteria. It is projected that from preliminary annual waste balancing that a minimum of approximately 2.9 -3.2Ha will be required along with a 3.0ML winter storage dam. This land must be unencumbered by drainage lines or swampy areas and must be set back from waterways and houses. There are three potential areas within the proposed farm landscape plan with these being finalised during detail design an EPA Development Approval Licence application.

4.0 REGULATORY REQUIREMENTS

The new Environment Protection Act (2017) has specific regulatory controls that are relevant to the site. Any changes to the sites wastewater treatment and reuse system must be subject to a development approval application.

In particular, the EP Act (2017) and regulations gives the EPA powers to licence sites not exempted from licencing by regulation. The Kongwak Butter Factory site is likely to be exempt from licencing if all wastes are treated and reused on site, but an EPA Development Approval must be obtained for the wastewater treatment and reuse system. Such reuse is guided by Guidelines for Environmental Management – Victorian guideline for water recycling - Publication 1910.2 March 2021 and the technical information for the Victorian guideline for water recycling - Publication 1911.2 March 2021

Any changes at the site will require a Development Licence Approval for any works to be undertaken in the provision of changes to the sewage treatment system, as the system has a capacity greater than 5000Lt/day. As part of that process, the percolation tests for dam construction and a land capability assessment will need to be conducted to justify full onsite reuse if irrigation watering is to be undertaken.

The EPA derives many of its enforcement direction from policies and regulations with respect to protecting waters and groundwater via the State Environment Protection Policies for Water as per the Environmental Reference standards (2021). The EPA is continually reviewing and tightening controls to meet the policy requirements and as such pre-existing rights are no longer considered as a right. No discharge off site would normally be allowed, except in rainfall conditions greater than the 90%ile rainfall year, unless the EPA grants an Operating Licence to discharge.

The approval process is long winded and exacting requiring a lot of proof. The following documents are likely to be required:

1. A completed registration of a *fit person* to apply for approval under the EPA.
2. Documentation of the operative company and creating all wastes on both sites and responsible for the treatment and reuse facilities on all sites.
3. Land ownership details and relationship to the operative company
4. A detailed Development Approval Application with supporting documentation (LCA, Dam test etc)
5. A summary document of the Development Approval Application for advertising

6. A Human Environment Management Plan – that looks at all environmental issues for the site (including noise management and wastes)
7. A Treatment Plant and Irrigation commissioning Plan

5.0 WASTE MINIMISATION AND CHEMICAL MANAGEMENT

The key to successful waste management and treatment for commercial kitchens involves the minimisation practices. The treatment plant design has been established based on a maximum waste strength of 1800 mg/L BOD and a pH within the range 6– 9, plus a strong regime of process and in-house control of at source management of the waste production. This involves plate and pot cleaning by hand to remove most deposits to a bin before prewash and then insertion into the dishwasher.

Use of Caustic and Acid Cleaning agents (Commercial Dishwashers) – Caustic soda is used extensively as a cleaning agent in dishwashers. It will be extremely important that caustic wash waters with pH less than 6 or greater than 9.5 not be discharged to the treatment system. This may require recirculation and reuse of caustic wash waters to a point where they reach pH 9.5 or less and or the coincident use of citric acid rinses to achieve some neutralisation. High strength caustic wastes will disrupt the treatment system.

Detergents – there should be a zero or low use of non-ionic and or quaternary-ammonium based detergents or cleaners used either in the accommodation or the kitchen. As the treatment system relies on a suspended organic bacterium over media for treatment, the overuse of non-biodegradable detergents in large quantities must be avoided at all costs. Consideration should also be given to use of silicate-based detergents as an alternative.

Use of Biocides – use of strong biocides such as Chlorine, Bromide, and Metabisulphite formulations or quaternary-ammonium compounds can be extremely disruptive to the operation of a biological treatment plant. The use of such compounds that access the waste stream will need to be very tightly controlled and use recorded.

Fats, Oil and Grease (FOG) management from Kitchens - being an onsite treatment plant, practices for waste fats oil and greases from kitchens must be very tight. Fats, oils, and greases must not be tipped down the sinks and a high degree of pot and plate scrapping must be undertaken before pre-rinse and washing. Hot dishwasher wastes must be cooled before entering the grease traps.

