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Kongwak Butter and Cheese Factory

Stormwater Management Concept

PREPARED FOR:

Kongwak Butter Factory Co

For Information

Revision:	1
Date:	15/06/2023

DOCUMENT HISTORY

Revision	Prepared By	Verified By	Date
1	JW	BW	15 / 06 / 2023

Job Number: 15141

Prepared by CJ Arms Pty Ltd

TABLE OF CONTENTS

Figures

Tables

1. INTRODUCTION

CJ Arms have been engaged by Kongwak Butter Factory Co. to prepare a concept for stormwater management for the following site:

1486-1488 Korumburra Wonthaggi Road, Kongwak, VIC 3951

Information for parcels that comprise the site are listed in Table 1.

Table 1 – Parcel Information

Address	Lot/Plan
1486 Korumburra Wonthaggi Road, Kongwak, VIC 3951	**1\PS716625** **2\PS716625**
Church Road, Kongwak, VIC 3951	**1\PS331420** **2\PS331420** **3\PS331420**

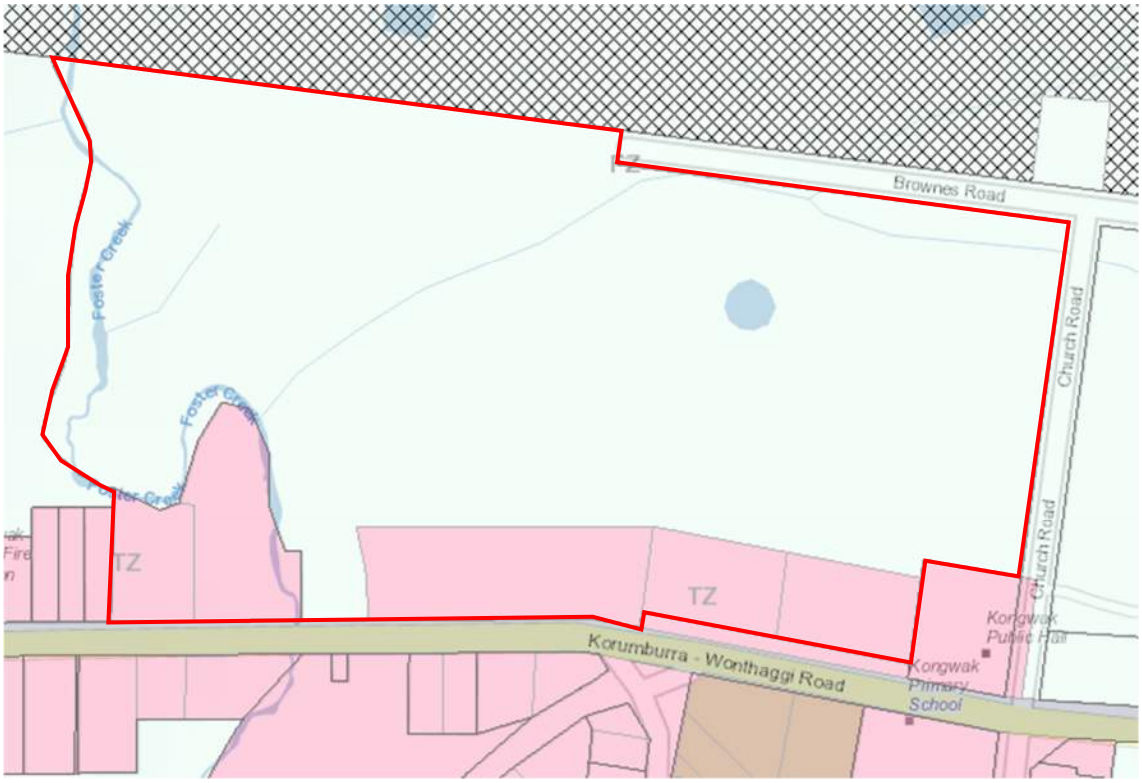

Figure 1 – Subject Site

The purpose of this report is to define the proposed strategy for the management of stormwater in relation to stormwater treatment and the conveyance of minor and major flows.

