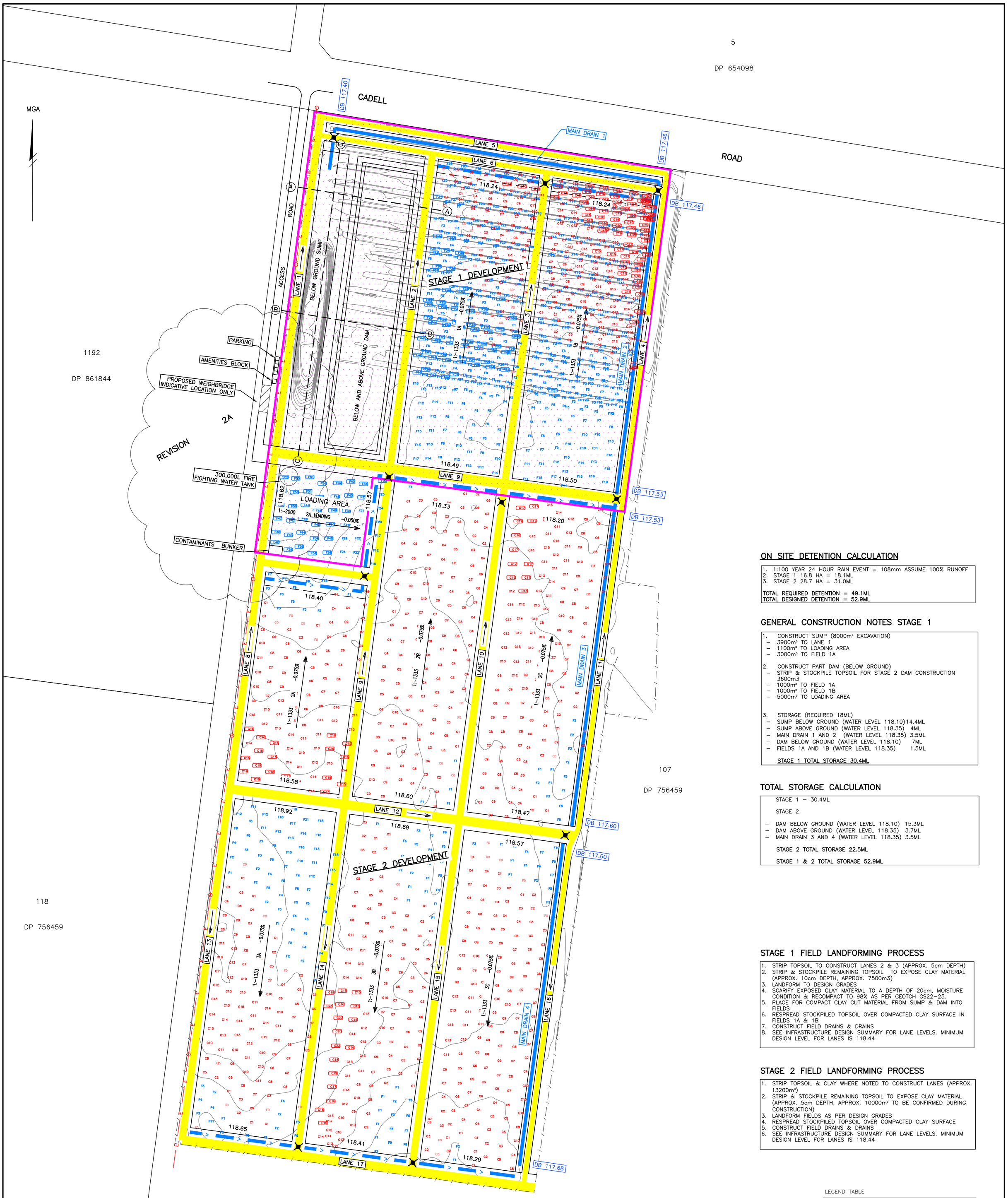
Appendix 1 – Development Plans



ON SITE DETENTION CALCULATION

1. 1:100 YEAR 24 HOUR RAIN EVENT = 108mm ASSUME 100% RUNOFF
2. STAGE 1 16.8 HA = 18.1ML
3. STAGE 2 28.7 HA = 31.0ML

TOTAL REQUIRED DETENTION = 49.1ML
TOTAL DESIGNED DETENTION = 52.9ML

GENERAL CONSTRUCTION NOTES STAGE 1

1. CONSTRUCT SUMP (8000m³ EXCAVATION)
   - 3900m³ TO LANE 1
   - 1100m³ TO LOADING AREA
   - 3000m³ TO FIELD 1A
2. CONSTRUCT PART DAM (BELOW GROUND)
   - STRIP & STOCKPILE TOPSOIL FOR STAGE 2 DAM CONSTRUCTION 3600m3
   - 1000m³ TO FIELD 1A
   - 1000m³ TO FIELD 1B
   - 5000m³ TO LOADING AREA
3. STORAGE (REQUIRED 18ML)
   - SUMP BELOW GROUND (WATER LEVEL 118.10) 14.4ML
   - SUMP ABOVE GROUND (WATER LEVEL 118.35) 4ML
   - MAIN DRAIN 1 AND 2 (WATER LEVEL 118.35) 3.5ML
   - DAM BELOW GROUND (WATER LEVEL 118.10) 7ML
   - FIELDS 1A AND 1B (WATER LEVEL 118.35) 1.5ML

   STAGE 1 TOTAL STORAGE 30.4ML

TOTAL STORAGE CALCULATION

STAGE 1 – 30.4ML

STAGE 2

- DAM BELOW GROUND (WATER LEVEL 118.10) 15.3ML
- DAM ABOVE GROUND (WATER LEVEL 118.35) 3.7ML
- MAIN DRAIN 3 AND 4 (WATER LEVEL 118.35) 3.5ML

STAGE 2 TOTAL STORAGE 22.5ML

STAGE 1 & 2 TOTAL STORAGE 52.9ML

STAGE 1 FIELD LANDFORMING PROCESS

1. STRIP TOPSOIL TO CONSTRUCT LANES 2 & 3 (APPROX. 5cm DEPTH)
2. STRIP & STOCKPILE REMAINING TOPSOIL TO EXPOSE CLAY MATERIAL (APPROX. 10cm DEPTH, APPROX. 7500m3)
3. LANDFORM TO DESIGN GRADES
4. SCARIFY EXPOSED CLAY MATERIAL TO A DEPTH OF 20cm, MOISTURE CONDITION & RECOMPACT TO 98% AS PER GEOTCH GS22–25.
5. PLACE FOR COMPACT CLAY CUT MATERIAL FROM SUMP & DAM INTO FIELDS
6. RESPREAD STOCKPILED TOPSOIL OVER COMPACTED CLAY SURFACE IN FIELDS 1A & 1B
7. CONSTRUCT FIELD DRAINS & DRAINS
8. SEE INFRASTRUCTURE DESIGN SUMMARY FOR LANE LEVELS. MINIMUM DESIGN LEVEL FOR LANES IS 118.44

STAGE 2 FIELD LANDFORMING PROCESS

1. STRIP TOPSOIL & CLAY WHERE NOTED TO CONSTRUCT LANES (APPROX. 13200m³)
2. STRIP & STOCKPILE REMAINING TOPSOIL TO EXPOSE CLAY MATERIAL (APPROX. 5cm DEPTH, APPROX. 10000m³ TO BE CONFIRMED DURING CONSTRUCTION)
3. LANDFORM FIELDS AS PER DESIGN GRADES
4. RESPREAD STOCKPILED TOPSOIL OVER COMPACTED CLAY SURFACE
5. CONSTRUCT FIELD DRAINS & DRAINS
6. SEE INFRASTRUCTURE DESIGN SUMMARY FOR LANE LEVELS. MINIMUM DESIGN LEVEL FOR LANES IS 118.44

LEGEND TABLE

DB 117.60	DESIGN DRAIN BED LEVEL
⊙	ELECTRICAL POLE
✕	CULVERT
F9 C9	CUT/FILL < 15cm
F21 C16	CUT/FILL > 15cm
	MAIN DRAIN
	FIELD DRAIN
	LANE/HIGH GROUND
E	OVERHEAD ELECTRICITY
/	EXISTING FENCE LINE
	COMPOST WINDROW CENTRELINE
	STAGE 1 DEVELOPMENT AREA

Bay Table

Bay	Ha	Acre	Cut(m3)	Cut/Ha	C/F ratio	Slope 1:	Slope %	Cross %	Haul	Spread	Topsoil (cut)
1A	3.88	9.58	371	95.61	1.15	1:-1333	-0.075	0.000	40	4000.0	0.0
1B	3.84	9.48	1777	463.07	1.15	1:-1333	-0.075	0.000	95	1000.0	320.0
2A_LOADING	1.14	2.82	0	0.00	1.15	1:-2000	-0.050	0.000	0	5000.0	0.0
Totals	8.85Ha	21.88A	2147m3	Cut/Ha Av=243m3						Spread Tot=10000m3	TS Cut Tot=320m3

Bay Table

Bay	Ha	Acre	Cut(m3)	Cut/Ha	C/F ratio	Slope 1:	Slope %	Cross %	Haul	Borrow	Topsoil (cut)
2A	2.68	6.62	2185	815.74	1.15	1:-1333	-0.075	0.000	163	-2000.0	0.0
2B	4.05	10.00	2016	498.24	1.15	1:-1333	-0.075	0.000	82	-2000.0	0.0
2C	4.05	10.00	3115	769.67	1.15	1:-1333	-0.075	0.000	245	-3000.0	320.0
Totals	10.77Ha	26.62A	7317m3	Cut/Ha Av=679m3					Haul Dist Av=180m	Borrow Tot=-7000m3	TS Cut Tot=320m3

Bay Table

Bay	Ha	Acre	Cut(m3)	Cut/Ha	C/F ratio	Slope 1:	Slope %	Cross %	Haul	Borrow	Topsoil (cut)
3A	4.22	10.42	1636	387.94	1.15	1:-1333	-0.075	0.000	207	0.0	0.0
3B	4.22	10.42	2707	641.87	1.15	1:-1333	-0.075	0.000	241	-2300.0	320.0
3C	3.96	9.79	2189	552.66	1.15	1:-1333	-0.075	0.000	214	-2000.0	0.0
Totals	12.40Ha	30.63A	6532m3	Cut/Ha Av=527m3					Haul Dist Av=220m	Borrow Tot=-4300m3	TS Cut Tot=320m3

DATE	No.	ISSUE	AUTHORISED
31/07/2023	3A	ELECTRICITY LINE ADDED	GP
19/07/2023	2A	INFRASTRUCTURE ADDED	GP
03/04/2023	1A	ISSUED TO CLIENT	GP

DRAWN: RS CHECKED: GP

COMMENTS:

SURVEY PROVIDED BY "FARM DESIGN SERVICE"
HORIZONTAL DATUM ASSUMED
VERTICAL DATUM ASSUMED
NO SURVEY UNDERTAKEN TO DEFINE BOUNDARIES

COMPUTER FILES: 14032F23.dwg

POLKINGHORNE HARRISON LONGHURST
115 Yambil Street, Griffith NSW 2680 P (02) 6964 3192
13 Gibraltar Street, Bungendore NSW 2621 P (02) 6238 0144
www.phlsurveyors.com.au

CLIENT: KILLORAN AG

TITLE: FARM 2006 CADELL ROAD COLEAMBALLY
PROPOSED LANDFORM DESIGNS FOR
COMPOSTING FACILITY
LANDFORM DESIGNS

DATE: 28/06/2023
FILE: PN14032
SCALE: 1:2000
A1 – 525340_3A
SHEET 1 OF 5

ORIGINAL A1 SHEET LIABILITY LIMITED BY A SCHEME APPROVED UNDER PROFESSIONAL STANDARDS LEGISLATION
0 100mm 200mm

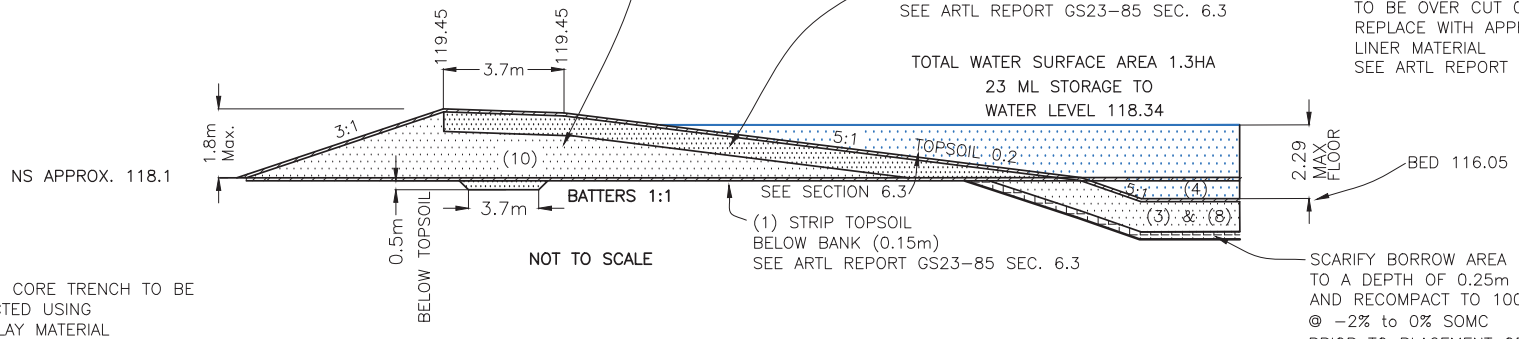
ORIGINAL A3 SHEET LIABILITY LIMITED BY A SCHEME UNDER PROFESSIONAL STANDARDS LEGISLATION
100mm
0

(11) ENTIRE INSIDE & OUTSIDE FILL BATTERS
TO HAVE 0.2m TOPSOIL PROTECTIVE LAYER
COMPACTED TO 95% AT −2% TO 0% SOMC
SEE ARTL REPORT GS23−85 SEC. 6.3

95% TO 100% DEPENDING
ON MATERIAL USED.
SEE ARTL REPORT GS23−85 SEC. 6.3

(9) INSIDE BATTER COMPACTED
TO 100% AT −2% TO 0% SOMC
SEE ARTL REPORT GS23−85 SEC. 6.3

(3) ENTIRE INSIDE CUT AREA
TO BE OVER CUT 0.6m &
REPLACE WITH APPROVED CLAY
LINER MATERIAL
SEE ARTL REPORT GS23−85 SEC. 6.3



(2) & (7) CORE TRENCH TO BE
CONSTRUCTED USING
SELECT CLAY MATERIAL
IF REQUIRED.
CONFIRM WITH GEOTECHNICAL
ENGINEER AT TIME OF
CONSTRUCTION

EARTHWORK VOLUME

		VOLUME SOLID (m^3)	VOLUME GROUND (m^3)
1	Cut topsoil 0.15m deep over dam footprint & stockpile for later use		3600
2	Cut Core below Topsoil. Confirm with Geotechnical Engineer if required		1700
3	Overcut Dam Floor (0.6m)		7800
4	Borrow Area Inside Dam		20100
5	Total Cut (excluding core trench)		31500
6	Fill (Topsoil below bank) (1)	1600	1840
7	Fill Core trench (2) (if required)	1700	1955
8	Fill Overcut Floor (3)	7800	8970
9	Fill Main Bank (Clay @ 100%)	6500	7475
10	Fill Main Bank (Clay @ 95% to 100%)	2000	2300
11	Replace topsoil over bank		3600
12	Total Fill (excluding core trench)		24185
13	Excess cut to fields 1A, 1B & loading area		7315

EMBANKMENT DETAILS

NOTES:

DAM IS TO BE CONSTUCTED IN ACCORDANCE WITH GEOTECHNICAL REPORT PREPARED BY "Aitken Rowe Testing" REPORT No GS23−85 DATE. 08/06/2023

NOTE:
VOLUMES ARE CALCULATED USING THE FOLLOWING COMPACTION FACTORS:
SOLID TO BANK = 1.15
THESE VALUES ARE APPROXIMATE AND ARE TO BE USED ONLY AS A GUIDE.

DATE	NO	REVISION	AUTH
13/07/2023	1A	ISSUED FOR CLIENT	GP

COMMENTS:

DATUM ORIGIN RL
COORD.SYSTEM ORIGIN

phl surveyors
115 Yambil Street, Griffith NSW
13 Gibraltar Street, Bungendore NSW
www.phlsurveyors.com.au

CLIENT: KILLORAN AG
TITLE: FARM 2006 CADELL ROAD
COLEAMBALLY
PROPOSED STORAGE FACILITY

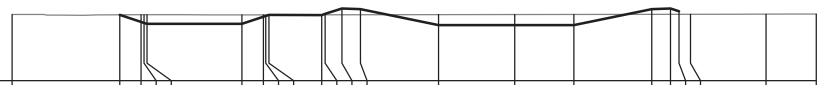
SCALE: NOT TO SCALE

FILE: PN14032	A3− 549229_1A
ACAD:14032_DAM 2023	CCAD:
DRN: RS	CHK: GP

SHEET 2 OF 4 SHEETS

ORIGINAL A3 SHEET LIABILITY LIMITED BY A SCHEME UNDER PROFESSIONAL STANDARDS LEGISLATION

100mm 0

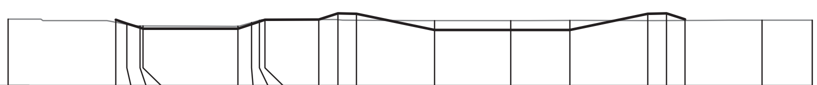


Datum 105.000m

Chainage	Cut/Fill	Design	Existing Surface
0.00			118.16
21.44	−0.02	118.09	118.11
25.66	−1.43	116.69	118.12
26.24	−1.62	116.50	118.12
26.85	−1.82	116.30	118.12
45.72	−1.79	116.30	118.09
50.00	−0.36	117.73	118.09
50.46	−0.21	117.88	118.09
51.12	0.00	118.09	118.09
61.61	−0.03	118.06	118.09
62.29	0.19	118.28	118.09
65.63	1.25	119.35	118.10
69.33	1.14	119.25	118.11
84.83	−2.11	116.05	118.16
100.00	−2.12	116.05	118.17
111.78	−2.11	116.05	118.16
127.28	1.06	119.25	118.19
130.98	1.16	119.35	118.19
132.70			118.20
134.97			118.20
150.00			118.24
160.00			118.26

SCALE HORIZONTAL 1:1000 VERTICAL 1:1000

SECTION A – A



Datum 105.000m

Chainage	Cut/Fill	Design	Existing Surface
0.00			118.22
21.44	0.48	118.07	117.59
23.63	0.16	117.34	117.18
26.24	−0.35	116.50	116.85
26.84	−0.55	116.30	116.85
45.72	−0.51	116.30	116.81
48.44	−0.32	117.21	117.52
50.00	−0.25	117.71	117.96
51.12	−0.02	118.07	118.09
61.84	−0.00	118.14	118.14
65.63	1.25	119.35	118.10
69.33	1.25	119.25	118.00
84.83	−1.87	116.05	117.92
100.00	−1.87	116.05	117.92
111.78	−1.89	116.05	117.94
127.28	1.35	119.25	117.90
130.98	1.44	119.35	117.91
134.66	0.24	118.17	117.93
150.00			118.01
160.00			118.01

SCALE HORIZONTAL 1:1000 VERTICAL 1:1000

SECTION B – B

DATE	NO	REVISION	AUTH
13/07/2023	1A	ISSUED FOR CLIENT	GP

COMMENTS:

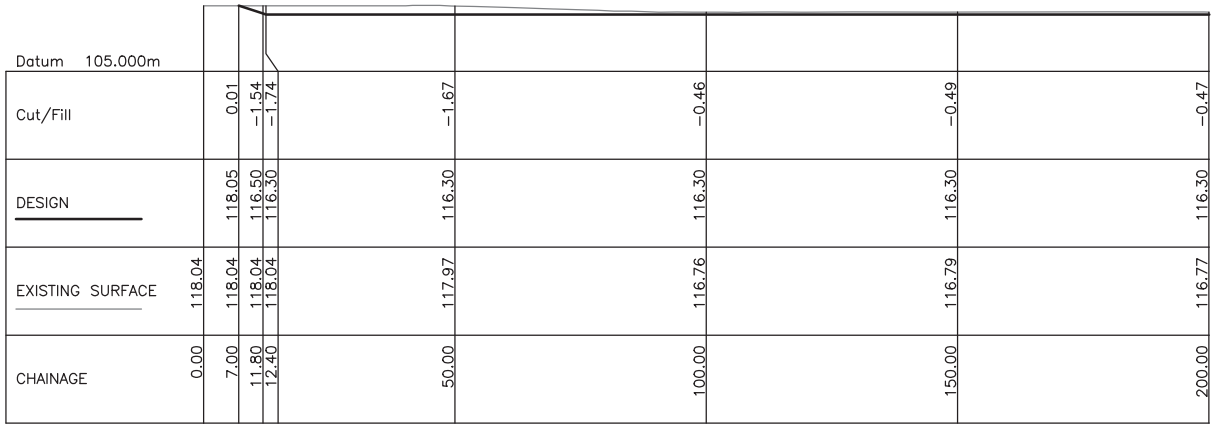
DATUM ORIGIN RL
COORD.SYSTEM ORIGIN

phl surveyors
115 Yambil Street, Griffith NSW
13 Gibraltar Street, Bungendore NSW
www.phlsurveyors.com.au

CLIENT: KILLORAN AG
TITLE: FARM 2006 CADELL ROAD COLEAMBALLY PROPOSED SUMP & STORAGE FACILITIY

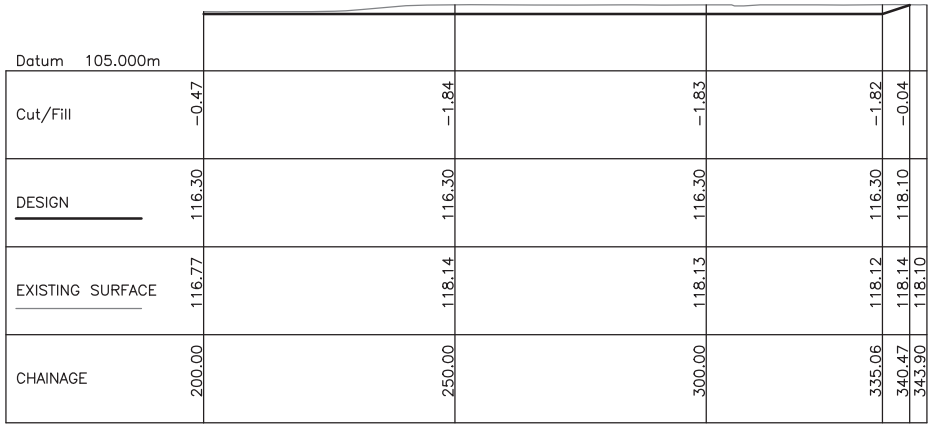
SCALE:
FILE: PN14032 | A3– 549230_1A
ACAD:14032_DAM 2023 | CCAD:
DRN: RS | CHK: GP
SHEET 3 OF 4 SHEETS

ORIGINAL A3 SHEET LIABILITY LIMITED BY A SCHEME UNDER PROFESSIONAL STANDARDS LEGISLATION
100mm
0



SCALE HORIZONTAL 1:1000 VERTICAL 1:1000

SECTION C – C



SCALE HORIZONTAL 1:1000 VERTICAL 1:1000

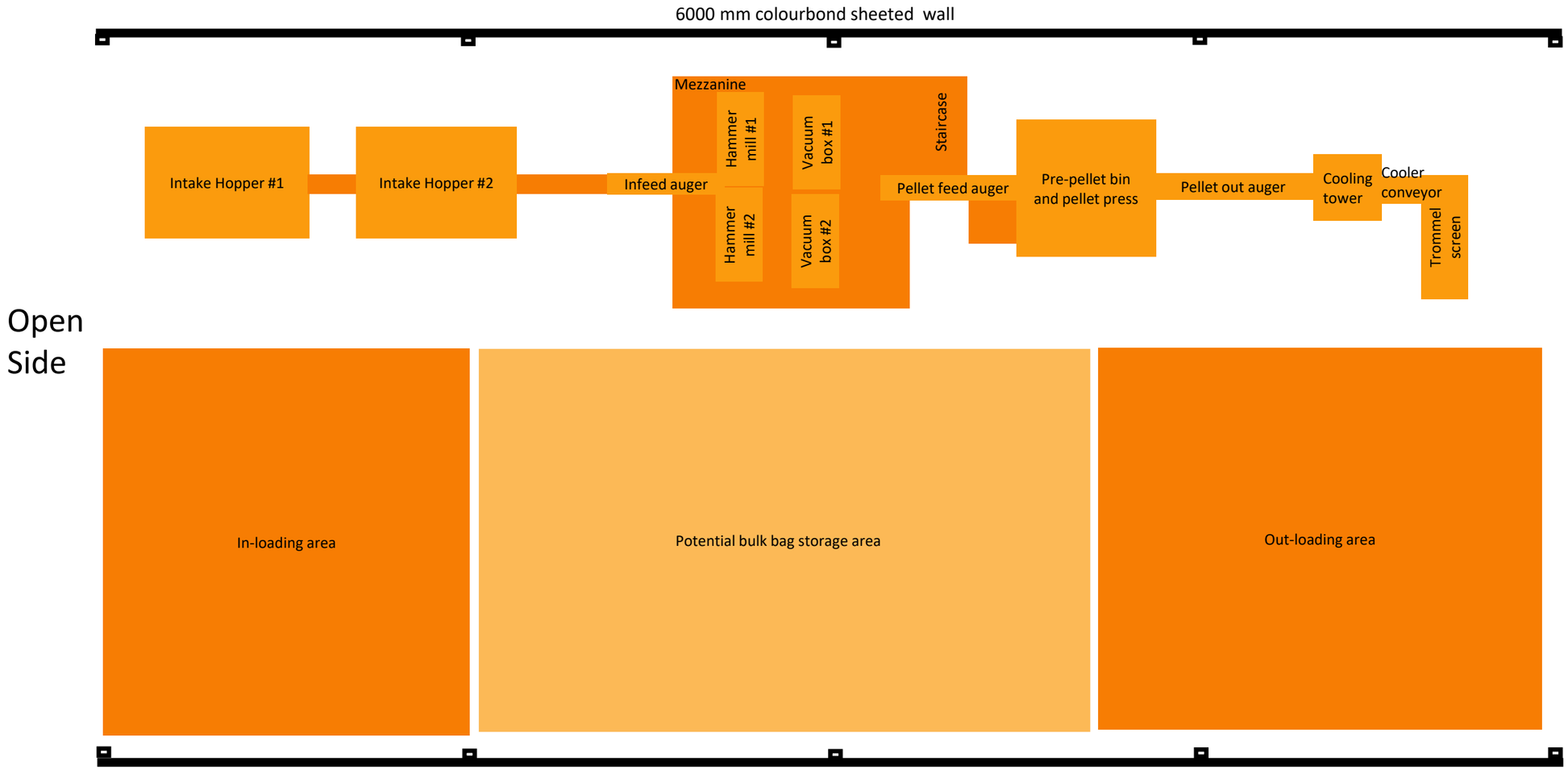
SECTION C – C

				COMMENTS:	
13/07/2023	1A	ISSUED FOR CLIENT	GP	DATUM ORIGIN	RL
DATE	NO	REVISION	AUTH	COORD.SYSTEM ORIGIN	

phl surveyors
115 Yambil Street, Griffith NSW
13 Gibraltar Street, Bungendore NSW
www.phlsurveyors.com.au

CLIENT: **KILLORAN AG**
TITLE: **FARM 2006 CADELL ROAD COLEAMBALLY PROPOSED SUMP**

SCALE: NOT TO SCALE	
FILE: PN14032	A3– 549231_1A
ACAD:14032_DAM 2023	CCAD:
DRN: RS	CHK: GP
SHEET 4 OF 4 SHEETS	



Pelletising Shed Floor Plan

Scale – 1:250 @ A3

Killoran Ag Pty Ltd

Cadell Road, Gala Vale

KILLORAN AG – COMPOSTING FACILITY – OVERALL SITE PLAN

SKM Planning

Appendix 2 – Geotechnical Reports

Aitken Rowe
GEOTECHNICAL ENGINEERING

GEOTECHNICAL INVESTIGATION

PROPOSED WATER STORAGE DAM AND SUMP
LOT 1 No. 1578 CADELL ROAD, GALA VALE, NSW

KILLORAN AG PTY LTD
ATF FOR KILLORAN AGRICULTURE FAMILY TRUST
COLEAMBALLY, NSW

GS23-85
8 JUNE 2023

AITKEN ROWE TESTING LABORATORIES PTY LTD

Head Office: 4/2 Riedell Street (Po Box 5158), Wagga Wagga, NSW, 2650 P: (02) 69395555 Email: admin@artl.com.au
17b Battista Street, Griffith, NSW, 2680 P: (02) 69645551 | 1/60 Boronia Street, Albury, NSW, 2640 P: (02) 60401661

Aitken Rowe
GEOTECHNICAL ENGINEERING

Geotechnical Engineering
Environmental Consultancy
Soil Concrete Aggregate Testing
NATA Accredited Laboratories

ABN 53 058 315 138 ACN 058 315 138

8 June 2023 Reg. No.: GS23-85

Killoran Ag Pty Ltd
ATF for Killoran Agriculture Family Trust
"Thule" Farm 566, Bridge Road
Coleambally, NSW 2707

Attention: Mr. Alastair MacDonald

Dear Sir,

GEOTECHNICAL INVESTIGATION REPORT – PROPOSED WATER STORGAE DAM AND SUMP, LOT 1, No. 1578 CADELL ROAD, GALA VALE, NSW

We have completed the above geotechnical report and forwarded to you for your perusal and use.

Should you have any queries, please contact us.

Yours truly,

Jarrod Gornall
Senior Geotechnical Engineer

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

This report presents the findings of a geotechnical investigation undertaken across the subject site of the proposed water storage dam and sump at Lot 107, No. 1578 Cadell Road, Gala Vale, NSW. Based upon the information obtained, comments and recommendations for the suitability of the construction of the proposed water storage dam and sump are presented in the report. This executive summary is provided as a brief overview and is not intended for the replacement of the more detailed findings in the report.

- TP1 and TP2 represent the proposed sump with a design cut depth of 1.6m below the existing surface level at the subject site.

- TP3 to TP6 represent the proposed water storage dam with a design cut depth of 1.8m below the existing surface level at the subject site.

- The test pit investigation revealed that the subsurface soil profile across the proposed water storage dam and sump site generally consisted of topsoil to 0.1m to 0.15m overlying natural alluvial material comprising silt-based and clay-based material, extending to the test pit termination depths of 3.5m.

- The dispersion (Emerson Class) tests carried out on samples recovered from the test pits excavated across the proposed water storage dam and sump sites showed “Emerson Class 2 to 4” and therefore considered generally “potentially highly to slightly dispersive”.

- Based on the subsurface type and condition encountered in the test pits excavated and assuming a similar soil profile across the site of the proposed water storage dam and sump, the proposed water storage dam and sump can be built at the subject site provided some treatment of the material with strict compaction control at the floor and sides of the dam are undertaken.

- The placement of clay liner or plastic liner may be required at the nominated excavation depth as low plasticity silt-based material, low plasticity silty sandy clay material and medium plasticity silty clay material may be encountered at the nominated excavation depth and sides of the excavation.

- It is highly recommended the regular routine inspection and maintenance of the embankment throughout its life as it is vital for the stability and long-term performance of the dam and sump. The routine inspection and maintenance may include the immediate repairing and reshaping of the batters once any signs of erosion, shrinkage and tension cracks are evident, irrigation of batter faces when batter faces become dry to maintain vegetation growth and or re-sowing vegetation as required in order to prevent further deterioration of the embankment in resulting complete embankment failures.

2.0 INTRODUCTION

Further to your request in response to our quotation, Q23-104 dated 2 March 2023, we have carried out the geotechnical field investigation for the proposed water storage dam and sump at the subject site in Gala Vale, NSW. The purpose of the investigation was to determine the nature of the subsurface soils and groundwater conditions by excavating test pits, sampling and testing across the proposed sites. Based upon the information obtained, comments and recommendations for the suitability of the construction of the proposed water storage dam are to be made.

3.0 SITE DESCRIPTION

The proposed water storage dam and sump site is located at DP 756459, Lot 107, No. 1578 Cadell Road, Gala Vale, NSW, approximately 17.5km south-west of the town centre of Coleambally as shown in the attached locality plan presented in Appendix A.

The proposed water storage dam and sump site is located on the southern side of Cadell Road, at the north-west corner of the lot (refer to attached site locality and borehole location plans). The subject site is noted to be generally flat and covered with vegetation including grasses as noted at the time of the investigation. It should be noted an existing borrow pit previously excavated contained water as noted at the time of the investigation which is to form the proposed sump. It should also be noted that the test pits at the proposed sump area (TP1 & TP2) were excavated directly west of the borrow pit from the existing surface level.

4.0 INVESTIGATION PROCEDURE

4.1 Fieldwork

The fieldwork for the test pit investigation was carried out on 13 April 2023 by our experienced Senior Geotechnician of Aitken Rowe Testing Laboratories Pty Ltd from Griffith, NSW who nominated the sampling and prepared engineering logs of the test pits.

The fieldwork for the investigation consisted of the logging and sampling of two (2) test pits (TP1 & TP2) across the proposed sump and four (4) test pits (TP3 to TP6) across the proposed water storage dam at the subject site at the locations as shown in the attached test pit location plan presented in Appendix B.

The test pits were excavated with a client supplied excavator to the depths of 3.5m at the locations as shown in the attached test pit location plan presented in Appendix B. Small and Bulk samples were recovered at various depths from the test pits for relevant laboratory testing.

The detailed test pit logs with explanatory note are presented in Appendix C.

4.2 Laboratory Testing

To confirm and evaluate the results of the fieldwork, laboratory tests were carried out on the representative samples of the subsoil obtained from the test pits. The relevant laboratory testing included Particle Size Distribution (PSD) test (including hydrometer test), Atterberg Limit test, Field Moisture Content (FMC) determination test, Standard Maximum Dry Density (SMDD) test, permeability test and dispersion (Emerson Class) test on the recovered samples, which were undertaken at our NATA accredited testing laboratory in Griffith and Wagga Wagga, NSW.

The samples for permeability tests were compacted at 95%, 98% and 100% of SMDD and at nearest 100% of Standard Optimum Moisture Content (SOMC). The laboratory test reports for Particle Size Distribution, Atterberg Limit, FMC, SMDD, SOMC, permeability and dispersion tests are herewith attached. The test results for FMC and SOMC are incorporated in the respective test pit logs presented in Appendix C.

The laboratory test reports are presented in Appendix D.

5.0 SUBSURFACE CONDITION

5.1 Proposed Sump

TP1 and TP2 represent the proposed sump. The test pit investigation revealed that the subsurface soil profile across the proposed sump site generally consisted of topsoil to 0.1m overlying natural alluvial material comprising low plasticity clayey silt and sandy silty clay, medium plasticity clay and silty clay and high plasticity clay, extending to the test pit termination depths of 3.5m in TP1 and TP2 (refer to attached test pit logs).

The moisture condition of the underlying alluvial silt-based and natural clay-based material was generally less than plastic limit in the upper and middle profile and greater than plastic limit in the lower clay-based profile within the investigation depth in TP1 and generally greater than plastic limit throughout the tested clay-based and silt-based profile within the investigation depth in TP2 at the time of the investigation. No groundwater or seepage was encountered during the course of the investigation within the test pits excavated at the time of the investigation. However, it should be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

The test pits were logged in accordance with “AS1726-2017 – Geotechnical site investigations”. The details of subsurface profile should be referred to the attached test pit logs with explanatory note presented in Appendix C.

5.2 Proposed Water Storage Dam

TP3 to TP6 represent the proposed water storage dam. The test pit investigation revealed that the subsurface soil profile across the proposed water storage dam site generally consisted of topsoil to 0.1m to 0.15m overlying natural alluvial material comprising low plasticity clayey silt and sandy silt, low to medium plasticity sandy silty clay, medium plasticity silty clay, sandy clay, medium to high plasticity clay and high plasticity clay, extending to the test pit termination depths of 3.5m in TP3 to TP6 (refer to attached test pit logs).

The moisture condition of the underlying alluvial silt-based and natural clay-based material was generally ranging from less than plastic limit to greater than plastic limit within the investigation depth in TP3 to TP6 at the time of the investigation. No groundwater or seepage was encountered during the course of the investigation within the test pits excavated at the time of the investigation. However, it should be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

The test pits were logged in accordance with "AS1726-2017 – Geotechnical site investigations". The details of subsurface profile should be referred to the attached test pit logs with explanatory note presented in Appendix C.

6.0 DISCUSSION & COMMENT

6.1 Soil Properties

The laboratory tests carried out on the underlying silt-based material recovered from TP4 and TP6 indicated that the material generally contains 0% gravel, 13% to 34% sand, 45% to 58% silt and 19% to 33% clay content with Liquid Limit (LL) ranging from 30% to 42% and Plasticity Index (PI) ranging from 13% to 27% on the samples tested. The material is generally classified as "ML – Clayey SILT; low plasticity, with fine to coarse sand" and "ML – Sandy SILT; low plasticity, fine to coarse sand" in accordance with "AS1726 - 2017 Geotechnical Site Investigations".

The permeability test carried out on the selected silt-based material recovered from TP4 and TP6 indicate the permeability of $1x10^{-9}$ m/sec on low plasticity clayey silt material which was compacted at 98% of SMDD at nearest 100% of SOMC and $9x10^{-10}$ m/sec on low plasticity sandy silt material which was compacted at 100% of SMDD at nearest 100% of SOMC. The dispersion (Emerson Class) test carried out on the same silt-based sample from TP4 & TP6 showed "Emerson Class 3 and 4" and therefore considered generally "potentially slightly dispersive".

The laboratory tests carried out on the underlying clay-based material recovered from TP3 and TP5 indicated that the material generally contains 0% gravel, 24% to 25% sand, 29% to 32% silt and 44% to 45% clay content with Liquid Limit (LL) ranging from 40% to 46% and Plasticity Index (PI) ranging from 26% to 32% on the samples tested. The material is generally classified as "CI – Silty CLAY;

medium plasticity, with fine to coarse sand" in accordance with "AS1726 -2017 Geotechnical Site Investigations".

The permeability test carried out on the selected clay-based material recovered from TP3 indicate the permeability of $4x10^{-9}$ m/sec on medium plasticity silty clay material, which was compacted at 95% of SMDD at nearest 100% of SOMC. The dispersion (Emerson Class) test carried out on the same clay-based samples from TP3 and TP5 showed "Emerson Class 2 and 3" and therefore considered generally "potentially highly to slightly dispersive".

6.2 Proposed Water Storage Dam and Sump Excavation & Preparation

It is noted that the excavation for the proposed water storage dam at the subject site is approximately 1.8m and the proposed sump is 1.6m below the existing site surface level. Based on the subsurface type and condition encountered in the test pits excavated and **assuming a similar soil profile across the site of the proposed water storage dam and sump,** the proposed water storage dam and sump can be built at the subject site **provided some treatment of the material with strict compaction control at the floor and sides of the water storge dam and sump are undertaken.**

Citing the occurrence of alluvial silt-based and clay-based material throughout the investigation depth in the test pits excavated at the proposed water storage dam and sump locations at the subject site, the excavation depth may be taken to the proposed design depth of 1.8m (water storage dam) and 1.6m (sump) below the existing surface level. It is anticipated that the excavation would be within mainly silt-based and clay-based material materials. It is therefore assessed that all the required earthworks should be capable of being performed by conventional earthmoving plant such as scrapers, dozers, rollers and backhoes or excavators.

It should be noted that the placement of clay liner or plastic liner may be required at the nominated excavation depth as low plasticity silt-based and clay-based material may be encountered throughout the excavation depth (refer to attached test pit logs).

The maximum batters of 1H: 1V are recommended for the excavation within the silt-based and clay-based materials. After the excavation to the nominated depth, it would generally expose a subgrade comprising low plasticity silt-based or medium plasticity silty clay material at the proposed floor and sides of the proposed water storage dam and sump, which are assessed to be "potentially highly to slightly dispersive".

Therefore, it is highly recommended that the silt-based and clay-based material at the bottom and sides of the proposed dam be scarified to a depth of at least 250mm and re-compacted in such a way that it achieves at least 100% of Standard Maximum Dry Density (SMDD) at -2 to 0% Standard Optimum Moisture Content (SOMC) in a 150mm thick compacted layer prior to the placement of clay liner or plastic liner.

It is highly recommended to remove the low plasticity silt-based and clay-based material where exposed on the sides and floor of the excavation to a minimum depth of 0.6m as required. Approved clay liner material shall then be replaced to a minimum thickness of 0.6m perpendicular to the final excavated surface. The careful selection of the material for the clay liner is vital to ensure that there is no gravel incorporated in the liner. It is anticipated that the natural medium plasticity silty clay and medium, medium to high and high plasticity clay material encountered across the site or similar materials may be used for clay liner provided the material is compacted in 150mm layers to the equivalent density of 100% of SMDD at a moisture content within the range of -2 to 0% of SOMC.

The overall performance of the clay liner is influenced by the construction performance of the contractor, degree of compaction and conditioning of the right moisture in the material at the time of construction. The permeability of the clay liner should be less than 1.0×10^{-9} m/sec to have a minimum seepage loss.

The clay liner utilizing the clay-based material as discussed above, shall be placed and compacted as specified below:

- The exposed natural material should be scarified to a depth of about 250mm at both sides and floor of the dam; moisture conditioned to within -2 to 0% of SOMC and compacted to a minimum of 100% of SMDD once excavation is taken to the required depth.
- Any soft or heave areas, if detected during the process, should be excavated down at least 0.5m and backfilled with appropriate approved materials compacted in 150mm thick layers to the minimum equivalent density of 100% of SMDD.
- Any area of exposed subgrade which exhibits shrinkage cracking and does not require recompaction, should be watered and rolled until the shrinkage cracks do not reappear. During this undertaking, care should be exercised to ensure the surface does not become soft.
- Once the exposed surface is treated as specified above, the approved clay liner material shall be placed in horizontal layers, compacted in 150mm thick layers to the equivalent density of 100% of SMDD at a moisture content within the range of -2 to 0% of SOMC. Care shall be taken in the placement of compacted materials to avoid laminations occurring between compacted layers. Compacted surfaces shall not be allowed to dry and crack before placing subsequent layers. If this should occur, then all dried clays shall be stripped off and replaced or alternatively, scarified and conditioned to the recommended moisture condition before placing the next layer. To prevent such laminations from occurring between compacted layers, each subsequent layer shall be compacted and kneaded into the underlying layer using a sheepsfoot roller.
- The batter incorporating with clay liner should not be steeper than 1V:2H (1 Vertical to 2 Horizontal).
- The clay-based materials are likely to crack if they are subject to drying and wetting and to prevent this, they are highly recommended to be covered with about 200mm of

topsoil or sand-based materials. The topsoil is generally non-dispersive and acts as a protective filter zone and it could minimize interaction of water with clay-based materials as part of the dispersive action. An adequate cover of topsoil will also promote grass cover and prevents internal clay-based materials from drying out and cracking during dry circles. The topsoil should be sown with grass, which generally protects the embankment from erosion.

Alternatively, any other type of liner material, such as plastic liner may be used provided it is approved by the relevant authority. If plastic lining is required where sand-based material is encountered, it is recommended to place a minimum 300mm of clay liner below plastic lining. It should be noted that clayey silt material can be used underneath the plastic liner provided it is compacted to a minimum of 100% of SMDD.

6.3 Proposed Water Storage Dam and Sump Embankment Construction

It is anticipated that the new embankments would be built using the excavated borrow medium, medium to high and high plasticity clay-based material. It is anticipated that the maximum height of the embankments above natural surface would be no greater than approximately 3.0m and the maximum fetch would be less than 500m and the total water depth would be maximum 3.8m with 2.0m maximum above natural surface for the proposed water storage dam and maximum 3.6m with 2.0m maximum above natural surface for the proposed sump. Based on these design criteria and using the clay-based material encountered on site or similar, we recommend the followings for the embankment construction;

Based on these design criteria and using the medium, medium to high and high plasticity clay-based material encountered on site, we recommend the followings for the embankment construction:

- All topsoil and fill material, if any, shall be stripped in the foundation area of the embankment. The stripping depth for the topsoil is noted to be about 0.1m to 0.15m (refer to attached test pit logs).
- Proof roll the exposed subgrade to detect any soft or heaving areas.
- Any wet, soft or heave areas, if detected, should be excavated down at least 0.5m and backfilled with appropriate approved excavated materials compacted in 150mm thick layers to the minimum equivalent density of 100% of SMDD at a moisture content within the range of –2% to 0% of SOMC.
- Any area of exposed subgrade, which exhibits shrinkage cracking and does not require recompaction, should be watered and rolled until the shrinkage cracks do not reappear. During this undertaking, care should be exercised to ensure the surface does not become soft.
- Cut-off trench excavation should be extended at least 500mm into the impervious clay material and the side batters of 1V: 1H (one vertical to one horizontal) may be adopted. As clay liner is to be incorporated as per section 6.2 above, a cut-off trench may not be required.

- Once the foundation subgrade is prepared, medium, medium to high and high plasticity clay-based material encountered on site or imported similar clay-based material shall be placed in horizontal layers and compacted in 150mm thickness to the equivalent density of 95 to 100% of SMDD respectively at a moisture content within the range of -2% to 0% of SOMC.
- The compaction of the inside batter of the embankment extending to the top of the outside batter, should be strictly controlled in such a way that it achieves relative compaction of at least 100% of SMDD.
- If the embankment inside batter is to be protected by applying and mixing with hydrated lime or gypsum, then a minimum of 95% of SMDD at OMC between -2% and 0% for the entire embankment may be adopted.
- The compaction of outside batter shall be compacted not less than 95% of SMDD at moisture content within the range of -2% to 0% of SOMC.
- Low plasticity silt-based or clay-based material from the site should be used on the outside batter of the embankment however compacted at 100% of SMDD at moisture content within the range of -2% to 0% of SOMC.
- Sand-based material, if encountered, should not be used for the embankment construction.
- A topsoil layer or less reactive, such as sandy silty clay/clayey sand material and non-dispersive soil layer of at least 200mm thick should be placed on the inside batter, which also serves to reduce surface erosion and prevent cracking. The crest and outside batter should also be protected with a topsoil layer or less reactive and non-dispersive soil layer.
- Care shall be taken in the placement of compacted materials to avoid laminations occurring between compacted layers.
- Embankment using above clay-based material should have a maximum batter of 2.5H: 1V for the upstream (inside batter) and 2.0H: 1V for the downstream (outside batter).
- A minimum crest width of 2.5m is recommended.
- A minimum freeboard of 1.0m is recommended.

The compaction with correct moisture content would also provide structural stability to the embankment and reduces the potential seepage losses due to the tendency of the dispersion of the materials. Care shall be exercised to ensure that the moisture is conditioned accordingly as discussed above.

It would be essential to maintain drainage of the site area during any earthworks to prevent rainfall from adversely affecting the material such that they become unsuitable for direct re-use.

Some settlements may occur from the consolidation of the founding material and therefore the designer is recommended to take appropriate design consideration to maintain the settlement within tolerable limit.