6.0 WASTEWATER OPTIONS FOR THE SITE

6.1 OPTION 1 – SEEKING CONNECTION TO A REGIONAL SEWAGE SYSTEM

The site is remote from immediate reticulated sewer systems that may be able to take the wastes. There is no period given by Gippsland Water for sewering the town. It is a ridiculous proposition for the site to affect a connection itself as the cost is prohibitive.

6.2 OPTION 2 - TREAT TO AN EPA CLASS B EFFLUENT AND DISCHARGE OFF SITE ALL YEAR

This Option seeks an offsite discharge of Class B effluent with additional bacterial treatment with UV disinfection. This option is subject to an EPA Operating Licence and further conditions. It is most unlikely that the EPA will accede to such a licence and receives no further consideration.

6.3 OPTION 3 – INCREASE TREATMENT OF THE WASTE TO EPA'S CLASS B QUALITY AND PROVIDE TREATED EFFLUENT FOR SEASONAL REUSE ON ADJOINING LANDS

This option involves provision of a new treatment plant to attain Class B effluent quality suitable for irrigation on the acquired neighbouring grazing lands to the north and east. This Option has the benefit of providing suitable reuse of the high-quality effluent to sustain an agricultural enterprise and fire protection.

Modelling shows that to irrigate to pasture, an area of about 3.0 Ha is needed. The property which is owned by Kongwak Butter Factory precinct entity to the north and east of the parent site has usable areas that could accommodate the treatment and irrigation system totally. As the entity of the Kongwak Butter factory has purchased this site, this option is live.

It is possible to pump the higher quality effluent from the new plant at the site to the acquired farmland via a large irrigation storage dam for seasonal reuse. The pumping distance required equipment and pipe size for this option are reasonable, thus lowing the overall cost to the site. Further the rising main for treated effluent can be installed by standard trenching methods. Provision of an estimated 3.0ML/year of highly treated effluent for winter storage and summer-autumn reuse is a best practice solution that maximises the use of the water resource. The EPA will also require a Health Environmental Management Plan for the system.

The elements of this Option include the following.

- Upgrade with the provision of a new treatment system with the following.
    - A new three phase wastewater transfer pumping station and a number of Raw Sewage pumping Stations for the proposed accommodation sites
    - Diston Model 7A Below or Aboveground Sewage Treatment Plant
    - A new chlorination facility and contact tank.
    - A UV treatment system
    - A final effluent pump well and pumps
    - Approximately 100m of rising main to the storage dam and irrigation system
    - A Minimum of 3.0ML dam
    - Irrigation equipment for approximately 3.0Ha
- A legal agreement between the Butter factory site owners and the owners of the acquired farmlands if required.
- to receive and reuse the effluent.
- Further there may a requirement for a S173 agreement subject to council planning approval.
- Provision of a Human and Environmental Management Plan (HEMP) for each site reusing effluent.
- Provision of Development Licence Application (DLA) Advertising Report.
- Provision of DLA Assessment Report.

6.4 SUMMARY OF OPTIONS

The following summary of the estimated cost for each stage options shows that Option 3 is preferred and should be considered by client for adoption.

Item	Option 2 Class B – discharge off site	Option 3 Class B – Irrigation at adjoining owned site(s)
Survey and service proving (by others)	$5,000	$5,000
LCA (by others)	$3,500	$3,500
Authority Development application and HEMP	$45,000	$45,000
Provide 3x Raw Sewage pumping station(s)	$249,000	$249,000
Provide Raw Sewage rising main	$60,000	$60,000
Maintenance Tap and water supply (by others)	$5,000	$5,000
Sewage Treatment Plant (STP) – treatment systems upgrade	$592,000 (Below ground) $572,000 (Above ground)	$592,000 (Below ground) $572,000 (Above ground)
Disinfection system	$10,000	$10,000
Flow Meter	$8,000	$8,000
Winter Storage (by others)		$100,000 (3.0 ML dam)
Irrigation Header Tank and Spray Irrigation		$180,000 (3.0 Ha)
Authorities fees/Licencing Agreement	$6,500	$6,500
Overall cost estimate*	**$984,000 below ground** **$964,000 for above ground**	**$1,264,000 below ground** **$1,244,000 for above ground**
Estimate of Rates, Operational, Maintenance, Desludging Cost /Yr	$6,500	$6,500
Operational simplicity	Simple	More complex
Long term sustainability	Yes	Yes
Meets EPA/ Council/ Agency criteria?	Subject to approval	Subject to approval
Achievable	Yes	Yes

*Budget Estimate (to an accuracy of +/- 20%) is of the Treatment Plant Only, all ancillary works are at a minimum to comply with EPA – does not include GST, connection of power, running sewer, encountering rock during excavation, Security fencing, consulting and statutory fees.