Ultimately the outcomes from this report will form the basis for further discussions to gain in-principle approval of the development works from a Stormwater Management perspective.

The report is not intended to present a finalised design, but rather a management concept and pathway forward for council approvals and detailed design.

2. EXISTING CONDITIONS

The current site is fronted by Korumburra Wonthaggi Road and is abutted by Kongwak Public Hall on the east. The area of the site is approximately 15Ha.

The site has a butter and cheese factory with an approximate area of 0.149 ha. The rest of the site has been used as agricultural pasture and is currently covered in grass with some minor vegetation.

It is anticipated that the existing site will have a predevelopment runoff coefficient in the order of 0.3 to 0.35.

2.1 EXISTING CATCHMENT AND SITE CONDITIONS

The topographic survey indicates that the development is relatively hilly with two water channels, Foster Creek and Browns creek, that meander around the northern/western region of the site before converging and exiting out to Korumburra Wonthaggi Road. Contour data indicates that this water channel drains to the south.

An informal drainage channel runs along the southern boundary of the site that fronts Korumburra Wonthaggi Road. According to contour data, the drainage channel drains to the west and exits our site via a piped outfall to rejoin Foster Creek downstream of Korumburra Wonthaggi Road.

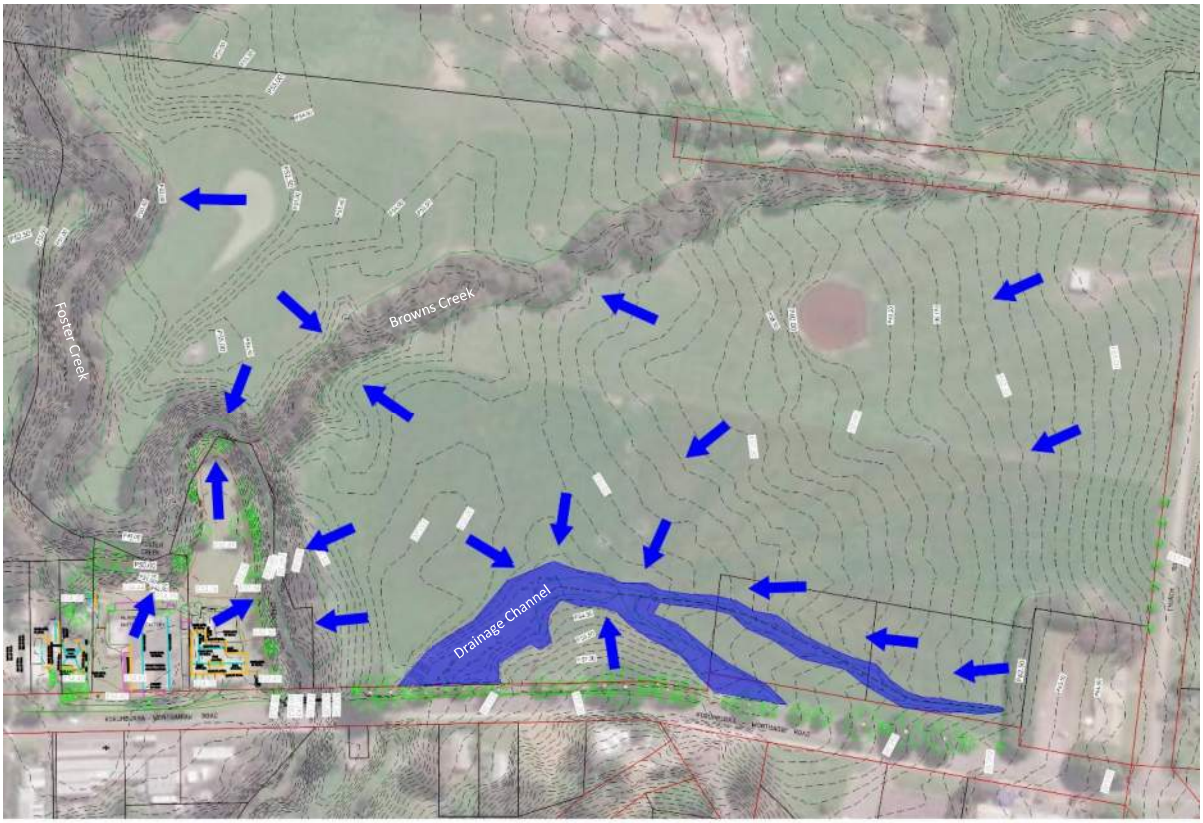

Figure 2 – Site Context

3. PROPOSED DEVELOPMENT

3.1 PROPOSED CATCHMENTS

The site can be divided into two catchments – a West catchment and an East catchment.