The silt-based and clay-based materials are considered slightly to highly reactive and therefore they are liable to crack if they are subjected to drying and wetting. The dispersion test results showed that the silt-based and clay-based materials are “potentially highly to slightly dispersive”. Similarly, the application of lime into the clay-based materials, if adopted, may develop shrinkage cracks when they are subjected to drying and wetting. Therefore, there is the potential for embankment slope and crest to develop tension cracks. In the long term, these tension cracks will subject to open and close due to drying and wetting cycles, resulting in fretting of the embankment slope and crest and consequently slope stability failure.

It is therefore required to ensure that the inner and outer face of the embankment and crest are given adequate protection. It is therefore recommended that the outer face and crest be covered with topsoil or less reactive materials, such as sandy silty clay/clayey sand material to a minimum thickness of 200mm, measured perpendicular to the slope upon the completion of the embankment. The topsoil is generally non-dispersive and acts as a protective filter zone and it could minimize interaction of water with clay materials as part of the dispersive action. An adequate cover of topsoil will also promote grass cover and prevents internal clay materials from drying out and cracking during dry circles. The topsoil should be sown with grass, which generally protects the embankment from erosion.

When topdressing an embankment, care shall be taken to achieve an even crest and batter finish, free of irregularities and tyre marks etc. Runoff water concentrating in these areas can result in rilling, which can expose the underlying clays and lead to more serious erosion problem. The embankment should be fenced off from stock to prevent grass cover being eaten, and to prevent the formation of deep cattle pads, which promotes scouring. It is also important to carry out regular inspection and maintenance to ensure topsoil cover is maintained. Some form of protection is recommended to prevent surface run-off into the water storage dam and sump.

7.0 COMMENTS & RECOMMENDATIONS

The degree of compaction should be verified by a NATA accredited testing authority to ensure that it achieves required density in the placement of clay-based material and construction of embankments. The failure in undertaking the strict control compaction during the construction would eventually result the collapse of the embankment and consequently face seepage problems.

Verification is also required that the clay-based material is being placed in 150mm thick compacted layers for the embankment and there is no lamination occurring between clay-based layers. Remoulding of the clay-based material is most important during the placement and compaction of clay-based material to ensure a low isotropic permeability.

In designing the water storage dam and sump, the designer should try to minimize the number of pipes through the embankment, as it is difficult to get adequate compaction around the pipes. Backfilling around the pipes is particularly susceptible to piping failure if poorly compacted.

Reinforced concrete cut-off walls at suitable intervals, should be provided around the pipe, and particularly concentrated in the inner face half of the embankment.

The excavations for pipe installations should not be left open for long periods allowing the exposed clays to dry and develop shrinkage cracks. The excavation through the completed embankment creates a point of weakness, which may result in failure. After the pipe is in place, care must be taken to ensure that the excavation trench is backfilled with selected clay-based materials and compacted thoroughly as specified above. Care must also be taken to ensure the required degree of compaction is achieved below the midline of the pipe. This normally involves the use of handheld compaction equipment. As the embankment is to be constructed from a dispersive soil, lime or gypsum stabilisation around the pipe shall be considered.

It is recommended that the clay-based material be compacted using a vibrating sheepsfoot roller or tamping roller. Rubber tyred or steel drum rollers are not recommended, as they tend to create horizontal laminations between layers. Care shall be taken in the preparation of the embankment foundation and the placement of compacted materials to avoid laminations occurring between compacted layers as discussed above.

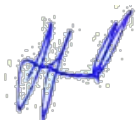
It is highly recommended that topsoil cover should be of less reactive materials. It should also be noted that the material used for topsoil cover needs to have proper nutrients and be suitable to promote vegetation growth.

It is also highly recommended the regular routine inspection and maintenance of the embankment throughout its life as it is vital for the stability and long-term performance of the dam. The routine inspection and maintenance may include the immediate repairing and reshaping of the batters once any signs of erosion, shrinkage and tension cracks are evident, irrigation of batter faces when batter faces become dry to maintain vegetation growth and or re-sowing vegetation as required in order to prevent further deterioration of the embankment in resulting complete embankment failures.

It is also recommended that the dam and sump should not be left empty for long periods of time as shrinkage cracks may develop which may result in seepage loss (once it is filled again) and consequently creating instability of the embankment. If the shrinkage cracks are significant, we highly recommend repairing these cracks prior to refilling of the dam and sump.

Occasionally, the subsurface soil conditions between the completed boreholes may be found different (or may be interpreted to be different) from those expected. This can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact us.

Yours truly,



Jarrod Gornall
Senior Geotechnical Engineer

Tin Maung
Principal Geotechnical Engineer

ADDENDUM

LIMITS OF INVESTIGATION

The recommendations made in this report are based on the assumption that the test results are representative of the overall subsurface conditions. However, it should be noted that even under optimum circumstances, actual conditions in some parts of the building site may differ from those said to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal all that is hidden by earth, rock and time.

The client should also be aware that our recommendations refer only to our test site locations and the ground level at the time of testing.

The recommendations in this report are based on the following: -

a) The information gained from our investigation.
b) The present "state of the art" in testing and design.
c) The building type and site treatment conveyed to us by the client.
d) Historical Information

Should the client or their agent have omitted to supply us with the correct relevant information, or make significant changes to the building type and/or building envelope, our report may not take responsibility for any consequences and we reserve the right to make an additional charge if more testing is necessary.

Not withstanding the recommendations made in this report, we also recommend that whenever footings are close to any excavations or easements, that consideration should be given to deepening the footings.

Unless otherwise stated in our commission, any dimensions or slope direction and magnitude should not be used for any building costing calculations and/or positioning. Any sketch supplied should be considered as only an approximate pictorial evidence of our work.

APPENDIX A

SITE LOCALITY PLAN

N

Aitken Rowe Testing Laboratories Pty Ltd

Registration Number: GS22-25

Client: KILLORAN AG PTY LTD ATF FOR KILLORAN AGRICULTURE FAMILY TRUST - COLEAMBALLY, NSW

Project: GEOTECHNICAL INVESTIGATION
PROPOSED WATER STORAGE DAM & SUMP
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW
SITE LOCALITY PLAN

APPENDIX B

TEST PIT LOCATION PLAN

Aitken Rowe Testing Laboratories Pty Ltd

Registration Number: GS23-85

Client: KILLORAN AG PTY LTD ATF FOR KILLORAN AGRICULTURE FAMILY TRUST - COLEAMBALLY, NSW

Project: GEOTECHNICAL INVESTIGATION
PROPOSED WATER STORAGE DAM & SUMP
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW
TEST PIT LOCATION PLAN

APPENDIX C

TEST PIT LOGS WITH EXPLANATORY NOTE

AITKEN ROWE TESTING LABORATORIES PTY LTD

Test Pit No.: **TP1**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Excavator 0.9m wide Bucket

Date: ***13/04/2023***
GPS N: ***6131942***
E: ***0390801***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy Clayey SILT; low plasticity, fine to coarse sand, yellow brown		MC<PL	St.				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5						
ML	Clayey SILT; low plasticity, with fine to coarse sand, yellow orange	1.0		VSt.	D	TP1A		
		1.5						
CI	Silty CLAY; medium plasticity, with fine to coarse sand, mottled grey yellow	2.0			D	TP1B		Anticipated cut line 1.6m
		2.5						
CH	CLAY; high plasticity, trace sand, trace gravel, mottled grey yellow orange	3.0	MC>PL					4% <OMC
		3.5						
	End of Test Pit (TP1) @ 3.5m	4.0						

Registration No.: GS23-85

Location: Geotechnical Investigation - Proposed Water Storage Dam & Sump - Lot 107, No. 1578 Cadell Road, Gala Vale, NSW

Client: Killoran AG Pty Ltd ATF for Killoran Agriculture Family Trust - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Test Pit No.: **TP2**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Excavator 0.9m wide Bucket

Date: ***13/04/2023***
GPS N: ***6132009***
E: ***0390814***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy Clayey SILT; low plasticity, fine to coarse sand, yellow brown		MC<PL	St.				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5						
ML	Clayey SILT; low plasticity, with fine to coarse sand, pale yellow grey	1.0		VSt.	D	TP2A		Macropores evident
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, mottled grey yellow	1.5			D	TP2B		
								Anticipated cut line 1.6m
CI	Silty CLAY; medium plasticity, with fine to coarse sand, mottled grey yellow	2.0			D	TP2C		
		2.5						
		3.0						
		3.5						
	End of Test Pit (TP2) @ 3.5m	4.0						

Registration No.: GS23-85

Location: Geotechnical Investigation - Proposed Water Storage Dam & Sump - Lot 107, No. 1578 Cadell Road, Gala Vale, NSW

Client: Killoran AG Pty Ltd ATF for Killoran Agriculture Family Trust - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Test Pit No.: **TP3**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Excavator 0.9m wide Bucket

Date: ***13/04/2023***
GPS N: ***6132100***
E: ***0390903***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
CI-CH	TOPSOIL: CLAY; medium to high plasticity, trace sand, red brown		MC>PL	F		TP3A		NATURAL
CH	CLAY; high plasticity, trace sand, red brown			F-St.	D			
ML	Clayey SILT; low plasticity, with fine to coarse sand, yellow orange brown	0.5		St.				2%<OMC
		1.0						
		1.5						@OMC
CI	Silty CLAY; medium plasticity, with fine to coarse sand, mottled grey orange	2.0			D	TP3B		Anticipated cut line 1.8m
		2.5						FMC = 20.4%
		3.0						SOMC = 19.8%
CL-CI	Sandy Silty CLAY; low to medium plasticity, fine to coarse sand, mottled grey orange	3.5						
	End of Test Pit (TP3) @ 3.5m	4.0						

Registration No.: GS23-85

Location: Geotechnical Investigation - Proposed Water Storage Dam & Sump - Lot 107, No. 1578 Cadell Road, Gala Vale, NSW

Client: Killoran AG Pty Ltd ATF for Killoran Agriculture Family Trust - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Test Pit No.: **TP4**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Excavator 0.9m wide Bucket

Date: ***13/04/2023***
GPS N: ***6132038***
E: ***0390893***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
CI-CH	TOPSOIL:CLAY; medium to high plasticity, trace sand, red brown		MC>PL	F				NATURAL
CH	CLAY; high plasticity, trace sand, red brown			St.				@OMC
ML	Clayey SILT; low plasticity, with fine to coarse sand, yellow orange	0.5			D	TP4A		FMC = 17.7% SOMC = 17.6%
		1.0						
ML	Clayey SILT; low plasticity, trace fine to coarse sand, mottled yellow orange grey		MC<PL	St.-VSt.	D	TP4B		FMC = 12.8%
		1.5						
CH	CLAY; high plasticity, trace sand, mottled grey orange orange		MC>PL	VSt.				Anticipated cut line 1.8m
		2.0			D	TP4C		4% <OMC
		2.5						
		3.0						
CI	Sandy CLAY; medium plasticity, fine to coarse sand, mottled yellow orange grey							
		3.5						
	End of Test Pit (TP4) @ 3.5m							
		4.0						

Registration No.: GS23-85

Location: Geotechnical Investigation - Proposed Water Storage Dam & Sump - Lot 107, No. 1578 Cadell Road, Gala Vale, NSW

Client: Killoran AG Pty Ltd ATF for Killoran Agriculture Family Trust - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Test Pit No.: **TP5**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Excavator 0.9m wide Bucket

Date: ***13/04/2023***
GPS N: ***6131948***
E: ***0390878***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
CI-CH	TOPSOIL: CLAY; medium to high plasticity, trace sand, red brown		MC>PL	F				NATURAL
CH	CLAY; high plasticity, trace sand, red brown			St.				
ML	Sandy SILT; low plasticity, fine to coarse sand, yellow orange	0.5	MC<PL					
		1.0						
CI	Silty CLAY; medium plasticity, with fine to coarse sand, mottled grey orange			VSt.				
		1.5			D	TP5A		FMC = 12.9%
		2.0						Anticipated cut line 1.8m
CH	CLAY; high plasticity, trace sand, mottled grey orange							
		2.5						
		3.0						
CI-CH	CLAY; medium to high plasticity, with fine to coarse sand, mottled grey orange							
		3.5						
	End of Test Pit (TP5) @ 3.5m							
		4.0						

Registration No.: GS23-85

Location: Geotechnical Investigation - Proposed Water Storage Dam & Sump - Lot 107, No. 1578 Cadell Road, Gala Vale, NSW

Client: Killoran AG Pty Ltd ATF for Killoran Agriculture Family Trust - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Test Pit No.: **TP6**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Excavator 0.9m wide Bucket

Date: ***13/04/2023***
GPS N: ***6131866***
E: ***0390867***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -425µm	Remarks & Field Records
ML	TOPSOIL: Sandy Clayey SILT; low plasticity, fine to coarse sand, red brown		MC>PL	F				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC<PL	St.				
ML	Sandy SILT; low plasticity, fine to coarse sand, yellow brown	1.0		St.-VSt.	D	TP6A		FMC = 15.0% SOMC = 16.8%
		1.5						
		2.0						Anticipated cut line 1.8m
CI	Silty CLAY; medium plasticity, trace sand, mottled grey yellow	2.5		VSt.	D	TP6B		
CI	Sandy CLAY; medium plasticity, fine to coarse sand, mottled grey yellow	3.0						
		3.5						
	End of Test Pit (TP6) @ 3.5m	4.0						

Registration No.: GS23-85

Location: Geotechnical Investigation - Proposed Water Storage Dam & Sump - Lot 107, No. 1578 Cadell Road, Gala Vale, NSW

Client: Killoran AG Pty Ltd ATF for Killoran Agriculture Family Trust - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

LOG SYMBOLS

LOG COLUMN	SYMBOL	DEFINITION
Groundwater Record	▼	Standing water level. Time delay following completion of drilling may be shown.
	▶	Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	D	Disturbed bag sample taken between the depths indicated by lines.
	U	Undisturbed 50mm diameter tube sample taken between the depths indicated by lines
Field Tests	4, 7, 10 N=17	Standard Penetration Test (S.P.T.) performed between depths indicated by lines. Individual figures show blows per 150mm penetration driven by SPT hammer.
	5 7 3	Dynamic Cone Penetration Test performed between depths indicated by lines. Individual figures show blows per 100mm penetration for 60 degree solid cone driven by 9 kg hammer.
Moisture Condition (Silt or Clay based)	MC<PL	Moisture content estimated to be less than plastic limit.
	MC=PL	Moisture content estimated to be approx. equal to plastic limit.
	MC>PL	Moisture content estimated to be greater than plastic limit.
Moisture Condition (Gravel or Sand based)	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Consistency (Silt or Clay based)	VS	VERY SOFT – unconfined compressive strength less than 25kPa.
	S	SOFT – unconfined compressive strength 25-50 kPa.
	F	FIRM – unconfined compressive strength 50-100kPa.
	St.	STIFF – unconfined compressive strength 100-200kPa.
	VSt.	VERY STIFF – unconfined compressive strength 200-400kPa.
	H	HARD – unconfined compressive strength greater than 400kPa.

Relative Density (Gravel or Sand based)		Description	Density Index Range %	'N' Value Range Blows/300mm
	VL	VERY LOOSE	<15	0-5
	L	LOOSE	15-35	6-10
	MD	MEDIUM DENSE	35-65	11-30
	D	DENSE	65-85	31-60
	VD	VERY DENSE	>85	>60

Hand Penetrometer Readings	300 250 280	Numbers indicate individual test results in kPa on representative undisturbed material.
Laboratory Test	L.S. %	Linear Shrinkage (As per TfNSW Method T113)
	M.C. %	Field Moisture Content (As per Australian Standard AS1289.2.1.1 or TfNSW Method T120)
	Iss	Shrink-Swell Index (As per Australian Standard AS1289.7.1.1)

Piezometer Construction	Fill		Piezometer	
		Bentonite		Solid Pipe
		Washed Fine Graded Gravel		Slotted Screen

Remarks	'V' bit	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten Carbide wing bit.

APPENDIX D

LABORATORY TEST REPORTS

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Griffith: 17b Battista Street, Griffith NSW 2680

*

PAGE 1 OF 1

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : KILLORAN AG PTY LTD ATF FOR KILLORAN AGRICULTURE FAMILY TRUST - COLEAMBALLY, NSW

JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION
PROPOSED WATER STORAGE DAM & SUMP
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

SAMPLED BY: ARTL
DATE SAMPLED: 13/04/2023
DATE SUBMITTED: 13/04/2023
SAMPLING METHOD: AS1289.1.2.1
SAMPLING CLAUSE: 6.5.4
DATES TESTED: 19-27/04/2023
ORDER No.: *

MATERIAL SOURCE : IN-SITU TEST PITS
MATERIAL TYPE : REFER TO TEST PIT LOGS
PROPOSED USE : DESIGN

REGISTRATION No : R28 **GS23-85**

		SAMPLE NUMBER :	TP3B	TP4A	TP4B	TP5A	TP6A	*
		SAMPLING LOCATION :	TP3	TP4	TP4	TP5	TP6	*
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	1800-2800	400-1100	1100-1800	1200-2200	500-1700	*
TESTS	TEST ELEMENT		*	*	*	*	*	*
AS1289.3.6.1		PASS 100.0mm SIEVE %	*	*	*	*	*	*
		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	*	*
		PASS 6.70mm SIEVE %	*	*	*	*	*	*
		PASS 4.75mm SIEVE %	*	*	*	*	*	*
		PASS 2.36mm SIEVE %	*	*	*	*	*	*
AS1141.19	WHOLE SAMPLE	PASS 425 µm SIEVE %	*	*	*	*	*	*
		PASS 75 µm SIEVE %	*	*	*	*	*	*
		LESS THAN 13.5 µm %	*	*	*	*	*	*
AS1141.19	-2.36mm	PASS 425 µm SIEVE %	*	*	*	*	*	*
		PASS 75 µm SIEVE %	*	*	*	*	*	*
		LESS THAN 13.5 µm %	*	*	*	*	*	*
		OBSERVATIONS	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	46	38	42	40	30	*
AS1289.3.2.1		PLASTIC LIMIT %	14	16	15	14	17	*
AS1289.3.3.1		PLASTICITY INDEX	32	22	27	26	13	*
		PREPARATION METHOD	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	*
AS1289.5.1.1		STANDARD MAX. DRY DENSITY t/m^3	1.66	1.72	*	*	1.72	*
(NOT DRY PREPPED)		OPTIMUM MOISTURE CONTENT %	19.8	17.6	*	*	16.8	*
		OVERSIZE MATERIAL % RETAINED ON 19.0mm	0	0	*	*	0	*
		LL METHOD OF CURING TIME DETERMINATION	VISUAL	VISUAL	*	*	VISUAL	*
		CURING DURATION HOURS	166	166	*	*	166	*
AS1289.2.1.1		FIELD MOISTURE CONTENT %	20.4	17.7	12.8	12.9	15.0	*
AS1289.3.8.1		EMERSON CLASS	2	4	3	3	3	*
(AIR DRIED)		TYPE OF WATER	DISTILLED	DISTILLED	DISTILLED	DISTILLED	DISTILLED	*

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

*
*
*
All samples are oven dried and dry sieved during prep. unless otherwise stated

APPROVED SIGNATORY : .....

Jarrod Gornall

DATE: 16/05/2023

Aitken Rowe Testing Laboratories Pty Ltd

ARTL Griffith: 17b Battista Street, Griffith NSW 2680

PERMEABILITY / DISPERSION REPORT

CLIENT: KILLORAN AG PTY LTD AFT for KILLORAN AGRICULTURE FAMILY TRUST - COLEAMBALLY, NSW

PROJECT: GEOTECHNICAL INVESTIGATION

PROPOSED WATER STORAGE DAM & SUMP

LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

MATERIAL TYPE: REFER TO TEST PIT LOGS

SOURCE OF MATERIAL: IN-SITU TEST PITS

PORTION OF STRUCTURE: PROPOSED FLOOR & EMBANKMENT

SURCHARGES ADDED: 2.65

PRESSURE APPLIED: 3Kpa

% RETAINED ON NOMINAL SIEVE: NIL

NOMINAL SIEVE SIZE: -19.0

SAMPLED BY: ARTL

DATE SAMPLED: 13/04/2023

DATE SUBMITTED: 13/04/2023

TEST DATE/S: 28/04/23-5/05/23

ORDER No.: *

TEST METHODS: AS1289.6.7.2
AS1289.5.1.1
AS1289.2.1.1
*

REGISTRATION No: R23 **GS23-85**

SAMPLE No.	TEST PIT No.	DEPTH (mm)	MAX. DRY DENSITY (t/m^3)	OPTIMUM MOISTURE (%)	DRY DENSITY OF SPECIMEN (t/m^3)	MOULDING MOISTURE (%)	ACTUAL % OF MDD	PERMEABILITY m / sec AS1289.6.7.2	EMERSON CLASS AS1289.3.8.1
TP3B	TP3	1800-2800	1.66	19.8	1.58	19.9	95	$4x10^{-09}$	2
TP4A	TP4	400-1100	1.72	17.6	1.69	17.5	98	$1x10^{-09}$	4
TP6A	TP6	500-1700	1.72	16.8	1.72	16.7	100	$9x10^{-10}$	3
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*

REMARKS: *

*

APPROVED SIGNATORY: .....

Jarrod Gornall

DATE: 5/6/2023

AITKEN ROWE TESTING LABORATORIES PTY LTD

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

SAMPLE No.: TP3B

TEST REPORT - GRADING/HYDROMETER

SAMPLED BY: ARTL

DATE SAMPLED: 13/04/2023

CLIENT: KILLORAN AG PTY LTD FOR KILLORAN AGRICULTURE FAMILY TRUST - COLEAMBALLY, NSW

DATE SUBMITTED: 13/04/2023

TEST METHOD: AS1289.3.6.3
AS1289.3.6.1

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION
PROPOSED WATER STORAGE DAM & SUMP

TEST HOLE: TP3

DEPTH: 1800-2800

TEST DATES: 17-20/5/2023

LOCATION: LOT 107, No. 1578, CADELL ROAD, GALA VALE, NSW

HYDROMETER TYPE: BULB

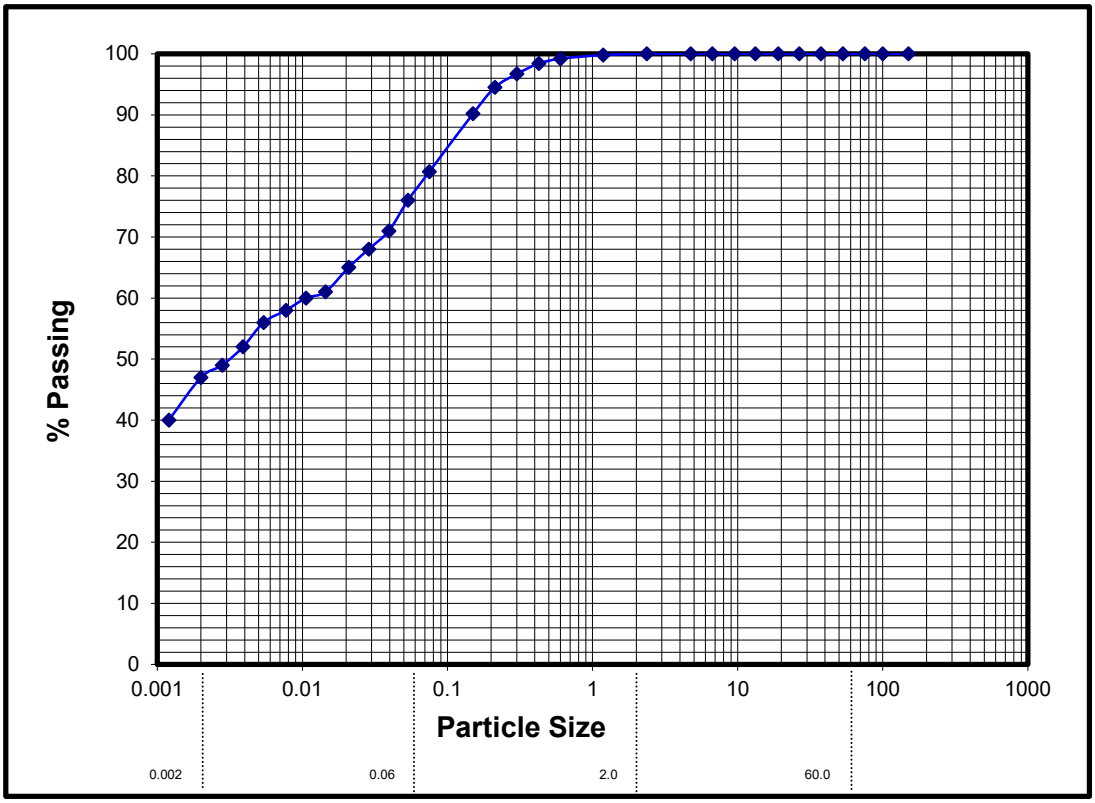
REGISTRATION No.: R36 **GS23-85**

METHOD OF DISPERSION

i). AGENT ☒
ii). MIXER ☒
iii). HYDROMETER ☒
CALIBRATED IN g/l

PERCENTAGE LOSS IN PRETREATMENT: NIL

SOIL CLASSIFICATION: Silty CLAY; medium plasticity, with fine to coarse sand



Particle Size (mm)	% Passing
150	100
100	100
75	100
53	100
37.5	100
26.5	100
19	100
13.2	100
9.5	100
6.7	100
4.75	100
2.36	100
1.18	99.8
0.6	99.2
0.425	98.4
0.3	96.7
0.212	94.5
0.15	90.2
0.075	80.7
0.06	74.5
0.02	63.7
0.006	54.9
0.002	45.1

CLAY	SILT			29%	SAND			25%	GRAVEL			0%	COBBLES
	FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		
45%	10%	9%	11%		14%	9%	2%		0%	0%	0%		0%

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

APPROVED SIGNATORY Peter Forbes-Taber

DATE: 22/05/2023

AITKEN ROWE TESTING LABORATORIES PTY LTD

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

SAMPLE No.: TP4A

SAMPLED BY: ARTL

DATE SAMPLED: 13/04/2023

DATE SUBMITTED: 13/04/2023

TEST METHOD: AS1289.3.6.3
AS1289.3.6.1

TEST HOLE: TP4

DEPTH: 400-1100

TEST DATES: 17-20/5/2023

HYDROMETER TYPE: BULB

REGISTRATION No.: R36 **GS23-85**

TEST REPORT - GRADING/HYDROMETER

CLIENT: KILLORAN AG PTY LTD FOR KILLORAN AGRICULTURE FAMILY TRUST - COLEAMBALLY, NSW

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION
PROPOSED WATER STORAGE DAM & SUMP,

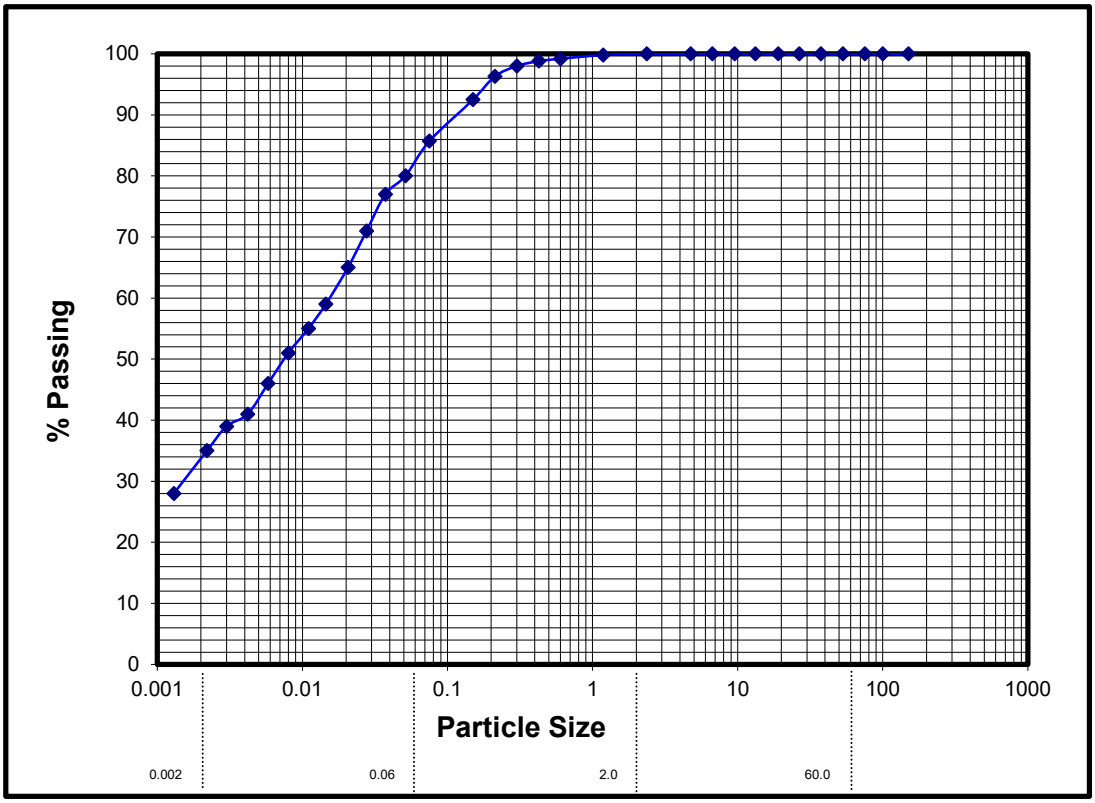
LOCATION: LOT 107, No. 1578, CADELL ROAD, GALA VALE, NSW

METHOD OF DISPERSION

i). AGENT ☒
ii). MIXER ☒
iii). HYDROMETER ☒
CALIBRATED IN g/l

PERCENTAGE LOSS IN PRETREATMENT: NIL

SOIL CLASSIFICATION: Clayey SILT; low plasticity, with fine to coarse sand



Particle Size (mm)	% Passing
150	100
100	100
75	100
53	100
37.5	100
26.5	100
19	100
13.2	100
9.5	100
6.7	100
4.75	100
2.36	100
1.18	99.8
0.6	99.2
0.425	98.8
0.3	98
0.212	96.3
0.15	92.5
0.075	85.7
0.06	77.9
0.02	63.1
0.006	45.6
0.002	33.0

CLAY	SILT			45%	SAND			22%	GRAVEL			0%	COBBLES
	FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		
33%	13%	18%	15%		13%	7%	1%		0%	0%	0%		0%

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

APPROVED SIGNATORY Peter Forbes-Taber

DATE: 22/05/2023

AITKEN ROWE TESTING LABORATORIES PTY LTD

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

SAMPLE No.: TP4B

TEST REPORT - GRADING/HYDROMETER

SAMPLED BY: ARTL

DATE SAMPLED: 13/04/2023

CLIENT: KILLORAN AG PTY LTD FOR KILLORAN AGRICULTURE FAMILY TRUST - COLEAMBALLY, NSW

DATE SUBMITTED: 13/04/2023

TEST METHOD: AS1289.3.6.3
AS1289.3.6.1

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION
PROPOSED WATER STORAGE DAM & SUMP,

TEST HOLE: TP4

DEPTH: 1100-1800

TEST DATES: 17-20/5/2023

LOCATION: LOT 107, No. 1578, CADELL ROAD, GALA VALE, NSW

HYDROMETER TYPE: BULB

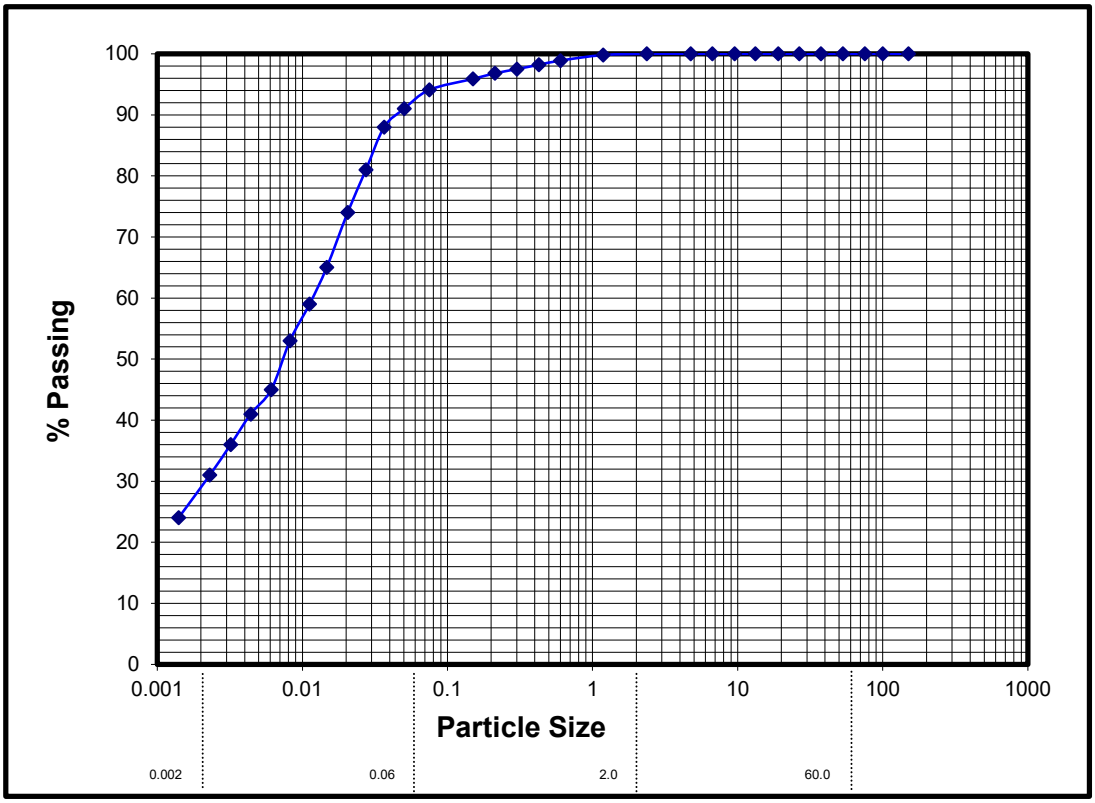
REGISTRATION No.: R36 **GS23-85**

METHOD OF DISPERSION

i). AGENT ☒
ii). MIXER ☒
iii). HYDROMETER ☒
CALIBRATED IN g/l

PERCENTAGE LOSS IN PRETREATMENT: NIL

SOIL CLASSIFICATION: Clayey SILT; low plasticity, trace sand



Particle Size (mm)	% Passing
150	100
100	100
75	100
53	100
37.5	100
26.5	100
19	100
13.2	100
9.5	100
6.7	100
4.75	100
2.36	100
1.18	99.8
0.6	98.9
0.425	98.2
0.3	97.5
0.212	96.8
0.15	95.9
0.075	94.1
0.06	86.8
0.02	70.3
0.006	45.0
0.002	28.9

CLAY	SILT			58%	SAND			13%	GRAVEL			0%	COBBLES
	FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		
29%	16%	25%	16%		9%	3%	2%		0%	0%	0%		0%

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WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

APPROVED SIGNATORY Peter Forbes-Taber

DATE: 22/05/2023

AITKEN ROWE TESTING LABORATORIES PTY LTD

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

PAGE: 4 OF 5

TEST REPORT - GRADING/HYDROMETER

SAMPLE No.: TP5A

SAMPLED BY: ARTL

DATE SAMPLED: 13/04/2023

CLIENT: KILLORAN AG PTY LTD FOR KILLORAN AGRICULTURE FAMILY TRUST - COLEAMBALLY, NSW

DATE SUBMITTED: 13/04/2023

TEST METHOD: AS1289.3.6.3
AS1289.3.6.1

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION PROPOSED WATER STORAGE DAM & SUMP,

TEST HOLE: TP5

DEPTH: 1200-2200

TEST DATES: 17-20/5/2023

LOCATION: LOT 107, No. 1578, CADELL ROAD, GALA VALE, NSW

HYDROMETER TYPE: BULB

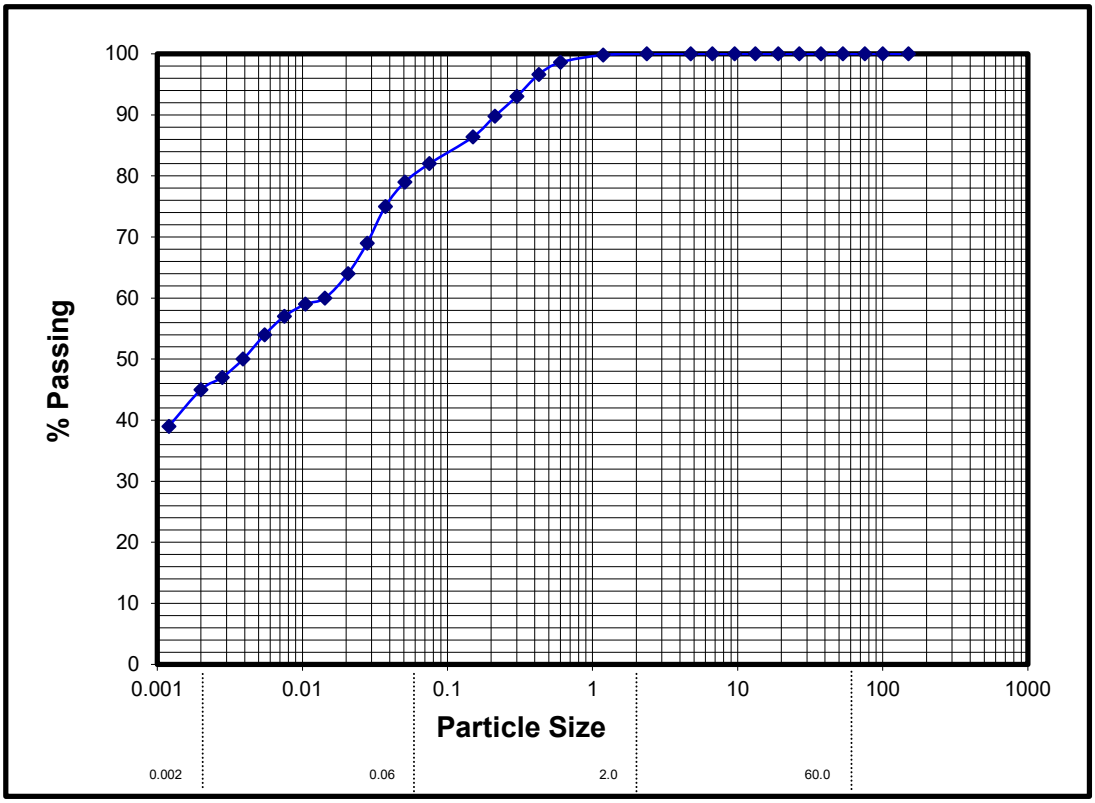
REGISTRATION No.: R36 **GS23-85**

METHOD OF DISPERSION

i). AGENT ☒
ii). MIXER ☒
iii). HYDROMETER ☒
CALIBRATED IN g/l

PERCENTAGE LOSS IN PRETREATMENT: NIL

SOIL CLASSIFICATION: Silty CLAY; medium plasticity, with fine to coarse sand



Particle Size (mm)	% Passing
150	100
100	100
75	100
53	100
37.5	100
26.5	100
19	100
13.2	100
9.5	100
6.7	100
4.75	100
2.36	100
1.18	99.8
0.6	98.6
0.425	96.6
0.3	93
0.212	89.8
0.15	86.4
0.075	82
0.06	75.4
0.02	64.2
0.006	53.3
0.002	43.5

CLAY	SILT			32%	SAND			24%	GRAVEL			0%	COBBLES
	FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		
44%	10%	11%	11%		12%	8%	4%		0%	0%	0%		0%

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

APPROVED SIGNATORY Peter Forbes-Taber

DATE: 22/05/2023

AITKEN ROWE TESTING LABORATORIES PTY LTD

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

SAMPLE No.: TP6A

TEST REPORT - GRADING/HYDROMETER

SAMPLED BY: ARTL

DATE SAMPLED: 13/04/2023

CLIENT: KILLORAN AG PTY LTD FOR KILLORAN AGRICULTURE FAMILY TRUST - COLEAMBALLY, NSW

DATE SUBMITTED: 13/04/2023

TEST METHOD: AS1289.3.6.3
AS1289.3.6.1

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION
PROPOSED WATER STORAGE DAM & SUMP,

TEST HOLE: TP6

DEPTH: 500-1700

TEST DATES: 17-20/5/2023

LOCATION: LOT 107, No. 1578, CADELL ROAD, GALA VALE, NSW

HYDROMETER TYPE: BULB

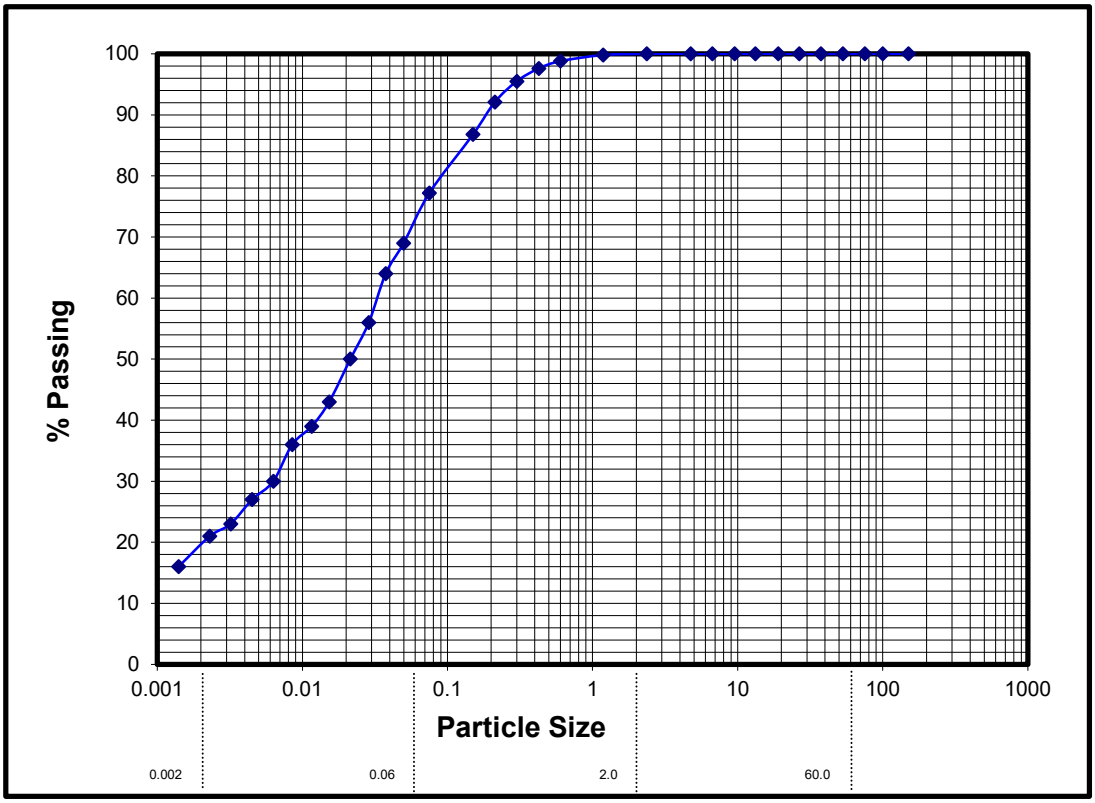
REGISTRATION No.: R36 **GS23-85**

METHOD OF DISPERSION

i). AGENT ☒
ii). MIXER ☒
iii). HYDROMETER ☒
CALIBRATED IN g/l

PERCENTAGE LOSS IN PRETREATMENT: NIL

SOIL CLASSIFICATION: Sandy SILT; low plasticity, fine to coarse sand



Particle Size (mm)	% Passing
150	100
100	100
75	100
53	100
37.5	100
26.5	100
19	100
13.2	100
9.5	100
6.7	100
4.75	100
2.36	100
1.18	99.8
0.6	98.8
0.425	97.6
0.3	95.5
0.212	92.1
0.15	86.8
0.075	77.2
0.06	66.3
0.02	47.5
0.006	29.4
0.002	19.2

CLAY	SILT			47%	SAND			34%	GRAVEL			0%	COBBLES
	FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		
19%	10%	18%	19%		19%	12%	3%		0%	0%	0%		0%

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

APPROVED SIGNATORY Peter Forbes-Taber

DATE: 22/05/2023

Aitken Rowe
GEOTECHNICAL ENGINEERING

Geotechnical Engineering
Environmental Consultancy
Soil Concrete Aggregate Testing
NATA Accredited Laboratories

ABN 53 058 315 138

ACN 058 315 138

22 March 2022

Reg. No: GS22-25

Killoran Ag Pty Ltd ATF for Killoran Agriculture Family Trust
"Thule" Farm 566
Bridge Road
Coleambally, NSW 2707

Attention: Mr. Alastair MacDonald

Dear Sir,

**GEOTECHNCIAL INVESTIGATION – PROPOSED COMPOSTING FACILITY,
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW**

Further to a request from Mr. Kelly Nicol (SKM Planning Griffith, NSW) in response to our quotation, Q21-688 dated 23 November 2021, we carried out a geotechnical field investigation at the proposed location of the composting facility at the above site between 31 January and 7 February 2022.

The purpose of the investigation was to determine the nature of the subsurface soils and groundwater conditions by augering, testing and sampling at the proposed location of the composting facility which includes the proposed composting operations pad area and separate borrow pit area. It is understood that the materials from the proposed borrow pit area are to be used in the composting pad construction which is to be raised above the existing surface level.

Based upon the information obtained, comments and recommendations for the proposed composting operations pad and suitability of the materials from the proposed borrow pit area are to be made.

1.0 SITE DESCRIPTION

The site for the proposed composting facility which includes the proposed composting operations pad and proposed borrow pit area is located approximately 17.5km south-west of Coleambally at DP 756459, Lot 107, No. 1578 Cadell Road, Gala Vale, NSW. The subject site is located on the southern side of Cadell Road, approximately 3km west of the Cadell Road and Kidman Way

intersection. The location of the proposed composting operations pad is located directly south of Cadell Road and measures approximately 0.41km east to west and 1.13km north to south (45 ha) with the proposed borrow pit area located directly west of the proposed composting operations pad directly north and south of the existing borrow pit area.

The subject site is noted to be generally flat and covered with vegetation including grasses as noted at the time of the investigation. It should be noted earthworks has commenced towards the northern section of the site covering BH1 to BH10 and the existing borrow pit previously excavated contained water as noted at the time of the investigation.

2.0 SITE GEOLOGY

The general topography of the area is flat, gently undulating low tablelands. The Gale Vale area is underlain by the Quaternary alluvium sediments (floodplain sediments) comprising unconsolidated clay, silt, sand and gravel in accordance with 1:250,000 Scale "Metallogenic Series Sheet SI/55-10 for Narrandera". The borehole investigation revealed that the subject site is underlain by alluvium material comprising silt-based, clay-based and sand-based material within the investigation depth.

3.0 INVESTIGATION PROCEDURE

3.1 Fieldwork

The fieldwork for the investigation was carried out between 31 January and 7 February 2022 by our experienced Senior Geotechnicians of Aitken Rowe Testing Laboratories Pty Ltd from Griffith and Wagga Wagga, NSW, who nominated the sampling and prepared engineering logs of the boreholes.