6.5 FACTORS FOR CONSIDERATION

The key to successful long-term management of wastewater at the site must consider a number of factors as follows.

1. Capital cost.
2. Operational cost
3. Maintenance and operational simplicity
4. Wear and Tear and replacement costs
5. Odour Management

6.5.1 Capital Cost

The initial capital cost of an installation must consider the period of investment return against the life of the proposed system. The effective asset life must be longer than the investment period used. Generally, the period of investment is 25 - 30 years for this type of installation, not including replacement of items like pumps that have shorter life spans. Option 3 above meets this criterion.

6.5.2 Operational Costs

Some of the options may have higher operational costs than others. Whilst it is not possible to provide fully costed estimates for the options until a detailed design is undertaken, both options could be considered.

Consideration also must be given to desludging costs.

6.5.3 Maintenance and Operational Simplicity

Option 3 is simple, but the STP must be operationally reliable and simple from a weekly input need. Monitoring of the system operation must be conducted daily. The lowest maintenance requirement for the client is the Option 2, where a bi-weekly check of power supply, system operation (such as power or pump outages) and addition of chlorine tablets is relatively simple. This must be supplemented with a 2-3 monthly inspection of all equipment by a Treatment Plant manufacturer's representative.

6.5.4 Wear and Tear and Replacement Costs.

This factor is addition to the normal maintenance routine. Depending upon the quality of equipment installed such as circuit breakers, pumps, timers, and other mechanical devices, both systems have a wear and tear factor. Commercial sewage is a very corrosive material to pump and manage. The deterioration of pumps system due to abrasive grit and the presence of anaerobic gases reduces the life of pumps and control equipment. If good high-quality equipment is installed, the equipment decline can be reduced, but allowances still

must be made for the wear and tear factor. This will apply to the Raw Sewage pumps and Trickling Filter systems, being basically simple operations, have a moderate to low equipment wear and tear factor and most of these systems have duty and standby pumps to ensure wear is evened out and pump life is increased.

The adoption of stainless-steel fasteners, electrical cabinets, guide rails and fusion welding of poly pipework, although initially slightly more expensive will more than compensate in maintenance and ongoing replacement costs be extending the life of componentry within the Sewage Treatment Plant (STP).

6.5.4 Odour Management

The site is going to have a high organic load from the food wastes and will not receive much human waste in the way of domestic sewage. The treatment plant design will cater for this but will be subject to potential odours if strong disinfectants or high loads of fats and oils are received. At this stage it is not considered advisable to establish a microbrewery at the site as these wases are particularly high is strength and potential to cause odours. More detail is required as to the potential volume of beer to be brewed and hence the quantity and strength of waste to be potentially treated. It is likely that such a waste is going to need special treatment for organic solids removal, pH correction before potentially entering a dedicated stage of an additional treatment facility.

6.5.5 Quality of equipment installed.

As with any system or facility the selection of quality of equipment and fittings ensures the best outcome for low maintenance and problems. Our experience is that use of inferior quality electrical systems, pumps, fittings, and installations can create annoying breakdown issues. Whilst the capital cost of the inferior equipment is lower, the ongoing problems increase rapidly. This is particularly so with sewage installations that are aggressive on all fixtures fittings and uses.

6.6 COMPACT TREATMENT PLANT OPTIONS

The preferred option is to provide a compact wastewater treatment plant capable of treating all the proposed wastes from the site and produce a high-quality effluent with a low odour potential for offsite reuse. This plant location must be clear of the developed area. Power to this area will need to be 3 phase (450V) and up to 65 Amp to provide for the facilities.

There are two basic types of treatment plant that could be used at the site; that of extended aeration or fixed film processes such as provided by Trickling Filters.

Of these two types of systems, the experience is that using extended aeration systems is fraught with problems of maintaining critical biomass through the extended periods of variable occupation and low and high peak loads. It will also require a greater frequency of desludging to maintain operational efficiency. It must be remembered that this site will have a commercial strength waste that is potentially problematic for EA plants to handle.