The West Catchment is situated where the existing butter and cheese factory is located. Stormwater runoff from this catchment will be directed into Foster Creek.

The East Catchment will be comprised of proposed holiday cabin accommodation, paved roads, carparking and other facilities. Most of the stormwater runoff will be guided into the informal drainage channel, and a small proportion will drain into Browns Creek.

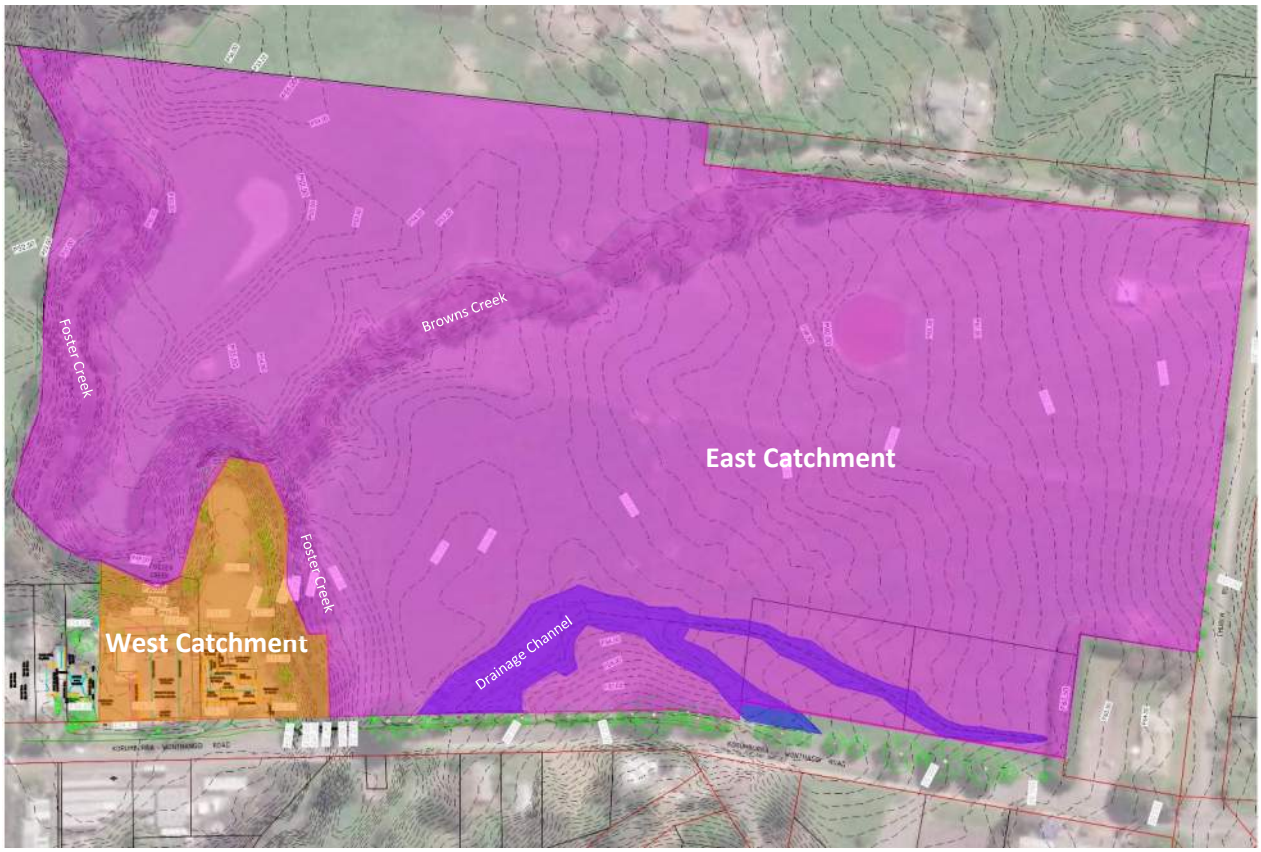

Figure 3 – Proposed Catchments

3.2 PROPOSED DEVELOPMENT MASTERPLAN

Figure 4 – Proposed Development Masterplan

Figure 4 shows the Proposed Development Masterplan. The existing butter and cheese factory is situated to the west of the site. The proposed cabin accommodation, roads, and other facilities such as a service building and restaurant garden are situated mainly on the eastern side of the site. Some of these developments (e.g., roofing and paved surfaces) will result in greater stormwater runoff, which will be accommodated for in the stormwater management plan.

3.3 PROPOSED DRAINAGE, LEVELS & GRADING

Stormwater runoff from roofs will be pumped to the water storage tanks and treatment system for reuse as drinking water – refer to plans by hydraulic engineer. Without authority potable water supply, it is proposed that catchment from roofs will be the major drinking water source for this development.

The stormwater runoff from footpaths, roads, and carparks will be guided by swales to raingardens located downstream, improving stormwater quality, before finally being discharged into the waterways. The proposed levels and grading will utilise the existing hydrology of the site to minimise construction works and site disturbance. The contours of the site naturally fall to Foster Creek and Browns creek as well as the informal drainage channel running along the southern boundary of the site.

The site belongs to a larger catchment - external flows (mainly coming from the east) will be catered for in the stormwater strategy.

The final detailed design must provide appropriate road and building levels to manage storm flows onsite as well as providing adequate freeboard to the satisfaction of the drainage authorities.

4. FLOW RATE METHODOLOGY

4.1.1 Design Storm Events