The fieldwork for the investigation consisted of the logging and sampling of forty-five (45) boreholes (BH1 to BH45) to the depth ranging from 2.0m to 6.0m below existing surface level across the proposed composting pad at the subject site and five (5) boreholes (BH46 to BH50) to the depth of 4.5m below existing surface level across the proposed borrow pit area at the subject site as shown in the attached borehole location plan. The boreholes were solid flight augered drilled with our trailer mounted drilling rig at the locations as shown in the attached borehole location plan. Small and bulk samples were recovered at various depths from the boreholes for relevant laboratory testing.

The detailed borehole logs with explanatory note are herewith attached. The descriptions in the borehole logs are provided in accordance with "AS 1726 –2017 Geotechnical Site Investigations".

3.2 Laboratory Testing

The laboratory tests including field moisture content determination, particle size distribution, hydrometer analysis, Atterberg Limit, permeability and dispersion (Emerson Class) were performed on the selected samples recovered at various depths in the boreholes drilled across the proposed composting pad and borrow pit areas of the subject site at our NATA accredited testing laboratories

in Griffith and Wagga Wagga, NSW. The samples for permeability testing were compacted at 98% Standard Maximum Dry Density (SMDD) at nearest 100% Standard Optimum Moisture Content (SOMC). The laboratory test reports are herewith attached.

4.0 SUBSURFACE CONDITIONS

4.1 Proposed Composting Operations Pad

BH1 to BH45 cover the proposed composting operations pad. The boreholes drilled revealed that the site is generally underlain by fill (in BH1 to BH9) to 0.3m to 0.4 (refer to attached borehole logs) and topsoil (in BH10 to BH45) to 0.05 to 0.1m overlying natural alluvial material medium, medium to high and high plasticity clays, extending to the borehole termination depths at 2.0m to borehole refusal depth of 6.0m in BH1 to BH45 across the subject site (refer to attached borehole logs). It should be noted that the borehole refusal where encountered was on very hard consistency clay-based material.

The moisture condition of the underlying natural alluvial material was generally varied from less than plastic limit to greater than plastic limit throughout the clay-based profile in BH1 to BH45 within the investigation depth at the time of the investigation. No groundwater or seepage was encountered during the drilling in all boreholes drilled within the investigation depth, however it should be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

The borehole logs were logged in accordance with AS1726-2017 – Geotechnical site investigations and are herewith attached.

4.2 Proposed Borrow Pit Area

BH46 to BH50 cover the proposed borrow pit area. The boreholes drilled revealed that the site is underlain by fill (in BH46 & BH47) comprising medium to high and high plasticity clay to 0.25m in BH46 and 0.2m in BH47 and topsoil (in BH49 & BH50) to 0.15m overlying natural alluvial a material comprising low plasticity sandy silty clay and clayey silt, low to medium plasticity sandy silty clay, medium plasticity silty clay, medium, medium to high and high plasticity clay and fine to coarse grained clayey sand, extending to the borehole termination depth at 4.5m in BH46 to BH50 across the subject borrow site (refer to attached borehole logs).

The moisture condition of the underlying natural alluvial material was generally varied from less than plastic limit to greater than plastic limit throughout the clay-based profile in BH46 to BH50, less than plastic limit in the silt-based profile where encountered in BH47 and moist in the sand-based profile where encountered in BH49 within the investigation depth at the time of the investigation. No groundwater or seepage was encountered during the drilling in all boreholes drilled within the investigation depth, however it should be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

The borehole logs were logged in accordance with AS1726-2017 – Geotechnical site investigations and are herewith attached.

5.0 DISCUSSIONS AND COMMENTS

5.1 Proposed Borrow Pit Area

5.1.1 Soil Properties

The laboratory tests carried out on the underlying natural material recovered from the boreholes drilled across the subject site (BH46, BH47 & BH49) indicated that the material generally contains 1 to 2% gravel, 19 to 44% sand, 26 to 40% silt and 29 to 39% clay content with Plasticity Index (PI) ranging from 13 to 27%. The materials are generally classified as "ML – Clayey SILT, low plasticity, with fine to coarse sand" and "CL – Sandy Silty CLAY, low plasticity, fine to coarse sand, trace gravel", in accordance with AS1726 - 2017 Geotechnical Investigations".

The permeability tests carried out on the natural material recovered from BH46, BH47 and BH49 indicated the permeability of $7x10^{-10}$ m/sec on low plasticity clayey silt, 4 to $9x10^{-10}$ m/sec on low plasticity sandy silty clay and to $7x10^{-11}$ m/sec on medium plasticity clay, which were compacted at 98% of SMDD at nearest 100% of SOMC. The dispersion (Emerson Class) tests carried out on the same samples tested showed "Emerson Class 2" and therefore are considered "potentially highly dispersive".

These results were found to be within the Department of Environment and Conservation (NSW) environmental guidelines for "Composting and Related Organics Processing Facilities ($1.0x10^{-7}$m/sec) for composting pads provided the subgrade material is compacted to 98% SMDD at nearest 100% of SOMC due to the highly dispersive nature of the natural silt-based and clay-based material.

It should be noted that the sand-based material encountered within the proposed borrow area at the location of BH9 from 2.2m to 2.5m below the existing surface level is considered "not suitable" for the composting operations pad construction.

5.2 Proposed Composting Operations Pad

5.2.1 Soil Properties

The laboratory tests carried out on the underlying natural material recovered from the boreholes drilled across the subject site (BH1, BH10, BH16, BH18, BH22, BH27, BH34, BH39 & BH43) indicated that the material generally contains 4 to 30% sand and 70 to 96% silt and clay content with Plasticity Index (PI) ranging from 21 to 47%. The materials are generally classified as "CI – CLAY, medium plasticity, with fine to medium sand" and "CH – CLAY, high plasticity, trace sand", in accordance with AS1726 - 2017 Geotechnical Investigations".

The dispersion (Emerson Class) tests carried out on the same samples showed “Emerson Class 1 to 3” and therefore the clay-based materials are considered “potentially moderately to highly dispersive”.

5.3 Site Preparation for Composting Pad

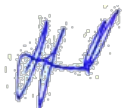
The following site preparation should be performed across the proposed composting operations pad site prior to any composting.

- Remove topsoil, if any, and fill and stockpile for later use for landscaping and fill as appropriate. It should be noted topsoil was generally encountered to the depth of 0.05m to 0.1m (BH10 to BH45) and fill encountered to the depths of 0.3m to 0.4m in BH1 to BH9 (refer to attached borehole logs).
- Remove any unsuitable material encountered at the time of the construction as required.
- Once the topsoil, fill and unsuitable materials, if any, are removed as required, the exposed subgrade material should then be scarified to a depth of about 200mm; moisture conditioned to within +/-2% of SOMC and compacted to a minimum of 98% of SMDD.
- Proof roll the exposed subgrade using a minimum of 10 passes of 12 tonne dead weight roller to detect any soft, loose or heaving areas.
- Any soft, loose or heave areas, if detected during the process, should be excavated down and backfilled with appropriate approved materials, compacted in 150mm thick layers to the equivalent density of minimum 98% of SMDD.
- Any area of exposed subgrade, which exhibits shrinkage cracking and does not require re-compaction, should be watered and rolled until the shrinkage cracks do not reappear. During this undertaking, care should be exercised to ensure the surface does not become soft.
- Monitor in dry conditions. If cracks appear then immediately apply water until cracking has ceased. Alternatively, a thin layer (minimum of 0.1m) of granular material (ie sand) can be applied over the surface to protect from cracking.

6.0 GENERAL COMMENT

Occasionally, the subsurface soil conditions between the completed boreholes may be found different (or may be interpreted to be different) from those expected. This can also occur with groundwater conditions, especially after climatic changes. If such differences appear to exist, we recommend that you immediately contact us.

Yours truly,



Jarrod Gornall
Senior Geotechnical Engineer

Tin Maung
Principal Geotechnical Engineer

Attachments:

- Addendum
- Site location plan
- Plan showing borehole and DCP test locations
- Borehole logs with explanatory note
- Dynamic Cone Penetrometer test report
- Laboratory test reports

ADDENDUM

LIMITS OF INVESTIGATION

The recommendations made in this report are based on the assumption that the test results are representative of the overall subsurface conditions. However, it should be noted that even under optimum circumstances, actual conditions in some parts of the building site may differ from those said to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal all that is hidden by earth, rock and time.

The client should also be aware that our recommendations refer only to our test site locations and the ground level at the time of testing.

The recommendations in this report are based on the following: -

a) The information gained from our investigation.
b) The present "state of the art" in testing and design.
c) The building type and site treatment conveyed to us by the client.
d) Historical Information

Should the client or their agent have omitted to supply us with the correct relevant information, or make significant changes to the building type and/or building envelope, our report may not take responsibility for any consequences and we reserve the right to make an additional charge if more testing is necessary.

Not withstanding the recommendations made in this report, we also recommend that whenever footings are close to any excavations or easements, that consideration should be given to deepening the footings.

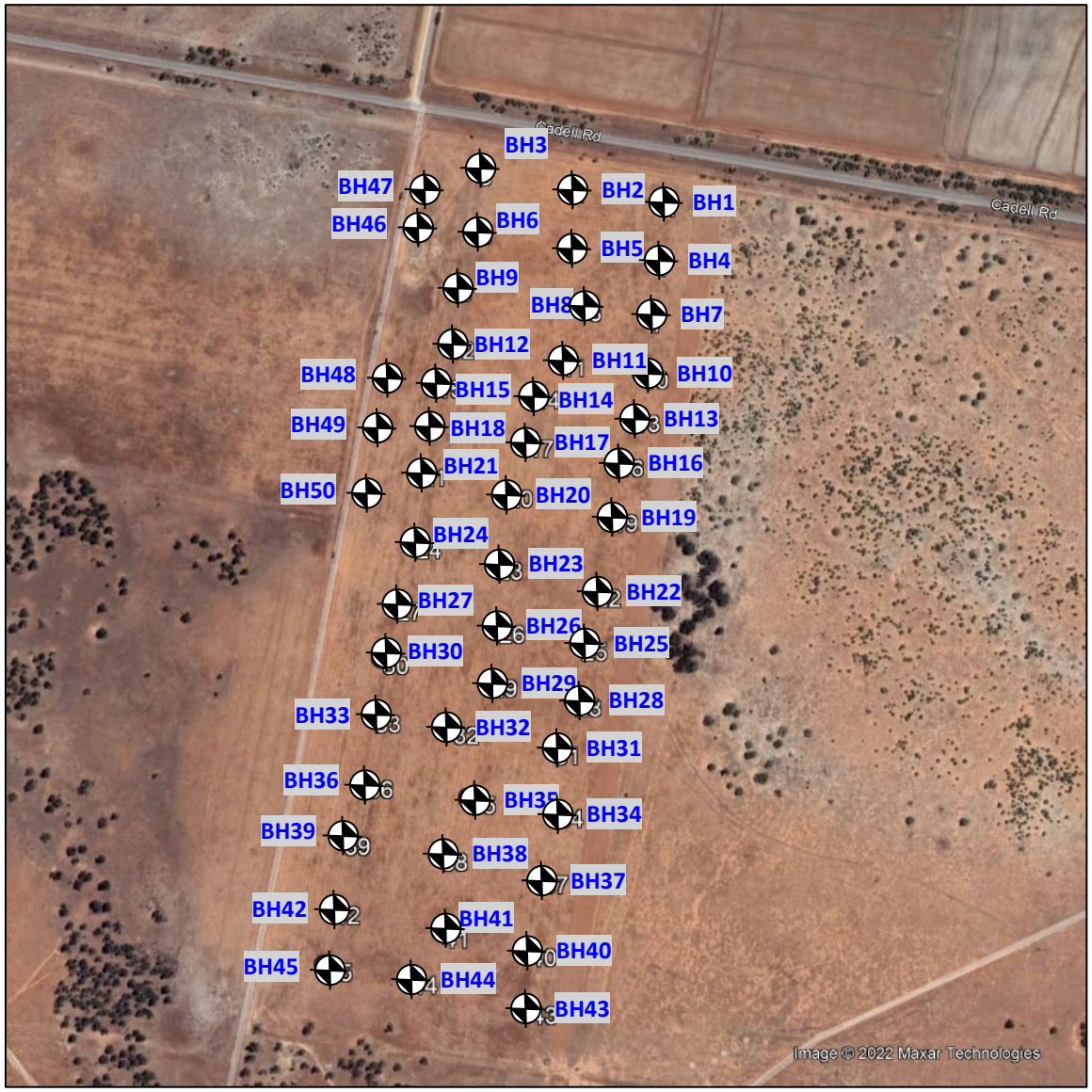
Unless otherwise stated in our commission, any dimensions or slope direction and magnitude should not be used for any building costing calculations and/or positioning. Any sketch supplied should be considered as only an approximate pictorial evidence of our work.

N

Aitken Rowe Testing Laboratories Pty Ltd

Registration Number: GS22-25

Client: KILLORAN AG PTY LTD – COLEAMBALLY, NSW
Project: GEOTECHNICAL INVESTIGATION
PROPOSED COMPOSTING FACILITY
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW
SITE LOCALITY PLAN



Aitken Rowe Testing Laboratories Pty Ltd

Registration Number: GS22-25

Client: KILLORAN AG PTY LTD – COLEAMBALLY, NSW

Project: GEOTECHNICAL INVESTIGATION
PROPOSED COMPOSTING FACILITY
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW
BOREHOLE LOCATION PLAN

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **1**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***31/01/2022***
GPS N: ***6132107***
E: ***0391152***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
SP-SM	FILL: SAND; fine to coarse grained, with silt fines of low plasticity, orange brown		M	L-MD				FILL: Appears moderately compacted 'Uncontrolled'
Cl	FILL: CLAY; medium plasticity, trace sand, red brown		MC>PL	St.	D	1A		
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.				NATURAL
		1.0						
CH	CLAY; high plasticity, trace sand, grey red brown		MC<PL	VSt.-H				
CH	CLAY; high plasticity, trace sand, grey	1.5			D	1B	17.1	
		2.0						
	End of Borehole (BH1) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **2**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***31/01/2022***
GPS N: ***6132125***
E: ***0391029***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
~~SP-SM~~	~~FILL: SAND; fine to coarse grained, with silt fines of low plasticity, orange brown~~		M	MD				
CH	FILL: CLAY; medium plasticity, trace sand, red brown		MC>PL	St.-VSt.				FILL: Appears moderately compacted 'Uncontrolled'
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.				NATURAL
		1.0						
CH	CLAY; high plasticity, trace sand, grey red brown		MC<PL	VSt.-H				
CH	CLAY; high plasticity, trace sand, grey	1.5						
		2.0						
	End of Borehole (BH2) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **3**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***31/01/2022***
GPS N: ***6132146***
E: ***0390908***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
SP-SM	FILL: SAND; fine to coarse grained, with fines of low plasticity, orange brown		M	LD				
CH	FILL: CLAY; medium plasticity, trace sand, red brown		MC>PL	St.				FILL: Appears moderately compacted 'Uncontrolled'
CH	CLAY; high plasticity, trace sand, red brown	0.5						NATURAL
CH	CLAY; high plasticity, trace sand, trace gravel, grey red brown	1.0	MC<PL	VSt.				
CH	CLAY; high plasticity, trace sand, trace gravel, grey	1.5			D	3A		
		2.0						
	End of Borehole (BH3) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **4**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***31/01/2022***
GPS N: ***6132027***
E: ***0391142***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	FILL: Sandy CLAY; medium plasticity, fine to coarse sand, orange brown		MC>PL	St.	D	4A		FILL: Appears moderately compacted 'Uncontrolled'
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC<PL	VSt.	D	4B	18.5	NATURAL
CH	CLAY; high plasticity, trace sand, grey	1.0			D	4C		
		1.5						
		2.0						
	End of Borehole (BH4) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **5**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***31/01/2022***
GPS N: ***6132047***
E: ***0391031***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CL	FILL: Sandy CLAY; low plasticity, fine to coarse sand, orange brown		MC≤PL	F-St.				FILL: Appears moderately compacted 'Uncontrolled'
CI	FILL: CLAY; medium plasticity, trace sand, red brown		MC>PL	St.	D	5A		
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC<PL	VSt.				NATURAL
		1.0						
CH	CLAY; high plasticity, trace sand, grey			VSt.-H				
		1.5			D	5B		
		2.0						
	End of Borehole (BH5) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **6**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***31/01/2022***
GPS N: ***6132067***
E: ***0390912***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	FILL: CLAY; medium plasticity, with fine to medium sand, grey orange red		MC<PL	St.	D	6A		FILL: Appears moderately compacted 'Uncontrolled'
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC≥PL	St.-VSt.				NATURAL
		1.0						
CI	CAY; medium plasticity, trace sand, grey	1.5	MC<PL	VSt.				
		2.0						
	End of Borehole (BH6) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **7**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131952***
E: ***0391140***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	FILL: Clayey SILT; low plasticity, trace sand, orange brown		MC<PL	F	D	7A		FILL: Appears moderately compacted 'Uncontrolled'
CH	CLAY; high plasticity, trace sand, red brown		MC≤PL	St.-VSt.	D	7B		NATURAL
		0.5	MC<PL					
		1.0						
CH	CLAY; high plasticity, trace sand, grey			VSt.				
		1.5			D	7C		
		2.0						
	End of Borehole (BH7) @ 2.0m							
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **8**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131966***
E: ***0391058***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CL-CI	FILL: Silty CLAY; low to medium plasticity, trace sand, orange red brown		MC<PL	F-St.	D	8A		FILL: Appears moderately compacted 'Uncontrolled'
CH	CLAY; high plasticity, trace sand, red orange brown	0.5	MC<PL	VSt.	D	8B	17.0	NATURAL
		1.0						
CH	CLAY; high plasticity, trace sand, grey	1.5			D	8C		
		2.0						
		2.5						
		3.0	MC>PL					
		3.5			D	8D		
		4.0						
		4.5						
	End of Borehole (BH8) @ 4.8m	5.0						Refusal on hard clay
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **9**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131990***
E: ***0390889***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	FILL: CLAY; medium plasticity, trace sand, trace silt, grey red brown		MC≥PL	St.	D	9A		FILL: Appears moderately compacted 'Uncontrolled'
CH	CLAY; high plasticity, trace sand, red brown	0.5		St.-VSt.	D	9B		NATURAL
CI	CLAY; medium plasticity, trace sand, yellow grey	1.0	MC<PL	VSt.				
		1.5			D	9C		
CI-CH	CLAY; medium to high plasticity, trace sand, grey	2.0						
		2.5			D	9D		
CH	CLAY; high plasticity, trace sand, grey	3.0						
		3.5			D	9E		
		4.0						
	End of Borehole (BH9) @ 4.2m	4.5						Refusal on hard clay
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **10**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131878***
E: ***0391131***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CL-CI	TOPSOIL: CLAY; low to medium plasticity, trace sand, orange brown red		MC>PL	F				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC<PL	St.-VSt.	D	10A	18.6	
CH	CLAY; high plasticity, trace sand, grey	1.0						
		1.5						
		2.0			D	10B	12.2	
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
	End of Borehole (BH10) @ 4.9m	5.0						Refusal on hard clay
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **11**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131893***
E: ***0391025***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, red orange brown		MC≥PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC>PL	St.-VSt.				
		1.0						
CH	CLAY; high plasticity, trace sand, grey		MC≥PL	VSt.				
		1.5						
		2.0						
	End of Borehole (BH11) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **12**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131914***
E: ***0390880***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	TOPSOIL: Silty CLAY; medium plasticity, trace sand, red orange brown		MC≥PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC>PL	St.-VSt.				
CI	CLAY; medium plasticity, trace sand, orange yellow brown	1.0	MC<PL					
CH	CLAY; high plasticity, trace sand, grey	1.5	MC≥PL	VSt.				
	End of Borehole (BH12) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **13**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131821***
E: ***0391122***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC≥PL	St.				NATURAL
Cl	CLAY; medium plasticity, trace sand, red orange brown	0.5	MC>PL	St.-VSt.	D	13A	22.0	
Cl-CH	CLAY; medium to high plasticity, trace sand, yellow grey orange	1.0	MC<PL	VSt.	D	13B		
CH	CLAY; high plasticity, trace sand, grey	1.5	MC≤PL	VSt.-H				
	End of Borehole (BH13) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **14**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131850***
E: ***0390993***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, red brown orange		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC>PL	St.-VSt.				
CI-CH	CLAY; medium to high plasticity, trace sand, red orange grey	1.0	MC<PL	VSt.				
CH	CLAY; high plasticity, trace sand, grey	1.5	MC≥PL					
	End of Borehole (BH14) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **15**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131863***
E: ***0390867***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, red orange brown		MC>PL	St.				NATURAL
Cl	CLAY; high plasticity, trace sand, red brown	0.5	MC≤PL	St.-VSt.	D	15A		
Cl-CH	CLAY; medium to high plasticity, trace sand, yellow grey brown	1.0	MC<PL		D	15B		
CH	CLAY; high plasticity, trace sand, grey	1.5	MC≤PL	VSt.				
		2.0						
	End of Borehole (BH15) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **16**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***1/02/2022***
GPS N: ***6131763***
E: ***0391103***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, red orange brown		MC≥PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red orange brown	0.5	MC<PL	St.-VSt.	D	16A	16.4	
CH	CLAY; high plasticity, trace sand, grey	1.0	MC≤PL	VSt.				
		1.5			D	16B		
		2.0						
	End of Borehole (BH16) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **17**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***2/02/2022***
GPS N: ***6131787***
E: ***0390987***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	TOPSOIL: Silty CLAY; medium plasticity, trace sand, red orange brown		MC≤PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red orange brown	0.5	MC>PL	VSt.				
CI-CH	CLAY; medium to high plasticity, trace sand, red brown grey	1.0						
CH	CLAY; high plasticity, trace sand, grey yellow	1.5						
		2.0			D	17A		
		2.5						
CH	CLAY; high plasticity, trace sand, grey	3.0						
		3.5						
		4.0						
		4.5						
	End of Borehole (BH17) @ 4.7m	5.0						Refusal on hard clay
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **18**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6151815***
E: ***0390847***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CL	TOPSOIL: Silty CLAY; low plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red orange brown	0.5		VSt.				
CI	CLAY; medium plasticity, with fine to medium sand, yellow brown	1.0		St.-VSt.	D	18A	9.7	
		1.5						
CH	CLAY; high plasticity, trace sand, yellow grey	2.0	MC>PL	VSt.	D	18B		
	End of Borehole (BH18) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **19**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131692***
E: ***0391098***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red orange brown	0.5		VSt.	D	19A		
CI-CH	CLAY; medium to high plasticity, trace sand, grey yellow orange	1.0	MC≥PL					
CH	CLAY; high plasticity, trace sand, grey	1.5			D	19B		
		2.0						
	End of Borehole (BH19) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **20**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131722***
E: ***0390963***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red orange brown	0.5		VSt.	D	20A		
CI-CH	CLAY; medium to high plasticity, trace sand, yellow orange grey	1.0			D	20B		
CH	CLAY; high plasticity, trace sand, yellow grey	1.5	MC≤PL					
	End of Borehole (BH20) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **21**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131748***
E: ***0390852***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC>PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC≥PL	VSt.	D	21A		
Cl-CH	CLAY; medium to high plasticity, trace sand, red yellow grey	1.0	MC≤PL		D	21B		
		1.5						
CH	CLAY; high plasticity, trace sand, yellow grey	2.0	MC≥PL					
		2.5						
CH	CLAY; high plasticity, trace sand, grey	3.0	MC≤PL					
		3.5						
		4.0						
	End of Borehole (BH21) @ 4.1m	4.5						Refusal on hard clay
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **22**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131596***
E: ***0391080***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.	D	22A		
		1.0						
CH	CLAY; high plasticity, trace sand, grey	1.5						
		2.0			D	22B	14.4	
		2.5						
		3.0		VSt.-H				
		3.5						
		4.0						
	End of Borehole (BH22) @ 4.2m	4.5						Refusal on hard clay
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **23**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131629***
E: ***0390954***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown red		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.	D	23A		
Cl-CH	CLAY; medium to high plasticity, trace sand, yellow grey orange	1.0						
CH	CLAY; high plasticity, trace sand, yellow grey	1.5						
		2.0						
	End of Borehole (BH23) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **24**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131655***
E: ***0390850***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC≥PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC≤PL	VSt.				
CH	CLAY; high plasticity, trace sand, yellow brown grey	1.0						
CH	CLAY; high plasticity, trace sand, yellow grey	1.5	MC≥PL					
	End of Borehole (BH24) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **25**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131528***
E: ***0391065***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC≥PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC<PL	VSt.				
CH	CLAY; high plasticity, trace sand, yellow grey brown	1.0			D	25A		
CH	CLAY; high plasticity, trace sand, yellow grey	1.5	MC>PL		D	25B		
	End of Borehole (BH25) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **26**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131549***
E: ***0390960***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.				
CH	CLAY; high plasticity, trace sand, yellow grey	1.0	MC≥PL					
		1.5						
		2.0						
	End of Borehole (BH26) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **27**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131576***
E: ***0390829***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.	D	27A	13.3	
CH	CLAY; high plasticity, trace sand, yellow grey	1.0			D	27B		
		1.5						
		2.0						
	End of Borehole (BH27) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **28**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131458***
E: ***0391060***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.	D	28A		
		1.0						
CH	CLAY; high plasticity, trace sand, yellow orange grey	1.5			D	28B		
		2.0						
	End of Borehole (BH28) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **29**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131481***
E: ***0390953***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC≤PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC<PL	VSt.	D	29A	15.7	
		1.0						
CH	CLAY; high plasticity, trace sand, yellow grey	1.5	MC>PL					
		2.0						
		2.5			D	29B		
		3.0						
			MC≥PL	VSt.-H				
		3.5						
		4.0						
		4.5						
	End of Borehole (BH29) @ 4.5m	5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **30**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131508***
E: ***0390815***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.	D	30A		
CH	CLAY; high plasticity, trace sand, yellow grey brown	1.0	MC≤PL		D	30B		
		1.5						
		2.0						
	End of Borehole (BH30) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **31**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131398***
E: ***0391036***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.				
CI-CH	CLAY; medium to high plasticity, trace sand, yellow orange grey	1.0	MC≤PL					
CH	CLAY; high plasticity, trace sand, grey	1.5	MC≥PL					
	End of Borehole (BH31) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **32**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131422***
E: ***0390908***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
Cl	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC≥PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC>PL	VSt.				
CI-CH	CLAY; medium to high plasticity, trace sand, yellow grey brown	1.0	MC≤PL					
CH	CLAY; high plasticity, trace sand, grey	1.5	MC≥PL					
	End of Borehole (BH32) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **33**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***3/02/2022***
GPS N: ***6131435***
E: ***0390809***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI	TOPSOIL: Silty CLAY; medium plasticity, trace sand, orange brown		MC>PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.				
CH	CLAY; high plasticity, trace sand, yellow grey brown	1.0	MC≤PL					
		1.5						
CH	CLAY; high plasticity, trace sand, yellow grey		MC≥PL					
		2.0						
	End of Borehole (BH33) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **34**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131321***
E: ***0391043***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.	D	34A	13.1	
CH	CLAY; high plasticity, trace sand, yellow orange grey	1.0	MC≤PL					
		1.5			D	34B		
		2.0						
	End of Borehole (BH34) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **35**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131336***
E: ***0390933***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.				
CI	CLAY; medium plasticity, trace sand, yellow grey brown	1.0		St.-VSt.	D	35A	9.7	
		1.5						
		2.0						
	End of Borehole (BH35) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **36**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131354***
E: ***0390804***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.	D	36A		
CI-CH	CLAY; medium to high plasticity, trace sand, yellow grey brown	1.0	MC≤PL	St.-VSt.	D	36B		
		1.5						
		2.0						
	End of Borehole (BH36) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **37**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131240***
E: ***0391027***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.	D	37A		
CI-CH	CLAY; medium to high plasticity, trace sand, yellow grey brown	1.0			D	37B		
		1.5	MC≤PL					
		2.0						
	End of Borehole (BH37) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **38**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131266***
E: ***0390901***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, orange brown	0.5		VSt.	D	38A		
CI-CH	CLAY; medium to high plasticity, trace sand, yellow orange grey	1.0	MC≥PL		D	38B		
CH	CLAY; high plasticity, trace sand, grey yellow	1.5						
		2.0			D	38C		
		2.5						
CH	CLAY; high plasticity, trace sand, trace gravel, grey yellow brown	3.0		VSt.-H				
		3.5			D	38D		
		4.0						
CH	CLAY; high plasticity, trace sand, grey brown	4.5		H				
					D	38E		
		5.0						Water added to drill
		5.5						
		6.0						

End of Borehole (BH38) @ 6.0m

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **39**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131284***
E: ***0390779***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, orange brown	0.5		VSt.	D	39A	13.1	
CH	CLAY; high plasticity, trace sand, yellow brown grey	1.0	MC≥PL		D	39B		
		1.5						
		2.0						
	End of Borehole (BH39) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **40**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131152***
E: ***0391016***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC≤PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5	MC>PL	VSt.	D	40A		
CH	CLAY; high plasticity, trace sand, yellow grey brown	1.0 1.5	MC≤PL	St.-VSt.	D	40B		
CH	CLAY; high plasticity, trace sand, grey yellow	2.0 2.5 3.0 3.5 4.0 4.5	MC=PL	VSt. VSt.-H	D	40C		
	End of Borehole (BH40) @ 4.5m	5.0 5.5 6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **41**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131173***
E: ***0390908***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC≤PL	St.				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5		VSt.				
CI-CH	CLAY; medium to high plasticity, trace sand, yellow orange grey	1.0						
CH	CLAY; high plasticity, trace sand, yellow grey	1.5	MC≥PL					
	End of Borehole (BH41) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **42**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131200***
E: ***0390771***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5		VSt.	D	42A		
CI-CH	CLAY; medium to high plasticity, trace sand, yellow orange grey	1.0			D	42B		
		1.5						
CH	CLAY; high plasticity, trace sand, yellow grey	2.0	MC≥PL		D	42C		
		2.5						
CH	CLAY; high plasticity, trace sand, grey	3.0		VSt.-H				
		3.5						
		4.0						
	End of Borehole (BH42) @ 4.2m	4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **43**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131083***
E: ***0391020***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5	MC≤PL	VSt.				
CI	CLAY; medium plasticity, with fine to medium sand, yellow orange grey	1.0		St.-VSt.	D	43A	8.5	
CH	CLAY; high plasticity, trace sand, yellow grey	1.5	MC≥PL	VSt.-H	D	43B		
	End of Borehole (BH43) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **44**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131117***
E: ***0390871***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5		VSt.				
CI-CH	CLAY; medium to high plasticity, trace sand, yellow orange grey	1.0			D	44A		
		1.5						
CH	CLAY; high plasticity, trace sand, yellow grey	2.0	MC≥PL	VSt.-H				
	End of Borehole (BH44) @ 2.0m	2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **45**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***4/02/2022***
GPS N: ***6131131***
E: ***0390765***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Clayey SILT; low to medium plasticity, trace sand, orange brown		MC<PL	St.				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5	MC>PL	VSt.				
CI-CH	CLAY; medium to high plasticity, trace sand, yellow orange grey	1.0	MC≤PL					
CH	CLAY; high plasticity, trace sand, yellow grey	1.5	MC≥PL	VSt.-H				
	End of Borehole (BH45) @ 2.0m	2.0						
		2.5						
		3.0						
		3.5						
		4.0						
		4.5						
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: GDL

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **46**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***7/02/2022***
GPS N: ***6132071***
E: ***0390835***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CI-CH	FILL: CLAY; medium to high plasticity, with fine to coarse sand, brown		MC<PL	St.				FILL: Appears moderately compacted 'Uncontrolled'
CH	FILL: CLAY; high plasticity, trace sand, red brown			VSt.				
CL-CI	Sandy Silty CLAY; low to medium plasticity, fine to coarse sand, red orange			St.				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5	MC>PL	VSt.	D	46A	16.8	SOMC = 21.6%
		1.0						
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, trace gravel, grey yellow brown		MC<PL		D	46B	9.2	SOMC = 14.5%
		1.5						
		2.0						
CI	CLAY; medium plasticity, with fine to coarse sand, mottled grey orange							
		2.5						
		3.0			D	46C	15.0	
		3.5						
CH	CLAY; high plasticity, with fine to coarse sand, mottled grey orange yellow	4.0						
		4.5						
	End of Borehole (BH46) @ 4.5m							
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **47**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***7/02/2022***
GPS N: ***6132114***
E: ***0390837***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
CH	FILL: CLAY; high plasticity, trace sand, red brown		MC<PL	St.-VSt.				FILL: Appears moderately compacted 'Uncontrolled'
CL-CI	Sandy CLAY; low to medium plasticity, fine to coarse sand, red brown			St.				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5	MC>PL	St.-VSt.				3-4% <OMC
ML	Clayey SILT; low plasticity, with fine to coarse sand, grey yellow brown	1.0	MC<PL	VSt.				
		1.5			D	47A	12.3	SOMC = 17.1%
		2.0						
CI	CLAY; medium plasticity, with fine to coarse sand, mottled grey orange		MC>PL					3% <OMC
		2.5						
		3.0						
		3.5						
		4.0						
CI-CH	CLAY; medium to high plasticity, with fine to coarse sand, mottled yellow orange grey							
		4.5						
	End of Borehole (BH47) @ 4.5m							
		5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **48**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***7/02/2022***
GPS N: ***6131873***
E: ***0390810***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	Sandy Clayey SILT; low plasticity, fine to coarse sand, yellow brown		MC<PL	F				NATURAL
CI	CLAY; medium plasticity, trace sand, red brown	0.5		VSt.				
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, trace gravel, grey yellow brown	1.0 1.5		St.-VSt.				
CI	CLAY; medium plasticity, with fine to coarse sand, mottled grey orange	2.0 2.5 3.0	MC>PL	VSt.				3% <OMC
		3.5 4.0 4.5		VSt.-H				
	End of Borehole (BH48) @ 4.5m	5.0 5.5 6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **49**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***7/02/2022***
GPS N: ***6131805***
E: ***0390803***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Sandy Clayey SILT; low plasticity, fine to coarse sand, yellow brown		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.				
CI	Silty CLAY; medium plasticity, with fine to coarse sand, yellow brown	1.0						
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, trace gravel, yellow brown	1.5		St.-VSt.	D	49A	10.5	SOMC = 15.5%
		2.0						
SC	Clayey SAND; fine to coarse grained, fines of low plasticity, yellow orange	2.5	M	D	D	49B		
CI	CLAY; medium plasticity, with fine to coarse sand, trace gravel, mottled grey orange	3.0	MC>PL	VSt.				5% <OMC
		3.5			D	49C	16.3	
		4.0						
		4.5						
	End of Borehole (BH49) @ 4.5m	5.0						
		5.5						
		6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

Borehole No.: **50**
Sheet No.: 1 of 1

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***7/02/2022***
GPS N: ***6131739***
E: ***0390794***

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test F.M.C. %	Remarks & Field Records
ML	TOPSOIL: Sandy Clayey SILT; low plasticity, fine to coarse sand, yellow orange		MC<PL	St.				NATURAL
CH	CLAY; high plasticity, trace sand, red brown	0.5		VSt.				
CL	Sandy Silty CLAY; low plasticity, fine to coarse sand, trace gravel, yellow brown	1.0 1.5 2.0						
CI	CLAY; medium plasticity, with fine to coarse sand, trace gravel, mottled grey orange	2.5 3.0 3.5 4.0 4.5	MC>PL					3-4% <OMC
	End of Borehole (BH50) @ 4.5m	5.0 5.5 6.0						

Registration No.: GS22-25

Location: Geotechnical Investigation - Proposed Composting Facility, Lot 107, No. 1578 Cadell Road, Gale Vale, NSW

Client: Killoran Ag Pty Ltd - Coleambally, NSW

Logged By: MS

Scale: As shown

Dry on completion

AITKEN ROWE TESTING LABORATORIES PTY LTD

LOG SYMBOLS

LOG COLUMN	SYMBOLS	DEFINITION
Groundwater Record	▼	Standing water level. Time delay following completion of drilling may be shown.
	▶—	Groundwater seepage into borehole or excavation noted during drilling or excavation.
Samples	**D**	Small disturbed bag sample taken between the depths indicated by lines.
	B	Bulk disturbed sample taken between the depths indicated by lines.
	U	Undisturbed 50mm diameter tube sample taken between the depths indicated by lines
Field Tests	**N=17** **4, 7, 10**	Standard Penetration Test (S.P.T.) performed between depths indicated by lines. Individual figures show blows per 150mm penetration driven by SPT hammer.
	N_c **5** **7** **3**	Dynamic Cone Penetration Test performed between depths indicated by lines. Individual figures show blows per 100mm penetration for 60 degree solid cone driven by 9 Kg hammer.
Moisture Condition (Cohesive Soils) (Cohensionless Soils)	**MC>PL**	Moisture content estimated to be greater than plastic limit.
	MC=PL	Moisture content estimated to be approx. equal to plastic limit.
	MC<PL	Moisture content estimated to be less than plastic limit.
	D	DRY – runs freely through fingers.
	M	MOIST – does not run freely but no free water visible on soil surface.
	W	WET – free water visible on soil surface.
Consistency (Cohesive Soils)	**VS**	VERY SOFT – unconfined compressive strength less than 25kPa.
	S	SOFT – unconfined compressive strength 25-50 kPa.
	F	FIRM – unconfined compressive strength 50-100kPa.
	St.	STIFF – unconfined compressive strength 100-200kPa.
	VSt.	VERY STIFF – unconfined compressive strength 200 – 400kPa.
	H	HARD – unconfined compressive strength greater than 400kPa.
Relative Density (Cohensionless Soils)		**Description** / **Density Index Range % S.P.T.** / **'N' Value Range Blows/300mm**
	VL	VERY LOOSE / <15 / 0-4
	L	LOOSE / 15-35 / 4-10
	MD	MEDIUM DENSE / 35-65 / 10-30
	D	DENSE / 65-85 / 30-50
	VD	VERY DENSE / >85 / > 50
Hand Penetrometer Readings	**300** **250** **280**	Numbers indicate individual test results in kPa on representative undisturbed material unless noted otherwise.
Laboratory Test	**L.S. %**	Linear Shrinkage (As per RTA Method T113)
	M.C. %	Field Moisture Content (As per Australian Standard AS1289.2.1.1 or RTA Method T120)
	I_{ss}	Shrink-Swell Index (As per Australian Standard AS1289.7.1.1)
Remarks	**'V' bit**	Hardened steel 'V' shaped bit.
	'TC' bit	Tungsten Carbide wing bit.
	T^{60}	Penetration of auger string in mm under static load of rig rear axle without rotation of augers.

AITKEN ROWE TESTING LABORATORIES PTY LTD

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

SAMPLE No.: 46B

TEST REPORT - GRADING/HYDROMETER

SAMPLED BY: ARTL

DATE SAMPLED: 31/01-04/02/2022

CLIENT: KILLORAN AG PTY LTD - COLEAMBALLY, NSW

DATE SUBMITTED: 04/02/2022

TEST METHOD: AS1289.3.6.3
AS1289.3.6.1

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION
PROPOSED COMPOSTING FACILITY

TEST HOLE: BH46

DEPTH: 1000-2000

TEST DATES: 27/02-02/03/2022

LOCATION: LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

HYDROMETER TYPE: BULB

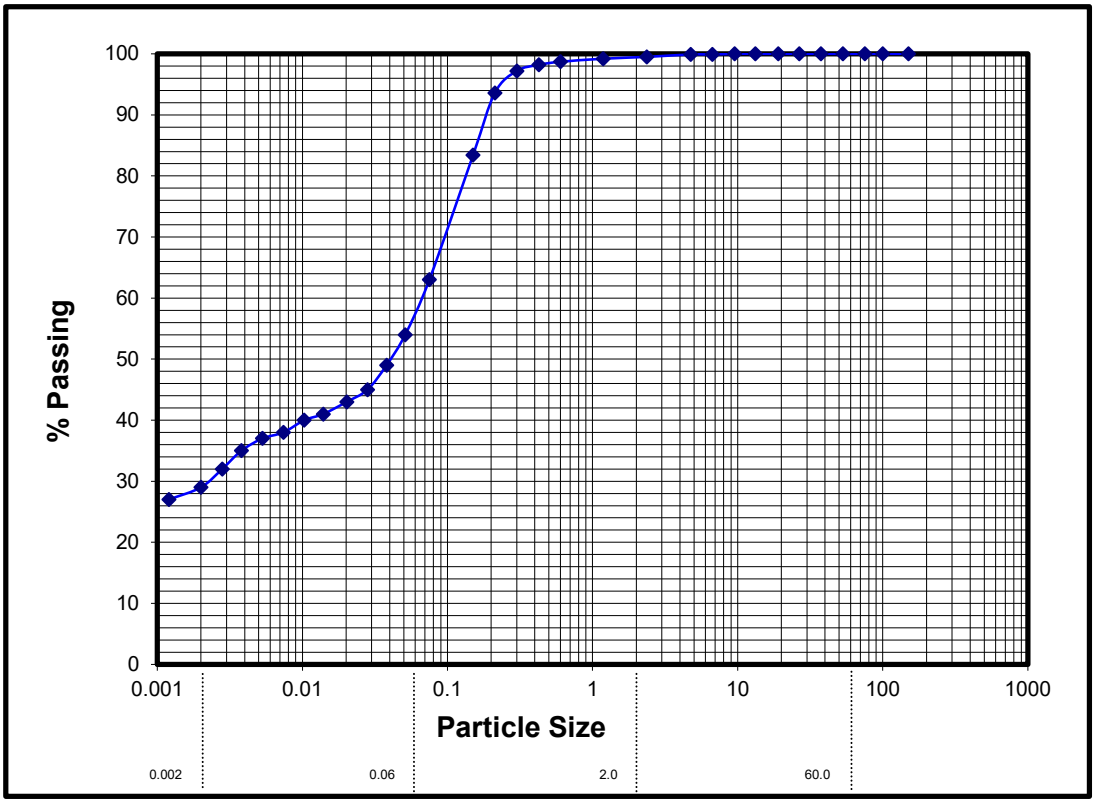
REGISTRATION No.: R36 **GS22-25**

METHOD OF DISPERSION

i). AGENT ☒
ii). MIXER ☒
iii). HYDROMETER ☒
CALIBRATED IN g/l

PERCENTAGE LOSS IN PRETREATMENT: NIL

SOIL CLASSIFICATION: Sandy Silty CLAY; low platicity, fine to coarse grained, trace gravel



Particle Size (mm)	% Passing
150	100
100	100
75	100
53	100
37.5	100
26.5	100
19	100
13.2	100
9.5	100
6.7	99.9
4.75	99.9
2.36	99.5
1.18	99.2
0.6	98.7
0.425	98.2
0.3	97.2
0.212	93.6
0.15	83.4
0.075	63
0.06	55.6
0.02	42.8
0.006	36.5
0.002	29.4

CLAY	SILT			26%	SAND			44%	GRAVEL			1%	COBBLES
	FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		
29%	7%	6%	13%		24%	18%	2%		1%	0%	0%		0%

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

APPROVED SIGNATORY Jarrod Gornall

DATE: 21/03/2022

AITKEN ROWE TESTING LABORATORIES PTY LTD

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

SAMPLE No.: 47A

TEST REPORT - GRADING/HYDROMETER

SAMPLED BY: ARTL

DATE SAMPLED: 31/01-04/02/2022

CLIENT: KILLORAN AG PTY LTD - COLEAMBALLY, NSW

DATE SUBMITTED: 04/02/2022

TEST METHOD: AS1289.3.6.3
AS1289.3.6.1

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION
PROPOSED COMPOSTING FACILITY

TEST HOLE: BH47

DEPTH: 800-2100

TEST DATES: 27/02-02/03/2022

LOCATION: LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

HYDROMETER TYPE: BULB

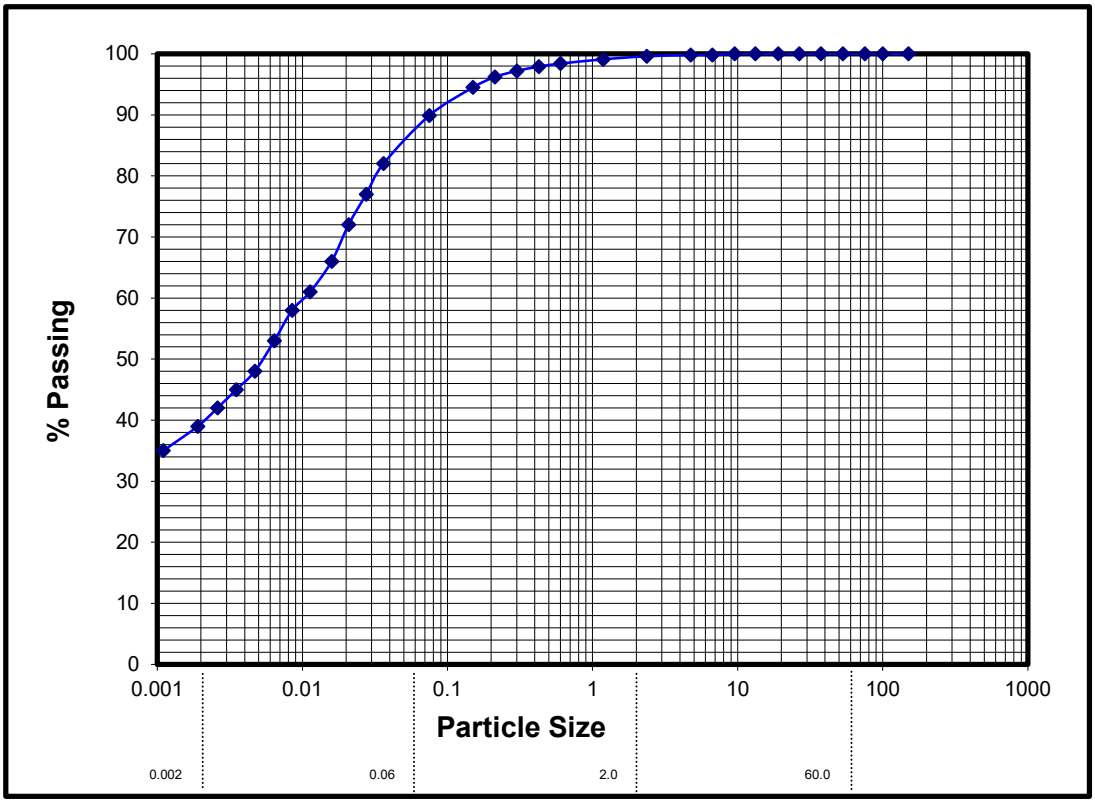
REGISTRATION No.: R36 **GS22-25**

METHOD OF DISPERSION

i). AGENT ☒
ii). MIXER ☒
iii). HYDROMETER ☒
CALIBRATED IN g/l

PERCENTAGE LOSS IN PRETREATMENT: NIL

SOIL CLASSIFICATION: Clayey SILT; low plasticity, with fine to coarse sand



Particle Size (mm)	% Passing
150	100
100	100
75	100
53	100
37.5	100
26.5	100
19	100
13.2	100
9.5	100
6.7	99.8
4.75	99.8
2.36	99.6
1.18	99.1
0.6	98.4
0.425	97.9
0.3	97.2
0.212	96.2
0.15	94.5
0.075	89.9
0.06	80.3
0.02	70.0
0.006	51.5
0.002	39.1

CLAY	SILT			40%	SAND			19%	GRAVEL			0%	COBBLES
	FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		
39%	12%	18%	10%		12%	5%	2%		0%	0%	0%		0%

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

APPROVED SIGNATORY Jarrod Gornall

DATE: 21/03/2022

AITKEN ROWE TESTING LABORATORIES PTY LTD

ARTL Wagga: 4/2 Riedell Street, Wagga Wagga NSW 2650

SAMPLE No.: 49A

TEST REPORT - GRADING/HYDROMETER

SAMPLED BY: ARTL

DATE SAMPLED: 31/01-04/02/2022

CLIENT: KILLORAN AG PTY LTD - COLEAMBALLY, NSW

DATE SUBMITTED: 04/02/2022

TEST METHOD: AS1289.3.6.3
AS1289.3.6.1

JOB DESCRIPTION: GEOTECHNICAL INVESTIGATION
PROPOSED COMPOSTING FACILITY

TEST HOLE: BH49

DEPTH: 1000-2200

TEST DATES: 27/02-02/03/2022

LOCATION: LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

HYDROMETER TYPE: BULB

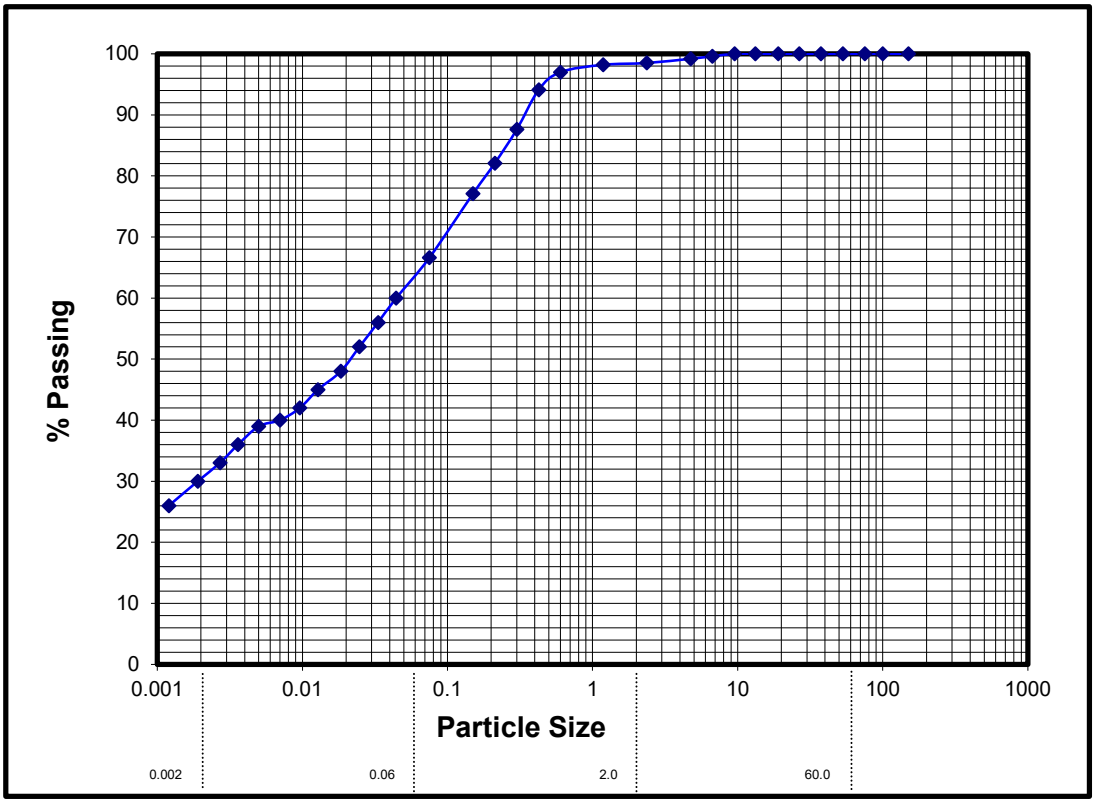
REGISTRATION No.: R36 **GS22-25**

METHOD OF DISPERSION

i). AGENT ☒
ii). MIXER ☒
iii). HYDROMETER ☒
CALIBRATED IN g/l

PERCENTAGE LOSS IN PRETREATMENT: NIL

SOIL CLASSIFICATION: Sandy Silty CLAY; low plasticity, fine to coarse grained, trace gravel



Particle Size (mm)	% Passing
150	100
100	100
75	100
53	100
37.5	100
26.5	100
19	100
13.2	100
9.5	100
6.7	99.6
4.75	99.2
2.36	98.5
1.18	98.2
0.6	97
0.425	94.1
0.3	87.6
0.212	82.1
0.15	77.1
0.075	66.6
0.06	59.8
0.02	48.6
0.006	38.5
0.002	29.9

CLAY	SILT			30%	SAND			39%	GRAVEL			2%	COBBLES
	FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		FINE	MEDIUM	COARSE		
30%	9%	10%	11%		17%	15%	7%		1%	1%	0%		0%

NATA
WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing.