On the other hand, a trickling filter process with inter inflow period recirculation has a demonstrated capability to withstand the awkward operating conditions that may be experienced at the site and in particular, the peak holiday periods. The power usage of Extended Aeration Plants is also a major issue compared to that of the Trickling Biofilter (TB) arrangement.

The Trickling Biofilter type plant is a very robust treatment system capable of producing a high-quality effluent that will meet the Class B or C reuse quality required at the site. The plant and associated treatment systems can be configured to produce a consistent high-quality reuse effluent that can be subjected to additional treatment for landscape watering if required.

The core treatment will provide an effluent quality of a maximum BOD of 20 mg/l, Suspended Solids of 30 mg/l. The intended reuse quality of the wastewater can be lifted to a good quality Class B reuse effluent for surface irrigation using extra filtration to achieve the required bacteria E. Coli level of less 100 organisms/100 ml (suitable for subsurface reuse).

Maximisation of onsite retention and/or reuse of the treated effluent will be required to satisfy the EPA guidelines and policy requirements.

6.7 RECOMMENDATIONS

The Kongwak Butter Factory Precinct entity have purchased the lands to the east and north to allow for siting of the treatment plant, winter storage dam and irrigation areas so that it is not necessary to approach the EPA for permission to allow for a new treatment plant to discharge offsite to Foster Creek.

It is recommended that a new Trickling Biofilter type plant be provided, being a very robust treatment system capable of producing a high-quality effluent that will meet the Class B reuse quality required at the site. The core treatment will provide an effluent quality of a maximum BOD of 20 mg/L, Suspended Solids of 30 mg/L and low bacterial content.

Having purchased the neighbouring lands, the EPA will only allow irrigation of the property subject to a legal agreement with the landowner(s) if a different entity and with EPA limitations for storage and Irrigation of the treated effluent.

Maximisation of reuse of the treated effluent will be required to satisfy the EPA guidelines and policy requirements.

It is recommended that the selected option be subject to the development of a detailed design and specification process leading to the preparation of a DLA report and HEMP submitted to the EPA.

7.0 WASTEWATER MANAGEMENT PRINCIPLES & GUIDELINES

7.1 BEST PRACTICE ENVIRONMENTAL MEASURES (BPEM)

As the total flow for the proposed treatment plant that is to be approved, is above 5000L/day for the whole development, an EPA Development Approval will be required. Best Practice Management Principles will apply, with the Hierarchy of Waste Management applied.
The EPA is likely to refer the application to the Gippsland South Shire for comment.

7.2 APPROVED PRACTICES

Best Practice Environmental Management Guidelines which will guide the EPA in their assessment of any Development application and will include policy and guidelines drawn from the following:

- Code of Practice, Small Wastewater Treatment Plants, EPA Publication 500.
- Environmental Reference Standards incorporating the State Environment Protection Policy (Waters of Victoria) 2018
- EPA Publication 1910.2 Victorian guideline for water recycling, March 2021 and.
- EPA Publication 1911.2 Technical information for the Victorian guideline for water recycling, March 2021

Further, the principles of the waste management hierarchy policy as outlined in the EPA Act 2017 will be applied. The management requirements from these policies seek to Avoid the waste creation, Minimise the wastewater creation and to Reuse wastewater as much as possible.

In particular, the EPA has policies that via the principle of wastes hierarchy, wastes should be managed in accordance with the following order of preference:

(a) Avoidance; (i.e., not create the waste)
(b) Re-use; (i.e., no discharge to any receiving environment)
(c) Re-cycling; (as above)
(d) Recovery of energy.
(e) Treatment.
(f) Containment (retain on-site)
(g) Disposal. (A last resort once all above options have been exhausted)

Further, the Environmental Reference Standards 2021 also states that for existing wastewater discharges and the need to protect beneficial uses, the discharge of wastewater to surface waters needs to be managed to minimise environmental risks to beneficial uses. The Foster Creek is potentially a seasonal stream and does not flow in the late summer autumn period. The EPA may be reluctant to approve a discharge off site in that period, even though the rest of the town discharges its sullage waters and potentially septic overflows to the Creek. Again, the EPA may not consider any arrangements that involve off site discharges. There are few other viable options.

7.3 WATER CONSERVATION

EPA policy requires the implementation of improved management of water consuming activities to reduce water usage. With respect to the site there is limited opportunity to avoid waste creation given the strong desire to establish the new enlarged facilities.