Based on recommendations within AS/NZ 3500.3 and Council's Infrastructure Design Manual 2022 version 5.40, the major and minor storm events were selected as follows:

- Minor Event: 1 in 5 year ARI
  - Surface drainage infrastructure sized for a 1 in 5 year ARI through to point of discharge.
- Major Event: 1 in 100 year ARI
  - Roads are designed to have capacity to safely convey all flows up to and including the 1 in 100 year ARI.
  - Surface drainage overflows in events up to and including the 1 in 100 year ARI will not present a hazard to people or cause significant damage to property.

Pipe sizing and overland flow modelling must ensure a safe depth vs velocity is maintained at all times during the major events.

4.1.2 Rational Method for Peak Flow Rate

The peak flow rate for the site will be obtained using the Rational Method in accordance with ARR and Section 5.3.2 of the Melbourne Water Land Development Manual.

$$Q = C_y I_y A / 360 \qquad \textbf{Equation 1}$$

Q = Peak flow rate (m3/s) for average recurrence interval

C_y = Co-efficient of runoff for ARI of y years (dimensionless)

A = Catchment area (ha)

I_y = Average rainfall intensity (mm/hr) for a design duration of t hours and an ARI of y years

4.1.3 Catchment Area (A)

Catchment areas will be measured using AutoCAD, contour surface data and known cadastral boundaries.

4.1.4 Coefficient of Runoff (C)

Based on Council's Infrastructure Design Manual 2022 version 5.40 clause 16 table 10 the following coefficients of runoff will be used for the minor and major flows.

Coefficient of Runoff 'C' for minor and major flows:

- For paved or roofed areas C = 0.90
- For permanently grassed areas C = 0.33

5. DETENTION ANALYSIS AND STRATEGY

5.1 ONSITE DETENTION STORAGE CONFIGURATION

The permissible site discharge (PSD) has been requested from council but at the time of writing, the PSD has not been specified by Council. A PSD will be confirmed and adhered to during the detailed design stage of the development.

The final detailed design of the detention system presented to Council for approval would need to clearly demonstrate that the measures provided on the site meet the requirements for capacity and detention as well as water quality. The strategy for onsite detention will consider the combination of rainwater tanks and reuse, swales, raingardens, and an underground pipe network.