ACCREDITATION NUMBER: 4679

APPROVED SIGNATORY Jarrod Gornall

DATE: 21/03/2022

Aitken Rowe Testing Laboratories Pty Ltd

ARTL Griffith: 17b Battista Street, Griffith NSW 2680

PERMEABILITY / DISPERSION REPORT

CLIENT: KILLORAN AG PTY LTD - COLEAMBALLY, NSW

PROJECT: GEOTECHNICAL INVESTIGATION

PROPOSED COMPOSTING FACILITY

LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

MATERIAL TYPE: REFER TO BOREHOLE LOGS

SOURCE OF MATERIAL: IN-SITU BOREHOLES

PORTION OF STRUCTURE: PROPOSED BORROW PIT AREA

SURCHARGES ADDED: 2.65

PRESSURE APPLIED: 3KPa

% RETAINED ON NOMINAL SIEVE: NIL

NOMINAL SIEVE SIZE: -19.0

PAGE 1 OF 1

SAMPLED BY: ARTL

DATE SAMPLED: 31/01/22-4/02/22

DATE SUBMITTED: 4/02/2022

TEST DATE/S: 23/02/22-2/03/22

ORDER No.: *

TEST METHODS: AS1289.6.7.2
AS1289.5.1.1
AS1289.2.1.1
*

REGISTRATION No: R23 **GS22-25**

SAMPLE No.	TEST PIT No.	DEPTH (m)	MAX. DRY DENSITY (t/m^3)	OPTIMUM MOISTURE (%)	DRY DENSITY OF SPECIMEN (t/m^3)	MOULDING MOISTURE (%)	ACTUAL % OF MDD	PERMEABILITY m / sec AS1289.6.7.2	EMERSON CLASS AS1289.3.8.1
46A	BH46	400-1000	1.66	21.6	1.63	21.7	98	$7x10^{-11}$	2
46B	BH46	1000-2000	1.81	14.5	1.78	14.5	98	$9x10^{-10}$	2
47A	BH47	800-2100	1.72	17.1	1.63	17.4	98	$7x10^{-10}$	2
49A	BH49	1000-2200	1.79	15.5	1.75	15.7	98	$4x10^{-10}$	2
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*

REMARKS: *

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APPROVED SIGNATORY: .....

Jarrod Gornall

DATE: 21/03/2022

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Griffith: 17b Battista Street, Griffith NSW 2680

*

SAMPLED BY: ARTL

DATE SAMPLED: 31/01/22-4/02/22

DATE SUBMITTED: 4/02/2022

SAMPLING METHOD: AS1289.1.2.1

SAMPLING CLAUSE: 6.5.3

DATES TESTED: 10/02/22-17/03/22

ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : KILLORAN AG PTY LTD - COLEAMBALLY, NSW

JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION
PROPOSED COMPOSTING FACILITY,
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : REFER TO BOREHOLE LOGS

REGISTRATION No : R28 **GS22-25**

		SAMPLE NUMBER :	1B	4B	8B	10A	10B	13A
		SAMPLING LOCATION :	BH1	BH4	BH8	BH10	BH10	BH13
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	1300-1800	500-800	400-700	100-400	1500-2500	100-300
TESTS	TEST ELEMENT		*	*	*	*	*	*
AS1289.3.6.1		PASS 100.0mm SIEVE %	*	*	*	*	*	*
		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	*	*
		PASS 6.70mm SIEVE %	*	*	*	*	*	*
		PASS 4.75mm SIEVE %	*	*	*	*	*	*
		PASS 2.36mm SIEVE %	100	*	*	100	100	*
AS1141.19	WHOLE SAMPLE	PASS 425 µm SIEVE %	99	*	*	99	99	*
		PASS 75 µm SIEVE %	96	*	*	94	93	*
		LESS THAN 13.5 µm %	84	*	*	75	81	*
AS1141.19	-2.36mm	PASS 425 µm SIEVE %	99	*	*	99	99	*
		PASS 75 µm SIEVE %	96	*	*	94	93	*
		LESS THAN 13.5 µm %	84	*	*	75	81	*
		OBSERVATIONS	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	64	*	*	64	63	*
AS1289.3.2.1		PLASTIC LIMIT %	22	*	*	22	22	*
AS1289.3.3.1		PLASTICITY INDEX	42	*	*	42	41	*
		PREPARATION METHOD	AS1289.1.1-5.3	*	*	AS1289.1.1-5.3	AS1289.1.1-5.3	*
AS1289.5.1.1		STANDARD MAX. DRY DENSITY t/m^3	*	*	*	*	*	*
		OPTIMUM MOISTURE CONTENT %	*	*	*	*	*	*
		CURING DURATION HOURS	*	*	*	*	*	*
AS1289.3.4.1		LINEAR SHRINKAGE %	*	*	*	*	*	*
		LENGTH OF MOULD mm	*	*	*	*	*	*
		CRUMBLING (CR) OR CURLING (CU) OCCURRED	*	*	*	*	*	*
AS1289.2.1.1		FIELD MOISTURE CONTENT %	17.1	18.5	17.0	18.6	12.2	22.0
AS1289.3.8.1 (AIR DRIED)		EMERSON CLASS	1	1	2	2	2	1
		TYPE OF WATER	DISTILLED	DISTILLED	DISTILLED	DISTILLED	DISTILLED	DISTILLED

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

ACCREDITATION NUMBER 4679

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All samples are oven dried and dry sieved during prep. unless otherwise stated

APPROVED SIGNATORY : .....

Jarrod Gornall

DATE: 14/03/2022

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Griffith: 17b Battista Street, Griffith NSW 2680

*

SAMPLED BY: ARTL

DATE SAMPLED: 31/01/22-4/02/22

DATE SUBMITTED: 4/02/2022

SAMPLING METHOD: AS1289.1.2.1

SAMPLING CLAUSE: 6.5.3

DATES TESTED: 10/02/22-17/03/22

ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : KILLORAN AG PTY LTD - COLEAMBALLY, NSW

JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION
PROPOSED COMPOSTING FACILITY,
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : REFER TO BOREHOLE LOGS

REGISTRATION No : R28 **GS22-25**

		SAMPLE NUMBER :	16A	18A	22B	27A	29A	34A
		SAMPLING LOCATION :	BH16	BH18	BH22	BH27	BH29	BH34
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	100-400	700-1200	1500-3000	200-500	200-500	200-700
TESTS	TEST ELEMENT		*	*	*	*	*	*
AS1289.3.6.1		PASS 100.0mm SIEVE %	*	*	*	*	*	*
		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	*	*
		PASS 6.70mm SIEVE %	*	*	*	*	*	*
		PASS 4.75mm SIEVE %	*	*	*	*	*	*
		PASS 2.36mm SIEVE %	100	100	100	100	*	100
AS1141.19	WHOLE SAMPLE	PASS 425 µm SIEVE %	99	95	99	99	*	98
		PASS 75 µm SIEVE %	93	70	96	89	*	92
		LESS THAN 13.5 µm %	75	47	82	69	*	76
AS1141.19	-2.36mm	PASS 425 µm SIEVE %	99	95	99	99	*	98
		PASS 75 µm SIEVE %	93	70	96	89	*	92
		LESS THAN 13.5 µm %	75	47	82	69	*	76
		OBSERVATIONS	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	69	37	57	66	*	68
AS1289.3.2.1		PLASTIC LIMIT %	23	18	21	21	*	24
AS1289.3.3.1		PLASTICITY INDEX	46	19	36	45	*	44
		PREPARATION METHOD	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	*	AS1289.1.1-5.3
AS1289.5.1.1		STANDARD MAX. DRY DENSITY t/m^3	*	*	*	*	*	*
		OPTIMUM MOISTURE CONTENT %	*	*	*	*	*	*
		CURING DURATION HOURS	*	*	*	*	*	*
AS1289.3.4.1		LINEAR SHRINKAGE %	*	*	*	*	*	*
		LENGTH OF MOULD mm	*	*	*	*	*	*
		CRUMBLING (CR) OR CURLING (CU) OCCURRED	*	*	*	*	*	*
AS1289.2.1.1		FIELD MOISTURE CONTENT %	16.4	9.7	14.4	13.3	15.7	13.1
AS1289.3.8.1 (AIR DRIED)		EMERSON CLASS	1	2	2	1	1	2
		TYPE OF WATER	DISTILLED	DISTILLED	DISTILLED	DISTILLED	DISTILLED	DISTILLED

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing.
The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

ACCREDITATION NUMBER 4679

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All samples are oven dried and dry sieved during prep. unless otherwise stated

APPROVED SIGNATORY : .....

Jarrod Gornall

DATE: 14/03/2022

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Griffith: 17b Battista Street, Griffith NSW 2680

*

SAMPLED BY: ARTL

DATE SAMPLED: 31/01/22-4/02/22

DATE SUBMITTED: 4/02/2022

SAMPLING METHOD: AS1289.1.2.1

SAMPLING CLAUSE: 6.5.3

DATES TESTED: 10/02/22-17/03/22

ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : KILLORAN AG PTY LTD - COLEAMBALLY, NSW

JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION
PROPOSED COMPOSTING FACILITY,
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : REFER TO BOREHOLE LOGS

REGISTRATION No : R28 **GS22-25**

		SAMPLE NUMBER :	35A	39A	43A	46A	46B	46C
		SAMPLING LOCATION :	BH35	BH39	BH43	BH46	BH46	BH46
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	1000-1500	200-500	700-1200	400-1000	1000-2000	2000-3900
TESTS	TEST ELEMENT		*	*	*	*	*	*
AS1289.3.6.1		PASS 100.0mm SIEVE %	*	*	*	*	*	*
		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	*	*
		PASS 6.70mm SIEVE %	*	*	*	*	*	*
		PASS 4.75mm SIEVE %	*	*	*	*	*	*
		PASS 2.36mm SIEVE %	*	100	100	*	*	*
AS1141.19	WHOLE SAMPLE	PASS 425 µm SIEVE %	*	97	98	*	*	*
		PASS 75 µm SIEVE %	*	87	75	*	*	*
		LESS THAN 13.5 µm %	*	68	49	*	*	*
AS1141.19	-2.36mm	PASS 425 µm SIEVE %	*	97	98	*	*	*
		PASS 75 µm SIEVE %	*	87	75	*	*	*
		LESS THAN 13.5 µm %	*	69	49	*	*	*
		OBSERVATIONS	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	*	68	37	39	29	41
AS1289.3.2.1		PLASTIC LIMIT %	*	21	16	15	16	14
AS1289.3.3.1		PLASTICITY INDEX	*	47	21	24	13	27
		PREPARATION METHOD	*	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3
AS1289.5.1.1		STANDARD MAX. DRY DENSITY t/m^3	*	*	*	1.66	1.81	*
		OPTIMUM MOISTURE CONTENT %	*	*	*	21.6	14.5	*
		CURING DURATION HOURS	*	*	*	188	188	*
AS1289.3.4.1		LINEAR SHRINKAGE %	*	*	*	*	*	*
		LENGTH OF MOULD mm	*	*	*	*	*	*
		CRUMBLING (CR) OR CURLING (CU) OCCURRED	*	*	*	*	*	*
AS1289.2.1.1		FIELD MOISTURE CONTENT %	9.7	13.1	8.5	16.8	9.2	15.0
AS1289.3.8.1 (AIR DRIED)		EMERSON CLASS	1	3	2	2	2	2
		TYPE OF WATER	DISTILLED	DISTILLED	DISTILLED	DISTILLED	DISTILLED	DISTILLED

NATA ACCREDITED FOR TECHNICAL COMPETENCE

Accredited for compliance with ISO/IEC 17025 - Testing. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

ACCREDITATION NUMBER 4679

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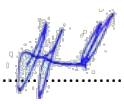
All samples are oven dried and dry sieved during prep. unless otherwise stated

APPROVED SIGNATORY : .....



Jarrod Gornall

DATE: 14/03/2022

AITKEN ROWE Testing Laboratories Pty Ltd

ARTL Griffith: 17b Battista Street, Griffith NSW 2680

*

SAMPLED BY: ARTL

DATE SAMPLED: 31/01/22-4/02/22

DATE SUBMITTED: 4/02/2022

SAMPLING METHOD: AS1289.1.2.1

SAMPLING CLAUSE: 6.5.3

DATES TESTED: 10/02/22-17/03/22

ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : KILLORAN AG PTY LTD - COLEAMBALLY, NSW

JOB DESCRIPTION : GEOTECHNICAL INVESTIGATION
PROPOSED COMPOSTING FACILITY,
LOT 107, No. 1578 CADELL ROAD, GALA VALE, NSW

MATERIAL SOURCE : IN-SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : REFER TO BOREHOLE LOGS

REGISTRATION No : R28 **GS22-25**

		SAMPLE NUMBER :	47A	49A	49C	*	*	*
		SAMPLING LOCATION :	BH47	BH49	BH49	*	*	*
		DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	800-2100	1000-2200	3000-4300	*	*	*
TESTS	TEST ELEMENT		*	*	*	*	*	*
AS1289.3.6.1		PASS 100.0mm SIEVE %	*	*	*	*	*	*
		PASS 75.0mm SIEVE %	*	*	*	*	*	*
		PASS 53.0mm SIEVE %	*	*	*	*	*	*
		PASS 37.5mm SIEVE %	*	*	*	*	*	*
		PASS 26.5mm SIEVE %	*	*	*	*	*	*
		PASS 19.0mm SIEVE %	*	*	*	*	*	*
		PASS 13.2mm SIEVE %	*	*	*	*	*	*
		PASS 9.50mm SIEVE %	*	*	*	*	*	*
		PASS 6.70mm SIEVE %	*	*	*	*	*	*
		PASS 4.75mm SIEVE %	*	*	*	*	*	*
		PASS 2.36mm SIEVE %	*	*	*	*	*	*
AS1141.19	WHOLE SAMPLE	PASS 425 µm SIEVE %	*	*	*	*	*	*
		PASS 75 µm SIEVE %	*	*	*	*	*	*
		LESS THAN 13.5 µm %	*	*	*	*	*	*
AS1141.19	-2.36mm	PASS 425 µm SIEVE %	*	*	*	*	*	*
		PASS 75 µm SIEVE %	*	*	*	*	*	*
		LESS THAN 13.5 µm %	*	*	*	*	*	*
		OBSERVATIONS	*	*	*	*	*	*
AS1289.3.1.2		LIQUID LIMIT %	37	30	46	*	*	*
AS1289.3.2.1		PLASTIC LIMIT %	15	16	13	*	*	*
AS1289.3.3.1		PLASTICITY INDEX	22	14	33	*	*	*
		PREPARATION METHOD	AS1289.1.1-5.3	AS1289.1.1-5.3	AS1289.1.1-5.3	*	*	*
AS1289.5.1.1		STANDARD MAX. DRY DENSITY t/m^3	1.72	1.79	*	*	*	*
		OPTIMUM MOISTURE CONTENT %	17.1	15.5	*	*	*	*
		CURING DURATION HOURS	188	189	*	*	*	*
AS1289.3.4.1		LINEAR SHRINKAGE %	*	*	*	*	*	*
		LENGTH OF MOULD mm	*	*	*	*	*	*
		CRUMBLING (CR) OR CURLING (CU) OCCURRED	*	*	*	*	*	*
AS1289.2.1.1		FIELD MOISTURE CONTENT %	12.3	10.5	16.3	*	*	*
AS1289.3.8.1		EMERSON CLASS	2	2	2	*	*	*
(AIR DRIED)		TYPE OF WATER	DISTILLED	DISTILLED	DISTILLED	*	*	*

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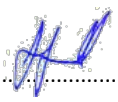


DATE: 14/03/2022

Jarrod Gornall

Appendix 3 – Noise Assessment

KILLORAN AG COMPOSTING FACILITY

NOISE AND VIBRATION IMPACT ASSESSMENT

REPORT NO. 17122-N
VERSION 1.1

OCTOBER 2023

PREPARED FOR

KILLORAN AG
1578 CADELL ROAD
GALA VALE NSW

DOCUMENT CONTROL

Version	Notes	Status	Date	Prepared	Reviewed	Approved
0.1	-	Draft	12/09/2023	NH		NH
1.0	-	Final	22/09/2023	NH		NH
1.1	-	Final	20/10/2023	NH		NH

TABLE OF CONTENTS

GLOSSARY OF ACOUSTIC TERMS

Most environments are affected by environmental noise which continuously varies. To describe the overall noise environment, a number of noise descriptors have been developed and these involve statistical and other analysis of the varying noise over sampling periods, typically taken as 15 minutes. The most common of these noise descriptors are defined below.

L_{Amax} The maximum noise level over a sample period is the maximum level, measured on fast response, during the sample period.

L_{A1} The L_{A1} level is the noise level which is exceeded for 1% of the sample period. During the sample period, the noise level is below the L_{A1} level for 99% of the time.

L_{A10} The L_{A10} level is the noise level which is exceeded for 10% of the sample period. During the sample period, the noise level is below the L_{A10} level for 90% of the time.

L_{A90} The L_{A90} level is the noise level which is exceeded for 90% of the sample period. During the sample period, the noise level is below the L_{A90} level for 10% of the time. This measure is commonly referred to as the background noise level.

L_{Aeq} The equivalent continuous sound level (L_{Aeq}) is the energy average of the varying noise over the sample period and is equivalent to the level of a constant noise which contains the same energy as the varying noise environment. This descriptor is a common measure of environmental noise.

ABL The Assessment Background Level is the single figure background level representing each assessment period (daytime, evening and night time) for each day.

RBL The Rating Background Level for each period is the median value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period – daytime, evening and night time.

1 INTRODUCTION

Killoran Ag Pty Ltd (Killoran Ag) proposes to establish a composting facility at 1578 Cadell Road, Gala Vale (the Site), which is legally described as Lot 107 &118 DP 756459 and Lot 1192 DP861844 in the Murrumbidgee Local Government Area (LGA).

The composting facility (the Proposal) would receive 99,000 tonnes per annum (tpa) of Category 1 and Category 2 organic materials (as referenced in Table 3 of the Composting Guidelines) including such waste types as poultry farm litter, food organics and garden organics (FOGO), waste straw, biosolids and manures. The organic materials would be windrowed and once the composting process is complete, would be removed from site in bulk or pelletised form. The use of a purpose-built pelletising machine in an existing farm building is also proposed.

SoundIN has been engaged by Killoran Ag to prepare a Noise and Vibration Impact Assessment for the Proposal.

No significant sources of vibration would be associated with the construction operation of the Proposal. Accordingly, no detailed assessment of vibration impacts is warranted.

2 THE PROPOSAL

2.1 Site Description

The site is located approximately 17km south of Coleambally via Kidman Way. The site has a history of agricultural use and is the primary location of the Killoran Ag operation who grow lucerne, wheat and other rotational crops. Killoran Ag's existing offices and farm shed are located on the site.

The site contains a single unsealed driveway with access from Cadell Road which is located on Lot 1192 DP861844 and continues to Lot 118 DP756459. The driveway is constructed of road base and has been compacted to create a hardstand. The driveway ends at the existing farm building which is used for storage. The farm building has a floor area of 1,600 m^2 and contains a water tank to hold stormwater. To the east of the farm building is the farm holding's offices. Another farm building is located to the west which is presently used for storage.

On Lot 107 DP756459 there is a paddock presently utilised for rotational crops. The cleared and cultivated portion of the lot is 45 ha in area. This paddock would be utilised for the composting pads. Killoran Ag has constructed some pads and is presently carrying out limited composting activities in this area to trial their system. The compost is used on their existing farm holdings in the area. A burrow pit and dam is also located on this lot adjacent to the paddock.

The site contains scattered native vegetation, none of which would be removed as part of the development.

2.2 Surrounding Land Use and Sensitive Receivers

Nearby isolated rural dwellings comprise the sensitive receivers near the development. These receivers are identified in **Table 2-1** and shown in **Figure 2-1**.

Table 2-1 Sensitive receivers

Receiver ID	Address	Description
R1	1308 Cadell Road, Gala Vale	Residence
R2	1189 Cadell Road, Gala Vale	Residence
R3	3583 Kidman Way, Coleambally	Residence
R4	132 Preston Road, Coleambally	Residence

2.3 Project Description

Killoran Ag is a multi-faceted agricultural and transport business which grows a variety of crops, farms sheep, places straw bedding in, and transports spent litter from the many poultry production operations in the region at the end of the grow out period. Having transported the litter to agricultural operations for direct application to land, Killoran Ag began planning the development of a composting facility to value add to the poultry litter and create a product with application for several types of farming operations. There is also a significant need for the processing and recovery of organic material from FOGO for reuse. The FOGO would be sourced from green bin collections of regional Council.

The composting facility will provide biologically active organic material for the amelioration of soils in regional irrigated and non-irrigated farm holdings regionally, and in northern NSW and Queensland.

The proposed development involves the establishment of a composting facility and construction of infrastructure to pelletise the material for the ultimate yearly input of 99,000 tonnes per year.

The facility would include the following:

- Establishment of compost pads
- Construction of a water / leachate recycling dam
- Use of a white bridge
- Improvements to site access
- Drainage infrastructure
- Water storage tank
- Retrospective approval of a shed and the use of pelletising plant within the shed
- Internal roads

It is proposed to receive spent bed litter from intensive livestock agriculture industries (up to 80% of total inputs at any given time), food and organics wastes from various food processors in the region and green bin waste from Council's (up to 30% of the total inputs at any given time). The material will be composted in windrows, before being sold in bulk or pelletised and sold as fertiliser in bulk bags. Specialised windrow mixing equipment would be utilised to turn over the windrows. It would take approximately 9-16 weeks for the composting process to complete. During this time the windrows would be turned over 6-8 times. Water would be added to compost as required from the water / leachate recycling dam. Other additives would be used to ensure the compost matures within optimal conditions.

The pelletiser will be housed in a shed with composting, windrowing and turning taking place in the open on the compost pads. Composting will take place on Lot 100 and the pelletiser will be located on Lot 106.

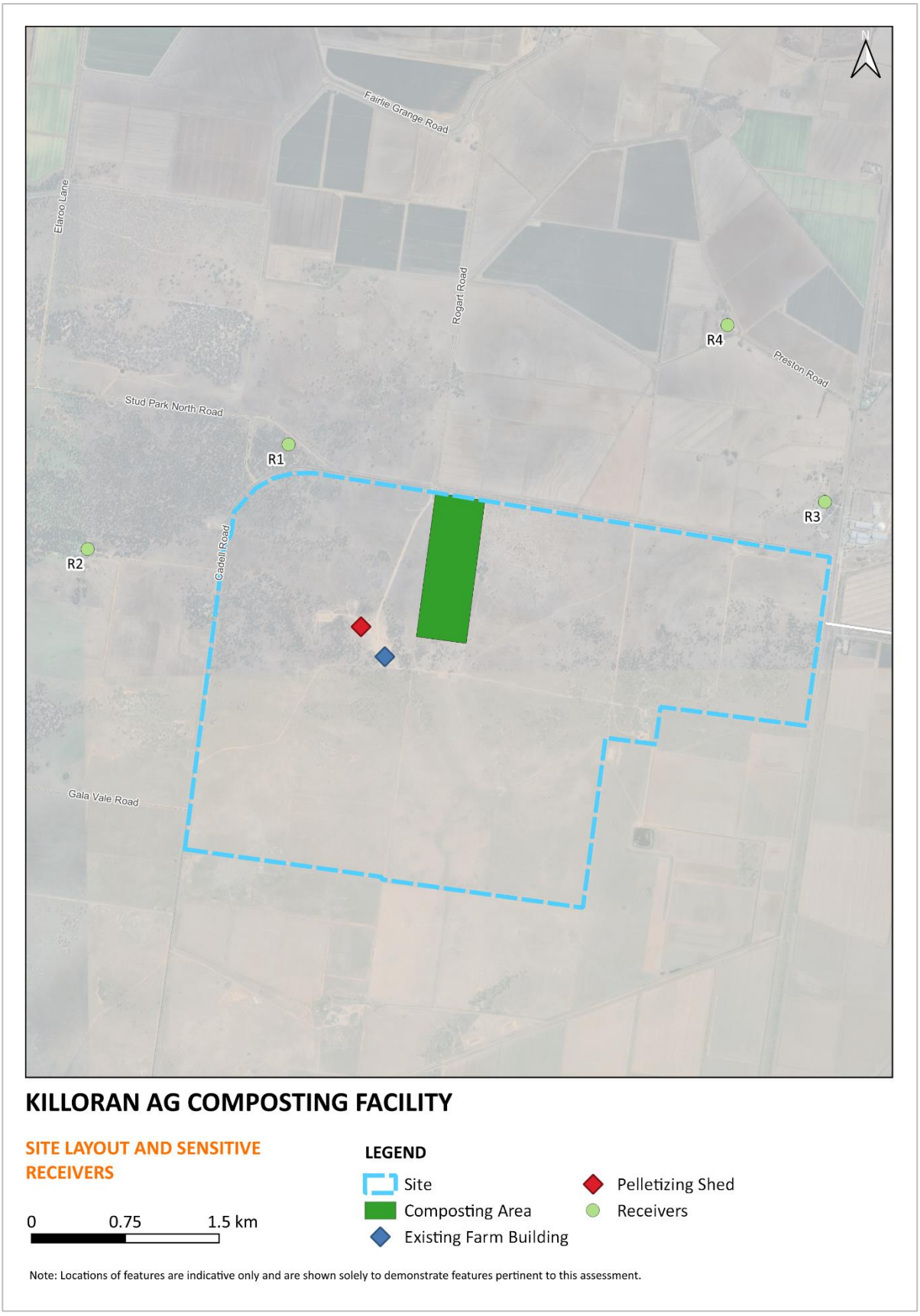
Access to the site is via Cadell Road which directly connects to Kidman Way approximately 2.7 km to

the east of the site. Kidman Way is a regional road under the control of Transport for NSW. Consultation with that authority will be required in relation to truck visitation through the intersection of Kidman Way and Cadell Road.

A proposed site footprint is presented in **Figure 2-1**, this provides a general outline of the location of the facility. The composting area would occupy at full build out of the facility an area of 45 ha. Composting pads would be created which drain to a water recycling area. The pads would be constructed to meet the requirements of the Department's Composting Guidelines. Water and leachate from the composting pads would be collected in a recycling dam for reapplication to the windrows.

The pelletiser will be housed in a shed in the approximate location on Lot 106 shown in red on **Figure 2-1**.

Figure 2-1 Site Layout and Sensitive Receivers



3 CONSTRUCTION NOISE ASSESSMENT

3.1 Construction Noise Management Levels

The *Interim Construction Noise Guideline* (ICNG) (DECC, 2009) recommends noise management levels (NML) to reduce the likelihood of noise impacts arising from construction activities. The ICNG NML for residential receivers are presented in **Table 3-1**.

Table 3-1 Construction NML – Residential Receivers

Time of day	Management level – $L_{Aeq,15min}$ (dBA)	How to apply
Recommended standard hours: Monday to Friday 7am to 6pm Saturday 8am to 1pm No work on Sundays or Public Holidays	Noise affected. RBL + 10dBA	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq,15min}$ is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to minimise noise. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected. 75dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. Where noise is above this level, the proponent should consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level. If no quieter work method is feasible and reasonable, and the works proceed, the proponent should communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.
Outside recommended standard hours	Noise affected. RBL + 5 dBA	A strong justification would typically be required for works outside the recommended standard hours. The proponent should apply all feasible and reasonable work practices to meet the noise affected level. Where all feasible and reasonable practices have been applied and noise is more than 5dBA above the noise affected level, the proponent should negotiate with the community. For guidance on negotiating agreements see *ICNG* section 7.2.2.

Noise monitoring has not been undertaken for the purpose of this assessment. Instead, a conservative approach has been taken whereby the minimum daytime RBL value of 35 dBA, as recommended in the *Noise Policy for Industry* (NPfI), has been adopted.

Construction activities associated with the Proposal would be conducted during standard daytime hours.

Project-specific construction NML for the most potentially affected receivers near the Site are presented in **Table 3-2**.

Table 3-2 Project-specific Construction NML

Receiver	Acceptable $L_{Aeq,15min}$ noise level (standard daytime hours) (dBA)	Highly affected noise level (dBA)
Nearby residences	45	75

3.2 Noise Modelling Methodology and Assumptions

Operational noise emissions from the Proposal have been modelled using SoundPLAN v8.2, using the CONCAWE prediction algorithm. The CONCAWE noise propagation model is used around the world and is widely accepted as an appropriate model for predicting noise over significant distances. Factors addressed in the noise modelling are:

- Equipment noise level emissions and locations
- Shielding from structures
- Noise attenuation due to geometric spreading
- Meteorological conditions
- Ground absorption
- Atmospheric absorption.

3.3 Construction Plant, Activities and Sound Power Levels

Sound levels of typical construction equipment are listed in **Table 3-3**. Equipment sound levels have been determined from Transport for NSW's *Construction Noise Estimator* and the UK Department of Environment, Food and Rural Affairs' (DEFRA) *Noise Database for Prediction of Noise on Construction and Open Sites*.

The table gives both Sound Power Level (SWL) and Sound Pressure Level (SPL) at seven metres from the equipment. SWL is independent of measurement position. Verification of plant noise is often done by measuring the SPL at seven metres.

Based on the information in **Table 3-3**, activity sound power levels for several key construction phases have been calculated and are presented in **Table 3-4**.

Table 3-4 presents typical worst-case construction source noise levels across a 15-minute period, considering the likely usage of plant during that time, termed the "activity sound power level". The activity sound power is considered to represent the typical worst-case level in a given 15-minute period. It is important to note that this sound power level is unlikely to be sustained at such a level for the duration of the activity. As a result, many 15-minute periods will be at lower levels.

Typical construction noise levels at sensitive receivers are predicted by modelling the activity sound power level across the works area. Worst-case construction noise levels are predicted by modelling the noisiest plant item in each scenario as a "moving point source" across the works area.

Table 3-3 Typical Construction Plant Sound Levels

Equipment	Sound Power Level, L_{Aeq} (dBA)	Sound Pressure Level at 7m, L_{Aeq} (dBA)
Backhoe	110	85
Truck	103	78
Hand-held power tools	100	75
Generator	103	78
Welder	105	80
Telehandler	106	81
Mobile crane	98	73
Dozer	116	91
Scraper	110	85
Grader	113	88
Roller	109	84
Excavator	110	85
Water cart	107	82
Concrete truck	109	84
Concrete pump	108	84
Concrete saw	118	93

Table 3-4 Construction Phase Activities and Associated Sound Power Levels

Code	Activity	Typical Equipment Used	Activity Sound Power Level (dBA)
E&D	Earthworks & Drainage	Dozer Scraper Grader Roller Backhoe Excavator Trucks Water cart	120
CON	Construction of weighbridge and ancillary infrastructure	Telehandler Mobile crane Truck Concrete truck Concrete pump Concrete saw Generator Welder Hand tools	120

3.4 Predicted Construction Noise Levels

The predicted $L_{Aeq,15min}$ noise levels at sensitive receivers during the identified activities are presented in **Table 3-5**.

The results indicate that:

- Noise levels are predicted to comply with the NML at all nearby receivers.
- Noise levels are not predicted to exceed the highly affected level of 75 dBA at any residential receivers.

Table 3-5 Predicted Construction Noise Levels

Receiver	Predicted Construction $L_{Aeq,15min}$ Noise Levels (dBA)		NML	Exceedance (dBA)
	E&D	CON		
R1	34-35	35-36	45	-
R2	23-26	25-26	45	-
R3	23-26	25-26	45	-
R4	25-26	26-27	45	-

4 OPERATIONAL NOISE ASSESSMENT

4.1 Operational Noise Trigger Levels

The *Noise Policy for Industry* (NPfI) (EPA, 2017) provides a framework for assessing environmental noise impacts from industrial premises and industrial development proposals in New South Wales.

The NPfI recommends the development of project noise trigger levels, which provide a benchmark for assessing a proposal or site. The project noise trigger levels should not be interpreted as mandatory noise criteria but, rather, as noise levels that, if exceeded, would indicate a potential noise impact on the community.

The project noise trigger level is the lower value of the project intrusiveness noise level and the project amenity noise level. The project intrusiveness noise level assesses the likelihood of noise being intrusive above the ambient noise level and is applied to residential receivers only. The project amenity noise level ensures the total industrial noise from all sources in the area does not rise above a maximum acceptable level.

The NPfI stipulates that project noise trigger levels are determined for the daytime (7am – 6pm), evening (6pm – 10pm) and night time (10pm – 7am) periods, as relevant. The determined trigger levels typically apply at the most affected point on or within the receiver property boundary.

4.1.1 Project Intrusiveness Noise Level

The intrusiveness noise level is the noise level 5 dBA above the rating background noise level (RBL) for each time period (daytime, evening or night time) of interest at a residential receiver. The RBL is derived from the measured L_{A90} noise levels.

The NPfI stipulates that project intrusiveness noise levels should not be set below 40 dBA during the daytime and 35 dBA in the evening and night time. Additionally, the NPfI recommends that the project intrusiveness noise level for evening is set at no greater than that for the daytime, and that the project intrusiveness level for night time is set at no greater than that for the evening and daytime.

A conservative approach has been adopted in this assessment whereby the minimum project intrusive noise levels recommended in the NPfI have been adopted. Intrusiveness noise levels for the project are summarised in **Table 4-1**.

Table 4-1 Project Intrusiveness Noise Levels

Receiver	Time of day [1]	RBL (dBA)	Project Intrusiveness noise level – $L_{Aeq,15min}$ (dBA)
R1 – R4	Day	35	40
	Evening	30	35
	Night	30	35

1. Day – 7am – 6pm; Evening = 6pm – 10pm; Night = 10pm – 7am.

4.1.2 Project Amenity Noise Levels

Project amenity noise levels aim to set a limit on continuing increases in noise levels from all industrial noise sources affecting a variety of receiver types; that is, the ambient noise level in an area from all industrial noise sources remains below recommended amenity noise levels.

The amenity assessment is based on noise criteria specific to land use and associated activities. The criteria relate only to industrial-type noise and do not include transportation noise (when on public transport corridors), noise from motor sport, construction noise, community noise, blasting, shooting ranges, occupational workplace noise, wind farms, amplified music/patron noise.

The amenity noise level aims to limit continuing increases in noise levels which may occur if the intrusiveness level alone is applied to successive development within an area.

The recommended amenity noise level represents the objective for total industrial noise at a receiver location. The project amenity noise level represents the objective for noise from a single industrial development at a receiver location.

To prevent increases in industrial noise due to the cumulative effect of several developments, the project amenity noise level for each new source of industrial noise is set at 5dBA below the recommended amenity noise level.

The following exceptions apply to determining the project amenity noise level:

- For high-traffic areas the amenity criterion for industrial noise becomes the $L_{Aeq,period(traffic)}$ minus 15dBA.
- In proposed developments in major industrial clusters.
- If the resulting project amenity noise level is at least 10 dB lower than the existing industrial noise level, the project amenity noise level can be set at 10 dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.
- Where cumulative industrial noise is not a consideration because no other industries are present in, or likely to be introduced into the area, the relevant amenity noise level is assigned as the project amenity noise level for the development.

Amenity noise levels are not used directly as regulatory limits. They are used in combination with the project intrusiveness noise level to assess the potential impact of noise, assess mitigation options and determine achievable noise requirements.

The project amenity noise levels are calculated from the recommended amenity noise levels presented in **Table 4-2**.

Table 4-2 Recommended Amenity Noise Levels

Receiver	Noise amenity area	Time of day [1]	Recommended amenity noise level – $L_{Aeq,period}$ (dBA)
Residential	Rural	Day	50
		Evening	45
		Night	40
	Urban	Day	55
		Evening	45
		Night	40
	Suburban	Day	60
		Evening	50
		Night	45
Hotels, motels, caretaker's quarters, holiday accommodation, permanent resident caravan parks	See column 4	See column 4	5 dBA above the recommended amenity noise level for a residence for the relevant noise amenity area and time of day.
School classroom (internal)	All	Noisiest 1-hour period when in use	35
Hospital ward:			
Internal	All	Noisiest 1-hour	35
External	All	Noisiest 1-hour	50
Place of worship (internal)	All	When in use	40
Area specifically reserved for passive recreation (e.g., national park)	All	When in use	50

Receiver	Noise amenity area	Time of day [1]	Recommended amenity noise level – $L_{Aeq,period}$ (dBA)
Active recreation area (e.g., school playground, golf course)	All	When in use	55
Commercial premises	All	When in use	65
Industrial premises	All	When in use	70
Industrial interface (applicable only to residential noise amenity areas)	All	All	Add 5 dBA to recommended noise amenity area

1. Day – 7am – 6pm; Evening = 6pm – 10pm; Night = 10pm – 7am.

Recommended amenity noise levels presented in **Table 4-2** represent the objective for total industrial noise at a receiver location. In the case of a single new noise source being proposed, the project amenity noise level represents the objective for noise from a single industrial development at the receiver location. This is typically calculated as the recommended amenity noise level minus 5 dBA.

Due to different averaging periods for the $L_{Aeq,15min}$ and $L_{Aeq,period}$ noise descriptors, the values of project intrusiveness and amenity noise levels cannot be compared directly when identifying noise trigger levels i.e. the most stringent values of each category. To make a comparison between descriptors, the NPfI assumes that the $L_{Aeq,15min}$ equivalent of an $L_{Aeq,period}$ noise level is equal to the $L_{Aeq,15min}$ level plus 3dB.

Residential receivers near the Proposal are classified as being in a “rural” noise amenity area.

The project amenity noise levels for the Proposal are presented in **Table 4-3**.

Table 4-3 Project Amenity Noise Levels

Receiver	Time of day [1]	Recommended amenity noise level – $L_{Aeq,period}$ (dBA)	Project amenity noise level – $L_{Aeq,15min}$ (dBA)
R1 – R4	Day	50	48
	Evening	45	43
	Night	40	38

1. Day – 7am – 6pm; Evening = 6pm – 10pm; Night = 10pm – 7am.

4.1.3 Project Noise Trigger Levels

The project intrusiveness noise levels and project amenity noise levels for sensitive receivers are summarised in **Table 4-4**. The project noise trigger levels (PNTL) – which are the lower values of the project intrusiveness noise levels and the project amenity noise levels – are highlighted in bold.

Table 4-4 Project Noise Trigger Levels

Receiver	Time of day [1]	Project intrusiveness noise level – $L_{Aeq,15min}$ (dBA)	Project amenity noise level – $L_{Aeq,15min}$ (dBA)
R1 – R4	Day	**40**	48
	Evening	**35**	43
	Night	**35**	38

1. Day – 7am – 6pm; Evening = 6pm – 10pm; Night = 10pm – 7am.

4.1.4 Maximum Noise Trigger Levels

Noise sources at night occurring over a short duration have the potential to cause sleep disturbance despite complying with project noise trigger levels. The Site operates on a 24-hour basis. Therefore, maximum noise level events need to be considered for potential sleep disturbance.

The NPfI recommends that, where the night time L_{Amax} receiver noise levels from a development exceeds 52 dBA or the RBL plus 15 dBA, whichever is the greater, then a more detailed assessment of potential sleep disturbance impacts is warranted. **Table 4-5** presents the maximum noise trigger levels for the receivers identified in this assessment.

Table 4-5 Maximum Noise Trigger Levels

Receiver	RBL (dBA)	RBL + 15 (dBA)	Maximum Noise Trigger Level (dBA)
R1 – R4	30	45	52

In accordance with the NPfI, in instances where night time $L_{Aeq,15min}$ noise levels exceed 40 dBA or the prevailing RBL plus 5 dBA, whichever is the greater, then a detailed assessment of potential sleep disturbance impacts is warranted. Since the night time project noise trigger level is less than 40 dBA for all nearby residential receivers, compliance with these noise trigger levels will ensure that no further assessment of night time $L_{Aeq,15min}$ noise levels, with regard to sleep disturbance, would be required.

4.2 Noise Modelling Methodology and Assumptions

Operational noise emissions from the Proposal have been modelled using SoundPLAN v8.2, using the CONCAWE prediction algorithm. The CONCAWE noise propagation model is used around the world and is widely accepted as an appropriate model for predicting noise over significant distances. Factors addressed in the noise modelling are:

- Equipment noise level emissions and locations
- Shielding from structures
- Noise attenuation due to geometric spreading
- Meteorological conditions
- Ground absorption
- Atmospheric absorption.

4.2.1 Meteorological Effects

At relatively large distances from a source, the resultant noise levels at receivers can be influenced by meteorological conditions, particularly temperature inversions and gradient winds. Where these factors are a feature of an area, their effect on resultant noise levels should be taken into account.

In accordance with the NPfI, the following default conditions have been modelled to account for potential noise-enhancing meteorology:

- Stability category F with 2. 0 m/s source-to-receiver winds.

It is noted that stability category F would only occur at night during temperature inversions, at which time the Proposal is very unlikely to operate. Therefore, the noise-enhancing meteorological conditions assumed for assessment purposes are conservative.

The SoundPLAN noise modelling software includes a feature that allows the model to be run with the “worst-case wind direction”. This option produces the highest noise level for each receiver due to noise-enhancing winds and has been used in the modelling.

Predicted noise levels associated with both standard meteorological conditions (“calm”) and noise enhancing (“NE”) meteorological conditions are presented in this assessment.

4.3 Operational Noise Sources and Assessment Scenarios

4.3.1 Continuous Noise Sources

Significant continuous noise sources associated with the operation of the Proposal are as follows:

- The pelletizing shed and associated generator.
- A telehandler, which would be used to load pelletized compost onto trucks.
- A tractor with a windrow turning attachment.
- Trucks bringing materials to and from site.

A site visit was conducted on five April 2023 to measure noise levels from the pelletizing shed and associated generator and the tractor with windrow turning attachment. Sound power levels (SWL) for the telehandler and trucks have been adopted from previous measurements conducted by SoundIN. SWL for significant noise sources associated with the operation of the Proposal a summarised in **Table 4-6**.

Table 4-6 Operational Noise Sources and Sound Power Levels

Item	Continuous SWL (dBA)
Pelletizing shed • **North and south (open) ends** • **East and West walls and roof sections**	 103 (each) 93 (each)
Generator	107
Telehandler	107
Tractor with windrow turning attachment	103
Trucks	103

For assessment purposes, it is assumed that all sources identified in **Table 4-6** are operating continuously. It is assumed that trucks are travelling back and forth both to the compost area and to the pelletizing shed.