As discussed previously, another area of avoidance is through the adoption of Water Conservation Plumbing fixtures and appliances. Being an existing site with mains supply and older fixtures, water saving is only partially practised. Any new facilities will require the use of three or four star rated fixtures. Slight savings in water use and hence some minimisation could be attained. However, any reduction will not save on Sewage Treatment Plant costs as the sites BOD loading is the critical factor.

7.4 WASTEWATER STORAGE

As indicated above, as immediate onsite reuse on the parent site is not possible, the EPA would normally require that a secure reuse scheme be put in place in accordance with the EPA Guidelines. As the reuse method is potentially to involve a variable seasonal reuse and time-controlled dosing of the irrigation areas, there is a need that the scheme includes some storage for the treated effluent. The purchased adjoining site to the east is reasonably large (14.14 Ha) and can easily take the projected annual discharge. The irrigation site must be unencumbered by valley lines waterways and swampy areas.

Whilst early winter irrigation may be possible, the storage capacity to cater for the mid-autumn through to mid-spring period will be needed, as reuse will be reduced or cease in that colder low growth period between April and December. Storage will also allow buffering of high peak loads and non-irrigation during periods of high rainfall.

7.5 REUSE AND DISPOSAL

Irrigation of the adjoining owned lot to the east is the only option and may require a legal interparty agreement and potentially a S173 agreement.

All irrigation would occur in the evapotranspiration period of December – April and be time clock controlled to ensure correct dosage. Dosage would occur between 1am and 5am

8.0 OFFSITE IMPACT

As the wastes are to be irrigated on lands away from Foster Creek and on-site tributaries and particularly when there are low summer/autumn base flows, the EPA will be focused on achieving a low BOD, Suspended Solids and nutrient loads so that there is no impact or runoff to the waterway.

9.0 DESIGN AND APPROVAL PROCESSES

If Option 3 is selected, approval will be sought through the EPA.

The approval process is likely to be rigorous and will require the following to be completed as part of the design and approval process:

1. Provision of a suitable person's information advice to allow EPA to consider the applications.
2. DLA advertising report
3. DLA assessment Report including:
    a. An LCA for the proposed irrigation site and soil testing for dam suitability
    b. Full water balances for the site,
    c. Treatment Plant and or irrigation system design data and technical information
    d. Provision of operational manuals and emergency procedures
    e. A Greenhouse audit for the treatment plant and
4. A written legal agreement (and potentially a S173 agreement) between landowners to show agreement to accept B Class Treated effluent to the sites for irrigation reuse at that purchased farm site. These agreements will encumber the properties for a long period of time.

5. A HEMP report to assess and minimise and manage the risks with regards to Human Health and the Environment.
6. Commissioning Plan Report to start new equipment in line with EPA, client and manufactures conditions.

The process may take several months before works can start. The current plant whilst overloaded will continue to treat the wastes to a moderate standard until an augmented system can be installed.