6. STORMWATER QUALITY ASSESSMENT

6.1 TREATMENT OBJECTIVES

The VPP 2018 specifies stormwater quality measures that must be implemented for any new development. Clause 53.18 of the VPP states that the stormwater management system should be designed to:

- Meet current best practice performance objectives for stormwater quality as outlined in *Urban Stormwater – Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee, 1999) (refer Table 2 below);
- Minimise the impact of stormwater contaminants and other toxicants. Operational, this will be achieved during onsite work and construction activities with careful management including, but not limited to, bunding and covering or roofing of storage, loading and work areas; and
- Contribute to cooling, improving local habitat and providing attractive and enjoyable spaces.

Table 2.1 of *Urban Stormwater – Best Practice Environmental Management Guidelines* outlines 'Current Best Practice Performance Objectives' as:

Table 2 – Objectives for Environmental Management of Stormwater

Water Quality Parameter	% Reduction of Baseline Annual Load
Total Suspended Solids (TSS)	80%
Total Phosphorus (TP)	45%
Total Nitrogen (TN)	45%
Gross Pollutants (>5mm)	70%

6.2 STORMWATER TREATMENT TRAIN

This section of the report describes practical approaches to achieving improvements in the quality of the stormwater runoff from the site that are cost effective, easily maintained, and readily implemented. The overarching aim of the developed stormwater management strategy has been designed to reduce peak stormwater flows and to meet the best practice water quality targets as specified above.

In summary, the stormwater management strategy for the development proposal includes:

- Stormwater from roads and pavements will be graded towards rain gardens via swales and channels before being discharged into Browns Creek, Foster Creek, and the

informal drainage channel. A proposed dam situated at the downstream end of the informal drainage channel, as illustrated in Figure 5, will reuse a portion of the stormwater for irrigation.

- Stormwater from roofs will be captured and pumped to the water storage tanks and treatment system and be treated and stored for use as potable water – refer to plans by the hydraulic engineer for more detail.

Figure 5 – Proposed Irrigation Dam

Internal stormwater drainage shall be designed and constructed in accordance with AS3500.3 and all other relevant standards and guidelines.

Treatment device selection will be in accordance with Industry Best Practice and WSUD Engineering Guidelines. Engineering diagrams and detailed drawings of site stormwater management and treatment devices are to be provided for Council approval.

6.3 VERIFICATION OF TREATMENT OBJECTIVES

To verify the treatment objectives as describe above the final design will require completion of a computer model using "eMusic" software to validate the proposed treatment measures.

Our preliminary eMusic model for the site is presented below for information. The final detailed civil design will need to include a detailed MUSIC model of the selected treatment processes to demonstrate compliance with Best Practice Environmental Management.

The following assumptions have been used in the eMusic model:

- All stormwater runoff generated from roofs will be captured and pumped to the water storage tanks and treatment system for reuse as potable water. The following annual demand parameters have been used:
  - Butter and Cheese Factory: 900 kL/yr with a uniform monthly distribution
  - Cabin Accommodation: 1960 kL/yr with a uniform monthly distribution
  - Service Building: 200 kL/yr with a uniform monthly distribution
  - Greenhouses: 700 kL/yr with a potential evapotranspiration (PET) distribution
- Areas for proposed roofs, roads, and carparks have been calculated using AutoCAD. Stormwater runoff from footpaths and walkways have been assumed to be negligible.