4.3.2 Maximum Noise Level Sources

Pneumatic brakes on trucks are the most likely source of maximum (L_{Amax}) noise levels at sensitive receivers. The L_{Amax} sound power level of a truck parking brake can be up to 122 dBA.

4.4 Predicted Noise Levels

4.4.1 Predicted $L_{Aeq,15min}$ Noise Levels

The predicted $L_{Aeq,15min}$ noise levels at nearby residential receivers associated with the scenario outlined above are presented in **Table 4-7**.

Table 4-7 Predicted $L_{Aeq,15min}$ Noise Levels

Receiver	Predicted $L_{Aeq,15min}$ noise level (dBA)		Project noise trigger level (dBA)			Complies?
	Calm	NE	Day	Evening	Night	
R1	28	34	40	35	35	Yes
R2	23	28	40	35	35	Yes
R3	<20	<20	40	35	35	Yes
R4	<20	20	40	35	35	Yes

The results in **Table 4-7** indicate that predicted noise levels at all nearby receivers comply with the noise trigger levels at all times, under both calm and noise enhancing meteorological conditions.

Contour plots of operational noise levels during calm and noise enhancing meteorological conditions are presented in **Figure 4-1** and **Figure 4-2**, respectively.

4.4.2 Predicted L_{Amax} Noise Levels / Sleep Disturbance Assessment

The predicted night time L_{Amax} noise levels at nearby residential receivers due to the operation of the Proposal are presented in **Table 4-8**.

Table 4-8 Predicted L_{Amax} Noise Levels

Receiver ID	Predicted L_{Amax} Noise Level (dBA)		Maximum Noise Trigger Level (dBA)	Complies?
	Calm	NE		
R1	40	46	52	Y
R2	31	37	52	Y
R3	26	32	52	Y
R4	29	34	52	Y

The results in **Table 4-8** indicate that predicted noise levels at all nearby receivers comply with the maximum noise trigger levels at all times, under both calm and noise enhancing meteorological conditions.

Figure 4-1 Predicted Operational Noise Levels – Calm Meteorology

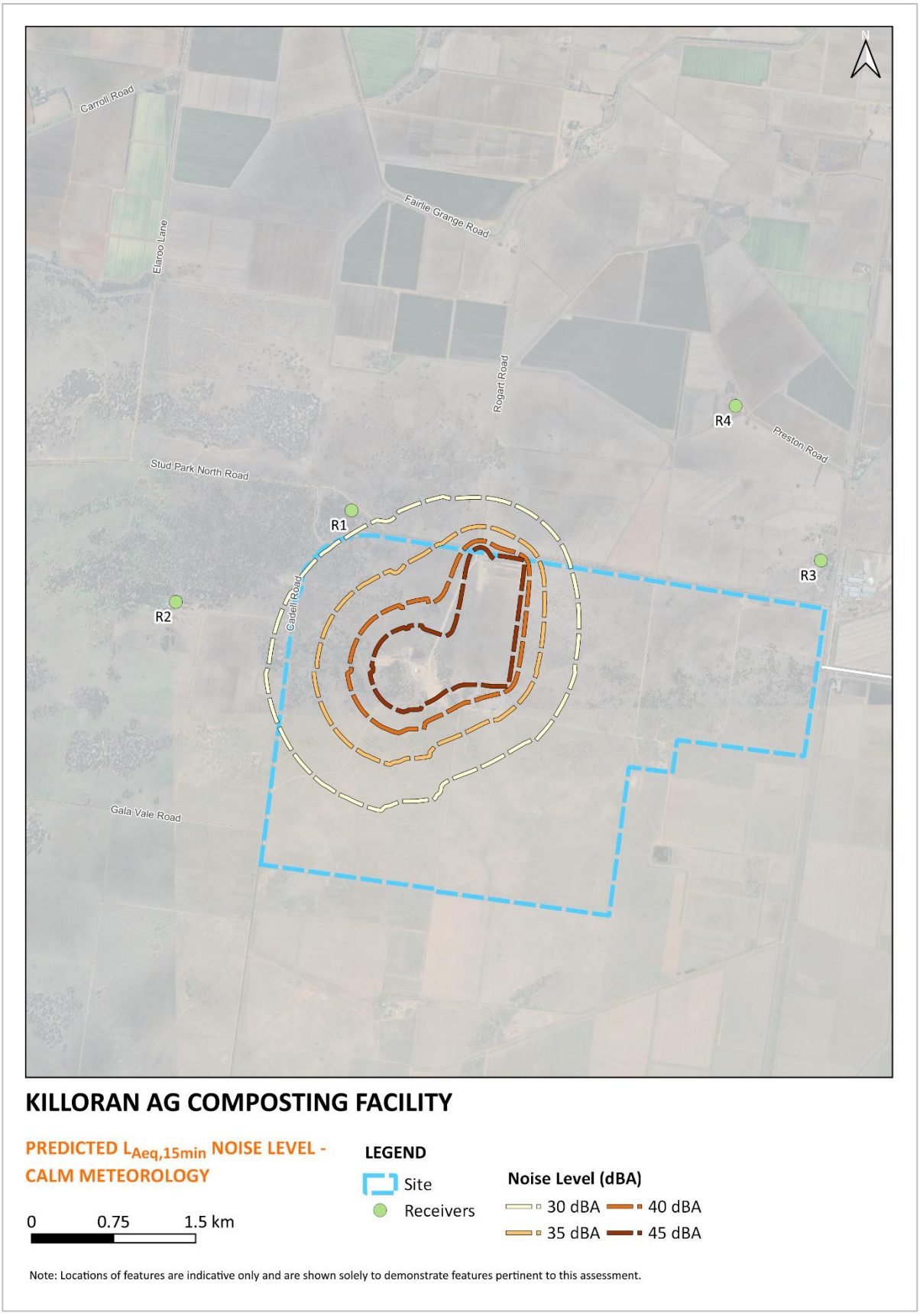
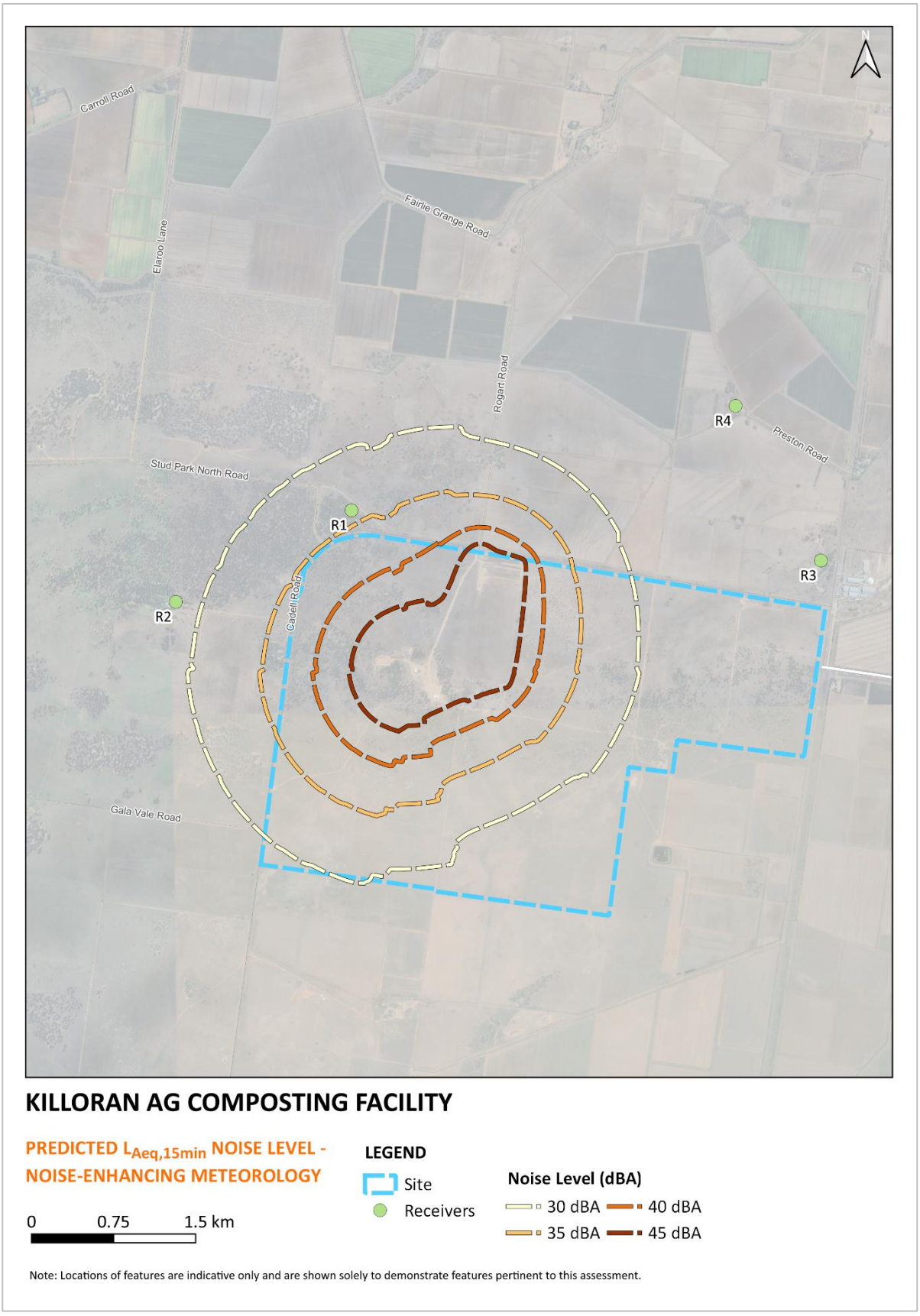


Figure 4-2 Predicted Operational Noise Levels – Noise Enhancing Meteorology



5 ROAD NOISE ASSESSMENT

The following Section assesses potential road noise impacts on sensitive receivers due to traffic generated by the Proposal.

Sensitive receivers most potentially affected by noise from traffic generated by the Proposal are residences along Kidman way, north of Cadell Road.

5.1 Road Noise Criteria

The *NSW Road Noise Policy* (RNP) (DECCW, 2011) sets out criteria for assessment of noise from traffic on public roads. The RNP sets out noise assessment criteria for "freeways", "arterial", "sub-arterial" and "local roads".

In accordance with the RNP, Kidman Way is considered an arterial road. The RNP impact assessment criteria for residential land uses affected by additional traffic on arterial roads are presented in **Table 5-1**.

Table 5-1 RNP Impact Assessment Criteria

Road	Category	Assessment criteria (dBA)	
		Day	Night
Kidman Way	Arterial	$L_{Aeq,15\ hour}$ 60 (external)	$L_{Aeq,9\ hour}$ 55 (external)

Note: Day = 7am – 10pm; Night = 10pm – 7am

With regard to the permissible increase in road traffic noise from a land use development the RNP states:

> *"For existing residences and other sensitive land uses affected by additional traffic on existing roads generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'."*

5.2 Road Noise Modelling

Road noise levels at the most potentially affected receivers along have been predicted using the Calculation of Road Traffic Noise (CoRTN) algorithm, and are based upon the following assumptions:

- Vehicle speeds are 100 km/h along Kidman Way.
- The facades of the nearest receivers to Kidman Way are set back approximately 65 metres from the road.

5.3 Existing Traffic Flows

According to the traffic impact assessment (TIA) prepared for the Proposal, prepared by Spotto Consulting (ref. P0196, dated 22 August 2022) the existing daily traffic volume along Kidman Way is 750 vehicles, with a heavy vehicle percentage of approximately 25%.

For assessment purposes, is assumed that 90% of the existing traffic volume on Kidman Way can be attributed to the daytime period, with the remaining 10% occurring at night. The existing traffic flows on Kidman way are summarised in **Table 5-2**.

Table 5-2 Existing Traffic Flows

Road	Day [a]		Night [a]	
	Volume	% Heavy	Volume	% Heavy
Kidman Way	675	25	75	25

a. Day = 7am – 10pm; Night = 10pm – 7am.

5.4 Traffic Generated by the Proposal

According to the TIA, traffic generated during construction of the Proposal would comprise up to 28 heavy and 45 light vehicle trips per day. During operations, the Proposal would generate up to 44 heavy and 16 light vehicle trips per day.

Noting that noise from heavy vehicles is significantly higher than that from light vehicles, noise impacts associated with the operation of the Proposal will be higher than those during construction. Accordingly, the following assessment of road noise is focused on impacts during operations. If road noise criteria are met during operations, then compliance will also be achieved during construction.

It is assumed that 90% of operational traffic movements would occur during the day and 10% at night.

Table 5-3 summarises the existing ("no build") and future ("build") traffic volumes and percent heavy vehicles ("mix") along Kidman Way near the Site

Table 5-3 Traffic Volumes – No-Build and Build

Road	Time [a]	Existing (no-build)		Future (build)	
		Volume	% Heavy	Volume	% Heavy
Kidman Way	Day	675	25	721	29
	Night	75	25	81	29

a. Day = 7am – 10pm; Night = 10pm – 7am.

5.5 Predicted Road Noise Levels

Using the traffic data in **Table 5-3**, road noise levels at the most potentially affected sensitive receivers along Kidman way have been predicted for the no-build and build scenarios and are shown in **Table 5-4**.

Table 5-4 Predicted $L_{Aeq,period}$ Road Noise Levels

Road	No-build		Build		RNP Criteria		Difference	
	Day [a]	Night [a]	Day [a]	Night [a]	Day [a]	Night [a]	Day [a]	Night [a]
Kidman Way	53.0	45.6	53.6	46.3	60	55	0.6	0.7

a. Day = 7am – 10pm; Night = 10pm – 7am.

Review of **Table 5-4** indicates that the predicted road noise levels at the facades of the most potentially affected receivers along Kidman Way comply with the RNP assessment criteria.

6 CONCLUSION

Killoran Ag proposes to establish a composting facility at 1578 Cadell Road, Gala Vale. The composting facility would receive 99,000 tpa of organic materials including such waste types as poultry farm litter, food organics and garden organics (FOGO), waste straw, biosolids and manures.

SoundIN has been engaged by Killoran Ag to conduct a NVIA for the Proposal.

Noise impacts associated with the construction of the Proposal have been assessed in accordance with the ICNG. A computer noise model has been developed to predict construction noise levels at nearby sensitive receivers. Predicted construction noise levels at nearby receivers comply with the established NML.

Noise impacts associated with the operation of the Proposal have been assessed in general accordance with the NPfI. A computer noise model has been developed to predict operational noise levels at sensitive receivers. Noise modelling indicates that operational noise levels comply with the established noise trigger levels at all receivers during both calm and noise enhancing meteorological conditions.

Road noise impacts associated with the Proposal have been assessed in accordance with the RNP. Predicted road noise levels associated with traffic generated by the Proposal comply with the RNP impact assessment criteria.

Appendix 4 – Air Quality Impact Assessment

KILLORAN AG COMPOSTING FACILITY

AIR QUALITY IMPACT ASSESSMENT

REPORT NO. 17122-A
VERSION 1.1

OCTOBER 2023

PREPARED FOR

KILLORAN AG
1578 CADELL ROAD
GALA VALE NSW

DOCUMENT CONTROL

Version	Notes	Status	Date	Prepared	Reviewed	Approved
0.1	-	Draft	05/09/2023	NH		NH
1.0	-	Final	22/09/2023	NH		NH
1.1	-	Final	20/10/2023	NH		NH

TABLE OF CONTENTS

1 INTRODUCTION

Killoran Ag Pty Ltd (Killoran Ag) proposes to establish a composting facility at 1578 Cadell Road, Gala Vale (the Site), which is legally described as Lot 107 &118 DP 756459 and Lot 1192 DP861844 in the Murrumbidgee Local Government Area (LGA).

The composting facility (the Proposal) would receive 99,000 tonnes per annum (tpa) of Category 1 and Category 2 organic materials (as referenced in Table 3 of the Composting Guidelines) including such waste types as poultry farm litter, food organics and garden organics (FOGO), waste straw, biosolids and manures. The organic materials would be windrowed and once the composting process is complete, would be removed from site in bulk or pelletised form. The use of a purpose-built pelletising machine in an existing farm building is also proposed.

SoundIN Pty Ltd (SoundIN) has been engaged by Killoran Ag to conduct an air quality impact assessment (AQIA) for the Proposal.

The assessment has been conducted in general accordance with the NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (the "Approved Methods").

2 THE PROPOSAL

2.1 Site Description

The site is located approximately 17km south of Coleambally via Kidman Way. The site has a history of agricultural use and is the primary location of the Killoran Ag operation who grow lucerne, wheat and other rotational crops. Killoran Ag's existing offices and farm shed are located on the site.

The site contains a single unsealed driveway with access from Cadell Road which is located on Lot 1192 DP861844 and continues to Lot 118 DP756459. The driveway is constructed of road base and has been compacted to create a hardstand. The driveway ends at the existing farm building which is used for storage. The farm building has a floor area of 1,600 m^2 and contains a water tank to hold stormwater. To the east of the farm building is the farm holding's offices. Another farm building is located to the west which is presently used for storage.

On Lot 107 DP756459 there is a paddock presently utilised for rotational crops. The cleared and cultivated portion of the lot is 45 ha in area. This paddock would be utilised for the composting pads. Killoran Ag has constructed some pads and is presently carrying out limited composting activities in this area to trial their system. The compost is used on their existing farm holdings in the area. A burrow pit and dam is also located on this lot adjacent to the paddock.

The site contains scattered native vegetation, none of which would be removed as part of the development.

2.2 Project Description

Killoran Ag is a multi-faceted agricultural and transport business which grows a variety of crops, farms sheep, places straw bedding in, and transports spent litter from the many poultry production operations in the region at the end of the grow out period. Having transported the litter to agricultural operations for direct application to land, Killoran Ag began planning the development of a composting facility to value add to the poultry litter and create a product with application for several types of farming operations. There is also a significant need for the processing and recovery of organic material from FOGO for reuse. The FOGO would be sourced from green bin collections of regional Council.

The composting facility will provide biologically active organic material for the amelioration of soils in regional irrigated and non-irrigated farm holdings regionally, and in northern NSW and Queensland.

The proposed development involves the establishment of a composting facility and construction of infrastructure to pelletise the material for the ultimate yearly input of 99,000 tonnes per year.

The facility would include the following:

- Establishment of compost pads
- Construction of a water / leachate recycling dam
- Use of a white bridge
- Improvements to site access
- Drainage infrastructure
- Water storage tank
- Retrospective approval of a shed and the use of pelletising plant within the shed
- Internal roads

It is proposed to receive spent bed litter from intensive livestock agriculture industries (up to 80% of total inputs at any given time), food and organics wastes from various food processors in the region and green bin waste from Council's (up to 30% of the total inputs at any given time). The material will be composted in windrows, before being sold in bulk or pelletised and sold as fertiliser in bulk bags. Specialised windrow mixing equipment would be utilised to turn over the windrows. It would take approximately 9-16 weeks for the composting process to complete. During this time the windrows would be turned over 6-8 times. Water would be added to compost as required from the water / leachate recycling dam. Other additives would be used to ensure the compost matures within optimal conditions.

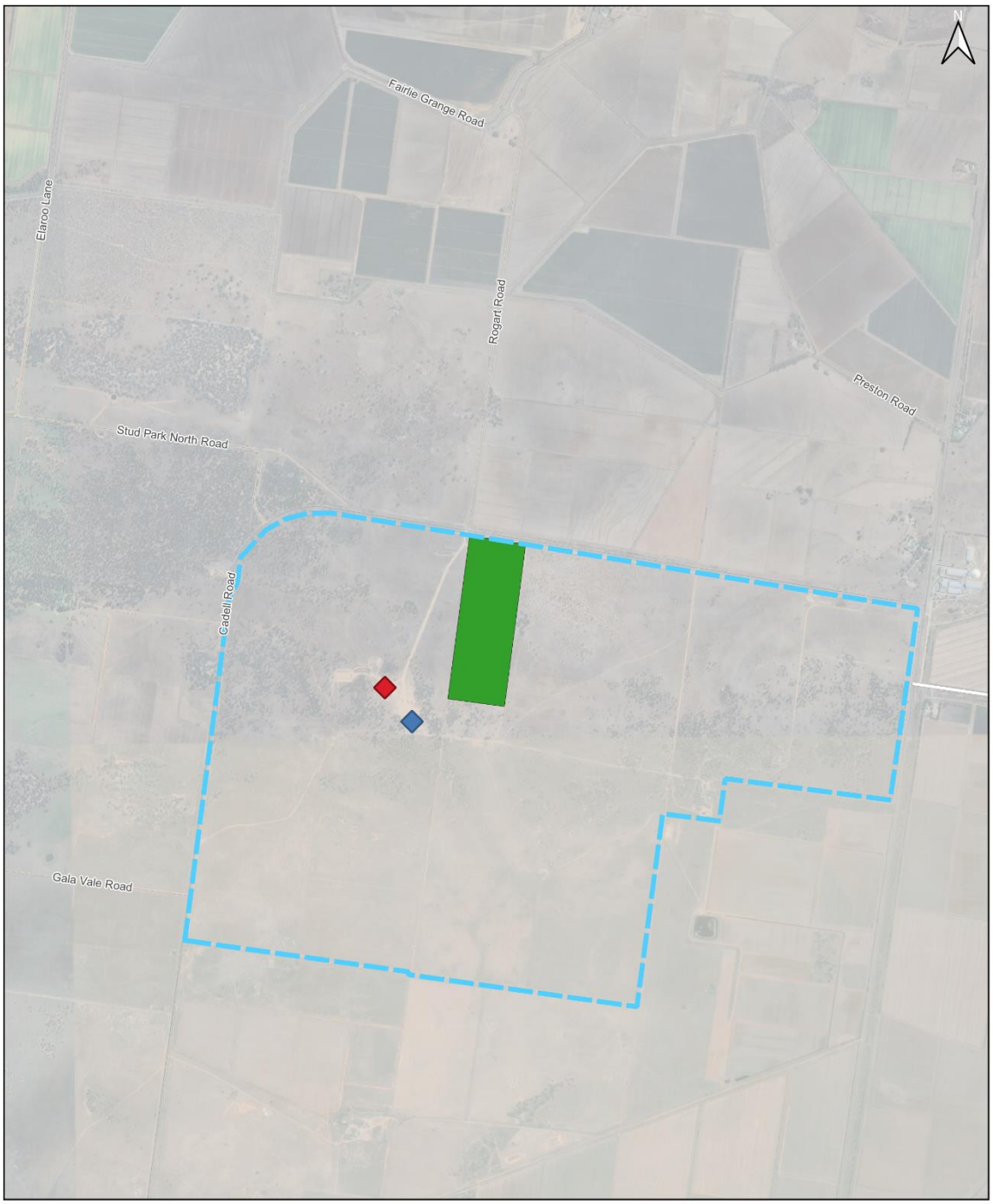
The pelletiser will be housed in a shed with composting, windrowing and turning taking place in the open on the compost pads. Composting will take place on Lot 100 and the pelletiser will be located on Lot 106.

Access to the site is via Cadell Road which directly connects to Kidman Way approximately 2.7 km to the east of the site. Kidman Way is a regional road under the control of Transport for NSW. Consultation with that authority will be required in relation to truck visitation through the intersection of Kidman Way and Cadell Road.

A proposed site layout is presented in **Figure 2-1**, this provides a general outline of the location of the facility. The composting area would occupy at full build out of the facility an area of 45 ha. Composting pads would be created which drain to a water recycling area. The pads would be constructed to meet the requirements of the Department's Composting Guidelines. Water and leachate from the composting pads would be collected in a recycling dam for reapplication to the windrows.

The pelletiser will be housed in a shed in the approximate location on Lot 106 shown in yellow on **Figure 2-1**.

Figure 2-1 Site layout



3 AIR QUALITY CRITERIA

3.1 Introduction

The NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (the "Approved Methods") (NSW EPA, 2022) sets out applicable impact assessment criteria for a number of air pollutants.

Air quality criteria are benchmarks set to protect the general health and amenity of the community in relation to air quality. The sections below identify the pollutants of interest in this study and the application air quality criteria for each pollutant.

3.2 Pollutants of Interest

Odour is the primary air pollutant associated with the Proposal and is the focus of this assessment. The proposal will also generate some dust emissions; however, noting the significant separation distances to nearby sensitive receptors, dust impacts from the proposal will be small and have not been assessed further.

3.3 Impact Assessment Criteria

NSW legislation prohibits emissions that cause offensive odour to occur at any off-site receptor. Offensive odour is evaluated in the field by authorised officers, who are obliged to consider the odour in the context of its receiving environment, frequency, duration, character and so on and to determine whether the odour would unreasonably interfere with the comfort and repose of the normal person. In this context, the concept of offensive odour is applied to operational facilities and relates to actual emissions in the air.

However, in the approval and planning process for proposed new operations or modifications to existing projects, no actual odour exists and it is necessary to consider hypothetical odour. In this context, odour concentrations are used and are defined in odour units. The number of odour units represents the number of times that the odour would need to be diluted to reach a level that is just detectable to the human nose. Thus, by definition, odour less than one odour unit (1 OU), would not be detectable to most people.

The range of a person's ability to detect odour varies greatly in the population, as does their sensitivity to the type of odour. Therefore, there can be a wide range of variability in the way odour response is interpreted.

It should be noted that odour refers to complex mixtures of odours, and not "pure" odour arising from a single chemical. Odour from a single, known chemical very rarely occurs (when it does, it is best to consider that specific chemical in terms of its concentration in the air). In most situations, odour will

be comprised of a cocktail of many substances that is referred to as a complex mixture of odorous pollutants, or more simply odour.

For developments with potential for odour it may be necessary to predict the likely odour impact that may arise. This is done by using air dispersion modelling which can calculate the level of dilution of odours emitted from the source at the point that it reaches surrounding receptors. This approach allows the air dispersion model to produce results in terms of odour units.

The NSW criteria for acceptable levels of odour range from 2 to 7 OU, with the more stringent 2 OU criteria applicable to densely populated urban areas and the 7 OU criteria applicable to sparsely populated rural areas, as outlined below.

3.3.1 Complex Mixtures of Odorous Air Pollutants

The Approved Methods provides a means of establishing impact assessment criteria for odour based on the nearby population. The following equation should be used to determine the appropriate impact assessment criterion for complex mixtures of odorous air pollutants:

$$Impact\ assessment\ criterion\ (OU) = \frac{log_{10}(population) - 4.5}{0.6}$$

Table 3-1 presents the relevant impact assessment criteria for various population densities.

Table 3-1 Impact assessment criteria – complex mixtures of odorous pollutants

Population of affected community	Impact assessment criteria (OU) [1]
Urban (≥~2,000) and/or schools and hospitals	2.0
~500	3.0
~125	4.0
~30	5.0
~10	6.0
Single rural residence (≤~2)	7.0

1. 99th percentile nose-response time.

4 EXISTING ENVIRONMENT

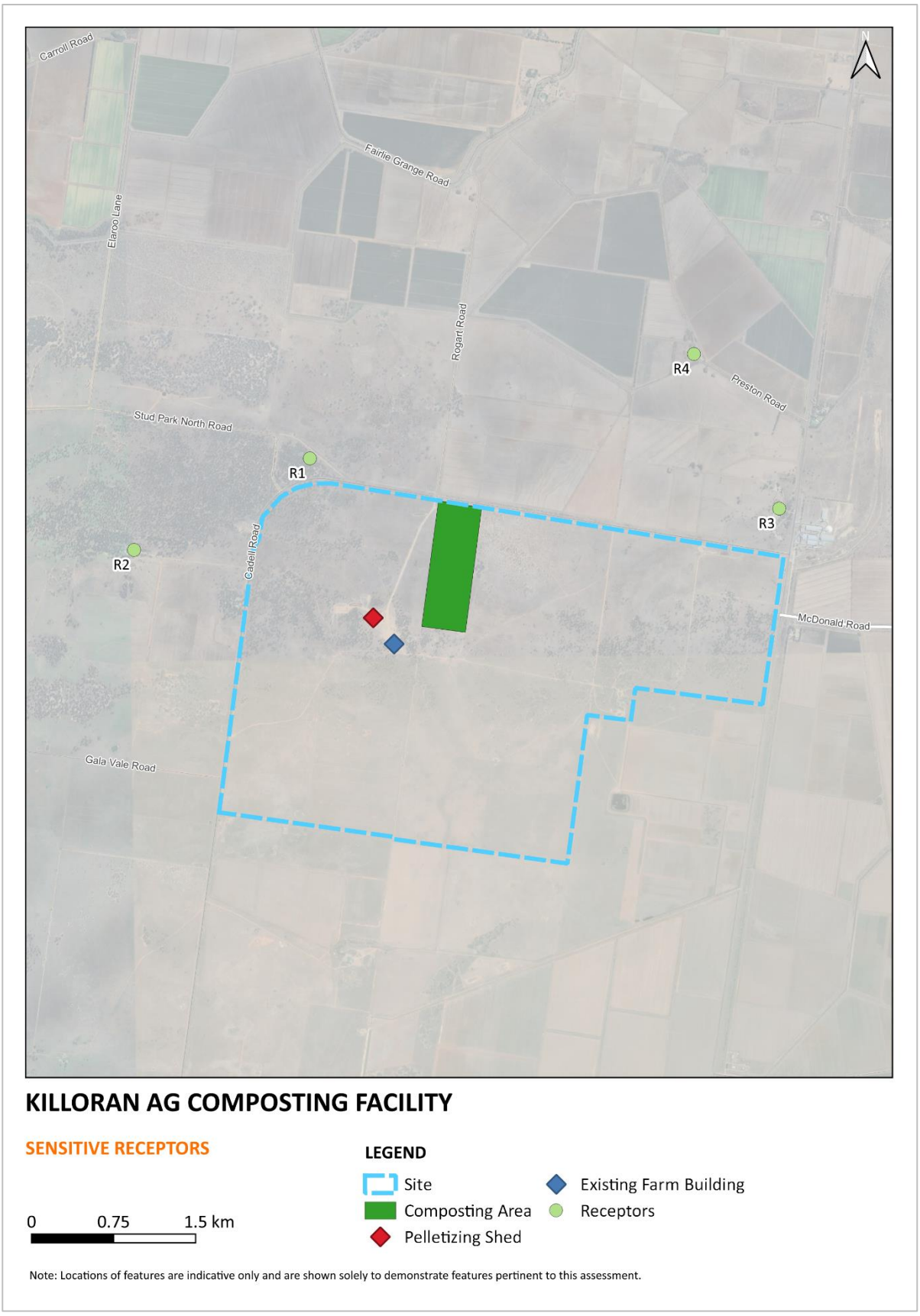
4.1 Sensitive Receptors

The predicted 2 OU contour (see Section 6) has been used to identify the most potentially affected sensitive receptors near the Site. These receptors are identified in **Table 4-1** and shown in **Figure 4-1**.

Table 4-1 Sensitive receptors

Receptor ID	Address	Description
R1	1308 Cadell Road, Gala Vale	Residence
R2	1189 Cadell Road, Gala Vale	Residence
R3	3583 Kidman Way, Coleambally	Residence
R4	132 Preston Road, Coleambally	Residence

Figure 4-1 Sensitive receptors



4.2 Local Meteorology

Meteorological conditions strongly influence air quality. Most significantly, wind speed, wind direction, temperature, relative humidity, and rainfall affect the dispersion of air pollutants. The following sub-sections discuss the local meteorology near the site.

4.2.1 Temperature, Humidity and Rainfall

Long term meteorological data for the area surrounding the site is available from the Bureau of Meteorology (BoM) weather station at the Yanco Agricultural Institute (Yanco). The Yanco weather station is located approximately 69 kilometres north-east of the Site and records observations of several meteorological parameters including temperature, humidity, and rainfall.

Long-term climate statistics are presented in **Table 4-2**. Temperature data recorded at the Yanco weather station indicates that January is the hottest month of the year, with a mean daily maximum temperature of 33.9°C. July is the coolest month with a mean daily minimum temperature of 4.9°C. October is the wettest month with an average rainfall of 40 mm falling over 5 days. There are, on average, 53 rain days per year, delivering 428 mm of rain.

Table 4-2 Climate averages for Yanco

Obs.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
9am mean temperature and humidity													
Temp(°C)	23.7	22.4	19.0	16.7	11.5	8.6	7.6	9.5	13.4	17.0	20.1	21.9	15.9
Hum(%)	46	55	58	61	76	87	89	80	68	53	51	46	64
3pm mean temperature and humidity													
Temp(°C)	32.1	30.6	27.8	23.3	18.5	14.5	13.5	15.4	19.2	22.8	27.0	28.8	22.8
Hum(%)	23	30	30	37	45	61	60	52	43	33	29	27	39
Daily minimum and maximum temperatures													
Min(°C)	18.8	18.2	15.4	11.7	7.7	5.7	4.9	5.3	7.6	10.6	14.2	16.2	11.4
Max(°C)	33.9	32.4	29.0	24.3	19.0	15.2	14.5	16.3	20.3	24.7	28.5	31.1	24.1
Rainfall													
Rain(mm)	32.1	31.4	37.1	32.3	37.7	36.9	35.5	38.1	38.9	40.3	35.0	32.3	427.6
Rain Days	3.3	2.7	3.3	3.6	4.5	5.3	6.4	6.3	5.3	5.0	3.9	3.6	53.2

4.2.2 Wind

As discussed in Section 5.1, a prognostic model has been used to develop site-specific meteorological data for dispersion modelling purposes. This prognostic model uses real observations of wind speed and wind direction to improve model performance. The BoM weather station at Yanco has been used for this purpose.

Figure 4-2 to **Figure 4-7** present annual and seasonal "wind rose" plots for Yanco for the period 2017 to 2021, inclusive. On an annual basis, northerly and south westerly winds appear dominant. The south westerly winds are a feature of summer, spring and autumn. It is noted that south easterly winds rarely feature in any season.

Wind speed and wind direction during 2021 are considered representative of the five-year period and have therefore been adopted for assessment purposes.

Figure 4-2 Yanco wind roses, 2017

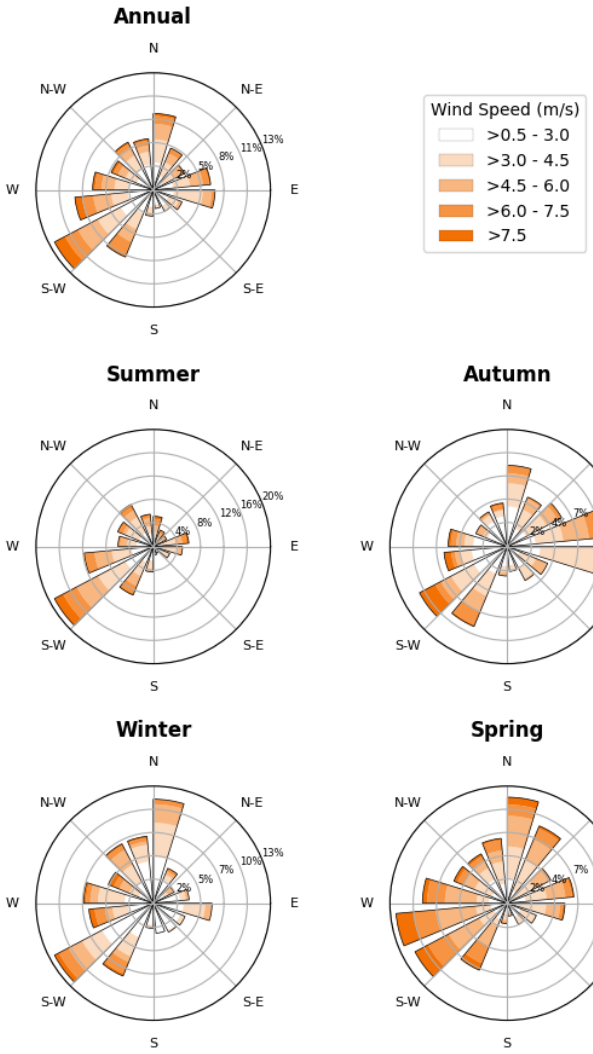


Figure 4-3 Yanco wind roses, 2018

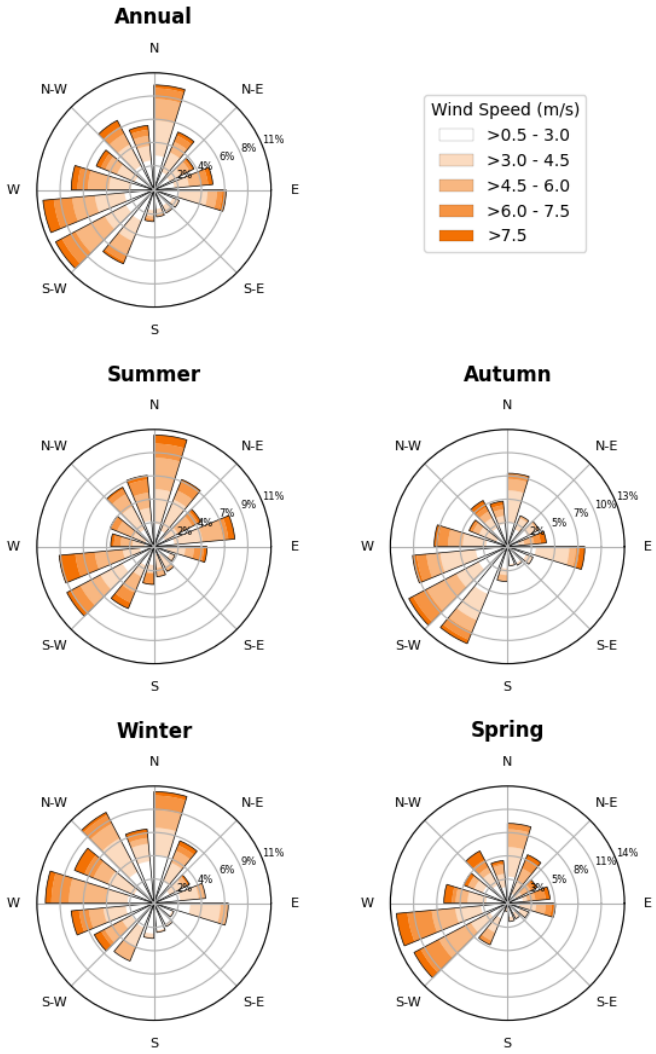


Figure 4-4 Yanco wind roses, 2019

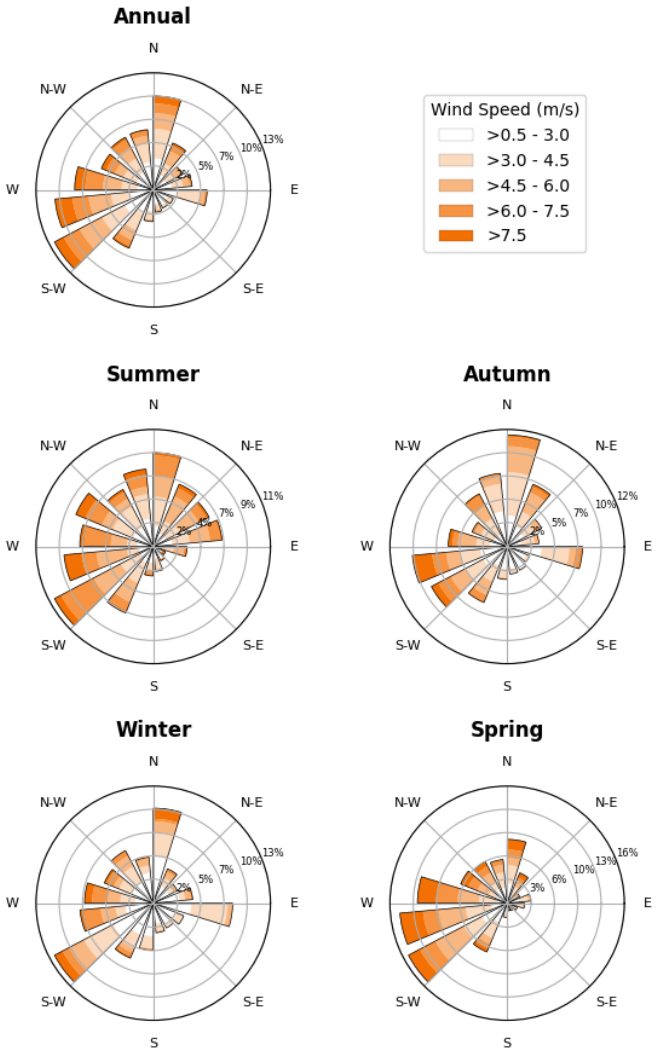


Figure 4-5 Yanco wind roses, 2020

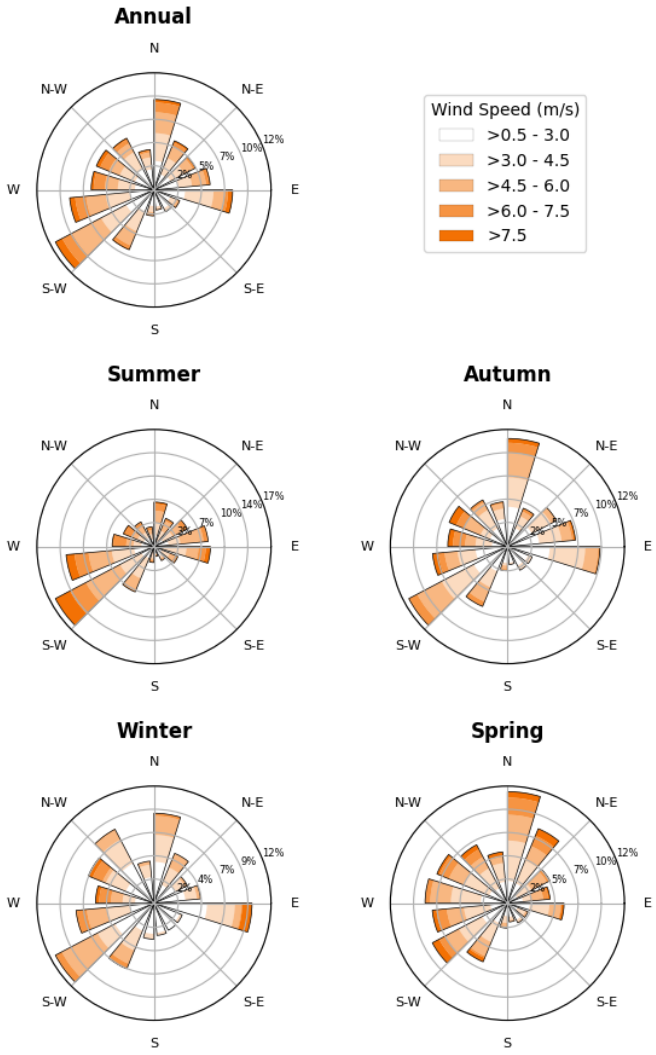


Figure 4-6 Yanco wind roses, 2021

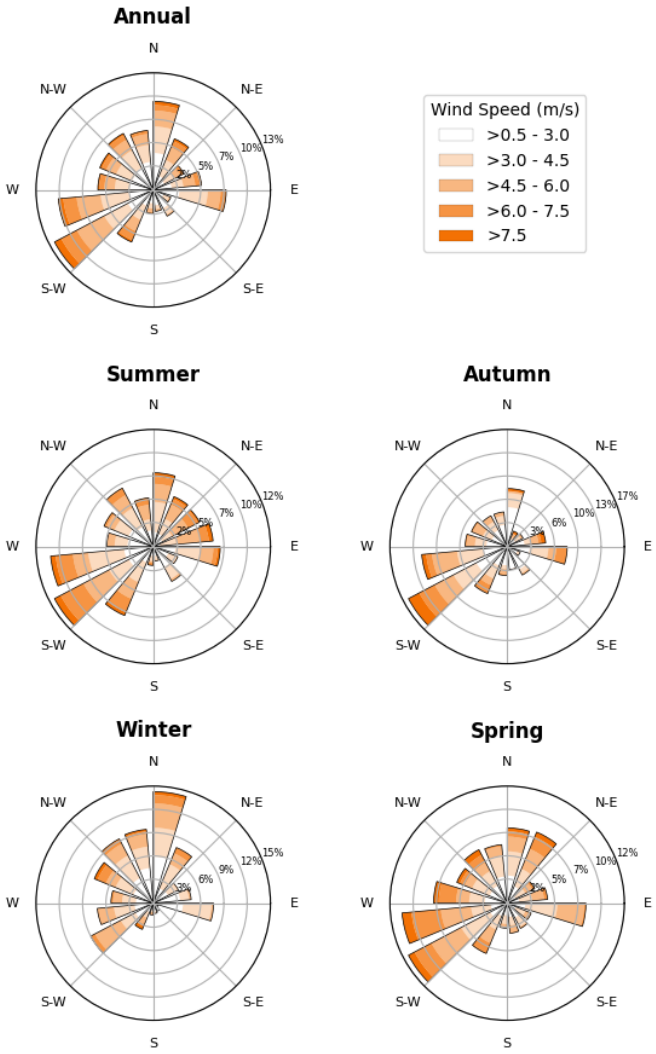
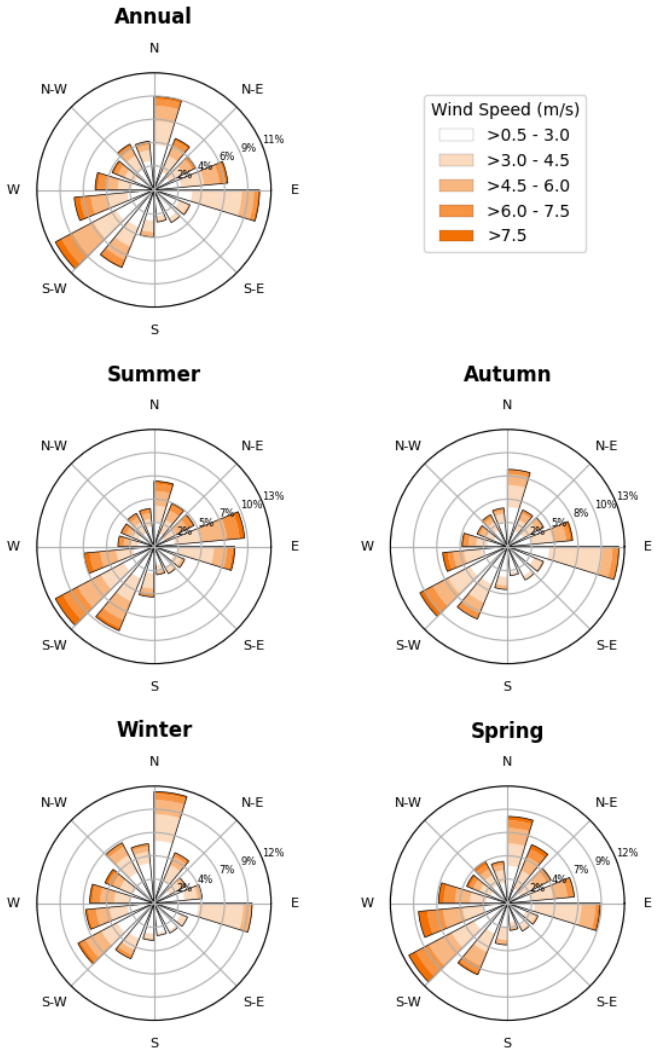


Figure 4-7 Yanco wind roses, 2017-2021



5 MODELLING METHODOLOGY

5.1 Meteorological Modelling

5.1.1 TAPM

No meteorological observation data is available for the area near the Project. Therefore, site-specific meteorological data was generated using a prognostic model. The prognostic model used was The Air Pollution Model (TAPM), developed and distributed by the Commonwealth Scientific and industrial Research Organisation (CSIRO).