10.0 CONCLUSION

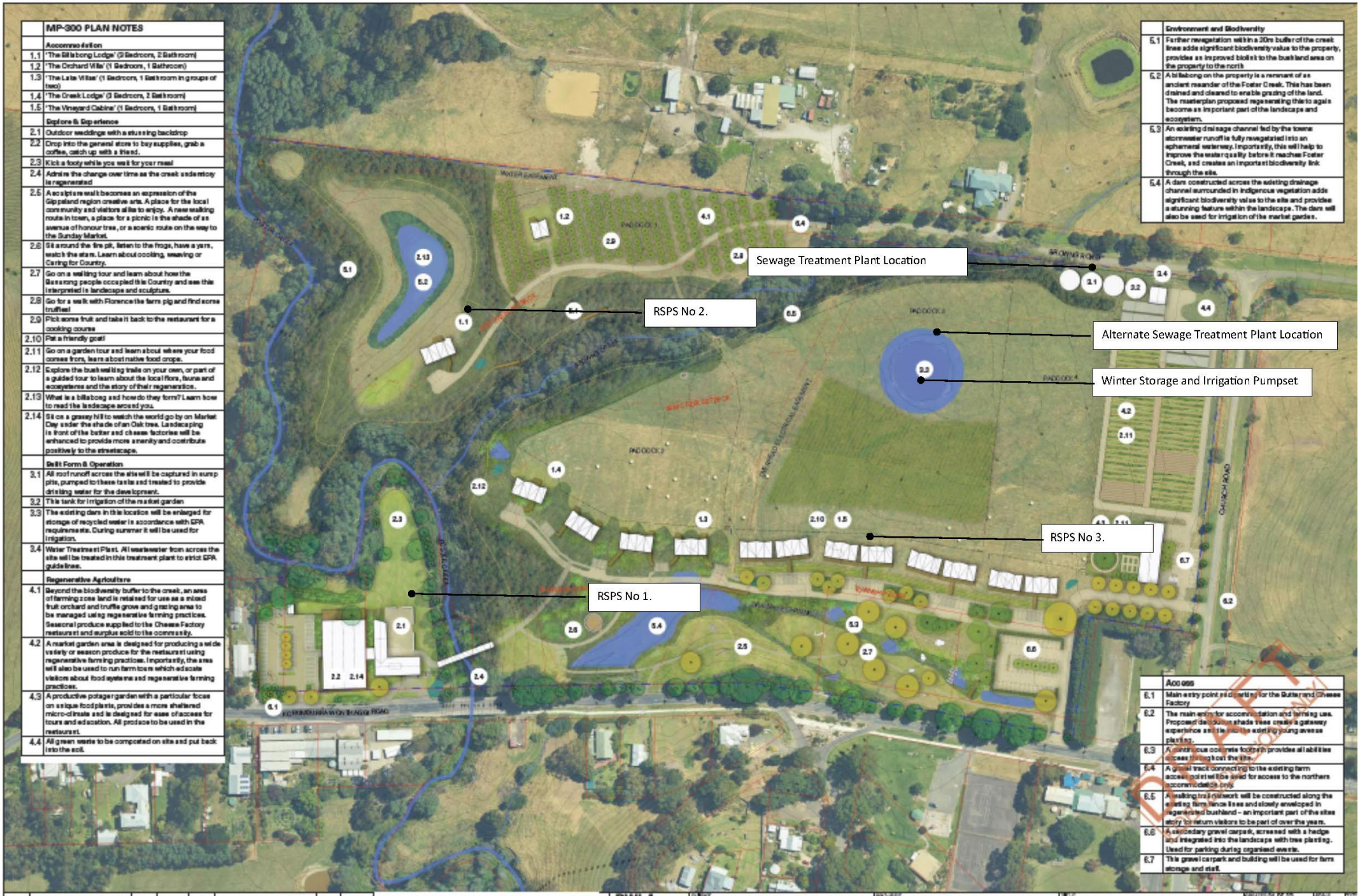
Of the options for the management of wastewaters at the Kongwak Butter Factory Destination Project, the treatment of wastewaters offsite can be managed to best practice levels.

It is recommended that the provision of a new wastewater treatment facility for the site include the following components as outlined in this report, but with water conservation to any additional facilities and treatment to a minimum of B Class treated effluent.

It is recommended to apply to EPA for a Development Approval (after initial discussions with EPA Officers) to provide the following.

- A series of new waste transfer pumps (RSPS) to transfer the wastes to the acquired property.
- A Diston Model 7A Below or Aboveground Sewage Treatment Plant Trickling Filter and or Fixed film Bioreactor system to cater for 26.94Kg BOD/day.
- Provision of a chlorine disinfection unit, pressure pumping system, inline sand filter and UV disinfection unit
- Electrical control panels
- Plumbing works to enable the connections.
- Provide of 3.0Ha of spray irrigation reuse area
- A winter storage dam oof approximately 3.0ML
- Suitable Irrigation pumps and fixed spray heads