The results of the above eMusic model are as follows:

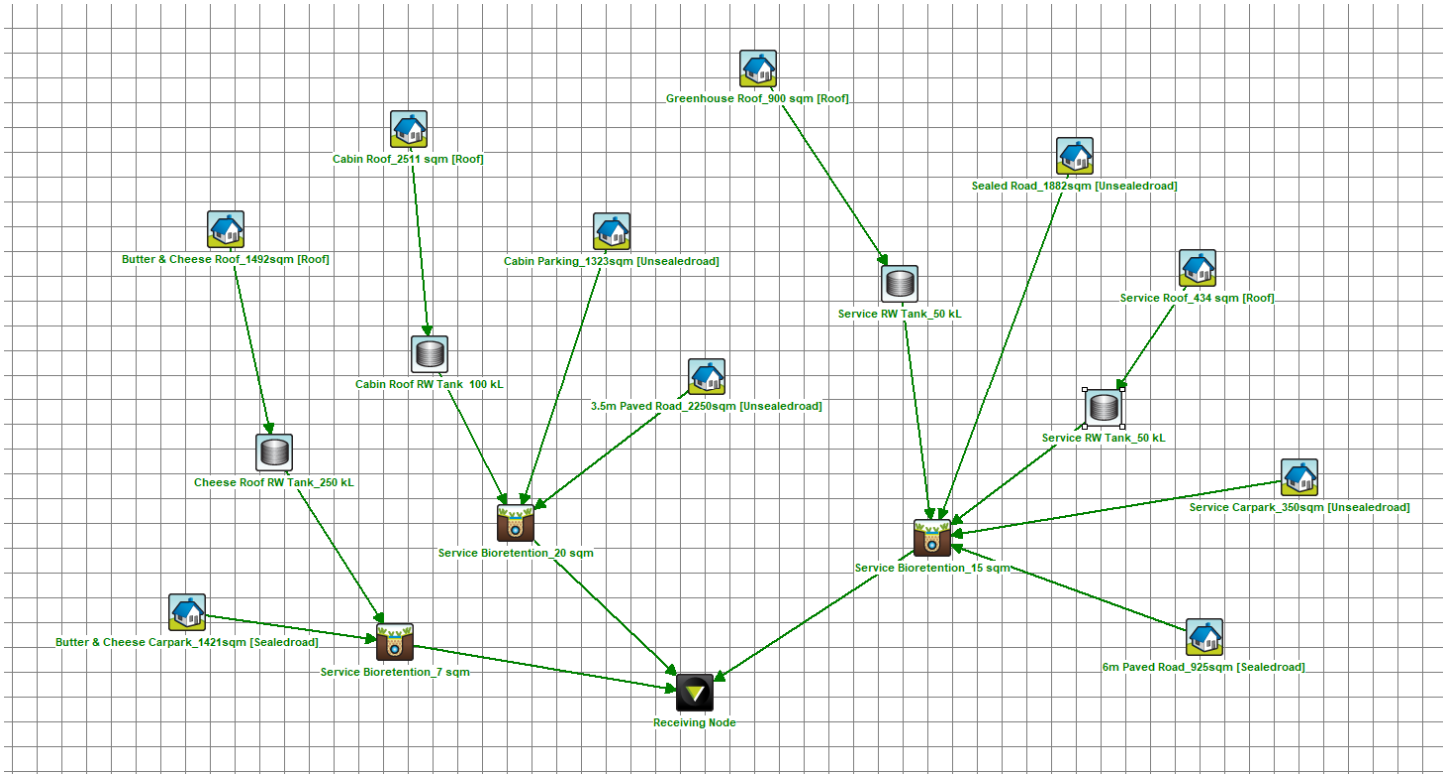

Figure 6 – MUSIC Model Layout

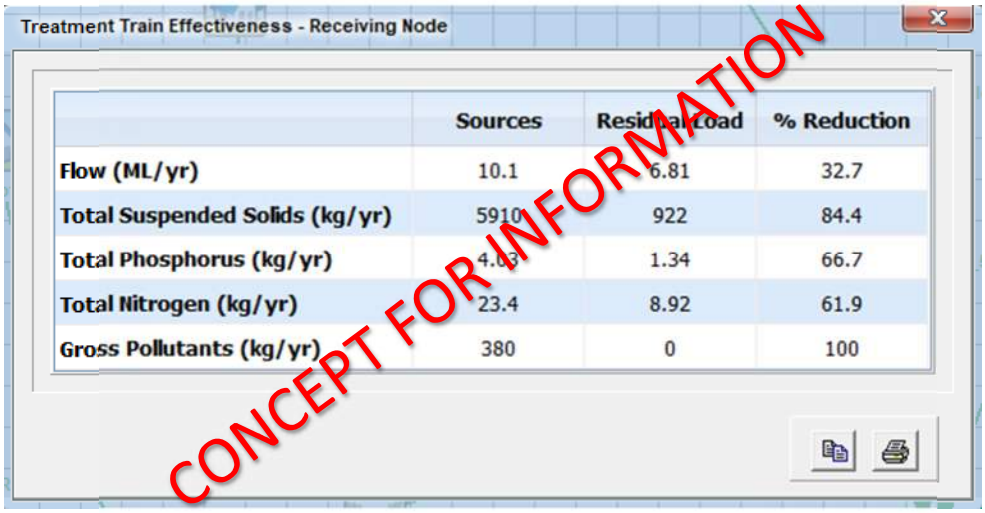

Figure 7 – MUSIC Model Results

Our preliminary modelling indicates that the proposed strategy can meet or exceed the minimum water quality objectives identified in Table 2.

7. APPENDIX 1 - STORMWATER CONCEPT PLAN

REF #	MP-300 PLAN NOTES
1 /300	'Villa' Accommodation (Groups of two)
2 /300	'Lodge' Accommodation
3 /300	'Cabin' Accommodation (Groups of 4)
4 /300	'The Potting Shed' General Storage and Market Garden Shed
5 /300	Main Car park
6 /300	Overflow and Events Parking
7 /300	Main Entry for accommodation
8 /300	Secondary entry for overflow parking
9 /300	Restaurant Garden
10 /300	Mixed Fruit Orchard
11 /300	Truffle Grove – mixed host species
12 /300	Existing billabong re-vegetated
13 /300	Vineyard
14 /300	Existing drainage channel re-vegetated
15 /300	Publicly accessible parkland and sculpture walk
16 /300	Irrigation Dam
17 /300	Bridge
18 /300	Wastewater Storage Dam

TANKS OVERFLOW TO FARM DAM

SWALE ALONG LOW SIDE OF ROAD AND CARPARK AREA WITH RAINGARDEN AT LOW END