TAPM is an incompressible, non-hydrostatic, primitive equations prognostic model with a terrain-following vertical coordinate for three-dimensional simulations. It predicts the flows important to local scale air pollution, such as sea breezes and terrain induced flows, against a background of large-scale meteorology provided by synoptic analyses. TAPM benefits from having access to databases of terrain, vegetation and soil type, leaf area index, sea-surface temperature, and synoptic scale meteorological analyses for various regions around the world.

The prognostic modelling domain was centred at 34.950° S, 145.808° E and involved four nesting grids of 30 km, 10 km, 3 km and 1km with 25 grids in the lateral dimensions and 25 vertical levels.

The TAPM model included assimilation of wind data collected at the Yanco BoM Station during 2021.

5.1.2 CALMET

The three dimensional prognostic wind field from the TAPM simulation was incorporated in a CALMET model as the initial guess wind field. CALMET was run using the 'No-Observations Approach' recommended by TRC (2011).

The CALMET domain was 20 x 20 km with a grid resolution of 0.20 km. Local land use and topographical data (SRTM 3) were used to produce realistic fine scale flow fields in the area surrounding the site.

Figure 5-1 presents annual and seasonal wind rose plots from the central point of the CALMET domain. The plots show high prevalence of northerly winds during winter and south westerly winds during spring, summer and autumn. The CALMET wind rose plots broadly reflect the expected wind patterns for the area surrounding the site, based on available measurement data and likely terrain effects on wind patterns.

Figure 5-2 presents plots of temperature, wind speed, stability class and mixing height from the CALMET data. The plots indicate sensible trends in the data, which are considered representative of the area.

Figure 5-1 CALMET wind roses

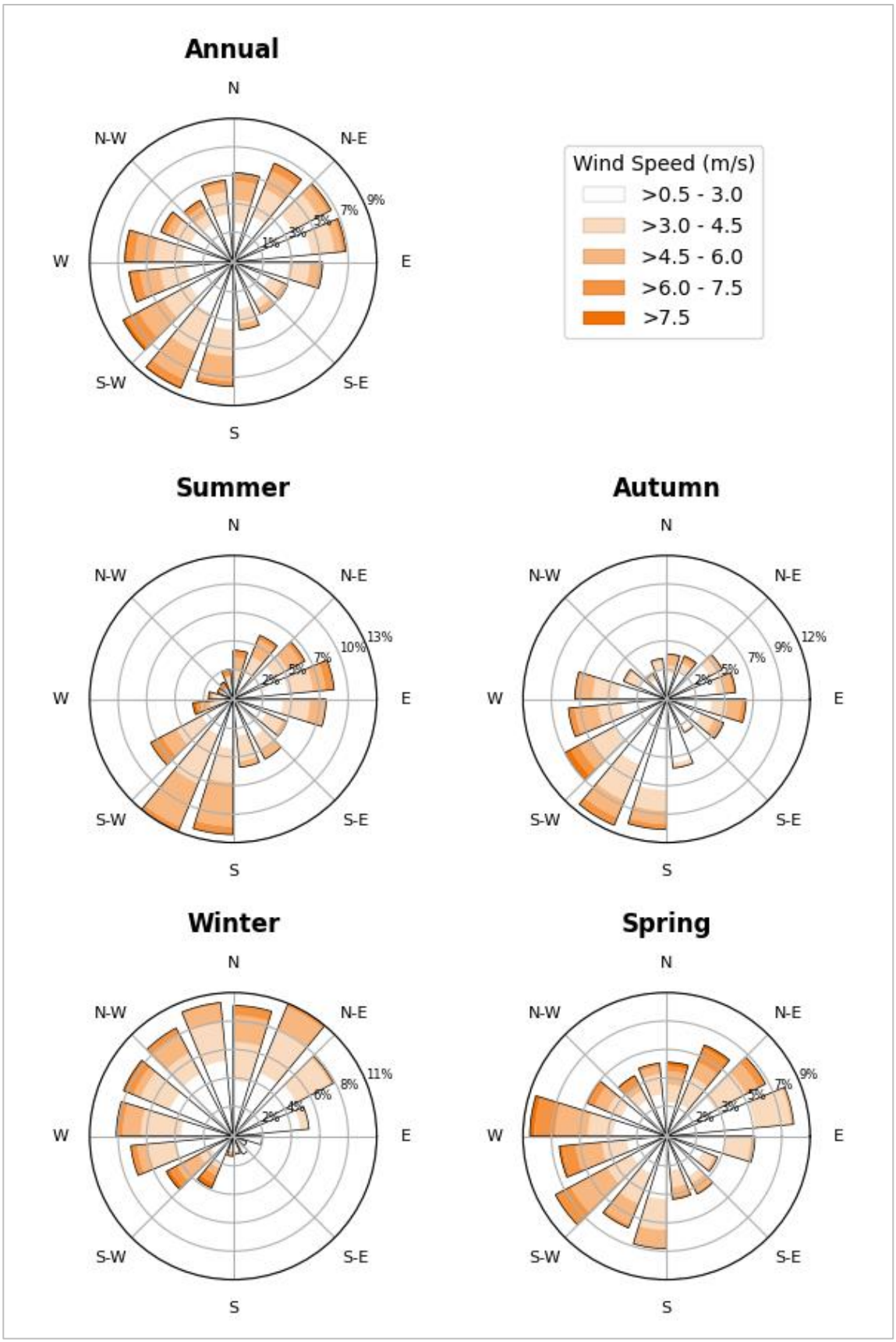
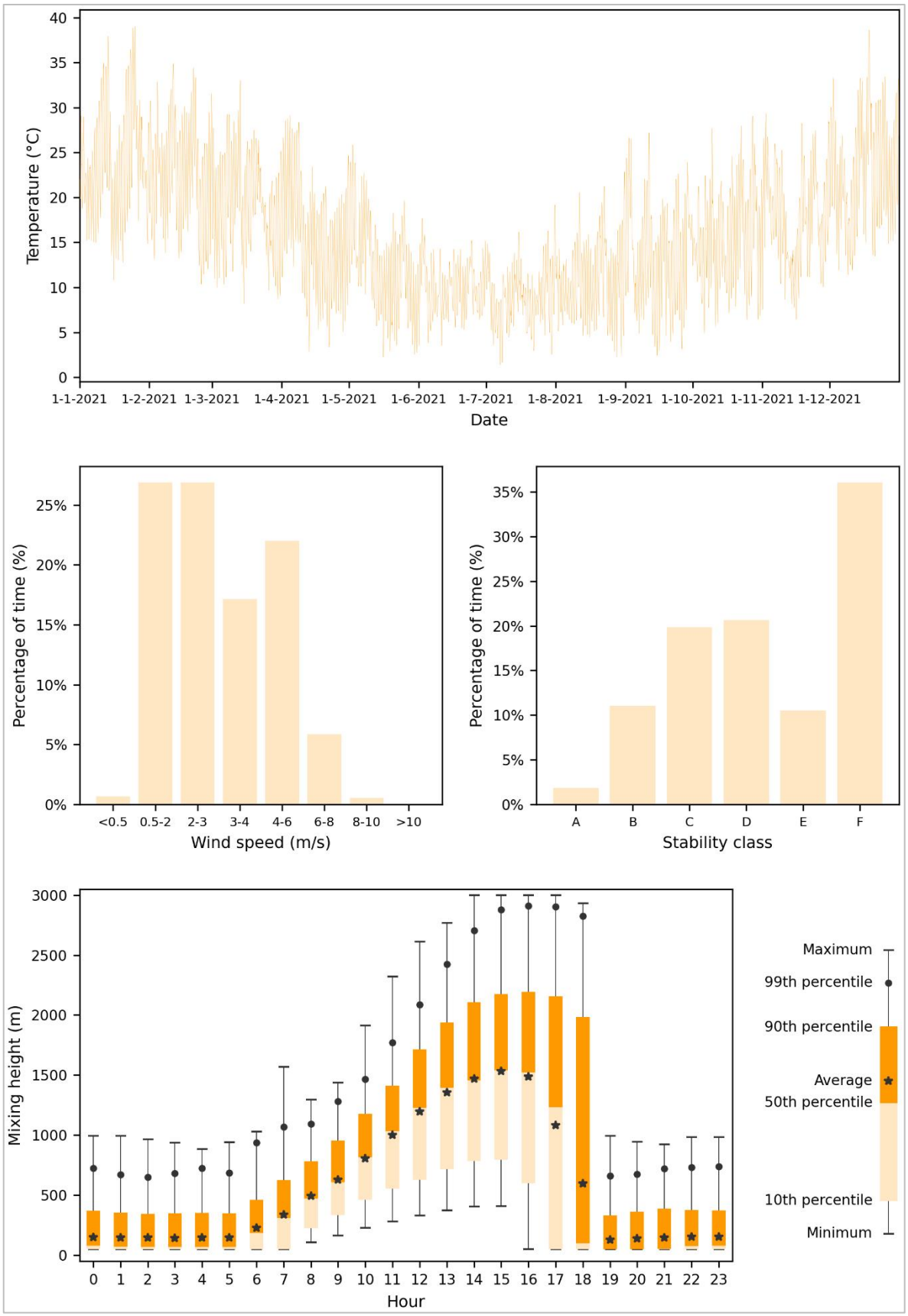


Figure 5-2 CALMET analysis



5.2 Dispersion Model

5.2.1 CALPUFF

CALPUFF is a non-steady state Gaussian puff dispersion model, developed for the US EPA and approved for use by the NSW EPA. CALPUFF is considered an advanced dispersion model and is intended for use in situations where less advanced Gaussian plume models are not appropriate. CALPUFF is most often used in areas exhibiting one or more of the following features:

- Complex terrain;
- Recirculating coastal sea breezes;
- High frequency of calm winds; and,
- Buoyant line sources.

CALPUFF is also the preferred dispersion model for odour, and for this reason has been selected for this assessment.

5.2.2 Peak to Mean Ratios

To account for the time-averaging limitations of the dispersion model, peak-to-mean ratios have been incorporated into all odour flux rates in accordance with the Approved Methods. Peak-to-mean ratios for various source types, as prescribed by the Approved Methods, are presented in **Table 5-1**.

Table 5-1 Peak-to-mean ratios

Source type	Pasquill-Gifford stability class	Peak-to-mean ratio	
		Near-field	Far-field
Area	A, B, C, D	2.5	2.3
	E, F	2.3	1.9
Line	A-F	6	6
Surface wake-free point	A, B, C	12	4
	D, E, F	25	7
Tall wake-free point	A, B, C	17	3
	D, E, F	35	6
Wake-affected point	A-F	2.3	2.3
Volume	A-F	2.3	2.3

5.2.3 Building Wake Effects

All odour emissions associated with the Site were modelled using area sources, which are not affected by building wakes.

5.3 Emissions Inventory

The main sources of odour emissions from the Proposal would be:

- Open compost windrows
- Input material stockpiles
- Leachate storage dam.

For assessment purposes, specific odour emission rates (SOER) have been adopted from relevant literature, as summarised in **Table 5-2**.

Table 5-2 Specific odour emission rates

Source	SOER (OUv/m²/s)	Reference
FOGO	5.65	SLR, 2011
Spent poultry litter	1.1	Dunlop, 2017
Finished compost	0.15	Northstar, 2022
Leachate	0.3	Northstar, 2022

New windrows would be formed using FOGO and spent poultry litter at a ratio of approximately 1:3. Accordingly, the SOER of new windrows would be equal to the weighted average of the input materials (2.24 OUv/m²/s)

Odour emissions from the windrows would reduce from the initial SOER to that of finished compost over the composting cycle. In practice it is expected that this reduction would occur exponentially. However, for assessment purposes, it is assumed that this reduction occurs in a linear fashion over a typical 12-week cycle. This is a conservative assumption and will tend to overestimate odour emissions from the windrows.

When windrows are turned, which will typically occur every other week during the composting cycle, odour emissions from the turned windrow will increase for a short time. For assessment purposes, it is assumed that the SOER of a freshly turned windrow will increase by a factor of 8 for a period of two hours.

Table 5-3 summarises the SOER for windrows during each week of a typical 12-week composting cycle. SOER are presented for windrows before and after turning, along with the weekday in which each set of windrows are “turned” in the dispersion model.

Table 5-3 Weekly windrow emissions rates

Week	SOER (OUv/m²/s)		Turning day
	Not-turned	Turned	
Week 1	2.24		
Week 2	2.05	17.90	Monday
Week 3	1.86		
Week 4	1.67	14.86	Tuesday
Week 5	1.48		
Week 6	1.29	11.83	Wednesday
Week 7	1.10		
Week 8	0.91	8.79	Thursday
Week 9	0.72		
Week 10	0.53	5.75	Friday
Week 11	0.34		
Week 12	0.15	2.72	Saturday

When full, the composing area will accommodate the equivalent of 38 windrows, each approximately 300 metres long, 2 metres high and 4 metres wide. For assessment purposes, a "peak" composting scenario has been developed which includes 38 windrows in the composting area, with 3 windrows at each of the weekly stages in a 12-week cycle and the remaining two windrows being at the week 12 (i.e. finished) stage.

The loading area would be used to store both incoming materials and finished compost at varying amounts depending upon site operations at the time. The assessment scenario assumes that the loading area contains approximately 5,000 tonnes of FOGO – the most odorous material associated with the facility – stored in stockpiles approximately 100 metres long, 6 metres wide and 3 metres high. This scenario represents the loading area being filled to capacity with FOGO, which is unlikely to occur for extended periods of time but, if it does occur, the FOGO would be "capped" with a layer of finished compost or similar material. Capping windrows in this manner has been demonstrated to reduce our emissions by approximately 60% (Arcadis, 2019). This reduction has been incorporated into the dispersion model.

Surface area corrections have been applied to both the windrows and the stockpiles to account for their trapezoidal shapes.

6 ASSESSMENT OF IMPACTS

The predicted odour concentrations at sensitive receptors, due to the operation of the Site, are presented in **Table 6-1**. A contour plot of the predicted odour concentrations is provided in **Figure 6-1**.

Table 6-1 Predicted 99th percentile odour concentrations at sensitive receptors

Receptor	Predicted odour concentration (OU)	Impact assessment criterion[1]	Complies?
R1	5.4	5.9	Yes
R2	2.4	5.9	Yes
R3	2.1	5.9	Yes
R4	2.8	5.9	Yes

1. See Section 6.1.

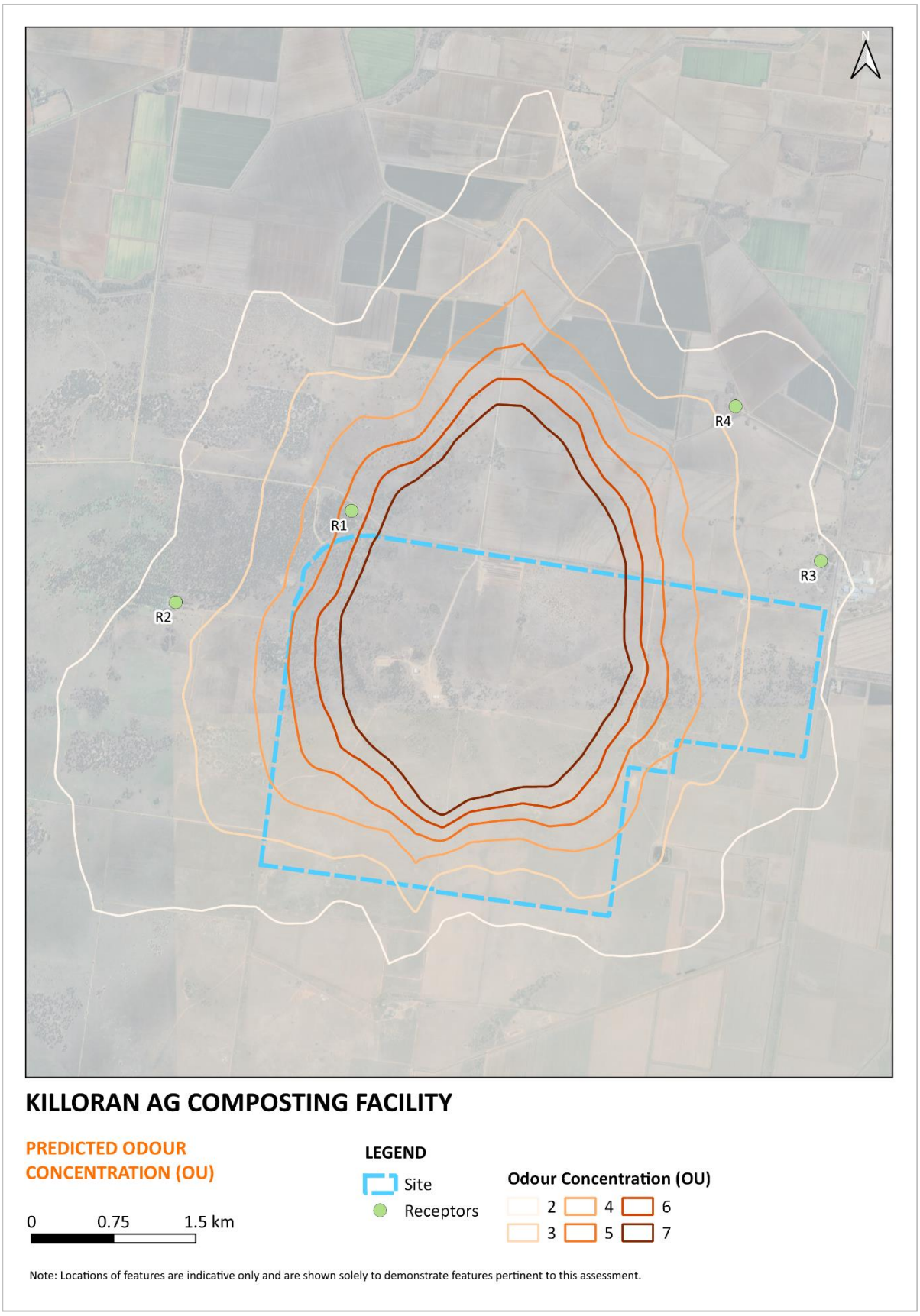
Review of Table 6-1 indicates that the predicted odour concentrations at sensitive receptors comply with the impact assessment criterion.

6.1 Applicable Odour Criterion

The NSW EPA has advised that the odour impact assessment criterion should be based on the number of sensitive receptors within the 2 OU contour for the Proposal.

As shown in **Figure 6-1**, there are five dwellings within the 2 OU contour. According to the 2021 Census data, there are an average of 2.4 people per dwelling in the Gala Vale and Coleambally localities. Therefore, in accordance with the procedure outlined in the Approved Methods, the impact assessment criterion for odour impacts associated with the Proposal is 5.9 OU.

Figure 6-1 Predicted 99th percentile odour concentration



7 CONCLUSION

Killoran Ag proposes to establish a composting facility at 1578 Cadell Road, Gala Vale. The composting facility would receive 99,000 tpa of organic materials including such waste types as poultry farm litter, food organics and garden organics (FOGO), waste straw, biosolids and manures.

SoundIN has been engaged by Killoran Ag to conduct an AQIA for the proposed development. The assessment has been conducted in general accordance with the NSW EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (the "Approved Methods").

Potential off-site odour impacts associated with the operation of the Site were predicted using the CALPUFF dispersion modelling system.

The modelling results indicate that predicted odour concentrations at sensitive receptors comply with the impact assessment criterion.

8 REFERENCES

Arcadis 2019, *Critical Evaluation of Composting Operations and Feedstock Suitability | Phase 1 – Odour Issues*, Arcadis Australia Pacific Pty Limited, March 2019.

Dunlop 2021, *Quantifying poultry litter conditions and relationships with odour emissions*, Vol. PhD, University of New South Wales, April 2017.

Northstar 2022, *Air Quality Impact Assessment, Worm Tech Composting Facility, Carathool NSW*, Northstar Air Quality, March 2022.

NSW EPA 2022, *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales*, New South Wales Government and the Environment Protection Authority, August 2022.

SLR 2011, *Woodlawn Bioreactor Odour and Dust Impact Assessment*, SLR Consulting Australia Pty Ltd, February 2011.

TRC 2011, *Generic Guidance and Optimum Model Settings for the CALPUFF Modeling System for Inclusion into the Approved Methods for the Modelling and Assessment of Air Pollutants in NSW, Australia,* TRC Environmental Corporation, March 2011.

Appendix 5 – Traffic Impact Assessment

Spotto CONSULTING

people-oriented traffic and transport solutions

Traffic Impact Assessment

Composting Facility

1578 Cadell Road
Gala Vale NSW

October 2023

Prepared by:

Spotto CONSULTING

For:

Killoran Agriculture

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Ref	Version	Date	Revision Details	Author
P0196	A	31 May 2022	Client Review	SWS
	B	22 August 2023	DA Submission	SWS
	C	26 October 2023	DA Submission	SWS

CONTENTS

1 INTRODUCTION

Spotto Consulting have been engaged by Killoran Agriculture to complete a Traffic Impact Assessment Report. The study is in response to a proposed development at 1578 Cadell Road, Gala Vale. The development is a composting facility, incorporating compost pads, water and wastewater infrastructure, processing and storage sheds, office/amenities and internal road network connecting to the existing site access onto Cadell Road near Rogart Road.

The purpose of the assessment is to review the existing conditions in the vicinity of the site, as well as the performance of the surrounding network. An evaluation is then required of the traffic requirements for the proposed development, and the impacts on the surrounding road network.

The assessment concluded that:

- Traffic surveys and analysis of key roads in the vicinity of the site (including Kidman Way and Cadell Road) shows that the roads currently carry low levels of traffic, operate at an excellent Level of Service and are of suitable capacity for the current level of traffic;
- The proposed development is anticipated to generate an additional 6 vehicle trips per hour in the peak period, and a total of 60 vehicle trips per day, which will not have a significant impact on the performance of the surrounding road network;
- The site and proposed development allows vehicles to enter and exit the site in a forward direction, with adequate room available on site to park anticipated vehicles; and
- There is no significant impact of the proposed development on pedestrians and cyclists.

The assessment recommended that:

- The intersection of Kidman Way and Cadell Road be upgraded to incorporate a Rural BAR (Basic Right Turn) treatment;
- Cadell Road be gazetted for travel by B-Doubles and Type 1 A-Doubles all year round; and
- Access into the site be designed as a typical rural property access (as detailed in Section 7.2.3 of the *Austroads Guide to Road Design Part 4: Intersections and Crossings – General* and shown in RMS (TfNSW) Model Drawing – Typical Rural Property Access Standards (Figure 2 – Articulated Vehicles).

2 EXISTING CONDITIONS

2.1 Site

The site is located on Cadell Road, Gala Vale, approximately 20km south of Coleambally, as shown in Figure 2-1.

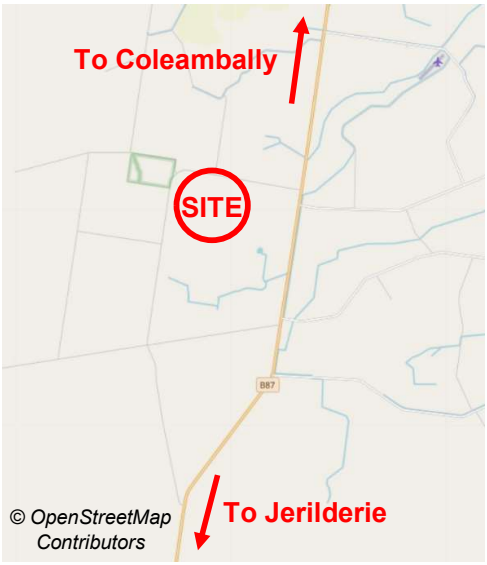


Figure 2-1: Locality Plan

The site's address is listed as 1578 Cadell Road, Gala Vale, and is bounded by Cadell Road to the north and west, Kidman Way to the east and private land to the south. The site comprises 12 lots in total, with a total area of approximately 1,200 hectares. The site is currently used for agricultural purposes including composting activities, and contains a dwelling with associated outbuildings.

The site is accessible from several locations along Cadell Road and Kidman Way, with the primary access being via an existing driveway on Cadell Road near the intersection with Rogart Road.

Figure 2-2: Looking south-west across Cadell Road at the site's existing operations

Figure 2-3: Looking south-east across Cadell Road at the site's main access

2.2 Surrounding Land Use

The site and immediate surrounds are zoned RU1 Primary Production under the *Jerilderie Local Environmental Plan 2012* (as shown in Figure 2-4, below). Some nearby properties are also zoned RAZ Rural Activity Zone. Land use in the area reflects these zonings, and comprises primarily agricultural uses with some dwellings (the nearest being 1.2km north-west of the site) and associated outbuildings.

Other nearby land uses include the South West Woodland Nature Reserve (located north-west of the site and zoned E1 National Parks and Nature Reserves) and Kidman Way (located to the east of the site and zoned SP2 Infrastructure – Classified Road).

Figure 2-4: Land Zoning (Source: NSW Planning Portal)

2.3 Consultation

In preparing this report, consultation has been undertaken with officers from Murrumbidgee Council and Transport for NSW (TfNSW). Spotto Consulting appreciates the opportunity to discuss key issues relating to the local transport network with these officers, and acknowledges the insights gained through this consultation.

2.4 Road Network

2.4.1 Kidman Way

Kidman Way is an important north-south route. It runs from the Newell Highway at Bundure (roughly 15km north of Jerilderie) for a length of over 600km to Bourke in northern NSW, providing access to western NSW regional centres including Griffith, Hillston and Cobar. Signposted as the B87, it is a State Road under the control of Transport for NSW (TfNSW), and is authorised for travel by vehicles up to and including AB-triples. It's role favours through movement over property access.

In the vicinity of the site, Kidman Way is a two-lane, two-way sealed rural road that runs roughly north-south and is located to the east of the site. Contained within an 80m-wide road reserve, the main carriageway contains one 3.6m-wide through lane in each direction, with 1.5-2.0m-wide sealed shoulders and roadside table drains. No pedestrian or cyclist facilities are present, and there is no street lighting. The speed limit is 100km/h in the vicinity of the site.

Figure 2-5: Looking south Kidman Way, south of Cadell Road

Figure 2-6: Looking south along Kidman, south of McDonald Road

2.4.2 Cadell Road

Cadell Road intersects with Kidman Way near the site, and also at a second point approximately 13km further south, looping around to the west. It is a local road under the control of Murrumbidgee Council, and it is authorised for travel by B-Doubles and Type 1 A-Double Road Trains (but only between 1 November and 30 May). It's role balances through movement with property access (although with a limited number of properties and accesses).

In the vicinity of the site, Cadell Road is a two-lane, two-way sealed rural road that runs roughly east-west and is located to the north of the site. Contained within a 60m-wide road reserve, the main carriageway comprises a 6.0m-wide sealed width, with roadside table drains. No pedestrian or cyclist facilities are present, and there is no street lighting. The speed limit is the default rural speed limit of 100km/h.

Figure 2-7: Looking west along Cadell Road, with the site on the left hand side

Figure 2-8: Looking east along Cadell Road, with the site access on the right hand side and Rogart Road on the left hand side

2.4.3 Intersections

The intersection of Kidman Way and Cadell Road is located east of the site. It is a three leg intersection, with priority given to through vehicles on Kidman Way as a result of Give Way signage and linemarking on Cadell Road. A 60m-long left turn auxiliary lane is present for northbound vehicles on Kidman Way.

Figure 2-9: Looking north along Kidman Way at the intersection with Cadell Road, with the existing left turn auxiliary lane on the left hand side

Figure 2-10: Looking east along Cadell Road at the intersection with Kidman Way

2.5 Existing Traffic Conditions

No traffic volume data was available for Cadell Road. As this is a local road with limited through movement, it is possible to estimate traffic volumes on this road. Traffic generation levels are typically determined by reference to published standards such as the *RTA (TfNSW) Guide to Traffic Generating Developments*, with the amount of traffic generated depending on the type and scale of land use.

In the case of Cadell Road, the predominant traffic-generating land use is rural residential dwellings. The total traffic can be determined by counting the total number of dwellings on or the road, and assuming each dwelling will generate the following traffic (based on figures for residential dwellings in regional areas identified in *TfNSW Technical Direction TDT2013/04a Guide to Traffic Generating Developments – Updated Traffic Surveys*):

- Daily vehicle trips: 7.4 trips per dwelling per day;
- Weekday average morning peak hour vehicle trips: 0.71 trips per dwelling per hour; and
- Weekday average evening peak hour vehicle trips: 0.78 trips per dwelling per hour.

A total of eight properties were identified from aerial photography and site inspections as likely to travel past or near the site (generally being on Cadell Road north of McLennons Bore Road, Stud Park North Road and Gala Vale Road).

Traffic data for Kidman Way was determined using the NSW Traffic Volume Viewer application, using the following:

- Traffic volume counts on Kidman Way in 2010, which show that the average daily traffic volume was 640 vehicles per day with a heavy vehicle percentage of 25-30% and an AM/PM peak equating to 10% of the daily total; and
- A permanent traffic counter on the Newell Highway north of Jerilderie, which showed that long term traffic volume growth has averaged 1.5% per annum.

Based on this data and analysis, a summary of the midblock data for key roads in the vicinity of the site under existing conditions is provided in Table 2-1 below.

Table 2-1: Midblock traffic data – existing

Location	Daily	AM Peak	PM Peak
	Veh/d	Veh/h	Veh/h
Cadell Road (west of Kidman Way)	60	6	6
Kidman Way (north of Cadell Rd)	750	75	75

Road design standards and capacity limits for low volume (typically rural) roads are determined reference to Section 4.2.6 of the *Austroads Guide to Road Design Part 3: Geometric Design* (AGRD 3). The current design standards for roads in the vicinity of the site are presented in Table 2-2, below.

Table 2-2: Daily traffic volumes and design standards

Daily Traffic Volume	Design Standard	Applicable Roads	Meets Design Standard?
<150	3.7m wide seal	Cadell Road	Yes
150-500	6-7m wide seal	-	-
500-1000	7-8m wide seal	Kidman Way	Yes

All roads in the vicinity of the site therefore have adequate cross sections to meet the relevant design standards for the existing traffic volumes.

2.6 Crash Data

Data on crashes was obtained from the Transport for NSW Centre for Road Safety Interactive Crash Statistics database. In the most recent five year period for which data is available, there were a number of crashes in the vicinity of the site, as shown in Figure 2-11, below.

Figure 2-11: Crashes in vicinity of site 2017-2021 (Source: TfNSW Interactive Crash Stats)

Two crashes were recorded on Kidman Way north of Cadell Road. Both involved single vehicles leaving the carriageway. One of the crashes resulted in no injuries, the other resulted in two people being seriously injured.

No crashes were recorded on Cadell Road.

2.7 Public Transport

There are no broad public transport services such as town buses in Gala Vale or surrounds. School buses operate, and community transport services provide free or subsidised services for eligible community members.

Buses provide regional public transport from Jerilderie to locations such as Echuca and Wagga Wagga, from where rail services may be accessed (providing access to more distant destinations such as Sydney and Melbourne).

2.8 Pedestrians and Cyclists

There are no dedicated cyclist or pedestrian facilities in the vicinity of the site, which is common in rural areas.

3 PROPOSED DEVELOPMENT

The proposed development is a composting facility with a capacity of up to 99,000 tonnes per year. The facility would receive organic material (primarily spent litter from poultry farms in the region, as well as food/organic waste and animal renderings), which is then distributed across the site in windrows for composting. The final product is in the form of pelletised organic fertiliser.

The proposed facility incorporates the following elements:

- Establishment of compost pads;
- Construction of a water/leachate recycling dam;
- Drainage structures;
- Water storage tanks;
- Construction of a shed and installation of a pelletising equipment;
- Internal roads with weighbridge; and
- Amenities, office and workshop building.

Access to the proposed development will be via the existing access driveway on the southern side of Cadell Road near the intersection with Rogart Road.

Plans of the proposed development are included in Appendix A.

4 IMPACT OF PROPOSED DEVELOPMENT

4.1 Road Network

4.1.1 Traffic Generation and Distribution

Traffic generation levels for proposed developments are typically determined by reference to published standards such as the *RTA (TfNSW) Guide to Traffic Generating Developments*, with the amount of traffic generated depending on the land use. In some cases, previous studies of similar sites can be used where published standards do not provide clear or up-to-date guidelines. Alternatively, traffic generation rates can be determined by a first-principles approach, based on an understanding of the site's operations.

For the construction traffic, the following assumptions are made:

- Average construction – this period would typically be the site establishment stage and final commissioning. There will be on average 16 daily truck deliveries to the site and 30 light vehicle visits, corresponding to 92 daily traffic movements in total.
- Peak construction – this period would typically occur during the early and mid stages of construction including earthworks and delivery activities, there will be on average 28 daily truck deliveries to the site and 45 light vehicle visits, corresponding to 146 daily traffic movements in total.

For the operational traffic, no published standards or studies of similar sites could be found to substantiate a traffic generation rate for this type of land use. The anticipated traffic generation must therefore be estimated based on the projected operations at the site.

There are three main types of traffic associated with the proposed development:

- Raw materials in;
- Processed materials out; and
- Staff, visitors and servicing.

For materials in and out, the following assumptions are made:

- 99,000 t/yr in total;
- Materials brought in using a mix of semi-trailers and B-Doubles (20%/80%);
- Load per vehicle = 20 t per semi-trailer and 32t per B-Double;
- Each vehicle makes two trips (one in plus one out); and
- Operations spread evenly over six days per week.

For other movements, the following assumptions are made:

- Maximum four staff, each travelling to and from site in their own private vehicle;
- Staff travel inbound in the morning and outbound in the PM, with 50% ancillary movements across the day; and
- A maximum of two other vehicles travelling to the site each day (visitors, deliveries, etc.).

Based on these assumptions, the traffic-generating activities for the proposed development are summarised in Table 4-1.

Table 4-1: Traffic Generating Activities – Proposed Development (Operational)

Element	Trips per week	Trips per day
Raw materials in	134 (19 Semi + 48 B-Double)	22
Processed materials out	134 (19 Semi + 48 B-Double)	22
Staff and other light vehicles	96	16
Total	*364*	*60*

It is assumed that all traffic will travel along Cadell Road between the site access (near Rogart Road) and Kidman Way to the east, with not vehicles expected to use Cadell Road to the west and south.

4.1.2 Traffic Impact at Intersections

An assessment has been carried out to determine whether the volume of traffic generated by the proposed development is sufficient to warrant the provision of turning lanes at the intersection of Kidman Way and Cadell Road, and if so, what type. This has been carried out in accordance with the procedure outlined in Section 3.3.6 of the *Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management (AGTM6)*, using the anticipated traffic generated by the proposed development detailed in Section 4.1.1. These movements can then be used to determine the major road and left/right turning volumes (Q_M, Q_L/Q_R, respectively), which can then be plotted onto Figure 3.25 from AGTM6 to determine what upgrades, if any, are warranted. This is shown in Figure 4-1, below.

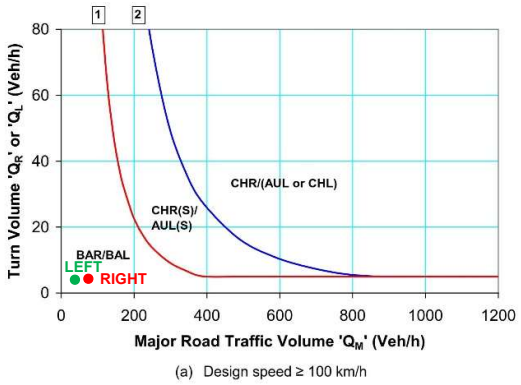


Figure 4-1: Major road and turning volumes

The assessment demonstrates that the following treatments are warranted to cater for traffic from the proposed development:

- Left turn from Kidman Way into Cadell Road – BAL or Basic Left Turn; and
- Right turn from Kidman Way into Cadell Road – BAR or Basic Right Turn.

As noted in Section 2.4.3, above, the left turn is currently a channelised left turn, and so no further work is warranted for that turning movement. It is recommended that the intersection of Kidman Way and Cadell Road be upgraded to provide a BAR or Basic Right Turn treatment on the eastern side of Kidman Way for southbound vehicles. A strategic design for this is included in Appendix A.

4.1.3 Traffic Impact Midblock

The additional traffic generated by the proposed development was added to the existing traffic volumes on nearby roads. A summary of the midblock data for the key sections of roads in the vicinity of the site, including weekday traffic volumes and peak hour traffic volumes with the proposed development is provided in Table 4-2, below.

Table 4-2: Midblock traffic data – future conditions

Location	Daily	AM Peak	PM Peak
	Veh/d	Veh/h	Veh/h
Cadell Road (west of Kidman Way)	120	12	12
Kidman Way (north of Cadell Rd)	810	81	81

Table 4-2 shows that none of the roads in the vicinity of the site will exceed the design capacities detailed in Section 2.5, above. It is therefore not anticipated that the additional traffic generated by the proposed development would have any appreciable impact on the level of service of any of the key roads in the vicinity of the site.

As noted in Section 2.4.2, above, Cadell Road is only authorised for travel by B-Doubles and Type 1 A-Double Road Trains between 1 November and 30 May. Given that the increase in traffic will still see traffic volumes on Cadell Road be less than 150 vehicles per day, Cadell Road should be gazetted for travel by heavy vehicles at all times.

As vehicles travel further throughout the network, traffic generated by the proposed development becomes more dispersed, and hence has a lower net impact on other roads. Hence if the impact on key roads in the vicinity of the site is within acceptable limits, then beyond these roads the impact will be even lower. It is concluded that there will be no significant impact on roads surrounding the site or further afield as a result of the proposed development.

4.2 Site Access and Parking

Access to the site is proposed to be from Cadell Road, near the intersection with Rogart Road (approximately 3.2km west of Kidman Way). It is recommended that the access be designed as a typical rural property access, capable of accommodating vehicles up to and including B-Doubles, in line with the requirements of Section 7.2.3 of the *Austroads Guide to Road Design Part 4: Intersections and Crossings – General*. An example of this is shown in the RMS (TfNSW) Model Drawing – Typical Rural Property Access Standards (Figure 2 – Articulated Vehicles), a copy of which is included in Appendix B.

The property access will connect to an internal access road network which gives access to all areas of the proposed development. This will be a private road, capable of supporting vehicles up to and including B-Doubles. Vehicles will be able to manoeuvre within the site via the

access road network, park where necessary and turn as required, permitting forward entry to and exit from the site onto the road network.

In general on-site parking requirements will be limited. Trucks delivering raw materials or colleting finished products will stand near the processing areas. As there will only be a small number of trucks arriving each day, and their movement can be managed to minimise the chance of arriving at similar times, the access and parking arrangements for trucks is considered adequate.

Other parking requirements include staff parking and servicing or delivery vehicles. Staff will be able to park in locations appropriate to where they will be working (for example, near the composting areas, sheds or office) without obstructing other vehicles. Service and delivery vehicles will be able to do likewise.

It is concluded that the proposed development provides adequate off-street parking spaces and manoeuvring areas to meet the anticipated demand, without any adverse effect on the surrounding road network.

4.3 Pedestrian and Cyclist Impact

It is not proposed to make any change to pedestrian or cyclist infrastructure in the vicinity of the site. Therefore it is not anticipated that there would be any significant impact on pedestrians or cyclists as a result of the proposed development.

5 CONCLUSIONS AND RECOMMENDATIONS

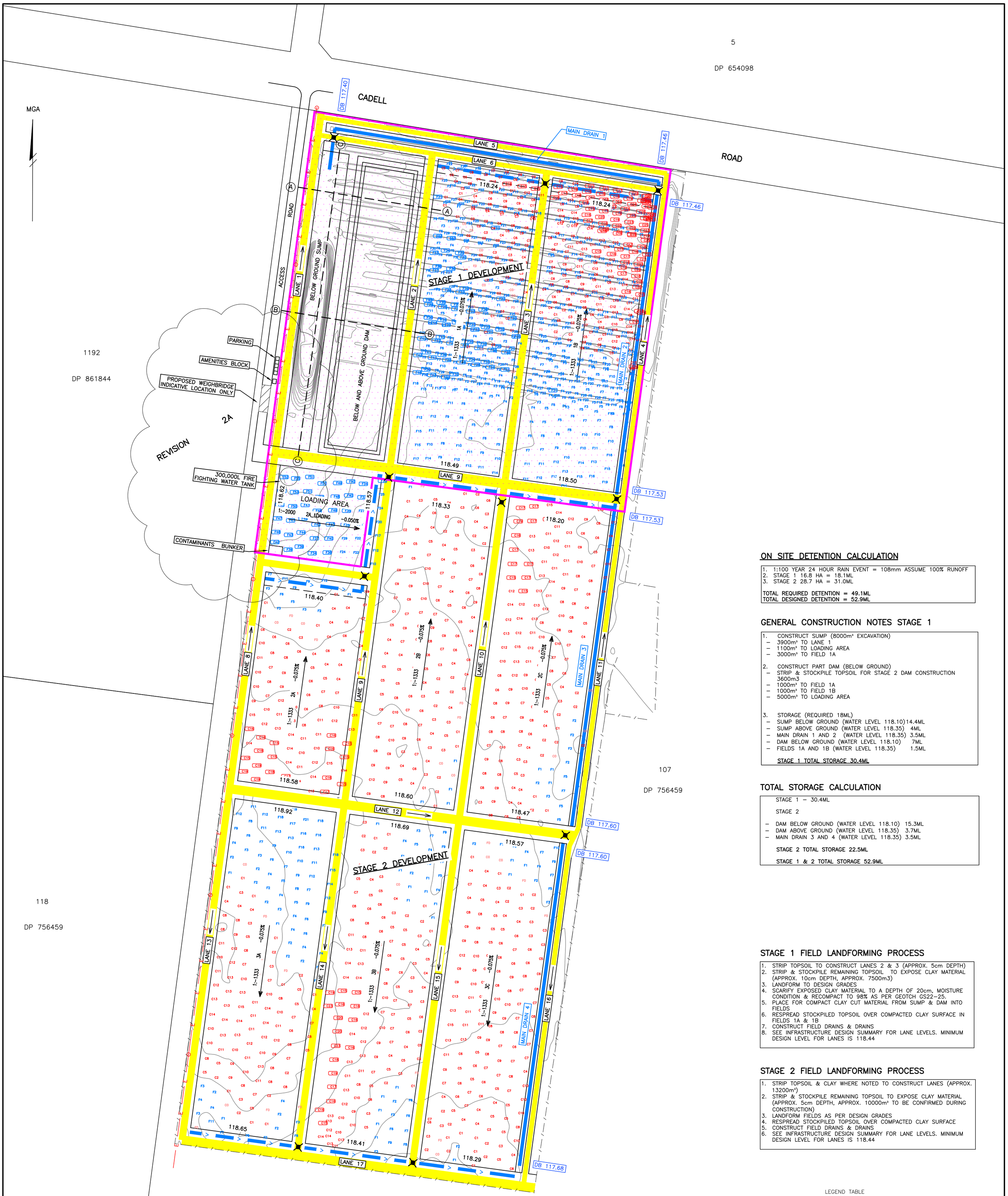
It is concluded that:

- Traffic surveys and analysis of key roads in the vicinity of the site (including Kidman Way and Cadell Road) shows that the roads currently carry low levels of traffic, operate at an excellent Level of Service and are of suitable capacity for the current level of traffic;
- The proposed development is anticipated to generate an additional 6 vehicle trips per hour in the peak period, and a total of 60 vehicle trips per day, which will not have a significant impact on the performance of the surrounding road network;
- The site and proposed development allows vehicles to enter and exit the site in a forward direction, with adequate room available on site to park anticipated vehicles; and
- There is no significant impact of the proposed development on pedestrians and cyclists.

It is recommended that:

- The intersection of Kidman Way and Cadell Road be upgraded to incorporate a Rural BAR (Basic Right Turn) treatment;
- Cadell Road be gazetted for travel by B-Doubles and Type 1 A-Doubles all year round; and
- Access into the site be designed as a typical rural property access (as detailed in Section 7.2.3 of the *Austroads Guide to Road Design Part 4: Intersections and Crossings – General* and shown in RMS (TfNSW) Model Drawing – Typical Rural Property Access Standards (Figure 2 – Articulated Vehicles).