11.0 APPENDICES



	MP-300 PLAN NOTES
	Accommodation
1.1	'The Billabong Lodge' (3 Bedroom, 2 Bathroom)
1.2	'The Orchard Villa' (1 Bedroom, 1 Bathroom)
1.3	'The Lake Villas' (1 Bedroom, 1 Bathroom in groups of two)
1.4	'The Creek Lodge' (3 Bedroom, 2 Bathroom)
1.5	'The Vineyard Cabins' (1 Bedroom, 1 Bathroom)
	Explore & Experience
2.1	Outdoor weddings with a stunning backdrop
2.2	Drop into the general store to buy supplies, grab a coffee, catch up with a friend.
2.3	Kick a footy while you wait for your meal
2.4	Admire the change over time as the creek understorey is regenerated
2.5	A sculpture walk becomes an expression of the Gippsland region creative arts. A place for the local community and visitors alike to enjoy. A new walking route in town, a place for a picnic in the shade of an avenue of honour tree, or a scenic route on the way to the Sunday Market.
2.6	Sit around the fire pit, listen to the frogs, have a yarn, watch the stars. Learn about cooking, weaving or Caring for Country.
2.7	Go on a walking tour and learn about how the Bunurong people occupied this Country and see this interpreted in landscape and sculpture.
2.8	Go for a walk with Florence the farm pig and find some truffles!
2.9	Pick some fruit and take it back to the restaurant for a cooking course
2.10	Pat a friendly goat!
2.11	Go on a garden tour and learn about where your food comes from, learn about native food crops.
2.12	Explore the bush walking trails on your own, or part of a guided tour to learn about the local flora, fauna and ecosystems and the story of their regeneration.
2.13	What is a billabong and how do they form? Learn how to read the landscape around you.
2.14	Sit on a grassy hill to watch the world go by on Market Day under the shade of an Oak tree. Landscaping in front of the butter and cheese factories will be enhanced to provide more amenity and contribute positively to the streetscape.
	Built Form & Operation
3.1	All roof runoff across the site will be captured in sump pits, pumped to these tanks and treated to provide drinking water for the development.
3.2	This tank for irrigation of the market garden
3.3	The existing dam in this location will be enlarged for storage of recycled water in accordance with EPA requirements. During summer it will be used for irrigation.
3.4	Water Treatment Plant. All wastewater from across the site will be treated in this treatment plant to strict EPA guidelines.
	Regenerative Agriculture
4.1	Beyond the biodiversity buffer to the creek, an area of farming zone land is retained for use as a mixed fruit orchard and truffle grove and grazing area to be managed using regenerative farming practices. Seasonal produce supplied to the Cheese Factory restaurant and surplus sold to the community.
4.2	A market garden area is designed for producing a wide variety or season produce for the restaurant using regenerative farming practices. Importantly, the area will also be used to run farm tours which educate visitors about food systems and regenerative farming practices.
4.3	A productive potager garden with a particular focus on unique food plants, provides a more sheltered micro-climate and is designed for ease of access for tours and education. All produce to be used in the restaurant.
4.4	All green waste to be composted on site and put back into the soil.

	Environment and Biodiversity
5.1	Further revegetation within a 30m buffer of the creek lines adds significant biodiversity value to the property, provides an improved biolink to the bushland area on the property to the north
5.2	A billabong on the property is a remnant of an ancient meander of the Foster Creek. This has been drained and cleared to enable grazing of the land. The masterplan proposed regenerating this to again become an important part of the landscape and ecosystem.
5.3	An existing drainage channel fed by the towns stormwater runoff is fully revegetated into an ephemeral waterway. Importantly, this will help to improve the water quality before it reaches Foster Creek, and creates an important biodiversity link through the site.
5.4	A dam constructed across the existing drainage channel surrounded in indigenous vegetation adds significant biodiversity value to the site and provides a stunning feature within the landscape. The dam will also be used for irrigation of the market garden.

	Access
6.1	Main entry point and parking for the Butter and Cheese Factory
6.2	The main entry for accommodation and farming use. Proposed deciduous shade trees create a gateway experience as you enter the existing young avenue planting.
6.3	A continuous concrete footpath provides all abilities access throughout the site.
6.4	A gravel track connecting to the existing farm access point will be used for access to the northern accommodation only.
6.5	A walking trail network will be constructed along the existing farm fence lines and slowly enveloped in regenerated bushland – an important part of the sites story for return visitors to be part of over the years.
6.6	A secondary gravel carpark, screened with a hedge and integrated into the landscape with tree planting. Used for parking during organised events.
6.7	This gravel carpark and building will be used for farm storage and staff.

REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	BY	DATE

PWLA

CLIENT: DAMIEN BACKHOLER & GEMMA COSGRIFF
1496-1498 KORUMBURRA-WONTHAGGI ROAD
KONGWAK VIC 3951

PROJECT: KONGWAK BUTTER & CHEESE
1496-1498 KORUMBURRA-WONTHAGGI ROAD
KONGWAK VIC 3951

TITLE: LANDSCAPE MASTERPLAN OVERALL VISION

DRAWING BY: DC/JP
STATUS: PRELIMINARY
SCALE @ A1: 1:1,000
DRAWN: FW
APPROVED:
JOB No: 19210
REV:
DRAWING No: MP-300