EARTHWORKS TO BRING TOP OF BANK TOWARDS THE SOUTH ON BOTH SIDES OF CHANNEL (OR RELOCATE ROAD FURTHER NORTH)

CUTOFF/SWALE DRAIN TO REDIRECT MINOR SURFACE FLOWS AROUND WASTEWATER DRAINFIELD.

SWALE ALONG LOW SIDE OF ROAD AND CARPARK AREA WITH RAINGARDEN AT LOW END

SWALE AND RAINGARDEN FOR SERVICE AND FOOD AREA

SECTION 3

SECTION 2

SECTION 1

SWALE SYSTEM IN FRONT OF CABIN PATHS

SWALE ALONG LOW SIDE OF ROAD AND CARPARK AREA WITH RAINGARDEN AT LOW END

EXISTING TOP OF BANK LINE TO BE PRESERVED. THIS CHANNEL FROM THE ROAD MUST REMAIN CONNECTED THROUGH.

UNDERGROUND DRAINAGE NETWORK TO RAINGARDEN AT LOW POINT/OUTFALL TO RIVER.

CULVERT FROM UPSTREAM CATCHMENT

DRAFT FOR DISCUSSION ONLY

CJ ARMS

KONGWAK STORMWATER TREATMENT STRATEGY MARKUP

1/06/2023

REV	DESCRIPTION	BY	DATE	REV	DESCRIPTION	BY	DATE

PWLA
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DAMIEN BACKHOLER & GEMMA COSGRIFF
1486-1488 KORUMBURRA-WONTHAGGI ROAD
KONGWAK VIC 3951

PROJECT
KONGWAK BUTTER & CHEESE
1486-1488 KORUMBURRA-WONTHAGGI ROAD
KONGWAK VIC 3951

TITLE
OVERALL LANDSCAPE MASTERPLAN

CREATED 31.05.23
SCALE @ A1 1:1,000
NORTH
STATUS PRELIMINARY
DRAWN PW
JOB No. 2210
DRAWING No. MP-300
REV