APPENDIX A – PLANS OF PROPOSED DEVELOPMENT



ON SITE DETENTION CALCULATION

1. 1:100 YEAR 24 HOUR RAIN EVENT = 108mm ASSUME 100% RUNOFF
2. STAGE 1 16.8 HA = 18.1ML
3. STAGE 2 28.7 HA = 31.0ML

TOTAL REQUIRED DETENTION = 49.1ML
TOTAL DESIGNED DETENTION = 52.9ML

GENERAL CONSTRUCTION NOTES STAGE 1

1. CONSTRUCT SUMP (8000m³ EXCAVATION)
   - 3900m³ TO LANE 1
   - 1100m³ TO LOADING AREA
   - 3000m³ TO FIELD 1A
2. CONSTRUCT PART DAM (BELOW GROUND)
   - STRIP & STOCKPILE TOPSOIL FOR STAGE 2 DAM CONSTRUCTION 3600m3
   - 1000m³ TO FIELD 1A
   - 1000m³ TO FIELD 1B
   - 5000m³ TO LOADING AREA
3. STORAGE (REQUIRED 18ML)
   - SUMP BELOW GROUND (WATER LEVEL 118.10) 14.4ML
   - SUMP ABOVE GROUND (WATER LEVEL 118.35) 4ML
   - MAIN DRAIN 1 AND 2 (WATER LEVEL 118.35) 3.5ML
   - DAM BELOW GROUND (WATER LEVEL 118.10) 7ML
   - FIELDS 1A AND 1B (WATER LEVEL 118.35) 1.5ML

   STAGE 1 TOTAL STORAGE 30.4ML

TOTAL STORAGE CALCULATION

STAGE 1 – 30.4ML

STAGE 2

- DAM BELOW GROUND (WATER LEVEL 118.10) 15.3ML
- DAM ABOVE GROUND (WATER LEVEL 118.35) 3.7ML
- MAIN DRAIN 3 AND 4 (WATER LEVEL 118.35) 3.5ML

STAGE 2 TOTAL STORAGE 22.5ML

STAGE 1 & 2 TOTAL STORAGE 52.9ML

STAGE 1 FIELD LANDFORMING PROCESS

1. STRIP TOPSOIL TO CONSTRUCT LANES 2 & 3 (APPROX. 5cm DEPTH)
2. STRIP & STOCKPILE REMAINING TOPSOIL TO EXPOSE CLAY MATERIAL (APPROX. 10cm DEPTH, APPROX. 7500m3)
3. LANDFORM TO DESIGN GRADES
4. SCARIFY EXPOSED CLAY MATERIAL TO A DEPTH OF 20cm, MOISTURE CONDITION & RECOMPACT TO 98% AS PER GEOTCH GS22–25.
5. PLACE FOR COMPACT CLAY CUT MATERIAL FROM SUMP & DAM INTO FIELDS
6. RESPREAD STOCKPILED TOPSOIL OVER COMPACTED CLAY SURFACE IN FIELDS 1A & 1B
7. CONSTRUCT FIELD DRAINS & DRAINS
8. SEE INFRASTRUCTURE DESIGN SUMMARY FOR LANE LEVELS. MINIMUM DESIGN LEVEL FOR LANES IS 118.44

STAGE 2 FIELD LANDFORMING PROCESS

1. STRIP TOPSOIL & CLAY WHERE NOTED TO CONSTRUCT LANES (APPROX. 13200m³)
2. STRIP & STOCKPILE REMAINING TOPSOIL TO EXPOSE CLAY MATERIAL (APPROX. 5cm DEPTH, APPROX. 10000m³ TO BE CONFIRMED DURING CONSTRUCTION)
3. LANDFORM FIELDS AS PER DESIGN GRADES
4. RESPREAD STOCKPILED TOPSOIL OVER COMPACTED CLAY SURFACE
5. CONSTRUCT FIELD DRAINS & DRAINS
6. SEE INFRASTRUCTURE DESIGN SUMMARY FOR LANE LEVELS. MINIMUM DESIGN LEVEL FOR LANES IS 118.44

LEGEND TABLE

DB 117.60	DESIGN DRAIN BED LEVEL
⊙	ELECTRICAL POLE
✕	CULVERT
F9 C9	CUT/FILL < 15cm
F21 C16	CUT/FILL > 15cm
	MAIN DRAIN
	FIELD DRAIN
	LANE/HIGH GROUND
E	OVERHEAD ELECTRICITY
/	EXISTING FENCE LINE
	COMPOST WINDROW CENTRELINE
	STAGE 1 DEVELOPMENT AREA

Bay Table

Bay	Ha	Acre	Cut(m3)	Cut/Ha	C/F ratio	Slope 1:	Slope %	Cross %	Haul	Spread	Topsoil (cut)
1A	3.88	9.58	371	95.61	1.15	1:–1333	–0.075	0.000	40	4000.0	0.0
1B	3.84	9.48	1777	463.07	1.15	1:–1333	–0.075	0.000	95	1000.0	320.0
2A_LOADING	1.14	2.82	0	0.00	1.15	1:–2000	–0.050	0.000	0	5000.0	0.0
Totals	8.85Ha	21.88A	2147m3	Cut/Ha Av=243m3						Spread Tot=10000m3	TS Cut Tot=320m3

Bay Table

Bay	Ha	Acre	Cut(m3)	Cut/Ha	C/F ratio	Slope 1:	Slope %	Cross %	Haul	Borrow	Topsoil (cut)
2A	2.68	6.62	2185	815.74	1.15	1:–1333	–0.075	0.000	163	–2000.0	0.0
2B	4.05	10.00	2016	498.24	1.15	1:–1333	–0.075	0.000	82	–2000.0	0.0
2C	4.05	10.00	3115	769.67	1.15	1:–1333	–0.075	0.000	245	–3000.0	320.0
Totals	10.77Ha	26.62A	7317m3	Cut/Ha Av=679m3					Haul Dist Av=180m	Borrow Tot=–7000m3	TS Cut Tot=320m3

Bay Table

Bay	Ha	Acre	Cut(m3)	Cut/Ha	C/F ratio	Slope 1:	Slope %	Cross %	Haul	Borrow	Topsoil (cut)
3A	4.22	10.42	1636	387.94	1.15	1:–1333	–0.075	0.000	207	0.0	0.0
3B	4.22	10.42	2707	641.87	1.15	1:–1333	–0.075	0.000	241	–2300.0	320.0
3C	3.96	9.79	2189	552.66	1.15	1:–1333	–0.075	0.000	214	–2000.0	0.0
Totals	12.40Ha	30.63A	6532m3	Cut/Ha Av=527m3					Haul Dist Av=220m	Borrow Tot=–4300m3	TS Cut Tot=320m3

DATE	No.	ISSUE	AUTHORISED
31/07/2023	3A	ELECTRICITY LINE ADDED	GP
19/07/2023	2A	INFRASTRUCTURE ADDED	GP
03/04/2023	1A	ISSUED TO CLIENT	GP

DRAWN: RS CHECKED: GP

COMMENTS:

SURVEY PROVIDED BY "FARM DESIGN SERVICE"
HORIZONTAL DATUM ASSUMED
VERTICAL DATUM ASSUMED
NO SURVEY UNDERTAKEN TO DEFINE BOUNDARIES

COMPUTER FILES: 14032F23.dwg

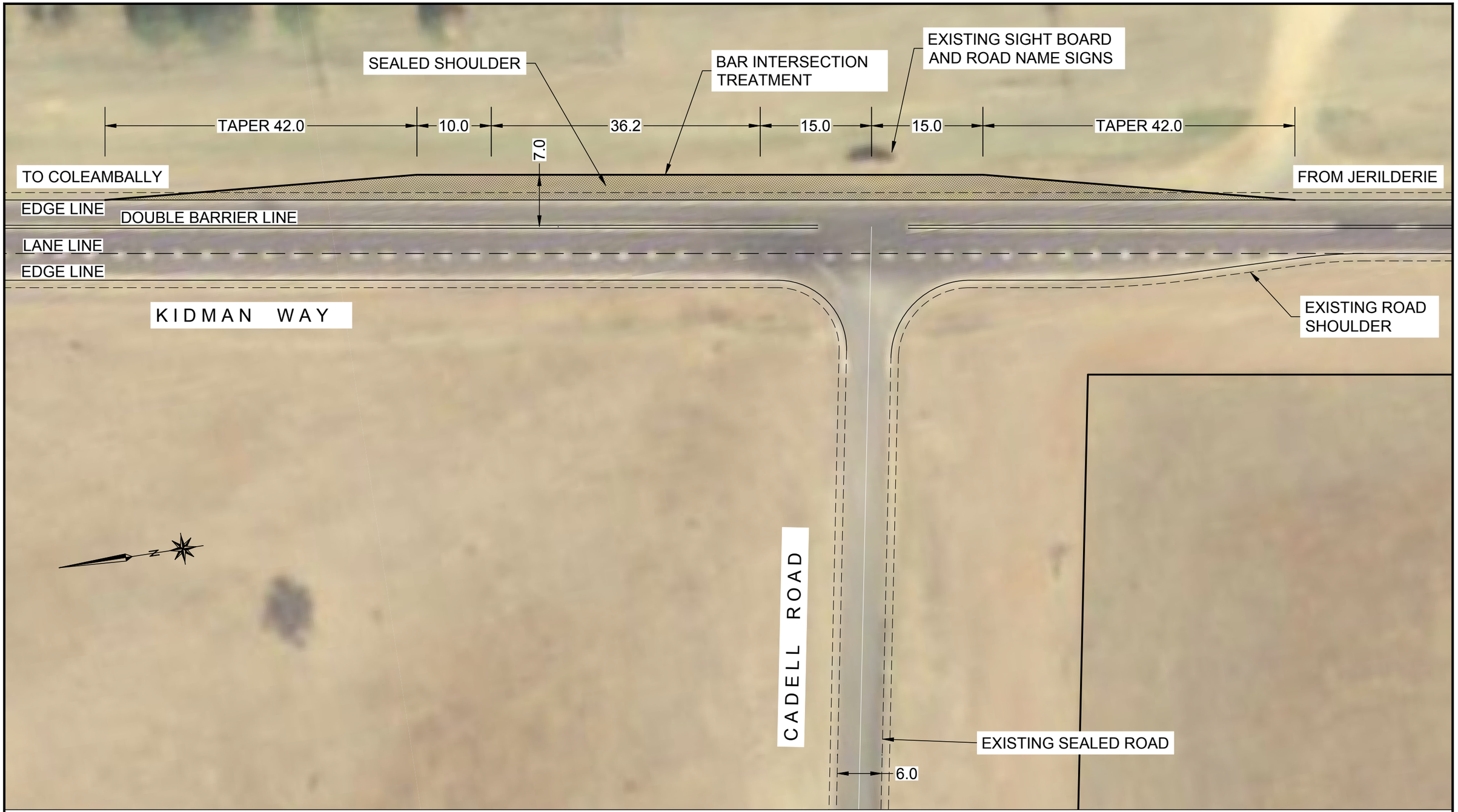
POLKINGHORNE HARRISON LONGHURST
115 Yambil Street, Griffith NSW 2680 P (02) 6964 3192
13 Gibraltar Street, Bungendore NSW 2621 P (02) 6238 0144
www.phlsurveyors.com.au

CLIENT: KILLORAN AG

TITLE: FARM 2006 CADELL ROAD COLEAMBALLY
PROPOSED LANDFORM DESIGNS FOR
COMPOSTING FACILITY
LANDFORM DESIGNS

DATE: 28/06/2023
FILE: PN14032
SCALE: 1:2000
A1 – 525340_3A
SHEET 1 OF 5

ORIGINAL A1 SHEET LIABILITY LIMITED BY A SCHEME APPROVED UNDER PROFESSIONAL STANDARDS LEGISLATION
0 100mm 200mm



SITE PLAN

HORIZONTAL 20 15 10 5 00 10 20 30 40

Spotto CONSULTING

DESIGNED BDC	25 / 10 / 2023	PROPOSED COMPOSTING FACILITY
DRAWN BDC	SWS	1578 CADELL ROAD, GALA VALE NSW
	APPROVED	INTERSECTION DESIGN - KIDMAN WAY AND CADELL ROAD

SCALE 1 : 500

REV. A3

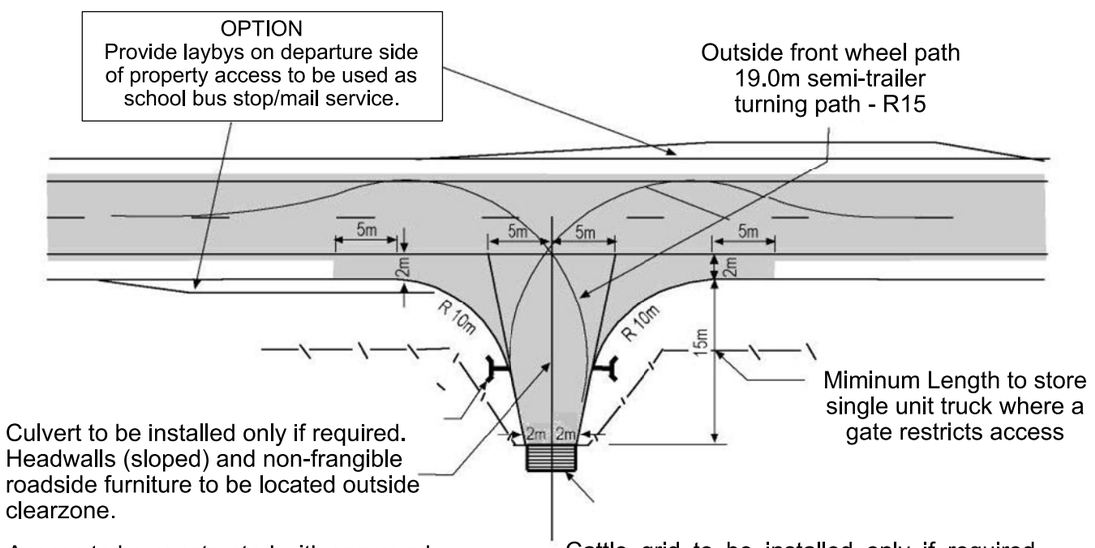
DRAWING NUMBER 0196 - 01

APPENDIX B – RURAL PROPERTY ACCESS MODEL DRAWINGS

Typical Rural Property Access Standards

1. Single Unit Truck

Access to be located where access driveway sight distance is available
Refer to AS2890.1 Table below



Culvert to be installed only if required. Headwalls (sloped) and non-frangible roadside furniture to be located outside clearzone.

Access to be constructed with approved compacted roadbase material and sealed as per Council specifications and requirements.

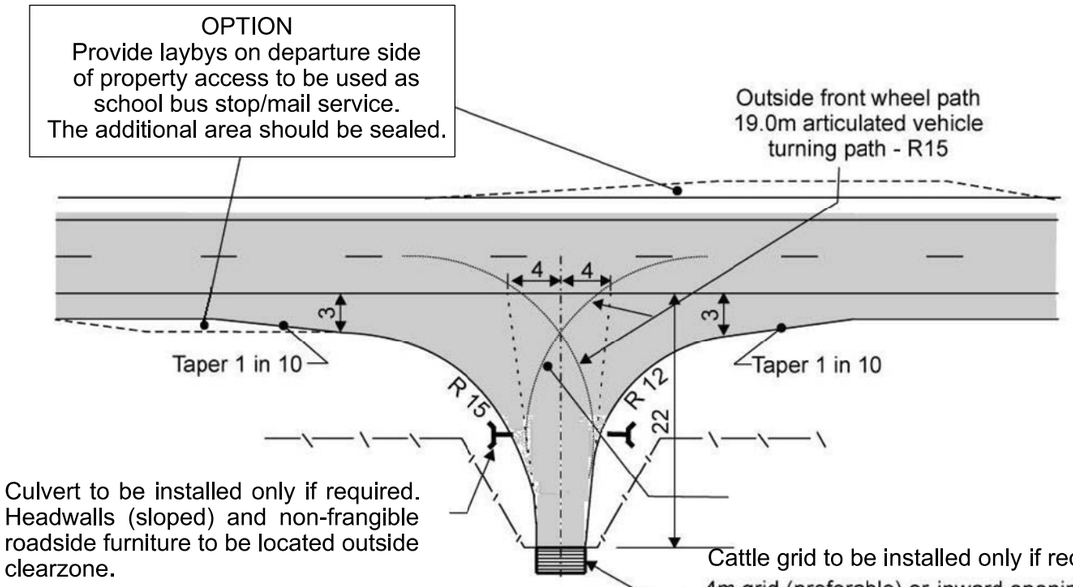
Cattle grid to be installed only if required. An inward opening 3.6m gate set back 15m from edge line is an alternative if access point is to be used by single unit vehicles 12.5m long or less.

Access Driveway Sight Distance
(AS2890.1)

Speed Limit km/h	Sight Distance (rounded to nearest 5m)
50	70
60	85
70	100
80	110
90	125
100	140
110	155

2. Articulated Vehicles

Access to be located where accesss driveway sight distance is available
Refer to AS2890.1 Table below



Culvert to be installed only if required. Headwalls (sloped) and non-frangible roadside furniture to be located outside clearzone.

Access to be constructed with approved compacted roadbase material and sealed as per Council specifications and requirements.

Cattle grid to be installed only if reqired. 4m grid (preferable) or inward opening 3.6m gate.

Where road train access is required, the desirable width of 8 m should be provided (minimum width is 6 m).

NOTES:

A: Council may require work to be undertaken to Auspec standards www.natspec.com.au

B: All ongoing maintenance to rural propety access is the responsibility of the property owner.

PRODUCED: $DATE$ AT $TIME$ $USER$
FILE PATH: $FILE$
PLOT DRIVER: $PLTDRVL$
PEN TABLE: $PENTBLL$

No.	Amendment Description	Initials	Date

A3 original | This sheet may be prepared using colour and may be incomplete if copied | Co-ordinate System: MGA Zone 56 | Height Datum: A.H.D.

SCALES
NOT TO SCALE

Transport NSW GOVERNMENT Roads & Maritime Services

DESIGNED.....
REVIEWED.....

ROADS AND MARITIME SERVICES
MODEL DRAWINGS
TYPICAL RURAL PROPERTY ACCESS STANDARDS

FILE No.	DRAWING	PRINTED DATE	SHEET No.
	27/02/2015		

REGISTRATION NUMBER

Appendix 6 – Scoping Report Submitted with SEARS Application

Scoping Report

Killoran Agriculture Composting Facility

1578 Cadell Road Gala Vale

PREPARED FOR: KILLORAN AGRICULTURE

BY: SKM PLANNING PTY LTD – 6 MURPHY CRESCENT, GRIFFITH NSW – ADMIN@SKMPLANNING.COM

DATE OF FINAL ISSUE – 30 JANUARY 2022

PREPARED BY – KELLY MCNICOL M.PL (DIRECTOR)

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Contents

1 Proponent and Site Details

The purpose of this report is to inform and facilitate pre-lodgement discussions with Murrumbidgee Council and other government agencies and to request Secretary's Environmental Assessment Requirements (SEARs) from the Department of Planning, Industry and Environment.

Killoran Agriculture is proposing to establish a composting and pelletising operation on Cadell Road in Gala Vale. The property is located approximately 17km south of Coleambally via Kidman Way. The property has a history of agricultural use and is the primary location of the Killoran Agriculture operation who grow lucerne, wheat and other rotational crops. Killoran Agriculture's existing offices and farm shed are located on the site.

Owner	Killoran Agriculture
Applicant	Killoran Agriculture
Site Address	1578 Cadell Road Gala Vale
Lot and Plan details of holding	Part Holding 1 Lots 116-118, Lot 1192 DP861844, Lot 3 DP113903 Holding 2 Lot 1 DP1273305, Lot 1 DP598665 and Lots 106-109 DP 756459
Lot and plan of site of facility	Lot 100 DP 756459 (Composting Works) Lot 106 DP 756459 (Pelletising Facility)
Local Government Area	Murrumbidgee Council
Total area of land containing the facility	Lot 118 - 120 ha Lot 107 - 120ha

The Killoran Agriculture farm holding consists of twelve lots in total, the most relevant to the development being the five contiguous of Lots 116-118, Lot 1192 DP861844 and Lot 3 DP113903 and the other consisting of six lots being Lot 1 DP1273305, Lot 1 DP598665 and Lots 106-109 DP 756459 including closed roads and allotment containing a dwelling and associated buildings.

1.1 Surrounding Land Uses

The site is located in a remote location in the Murrumbidgee Local Government Area on Cadell Road which connects to the Kidman Way at an existing channelised intersection around 2.8 km from the site. Cadell Road is a bitumen sealed two lane road. The nearest residential receiver not located on the farm holding is located 1.2 km to the north-west of the site. The predominant land use in the locality is broadacre crop agriculture.

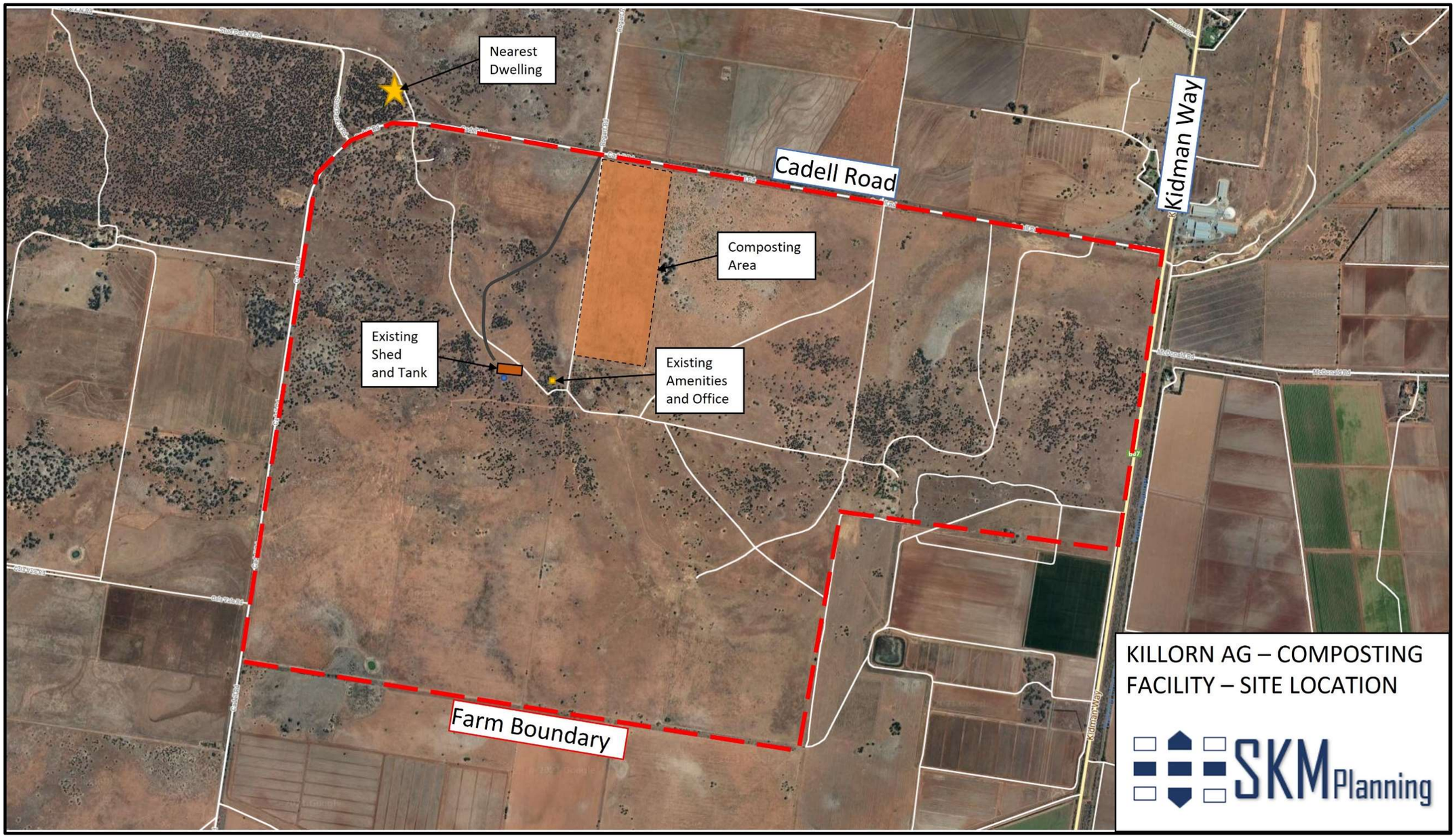


Figure 1 - Site Location and Layout

2 Proposed Development

2.1 Overview

The proposal involves receiving to site primarily spent litter from poultry farms in the region, but also food and organic waste and animal renderings and composting it in windrows prior to transforming it into a stable pelletised form of organic fertiliser. The proposal value adds to a by-product of egg and chicken meat production to enable it to be applied to land as a fertiliser. This product fills a growing market need for organic product fertilisers that is easily transported and applied to agricultural land.

At this stage there is a need and market for such a product in cotton production in northern NSW and Queensland where it would be shipped in bulk.

The proposal will have some additional inputs to assist with the composting process and to ensure that sterilisation temperatures are achieved.

2.2 Proposal in Detail

The proposed development involves the establishment of a composting facility and construction of infrastructure to pelletise the material. Initially the facility would compost 5,000 tonnes of organic material per year under a local (non-designated) development application submitted to Murrumbidgee Council. The purpose of the first development application is to get the facility up and running while an EIS is prepared for the ultimate yearly input of 99,000 tonnes per year.

The facility would include the following:

- Establishment of compost pads
- Construction of a water / leachate recycling dam
- Drainage structures
- Water storage tanks
- Construction of a shed and installation of a pelletising equipment
- Internal roads
- Amenities, office and workshop building.

It is proposed to receive spent bed litter from intensive livestock agriculture industries, food and organics wastes from various food processors in the region and animal renderings from rendering plants including Baiada's plant in Hanwood. The material will be composted in windrows, before being pelletised and sold as fertiliser. Specialised windrow mixing equipment would be utilised to turn over the windrows. It would take approximately 12-14 weeks for the composting process to complete. During this time the windrows would be turned over 6-8 times. Water would be added to compost as required from the water / leachate recycling dam. Other additives would be used to ensure the compost matures within optimal conditions (see **Table 1**)

Table 1: Composting Factors – Optimal Ranges

Conditions for Rapid Composting	Reasonable range	Preferred range
Carbon to nitrogen ratio	20:1 - 40:1	25:1 - 30:1
Water content	40 - 65%	50 - 60%
Oxygen concentration	5%	5 -15 %
Particle size (diameter)	1/8 - 1/2 inch	Depends on the material
pH	5.5 - 9.0	6.5 - 8.0
Temperature	110 –150 °F	130 – 140 °F

The pelletiser will be housed in a shed with composting, windrowing and turning taking place in the open on the compost pads. Composting will take place on Lot 100 and the pelletiser will be located on Lot 106.

Access to the site is via Cadell Road which directly connects to Kidman Way approximately 2.7 km to the east of the site. Kidman Way is a regional road under the control of Transport for NSW. Consultation with that authority will be required in relation to truck visitation through the intersection of Kidman Way and Cadell Road.

A proposed site footprint is presented in **Figure 2**, this provides a general outline of the location of the facility. The composting area would occupy at full build out of the facility an area of 45 ha. Composting pads would be created which drain to a water recycling area. The pads would be constructed to meet the requirements of the Department's Composting Guidelines. Water and leachate from the composting pads would be collected in a recycling dam for reapplication to the windrows.

The pelletiser will be housed in a shed in the approximate location on Lot 106 shown in yellow on **Figure 2**. Detailed plans will be included with the development applications.

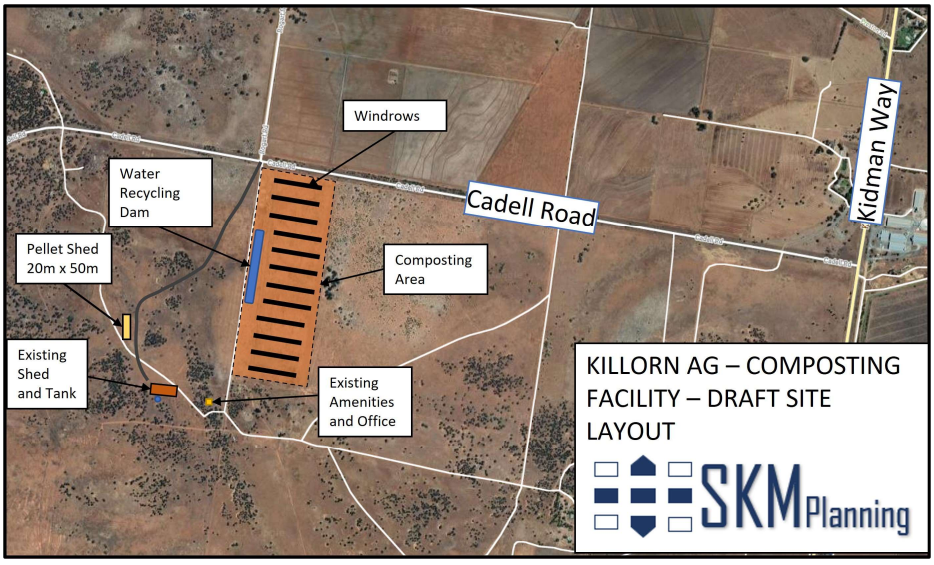


Figure 2: Draft Layout Plan

3 Legislative Context

This section provides a review of the proposal against the relevant planning legislation as prescribed in Section 4.15 of the Environmental Planning and Assessment Act 1979.

3.1 Environmental Planning and Assessment Act 1979

The proposed composting facility will require development consent from Murrumbidgee Council under Part 4 of the *Environmental Planning and Assessment Act, 1979.*

The first development application will be lodged as local (non-designated) development with a processing capacity of 5,000 tonnes per year of organic material.

The second development application will increase the processing capacity to 99,000 and would be considered Designated Development under Schedule 3 Section 13 of the *Environmental Planning and Regulation, 2000* which prescribes as follows:

13 Composting facilities or works

Composting facilities or works (being works involving the controlled aerobic or anaerobic biological conversion of organic material into stable cured humus-like products, including bioconversion, biodigestion and vermiculture)—

(a) that process more than 5,000 tonnes per year of organic materials, or

(b) that are located—

(i) in or within 100 metres of a natural waterbody, wetland, coastal dune field or environmentally sensitive area, or

(ii) in an area of high watertable, highly permeable soils, acid sulphate, sodic or saline soils, or

(iii) within a drinking water catchment, or

(iv) within a catchment of an estuary where the entrance to the sea is intermittently open, or

(v) on a floodplain, or

(vi) within 500 metres of a residential zone or 250 metres of a dwelling not associated with the development and, in the opinion of the consent authority, having regard to topography and local meteorological conditions, are likely to significantly affect the amenity of the neighbourhood by reason of noise, visual impacts, air pollution (including odour, smoke, fumes or dust), vermin or traffic.

3.2 Protection of the Environment Operations Act 1997

The second development application would also be considered a scheduled activity under Schedule 1 Section 12 of the *Protection of the Environment Operations Act, 1997.* This section prescribes:

12 Composting

(1) This clause applies to ***composting****, meaning the aerobic or anaerobic biological conversion of organics into humus-like products—*

(a) by methods such as bioconversion, biodigestion or vermiculture, or

(b) by size reduction of organics by shredding, chipping, mulching or grinding.

(2) The activity to which this clause applies is declared to be a scheduled activity if—

(a) where it takes place inside the regulated area, or takes place outside the regulated area but receives organics from inside the regulated area (whether or not it also receives organics from outside the regulated area)—

(i) it has on site at any time more than 200 tonnes of organics received from off site, or

(ii) it receives from off site more than 5,000 tonnes per year of non-putrescible organics or more than 200 tonnes per year of putrescible organics, or

(b) where it takes place outside the regulated area and does not receive organics from inside the regulated area—

(i) it has on site at any time more than 2,000 tonnes of organics received from off site, or

(ii) it receives from off site more than 5,000 tonnes per year of non-putrescible organics or more than 200 tonnes per year of putrescible organics.

(3) For the purposes of this clause, 1 cubic metre of organics is taken to weigh 0.5 tonnes.

Accordingly, the second development application requires Secretary Environmental Assessment Requirements (SEARs) and an Environmental Protection Licence (EPL) from NSW Environment Protection Authority in order to operate.

3.3 Jerilderie Local Environmental Plan 2012

The site is zoned RU1 Primary Production under the Jerilderie Local Environmental Plan 2012 and composting facilities are a permissible use with the consent of Murrumbidgee Council.

Composting facilities being a sub definition of *rural industry* being defined as*:*

the handling, treating, production, processing, storage or packing of animal or plant agricultural products for commercial purposes, and includes any of the following—

(a) agricultural produce industries,

(b) livestock processing industries,

(c) composting facilities and works (including the production of mushroom substrate),

(d) sawmill or log processing works,

(e) stock and sale yards,

(f) the regular servicing or repairing of plant or equipment used for the purposes of a rural enterprise.

Under Jerilderie Local Environmental Plan 2012 the objective of the RU1 Primary Production zone are:

- To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.

- To encourage diversity in primary industry enterprises and systems appropriate for the area.
- To minimise the fragmentation and alienation of resource lands.
- To minimise conflict between land uses within this zone and land uses within adjoining zones.

The proposal would meet the objectives of the zone by providing a facility that will reuse the by-products of primary industries in the region. Land use conflict would be avoided through the careful management of the composting facility.

3.4 Composting Guidelines

The Department of Urban Affairs and Planning released, in September 1996, EIS Guidelines for Composting and Related Facilities (Composting Guidelines). This Guidelines places a high priority on assessing environmental factors in site selection to determine the suitability of the site for the facility. It recognises the key issues surrounding composting facilities are air quality, particularly odour, surface and groundwater protection and traffic. An initial site assessment against Table 4 of the Composting Guidelines is provided below:

Table 2: Matters for consideration in initial site investigations (EIS Guideline – Composting)

Factor for Consideration	**Comments**
Operational Requirements	The site is relatively flat with good transport networks and ready access to raw materials
Surface Water	There are no watercourses on site nor in the immediate vicinity, nor is the site in a drinking water catchment. Stormwater will be directed around the composting site. Stormwater falling onto the composting area will be directed to a water / leachate recycling dam which would
Factor for Consideration	**Comments**
Groundwater	The site is mapped as having vulnerable groundwater. The composting operation will take place on compacted, impervious pads with leachate management infrastructure in place.
Flooding	The site is not subject to flooding.
Soils	The composting operation is to be undertaken on a compacted impervious area with stormwater directed to a leachate capture dam. The pelletising process will take place inside a purpose built shed.

	There is no evidence of acid sulphate soils, erodibility, sodicity nor soil instability.
Topography	The site and surrounding area are relatively flat and there are no topographic features that will assist with odour or particulate buffering. For this reason, good management practices and monitoring are to be employed to limit off site impacts. The site is located to the west of the nearest dwelling and the prevailing winds are in an easterly direction.
Flora and Fauna	The area of the proposed composting facility is not mapped as terrestrial biodiversity. The site is highly degraded from the planting of rotational crops and void of any native vegetation.
Transport	The site has good access to the State's classified road network. Cadell Road bitumen sealed with good connection to Kidman Way. All organic material for composting will be delivered to site in covered road train trucks (B-triple or similar). Transport between the composting site and pelletising facility will be via internal roads. Bulk pelletised material will be loaded into road train trucks and transported off site.

3.5 State Environmental Planning Policy (Infrastructure) 2007

Clause 104 & Schedule 3 – Traffic Generating Development
Schedule 3 requires the referral of any waste facility to TfNSW. Traffic movements, impact and assessment will be undertaken as part of consideration of the environmental factors in lodging a development application.

3.6 State Environmental Planning Policy 55 – Remediation of Land

There is no past history to indicate that the land is contaminated, nonetheless a full site history will be undertaken as part of the environmental assessment process. A preliminary analysis will be undertaken in light of additives, chemical use and storage to the composting process to demonstrate that contamination of the site is unlikely to occur as a result of the proposal being established and operated from the site.

3.7 State Environmental Planning Policy (State and Regional Development) 2007

The SEPP includes classes of State significant development (SSD) in Schedule 1. Waste and resource management facilities:

(1) Development for the purpose of regional putrescible landfills or an extension to a regional putrescible landfill that—

> *(a) has a capacity to receive more than 75,000 tonnes per year of putrescible waste, or*
>
> *(b) has a capacity to receive more than 650,000 tonnes of putrescible waste over the life of the site, or*
>
> *(c) is located in an environmentally sensitive area of State significance.*

(2) Development for the purpose of waste or resource transfer stations in metropolitan areas of the Sydney region that handle more than 100,000 tonnes per year of waste.

(3) Development for the purpose of resource recovery or recycling facilities that handle more than 100,000 tonnes per year of waste.

(4) Development for the purpose of waste incineration that handles more than 1,000 tonnes per year of waste.

(5) Development for the purpose of hazardous waste facilities that transfer, store or dispose of solid or liquid waste classified in the Australian Dangerous Goods Code or medical, cytotoxic or quarantine waste that handles more than 1,000 tonnes per year of waste.

(6) Development for the purpose of any other liquid waste depot that treats, stores or disposes of industrial liquid waste and—

> *(a) handles more than 10,000 tonnes per year of liquid food or grease trap waste, or*
>
> *(b) handles more than 1,000 tonnes per year of other aqueous or non-aqueous liquid industrial waste.*

The proposal at its full build out would not exceed 100,000 tonnes per year of waste acceptance at the site which is below the threshold for the development to be considered SSD.

4 Preliminary Impact Assessment

This section provides an assessment of the potential impact arising from the proposal. The impact assessment is based on the matters for consideration listed in Section 4.15 of the EP&A Act.

4.1 Climate

The climate at the site can be described as warm and temperate. The nearest long term weather station is Yanco some 56.7km away. Long term averages from Elders are shown below:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Mean Max (°C)	34.2	32.4	28.9	24.3	19.0	15.2	14.5	16.3	20.5	25.0	29.0	31.1	**24.2**
Mean Min (°C)	18.8	18.3	15.4	11.7	7.6	5.7	4.9	5.2	7.6	10.7	14.3	16.4	**11.4**
Mean Rain (mm)	30.4	30.4	34.6	29.9	35.4	35.1	33.2	34.9	35.1	36.8	29.6	31.0	**394.0**
Mean Rain Days	4.5	4.0	4.7	5.2	8.1	10.9	12.1	10.8	8.8	7.1	5.7	5.2	**86.8**

Wind directional data is to be obtained to assist in the assessment of odour and dust impact for the lodgement of a development application. However, it is noted the prevailing winds in the locality are from the east.

4.2 Soils and Geology

The site geography is the Shepparton formation, being poorly consolidated clay, silt, sand and gravel. This formation is found throughout the Riverina between the Lachlan and Murray Rivers.

The site is predominantly class 6 land with very severe limitations; there is some class 4 land which has moderate to severe limitations closer to the road.

Class 6 shown in yellow below land has very severe limitations for a wide range of land uses and few management practices are available to overcome these limitations. Land generally is suitable only for grazing with limitations and is not suitable for cultivation.

Class 4 land shown in green can be cultivated occasionally for sowing of pastures and crops. However, it has cropping limitations because of erosion hazard, weak structure, salinity, acidification, shallowness of soils, climate, wetness, stoniness or a combination of these factors. It is only suitable for intermittent cultivation with specialised practices. Required erosion control practices include advanced conservation tillage, pasture cropping, well-planned rotations and maintenance of ground cover.

Classes as per the Land and Soil Capability Mapping for NSW and provide a statewide classification of soil capabilities.

Figure 3: Soil and Land Classification Map

4.3 Hydrology

Surface Water

The land is relatively flat and drains predominantly to a serious of intermittent wetlands and swamps. There are no natural watercourses lines within close proximity to the site. There are a series of irrigation channels that traverse the locality. The area is within the Coleambally Irrigation Area which ensures a secure water source as part of the regulated allocation from the Murrumbidgee River.

Coleambally Irrigation Area covers almost 400,000 hectares and services over 500 farms. The average farm size is 220ha and provides for irrigated agriculture.

The composting operation will need to be constructed and drained to direct stormwater around the operation as well as collect leachate water from the composting pads themselves so as not to contaminate any surface water.

Groundwater

The site is mapped on the vulnerable Ground Water Map of the Jerilderie Local Environmental Plan. The composting operations will need to be undertaken on a fully compacted hardstand area to limit groundwater penetration.

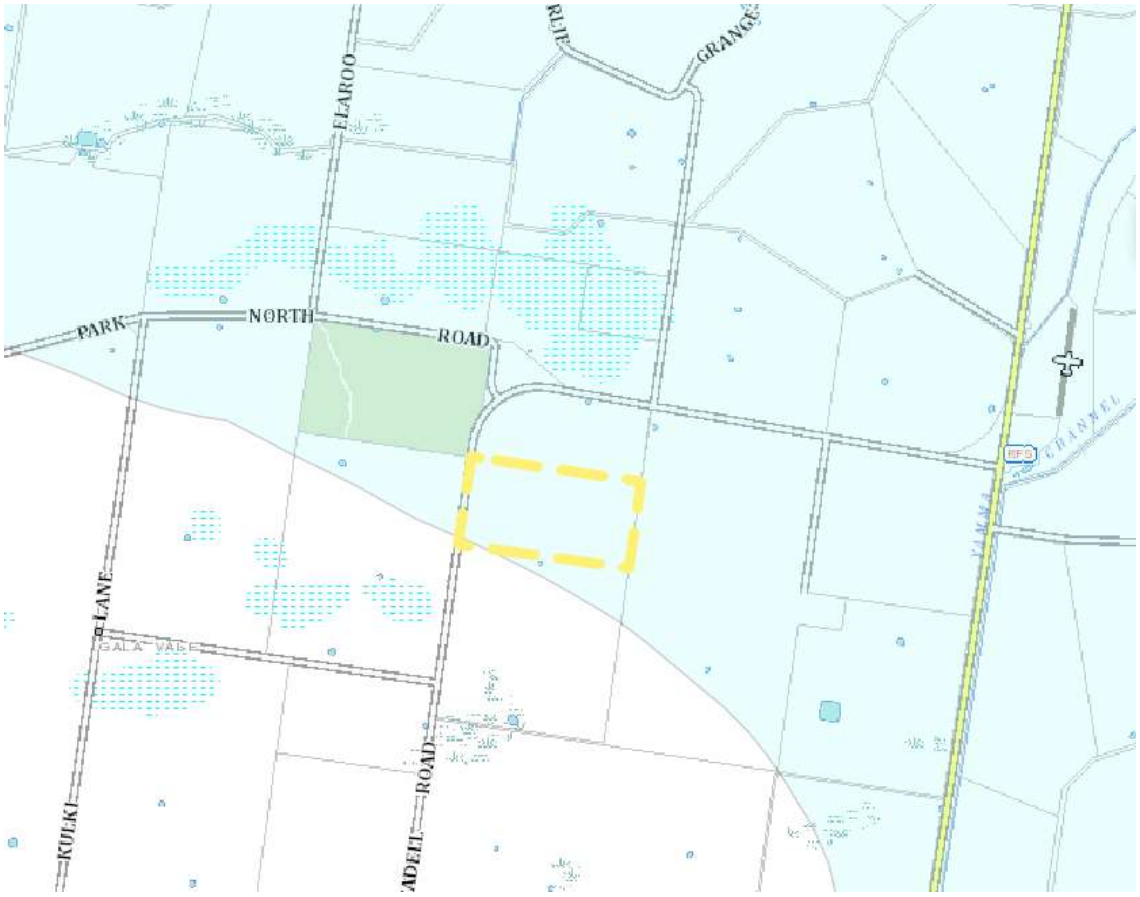


Figure 4: Vulnerable Groundwater Map (source: NSW Planning Portal)

Flooding

Flooding has not been identified as a risk for this site.

4.4 Biodiversity

The site is mapped on the Jerilderie Local Environmental Plan as containing terrestrial biodiversity on both lots associated with the proposal. However, the area in which the composting operation is proposed to be constructed is **not** within the area mapped as terrestrial biodiversity.

Figure 5: Terrestrial Biodiversity Map (source: NSW Planning Portal)

4.5 Traffic

It is anticipated that organic material will arrive to site via covered Road Train trucks from intensive livestock operations within the region, food processing operations and rendering plants. Transport of material between the composting operations and the pelletising facility will be via the internal road network. Product will be transported off site in bulk form via Road Train trucks. Delivery of other inputs for the operation will be via B-doubles or Road Trains. Kidman Way is a regional road with HML rating and is able to cater for Road Train movements. Cadell Road also has an HML rating for Road Train trucks. Around 1600 Road Train movements per year would be expected which equates to 4-5 truck movements to the site per day. The dispatch of pelletised product would require the same amount of trucks movement. As such, a total of 10 truck movements per day would be expected. This level of truck movements would not be considered to have a detrimental impact on the Kidman Way or the Cadell Road intersection which would impact efficiency to a level which would require additional road works (the Cadell Road / Kidman Way intersection has an existing channelised treatment).

4.6 Sensitive Receivers

There are seven dwellings not associated with the proposed development within 5km of the proposed composting site. The map below illustrates the sensitive receivers in the locality.

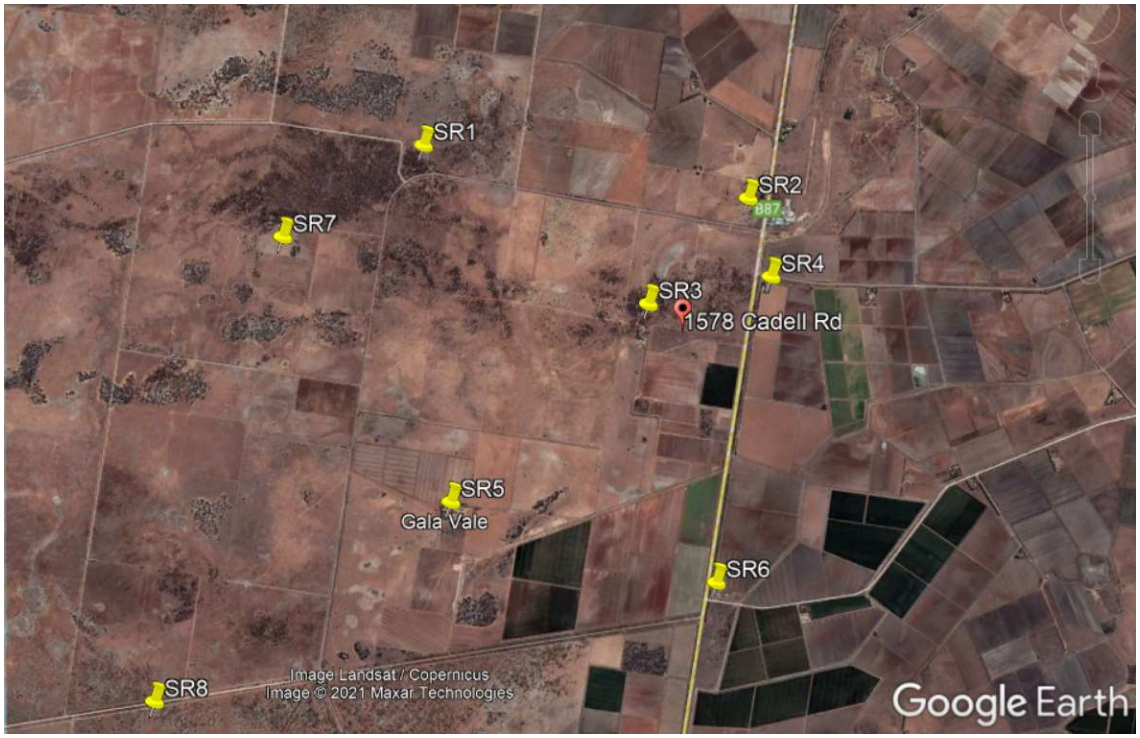


Figure 6: Sensitive Receivers within 5km of site (source: Google Earth)

4.7 Noise

Typically background noise in a rural environment is generally quite low, it is however acknowledged that this is variable depending upon the type of activity usually undertaken in the vicinity. Background noise levels can range from 25 to 45 dBA and this fluctuation can be attributed to a number of things including animal and bird vocalisation, farming equipment and traffic. It is usual that night time inversion and low wind interruption are generally more prominent in rural areas and can decrease noise attenuation. Nonetheless the facility is not proposing to operate at night. Typical noise associated with the facility would include trucks, windrow machinery, workshop, pelletiser, heavy machinery such as loaders and tractors. Based on a review of other similar composting operations, offensive noise generation would not be expected.

4.8 Air Quality

Dust

Dust is a common issue in rural and agricultural areas, there are many activities that produce dust and give rise to visible haze and deposition on surfaces. Dust is likely to be generated during construction phase by earthmoving equipment, traffic and topsoil stripping.

Dust is also likely to be generated during operations with unloading, turning, traffic, stockpiles, heavy machinery, bagging of pelletised product.

Appropriate management plans will be implemented to ensure that dust does not have a negative impact in the locality.

Odour

Odour emissions from composting works are highly dependent upon a number of factors including:

- Moisture content of material;
- Cover of active compost;
- Oxygen content;
- Heat;
- Active additives
- Nutrient content in leachate

Potential odour sources and points include:

- Material arrival and unloading;
- Turning and windrowing;
- Incorrect moisture and heat management;
- Pelletising;
- Transport;
- Leachate

A level one odour assessment will be performed as part of the environmental assessment for the development application. Odour impacts may give rise to concerns of neighbouring residences however the appropriate management of site operations, placement of site facilities and establishment of buffers will enable odour to be adequately and appropriately managed on site.

4.9 Cultural Heritage

AHIMS search conducted revealed no Aboriginal site or places within the site nor within a 200m buffer of the site.

5 Conclusion

This report has outlined aspects of the proposed development of a composting and pelletising operation at 1578 Cadell Road, Gala Vale. The development application for ultimate processing capacity of the proposal will require an environmental impact statement (EIS) to be prepared. The environmental assessment will cover the following factors:

- Geotechnical assessment including groundwater;
- Air quality assessment including odour and dust assessment;
- Visual amenity and social impacts in the vicinity, including an assessment of impact on nearby sensitive receivers;
- Traffic impact assessment including an assessment of construction and operational traffic impacts;
- Design of water/leachate management system in accordance with Composting Guidelines

Notwithstanding the above identified matters it is considered that the site is suitable for the development and the implementation of onsite management practices will ensure that any environmental impacts can be mitigated and managed.

Appendix 7 – Water Balance

General assumptions	Typical	Comments
Months in calendar year	12	
mL in L	1,000	
L in kL	1,000	
kL in ML	1,000	
sqm in ha	10,000	
Annual rainfall (mm)	426.9	
Rainfall runoff capture	50%	
Compost facility size (ha)	45.5	
Leachate dam surface area (ha)	2.5	
Annual pan evaporation (mm)	1400	http://www.bom.gov.au/watl/evaporation/
Dam evaporation factor	0.67	https://calculator.agriculture.vic.gov.au/fwcalc/information/determining-the-evaporative-loss-from-a-farm-dam
Annual compost production (tonnes)	99,000	There would be a seasonal change in compost production, however unable to meaningfully predict.
Water requirement per tonne of compost (L)	750	There would be a seasonal change in water requirement, however unable to meaningfully predict.
Fire tank size (kL)	144	
Fire tank refills per year	1	
Monthly water requirement for dust suppression (kL)	100	

Monthly assumptions

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Seasonality of rainfall	7.52%	7.35%	8.68%	7.56%	8.82%	8.63%	8.31%	8.85%	9.10%	9.43%	8.19%	7.56%

Comments

Seasonality of rainfall based on BOM data as per above annual rainfall weblink

Any residual water remaining in the leachate dam at end of calendar year is not included in the modelling i.e. reliance on bore water for composting in following years will be less.

Site water requirement

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Rainfall (mm)		32	31	37	32	38	37	35	38	39	40	35	32	427
Rainfall per sqm on composting facility (L)		32	31	37	32	38	37	35	38	39	40	35	32	427
Rainfall on total composting facility less leachate dam (kL)		13,801	13,489	15,930	13,874	16,187	15,838	15,251	16,242	16,701	17,306	15,031	13,874	183,524
Rainfall run-off capture on total composting facility less leachate dam (kL)		6,901	6,745	7,965	6,937	8,093	7,919	7,625	8,121	8,350	8,653	7,515	6,937	91,762
Rainfall on leachate dam (kL)		806	788	930	810	945	925	890	948	975	1,010	878	810	10,715
Rainfall capture on leachate dam (kL)		806	788	930	810	945	925	890	948	975	1,010	878	810	10,715
Total rainfall capture (kL)		**7,706**	**7,532**	**8,895**	**7,747**	**9,039**	**8,844**	**8,516**	**9,069**	**9,325**	**9,664**	**8,393**	**7,747**	**102,477**
Evaporation (mm)		(117)	(117)	(117)	(117)	(117)	(117)	(117)	(117)	(117)	(117)	(117)	(117)	(1,400)
Evaporation per sqm on leachate dam (L)		(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(78)	(938)
Potential evaporation on total leachate dam (kL)		(1,962)	(1,962)	(1,962)	(1,962)	(1,962)	(1,962)	(1,962)	(1,962)	(1,962)	(1,962)	(1,962)	(1,962)	(23,544)
Total evaporation on total leachate dam (kL)		**(1,962)**	**(1,962)**	**(1,962)**	**(1,962)**	**(1,962)**	**(1,962)**	**(1,962)**	**(1,962)**	**(1,962)**	**(1,962)**	**(1,962)**	**(1,962)**	**(23,544)**
Leachate dam water level before use for composting (kL)		5,744	5,570	6,933	6,531	7,420	8,114	8,481	9,400	10,576	12,090	12,334	11,932	
Water use for composting (kL)		(6,188)	(6,188)	(6,188)	(6,188)	(6,188)	(6,188)	(6,188)	(6,188)	(6,188)	(6,188)	(6,188)	(6,188)	(74,250)
Leachate dam water level after use for composting (kL)	**0**	**0**	**0**	**746**	**343**	**1,232**	**1,927**	**2,293**	**3,213**	**4,389**	**5,903**	**6,146**	**5,744**	
Bore water requirement for composting (ML)		**(0.44)**	**(0.62)**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**(1.06)**
Water requirement for fire tank (ML)		(0.14)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	(0.14)
Water requirement for dust suppression (ML)		(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(1.20)
Bore water requirement for facility (ML)		**(0.69)**	**(0.72)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(0.10)**	**(2.40)**

Appendix 8 – AHIMS Search

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Gala Vale

Client Service ID : 822047

Kelly Mcnicol

1 Murphy Crescent
Griffith New South Wales 2680

Attention: Kelly Mcnicol

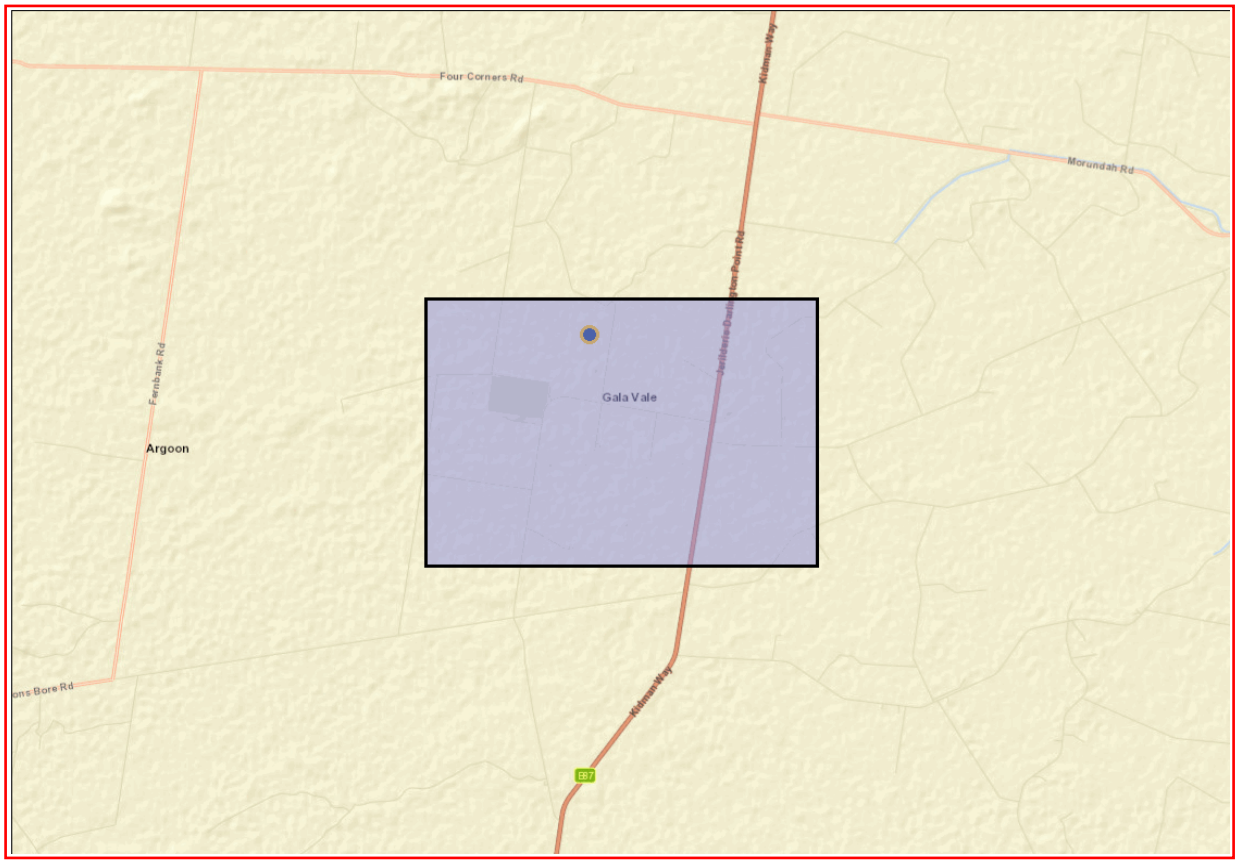
Email: admin@skmplanning.com

Date: 21 September 2023

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -34.9896, 145.7487 - Lat, Long To : -34.9192, 145.8723, conducted by Kelly Mcnicol on 21 September 2023.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

1	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

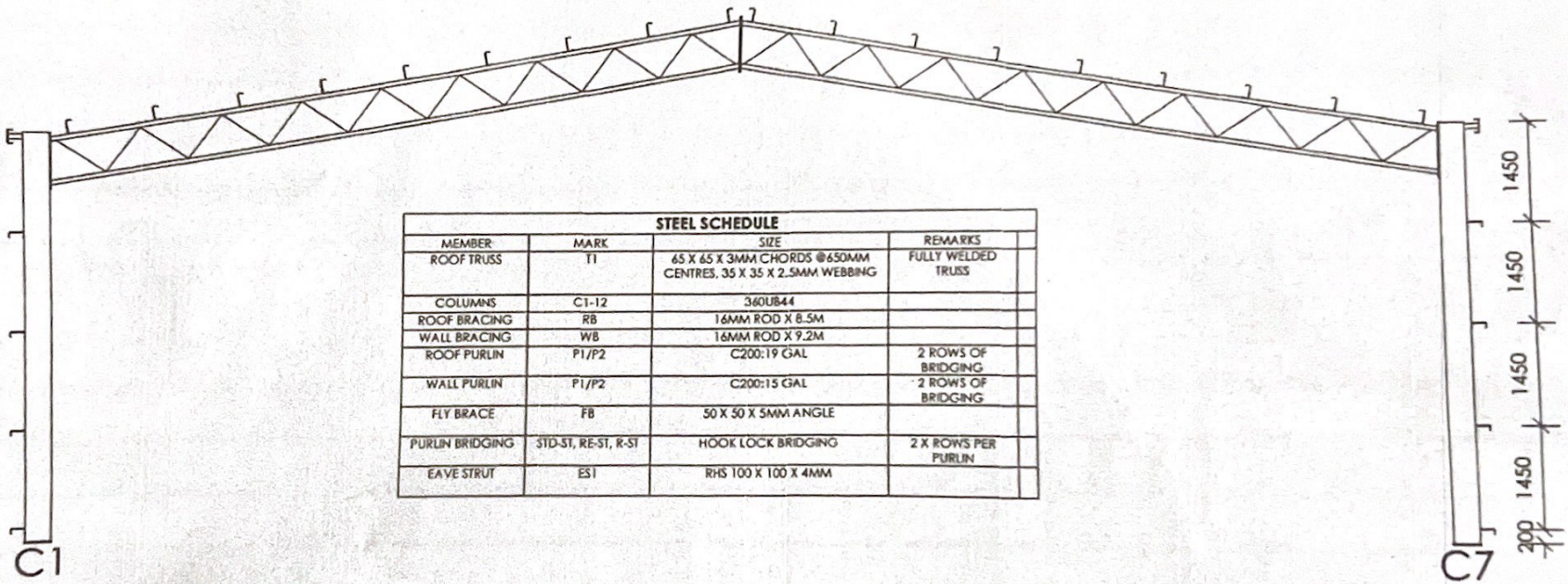
- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

Appendix 9 – Plans for Existing Pelletising Shed

HUGH MACDONALD



STEEL SCHEDULE

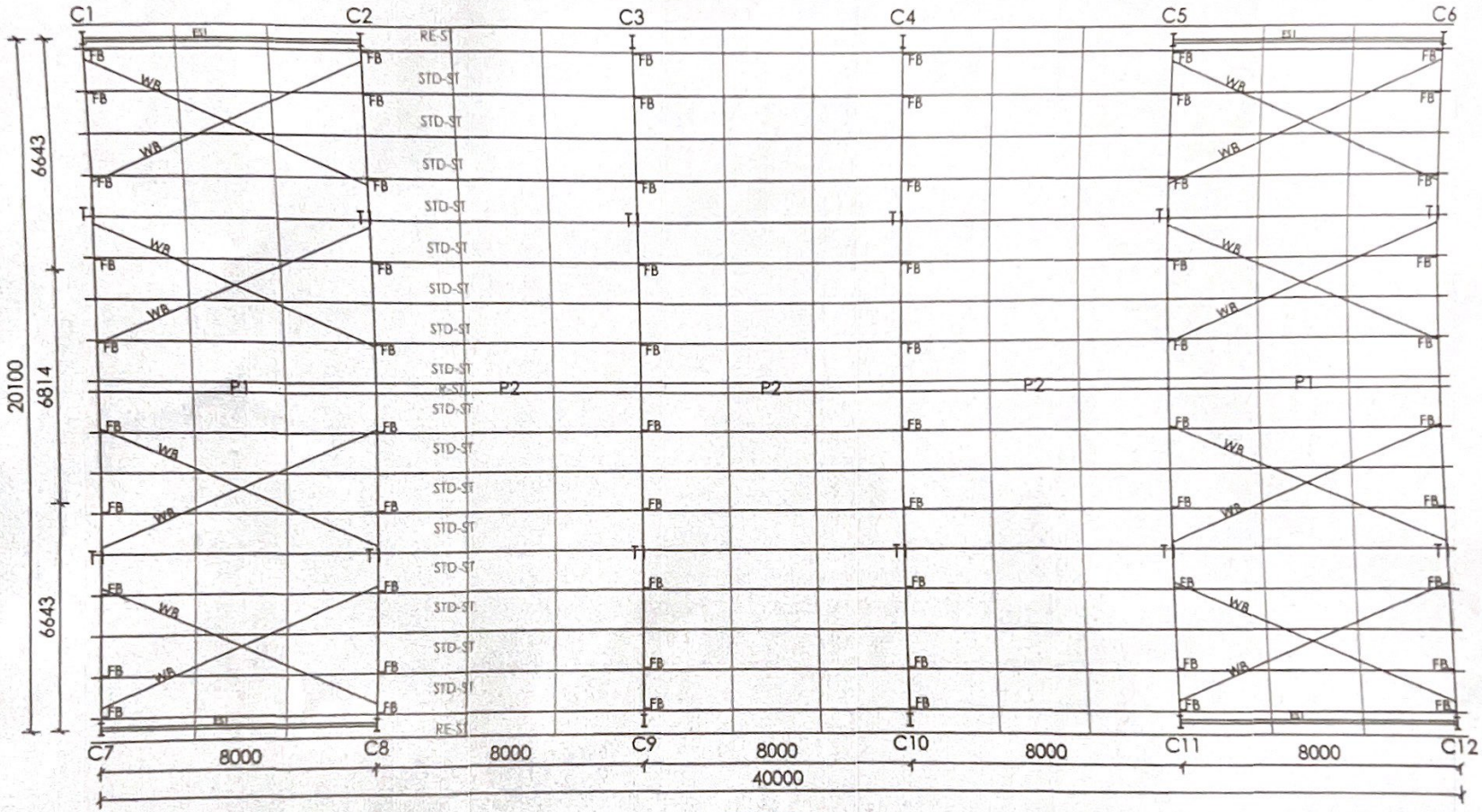
MEMBER	MARK	SIZE	REMARKS
ROOF TRUSS	T1	65 X 65 X 3MM CHORDS @650MM CENTRES, 35 X 35 X 2.5MM WEBBING	FULLY WELDED TRUSS
COLUMNS	C1-12	360UB44	
ROOF BRACING	RB	16MM ROD X 8.5M	
WALL BRACING	WB	16MM ROD X 9.2M	
ROOF PURLIN	P1/P2	C200:19 GAL	2 ROWS OF BRIDGING
WALL PURLIN	P1/P2	C200:15 GAL	2 ROWS OF BRIDGING
FLY BRACE	FB	50 X 50 X 5MM ANGLE	
PURLIN BRIDGING	STD-ST, RE-ST, R-ST	HOOK LOCK BRIDGING	2 X ROWS PER PURLIN
EAVE STRUT	EST	RHS 100 X 100 X 4MM	

REMARKS
FULLY WELDED TRUSS
2 ROWS OF BRIDGING
2 X ROWS PER PURLIN

20100

END VIEW

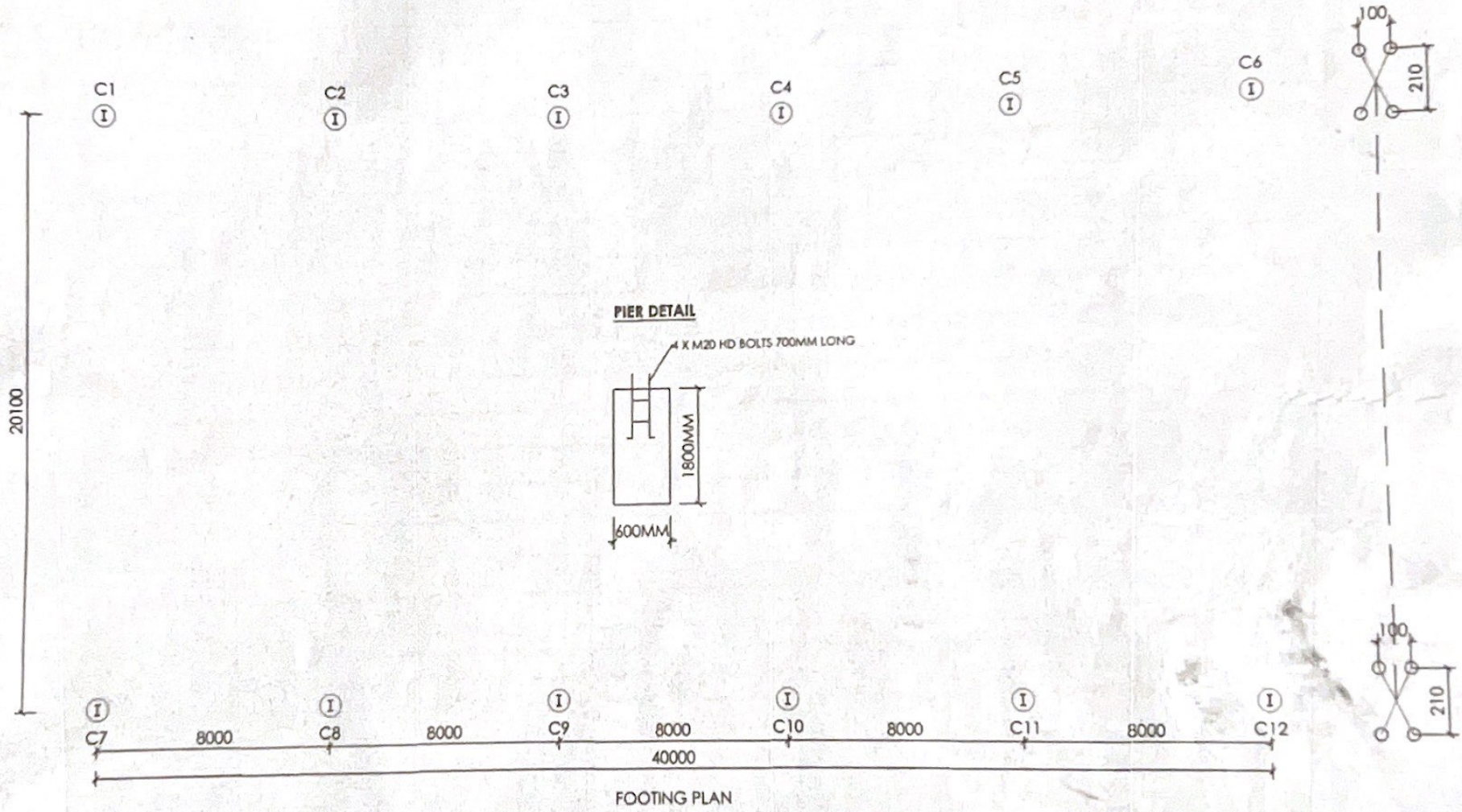
HUGH MACDONALD



ROOF PLAN

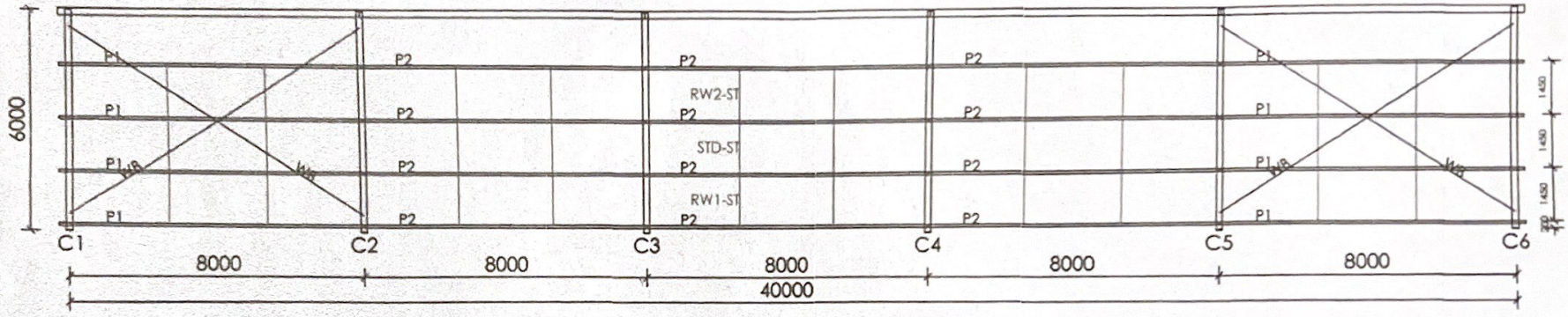
- ALL TRUSSES ARE INTERCHANGEABLE - LINE THEM UP IN THE DIRECTION OF THE FLY BRACE
- FOR THE PURLIN BRIDGING START FROM THE RIDGE AND WORK TO THE FASCIA
- THE RIDGE STRUT (R-ST) MUST BE MADE ON SITE BY JOINING THE SMALL CHANNEL WITH 2 X FEMALE BRACKETS TO MATCH THE PITCH OF ROOF
- THE FASCIA STRUT (RE-ST) MUST BE MADE ON SITE BY JOINING THE SMALL GAL ANGLE WITH 2 X HOLES TO END OF THE FASCIA STRUT TO MATCH THE PITCH OF THE ROOF

HUGH MACDONALD

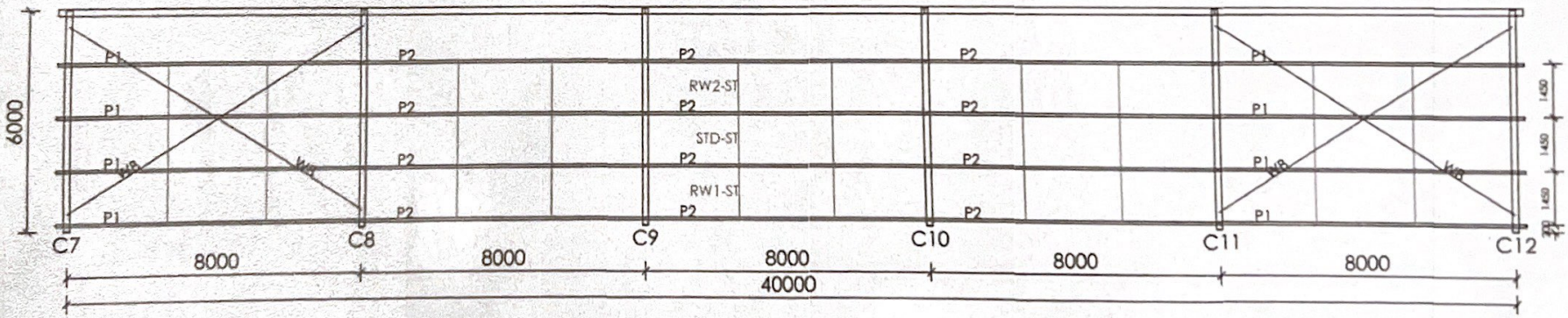


FOOTING PLAN

HUGH MACDONALD



BACK SIDE



FRONT SIDE

Appendix 10 – SEAR's

Department of Planning and Environment

28 February 2022

Mr Kelly McNicol
Director
SKM Planning
PO Box 8085
Griffith East NSW 2680

EF22/1230
SEAR 1648

Dear Mr McNicol

Composting Facility
1578 Cadell Road, Gala Vale (Lots 100 and 106 DP 756459)
Planning Secretary's Environmental Assessment Requirements (SEAR) 1648

Thank you for your request for the Planning Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Statement (EIS) for the above development proposal. I have attached a copy of these requirements.

In support of your application, you indicated that your proposal is both designated and integrated development under Part 4 of the *Environmental Planning and Assessment Act 1979* and requires an approval under the *Protection of the Environment Operations Act 1997*. In preparing the SEARs, the Department of Planning and Environment (the Department) has consulted with the Environment Protection Authority. A copy of their requirements is attached.

The Department has also consulted with the Transport for NSW as required by Schedule 3 of Chapter 2 of State Environmental Planning Policy (Transport and Infrastructure) 2021. A copy of their requirements is attached.

If other integrated approvals are identified before the Development Application (DA) is lodged, you must undertake direct consultation with the relevant agencies, and address their requirements in the EIS.

If your proposal contains any actions that could have a significant impact on matters of National Environmental Significance, then it will require an additional approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This approval is in addition to any approvals required under NSW legislation. If you have any questions about the application of the EPBC Act to your proposal, you should contact the Commonwealth Department of Agriculture, Water and the Environment on (02) 6274 1111.

Should you have any further enquiries, please contact Kathryn Moreira, Planning and Assessment, at the Department on (02) 9274 6086 or via kathryn.moreira@dpie.nsw.gov.au.

Yours sincerely

Chris Ritchie
Director
Industry Assessments
as delegate of the Planning Secretary

Planning Secretary's Environmental Assessment Requirements

Section 4.12(8) of the *Environmental Planning and Assessment Act 1979*. Schedule 3 of the Environmental Planning and Assessment Regulation 2021.

Designated Development

SEAR Number	1648
Proposal	Composting facility with a processing capacity of up to 99,000 tonnes per annum (tpa)
Location	1578 Cadell Road, Gala Vale (Lots 100 and 106 DP 756459)
Applicant	Killoran Agriculture
Date of Issue	28 February 2022
General Requirements	The Environmental Impact Statement (EIS) must comply with these assessment requirements and meet the minimum form and content requirements in sections 190 and 192 of the Environmental Planning and Assessment Regulation 2021.
Key Issues	The EIS must include an assessment of all potential impacts of the proposed development on the existing environment (including cumulative impacts if necessary) and develop appropriate measures to avoid, minimise, mitigate and/or manage these potential impacts. As part of the EIS assessment, the following matters must also be addressed: • **strategic and statutory context** – including: – a detailed justification for the proposal and suitability of the site for the development – a demonstration that the proposal is consistent with all relevant planning strategies, environmental planning instruments, development control plans (DCPs), or justification for any inconsistencies – a list of any approvals that must be obtained under any other Act or law before the development may lawfully be carried out. • **suitability of the site** – including: – a detailed justification that the site can accommodate the proposed receival capacity, having regard to the scope of the operations and its environmental impacts and relevant mitigation measures – plans depicting the proposed layout, including the location of machinery, equipment and stockpiles. • **waste management** – including: – details of the type, quantity and classification of waste to be received at the site – details of the resource outputs and any additional processes for residual waste – details of waste handling including, transport, identification, receipt, stockpiling and quality control – the measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the *NSW Waste Avoidance and Sustainable Materials Strategy 2041*.

- **hazards and risk** – including:
  - a preliminary risk screening completed in accordance with State Environmental Planning Policy (Resilience and Hazards) 2021, Chapter 3 and Applying SEPP 33 (DoP, 2011), with a clear indication of class, quantity and location of all dangerous goods and hazardous materials associated with the development. Should preliminary screening indicate that the project is "potentially hazardous" a Preliminary Hazard Analysis (PHA) must be prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011).

- **air quality and odour** – including:
  - a description of all potential sources of air and odour emissions during construction and operation
  - an air quality impact assessment in accordance with relevant Environment Protection Authority guidelines
  - a description and appraisal of air quality impact mitigation and monitoring measures.

- **fire and incident management** – including:
  - details of the size and volume of stockpiles and their arrangements to minimise fire spread and facilitate emergency vehicle access
  - the measures that would be implemented to ensure that the proposed development is consistent with the aims, objectives and guidelines in the NSW Fire and Rescue guideline *Fire Safety in Waste Facilities dated 27 February 2020*.

- **soil and water** – including:
  - a description of local soils, topography, drainage and landscapes
  - details of water usage for the proposal including existing and proposed water licencing requirements in accordance with the *Water Act 1912* and/or the *Water Management Act 2000*
  - details of sediment and erosion controls
  - a detailed site water balance
  - an assessment of potential impacts on the quality and quantity of surface and groundwater resources
  - details of the proposed stormwater and wastewater management systems (including sewage), water monitoring program and other measures to mitigate surface and groundwater impacts
  - characterisation of the nature and extent of any contamination on the site and surrounding area including an assessment against the provisions of State Environmental Planning Policy (Resilience and Hazards) 2021, Chapter 4
  - a description and appraisal of impact mitigation and monitoring measures.

- **biodiversity** – including:
  - accurate predictions of any vegetation clearing on site or for any road upgrades
  - a detailed assessment of the potential impacts on any threatened species, populations, endangered ecological communities or their habitats, groundwater dependent ecosystems and any potential for offset requirements
  - details of weed management during construction and operation in accordance with existing State, regional or local weed management plans

	or strategies – a detailed description of the measures to avoid, minimise, mitigate and/or offset biodiversity impacts. • **noise and vibration** – including: – a description of all potential noise and vibration sources during construction and operation, including road traffic noise – a noise and vibration assessment in accordance with the relevant Environment Protection Authority guidelines – a description and appraisal of noise and vibration mitigation and monitoring measures. • **traffic and transport** – including: – details of road transport routes and access to the site – road traffic predictions for the development during construction and operation – swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site – an assessment of impacts to the safety and function of the road network and the details of any road upgrades required for the development. • **visual** – including an impact assessment at private receptors and public vantage points. • **heritage** – including an assessment of Aboriginal and non-Aboriginal cultural heritage.
Environmental Planning Instruments and other policies	The EIS must assess the proposal against the relevant environmental planning instruments, including but not limited to: • State Environmental Planning Policy (Transport and Infrastructure) 2021 (Chapter 2) • State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Chapter 2) • State Environmental Planning Policy (Resilience and Hazards) 2021 (Chapters 3 and 4) • Jerilderie Local Environmental Plan 2012 • relevant development control plans and section 7.11 plans.
Guidelines	During the preparation of the EIS you should consult the Department's Register of Development Assessment Guidelines which is available on the Department's website at https://www.planning.nsw.gov.au/Assess-and-Regulate/Development-Assessment/Industries. Whilst not exhaustive, this Register contains some of the guidelines, policies, and plans that must be taken into account in the environmental assessment of the proposed development.
Consultation	During the preparation of the EIS, you must consult the relevant local, State and Commonwealth government authorities, service providers and community groups, and address any issues they may raise in the EIS. In particular, you should consult with the: • Environment Protection Authority • Transport for NSW • Griffith Local Aboriginal Land Council • Murrumbidgee Council • the surrounding landowners and occupiers that are likely to be impacted by the proposal. Details of the consultation carried out and issues raised must be included in the EIS.

Further consultation after 2 years	If you do not lodge an application under Section 4.12(8) of the *Environmental Planning and Assessment Act 1979* within 2 years of the issue date of these SEARs, you must consult with the Planning Secretary in relation to any further requirements for lodgement.

DOC22/66073-1
11 February 2022

Ms Kathryn Moreira
Planning Officer
Industry Assessments
Department of Planning and Environment
Locked Bag 5022
PARRAMATTA NSW 2124

Email: kathryn.moreira@dpie.nsw.gov.au

Dear Ms Moreira,

Re SEAR 1648

I refer to the request for the NSW Environment Protection Authority (EPA) requirements for the Secretary's Environmental Assessment Requirements (SEARS) for the proposed Composting Facility to be located at 1578 Cadell Road Gala Vale NSW (Lots 100 and 106, DP756459).

The EPA understands the proposal is for a composting development to process up to 99,000 tonnes per annum of organic material and will include the establishment of compost pads, construction of a water/leachate recycling dam, drainage structures, water storage tanks, construction of a shed and pelletising equipment, internal roads and an amenities, office and workshop building.

The EPA has considered the details of the proposal as provided by the Department of Planning and Environment (DPE) and has identified the information it required to issue its General Terms of Approval in Attachment A. The EPA's key information requirements for the project includes the following:

- Details of the potential air quality and odour impacts, including cumulative impacts and mitigation measures to minimise these impacts; and
- Details on water and waste management including controls to manage any runoff from the premises.

In carrying out the environmental assessment the guidelines identified at Attachment B should be referred to along with any relevant industry codes of practice and best management guidelines.

The proponant should be made aware that any commitments made in the environmental assessment may be formalised as approval conditions and may also be placed as formal licence conditions.

The EPA has responsibilities for the regulation of scheduled activities under the *Protection of the Environment Operations Act 1997* (the Act). Based on the information provided to us this activity is scheduled under the Act and the applicant will require an Environment Protection Licence (EPL) to carry out scheduled activities. The applicant will need to make a separate application to the EPA to obtain this licence if planning consent is granted.

If you have any queries regarding this matter, please contact me on 02 6983 4931.

Yours sincerely

JESSICA CREED
Regional Manager - Regulatory Operations Regional
NSW Environment Protection Authority

ATTACHMENT A

Environmental Impacts of the Project

The Environmental Impact Statement (EIS) must address the requirements of Section 45 of the *Protection of the Environment Operations Act 1997* (POEO Act) by determining the extent of each impact and providing sufficient information to enable the EPA to determine appropriate conditions, limits and monitoring requirements for an Environment Protection Licence (EPL).

1. The following potential environmental impacts of the project need to be assessed, quantified and reported on.

   - Air
   - Noise
   - Water
   - Land
   - Waste and chemicals.

   The EIS should address how the required environmental goals will be met for each potential impact.

2. Describe the management strategies for the treatment and processing of all wastes proposed to be received at the facility.

3. Describe the mitigation and management options that will be used to prevent, control, abate or mitigate identified potential environmental impacts associated with the project and to reduce risks to human health and prevent the degradation of the environment.

   This should include an assessment of the effectiveness and reliability of the measures and any residual impacts after these measures are implemented.

The EIS must also take into consideration cumulative impacts of the proposed activity with those activities existing within the area.

Air Quality Impacts

The goals of the proposed development in relation to air quality should be to ensure sensitive receptors are protected from adverse impacts from odour and dust.

Details would need to be provided on the proposed measures to manage odour and dust from all sources. Measures to prevent or control the emission of odour from the premises must be detailed based on the outcome of an air quality impact assessment undertaken in accordance with the *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in New South Wales* (DECC, 2005) as appropriate. All potentially impacted residential or sensitive premises likely to be impacted by the development must be identified and included in the assessment.

The EIS should identify any other existing impacts on air quality within the area and if necessary, provide an assessment and commentary on the predicted cumulative impacts that may arise.

Emissions from any plant must meet the design criteria detailed in the Protection of the Environment Operations (Clean Air) Regulation 2010. Details need to be provided on the proposed air pollution control techniques from any air emission points, including proposed measures to manage and monitor efficiency and performance.

Noise Impacts

The goal of the project should include design, construction, operation and maintenance of the facility in accordance with relevant EPA policy, guidelines and criteria, and in order to minimise potential impacts from noise.

The EPA expects that potential noise sources are assessed in accordance with the *Noise Policy for Industry* (EPA 2017), and where required mitigation measures are proposed (eg appropriate equipment chosen to minimise noise levels). All residential or noise sensitive premises likely to be impacted by the development must be identified and included in the assessment.

The proposed development may result in an increase in traffic movements. The number of traffic movements associated with the proposal should be quantified and the potential noise impacts associated with these traffic movements need to be assessed in accordance with the *NSW Road Noise Policy* (DECCW, 2011).

Surface and Groundwater Impacts

The goal of the project should include the following.

- No pollution of waters (including surface and groundwater), except to the extent authorised by EPA (ie in accordance with an Environment Protection Licence);
- Polluted water (including effluent, process waters, wash down waters, polluted stormwater or sewage) is captured on the site and collected, treated and beneficially reused, where this is safe and practicable to do so; and
- It is acceptable in terms of the achievement or protection of the River Flow Objectives and Water Quality Objectives.

The EIS should document the measures that will achieve the above goals.

Details of the site drainage and any natural or artificial waters within or adjacent to the development must be identified and, where applicable, include details of measures proposed to mitigate potential impacts of the development on these waters.

The EIS must include a water balance for the development including water requirements (quantity, quality and source(s)) and proposed storm and wastewater disposal, including type, volumes, proposed treatment and management methods and re-use options.

If the proposed development intends to discharge waters to the environment, the EIS must demonstrate how the discharge(s) will be managed in terms of water quantity, quality and frequency of discharge and include an impact assessment of the discharge on the receiving environment. This should include:

- Description of the proposal including position of any intakes and discharges, volumes, water quality and frequency of all water discharges.

- Description of the receiving waters including upstream and downstream water quality as well as any other water users.

- Demonstration that all practical options to avoid discharge have been implemented and environmental impact minimised where discharge is necessary.

The EIS should provide details of any water management systems for the site to ensure surface and ground waters are protected from contaminants.

The EIS must refer to Water Quality Objectives for the receiving waters and indicators and associated trigger values or criteria for the identified environmental values of the receiving environment. This information should be sourced from the ANZECC (2018) Guidelines for Fresh and Marine Water Quality, available at: https://www.waterquality.gov.au/anz-guidelines

The EIS must describe how stormwater will be managed in all phases of the project, including details of how stormwater and runoff will be managed to minimise pollution. Information should include measures to be implemented to minimise erosion, leachate and sediment mobilisation at the site. The EIS should consider the guidelines *Managing urban stormwater: soils and construction,* vol. 1 (Landcom 2004) and vol. 2 (A. Installation of services; C. Unsealed roads; D. Main Roads; E. Mines and quarries) (DECC, 2008).

The EIS must describe any water quality monitoring programs to be carried out at the project site. Water quality monitoring should be undertaken in accordance with the *Approved Methods for the Sampling and Analysis of Water Pollutant in NSW* (2004) which is available at: https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/water/approvedmethods-water.pdf

Potential impacts on land

The goals of the proposed development should include the following:

- No pollution of land, except to the extent authorised by EPA (i.e., in accordance with an Environment Protection Licence); and
- The potential impact of land erosion from the development is mitigated.

The SEE should document the measures that will achieve the above goals.

Waste

The EIS must assess all aspects of waste generation, management and disposal associated with the proposed development. The EIS should include the following:

- Demonstrate waste management is in accordance with the principles of the waste hierarchy and cleaner production;
- Where potential impacts associated with the handling, processing and storage of all waste materials generated at the premises are identified, these be satisfactorily mitigated;
- The beneficial reuse of all wastes generated at the premises are maximised where it is safe and practical to do so; and
- No waste disposal occurs on site except in accordance with an Environment Protection Licence.

The EIS needs to identify the proposed type, quantity and location of wastes to be stored and/or processed at the site. Spill management measures, including items such as bunding, and emergency procedures should be clearly outlined.

The EIS must identify, characterise and classify the following in accordance with the EPA's *Waste Classification Guidelines (2014)* and associated addendums:

- all waste that will be generated onsite through excavation, demolition or construction activities, including proposed quantities of the waste;
- all waste that is proposed to be disposed of to an offsite location, including proposed quantities of the waste and the disposal locations for the waste. This includes waste that is intended for re-use or recycling.

The EIS must outline contingency plans for any event that may result in environmental harm, such as excessive stockpiling of material, or dirty water volumes exceeding the storage capacity available on-site.

Monitoring

The EIS must outline the proposed monitoring regime to be implemented in relation to the following potential impacts, where relevant:

- Surface water quality monitoring;
- Groundwater quality monitoring;
- Effluent and soil quality monitoring.

ATTACHMENT B

Title	Web address
Relevant Legislation	
Environmental Planning and Assessment Act 1979	https://www.legislation.nsw.gov.au/#/view/act/1979/203
Protection of the Environment Operations Act 1997	https://www.legislation.nsw.gov.au/#/view/act/1997/156/full
Licensing	
Guide to Licensing	http://www.epa.nsw.gov.au/licensing/licenceguide.htm
Air Issues	
POEO (Clean Air) Regulation 2010	https://www.legislation.nsw.gov.au/#/view/regulation/2010/428/historical2016-11-01/full
Approved methods for modelling and assessment of air pollutants in NSW (2016)	http://www.environment.nsw.gov.au/resources/air/ammodelling05361.pdf
Assessment and management of odour from stationary sources in NSW (DEC, 2006)	Technical framework: https://www.environment.nsw.gov.au/resources/air/20060440framework.pdf Technical notes: https://www.environment.nsw.gov.au/resources/air/20060441notes.pdf
Noise and Vibration	
Interim Construction Noise Guidelines (EPA, 2017)	https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/interim-construction-noise-guideline
Noise Policy for Industry (EPA, 2017)	https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noise-policy-for-industry-(2017)
NSW Road Noise Policy (EPA, 2011)	https://www.epa.nsw.gov.au/publications/noise/2011236-nsw-road-noise-policy
Assessing Vibration: a technical guideline (DEC 2006)	https://www.epa.nsw.gov.au/noise/vibrationguide.htm
Australian and New Zealand Environment Council: Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration (ANZECC 1990)	https://www.epa.nsw.gov.au/resources/noise/ANZECBlasting.pdf

Soils	
Managing Urban Stormwater: Soils and Construction (Landcom, 2004)	https://www.environment.nsw.gov.au/stormwater/publications.htm
Environmental Guidelines: Composting and Related Organics Processing Facilities (DEC 2004)	https://www.environment.nsw.gov.au/resources/waste/envguidlns/composting_guidelines.pdf
Waste	
Waste Classification Guidelines (EPA, 2014)	https://www.epa.nsw.gov.au/your-environment/waste/classifying-waste/waste-classification-guidelines
Protection of the Environment Operations (Waste) Regulation 2014	https://www.legislation.nsw.gov.au/regulations/2014-666.pdf
Environmental Guidelines: Solid Waste Landfills, Second edition (EPA, 2016)	https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/waste/solid-waste-landfill-guidelines-160259.ashx
Water	
Water Quality Objectives	http://www.environment.nsw.gov.au/ieo/index.htm
National Water Quality Management Strategy: Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ, 2000)	http://www.waterquality.gov.au/anz-guidelines/Documents/ANZECC-ARMCANZ-2000-guidelines-vol2.pdf
National Water Quality Management Strategy: Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000)	http://www.waterquality.gov.au/anz-guidelines/Documents/ANZECC-ARMCANZ-monitoring-reporting.pdf
Using the ANZECC Guidelines and Water Quality Objectives in NSW (EPA, 2006)	https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/water/anzeccandwqos06290.pdf
Environmental Guidelines: Storage and Handling of Liquids (EPA, 2007)	https://www.epa.nsw.gov.au/licensing-and-regulation/licensing/environment-protection-licences/compliance-audit-program/chemical-storage-handling-and-spill-management/storing-and-handling-liquids-trainers-manual
The NSW State Groundwater Policy Framework Document (DLWC, 1997)	http://www.water.nsw.gov.au/__data/assets/pdf_file/0008/547550/avail_ground_nsw_state_groundwater_policy_framework_document.pdf
The NSW State Groundwater Quality Protection Policy (DLWC, 1998)	http://www.water.nsw.gov.au/__data/assets/pdf_file/0006/548286/nsw_state_groundwater_quality_policy.pdf
National Water Quality Management Strategy Guidelines for Groundwater Protection in Australia (ARMCANZ/ANZECC, 1995)	https://www.water.wa.gov.au/__data/assets/pdf_file/0020/4925/8728.pdf

Our ref: STH22/00042
Contact: Cam O'Kane

18 February 2022

Department of Planning, Industry & Environment
By Email: information@planning.nsw.gov.au

Attention: Kathryn Moreira

REQUEST FOR ADVICE - SEAR 1648 – 1578 CADELL ROAD, GALA VALE - COMPOSTING FACILITY

Transport for NSW (TfNSW) refers to your correspondence dated 31 January 2022 requesting advice on the Planning Secretary's Environmental Assessment Requirements for proposed Composting Facility.

TfNSW is interested in the characteristics of the traffic generated by the development and the potential impact of the development on the safety and efficiency of the road network, particularly the interaction of the development with the classified state road network. The relevant state classified road in this location is the Kidman Way.

TfNSW notes the following:

- TfNSW input and requirement for the EIS is requested under Schedule 2 of the Environmental Planning and Assessment Regulation 2000;
- The proposal involves the establishment of a composting facility and construction of infrastructure to pelletise the material. Initially the facility would compost 5,000 tonnes of organic material per year;
- The development proposes access to Kidman Way via Cadell Road. The proposed development is anticipated to generate a total of 10 truck movements per day;
- TfNSW concurrence under Section 138 of the Roads Act, 1993 is required for any road upgrades to the State road network required to mitigate the impacts of the proposed development.

TfNSW requires the following issues to be addressed as part of the Environmental Impact Statement (EIS):

- A traffic impact assessment (TIA) is required. The detail required in the TIA is governed by the traffic generation and potential impact of the expanded development on the road network. Note that as the development is additional to existing operations on the site the cumulative traffic generation of all the operations are to be taken into consideration,
- For guidance in the preparation of the TIA the applicant is referred to the Austroads publications, particularly the Austroads Guide to Traffic Management Part 12: Traffic Impacts of Development and Part 3: Traffic Studies and Analysis, and the "Guide to Traffic Generating Developments" prepared by the former RTA and similar documentation. As a guide Table 2.1 of the RTA Guide to Traffic Generating Developments outlines the key issues that may be considered in preparing a TIA.;
- The TIS needs to include the type of vehicles accessing the site, the likely daily and peak hour movements in and out of the site (including staff movements), the likely distribution of these movements (i.e. which direction they are coming from/going to) and the expected duration of the construction/operation (and associated traffic movements);
- An assessment of the predicted impacts of this traffic on road safety and the capacity of the road network. This is to include the identification and consideration of approved and proposed developments/planning proposals/road upgrades in the vicinity; and

- Where the development has an impact on the performance of an intersection on the state road network, an appropriate junction upgrade may need to be provided.
- Should it be identified as part of preparing the EIS or during assessment of the application that mitigation measures are required that will impact a state/classified road then a concept design for the proposed works will need to be prepared and submitted. This is required to clarify the scope of works, demonstrate the works can be constructed within the road reserve and allow the consent authority to consider any environmental impacts of the works as part of their assessment.
- The concept design submitted must include, but not be limited to, legal property boundaries (including the existing road reserve boundaries based on survey), existing and proposed lane configurations and lane widths at a number of locations along the length of the proposed works, concept drainage detail, etc. The design provided, should be based on a design speed which is 10km/h over the posted speed limit and should demonstrate compliance with the applicable requirements in Austroads Guide to Road Design and any relevant TfNSW supplements.

If you have any questions please contact the writer.

Please ensure that any further email correspondence is sent to development.south@transport.nsw.gov.au

Yours faithfully

Cam O'Kane
Case Officer, Development Services South